SIEMENS

DRIVEPAC

Anti-Sway Control for Cranes

Operating Instructions **Edition 10.2002**

for T400 Technology Module

in SIMOVERT MASTER DRIVES 6SE70/71
and SIMOREG DC-MASTER 6RA70

Bestell-Nr. / Order-No. 6GA7100-3BA76

A CD-ROM containing the following is included with these Operating Instructions:

- The commissioning and service program DriveMonitor for parameterizing the T400. The DriveMonitor included with the basic unit can also be used.
- DriveMonitor files to support the configuring, engineering and commissioning. These files can also be downloaded from the Intranet or Internet.
- Operating Instructions, German and English in Acrobat reader format (*.pdf) The Operating Instructions can also be downloaded from the Intranet.

Exclusion of liability

We have checked the contents of this Document to ensure that they coincide with the described hardware and software. However, deviations cannot be completely ruled-out, so we cannot guarantee complete conformance. However, the information in this document is regularly checked and the necessary corrections included in subsequent editions. We are thankful for any recommendations or suggestions.

We reserve the right to make technical changes

Order No.: 6GA7100-3BA76
Printed in the Federal Republic of Germany

Contents

Note

The information in this manual does not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, please contact your local Siemens office.

Further, the contents of this manual shall neither become a part of nor modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties nor modify the existing warranty.

Safety information

0

0.1 Definitions, warning information

Qualified personnel

For the purpose of this Instruction Manual and product labels, a "Qualified person" is someone who is familiar with the installation, mounting, start-up and operation of the equipment and the hazards involved.
He or she must have the following qualifications:

1) Trained and authorised to energise, de-energise, clear, ground and tag circuits and equipment in accordance with established safety procedures.
2) Trained in the proper care and use of protective equipment in accordance with established safety procedures.
3) Trained in rendering first aid.

Danger

DANGER
means that death, grievous injury or extensive damage to property **will** occur if the appropriate precautions are not taken.

Warning

WARNING
means that death, grievous injury or extensive damage to property **may** occur if the appropriate precautions are not taken.

Caution

CAUTION
with warning triangle, means that minor personal injury may occur if the appropriate precautions are not taken.

CAUTION
without warning triangle, means that damage to property may occur if the appropriate precautions are not taken.

Notice

NOTICE

means that an undesirable situation or condition can occur if the appropriate information/instruction is not observed

Note

NOTE

highlights an important item of information about the product or a section of the instructions which requires careful attention.

WARNING

Electrical equipment contains components which are at dangerous voltage levels.

If these instructions are not strictly adhered to, this can result in severe bodily injury and material damage.

Only appropriately qualified personnel may work on this equipment or in its vicinity.

This personnel must be completely knowledgeable about all the warnings and service measures according to this Instruction Manual.

The successful and safe operation of this equipment is dependent on proper handling, installation, operation and maintenance.

Domestic safety guidelines and regulations must be carefully observed.

0.2 Safety and application information

DANGER

These electrical motors are designed for use in industrial power systems. While in operation, the equipment has live, uninsulated parts as well as rotating parts. There is consequently a risk of severe personal injury or substantial damage to property, for example, if the necessary covers are removed without authorisation or if the equipment is handled improperly, operated incorrectly or maintained inadequately.

If the motors are used outside industrial areas, the installation site must be safeguarded against unauthorised access by means of suitable protection facilities (e.g. fencing) and appropriate warning signs.

The persons responsible for the safety of the system are under an obligation to ensure that

- The basic planning work for the system and all work relating to transportation, assembly, installation, commissioning, maintenance and repairs are carried out by qualified persons and checked by responsible, suitably skilled persons.
- These instructions and the motor documentation are made available at all times while work is in progress.
- The technical data and specifications relating to the permissible installation, connection, ambient and operating conditions are taken into account at all times.
- The system-specific erection and safety regulations are observed and personal protective gear is used.
- Work on these machines, or in the vicinity of these machines, by unqualified persons is prohibited.

These instructions therefore only contain the information which is necessary for the motors to be used by qualified personnel in accordance with their intended purpose.

The instructions and the motor documentation are available in the languages specified in the supply contracts.

NOTE

We recommend engaging the support and services of your local SIEMENS Service Center for all planning, installation, commissioning and maintenance work.

0.3 Electromagnetic compatibility

When used in accordance with their intended purpose and operated in an electrical supply system with characteristics to EN 50 160, the motors comply with the requirements of the EC Directive concerning electromagnetic compatibility 89/336/EWG.

NOTE

Where the torque is uneven (the drive of a piston-type compressor, for example), the inevitable result is a non-sinusoidal motor current, whose harmonics can lead to excessive system perturbation and thus excessive emitted interference via the connecting cables.

■

Overview

1

1.1 Software and software version, hardware prerequisites

This Manual describes Version 1.0 of the standard DRIVEPAC application software for anti sway control for cranes.

With the exception of the expanded functionality, described in Section 8 "Changes", this standard application software is compatible to previous versions. This means that generally it can be used instead of an older version.
The DRIVEPAC standard application software can only run on the T400.

The following basic units and supplementary modules have been released for use with DRIVEPAC:

Table 1-1 Basic units and supplementary modules which have been released for DRIVEPAC

Basic unit	Supplementary modules which have been released	Order No.
MASTERDRIVES Vector Control SW Version ≥ 3.0	- terminal expansion EB1 - SIMOLINK interface SLB - PROFIBUS interface CBP2	6SE70...
MASTERDRIVES Motion Control SW Version ≥ 1.1	- terminal expansion EB1 - SIMOLINK interface SLB - PROFIBUS interface CBP2	6SE70...
SIMOREG DC-MASTER SW Version ≥ 1.3	- terminal expansion CUD2 - terminal expansion EB1 - PROFIBUS interface CBP2	6RA70...

1.2 Guidelines to use these Operating Instructions

Section	Subject	Notes
1	Overview and application information for the DRIVEPAC anti sway control	
2	Brief description of the T400 technology module	
3	Function charts and function description	The function chart represents the complete DRIVEPAC application software. It includes all of the technology parameters Hxxx, dxxx, Lxxx, cxxx; this is the reason that the function charts are an important support tool when configuring/engineering and commissioning the system.
4	Parameter list	List of all of the technology parameters
5	Connector list	List of the signals which can be freely interconnected
6	Commissioning	Procedure when setting the parameters. When commissioning the basic units, the associated Operating Instructions should be used.
7	Essential drive structures and circuit examples	This section describes concepts and circuit examples. This provides a fast entry into anti sway control
8	Changes	Comments to the changes and the various software versions
A1	DriveMonitor lists which can be downloaded	
A2	Interface specifications	

1.3 General information

The T400 technology module, which is installed as supplementary module in 6SE70 drive converters and 6RA70 rectifiers, allows the drive functionality to be expanded.

The T400 can be freely programmed using the STEP7, CFC and D7-SYS tools. It also has various interfaces for communications with the peripherals and the basic unit processor (CUVC, CUMC, CUD1).

- In this standard application software, the T400 is already configured which also means that the specified tools are not required. DriveMonitor is used for parameterization, i.e. to adapt the system to the crane application.

The CBP2 supplementary module allows a PROFIBUS coupling to be established to an automation system. A fast communications link to other MASTER DRIVES drive units can be established using the supplementary module SLB (SIMOLINK bus).

1.4 Ordering information

An overview of the components which are necessary to operate the SIMOVERT MASTERDRIVES VC, MC or SIMOREG DC-MASTER 6RA70 with the T400 technology module using the "DRIVEPAC" program is provided in the following table.

Table 1-2 DRIVEPAC components

Product	**Order No.**
T400 technology module with the DRIVEPAC standard application software, anti sway control for cranes, with brief instructions for the T400 technology module **without** Operating Instructions for the standard DRIVEPAC application software. Weight, 0.4 kg	6GA7100-3DP00 *)
German Operating Instructions for the standard DRIVEPAC application software package, anti sway control for cranes with CD ROM.	6GA7100-3BA00 **)
English Operating Instructions for the standard DRIVEPAC application software package, anti sway control for cranes with CD ROM.	6GA7100-3BA76 **)
Standard DRIVEPAC application software as source code on CD ROM, all versions	6GA7100-3CD00 ***)
Camera system to directly sense the pendulum angle	6GA7100-1KE00 ****)
Reflector for the camera system	6GA7100-1RV00 ****)

*) 1x required for each crane. The T400 can simultaneously process the two axes (traversing gear, trolley) as well as the hoisting gear of a crane.

**) The CD ROM is only supplied together with the Operating Instructions/Manual. At least one set of these Operating Instructions must be ordered for each system.

***) This CD ROM is only required if the standard DRIVEPAC application software must be adapted to special applications. This means that this CD is not required for all of the users whose applications can be covered using the standard software package!

****) We urgently recommend that the specialist department A&D MC PM2, Cranes in Erlangen (Gerätewerk) is consulted before the camera sensor system is used. This sensor system is not required for standard applications!

Components which are additionally required

Please refer to Section 7 "Essential drive structures and circuit examples" to determine which of the following components are required and the unit quantity.

Table 1-3 Additional DRIVEPAC components

Product	Order No.
Local bus adapter LBA	6SE7090-0XX84-4HA0
Adapter module ADB	6SE7090-0XX84-0KA0
Terminal expansion EB1	6SE7090-0XX84-0KB0
SIMOLINK interface SLB	6SE7090-0XX84-0FJ0
PROFIBUS DP interface CBP2	6SE7090-0XX84-0FF0
Terminal expansion CUD2	6RX1700-0AK01
Technological software in the 6RA70 basic unit "Free function blocks"	6RX1700-0AS00

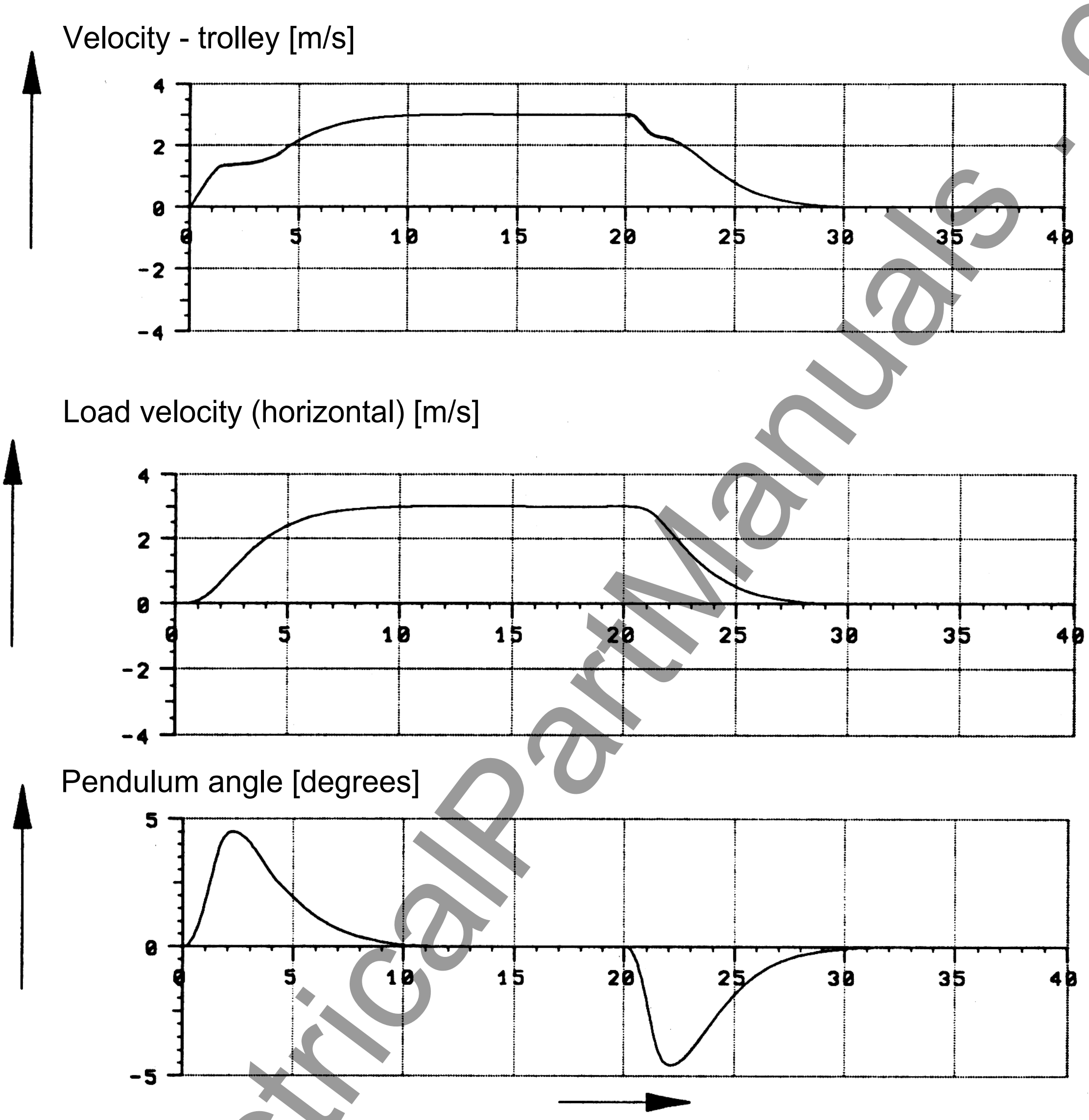
1.5 Applications and features of DRIVEPAC

The standard DRIVEPAC application software is an anti sway control software for cranes, which are equipped with a traversing gear or a trolley or a traversing gear and a trolley.

The anti sway control is applied to suspended loads using an algorithm which is saved in the T400.

The basic difference between a conventional crane, which does not have DRIVEPAC and a crane which is equipped with DRIVEPAC is that in the first case, the crane operator enters a velocity setpoint for the traversing gear drives (trolley / trolley and traversing gear), and in the case of DRIVEPAC, the crane operator enters a velocity setpoint for the load. This correspondingly applies for the automatic mode.

This is achieved by calculating a suitable speed setpoint. A typical characteristic of such a speed setpoint is illustrated in Fig. 1-1.


Velocity - trolley [m/s]

Load velocity (horizontal) [m/s]

Pendulum angle [degrees]

Fig. 1-1 Typical speed setpoint characteristic

The response of the trolley velocity, the load velocity and the pendulum angle for a step setpoint input is shown in the diagrams above.

When approaching the target, the trolley is first accelerated, then briefly decelerates and then again accelerated.

- The load velocity continually increases to the entered setpoint.

When approaching the target and stopping, a semi pendulum motion occurs. There is no residual pendulum motion after stopping.

A differentiation is made between the two following main operating modes:

- **Manual mode:**
  The crane operator operates the crane, for example using a master switch or remote control. The anti sway control almost suppresses the complete pendulum motion which is caused by the crane motion.
- **Positioning mode:**
  In addition to the manual mode, the crane can be automatically moved from one target to the other by entering a position reference value.

Equipment platform for the anti sway control

The application software runs on the T400 technology module. The application software and the T400 are marketed together as one product with its own Order No. [MLFB].

The standard application software is designed for operation via terminals (mainly when using the manual mode) or operation with a higher-level open-loop control / automation system via PROFIBUS DP (manual and automatic operation).

All of the signal inputs and outputs can be freely interconnected on the T400 by appropriately parameterizing them. This makes it significantly simpler to integrate DRIVEPAC into the overall crane system. The fact that the signals can be freely interconnected also allows signals to be mixed which are routed via terminals or via the bus.

A description is given on how the above functions are implemented in Section 7 "Essential drive structures and connection examples".

1.6 Functional scope

The functions, included in the module, include:

Signal input / output

- 5 analog inputs - which can be freely used
- 2 analog outputs - which can be freely used
- 10 digital inputs - which can be freely used
- 2 digital outputs - which can be freely used
- 2 bidirectional digital inputs/outputs which can be toggled between
- Serial interface for diagnostics with the SIMADYN D service / diagnostics program via PC/PG
- 2 pulse encoder sensing functions, which can be set / reset
- 2 absolute encoder sensing functions (SSI or EnDat interface)
- 10 words can be received and sent via PROFIBUS
- 16 words can be received and sent from/to the basic unit (CU) via dual Port Ram

Open-loop drive control

- Switch-on / switch-off control
- Traversing command evaluation
- Pre limit switch, limit switch evaluation
- Fault monitoring (pulse encoder, communications, anti-stall protection)

Speed setpoint conditioning including anti sway control

- Parameterizable anti sway control setting
- Toggling between traversing operation with or without anti sway control

Closed-loop position control

- Position controller, version 1 (single positioning controller)
- Position controller, version 2 (with position ramp-function generator with rounding-off)

Special functions

- Freely-definable T400 status word

Concepts of the T400 program

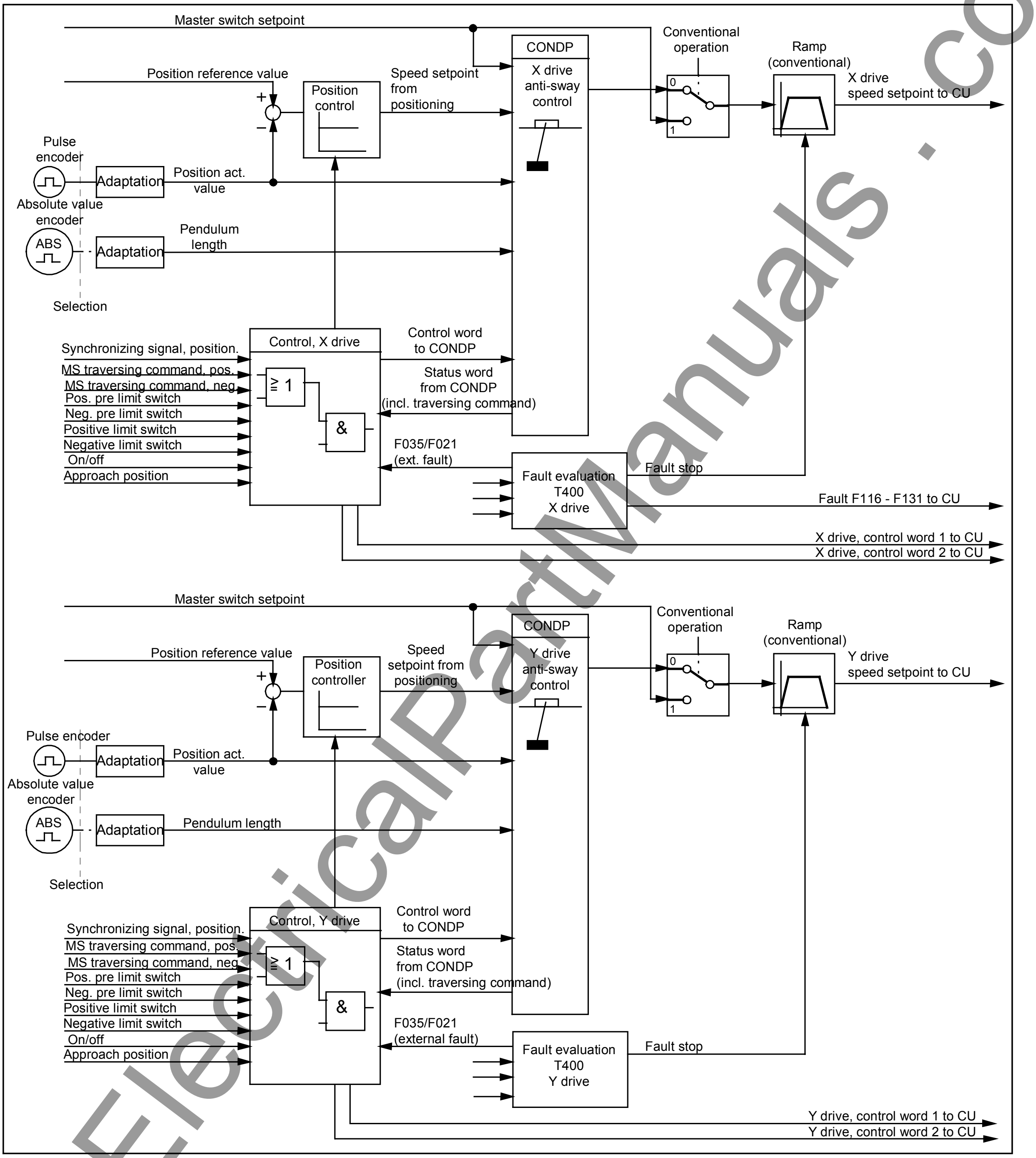


Fig. 1-2 Concept of the T400 program:

The main setpoint from the master switch, in anti-sway controlled operation (not conventional operation), is converted into a speed setpoint by the anti sway control. This speed setpoint is transferred to the basic unit.

The trolley is moved using this speed setpoint so that the load does not make any pendulum motion during traversing and when stopping.

The anti sway control requires the pendulum length and position actual value quantities.

It is not necessary to sense the pendulum angle, as a calculation model simulates the pendulum angle. The calculation model cannot compensate for pendulum motion caused by external effects, e.g. wind.

The pendulum length is determined from the hoisting height, which can be sensed using an absolute value generator.

The position actual value can be determined, e.g. by counting the pulses received from a pulse generator. It is not necessary to measure the position actual value if closed-loop position control is not required.

If closed-loop position control is used, the position actual value and position reference value are required. The position controller output supplies a speed setpoint, which is influenced by the anti sway control so that in this case the load does not manifest pendulum motion.

1.7 Faults and fault messages

1.7.1 Diagnostic LEDs

There are three diagnostic LEDs on the T400 technology module.

The red and yellow LED must always flash when the standard software package is operational. The green LED must additionally flash if a communications module (CBP2) is used.

Red LED

The red LED flashes if the software on the technology module is being processed.

If the red LED flashes in spite of the fact that the drive converter is powered-up, then one of the following faults can be available:

Fault cause	Remedy
Defective technology module / LED	Replace the module
Module incorrect or not completely inserted	Insert the module into the correct slot and screw into place
Defective LBA	Replace the LBA

Yellow LED

The yellow LED flashes if the technology module is communicating with the basic unit (CU).

If the red LED is flashing, but the yellow not, then one of the following faults may be present:

Fault cause	Remedy
Defective technology module (DPR) / LED	Replace the module
CUVC, CUMC: The basic unit does not recognize the T400.	CUVC, CUMC: Replace the T400 or CUVC, CUMC
Module incorrectly or not completely inserted	Insert the module into the right slot and screw into place

Green LED

Fault cause	Remedy
Technology module/LED or communications module failed	Replace the module
CUVC, CUMC: T400 has not recognized the CBP.	CUVC, CUMC: Replace T400 or CBP
T400 module either incorrectly or not completely inserted	Insert the module into the right slot and screw into place
Communications module incorrectly or not completely inserted	Insert the module into the right slot and screw into place

NOTE

The red LED must always flash if the technology module is OK.

1.7.2 Fault messages F116 – F131, F035 (F021)

The technology module transfers central T400 fault messages to the basic unit where they are displayed as faults F116 to F131 at the basic unit operator panel PMU.

Drive-specific faults (X, Y, Z drive) can also occur which generate fault F035 (for CUVC, CUMC) or F021 (for CUD1) in the particular basic unit.

Central T400 faults (F116 – F131) can only occur at the X drive as only the T400 is present here.

When faults F116 – F131 or F035 or F021 occur, the drive is powered-down just like the other basic unit faults.

Table 1-4 Central T400 fault

Fault No.	Designation	Cause / remedies / information
F116	Fault, communications CBP	Communications module incorrectly / not inserted. This fault also occurs if there is no communications interface to PROFIBUS DP. It must then be appropriately suppressed using parameter H008, refer below. No valid telegrams received, as possibly all of the bits in word 1 = 0. Remedy: One bit in word 1 must be "1". We recommend that bit 10 is always set to "1".
F117	Fault, communications CU	Communications with the basic unit faulted Instead of F117, F080 then appears. Note: Monitor T400 LEDs, refer to 1.7.1
F118	T400 - generated fault, X drive	F035 (for CUVC, CUMC) or F021 (for CUD1) are additionally displayed in the basic unit of the X drive, refer to fault word d390.
F119	T400 - generated fault, Y drive	F035 (for CUVC, CUMC) or F021 (for CUD1) are additionally displayed in the basic unit of the Y drive refer to fault word d790.
F120	T400 - generated fault, Z drive	F035 (for CUVC, CUMC) or F021 (for CUD1) are additionally displayed in the basic unit of the Z drive refer to fault word c390.
F122	Fault, pulse encoder 1	The sensing block for the pulse encoder connection 1 has detected a fault. Refer to Section 3.2.7 for the cause
F123	Fault, absolute encoder 1	The sensing block for the pulse encoder connection 1 has detected a fault. Refer to Section 3.2.8 for the cause
F127	Fault, pulse encoder 2	The sensing block for the pulse encoder connection 2 has detected a fault. Refer to Section 3.2.7 for the cause
F128	Fault, absolute encoder 2	The sensing block for the pulse encoder connection 2 has detected a fault. Refer to Section 3.2.8 for the cause

The central T400 fault word is displayed in parameter d010.

Faults F116 to F131 are activated by setting the particular bit of parameter H008 to "1". They are de-activated if the bit which is being viewed is set to "0". All of the bits are set to "1" in the factory setting.

The structure of H008 and d020 is shown in the following:

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
F131	F130	F129	F128	F127	F126	F125	F124	F123	F122	F121	F120	F119	F118	F117	F116

Example

The crane being considered does **not** have a coupling to PROFIBUS DP. This means that the bit for F116 must be set to "0".
1111 1111 1111 1110 = FFFE
If there is no PROFIBUS DP connection, H008 = FFFE.

Drive-specific T400 fault

If, when a drive-specific fault occurs, only the corresponding drive is to be powered-down, then parameter H008 must be appropriately parameterized.

Example

If the Y drive is faulted, then only this should be powered-down; the X drive and where relevant, the Z drive should continue to run which means that fault F119 should not be initiated:
Bit 3 in H008 must then be "0", i.e. H008 = FFF7, if all other faults are not suppressed.

Table 1-5 Drive-specific T400 faults

Bit in fault word d390, d790, c390	Significance	Cause, comments
Bit 0	Fault, checkback signal ON	The drive has not gone into the run condition within a parameterizable time although a power-on command is entered in T400. The basic unit parameterization should be checked!
Bit 1	Overspeed, positive	The actual drive speed has, for a positive direction of rotation, exceeded a parameterizable threshold.
Bit 2	Overspeed, negative	The actual drive speed has, for a negative direction of rotation, fallen below a parameterizable threshold.
Bit 3	Off after fault stop (only for X and Y drives)	If the absolute difference between the speed setpoint and speed actual value exceeds a parameterizable value, then the drive is initially brought to zero speed with a standard stop and then powered-down. This fault is then generated. The speed controller setting should be checked.
Bit 4	Drive blocked	The drive does not rotate in spite of a setpoint being entered and a torque being generated. The mechanical brake should be checked.

The drive-specific T400 fault words are displayed in the following technology parameters:
X drive: d390,
Y drive: d790,
Z drive: c390

The individual fault bits can be activated or de-activated using the subsequent masks:
X drive: H388,
Y drive: H788,
Z drive: L388

To suppress faults, refer above.

If they are no longer present, central or drive-specific T400 faults can be reset using the control bit "Fault acknowledgement" (e.g. also using the P button on the basic unit PMU).

1.8 Engineering information and instructions

Important engineering information and instructions are subsequently summarized.

1.8.1 Connecting control signals

The control signals are connected to the T400 as well as to the basic unit.

1.8.2 Digital inputs

All of the T400 digital inputs can be individually inverted. This means that it is possible to implement each input signal as either NC or NO contact.

1.8.3 Pulse encoders

Generally, the incremental track signals of the motor encoder of the X drive are fed to the T400 via the backplane bus.

If a second pulse encoder is to be mounted on the machine component to be positioned, then only this is directly connected to the T400.

1.8.4 Maximum cable lengths

The following values are rough guide values which have been identified from actual applications in the field. If values are required, which are above the limit values specified here, then the appropriate equipment/device documents and engineering information and instructions must be carefully observed. It is especially important to carefully observe EMC-correct design and cable routing.

SIMOVERT VC

The specified values refer to the 1PX8001-1 pulse encoder or the pulse encoder mounted onto the 1PA or 1PH motors.

Distance between the drive converter and motor : Less than 100 m for f_{max} = 120 kHz

CUMC

Resolver: Distance between the drive converter and motor : Less than 100 m for n_{max} = 3000 RPM

Encoder: Distance between the drive converter and motor : Less than 100 m for n_{max} = 3000 RPM

Information regarding encoders / resolvers:

- Only use the original manufacturer’s cable with the correct length.
- The encoder signals may not be connected via terminals.

1.8.5 Commissioning

Parameterization

Although the system can be parameterized using the unit operator panel (PMU) we do not recommend this due to the large number of basic unit and technology parameters.

We urgently recommend that the system is parameterized using the PC-based DriveMonitor.

The OP1S operator panel is mainly used if the parameter set, after commissioning, is to be saved and afterwards an identical drive is to be parameterized.

Basic / reserve setting

In practice it has been shown that it is practical to parameterize the basic unit so that after the BICO data set changeover or changeover between the basic and reserve setting, the drive can be moved without positioning. This is explained in more detail in Section 6.2.2.

1.8.6 Limit switch

The limit switch signals must be arranged so that they always supply a range signal up to the mechanical endstop. This can be achieved either using an appropriately long actuating lug or using a toggle switch, which supplies a constant one or zero signal depending on the direction that the drive moves past the switch.

1.8.7 Stopping the drive

When the drive converter fails as a result of a fault or power failure, the drive coasts down and can no longer be electrically braked down to standstill.

It is the responsibility of the operator of the crane system or plant that suitable safety measures are applied to avoid a hazardous operating condition.

This can be realized, for example, by mounting a suitable mechanical brake.

1.9 Establishing the factory setting

The EEPROM of the T400 can be erased, therefore establishing the initial factory setting, using parameter H998.

This means that all of the T400 parameters are reset to the original value.

The factory setting can be made if there is, for example, uncertainty about the parameterization.

Procedure:

- ♦ Set H998 to 165.
  Power-down the unit and power-up again. The factory setting only becomes effective after the unit has been powered-up again.
- ♦ Set H998 to 0.

NOTE

If the EEPROM is full, i.e. it is no longer possible to change parameters:

- Using the DriveMonitor program, the memory type should be changed from EEPROM to RAM (this selection is made in the main menu).
- Establish the factory setting as described above.
- In DriveMonitor, the EEPROM memory type should be re-selected.

1.10 Commissioning with DriveMonitor for Windows

1.10.1 Generating a database for the technology type

For each unit or technology module to be parameterized, DriveMonitor requires precise information about the number and properties (parameter numbers, limit values to be maintained, etc.) of the available parameters. This information is saved in files (database).

Possibility 1: Copying the database file from CD ROM

The database files for the DRIVEPAC technology type can be found on the CD ROM which is provided with the Operating Instructions.

The folder T400DPACD (German T400 parameter texts) and T400DPACE (English T400 parameter texts) should be copied from the CD in the following path: ...\DriveMonitor\System\Technology\

After the DriveMonitor program has been called, the technology type can be selected using the menu item File/New/Empty Parameter Set.

All of the technology parameters are now available to the DriveMonitor program.

Possibility 2: Generating new database files ("learn")

Prerequisites:

Communications must be established between the PC/laptop and the basic unit.

We recommend that the learning operation or generating the database is only made if the module is in the factory setting. The unit is in the factory setting when supplied from the plant. If in doubt, the factory setting should be re-established, refer to Section 1.9.

If the technology module is not set to the factory setting when learning, these functions do not refer to the factory setting but to the status of the technology module when generating the database!

Procedure to learn the database:

NOTE

If the database is to be generated with the English parameter texts, then initially parameter H000 should be set to 1 via the basic unit operator panel PMU. After this, the unit should be switched into the no-voltage condition and then powered-up again.

1. Disable all additional interfaces (Profibus), for example, by withdrawing the appropriate connectors.
2. Ensure that the T400 is in the factory setting, refer above. If the English parameter texts are required: Set H000 to 1 (refer above).

In the BUS CONFIGURATION menu:

3. If required carry-out File/New/Empty Parameter Set if a unit has still not been selected.
   Select the unit by clicking its particular line using the lefthand mouse key and establish the connection (click on the toolbar "Online/Offline"). This toolbar is green if communications to the unit have been established.
4. In the toolbar click on the "Generate Database", or select the menu command Parameter/Device Identification > Generate database ("learn").

5. You can see the bus address and type of the connected (basic) unit in the dialog box "Generate Database" under the tab "Technology Type". This allows you to check the bus address and type. In the drop down list field "Technology type name" enter the name of the technology type to be learnt (default name = TECHN000). A name already existing in the list cannot be entered.
   The H/d and also the L/c parameters must be learnt, this is the reason that both fields should be selected.
6. Then press the "Start" button to create the database.

The subsequent learning operation takes several minutes (approx. 20 min.). After it has been executed error-free, the new technology module type is in the dialog box under add unit or change unit for all units which have a slot for the technology module. Now interrupt the connection to the unit with the "Learnt technology type" and assign it to the new technology module type using the "Change unit" function.

NOTE

If the learning operation was completed with errors, you will find appropriate information in the dialog box, displayed during the learning process, under the "Details" button. Remove any access restrictions and re-start learning.

1.10.2 Parameterizing the T400

After the database was created, the T400 can then be parameterized using DriveMonitor. (additional details on using DriveMonitor can be taken from the DriveMonitor help file).

Complete parameter list

(All of the parameters are displayed, initially the basic unit parameters P/r then the technology parameters H/d, followed by the basic unit parameters U/n and finally the technology parameters L/c).

A parameter can be modified by double clicking on its line.

Free parameterization

The parameters are individually called by entering the parameter number (e.g.: H008 or d010 or 1008 or 1010)

A parameter can be modified by double clicking on its line.

Download

- Complete parameter sets are transferred (upread files, files created offline).

Upread

Complete parameter sets are read.

1.10.3 Important information

For the DRIVEPAC T400 module, the download file may only be a comparison file and not the complete parameter set, as otherwise the non-volatile parameter memory (EEPROM) overflows. DriveMonitor signals when the parameter memory is full - "Fault when writing".

Non-volatile parameter memory which has overflown:
This can be identified if parameters can no longer be written into.

Proceed as follows:

- Establish the factory settings, refer to Section 1.9.
- Create a comparison file.
- Then transfer this file as download file.

Procedure when creating a comparison file

1. The factory setting file T4DP0000.DNL must be available, either by copying it from the CD ROM or by an upread in the factory setting status.
2. After the necessary T400 technology parameters have been set during the commissioning phase, an upread must be made. The file name could be, e.g.: T4DP1234.DNL. This file contains all of the T400 parameters, also those, which do not deviate from the factory setting.
3. Then set the parameter set to offline under the menu item *View>offline*. Then open the upread file T4DP1234.DNL (typical name) under the menu item *File>open*. Free parameterization should be set beforehand under menu item *Parameter*.
4. Under the menu item *File>new>compare*, select the factory setting file T4DP0000.DNL.
5. Click on the menu button "List of all offline parameters", which is located to the outer right.
   All of the parameters are now displayed which, in file T4DP1234.DNL differ from file T4DP0000.DNL. These are the parameters which were changed during commissioning.
6. Now save this parameter data set under the menu item *File>Save under* as file (e.g. T4DPVGL1.DNL).
   This file is now available as download file if a new T400 with factory setting should receive this parameter set.

■

Technology module T400

2

The T400 technology module is a processor module which can be configured using CFC. This can be used to expand drives for sophisticated high dynamic performance open-loop and closed-loop control functions.

The T400 is inserted at slot 2 in an electronics box, equipped with a local bus adapter. The subsequent Fig. 2-1 shows the connection diagram of the T400.

More detailed information can be taken from the brief description of the T400 technology module. These Operating Instructions are provided with every T400.

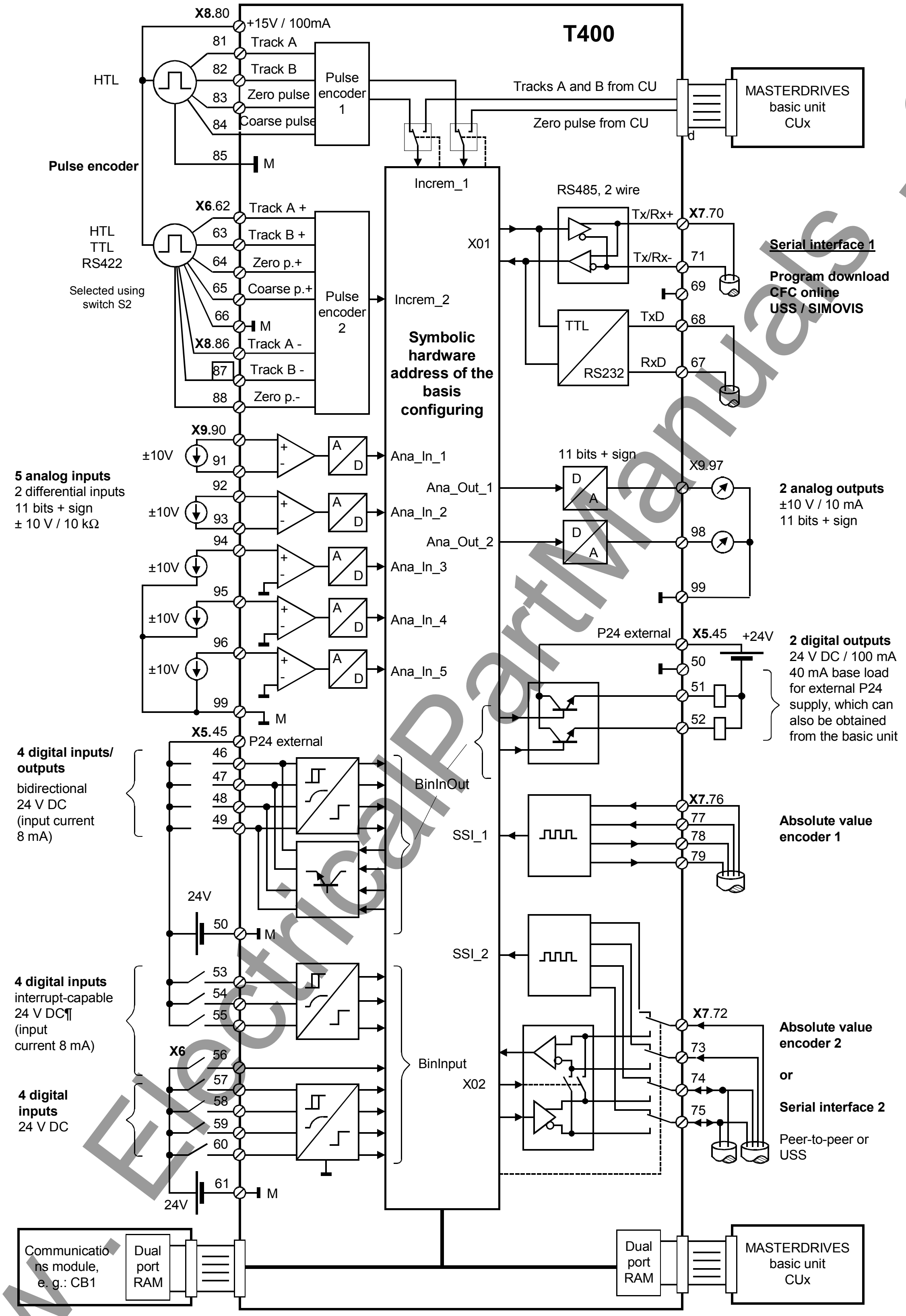


Fig. 2-1 Connections, T400 technology module

Comments regarding fault diagnostics

Refer to Section 1.7 "Faults and fault messages" and the "Brief description of the T400 technology module" for diagnostics and possible faults.

Information when replacing the T400

The new module with the standard DRIVEPAC application software is inserted in the electronics box. Using DriveMonitor, the technology parameters, which were previously read with upread, are downloaded into the new T400.
There must be a connection between the PC and the basic unit SST1.
Also refer to Section 1.10.

We recommend that the modified T400 parameters (and those of the basic unit) are saved in a file (on paper) so that when a fault occurs, the parameter set for the particular crane, are always available.

Before inserting the T400 **with** DRIVEPAC, its Order No. should be checked, refer to Section 1.4 "Ordering information".

■

Function description

3

General information

This section essentially describes the function charts.

The function charts are structured as follows:

- Section A: General parameter, signal inputs and outputs
- Section B: Open-loop control
- Section C: Speed setpoint conditioning, anti-sway control
- Section D: Closed-loop position control

Agreements and definitions

The following always applies in these Operating Instructions:

a) If the crane only has one traversing gear drive:
This drive is designated the X drive.

b) If the crane has two traversing drives:
The crane traversing gear is the X drive.
The trolley traversing gear is the Y drive.

c) If there is a hoisting gear, then this always has the designation Z drive.

- Function charts, which are applicable for the X drive, are called AX, BX, CX, DX.
- Function charts, which are applicable for the Y drive, are called AY, BY, CY, DY.
- Function charts, which are applicable for the Z drive, are called AZ, BZ, CZ, DZ.

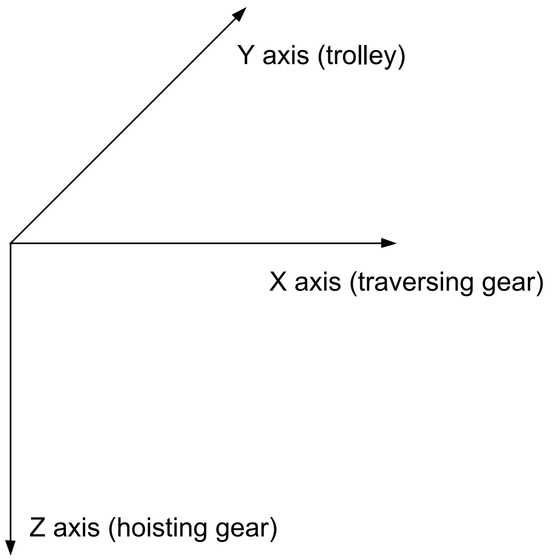


Fig. 3-1 Definition of the drive axes

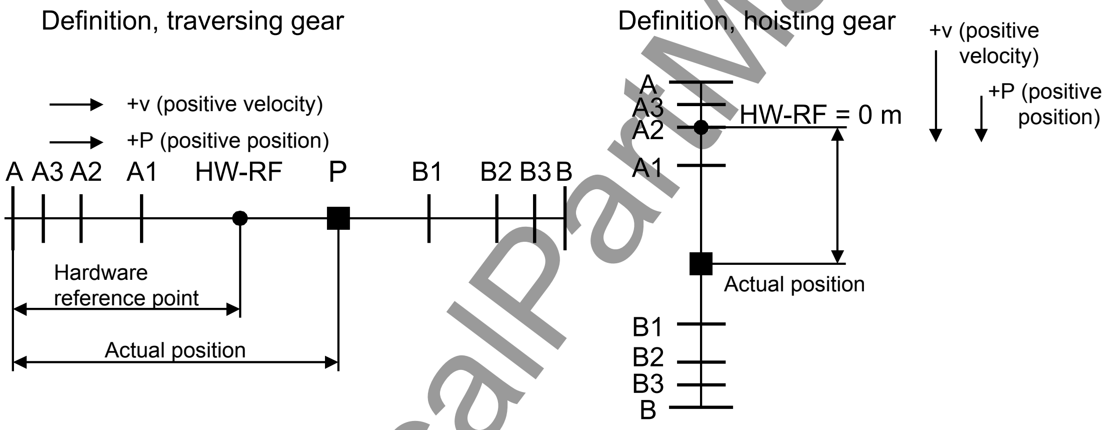


Fig. 3-2 Definition, linear axis

A: Mechanical starting position (negative direction), for the hoisting gear = at the top
B: Mechanical end position (positive direction), for the hoisting gear = at the bottom
A3: Negative emergency limit switch
B3: Positive emergency limit switch
A2: Negative (main) limit switch
B2: Positive (main) limit switch
A1: Negative pre-limit switch
B1: Negative pre-limit switch
P: Actual position
HW-RF: Hardware reference point
v: Traversing velocity

Value formats

The following, various data types occur in the T400 program:

Table 3-1 Data types of the T400 program

Type	Range	Example for DriveMonitor display	No. connector / binector
Binary	0 or 1	1	B1000 – B3999
Integer	Integer number -32768 to +32767	16386	K4000 – K4999
Hex	0000h to FFFFh	1111 0001 1100 1100	K4000 – K4999
Real	-3.4e+38 to +3.4e+38	987,123	KR0000 – KR0999
Real (time)	0 ms to +3.4e+38 ms	987,123	KR0000 – KR0999

Contrary to the basic device (CUVC, CUMC, CUD1), which computes using integer values or percentage values, T400 computes using REAL values.

The following interrelationship applies in the basic device: 100 % corresponds to 16384 (integer) or 4000h (hexadecimal).

The REAL values are normalized in the T400 so that 1.0 corresponds to the value 100%.

T400 specific conversion blocks are used to convert from integer to REAL and vice versa. There are also conversion blocks which convert from double word (32-bit integer) to REAL and vice versa in the T400.

Integer and hex values are both 16-bit quantities, whose interrelationship is shown in the following examples:

Integer	Hex
0	0000h
1	0001h
16384	4000h
32767	7FFFh
-32768	8000h
-1	FFFFh

Sampling times

5 different sampling times (T1, T2, T3, T4, T5) are used in the T400 program.

The sampling time defines in which time interval the particular function is "sampled", i.e. computed.

The assignment is as follows:

Time plane	Sampling time	Computed function
T1	4.8 [ms]	- T400 analog inputs 1, 2, 3 - T400 pulse encoder inputs 1, 2 - T400 absolute value encoder inputs 1, 2 - data received from the CU (basic unit) - anti-sway control and speed setpoint transfer - data sent to the CU (basic unit) - T400 analog outputs 1, 2
T2	9.6 [ms]	- T400 analog input 4 - T400 digital inputs, digital outputs - data received from CBP (Profibus) - prediction, pendulum angle from the camera - closed-loop positioning control - evaluation, limit switch, pre-limit switch - speed setpoint conditioning - data sent to CBP (Profibus)
T3	18.4 [ms]	- T400 analog input 5 - open-loop control
T4	76.8 [ms]	- fault evaluation
T5	153.6 [ms]	- parameter handling, system handling T400

3.1 Function charts

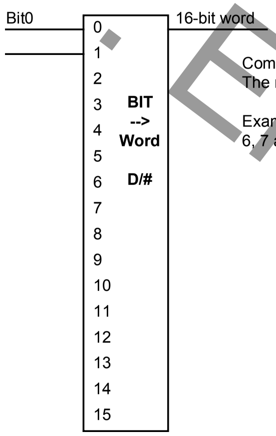
NOTE

A description of the function charts is provided after the various function charts.

1	2	3	4	5	6	7	8
General information				V1.0		Function chart	- 000 -
List of contents					10.09.2001	DRIVEPAC	

Only the blocks are described here which are not self-explanatory.

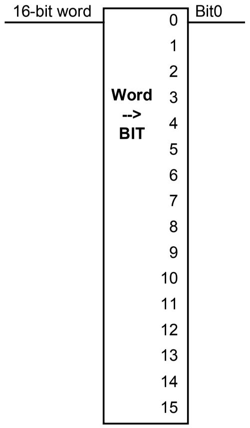
Converter, bit - word



Combines 16 individual bits to form a 16-bit word.
The result is a hex/integer word.

Example: If the 16-bit output word = 0h10F3, then the input bits 0, 1, 4, 5, 6, 7 and 12 = "1", the other bits are "0".

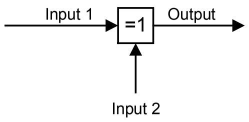
Converter, word - bit



Generates the individual bits of a 16-bit word.

Example: If the 16-bit input word = 0h0003, then the bits 0 and 1, generated at the output = "1", all other bits are "0".

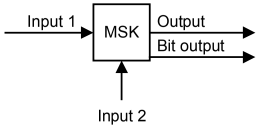
Bit inversion, 16-bit word



Each bit of the 16-bit input word 1 is inverted if the appropriate bit in the 16-bit input word 2 = "1" .

Example: Bits 4 and 5 are to be inverted
Input 1 = 0h1234 (0001 0010 0011 0100)
Input 2 = 0h0130 (0000 0001 0011 0000)
Output = 0h1304 (0001 0011 0000 0100)

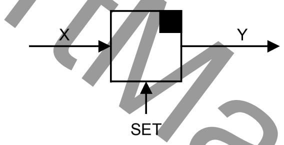
Bit masking, 16-bit word



Each bit of the 16-bit input word 1 is AND'ed with the appropriate bit of the 16-bit input word 2.
The result of this bitwise logic operation is in the 16-bit output word.
The bit output is also = "1" if at least one bit of the output word = "1".

Example:
Input 1 = 0h1234 (0001 0010 0011 0100)
Input 2 = 0h0130 (0000 0001 0011 0000)
Output = 0h0030 (0000 0000 0011 0000)

Word memory

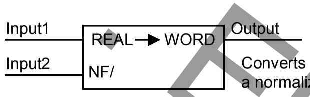


For each positive edge at input SET, the 16-bit input word X is saved and is then available in the 16-bit output word Y.

1	2	3	4	5	6	7	8
General information				V1.0		Function chart	- 001 -
Description of the function blocks used, Section 1					10.09.2001	DRIVEPAC	

Continuation from Sheet 001

Converter, REAL - INTEGER

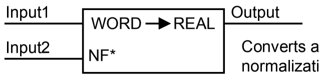


Converts a REAL number into a 16-bit number (hex or integer) , whereby a normalization factor is taken into account. The following applies:

Output = (input1/input2) x 16384

Example:
Input1 = 54.321 (REAL number)
Input2 = 50.0
--> output = 17799 (corresponds to 4587hex)
Decimal places are rounded-off.

Converter, INTEGER - REAL

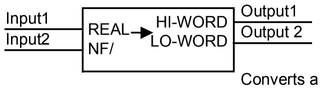


Converts a 16-bit number (hex or integer) into a REAL number, whereby a normalization factor is taken into account. The following applies:

Output = (input1/16384) x input2

Example:
Input1 = 12345 (INTEGER number)
Input2 = 50.0
--> output = 37.67395

Converter, REAL - double word



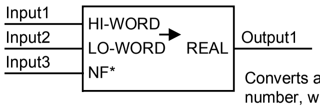
Converts a REAL number into a 32-bit double word, whereby a normalization factor is taken into account.
The double word is sub-divided into a 16-bit high word and a 16-bit low word.

Double word = (input1/input2) x 1 073 741 824
Output1 = high word (double word)
Output2 = low word (double word)

Example:
Input1 = 123.4567 (REAL number)
Input2 = 100.0

--> double word = 1 325 606 222. This corresponds to 4F03 254E hex.
Output1 = 4F03 hex.
Output2 = 254E hex

Converter, double word - REAL



Converts a 32-bit double word (comprising high and low words) into a REAL number, whereby a normalization factor is taken into account.

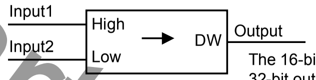
High word(double word) = input1
Low word(double word) = input2

Output1 = (double word/1 073 741 824)xinput3

Example:
Input1 = 4000h
Input2 = 7FFFh
Input3 = 100.0

--> double word = 4000 7FFF hex. This corresponds to 1 073 774 591 dec.
--> output1 = 100.0030517

Double word (32-bit) generator



The 16-bit input word 1 is combined with the 16-bit input word 2 to form a 32-bit output word.

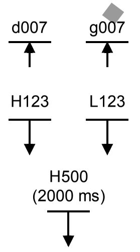
Output = (input1/input2) x 16384

Example:
Input1 = 0h1234
Input2 = 0h5678
Output = 0h1234 5678

1	2	3	4	5	6	7	8
General information				V1.0		Function chart	- 002 -
Description of the function blocks used, Section 2					10.09.2001	DRIVEPAC	

Description of the symbols used in the function charts

Parameter

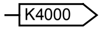


Display parameters

Setting parameters

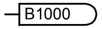
Setting parameters
(factory setting 2000 ms)

Connectors/binectors

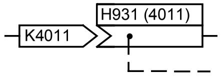


Connector INTEGER / HEX, numerical range 4000 - 4999
freely-interconnectable 16-bit signal
value range INTEGER: -32768 ... +32767
value range HEX: 0000h ... FFFFh
The following applies: 4000h corresponds to 16384dec

Connector REAL, numerical range 0000 - 0999
freely-interconnectable 32-bit signal;
value range REAL: -3.4e+38 ... 3.4e+38
REAL parameters can be entered to 3 decimal places, e.g. 100.001

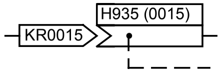


Binector, numerical range 1000 - 3999
freely-interconnectable binary signal
output, e.g. via binary outputs [A3]



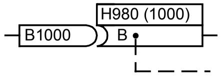
Selects any INTEGER connector
(factory setting: H931 = 4011, i.e. connector K4011 is selected)

Space to enter another selected INTEGER connector



Selects any REAL connector
(factory setting: H935 = 0015, i.e. connector KR0015 is selected)

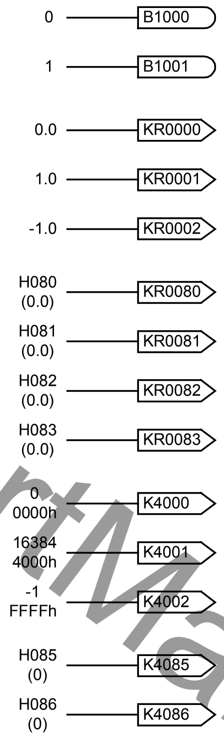
Space to enter another selected REAL connector



Selects any particular binector
(factory setting: H980 = 1000, i.e. binector B1000 is selected,
= fixed value "0")

Space to enter another selected binector

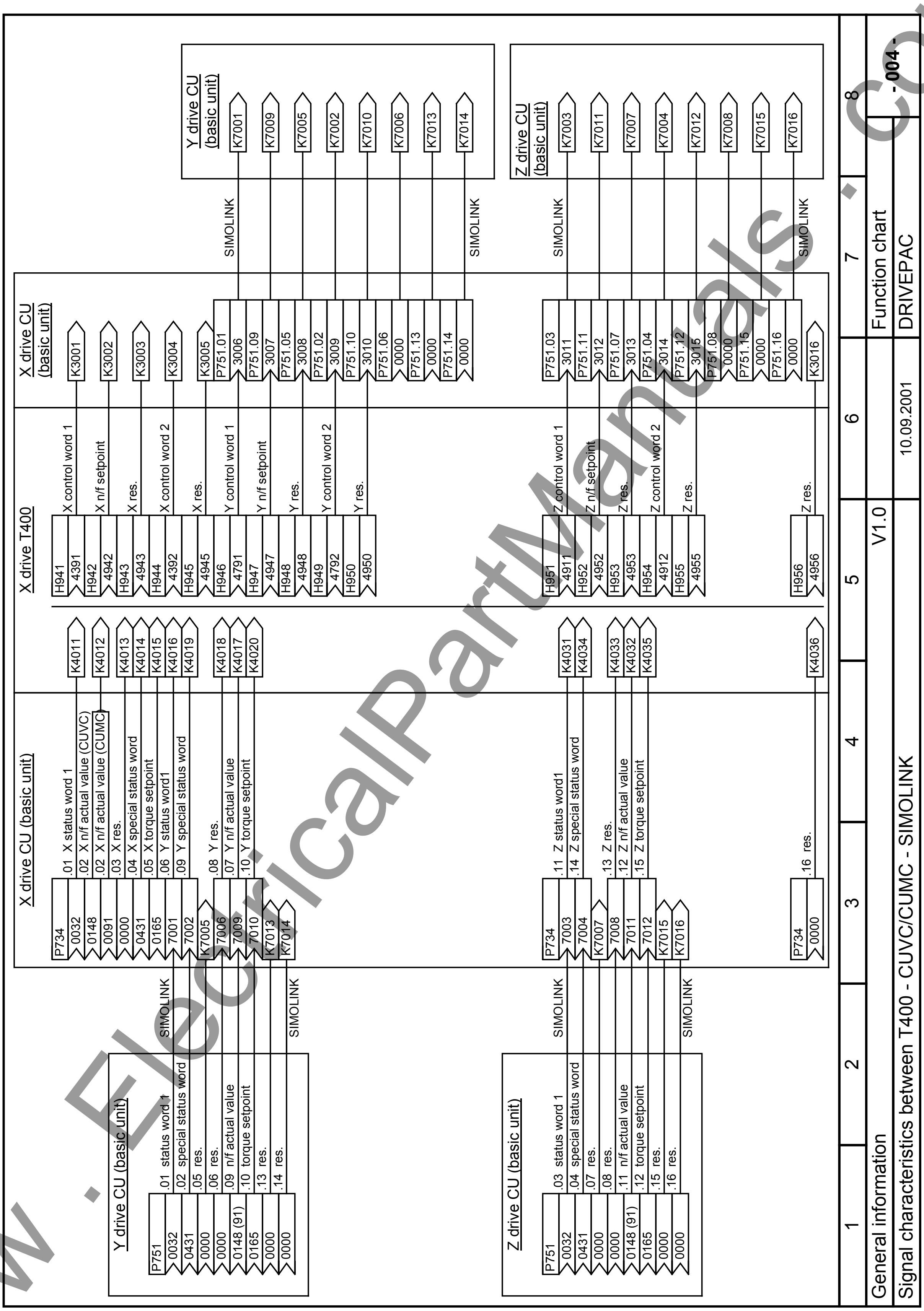
Fixed setpoints



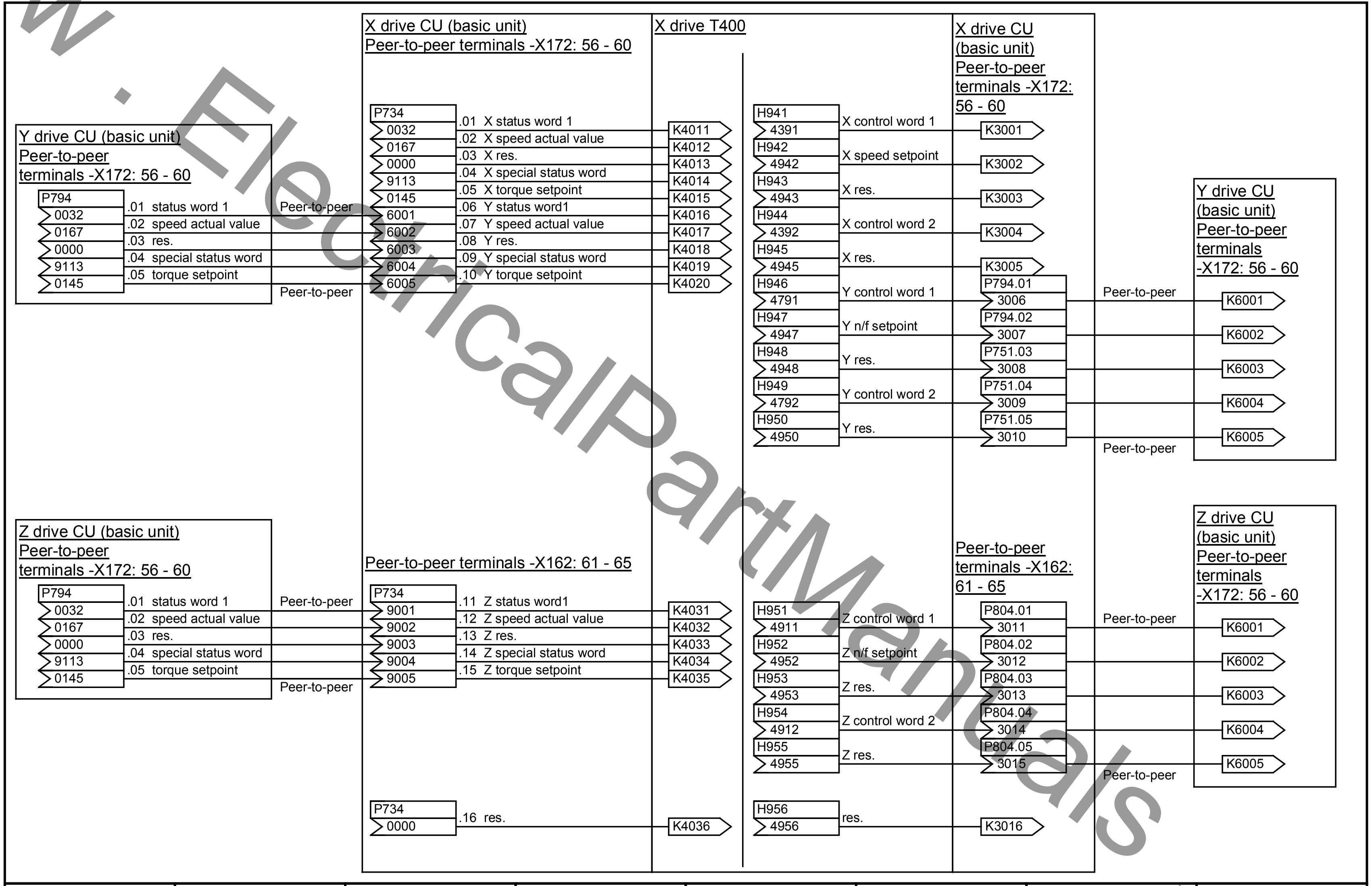
Cross references

[BX2/ 5] The signal comes from/ goes to Sheet BX2 signal path 5 of the function chart

1	2	3	4	5	6	7	8
General information				V1.0		Function chart	- 003 -
Symbols of the function chart					10.09.2001	DRIVEPAC	



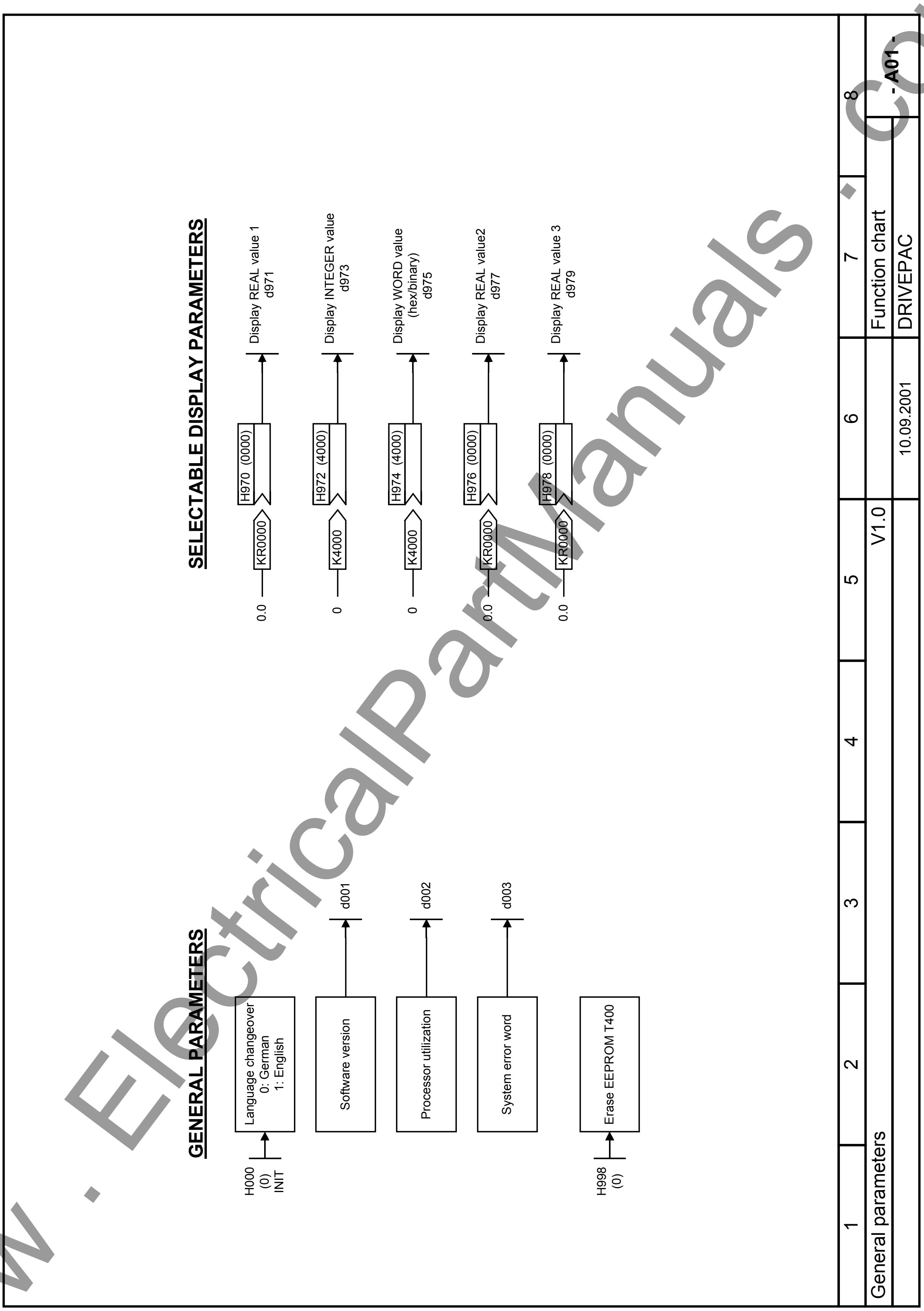
Y drive CU (basic unit)
P751
.01 status word 1
.02 special status word
.05 res.
.06 res.
.09 n/f actual value
.10 torque setpoint
.13 res.
.14 res.
SIMOLINK
X drive CU (basic unit)
P734
.01 X status word 1
.02 X n/f actual value (CUVC)
.02 X n/f actual value (CUMC)
.03 X res.
.04 X special status word
.05 X torque setpoint
.06 Y status word1
.09 Y special status word
.08 Y res.
.07 Y n/f actual value
.10 Y torque setpoint
X drive T400
X control word 1
X n/f setpoint
X res.
X control word 2
Y control word 1
Y n/f setpoint
Y res.
Y control word 2
X drive CU (basic unit)
Y drive CU (basic unit)
Z drive CU (basic unit)
.03 status word 1
.04 special status word
.07 res.
.08 res.
.11 n/f actual value
.12 torque setpoint
.15 res.
.16 res.
.11 Z status word1
.14 Z special status word
.13 Z res.
.12 Z n/f actual value
.15 Z torque setpoint
.16 res.
Z control word 1
Z n/f setpoint
Z res.
Z control word 2
Z drive CU (basic unit)
1 2 3 4 5 6 7 8
V1.0
10.09.2001
General information
Signal characteristics between T400 - CUVC/CUMC - SIMOLINK
Function chart
DRIVEPAC
- 004 -

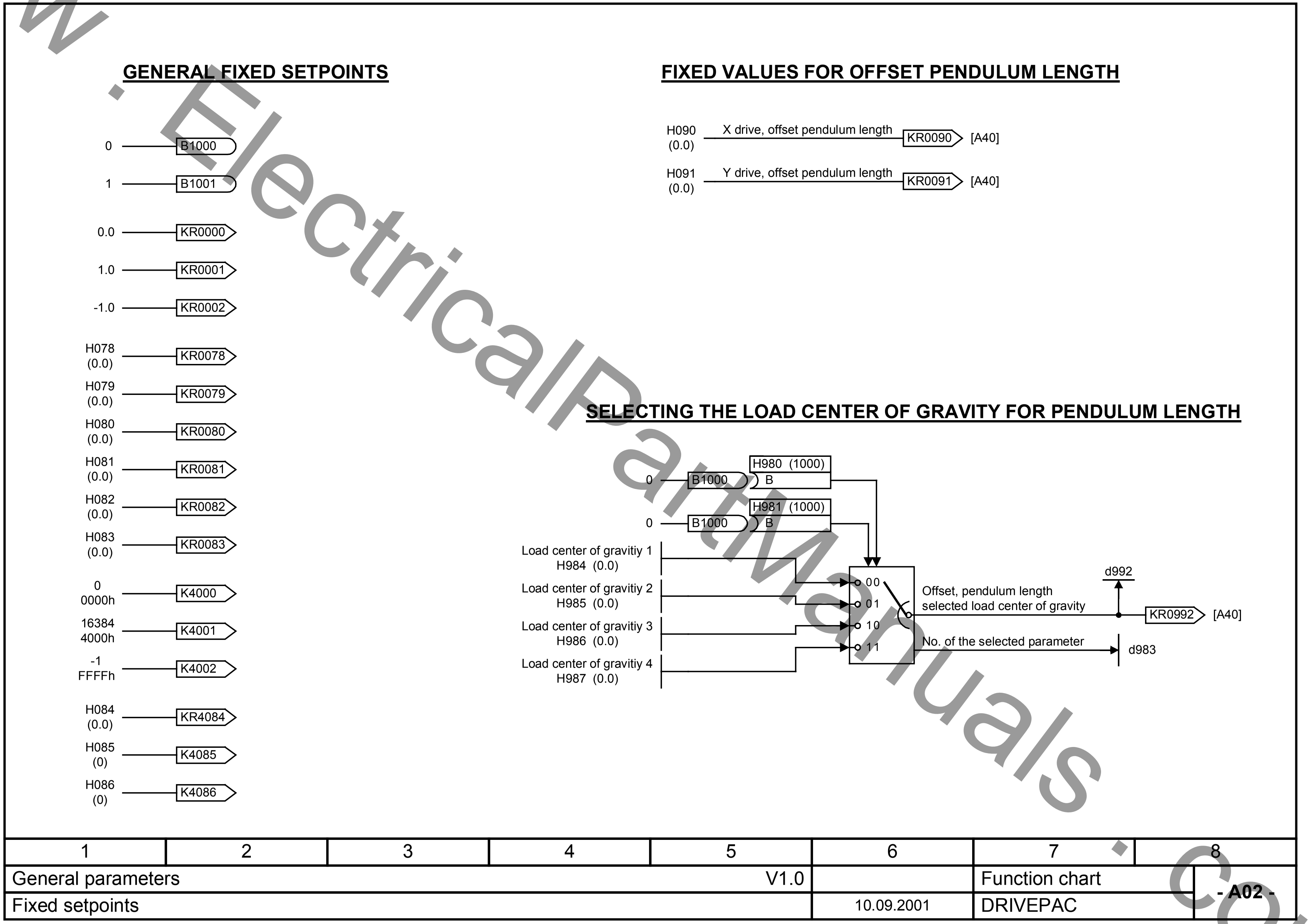


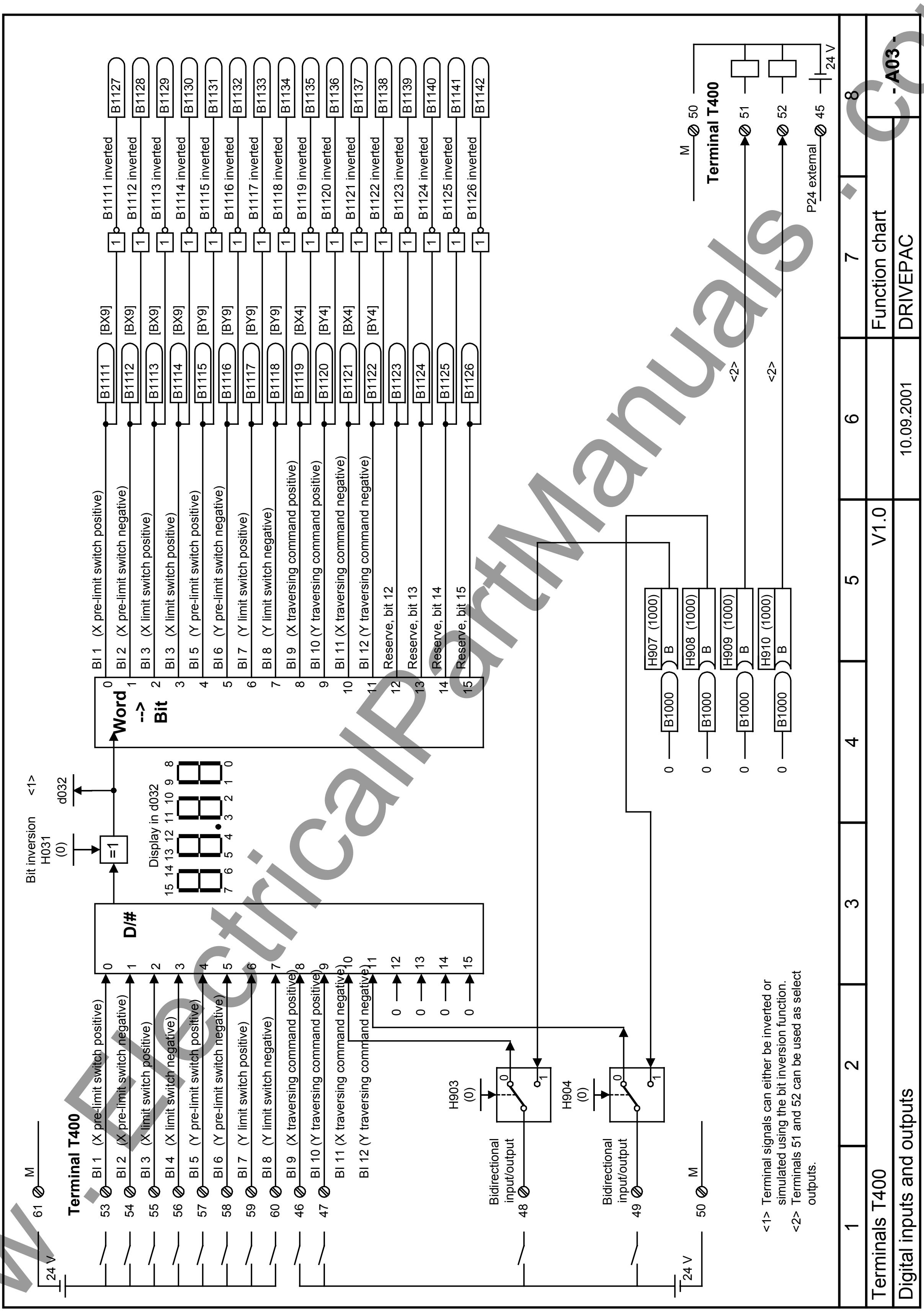
1	2	3	4	5	6	7	8

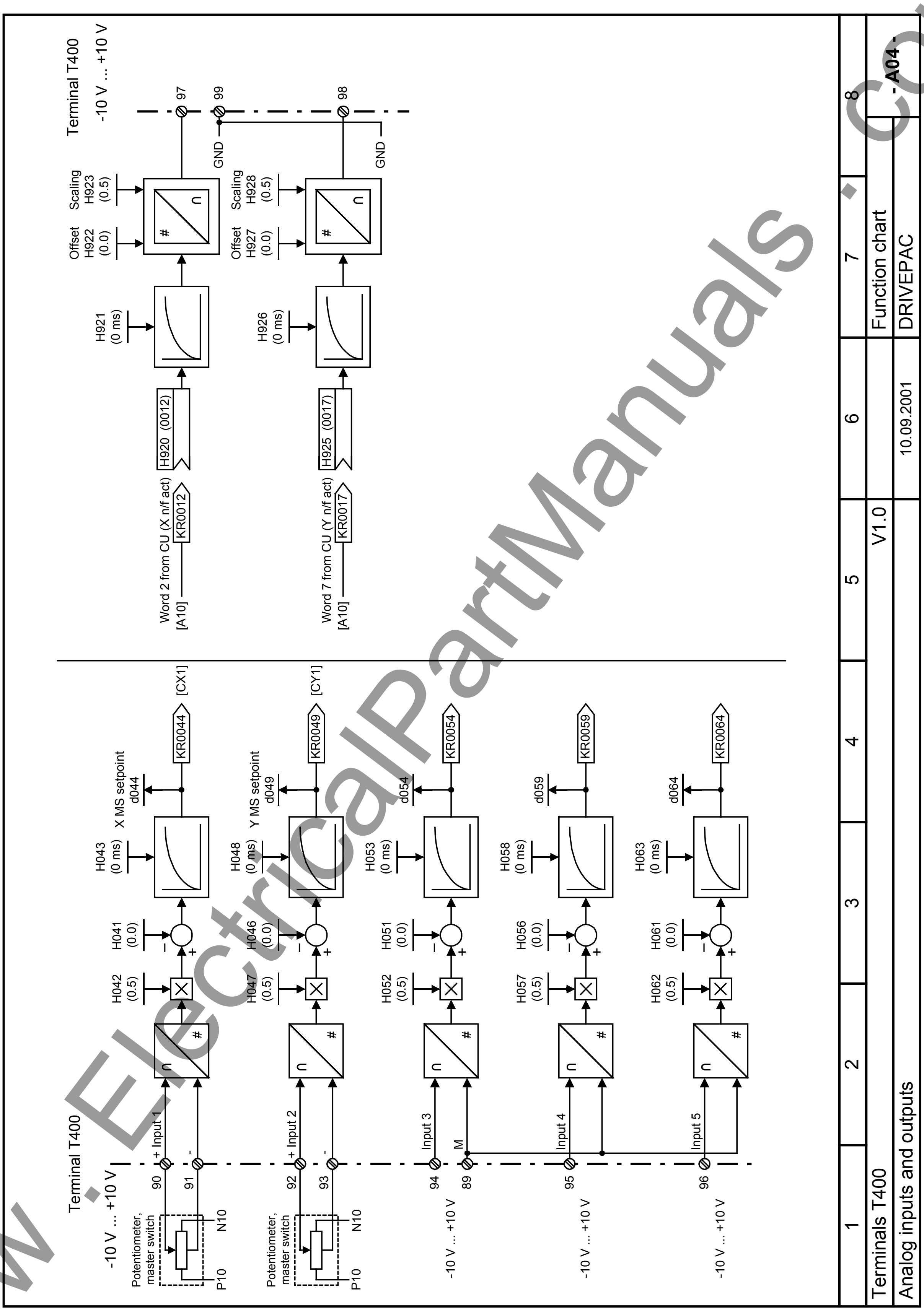
General information V1.0 | Function chart | - 005 -

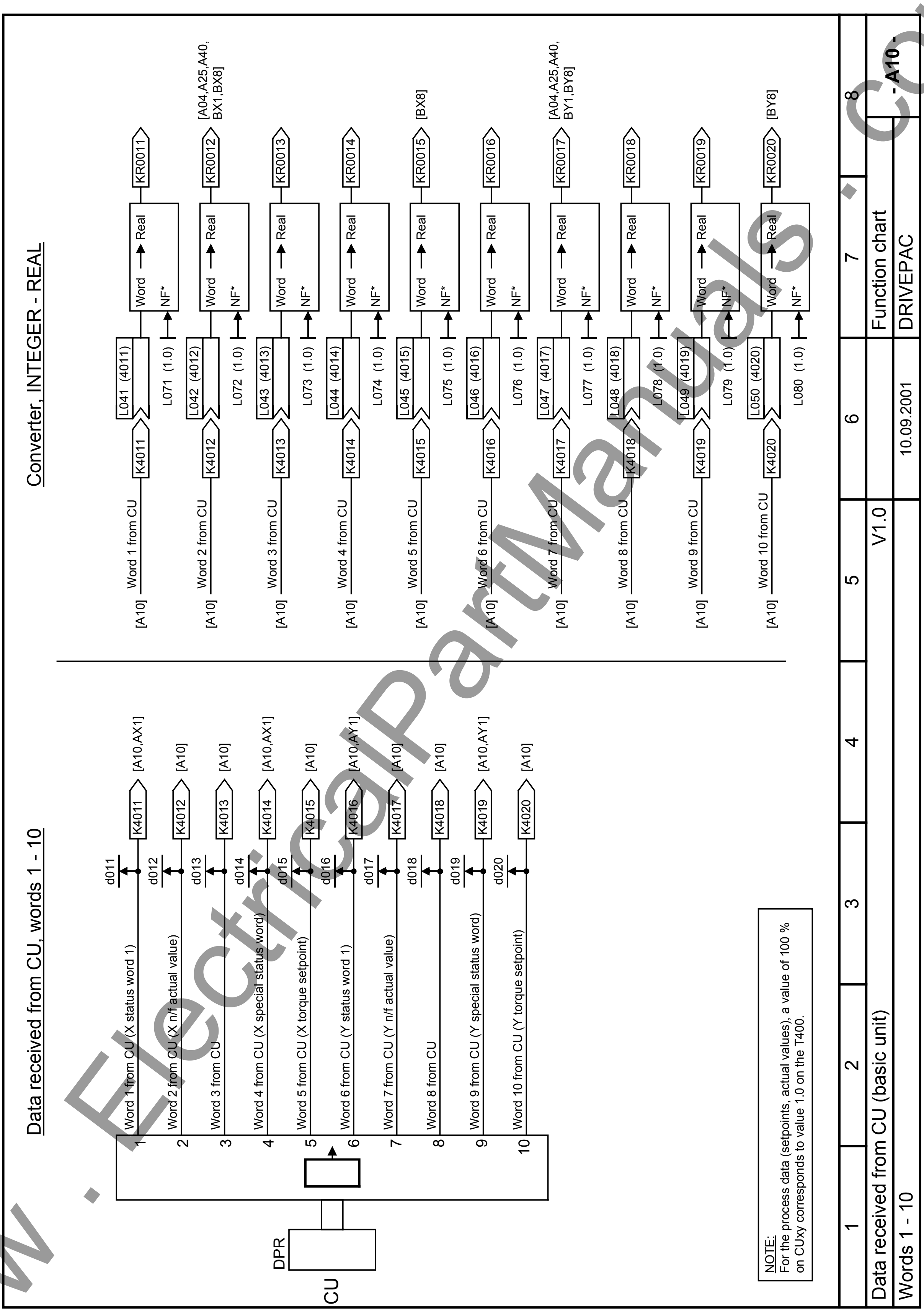
Signal characteristics between T400 - CUD1 (6RA70) - peer-to-peer | 10.09.2001 | DRIVEPAC


GENERAL PARAMETERS
H000
(0)
INIT
Language changeover
0: German
1: English
Software version
d001
Processor utilization
d002
System error word
d003
H998
(0)
Erase EEPROM T400
SELECTABLE DISPLAY PARAMETERS
0.0
KR0000
H970 (0000)
Display REAL value 1
d971
0
K4000
H972 (4000)
Display INTEGER value
d973
0
K4000
H974 (4000)
Display WORD value
(hex/binary)
d975
0.0
KR0000
H976 (0000)
Display REAL value2
d977
0.0
KR0000
H978 (0000)
Display REAL value 3
d979
1
2
3
4
5
6
7
8
General parameters
V1.0
Function chart
- A01 -
10.09.2001
DRIVEPAC


GENERAL FIXED SETPOINTS
0
B1000
1
B1001
0.0
KR0000
1.0
KR0001
-1.0
KR0002
H078 (0.0)
KR0078
H079 (0.0)
KR0079
H080 (0.0)
KR0080
H081 (0.0)
KR0081
H082 (0.0)
KR0082
H083 (0.0)
KR0083
0 0000h
K4000
16384 4000h
K4001
-1 FFFFh
K4002
H084 (0.0)
KR4084
H085 (0)
K4085
H086 (0)
K4086
FIXED VALUES FOR OFFSET PENDULUM LENGTH
H090 (0.0)
X drive, offset pendulum length
KR0090
[A40]
H091 (0.0)
Y drive, offset pendulum length
KR0091
[A40]
SELECTING THE LOAD CENTER OF GRAVITY FOR PENDULUM LENGTH
0
B1000
H980 (1000)
B
0
B1000
H981 (1000)
B
Load center of gravitiy 1 H984 (0.0)
Load center of gravitiy 2 H985 (0.0)
Load center of gravitiy 3 H986 (0.0)
Load center of gravitiy 4 H987 (0.0)
00
01
10
11
Offset, pendulum length selected load center of gravity
d992
KR0992
[A40]
No. of the selected parameter
d983
1
2
3
4
5
6
7
8
General parameters
V1.0
Function chart
- A02 -
Fixed setpoints
10.09.2001
DRIVEPAC


24 V
61 M
Terminal T400
53 BI 1 (X pre-limit switch positive)
54 BI 2 (X pre-limit switch negative)
55 BI 3 (X limit switch positive)
56 BI 4 (X limit switch negative)
57 BI 5 (Y pre-limit switch positive)
58 BI 6 (Y pre-limit switch negative)
59 BI 7 (Y limit switch positive)
60 BI 8 (Y limit switch negative)
46 BI 9 (X traversing command positive)
47 BI 10 (Y traversing command positive)
BI 11 (X traversing command negative)
BI 12 (Y traversing command negative)
48 Bidirectional input/output
H903 (0)
49 Bidirectional input/output
H904 (0)
50 M
24 V
D/#
Bit inversion H031 (0)
=1
d032
<1>
Display in d032
15 14 13 12 11 10 9 8
7 6 5 4 3 2 1 0
Word --> Bit
BI 1 (X pre-limit switch positive)
BI 2 (X pre-limit switch negative)
BI 3 (X limit switch positive)
BI 3 (X limit switch positive)
BI 5 (Y pre-limit switch positive)
BI 6 (Y pre-limit switch negative)
BI 7 (Y limit switch positive)
BI 8 (Y limit switch negative)
BI 9 (X traversing command positive)
BI 10 (Y traversing command positive)
BI 11 (X traversing command negative)
BI 12 (Y traversing command negative)
Reserve, bit 12
Reserve, bit 13
Reserve, bit 14
Reserve, bit 15
B1111 [BX9]
B1112 [BX9]
B1113 [BX9]
B1114 [BX9]
B1115 [BY9]
B1116 [BY9]
B1117 [BY9]
B1118 [BY9]
B1119 [BX4]
B1120 [BY4]
B1121 [BX4]
B1122 [BY4]
B1123
B1124
B1125
B1126
B1111 inverted B1127
B1112 inverted B1128
B1113 inverted B1129
B1114 inverted B1130
B1115 inverted B1131
B1116 inverted B1132
B1117 inverted B1133
B1118 inverted B1134
B1119 inverted B1135
B1120 inverted B1136
B1121 inverted B1137
B1122 inverted B1138
B1123 inverted B1139
B1124 inverted B1140
B1125 inverted B1141
B1126 inverted B1142
0 B1000 H907 (1000) B
0 B1000 H908 (1000) B
0 B1000 H909 (1000) B
0 B1000 H910 (1000) B
<2>
<2>
M 50
Terminal T400
51
52
P24 external 45
24 V
<1> Terminal signals can either be inverted or simulated using the bit inversion function.
<2> Terminals 51 and 52 can be used as select outputs.
1 2 3 4 5 6 7 8
Terminals T400
Digital inputs and outputs
V1.0
10.09.2001
Function chart
DRIVEPAC
- A03 -

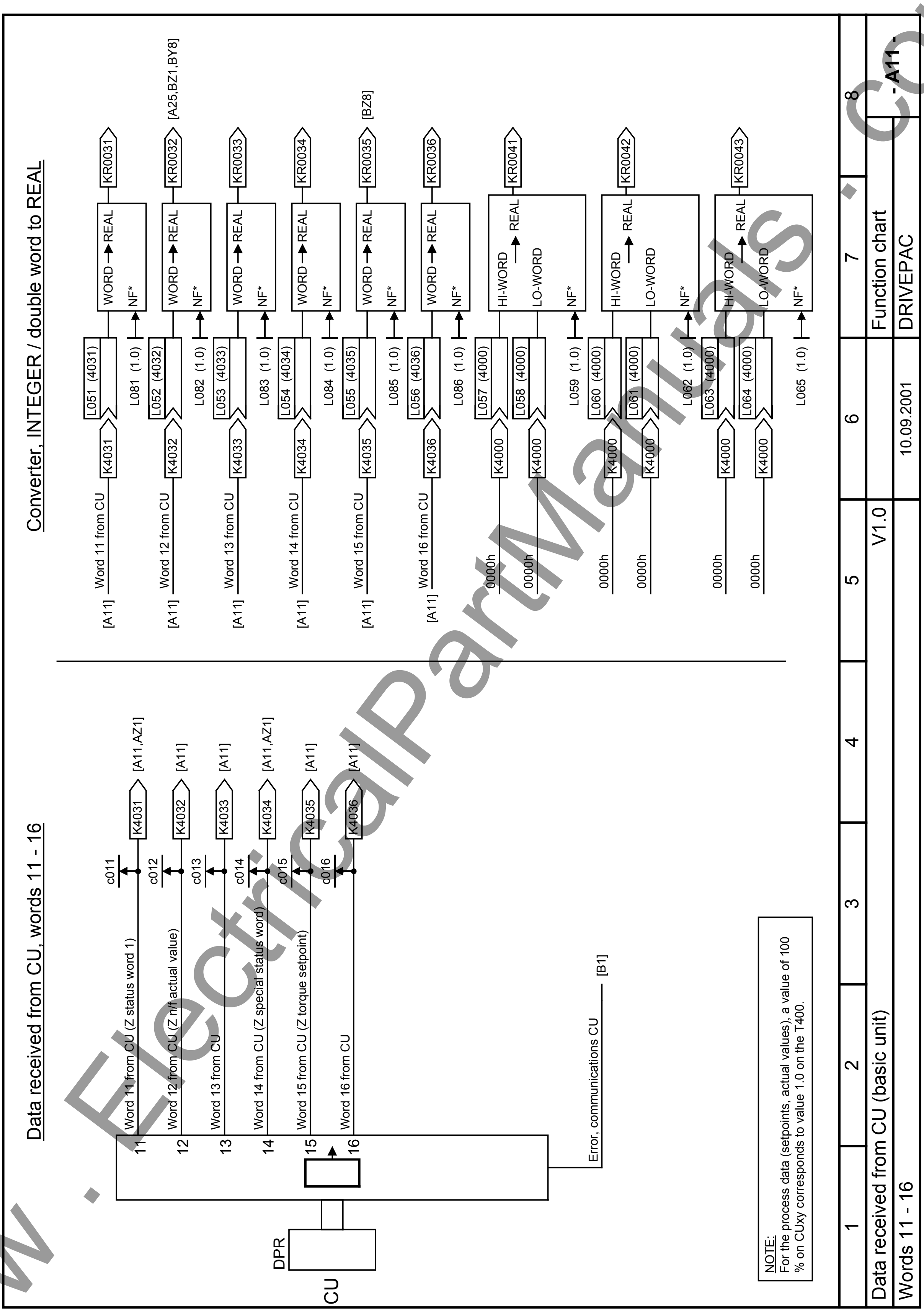

Terminal T400
-10 V ... +10 V
97
99
98
GND
GND
Offset H922 (0.0)
Scaling H923 (0.5)
Offset H927 (0.0)
Scaling H928 (0.5)
H921 (0 ms)
H926 (0 ms)
H920 (0012)
H925 (0017)
Word 2 from CU (X n/f act) KR0012
[A10]
Word 7 from CU (Y n/f act) KR0017
[A10]
#
∩
Terminal T400
-10 V ... +10 V
Potentiometer, master switch
P10
N10
90
91
+ Input 1
-
92
93
+ Input 2
-
94
89
Input 3
M
95
Input 4
96
Input 5
-10 V ... +10 V
-10 V ... +10 V
-10 V ... +10 V
H042 (0.5)
H041 (0.0)
H043 (0 ms)
X MS setpoint d044
KR0044
[CX1]
H047 (0.5)
H046 (0.0)
H048 (0 ms)
Y MS setpoint d049
KR0049
[CY1]
H052 (0.5)
H051 (0.0)
H053 (0 ms)
d054
KR0054
H057 (0.5)
H056 (0.0)
H058 (0 ms)
d059
KR0059
H062 (0.5)
H061 (0.0)
H063 (0 ms)
d064
KR0064
1
2
3
4
5
6
7
8
Terminals T400
Analog inputs and outputs
V1.0
10.09.2001
Function chart
DRIVEPAC
- A04 -



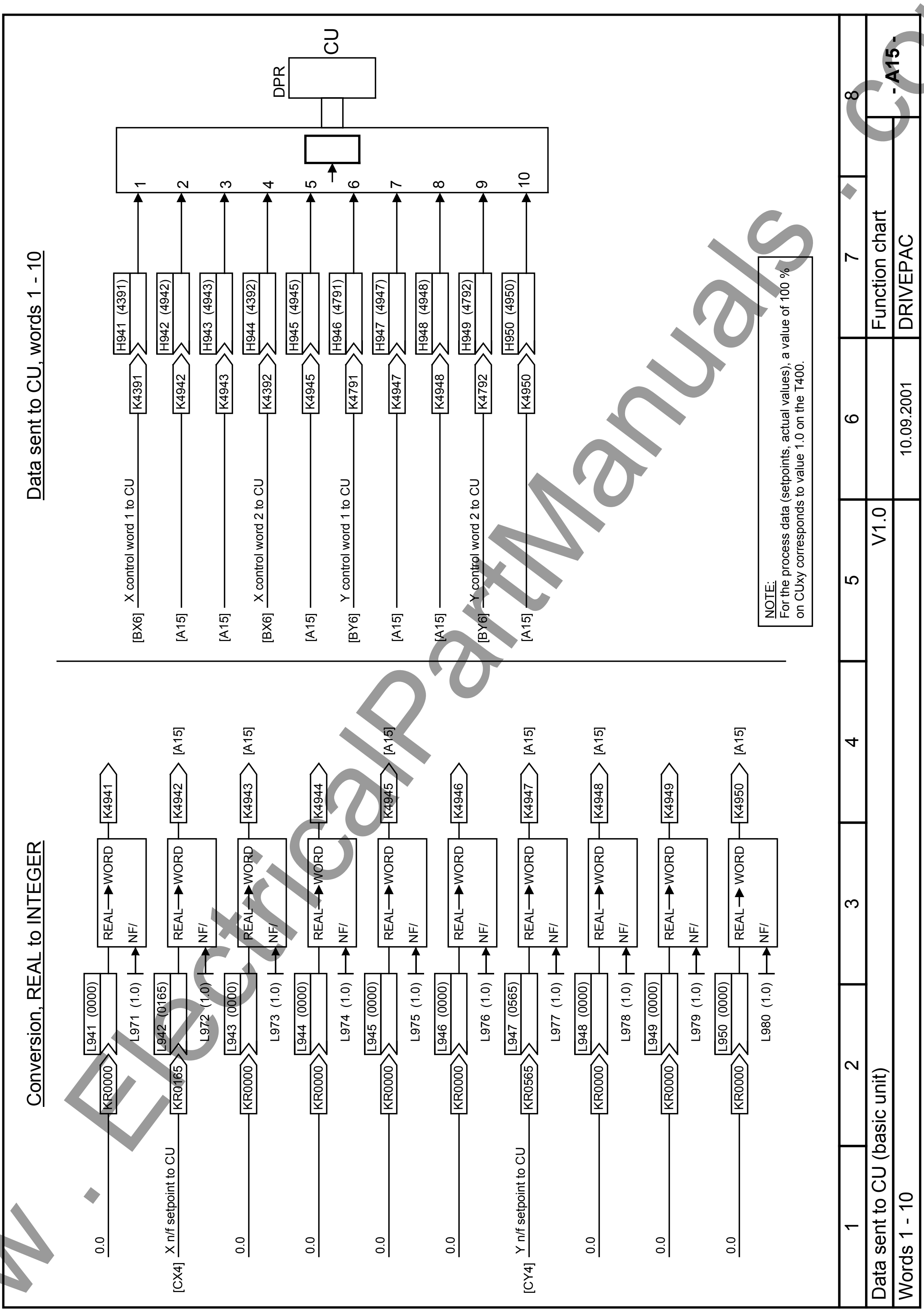
NOTE:
For the process data (setpoints, actual values), a value of 100 % on CUxy corresponds to value 1.0 on the T400.

Data received from CU (basic unit)

Words 1 - 10



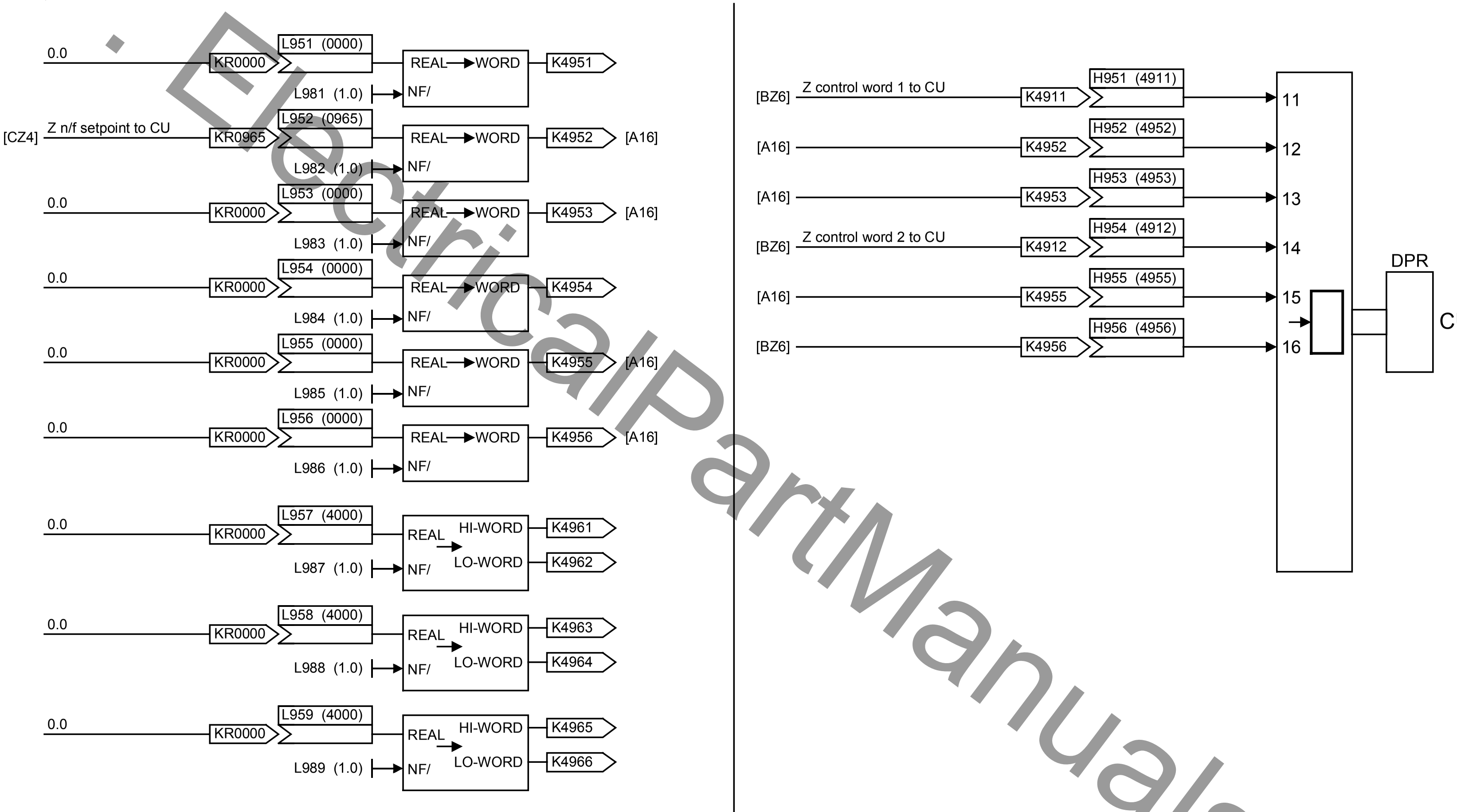
NOTE:
For the process data (setpoints, actual values), a value of 100 % on CUxy corresponds to value 1.0 on the T400.



NOTE:
For the process data (setpoints, actual values), a value of 100 % on CUxy corresponds to value 1.0 on the T400.

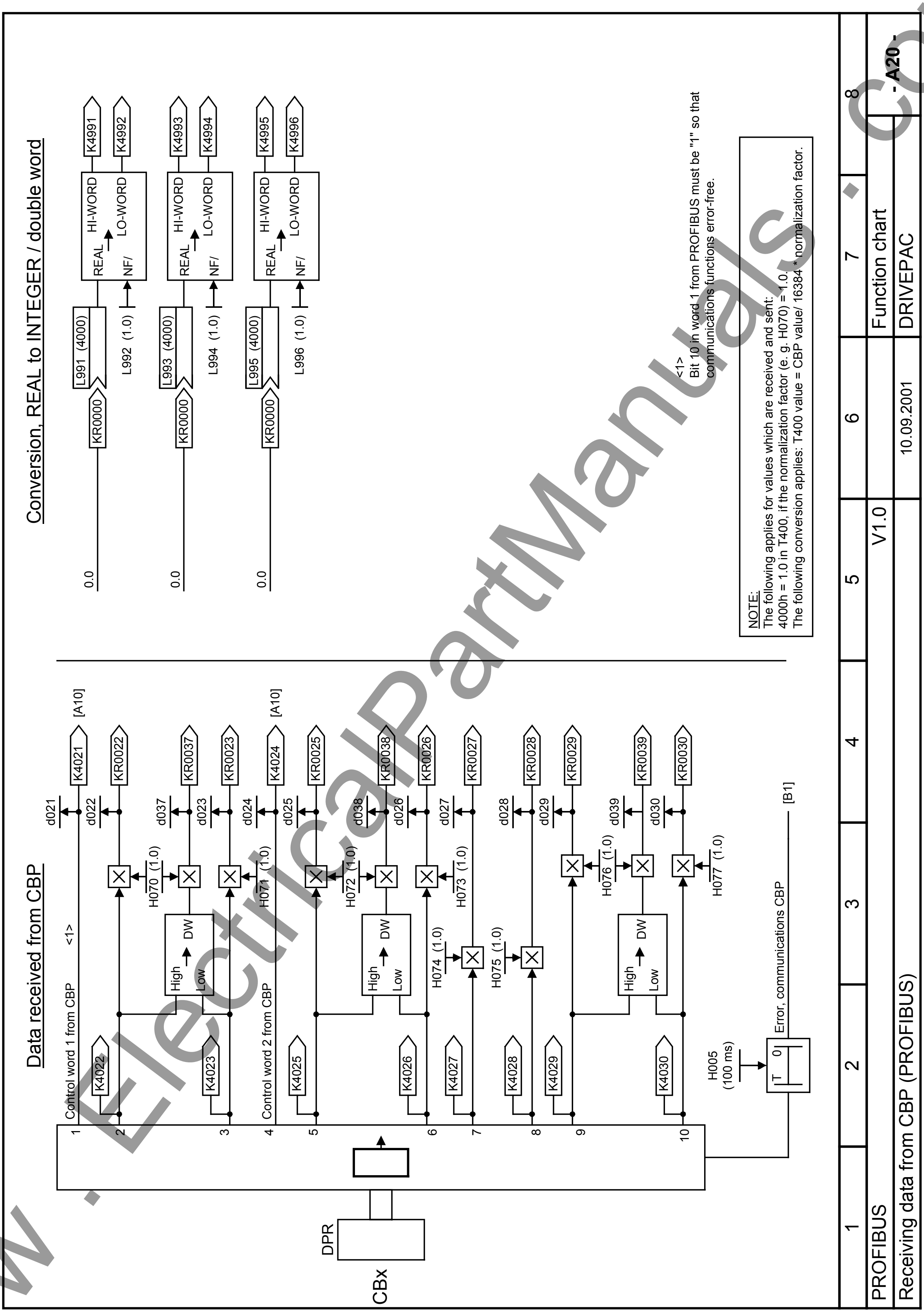
Conversion, REAL to INTEGER / double word

Data sent to CU, words 11 - 16



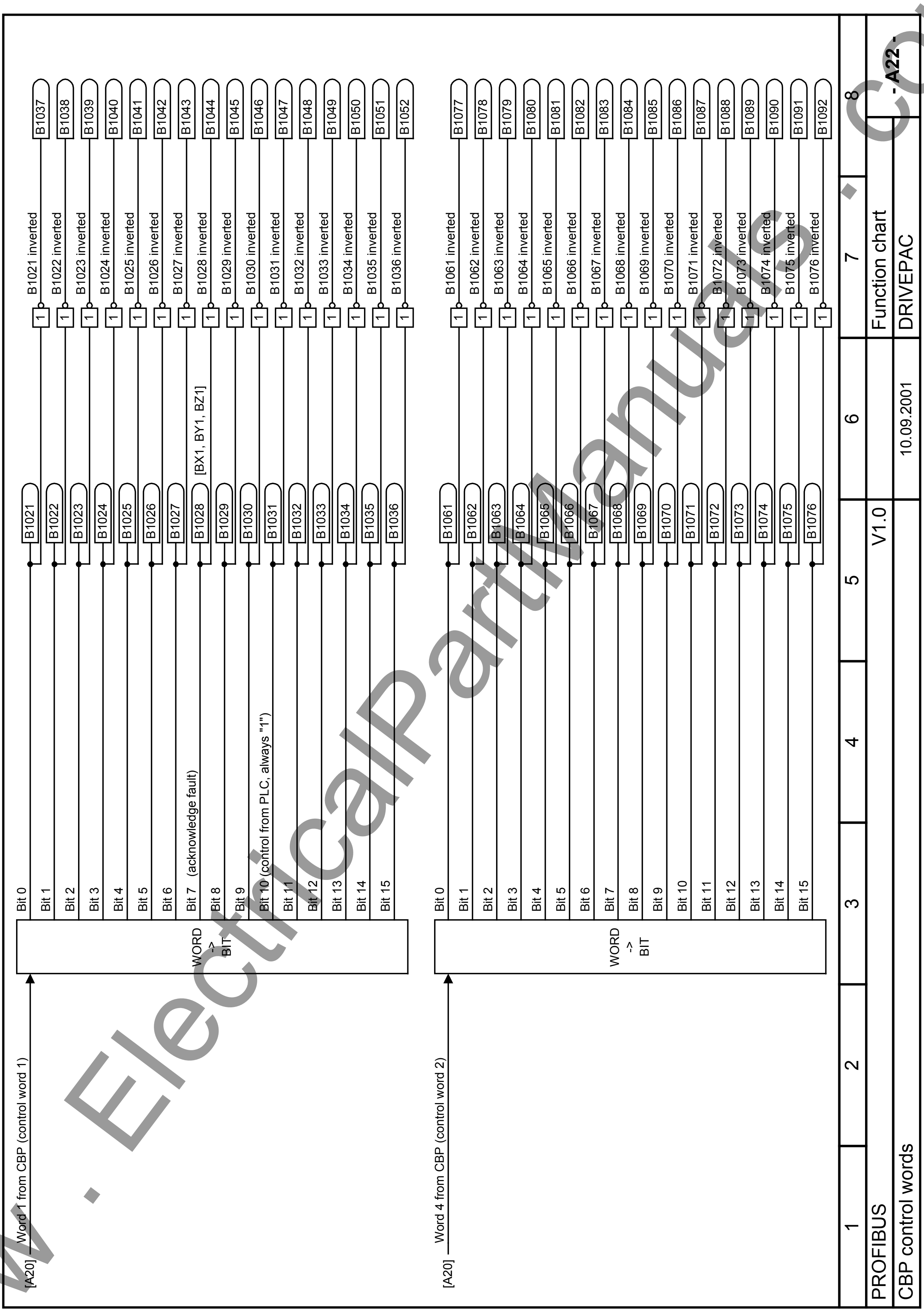
NOTE:
For the process data (setpoints, actual values), a value of 100 % on CUxy corresponds to value 1.0 on the T400.

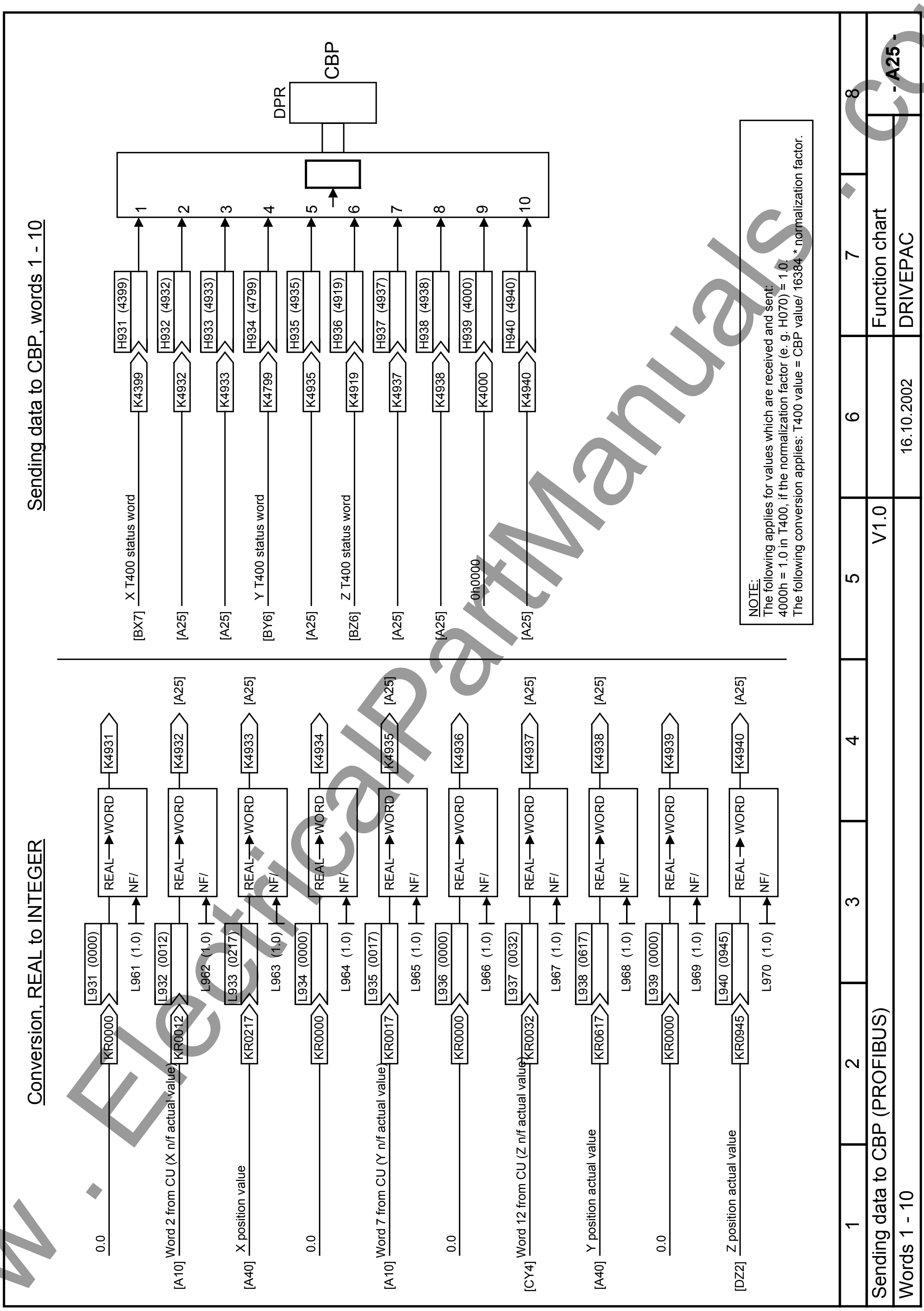
1	2	3	4	5	6	7	8
Data sent to CU (basic unit)				V1.0		Function chart	- A16 -
Words 11 - 16					10.09.2001	DRIVEPAC	

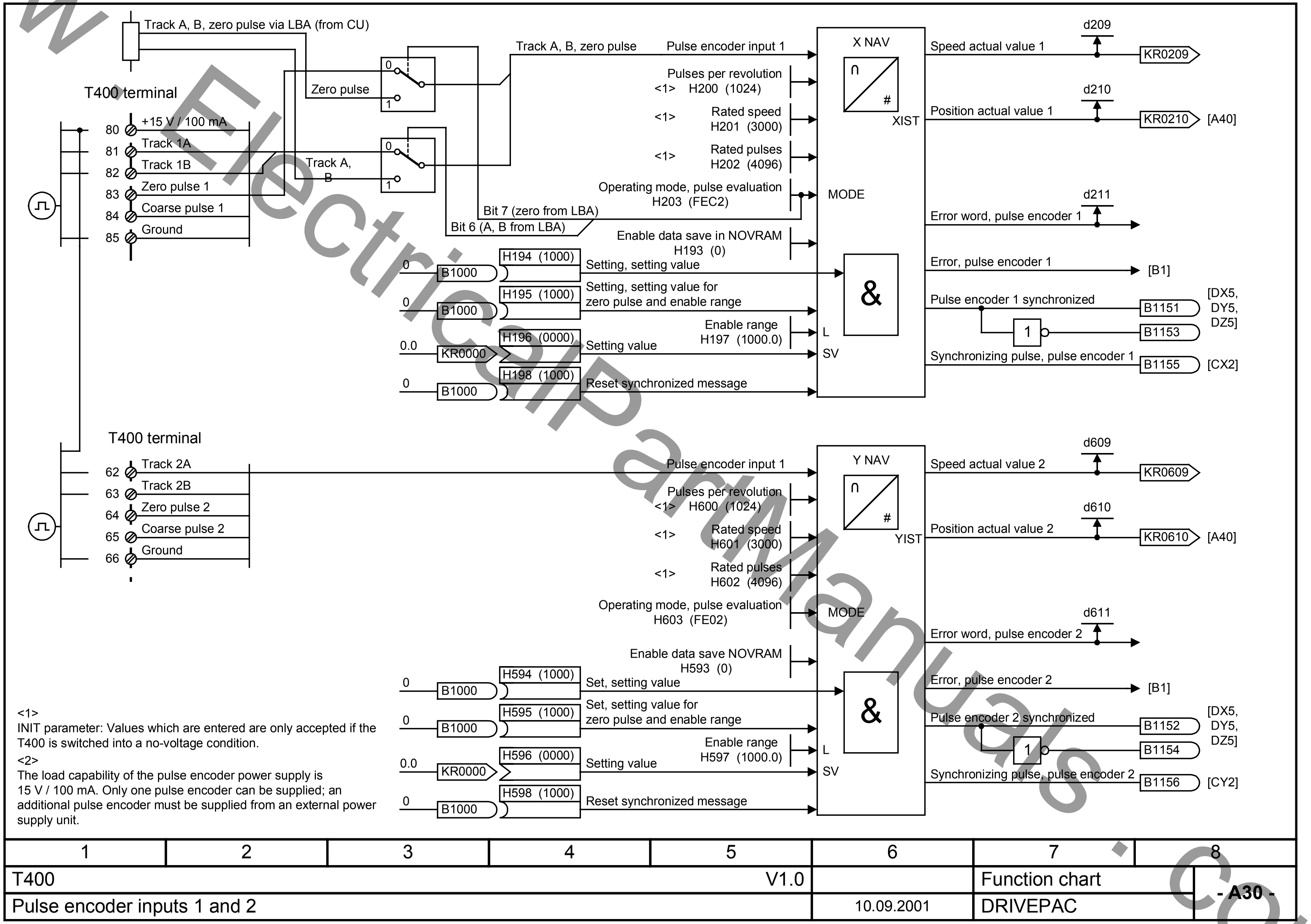


<1>
Bit 10 in word 1 from PROFIBUS must be "1" so that communications functions error-free.

NOTE:
The following applies for values which are received and sent:
4000h = 1.0 in T400, if the normalization factor (e. g. H070) = 1.0.
The following conversion applies: T400 value = CBP value/ 16384 * normalization factor.

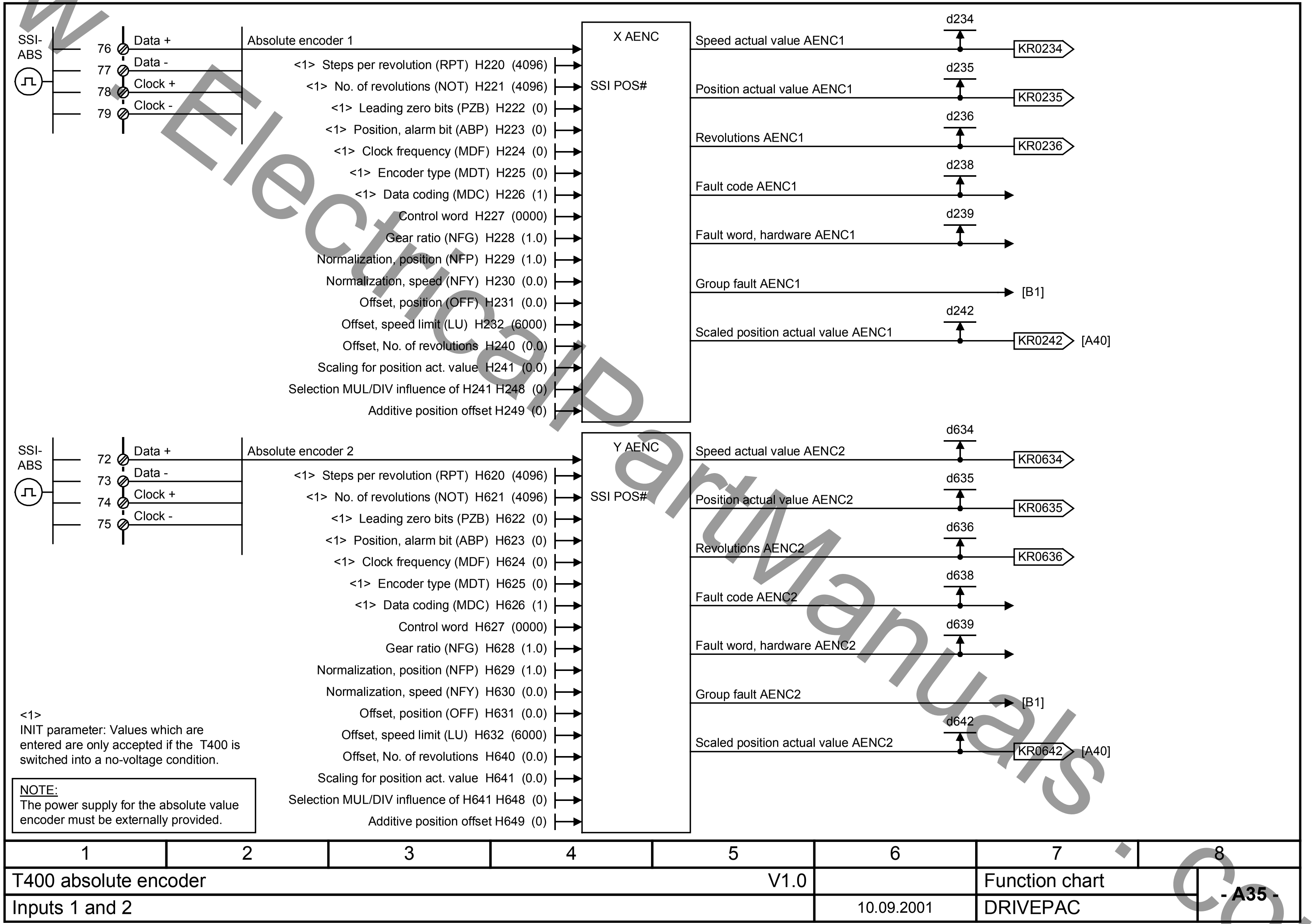

[A20]
Word 1 from CBP (control word 1)
WORD -> BIT
Bit 0
Bit 1
Bit 2
Bit 3
Bit 4
Bit 5
Bit 6
Bit 7 (acknowledge fault)
Bit 8
Bit 9
Bit 10 (control from PLC, always "1")
Bit 11
Bit 12
Bit 13
Bit 14
Bit 15
B1021
B1022
B1023
B1024
B1025
B1026
B1027
B1028
[BX1, BY1, BZ1]
B1029
B1030
B1031
B1032
B1033
B1034
B1035
B1036
1
B1021 inverted
B1022 inverted
B1023 inverted
B1024 inverted
B1025 inverted
B1026 inverted
B1027 inverted
B1028 inverted
B1029 inverted
B1030 inverted
B1031 inverted
B1032 inverted
B1033 inverted
B1034 inverted
B1035 inverted
B1036 inverted
B1037
B1038
B1039
B1040
B1041
B1042
B1043
B1044
B1045
B1046
B1047
B1048
B1049
B1050
B1051
B1052
[A20]
Word 4 from CBP (control word 2)
WORD -> BIT
Bit 0
Bit 1
Bit 2
Bit 3
Bit 4
Bit 5
Bit 6
Bit 7
Bit 8
Bit 9
Bit 10
Bit 11
Bit 12
Bit 13
Bit 14
Bit 15
B1061
B1062
B1063
B1064
B1065
B1066
B1067
B1068
B1069
B1070
B1071
B1072
B1073
B1074
B1075
B1076
B1061 inverted
B1062 inverted
B1063 inverted
B1064 inverted
B1065 inverted
B1066 inverted
B1067 inverted
B1068 inverted
B1069 inverted
B1070 inverted
B1071 inverted
B1072 inverted
B1073 inverted
B1074 inverted
B1075 inverted
B1076 inverted
B1077
B1078
B1079
B1080
B1081
B1082
B1083
B1084
B1085
B1086
B1087
B1088
B1089
B1090
B1091
B1092
1
2
3
4
5
6
7
8
PROFIBUS
CBP control words
V1.0
10.09.2001
Function chart
DRIVEPAC
- A22 -


Conversion, REAL to INTEGER
0.0
KR0000
L931 (0000)
L961 (1.0)
REAL → WORD
NF/
K4931
[A10] Word 2 from CU (X n/f actual value)
KR0012
L932 (0012)
L962 (1.0)
K4932
[A25]
[A40] X position value
KR0217
L933 (0217)
L963 (1.0)
K4933
[A25]
0.0
KR0000
L934 (0000)
L964 (1.0)
K4934
[A10] Word 7 from CU (Y n/f actual value)
KR0017
L935 (0017)
L965 (1.0)
K4935
[A25]
0.0
KR0000
L936 (0000)
L966 (1.0)
K4936
[CY4] Word 12 from CU (Z n/f actual value)
KR0032
L937 (0032)
L967 (1.0)
K4937
[A25]
[A40] Y position actual value
KR0617
L938 (0617)
L968 (1.0)
K4938
[A25]
0.0
KR0000
L939 (0000)
L969 (1.0)
K4939
[DZ2] Z position actual value
KR0945
L940 (0945)
L970 (1.0)
K4940
[A25]
Sending data to CBP, words 1 - 10
[BX7] X T400 status word
K4399
H931 (4399)
1
[A25]
K4932
H932 (4932)
2
[A25]
K4933
H933 (4933)
3
[BY6] Y T400 status word
K4799
H934 (4799)
4
[A25]
K4935
H935 (4935)
5
[BZ6] Z T400 status word
K4919
H936 (4919)
6
[A25]
K4937
H937 (4937)
7
[A25]
K4938
H938 (4938)
8
0h0000
K4000
H939 (4000)
9
[A25]
K4940
H940 (4940)
10
DPR
CBP
NOTE:
The following applies for values which are received and sent:
4000h = 1.0 in T400, if the normalization factor (e. g. H070) = 1.0.
The following conversion applies: T400 value = CBP value/ 16384 * normalization factor.
1
2
3
4
5
6
7
8
Sending data to CBP (PROFIBUS)
Words 1 - 10
V1.0
16.10.2002
Function chart
DRIVEPAC
- A25 -



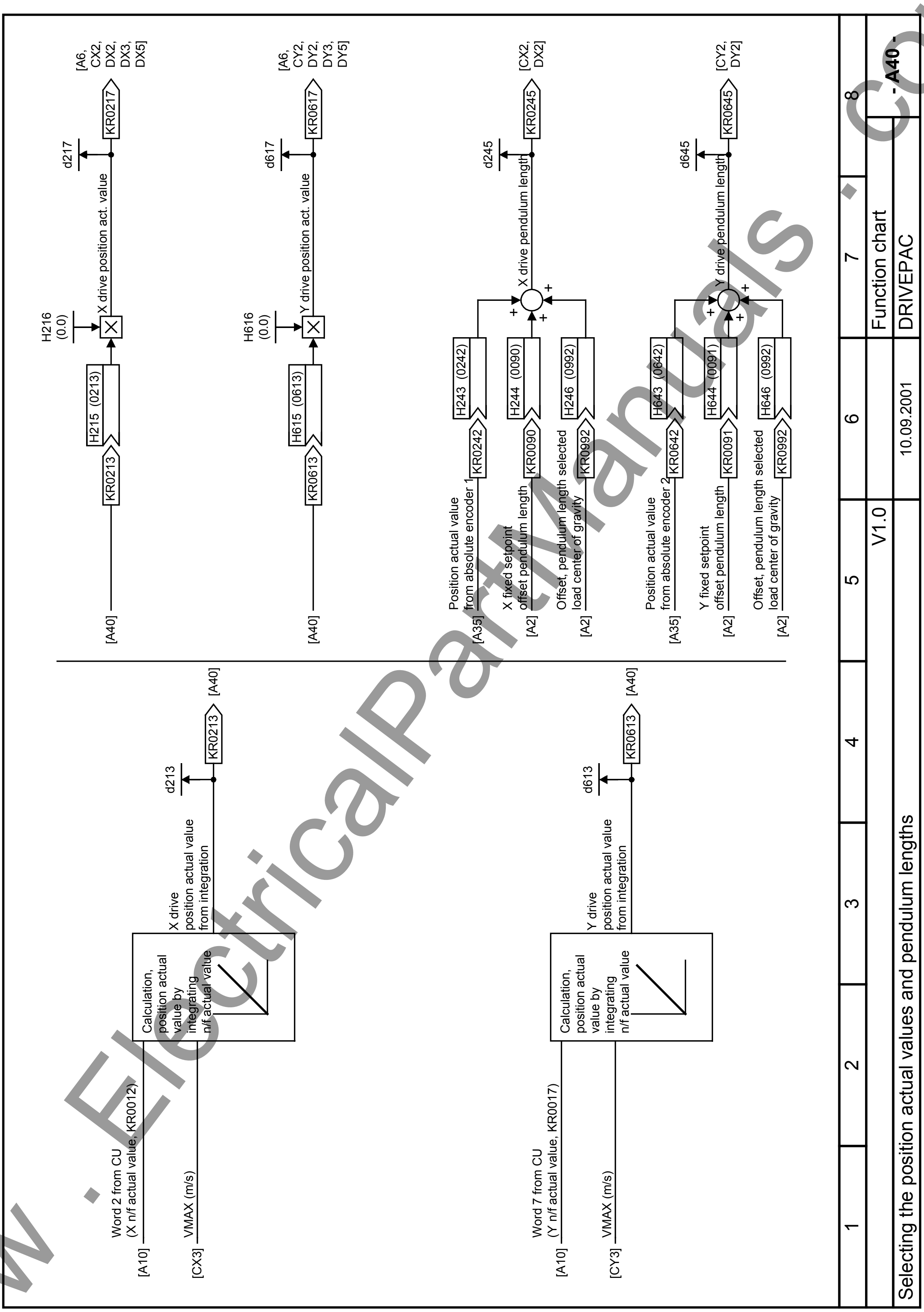
<1>
INIT parameter: Values which are entered are only accepted if the T400 is switched into a no-voltage condition.
<2>
The load capability of the pulse encoder power supply is 15 V / 100 mA. Only one pulse encoder can be supplied; an additional pulse encoder must be supplied from an external power supply unit.

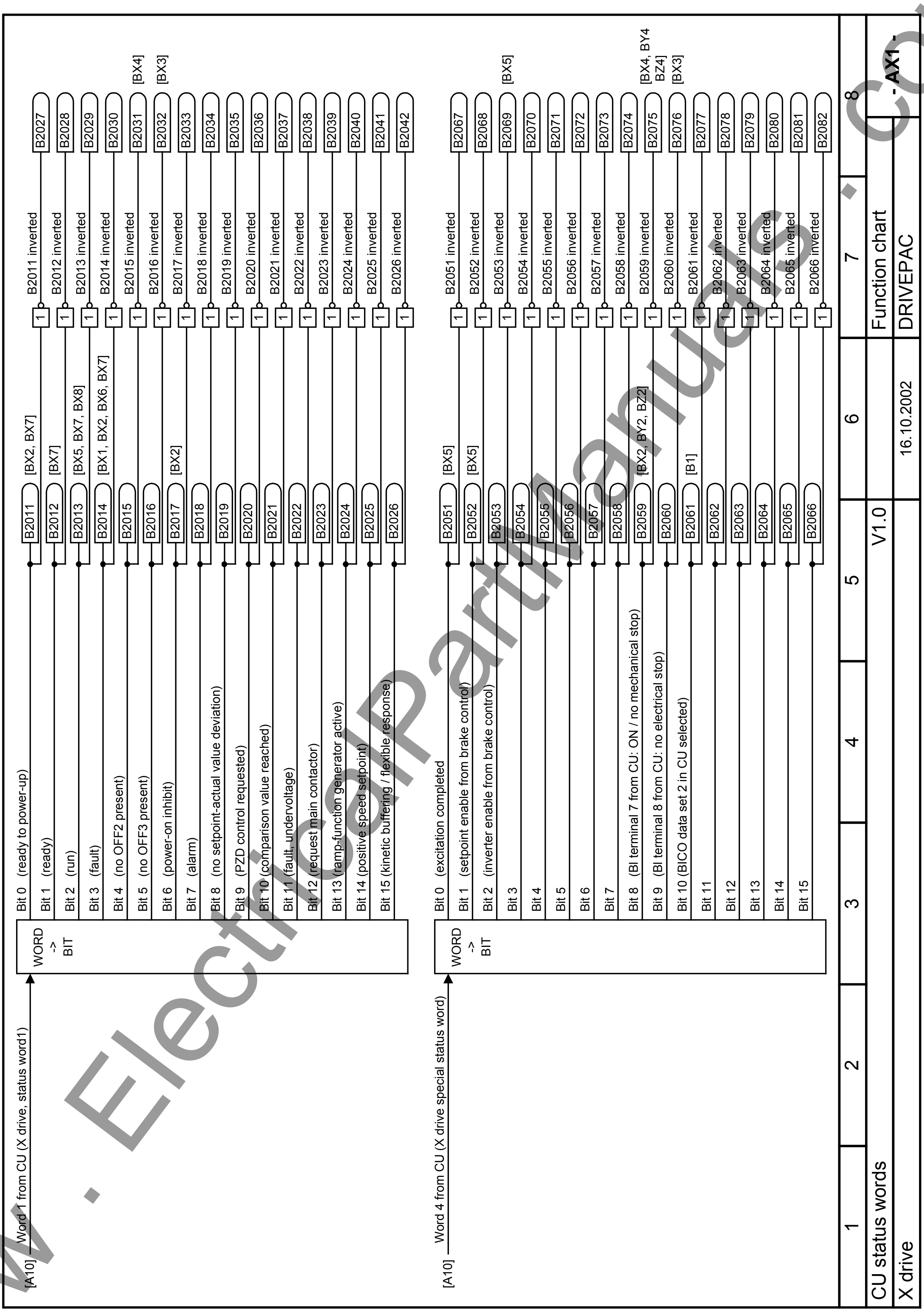
T400	V1.0		Function chart	- A30 -
Pulse encoder inputs 1 and 2		10.09.2001	DRIVEPAC	



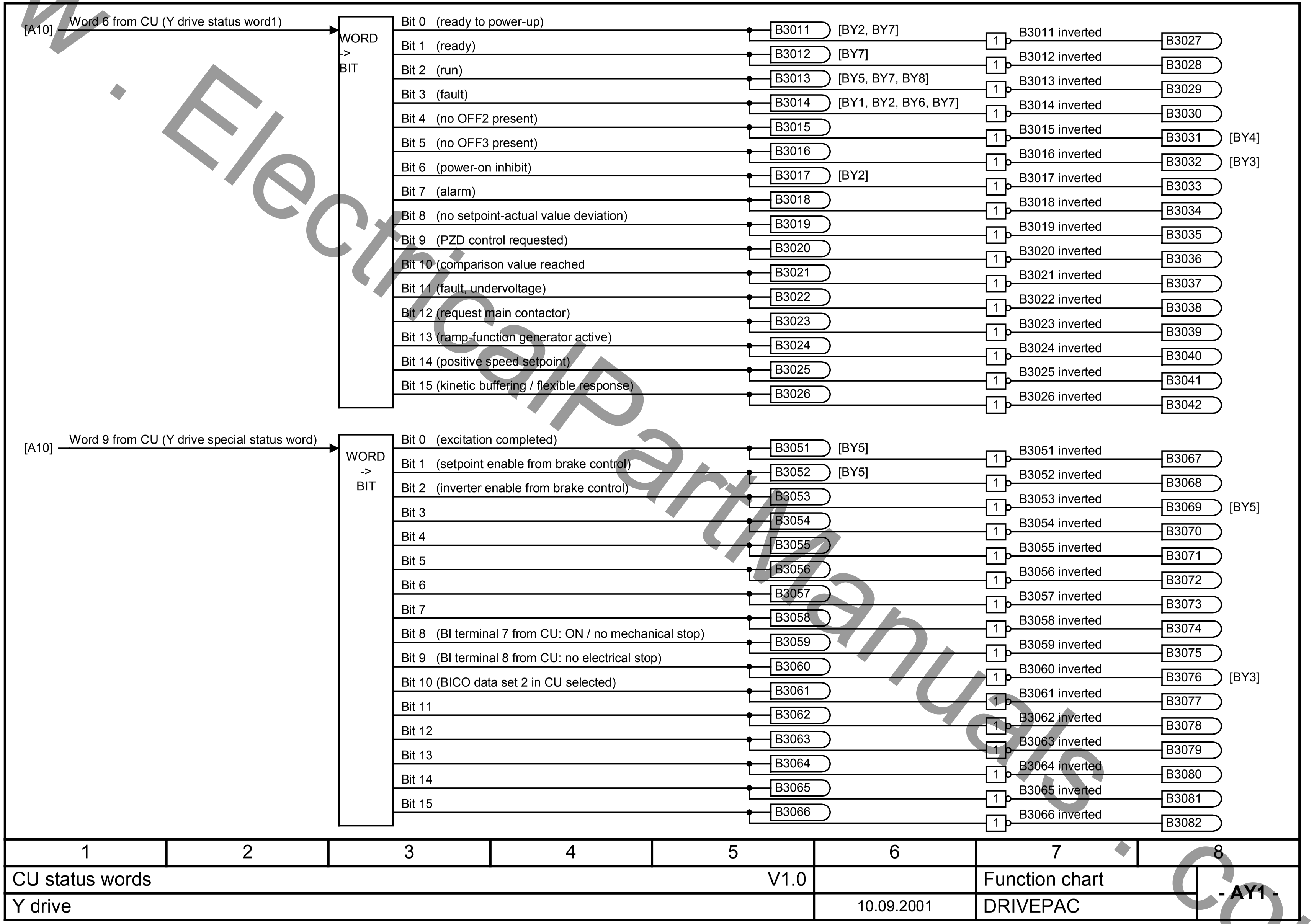
<1>
INIT parameter: Values which are entered are only accepted if the T400 is switched into a no-voltage condition.

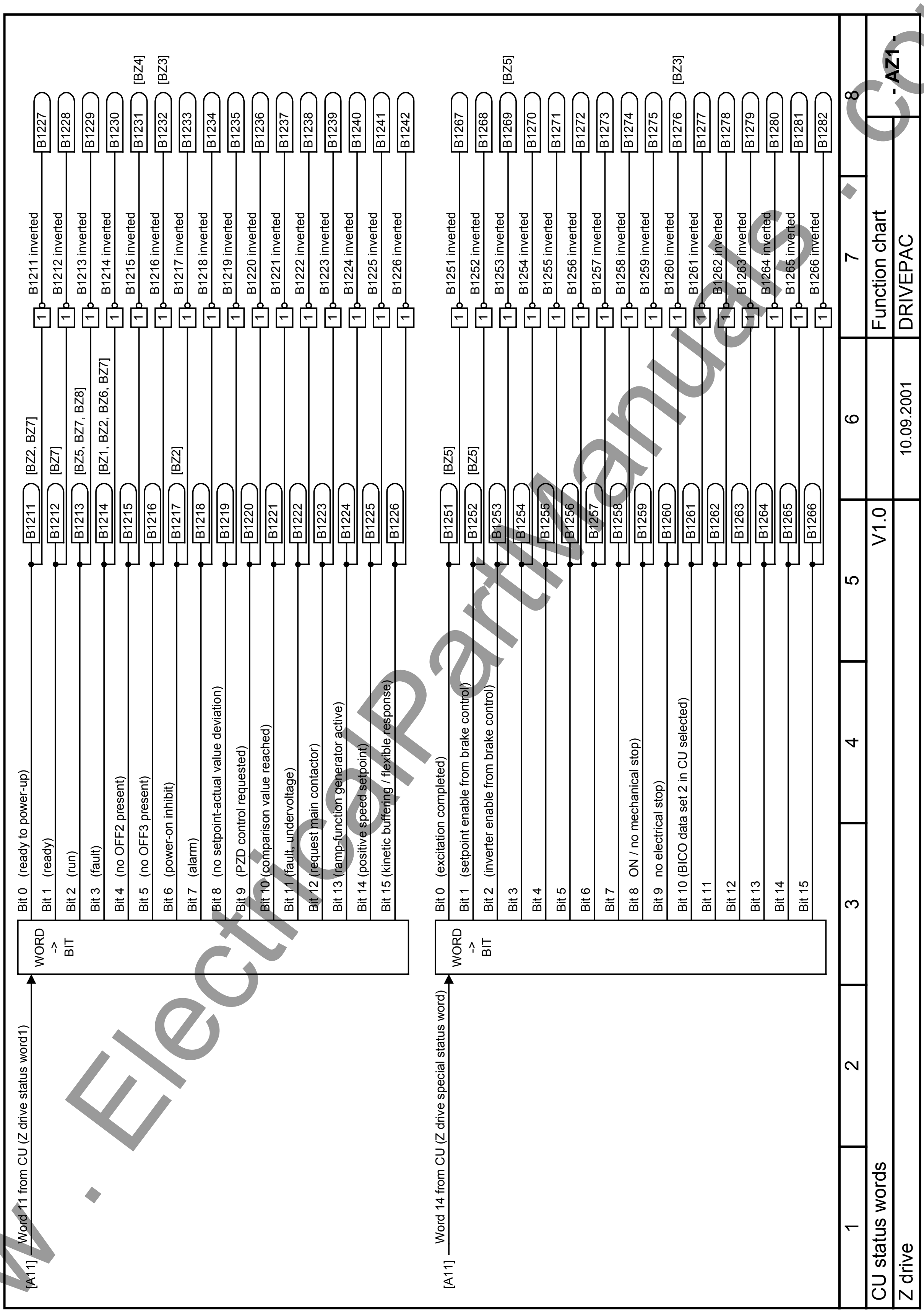
NOTE:
The power supply for the absolute value encoder must be externally provided.

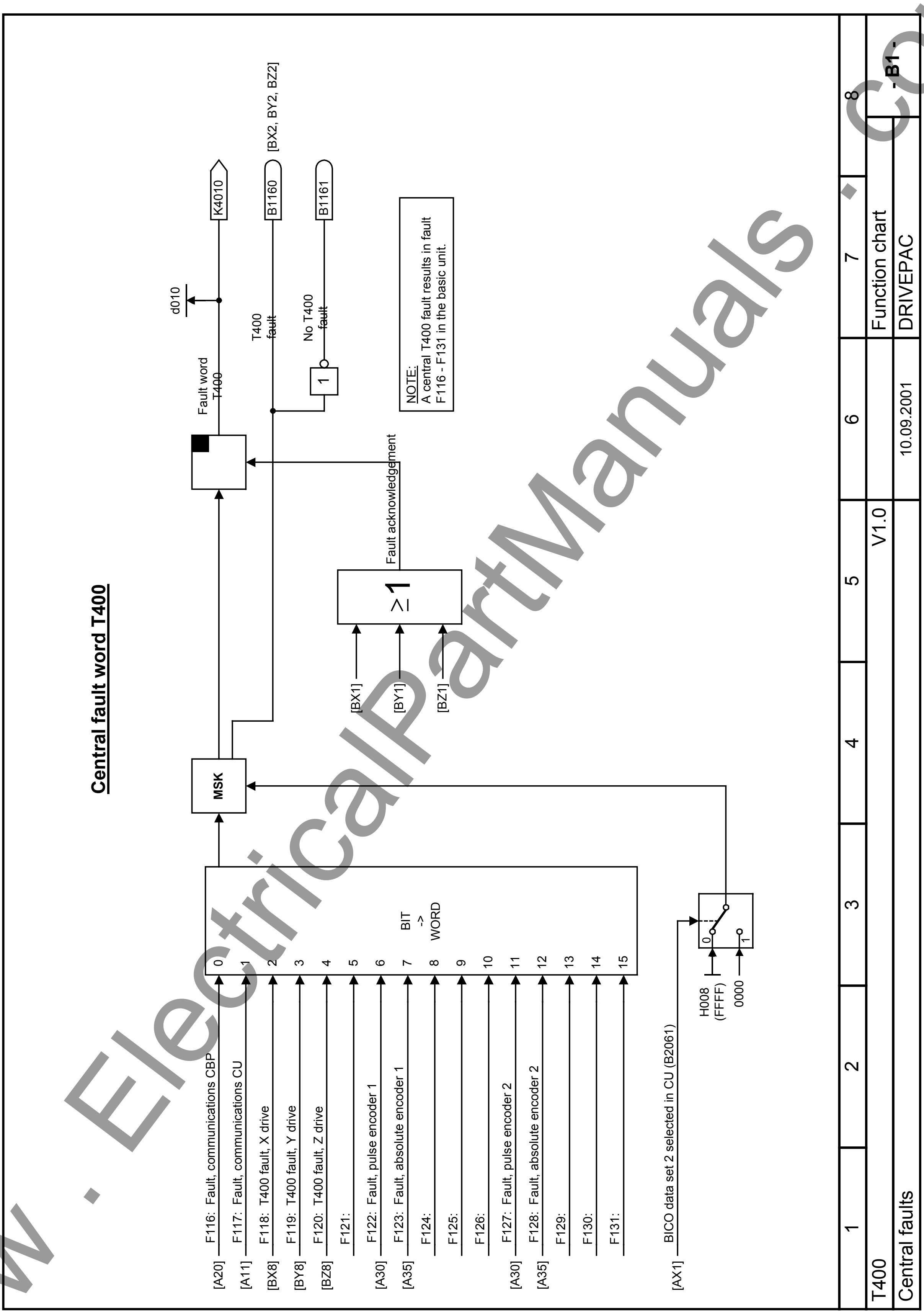

[A10]
Word 2 from CU
(X n/f actual value, KR0012)
[CX3]
VMAX (m/s)
Calculation,
position actual
value by
integrating
n/f actual value
X drive
position actual value
from integration
d213
KR0213
[A40]
[A10]
Word 7 from CU
(Y n/f actual value, KR0017)
[CY3]
VMAX (m/s)
Calculation,
position actual
value by
integrating
n/f actual value
Y drive
position actual value
from integration
d613
KR0613
[A40]
[A40]
KR0213
H215 (0213)
H216
(0.0)
X drive position act. value
d217
KR0217
[A6,
CX2,
DX2,
DX3,
DX5]
[A40]
KR0613
H615 (0613)
H616
(0.0)
Y drive position act. value
d617
KR0617
[A6,
CY2,
DY2,
DY3,
DY5]
[A35]
Position actual value
from absolute encoder 1
KR0242
H243 (0242)
[A2]
X fixed setpoint
offset pendulum length
KR0090
H244 (0090)
[A2]
Offset, pendulum length selected
load center of gravity
KR0992
H246 (0992)
+
+
+
X drive pendulum length
d245
KR0245
[CX2,
DX2]
[A35]
Position actual value
from absolute encoder 2
KR0642
H643 (0642)
[A2]
Y fixed setpoint
offset pendulum length
KR0091
H644 (0091)
[A2]
Offset, pendulum length selected
load center of gravity
KR0992
H646 (0992)
+
+
+
Y drive pendulum length
d645
KR0645
[CY2,
DY2]
1
2
3
4
5
6
7
8
V1.0
Function chart
Selecting the position actual values and pendulum lengths
10.09.2001
DRIVEPAC
- A40 -



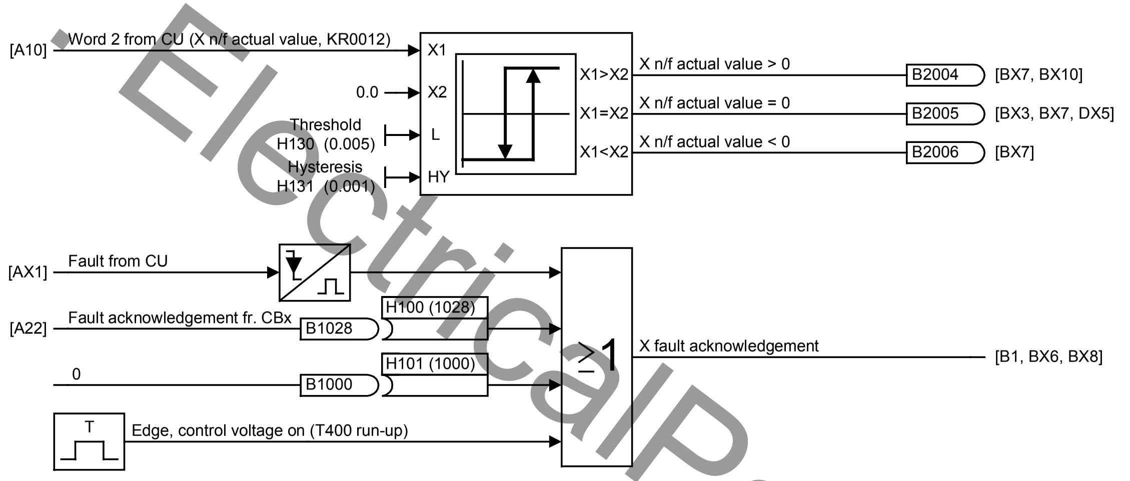
[A10]
Word 1 from CU (X drive, status word1)
WORD
->
BIT
Bit 0 (ready to power-up)
Bit 1 (ready)
Bit 2 (run)
Bit 3 (fault)
Bit 4 (no OFF2 present)
Bit 5 (no OFF3 present)
Bit 6 (power-on inhibit)
Bit 7 (alarm)
Bit 8 (no setpoint-actual value deviation)
Bit 9 (PZD control requested)
Bit 10 (comparison value reached)
Bit 11 (fault, undervoltage)
Bit 12 (request main contactor)
Bit 13 (ramp-function generator active)
Bit 14 (positive speed setpoint)
Bit 15 (kinetic buffering / flexible response)
B2011 [BX2, BX7]
B2012 [BX7]
B2013 [BX5, BX7, BX8]
B2014 [BX1, BX2, BX6, BX7]
B2015
B2016
B2017 [BX2]
B2018
B2019
B2020
B2021
B2022
B2023
B2024
B2025
B2026
1
B2011 inverted
B2012 inverted
B2013 inverted
B2014 inverted
B2015 inverted
B2016 inverted
B2017 inverted
B2018 inverted
B2019 inverted
B2020 inverted
B2021 inverted
B2022 inverted
B2023 inverted
B2024 inverted
B2025 inverted
B2026 inverted
B2027
B2028
B2029
B2030
B2031 [BX4]
B2032 [BX3]
B2033
B2034
B2035
B2036
B2037
B2038
B2039
B2040
B2041
B2042
[A10]
Word 4 from CU (X drive special status word)
WORD
->
BIT
Bit 0 (excitation completed
Bit 1 (setpoint enable from brake control)
Bit 2 (inverter enable from brake control)
Bit 3
Bit 4
Bit 5
Bit 6
Bit 7
Bit 8 (BI terminal 7 from CU: ON / no mechanical stop)
Bit 9 (BI terminal 8 from CU: no electrical stop)
Bit 10 (BICO data set 2 in CU selected)
Bit 11
Bit 12
Bit 13
Bit 14
Bit 15
B2051 [BX5]
B2052 [BX5]
B2053
B2054
B2055
B2056
B2057
B2058
B2059 [BX2, BY2, BZ2]
B2060
B2061 [B1]
B2062
B2063
B2064
B2065
B2066
B2051 inverted
B2052 inverted
B2053 inverted
B2054 inverted
B2055 inverted
B2056 inverted
B2057 inverted
B2058 inverted
B2059 inverted
B2060 inverted
B2061 inverted
B2062 inverted
B2063 inverted
B2064 inverted
B2065 inverted
B2066 inverted
B2067
B2068
B2069 [BX5]
B2070
B2071
B2072
B2073
B2074
B2075 [BX4, BY4 BZ4]
B2076 [BX3]
B2077
B2078
B2079
B2080
B2081
B2082
1
2
3
4
5
6
7
8
CU status words
X drive
V1.0
16.10.2002
Function chart
DRIVEPAC
- AX1 -


[A10] Word 6 from CU (Y drive status word1)
WORD -> BIT
Bit 0 (ready to power-up)
Bit 1 (ready)
Bit 2 (run)
Bit 3 (fault)
Bit 4 (no OFF2 present)
Bit 5 (no OFF3 present)
Bit 6 (power-on inhibit)
Bit 7 (alarm)
Bit 8 (no setpoint-actual value deviation)
Bit 9 (PZD control requested)
Bit 10 (comparison value reached
Bit 11 (fault, undervoltage)
Bit 12 (request main contactor)
Bit 13 (ramp-function generator active)
Bit 14 (positive speed setpoint)
Bit 15 (kinetic buffering / flexible response)
B3011 [BY2, BY7]
B3012 [BY7]
B3013 [BY5, BY7, BY8]
B3014 [BY1, BY2, BY6, BY7]
B3015
B3016
B3017 [BY2]
B3018
B3019
B3020
B3021
B3022
B3023
B3024
B3025
B3026
1
B3011 inverted
B3012 inverted
B3013 inverted
B3014 inverted
B3015 inverted
B3016 inverted
B3017 inverted
B3018 inverted
B3019 inverted
B3020 inverted
B3021 inverted
B3022 inverted
B3023 inverted
B3024 inverted
B3025 inverted
B3026 inverted
B3027
B3028
B3029
B3030
B3031 [BY4]
B3032 [BY3]
B3033
B3034
B3035
B3036
B3037
B3038
B3039
B3040
B3041
B3042
[A10] Word 9 from CU (Y drive special status word)
WORD -> BIT
Bit 0 (excitation completed)
Bit 1 (setpoint enable from brake control)
Bit 2 (inverter enable from brake control)
Bit 3
Bit 4
Bit 5
Bit 6
Bit 7
Bit 8 (BI terminal 7 from CU: ON / no mechanical stop)
Bit 9 (BI terminal 8 from CU: no electrical stop)
Bit 10 (BICO data set 2 in CU selected)
Bit 11
Bit 12
Bit 13
Bit 14
Bit 15
B3051 [BY5]
B3052 [BY5]
B3053
B3054
B3055
B3056
B3057
B3058
B3059
B3060
B3061
B3062
B3063
B3064
B3065
B3066
B3051 inverted
B3052 inverted
B3053 inverted
B3054 inverted
B3055 inverted
B3056 inverted
B3057 inverted
B3058 inverted
B3059 inverted
B3060 inverted
B3061 inverted
B3062 inverted
B3063 inverted
B3064 inverted
B3065 inverted
B3066 inverted
B3067
B3068
B3069 [BY5]
B3070
B3071
B3072
B3073
B3074
B3075
B3076 [BY3]
B3077
B3078
B3079
B3080
B3081
B3082
1
2
3
4
5
6
7
8
CU status words
V1.0
Function chart
- AY1 -
Y drive
10.09.2001
DRIVEPAC

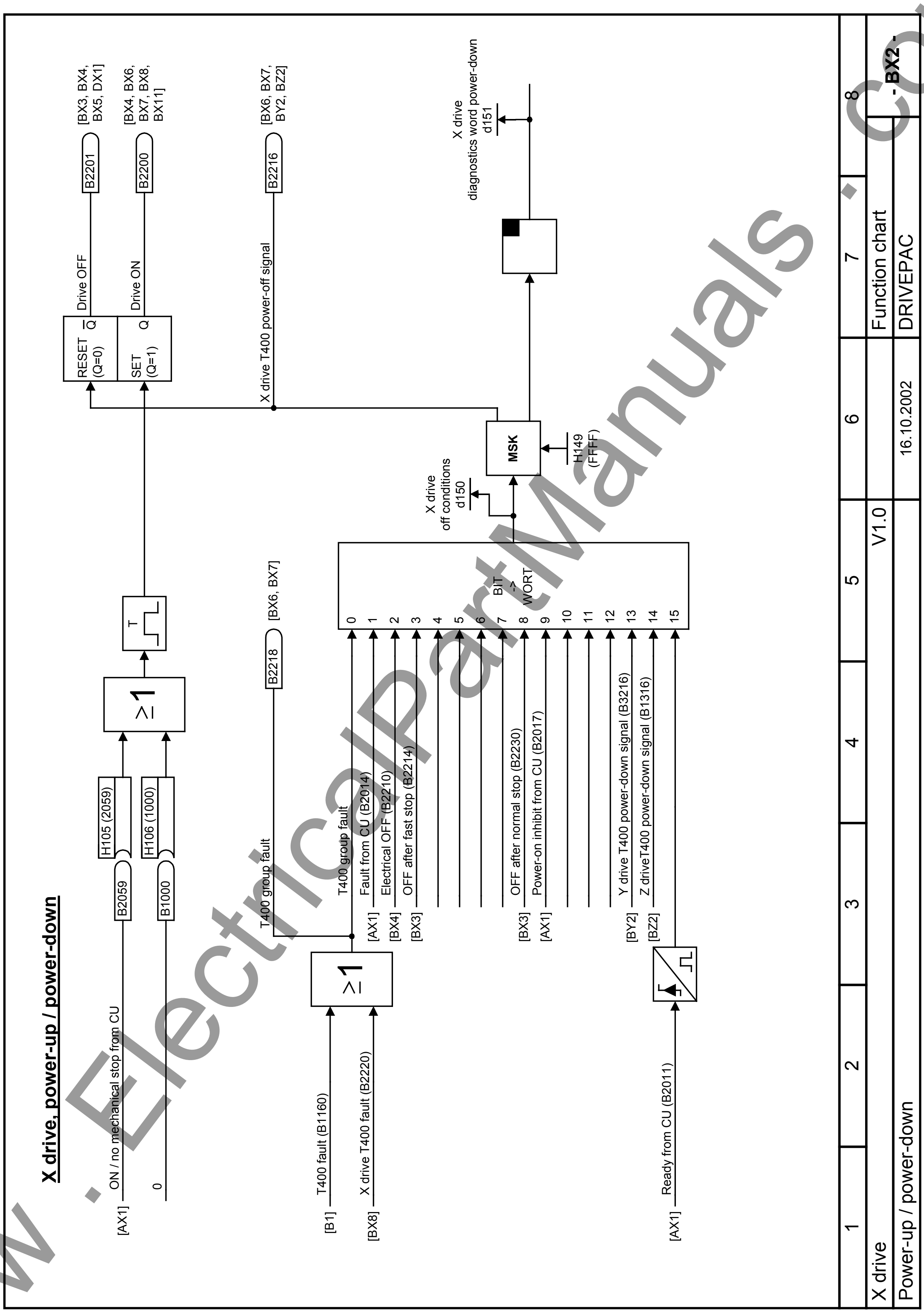

[A11] Word 11 from CU (Z drive status word1)
WORD -> BIT
Bit 0 (ready to power-up)
Bit 1 (ready)
Bit 2 (run)
Bit 3 (fault)
Bit 4 (no OFF2 present)
Bit 5 (no OFF3 present)
Bit 6 (power-on inhibit)
Bit 7 (alarm)
Bit 8 (no setpoint-actual value deviation)
Bit 9 (PZD control requested)
Bit 10 (comparison value reached)
Bit 11 (fault, undervoltage)
Bit 12 (request main contactor)
Bit 13 (ramp-function generator active)
Bit 14 (positive speed setpoint)
Bit 15 (kinetic buffering / flexible response)
B1211 [BZ2, BZ7]
B1212 [BZ7]
B1213 [BZ5, BZ7, BZ8]
B1214 [BZ1, BZ2, BZ6, BZ7]
B1215
B1216
B1217 [BZ2]
B1218
B1219
B1220
B1221
B1222
B1223
B1224
B1225
B1226
1
B1211 inverted
B1212 inverted
B1213 inverted
B1214 inverted
B1215 inverted
B1216 inverted
B1217 inverted
B1218 inverted
B1219 inverted
B1220 inverted
B1221 inverted
B1222 inverted
B1223 inverted
B1224 inverted
B1225 inverted
B1226 inverted
B1227
B1228
B1229
B1230
B1231 [BZ4]
B1232 [BZ3]
B1233
B1234
B1235
B1236
B1237
B1238
B1239
B1240
B1241
B1242
[A11] Word 14 from CU (Z drive special status word)
WORD -> BIT
Bit 0 (excitation completed)
Bit 1 (setpoint enable from brake control)
Bit 2 (inverter enable from brake control)
Bit 3
Bit 4
Bit 5
Bit 6
Bit 7
Bit 8 ON / no mechanical stop)
Bit 9 no electrical stop)
Bit 10 (BICO data set 2 in CU selected)
Bit 11
Bit 12
Bit 13
Bit 14
Bit 15
B1251 [BZ5]
B1252 [BZ5]
B1253
B1254
B1255
B1256
B1257
B1258
B1259
B1260
B1261
B1262
B1263
B1264
B1265
B1266
B1251 inverted
B1252 inverted
B1253 inverted
B1254 inverted
B1255 inverted
B1256 inverted
B1257 inverted
B1258 inverted
B1259 inverted
B1260 inverted
B1261 inverted
B1262 inverted
B1263 inverted
B1264 inverted
B1265 inverted
B1266 inverted
B1267
B1268
B1269 [BZ5]
B1270
B1271
B1272
B1273
B1274
B1275
B1276 [BZ3]
B1277
B1278
B1279
B1280
B1281
B1282
1
2
3
4
5
6
7
8
CU status words
Z drive
V1.0
10.09.2001
Function chart
DRIVEPAC
- AZ1 -

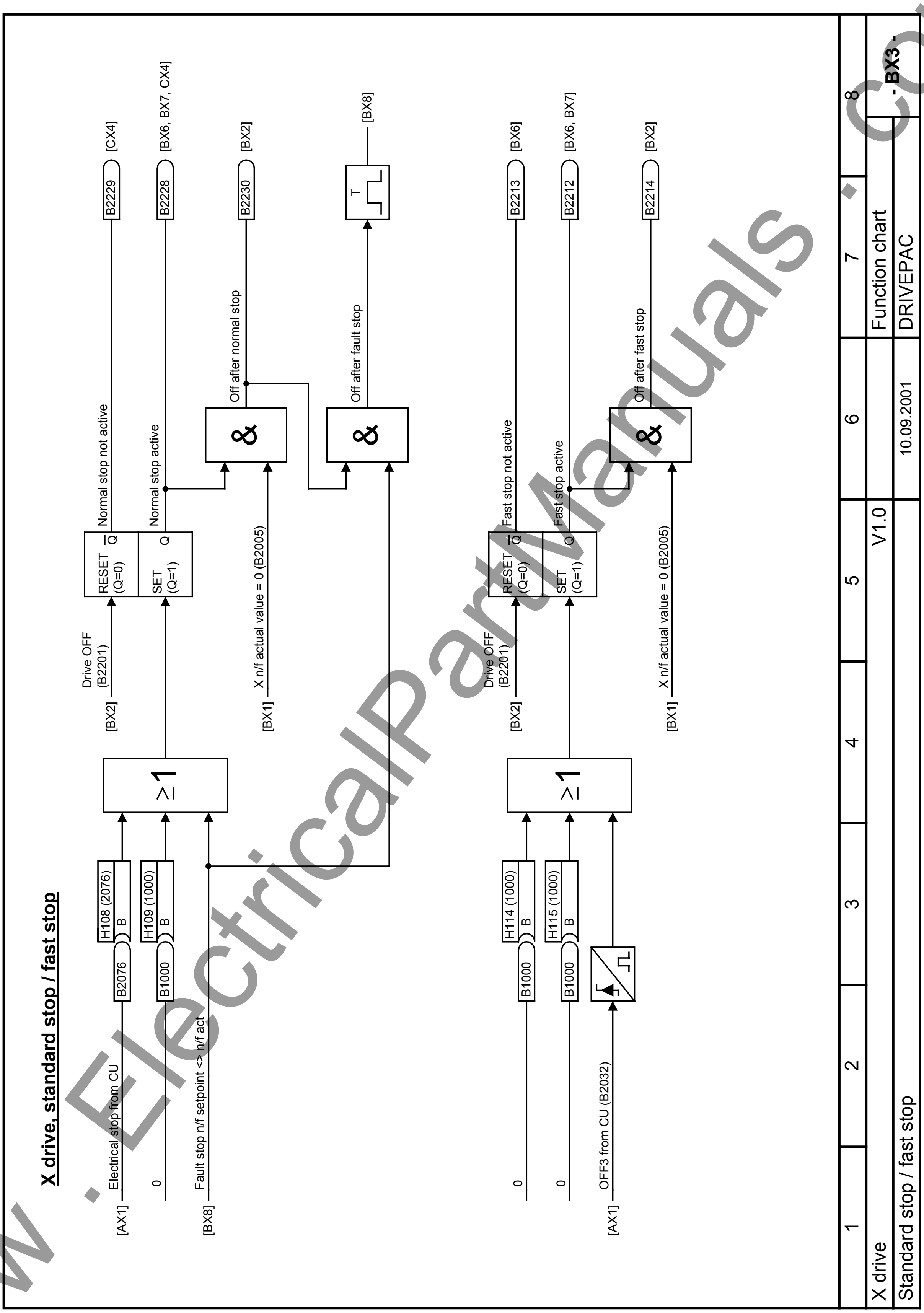

Central fault word T400
[A20] F116: Fault, communications CBP
[A11] F117: Fault, communications CU
[BX8] F118: T400 fault, X drive
[BY8] F119: T400 fault, Y drive
[BZ8] F120: T400 fault, Z drive
F121:
[A30] F122: Fault, pulse encoder 1
[A35] F123: Fault, absolute encoder 1
F124:
F125:
F126:
[A30] F127: Fault, pulse encoder 2
[A35] F128: Fault, absolute encoder 2
F129:
F130:
F131:
[AX1] BICO data set 2 selected in CU (B2061)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
BIT -> WORD
H008 (FFFF)
0000
0
1
MSK
[BX1]
[BY1]
[BZ1]
≥1
Fault acknowledgement
Fault word T400
d010
K4010
T400 fault
B1160
[BX2, BY2, BZ2]
No T400 fault
1
B1161
NOTE:
A central T400 fault results in fault F116 - F131 in the basic unit.
1 2 3 4 5 6 7 8
T400
Central faults
V1.0
10.09.2001
Function chart
DRIVEPAC
- B1 -

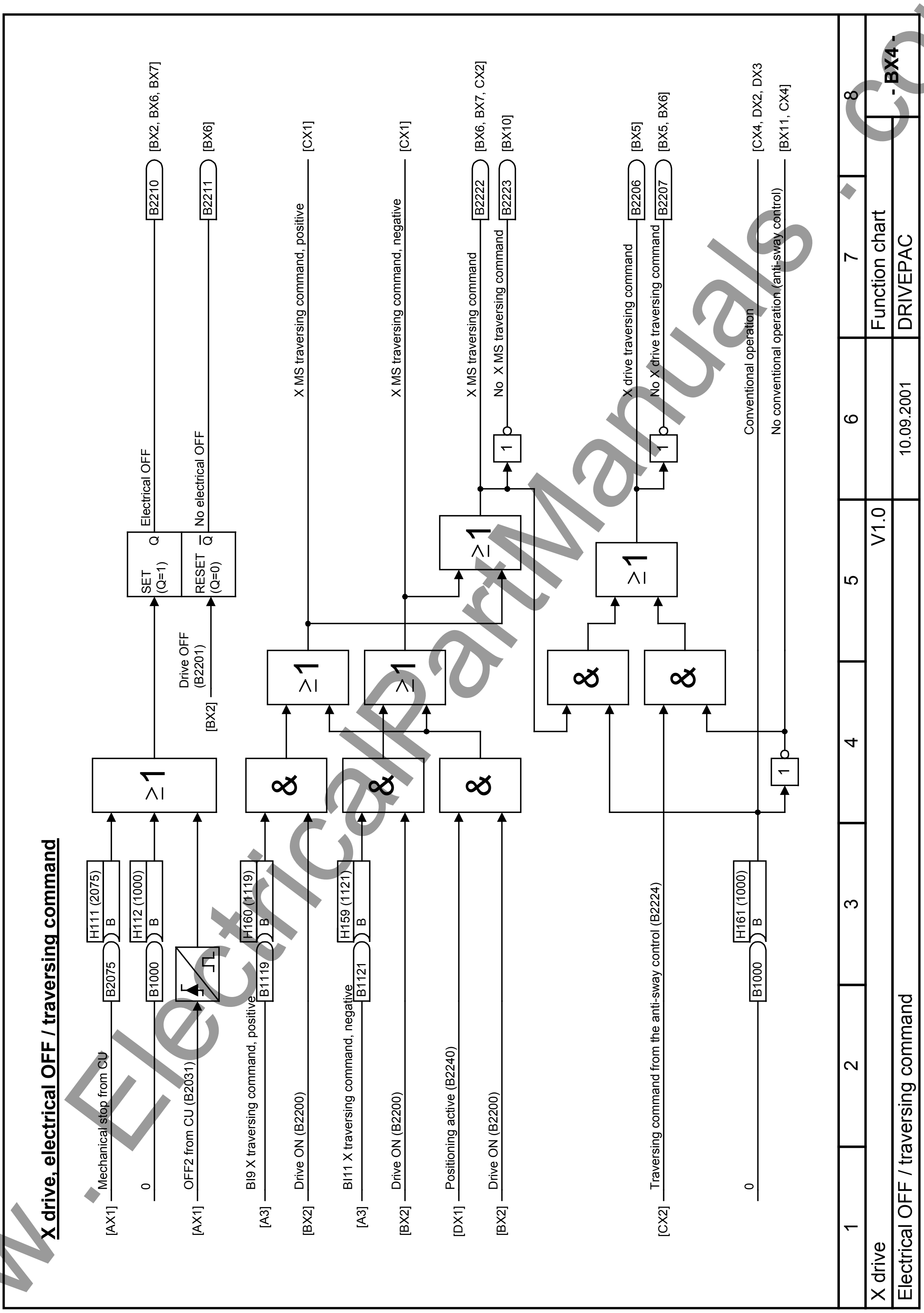
X drive zero speed signal, fault acknowledgement

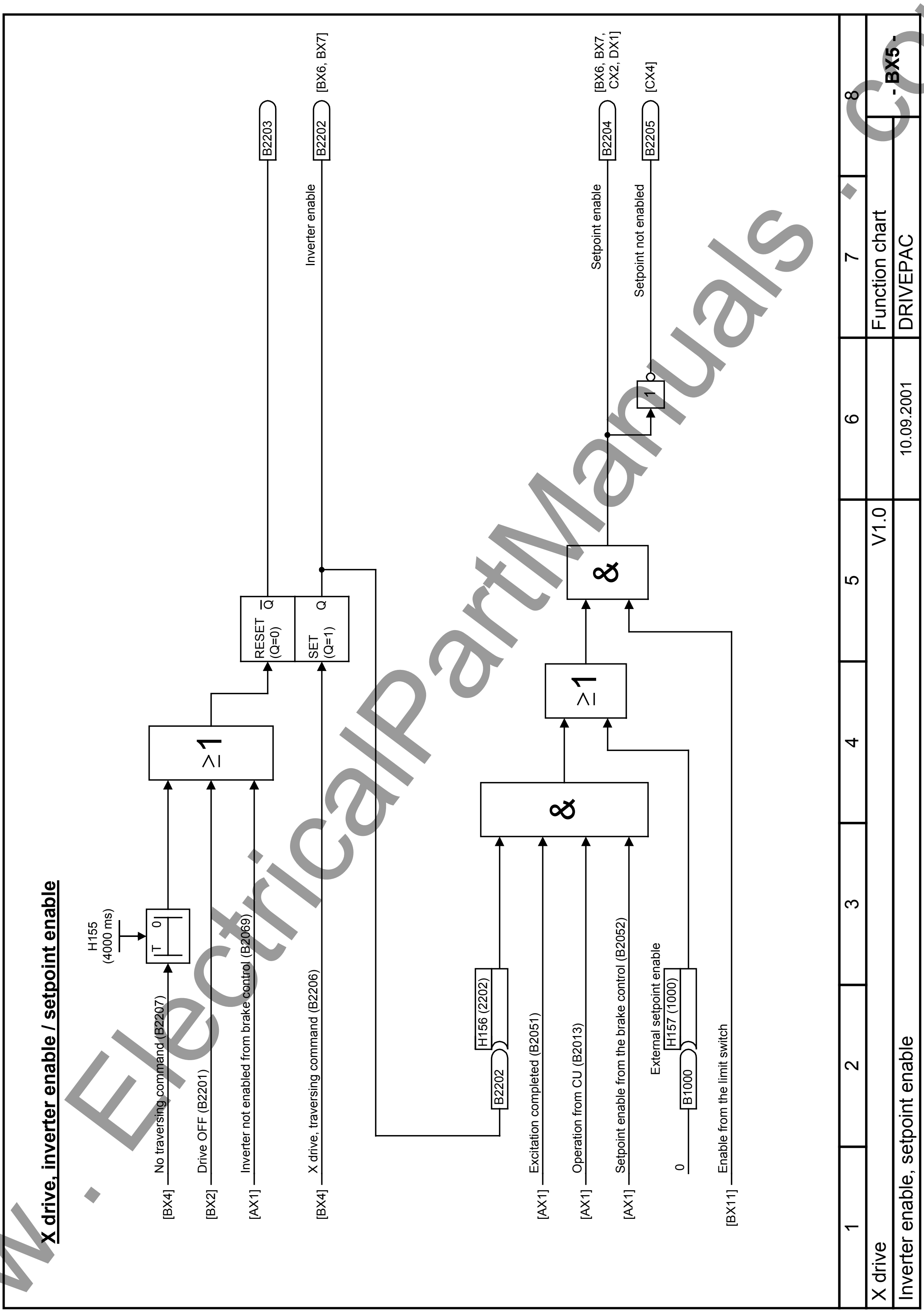


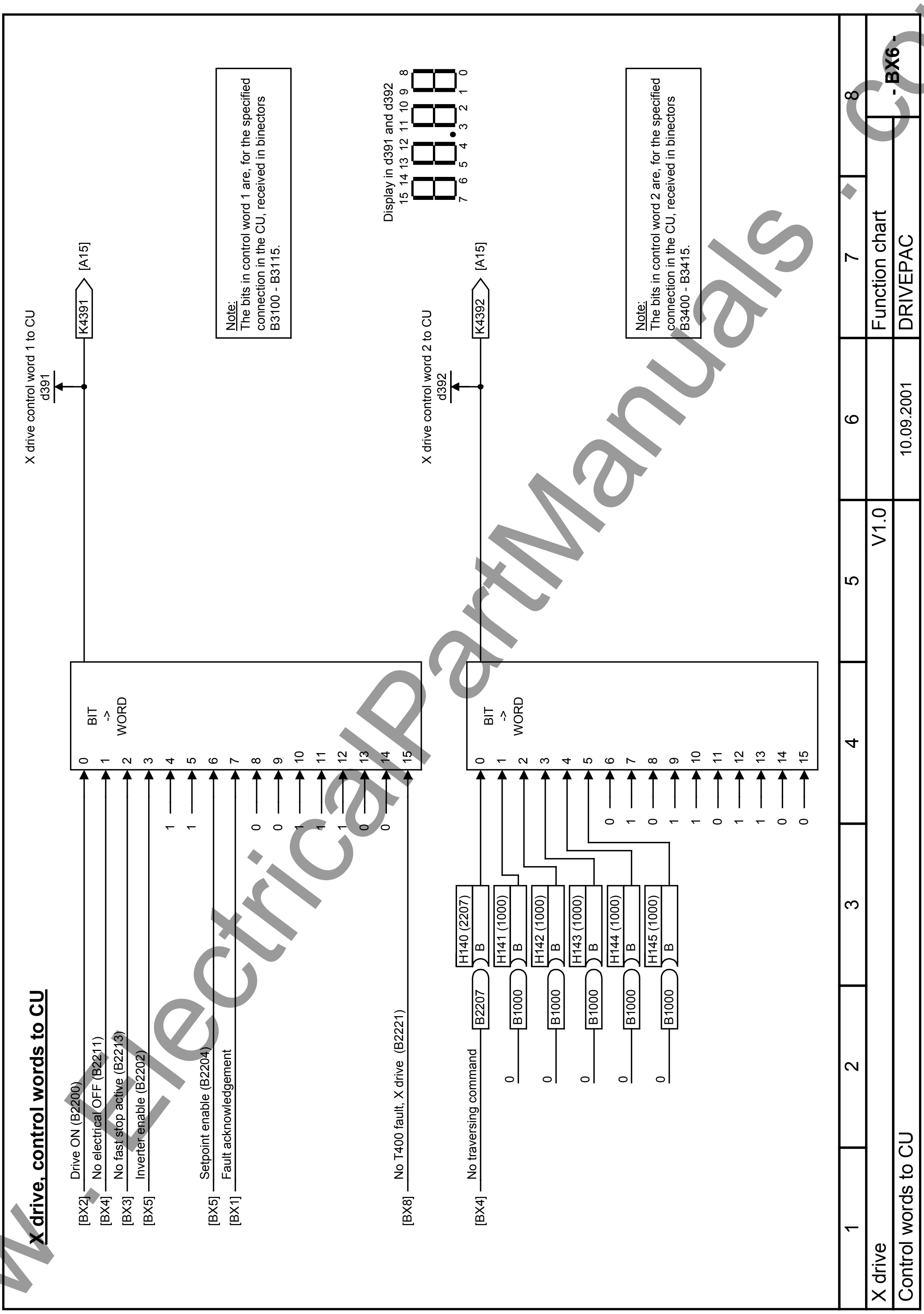
1	2	3	4	5	6	7	8
X drive				V1.0		Function chart	- BX1 -
Zero speed signal / fault acknowledgement					10.09.2001	DRIVEPAC	

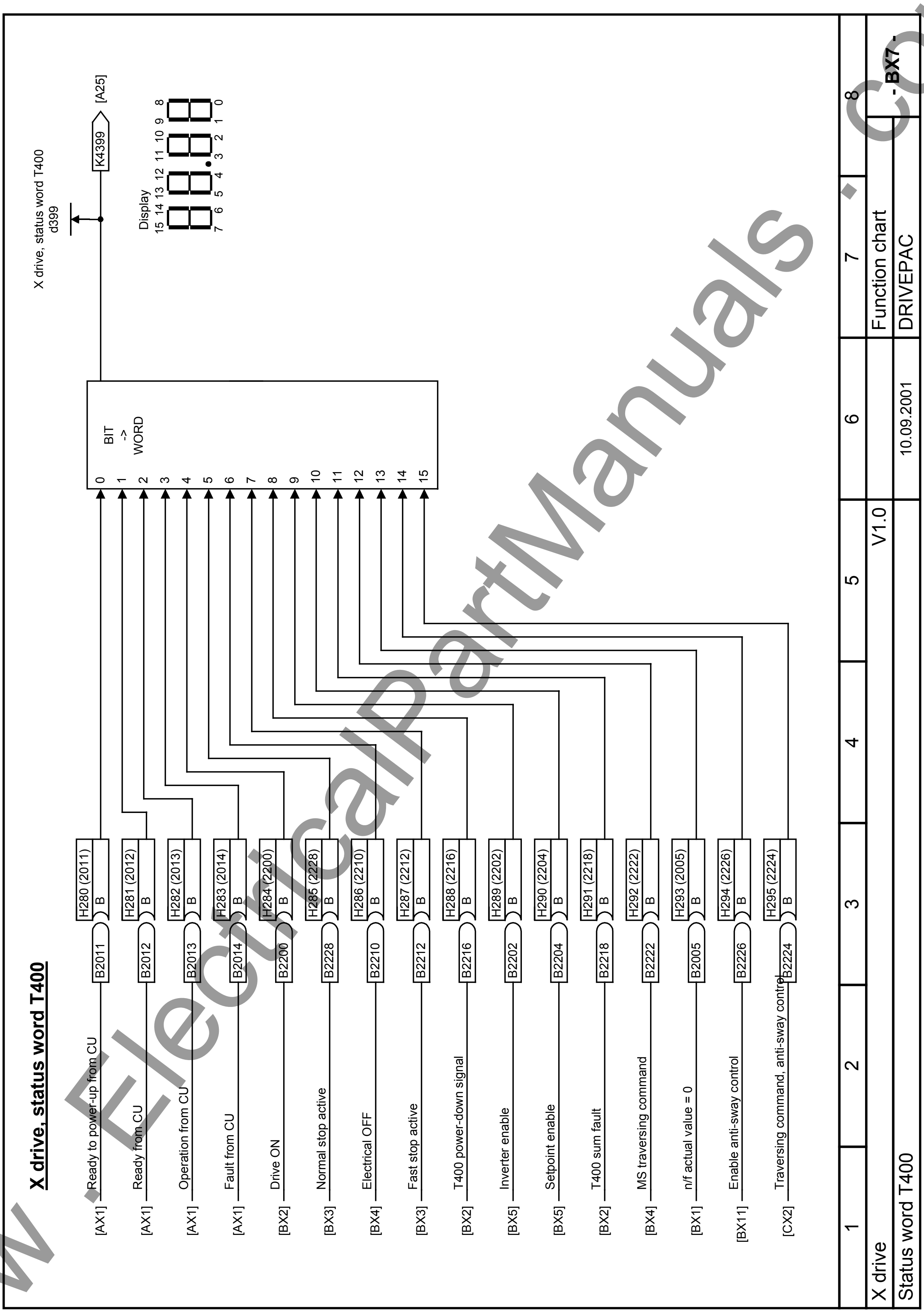

X drive, power-up / power-down
[AX1] ON / no mechanical stop from CU
B2059
H105 (2059)
0
B1000
H106 (1000)
≥1
T
RESET (Q=0) Q̄ Drive OFF
SET (Q=1) Q Drive ON
B2201 [BX3, BX4, BX5, DX1]
B2200 [BX4, BX6, BX7, BX8, BX11]
X drive T400 power-off signal
B2216 [BX6, BX7, BY2, BZ2]
[B1] T400 fault (B1160)
[BX8] X drive T400 fault (B2220)
≥1
T400 group fault
B2218 [BX6, BX7]
T400 group fault
[AX1] Fault from CU (B2014)
[BX4] Electrical OFF (B2210)
[BX3] OFF after fast stop (B2214)
[BX3] OFF after normal stop (B2230)
[AX1] Power-on inhibit from CU (B2017)
[BY2] Y drive T400 power-down signal (B3216)
[BZ2] Z driveT400 power-down signal (B1316)
[AX1] Ready from CU (B2011)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
BIT -> WORT
X drive off conditions d150
MSK
H149 (FFFF)
X drive diagnostics word power-down d151
1 2 3 4 5 6 7 8
X drive
Power-up / power-down
V1.0
16.10.2002
Function chart
DRIVEPAC
- BX2 -


X drive, standard stop / fast stop
[AX1] Electrical stop from CU
B2076
H108 (2076) B
0
B1000
H109 (1000) B
[BX8] Fault stop n/f setpoint <> n/f act
≥1
[BX2] Drive OFF (B2201)
RESET (Q=0) Q̄
SET (Q=1) Q
Normal stop not active
B2229 [CX4]
Normal stop active
B2228 [BX6, BX7, CX4]
[BX1] X n/f actual value = 0 (B2005)
&
Off after normal stop
B2230 [BX2]
&
Off after fault stop
T
[BX8]
0
B1000
H114 (1000) B
0
B1000
H115 (1000) B
[AX1] OFF3 from CU (B2032)
≥1
[BX2] Drive OFF (B2201)
RESET (Q=0) Q̄
SET (Q=1) Q
Fast stop not active
B2213 [BX6]
Fast stop active
B2212 [BX6, BX7]
[BX1] X n/f actual value = 0 (B2005)
&
Off after fast stop
B2214 [BX2]
1
2
3
4
5
6
7
8
X drive
Standard stop / fast stop
V1.0
10.09.2001
Function chart
DRIVEPAC
- BX3 -

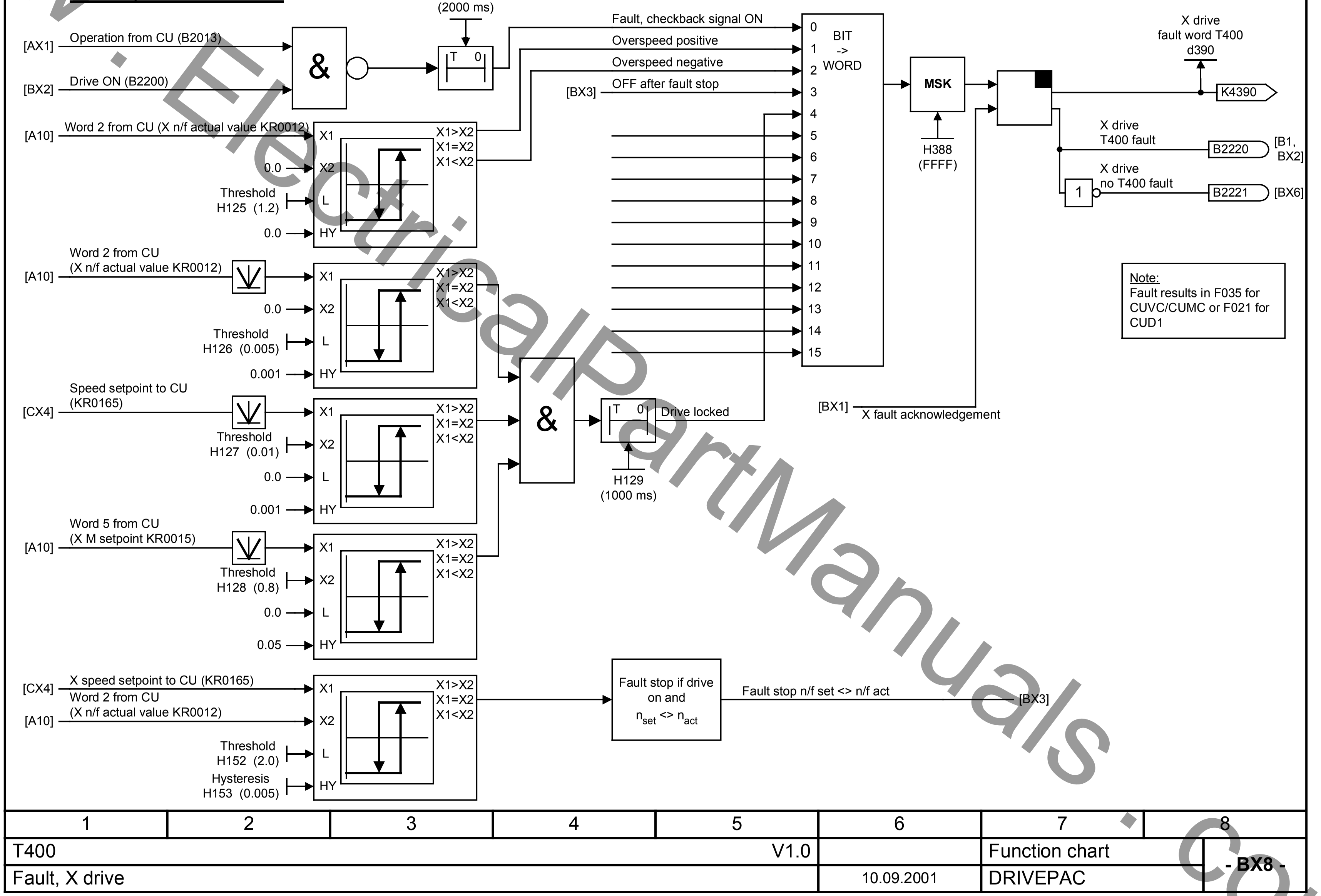

X drive, electrical OFF / traversing command
[AX1] Mechanical stop from CU B2075 H111 (2075) B
0 B1000 H112 (1000) B
[AX1] OFF2 from CU (B2031)
[A3] BI9 X traversing command, positive B1119 H160 (1119) B
[BX2] Drive ON (B2200)
[A3] BI11 X traversing command, negative B1121 H159 (1121) B
[BX2] Drive ON (B2200)
[DX1] Positioning active (B2240)
[BX2] Drive ON (B2200)
[CX2] Traversing command from the anti-sway control (B2224)
0 B1000 H161 (1000) B
≥1
&
&
&
≥1
≥1
&
&
1
[BX2] Drive OFF (B2201)
SET (Q=1) Q
RESET (Q=0) Q̄
≥1
≥1
1
1
Electrical OFF B2210 [BX2, BX6, BX7]
No electrical OFF B2211 [BX6]
X MS traversing command, positive [CX1]
X MS traversing command, negative [CX1]
X MS traversing command B2222 [BX6, BX7, CX2]
No X MS traversing command B2223 [BX10]
X drive traversing command B2206 [BX5]
No X drive traversing command B2207 [BX5, BX6]
Conventional operation [CX4, DX2, DX3]
No conventional operation (anti-sway control) [BX11, CX4]
1 2 3 4 5 6 7 8
X drive
Electrical OFF / traversing command
V1.0
10.09.2001
Function chart
DRIVEPAC
- BX4 -

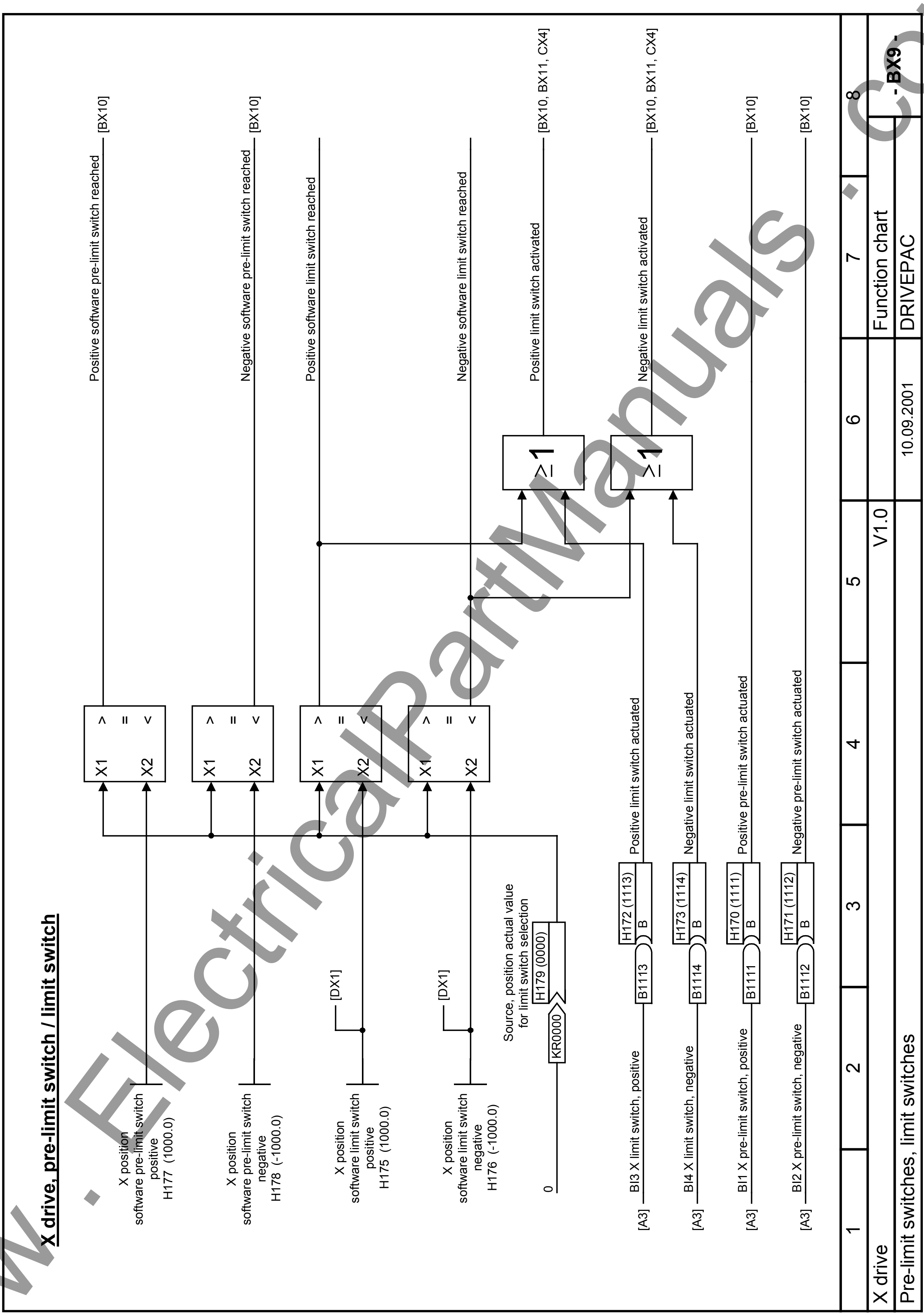

X drive, inverter enable / setpoint enable
[BX4] No traversing command (B2207)
H155 (4000 ms)
T 0
[BX2] Drive OFF (B2201)
[AX1] Inverter not enabled from brake control (B2069)
≥1
RESET (Q=0) Q̄
SET (Q=1) Q
B2203
[BX6, BX7]
B2202
Inverter enable
[BX4] X drive, traversing command (B2206)
B2202
H156 (2202)
[AX1] Excitation completed (B2051)
[AX1] Operation from CU (B2013)
[AX1] Setpoint enable from the brake control (B2052)
0
B1000
H157 (1000)
External setpoint enable
[BX11] Enable from the limit switch
&
≥1
&
1
Setpoint enable
B2204
[BX6, BX7, CX2, DX1]
Setpoint not enabled
B2205
[CX4]
1
2
3
4
5
6
7
8
X drive
Inverter enable, setpoint enable
V1.0
10.09.2001
Function chart
DRIVEPAC
- BX5 -

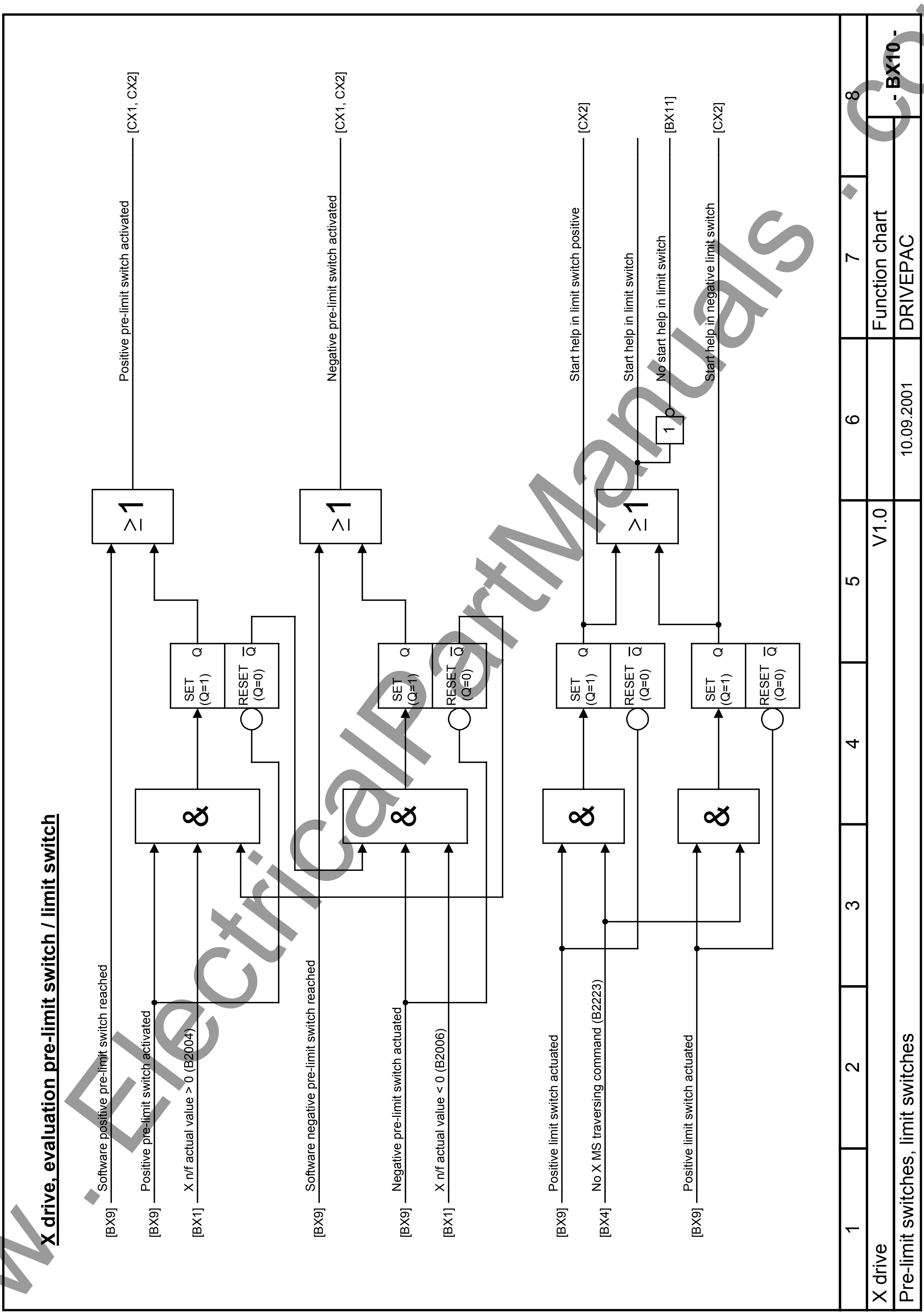

X drive, control words to CU
[BX2] Drive ON (B2200)
[BX4] No electrical OFF (B2211)
[BX3] No fast stop active (B2213)
[BX5] Inverter enable (B2202)
[BX5] Setpoint enable (B2204)
[BX1] Fault acknowledgement
[BX8] No T400 fault, X drive (B2221)
1
1
0
0
1
1
1
0
0
BIT
->
WORD
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
X drive control word 1 to CU
d391
K4391
[A15]
Note:
The bits in control word 1 are, for the specified connection in the CU, received in binectors B3100 - B3115.
Display in d391 and d392
15 14 13 12 11 10 9 8
7 6 5 4 3 2 1 0
[BX4] No traversing command
B2207
H140 (2207)
B
0
B1000
H141 (1000)
B
0
B1000
H142 (1000)
B
0
B1000
H143 (1000)
B
0
B1000
H144 (1000)
B
0
B1000
H145 (1000)
B
0
1
0
1
1
0
1
1
0
0
BIT
->
WORD
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
X drive control word 2 to CU
d392
K4392
[A15]
Note:
The bits in control word 2 are, for the specified connection in the CU, received in binectors B3400 - B3415.
1 2 3 4 5 6 7 8
V1.0
10.09.2001
X drive
Control words to CU
Function chart
DRIVEPAC
- BX6 -

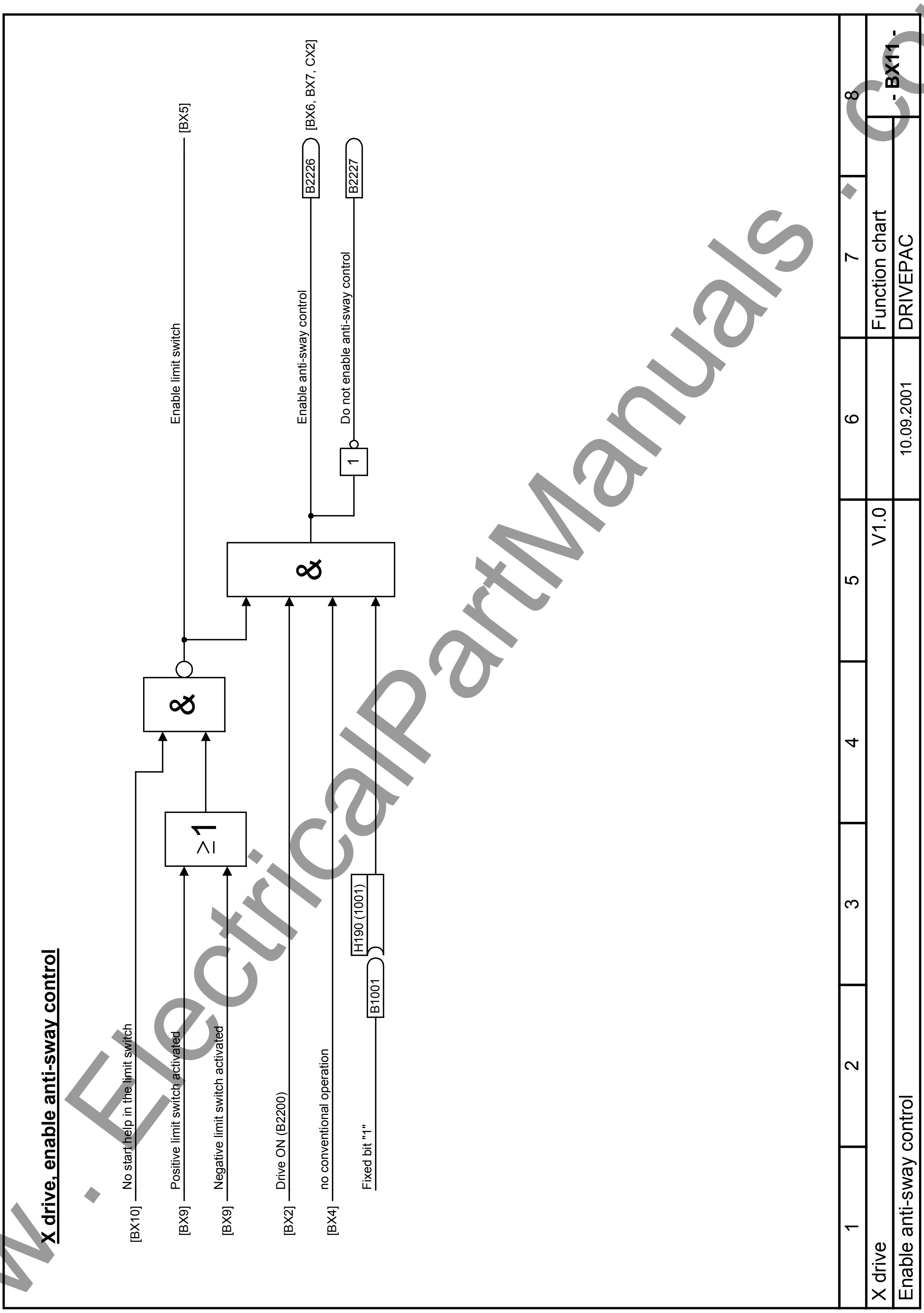

X drive, status word T400
[AX1] Ready to power-up from CU B2011 H280 (2011) B
[AX1] Ready from CU B2012 H281 (2012) B
[AX1] Operation from CU B2013 H282 (2013) B
[AX1] Fault from CU B2014 H283 (2014) B
[BX2] Drive ON B2200 H284 (2200) B
[BX3] Normal stop active B2228 H285 (2228) B
[BX4] Electrical OFF B2210 H286 (2210) B
[BX3] Fast stop active B2212 H287 (2212) B
[BX2] T400 power-down signal B2216 H288 (2216) B
[BX5] Inverter enable B2202 H289 (2202) B
[BX5] Setpoint enable B2204 H290 (2204) B
[BX2] T400 sum fault B2218 H291 (2218) B
[BX4] MS traversing command B2222 H292 (2222) B
[BX1] n/f actual value = 0 B2005 H293 (2005) B
[BX11] Enable anti-sway control B2226 H294 (2226) B
[CX2] Traversing command, anti-sway control B2224 H295 (2224) B
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
BIT -> WORD
X drive, status word T400
d399
K4399 [A25]
Display
15 14 13 12 11 10 9 8
7 6 5 4 3 2 1 0
1 2 3 4 5 6 7 8
V1.0
10.09.2001
Function chart
DRIVEPAC
- BX7 -
X drive
Status word T400

X drive, fault word T400

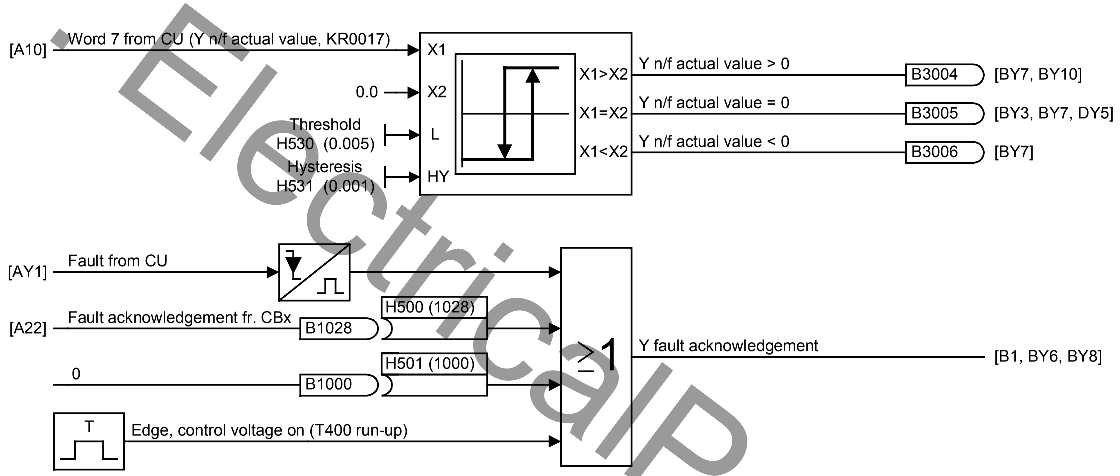



X drive, pre-limit switch / limit switch
X position
software pre-limit switch
positive
H177 (1000.0)
X position
software pre-limit switch
negative
H178 (-1000.0)
X position
software limit switch
positive
H175 (1000.0)
X position
software limit switch
negative
H176 (-1000.0)
[DX1]
[DX1]
0
KR0000
H179 (0000)
Source, position actual value
for limit switch selection
[A3]
BI3 X limit switch, positive
B1113
H172 (1113)
B
Positive limit switch actuated
[A3]
BI4 X limit switch, negative
B1114
H173 (1114)
B
Negative limit switch actuated
[A3]
BI1 X pre-limit switch, positive
B1111
H170 (1111)
B
Positive pre-limit switch actuated
[A3]
BI2 X pre-limit switch, negative
B1112
H171 (1112)
B
Negative pre-limit switch actuated
X1
X2
>
=
<
≥1
≥1
Positive software pre-limit switch reached
[BX10]
Negative software pre-limit switch reached
[BX10]
Positive software limit switch reached
Negative software limit switch reached
Positive limit switch activated
[BX10, BX11, CX4]
Negative limit switch activated
[BX10, BX11, CX4]
[BX10]
[BX10]
1
2
3
4
5
6
7
8
X drive
Pre-limit switches, limit switches
V1.0
10.09.2001
Function chart
DRIVEPAC
- BX9 -

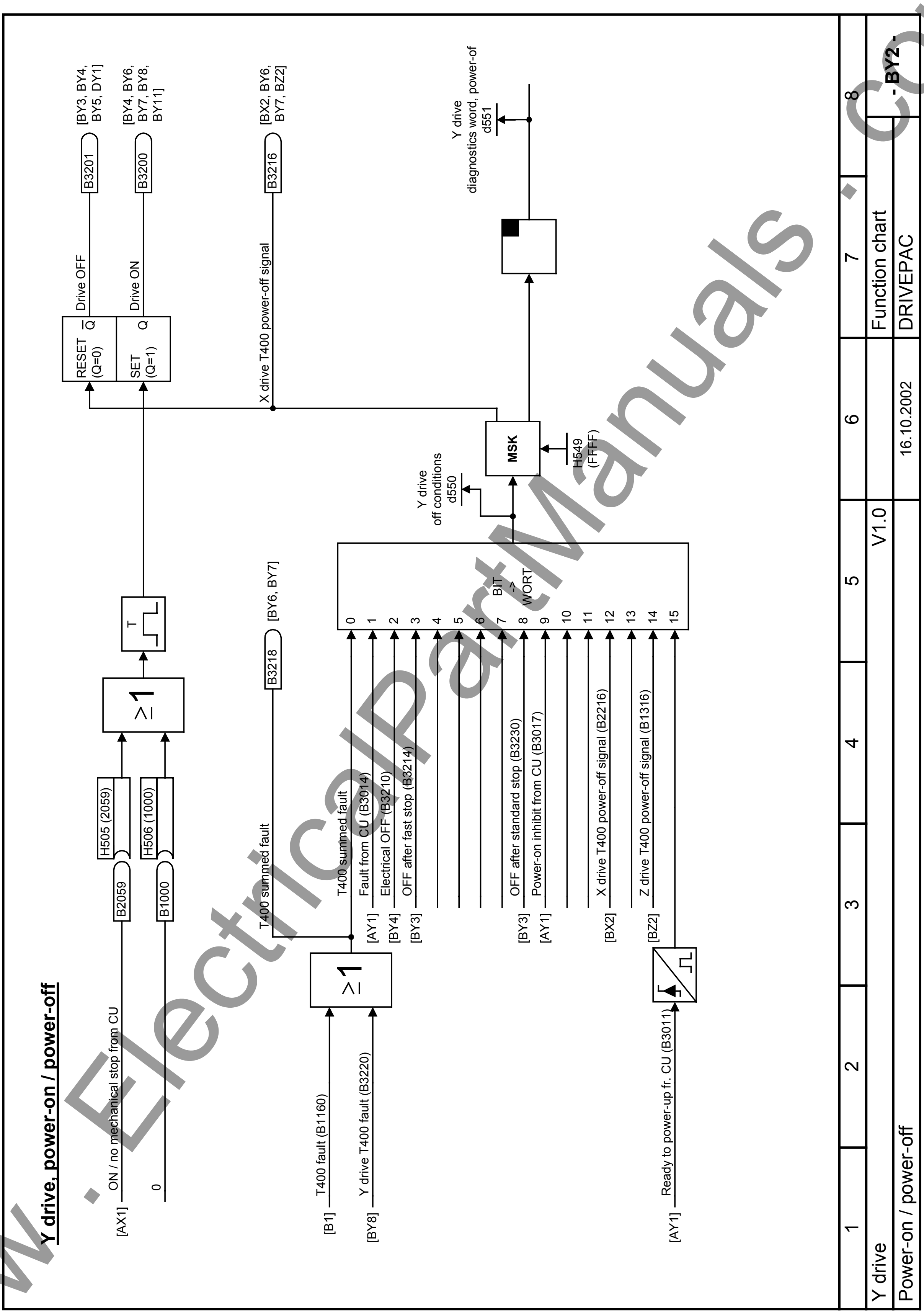

X drive, evaluation pre-limit switch / limit switch
[BX9] Software positive pre-limit switch reached
[BX9] Positive pre-limit switch activated
[BX1] X n/f actual value > 0 (B2004)
[BX9] Software negative pre-limit switch reached
[BX9] Negative pre-limit switch actuated
[BX1] X n/f actual value < 0 (B2006)
[BX9] Positive limit switch actuated
[BX4] No X MS traversing command (B2223)
[BX9] Positive limit switch actuated
&
SET (Q=1)
RESET (Q=0)
Q
Q̄
≥1
1
Positive pre-limit switch activated [CX1, CX2]
Negative pre-limit switch activated [CX1, CX2]
Start help in limit switch positive [CX2]
Start help in limit switch
No start help in limit switch [BX11]
Start help in negative limit switch [CX2]
1
2
3
4
5
6
7
8
X drive
Pre-limit switches, limit switches
V1.0
10.09.2001
Function chart
DRIVEPAC
- BX10 -

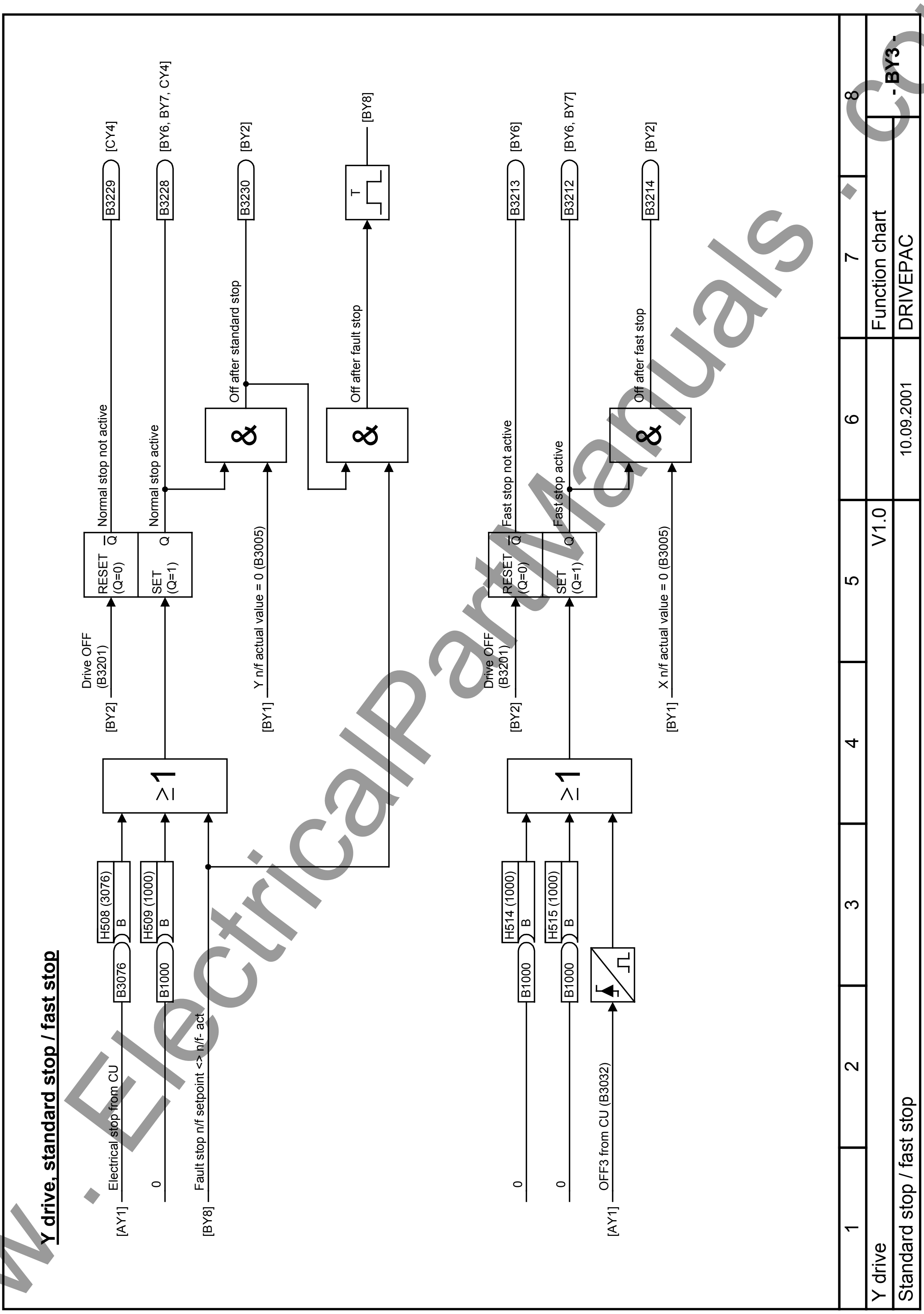

X drive, enable anti-sway control
[BX10] No start help in the limit switch
[BX9] Positive limit switch activated
[BX9] Negative limit switch activated
[BX2] Drive ON (B2200)
[BX4] no conventional operation
Fixed bit "1"
B1001
H190 (1001)
≥1
&
Enable limit switch
[BX5]
&
Enable anti-sway control
B2226
[BX6, BX7, CX2]
1
Do not enable anti-sway control
B2227
1
2
3
4
5
6
7
8
X drive
V1.0
Function chart
- BX11 -
Enable anti-sway control
10.09.2001
DRIVEPAC

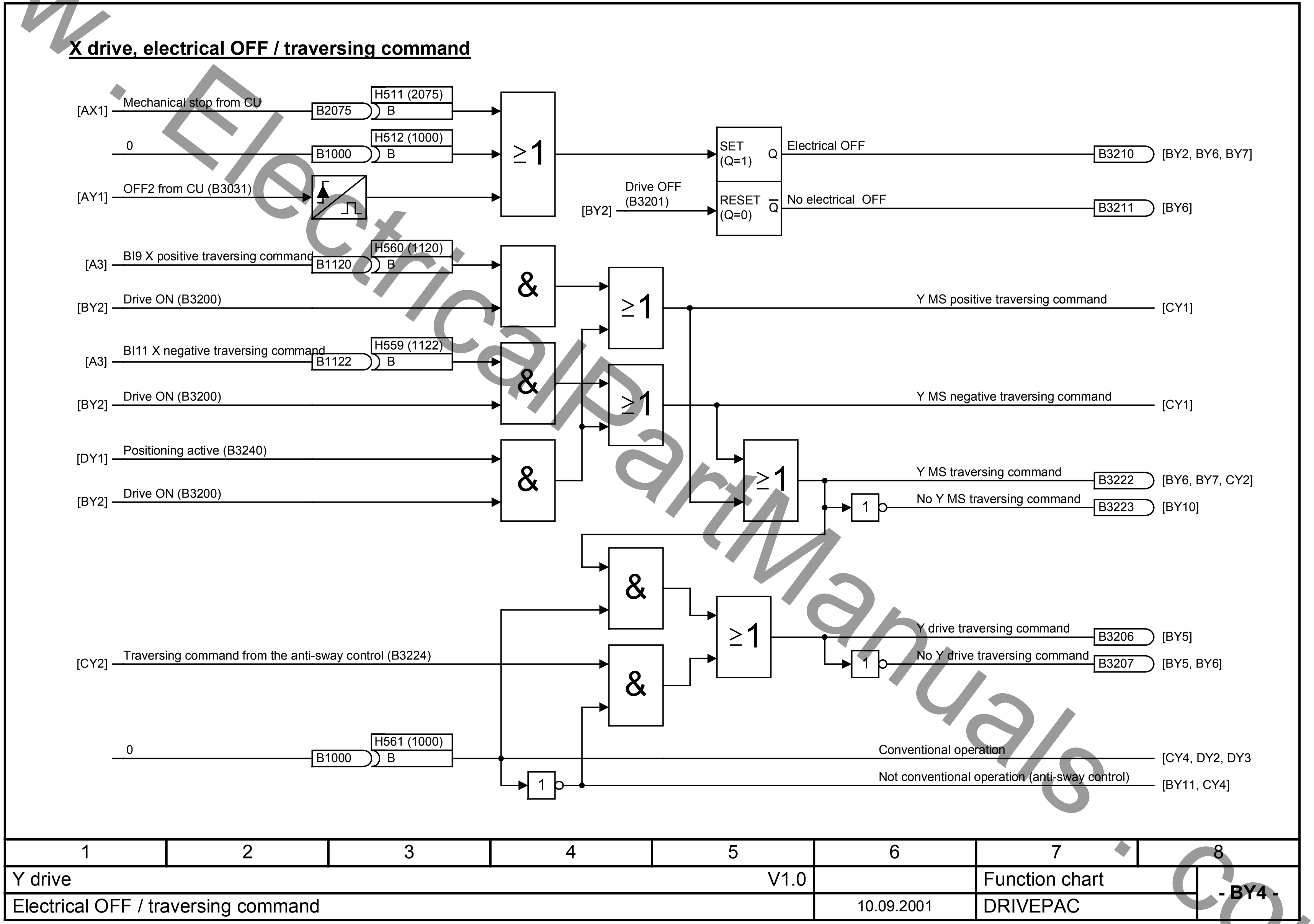
Y drive zero speed signal, fault acknowledgement

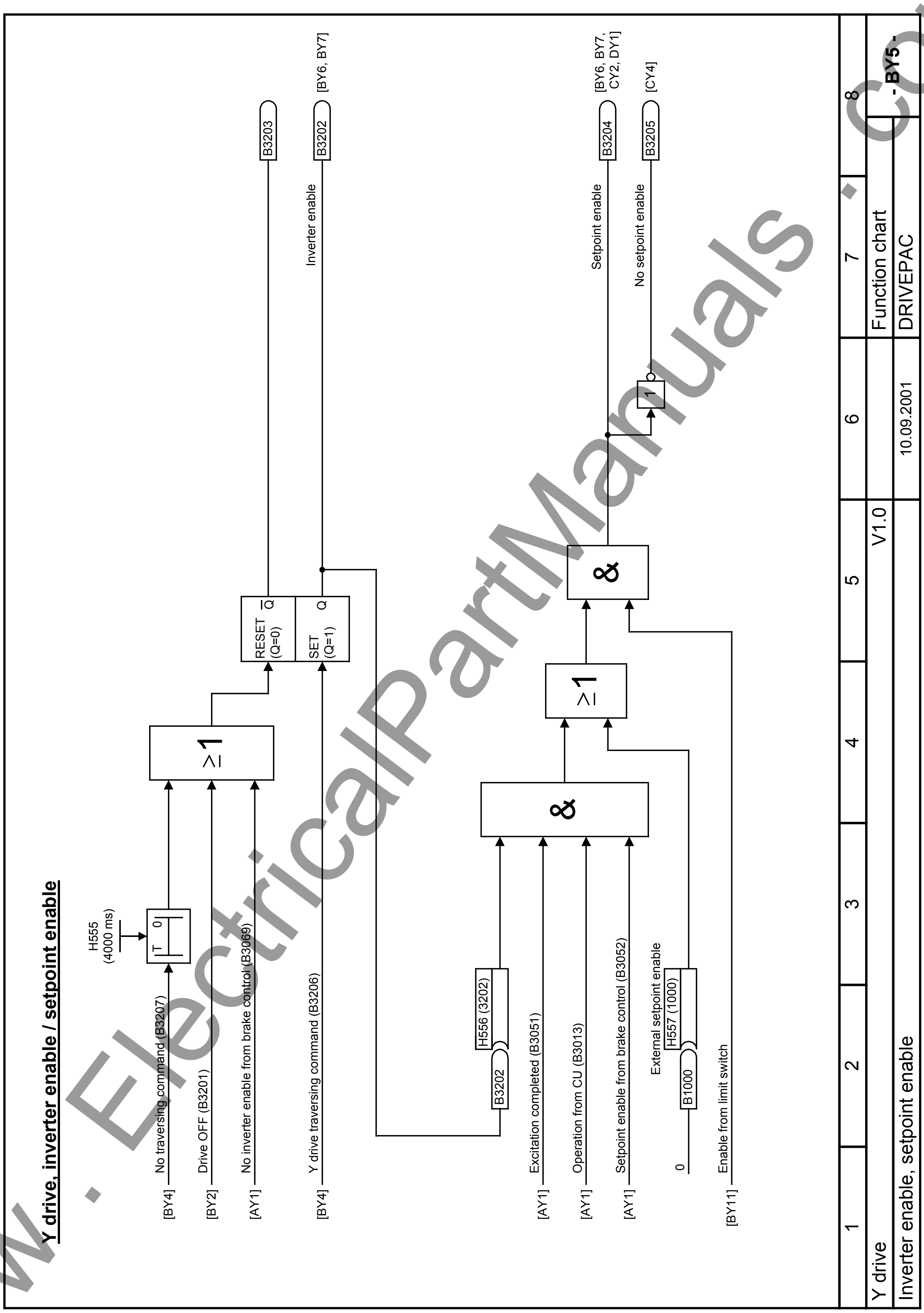


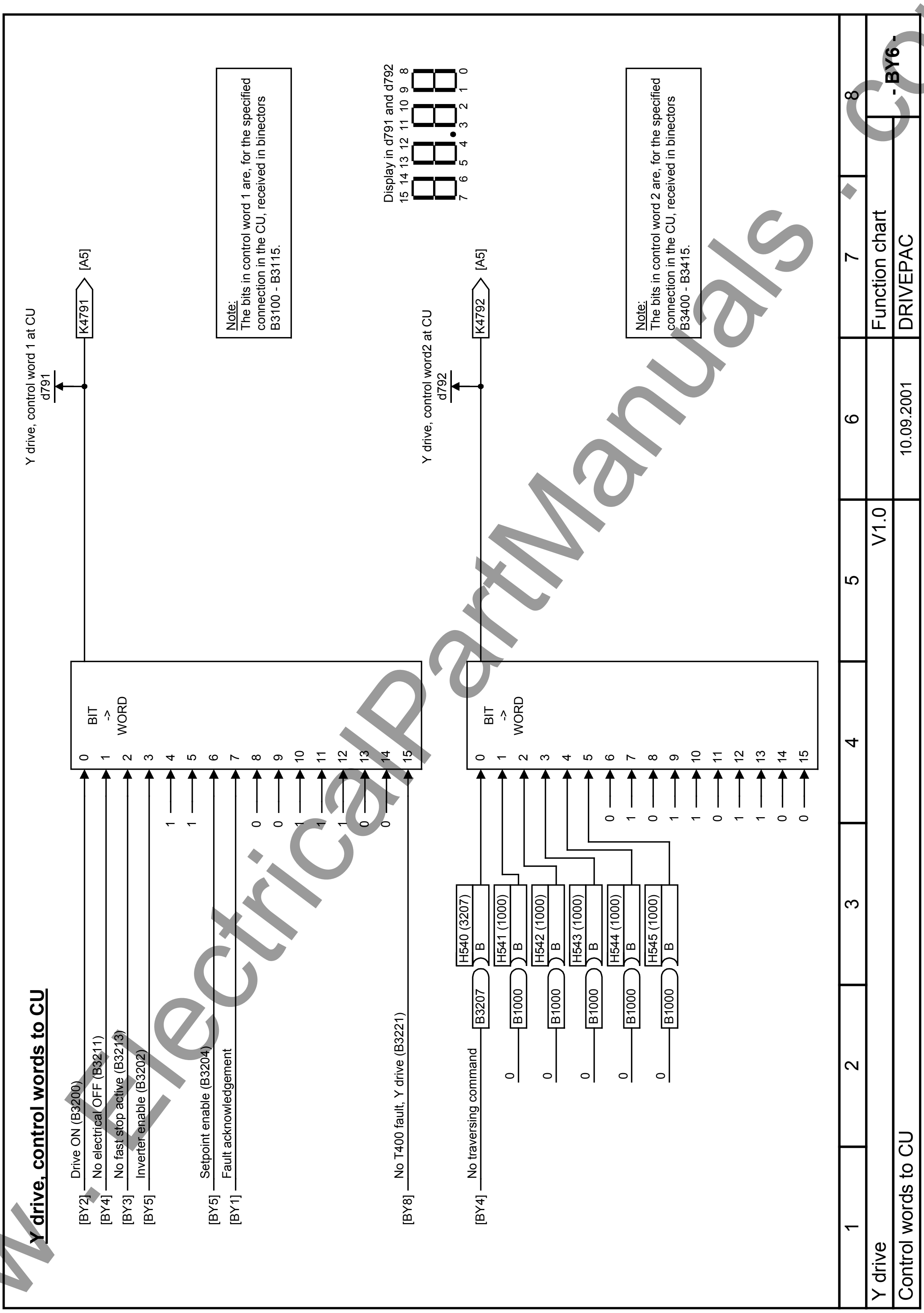
1	2	3	4	5	6	7	8
Y drive				V1.0		Function chart	- BY1 -
Zero speed signal / fault acknowledgement					10.09.2001	DRIVEPAC	


Y drive, power-on / power-off
[AX1]
ON / no mechanical stop from CU
B2059
H505 (2059)
0
B1000
H506 (1000)
≥1
T
RESET (Q=0)
Q̄
Drive OFF
B3201
[BY3, BY4, BY5, DY1]
SET (Q=1)
Q
Drive ON
B3200
[BY4, BY6, BY7, BY8, BY11]
X drive T400 power-off signal
B3216
[BX2, BY6, BY7, BZ2]
[B1]
T400 fault (B1160)
[BY8]
Y drive T400 fault (B3220)
≥1
T400 summed fault
B3218
[BY6, BY7]
T400 summed fault
[AY1]
Fault from CU (B3014)
[BY4]
Electrical OFF (B3210)
[BY3]
OFF after fast stop (B3214)
[BY3]
OFF after standard stop (B3230)
[AY1]
Power-on inhibit from CU (B3017)
[BX2]
X drive T400 power-off signal (B2216)
[BZ2]
Z drive T400 power-off signal (B1316)
[AY1]
Ready to power-up fr. CU (B3011)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
BIT
->
WORT
Y drive
off conditions
d550
MSK
H549
(FFFF)
Y drive
diagnostics word, power-of
d551
1
2
3
4
5
6
7
8
V1.0
Y drive
Power-on / power-off
16.10.2002
Function chart
DRIVEPAC
- BY2 -


Y drive, standard stop / fast stop
[AY1] Electrical stop from CU
B3076
H508 (3076)
B
0
B1000
H509 (1000)
B
[BY8] Fault stop n/f setpoint <> n/f- act
≥1
[BY2] Drive OFF (B3201)
RESET (Q=0)
Q̄
SET (Q=1)
Q
Normal stop not active
Normal stop active
B3229
[CY4]
B3228
[BY6, BY7, CY4]
[BY1] Y n/f actual value = 0 (B3005)
&
Off after standard stop
B3230
[BY2]
&
Off after fault stop
T
[BY8]
0
B1000
H514 (1000)
B
0
B1000
H515 (1000)
B
[AY1] OFF3 from CU (B3032)
≥1
[BY2] Drive OFF (B3201)
RESET (Q=0)
Q̄
SET (Q=1)
Q
Fast stop not active
Fast stop active
B3213
[BY6]
B3212
[BY6, BY7]
[BY1] X n/f actual value = 0 (B3005)
&
Off after fast stop
B3214
[BY2]
1
2
3
4
5
6
7
8
Y drive
Standard stop / fast stop
V1.0
10.09.2001
Function chart
DRIVEPAC
- BY3 -

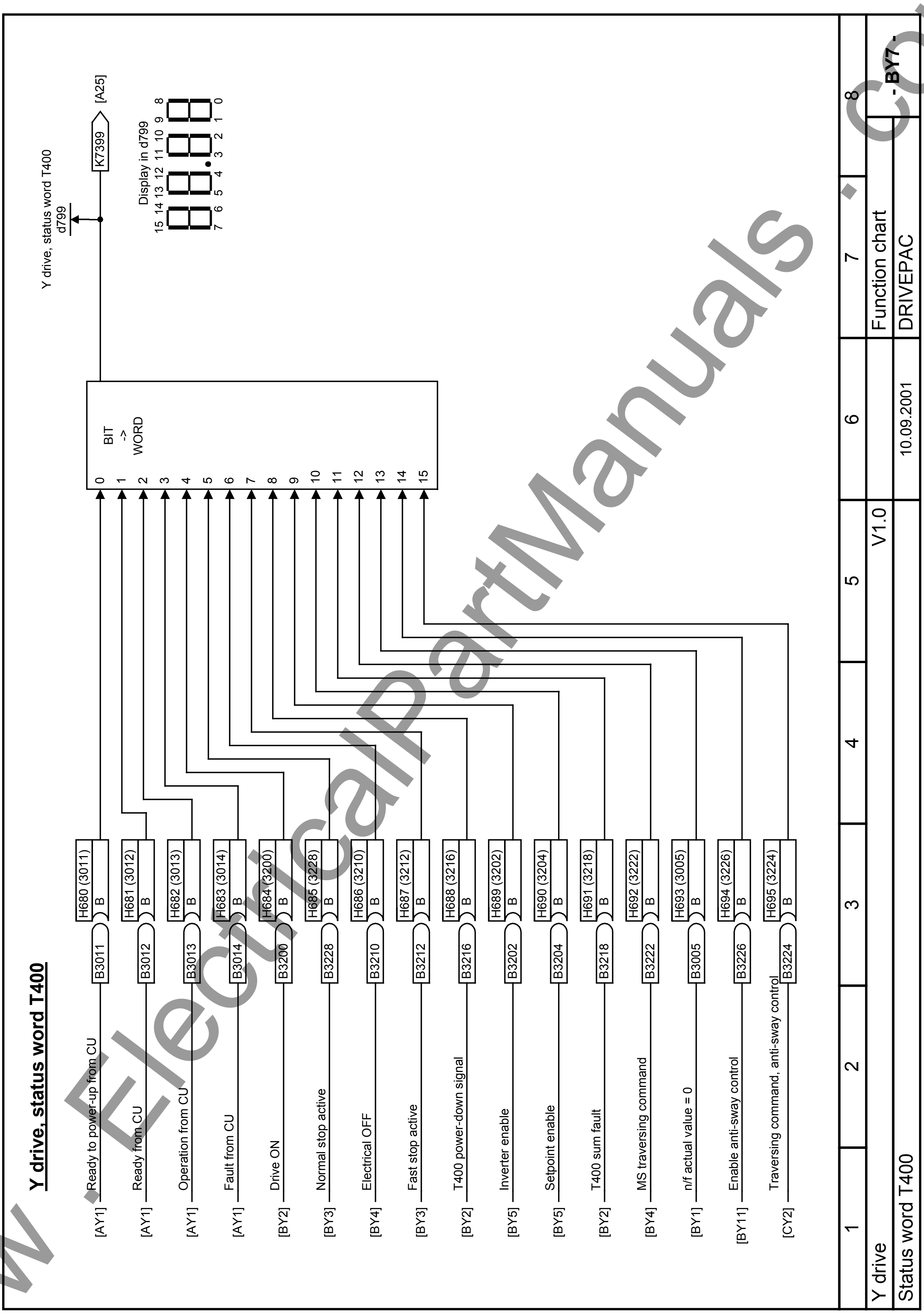

X drive, electrical OFF / traversing command
[AX1]
Mechanical stop from CU
B2075
H511 (2075)
B
0
B1000
H512 (1000)
B
[AY1]
OFF2 from CU (B3031)
≥1
SET
(Q=1)
Q
RESET
(Q=0)
Q̄
Drive OFF
(B3201)
[BY2]
Electrical OFF
B3210
[BY2, BY6, BY7]
No electrical OFF
B3211
[BY6]
[A3]
BI9 X positive traversing command
B1120
H560 (1120)
B
[BY2]
Drive ON (B3200)
&
≥1
Y MS positive traversing command
[CY1]
[A3]
BI11 X negative traversing command
B1122
H559 (1122)
B
[BY2]
Drive ON (B3200)
&
≥1
Y MS negative traversing command
[CY1]
[DY1]
Positioning active (B3240)
[BY2]
Drive ON (B3200)
&
≥1
Y MS traversing command
B3222
[BY6, BY7, CY2]
1
No Y MS traversing command
B3223
[BY10]
&
[CY2]
Traversing command from the anti-sway control (B3224)
&
≥1
Y drive traversing command
B3206
[BY5]
1
No Y drive traversing command
B3207
[BY5, BY6]
0
B1000
H561 (1000)
B
1
Conventional operation
[CY4, DY2, DY3
Not conventional operation (anti-sway control)
[BY11, CY4]
1
2
3
4
5
6
7
8
Y drive
V1.0
Function chart
- BY4 -
Electrical OFF / traversing command
10.09.2001
DRIVEPAC

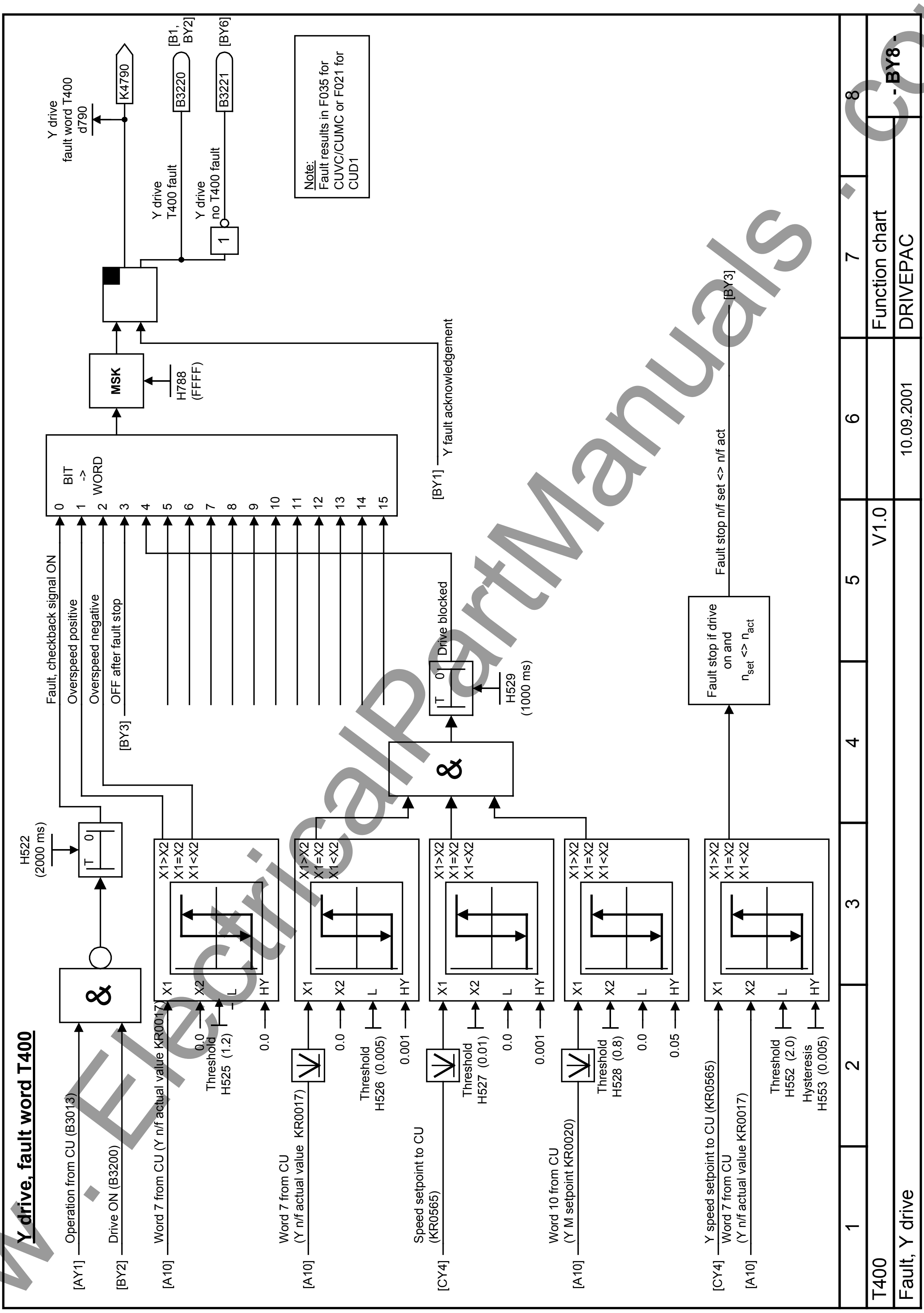

Y drive, inverter enable / setpoint enable
[BY4] No traversing command (B3207)
H555 (4000 ms)
T 0
[BY2] Drive OFF (B3201)
[AY1] No inverter enable from brake control (B3069)
≥1
RESET (Q=0) Q̄
SET (Q=1) Q
B3203
B3202
[BY6, BY7]
Inverter enable
[BY4] Y drive traversing command (B3206)
B3202
H556 (3202)
[AY1] Excitation completed (B3051)
[AY1] Operation from CU (B3013)
[AY1] Setpoint enable from brake control (B3052)
0
B1000
H557 (1000)
External setpoint enable
[BY11] Enable from limit switch
&
≥1
&
1
Setpoint enable
B3204
[BY6, BY7, CY2, DY1]
No setpoint enable
B3205
[CY4]
1
2
3
4
5
6
7
8
V1.0
10.09.2001
Function chart
DRIVEPAC
- BY5 -
Y drive
Inverter enable, setpoint enable

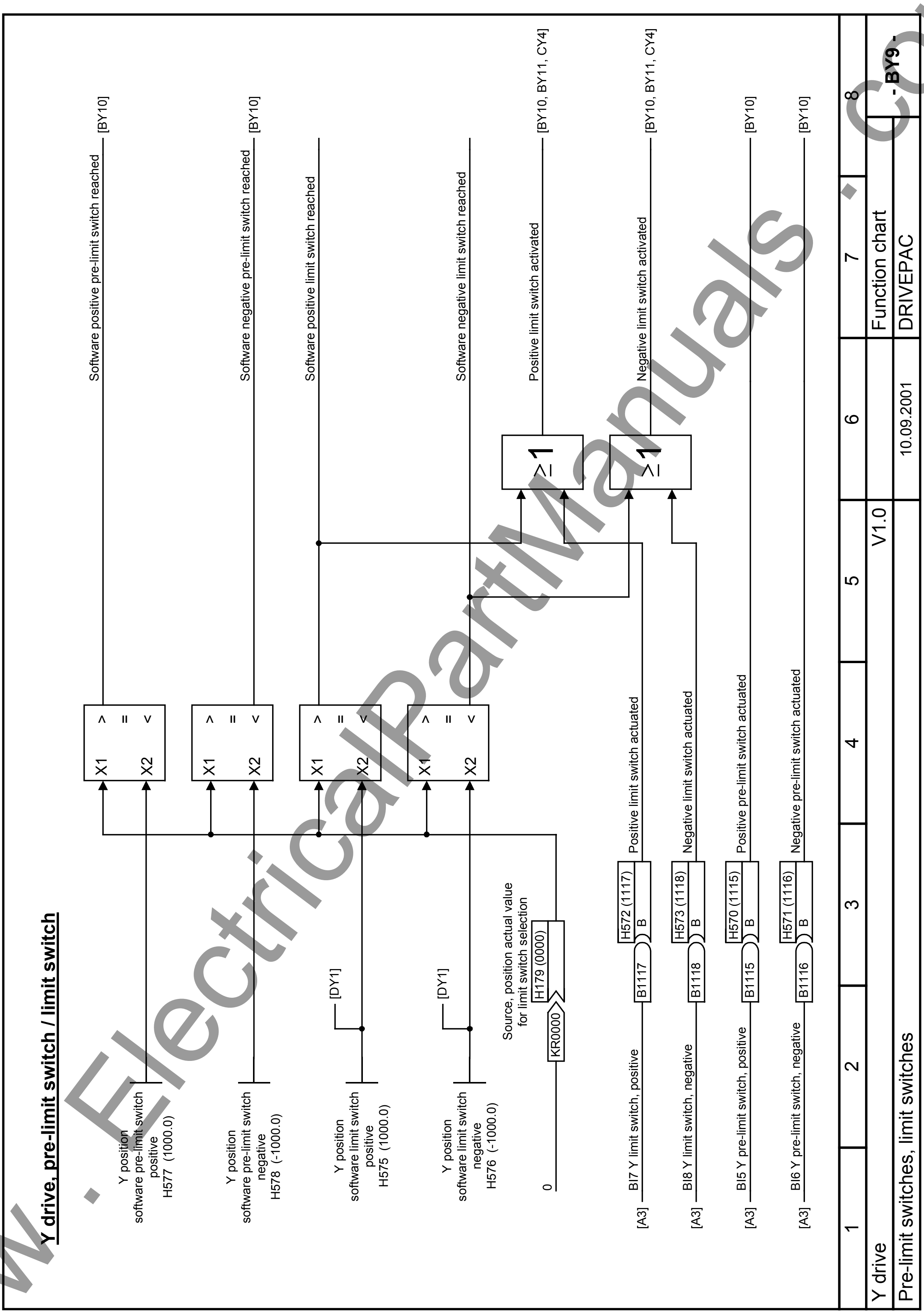


Note:
The bits in control word 1 are, for the specified connection in the CU, received in binectors B3100 - B3115.

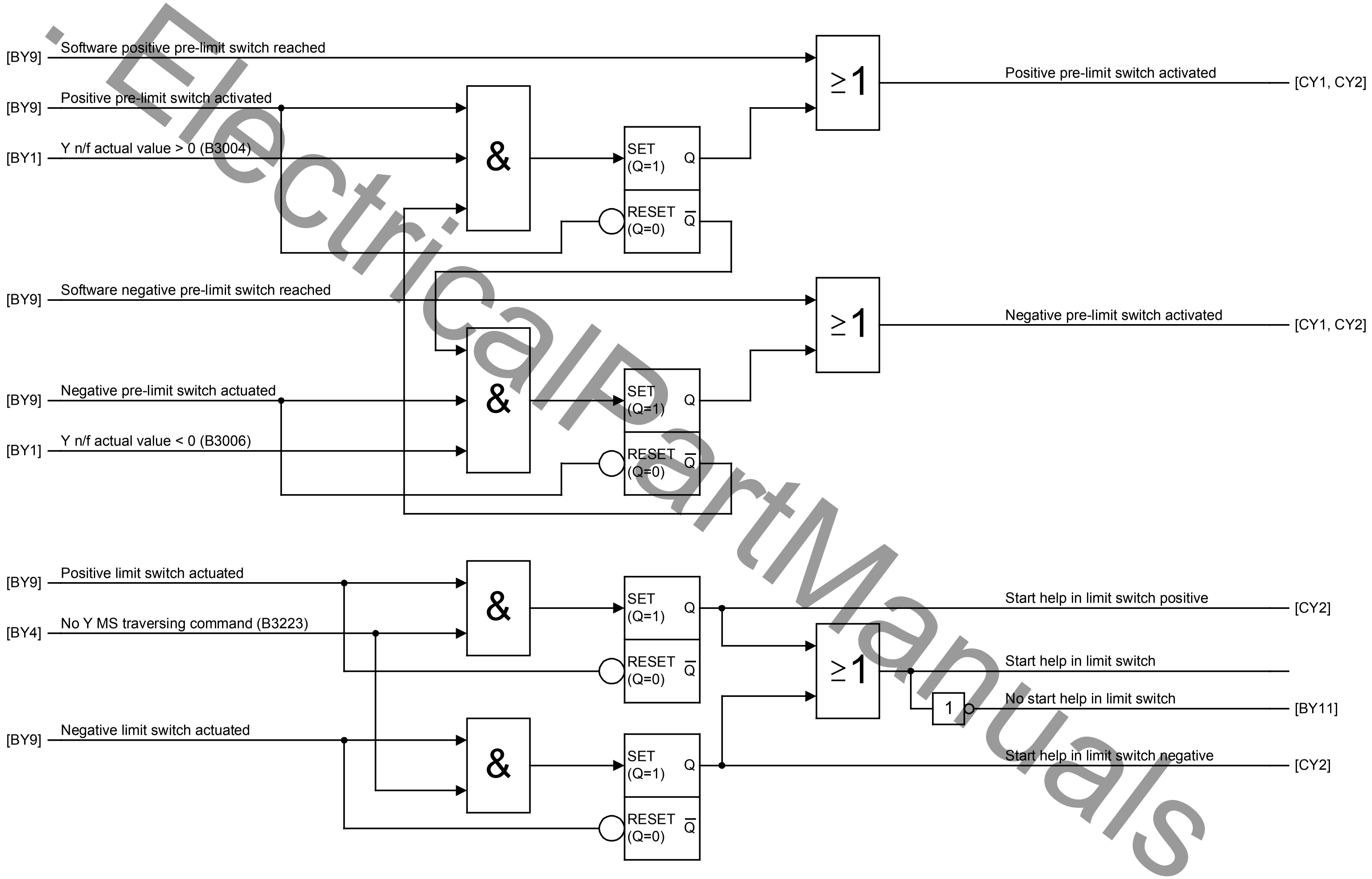
Note:
The bits in control word 2 are, for the specified connection in the CU, received in binectors B3400 - B3415.


Y drive, status word T400
[AY1] Ready to power-up from CU B3011 H680 (3011) B
[AY1] Ready from CU B3012 H681 (3012) B
[AY1] Operation from CU B3013 H682 (3013) B
[AY1] Fault from CU B3014 H683 (3014) B
[BY2] Drive ON B3200 H684 (3200) B
[BY3] Normal stop active B3228 H685 (3228) B
[BY4] Electrical OFF B3210 H686 (3210) B
[BY3] Fast stop active B3212 H687 (3212) B
[BY2] T400 power-down signal B3216 H688 (3216) B
[BY5] Inverter enable B3202 H689 (3202) B
[BY5] Setpoint enable B3204 H690 (3204) B
[BY2] T400 sum fault B3218 H691 (3218) B
[BY4] MS traversing command B3222 H692 (3222) B
[BY1] n/f actual value = 0 B3005 H693 (3005) B
[BY11] Enable anti-sway control B3226 H694 (3226) B
[CY2] Traversing command, anti-sway control B3224 H695 (3224) B
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
BIT -> WORD
Y drive, status word T400
d799
K7399
[A25]
Display in d799
15 14 13 12 11 10 9 8
7 6 5 4 3 2 1 0
1
2
3
4
5
6
7
8
V1.0
Y drive
Status word T400
10.09.2001
Function chart
DRIVEPAC
- BY7 -

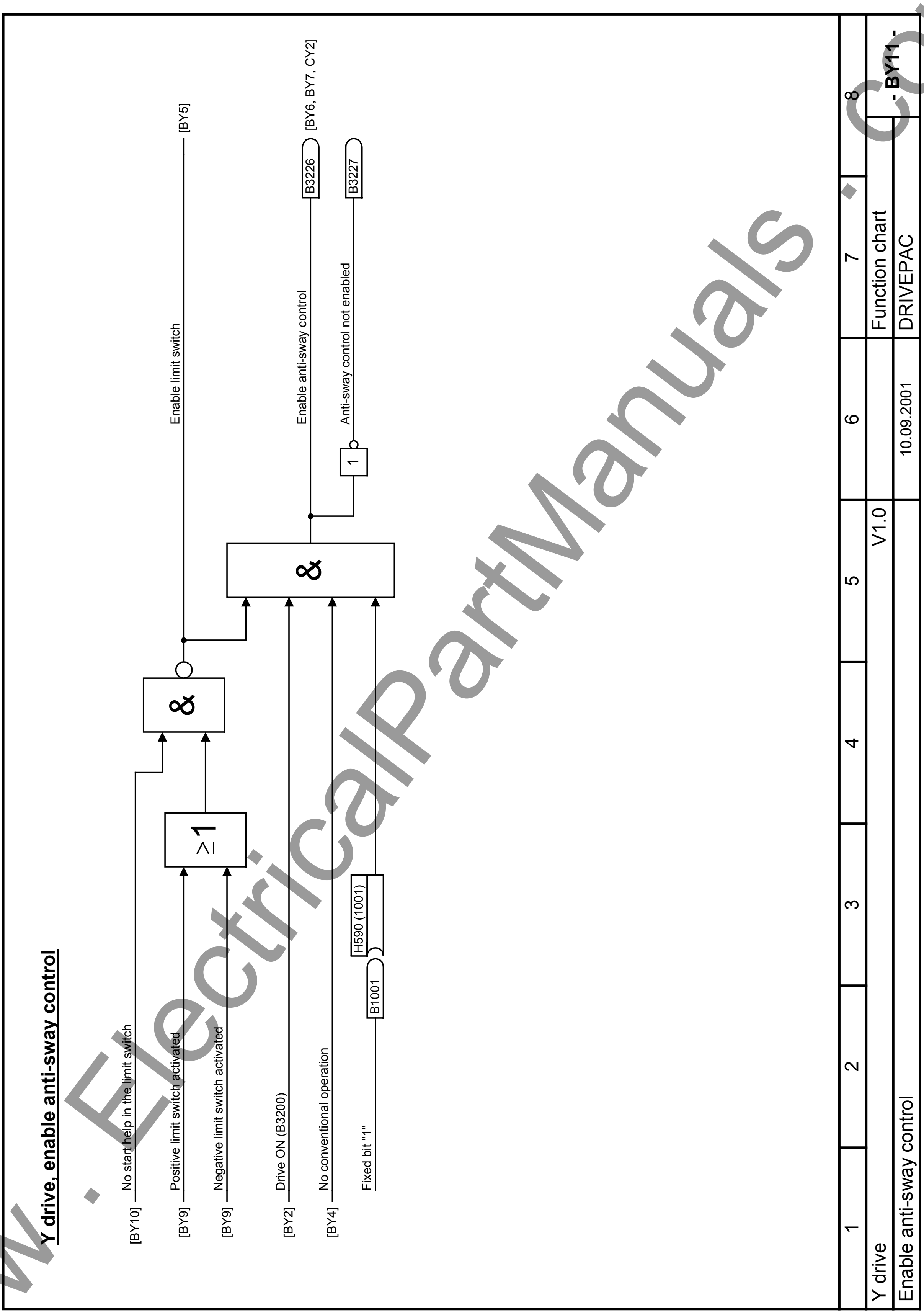

Y drive, fault word T400
[AY1] Operation from CU (B3013)
[BY2] Drive ON (B3200)
[A10] Word 7 from CU (Y n/f actual value KR0017)
[A10] Word 7 from CU (Y n/f actual value KR0017)
[CY4] Speed setpoint to CU (KR0565)
[A10] Word 10 from CU (Y M setpoint KR0020)
[CY4] Y speed setpoint to CU (KR0565)
[A10] Word 7 from CU (Y n/f actual value KR0017)
&
H522 (2000 ms)
T 0
X1 X2 L HY
X1>X2 X1=X2 X1<X2
0.0
Threshold H525 (1.2)
0.0
Threshold H526 (0.005)
0.001
Threshold H527 (0.01)
0.0
0.001
Threshold H528 (0.8)
0.0
0.05
Threshold H552 (2.0)
Hysteresis H553 (0.005)
&
T 0
H529 (1000 ms)
Drive blocked
Fault stop if drive on and n_{set} <> n_{act}
Fault stop n/f set <> n/f act
[BY3]
Fault, checkback signal ON
Overspeed positive
Overspeed negative
[BY3] OFF after fault stop
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
BIT -> WORD
MSK
H788 (FFFF)
[BY1] Y fault acknowledgement
Y drive fault word T400 d790
K4790
Y drive T400 fault
B3220 [B1, BY2]
Y drive no T400 fault
1
B3221 [BY6]
Note: Fault results in F035 for CUVC/CUMC or F021 for CUD1
1 2 3 4 5 6 7 8
T400
Fault, Y drive
V1.0
10.09.2001
Function chart
DRIVEPAC
- BY8 -

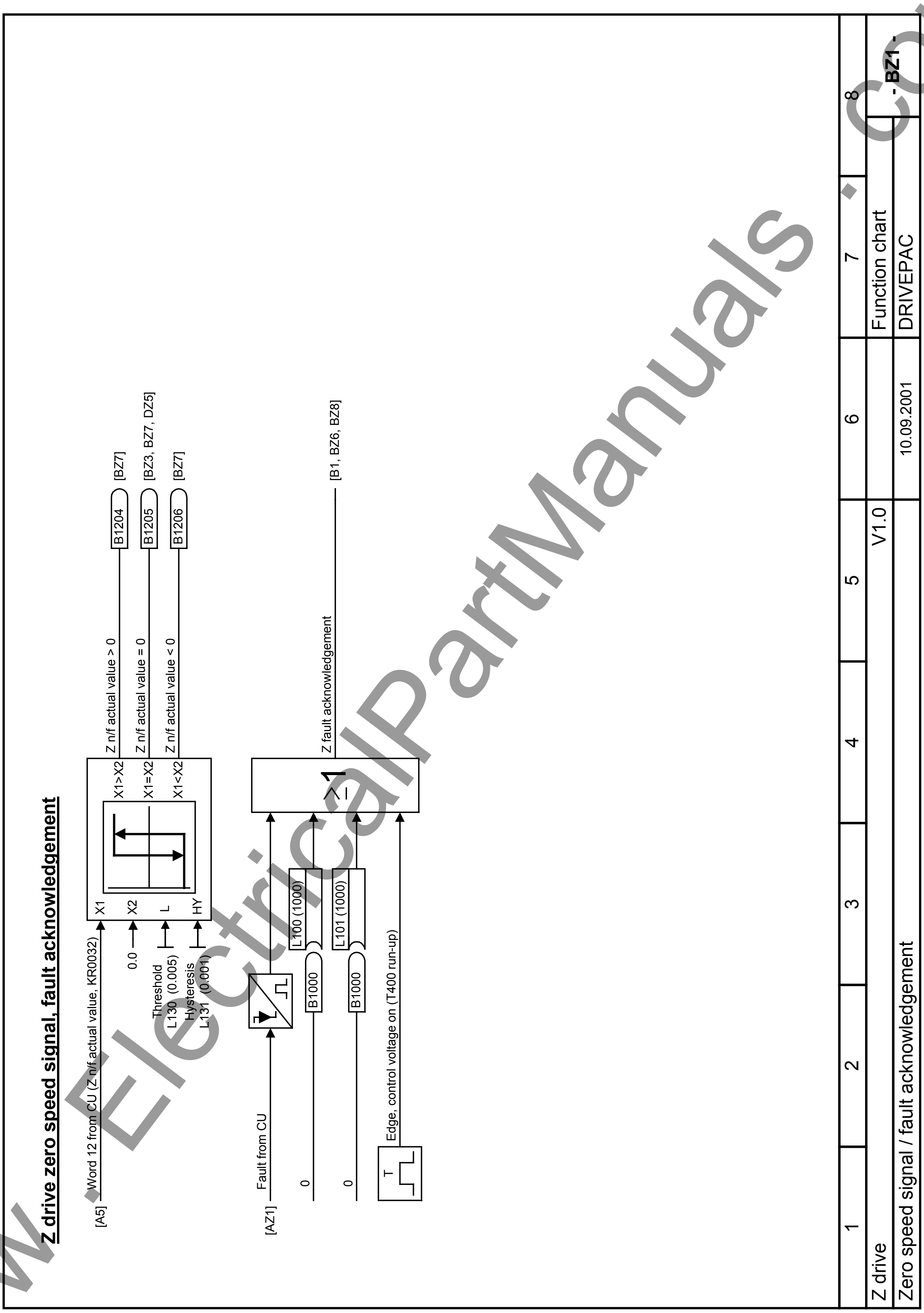

Y drive, pre-limit switch / limit switch
Y position
software pre-limit switch
positive
H577 (1000.0)
Y position
software pre-limit switch
negative
H578 (-1000.0)
Y position
software limit switch
positive
H575 (1000.0)
[DY1]
Y position
software limit switch
negative
H576 (-1000.0)
[DY1]
0
Source, position actual value
for limit switch selection
KR0000
H179 (0000)
X1
X2
>
=
<
Software positive pre-limit switch reached
[BY10]
Software negative pre-limit switch reached
[BY10]
Software positive limit switch reached
Software negative limit switch reached
≥1
Positive limit switch activated
[BY10, BY11, CY4]
Negative limit switch activated
[BY10, BY11, CY4]
[A3]
BI7 Y limit switch, positive
B1117
H572 (1117)
B
Positive limit switch actuated
[A3]
BI8 Y limit switch, negative
B1118
H573 (1118)
B
Negative limit switch actuated
[A3]
BI5 Y pre-limit switch, positive
B1115
H570 (1115)
B
Positive pre-limit switch actuated
[BY10]
[A3]
BI6 Y pre-limit switch, negative
B1116
H571 (1116)
B
Negative pre-limit switch actuated
[BY10]
1
2
3
4
5
6
7
8
Y drive
Pre-limit switches, limit switches
V1.0
10.09.2001
Function chart
DRIVEPAC
- BY9 -

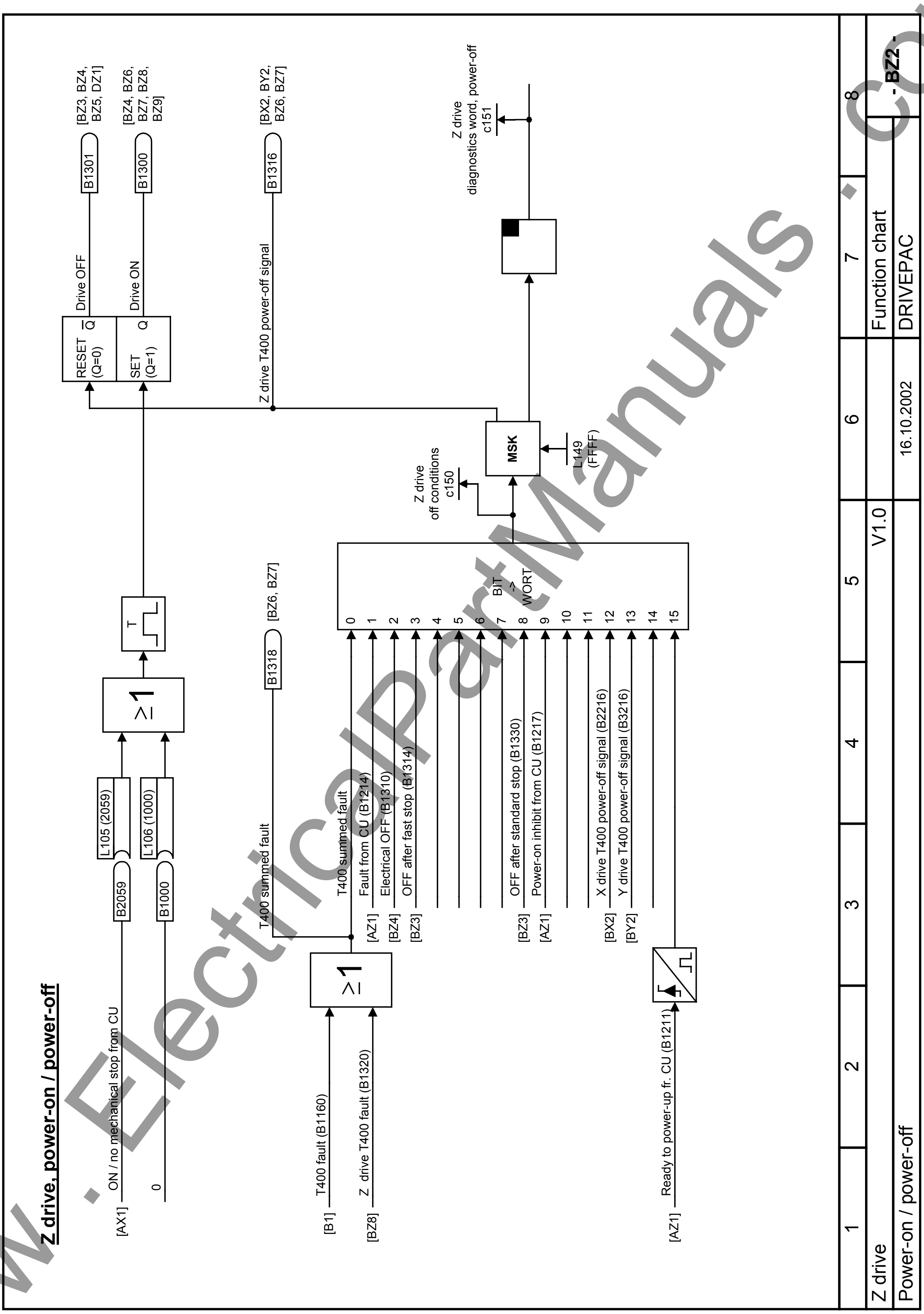
Y drive, evaluation pre-limit switch / limit switch

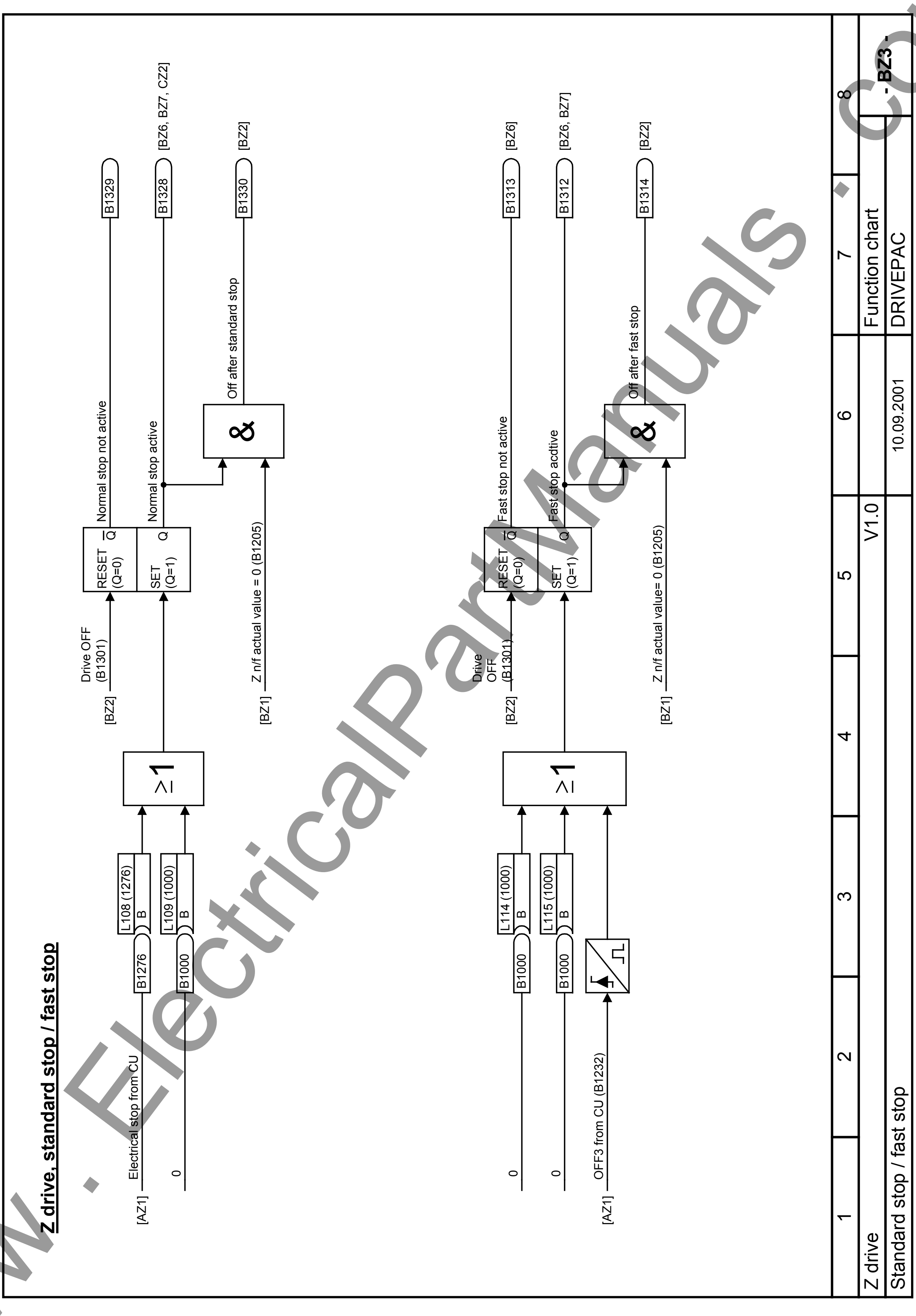


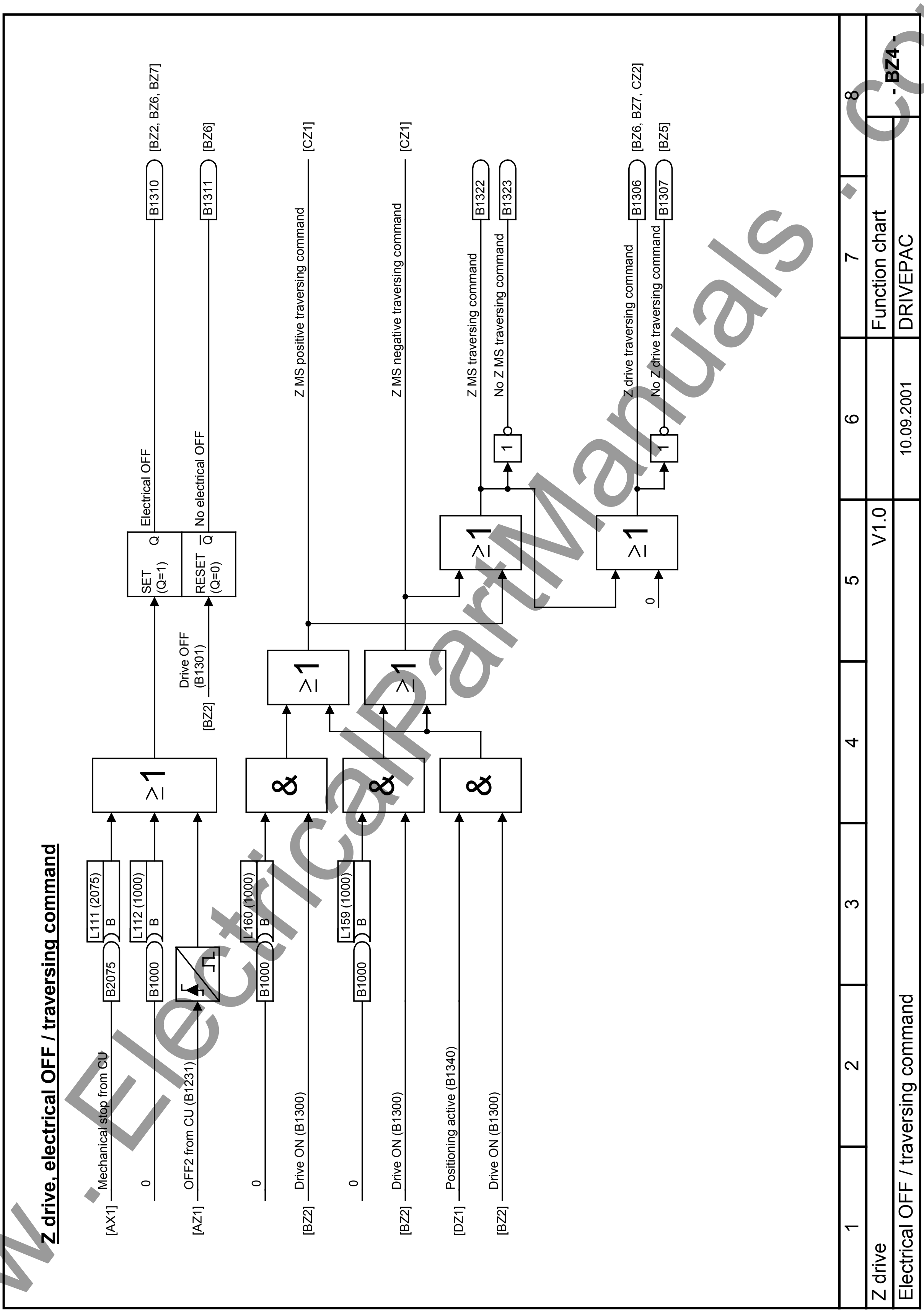
1	2	3	4	5	6	7	8
Y drive				V1.0		Function chart	- BY10 -
Pre-limit switches, limit switches					10.09.2001	DRIVEPAC	


Y drive, enable anti-sway control
[BY10]
No start help in the limit switch
[BY9]
Positive limit switch activated
[BY9]
Negative limit switch activated
[BY2]
Drive ON (B3200)
[BY4]
No conventional operation
Fixed bit "1"
B1001
H590 (1001)
≥1
&
&
Enable limit switch
[BY5]
Enable anti-sway control
B3226
[BY6, BY7, CY2]
1
Anti-sway control not enabled
B3227
1
2
3
4
5
6
7
8
Y drive
Enable anti-sway control
V1.0
10.09.2001
Function chart
DRIVEPAC
- BY11 -

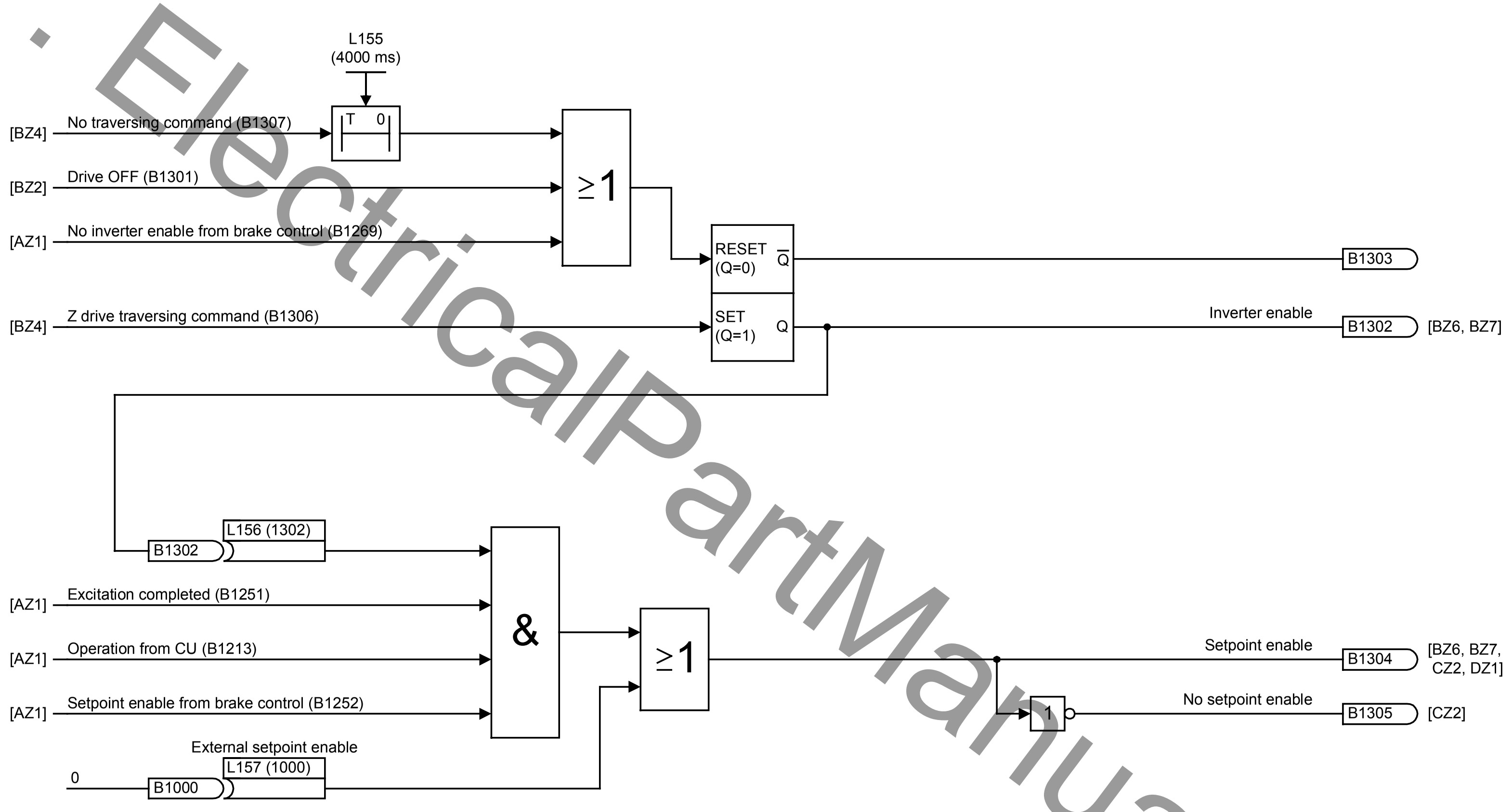

Z drive zero speed signal, fault acknowledgement
[A5]
Word 12 from CU (Z n/f actual value, KR0032)
0.0
Threshold
L130 (0.005)
Hysteresis
L131 (0.001)
X1
X2
L
HY
X1>X2
X1=X2
X1<X2
Z n/f actual value > 0
Z n/f actual value = 0
Z n/f actual value < 0
B1204
B1205
B1206
[BZ7]
[BZ3, BZ7, DZ5]
[BZ7]
[AZ1]
Fault from CU
0
B1000
L100 (1000)
0
B1000
L101 (1000)
T
Edge, control voltage on (T400 run-up)
≥1
Z fault acknowledgement
[B1, BZ6, BZ8]
1
2
3
4
5
6
7
8
Z drive
V1.0
Function chart
Zero speed signal / fault acknowledgement
10.09.2001
DRIVEPAC
- BZ1 -


Z drive, power-on / power-off
[AX1] ON / no mechanical stop from CU
B2059
L105 (2059)
0
B1000
L106 (1000)
≥1
T
Drive OFF
Drive ON
RESET (Q=0)
SET (Q=1)
Q̄
Q
B1301
[BZ3, BZ4, BZ5, DZ1]
B1300
[BZ4, BZ6, BZ7, BZ8, BZ9]
[B1] T400 fault (B1160)
[BZ8] Z drive T400 fault (B1320)
≥1
T400 summed fault
B1318
[BZ6, BZ7]
Z drive T400 power-off signal
B1316
[BX2, BY2, BZ6, BZ7]
T400 summed fault
[AZ1] Fault from CU (B1214)
[BZ4] Electrical OFF (B1310)
[BZ3] OFF after fast stop (B1314)
[BZ3] OFF after standard stop (B1330)
[AZ1] Power-on inhibit from CU (B1217)
[BX2] X drive T400 power-off signal (B2216)
[BY2] Y drive T400 power-off signal (B3216)
[AZ1] Ready to power-up fr. CU (B1211)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
BIT -> WORT
Z drive off conditions c150
MSK
L149 (FFFF)
Z drive diagnostics word, power-off c151
1
2
3
4
5
6
7
8
V1.0
16.10.2002
Z drive
Power-on / power-off
Function chart
DRIVEPAC
- BZ2 -

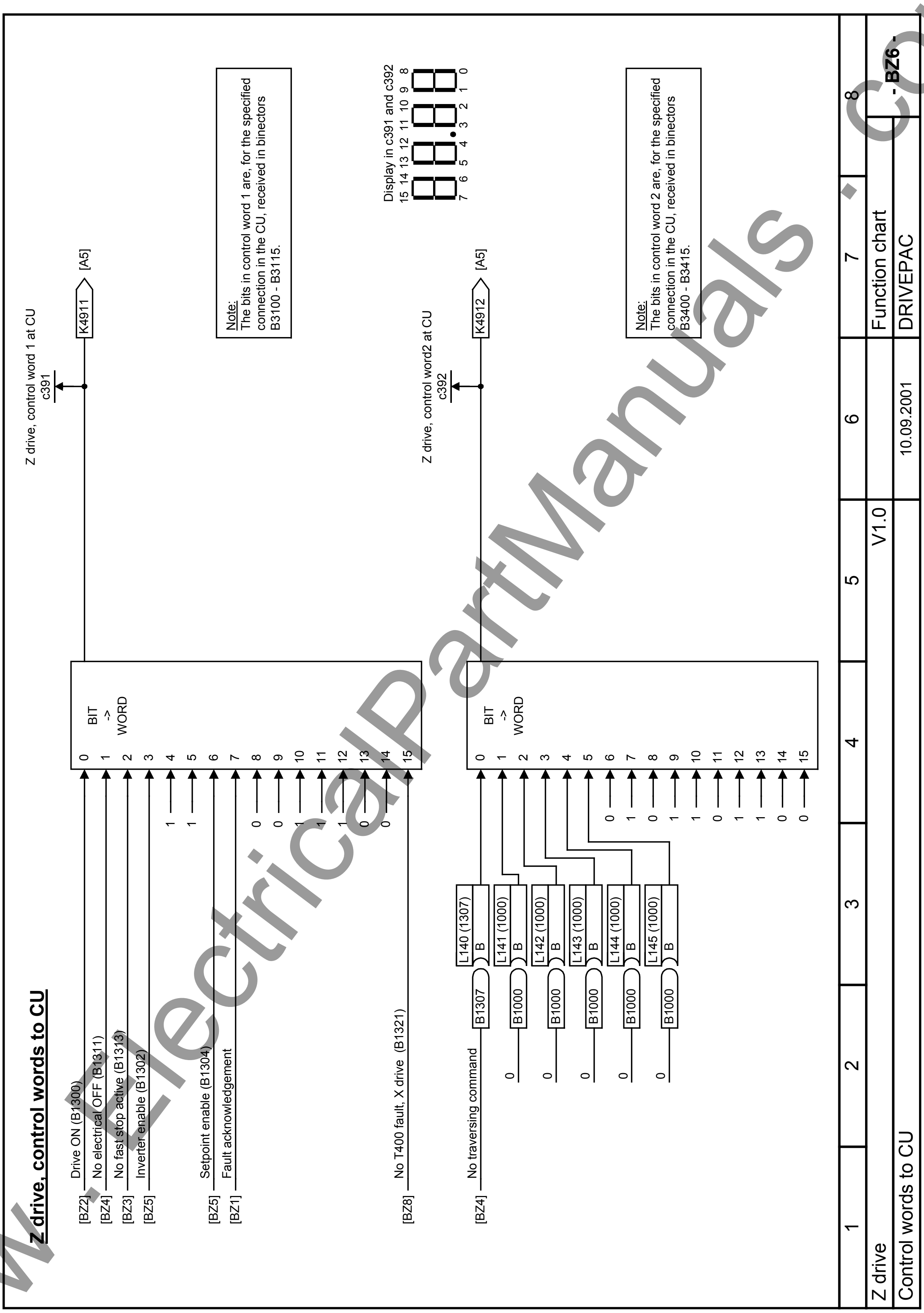

Z drive, standard stop / fast stop
[AZ1]
Electrical stop from CU
B1276
L108 (1276)
B
0
B1000
L109 (1000)
B
≥1
[BZ2]
Drive OFF (B1301)
RESET (Q=0)
Q̄
SET (Q=1)
Q
Normal stop not active
Normal stop active
[BZ1]
Z n/f actual value = 0 (B1205)
&
Off after standard stop
B1329
[BZ6, BZ7, CZ2]
B1328
B1330
[BZ2]
0
B1000
L114 (1000)
B
0
B1000
L115 (1000)
B
[AZ1]
OFF3 from CU (B1232)
≥1
[BZ2]
Drive OFF (B1301)
RESET (Q=0)
Q̄
SET (Q=1)
Q
Fast stop not active
Fast stop acdtive
[BZ1]
Z n/f actual value= 0 (B1205)
&
Off after fast stop
B1313
[BZ6]
B1312
[BZ6, BZ7]
B1314
[BZ2]
1
2
3
4
5
6
7
8
V1.0
10.09.2001
Function chart
DRIVEPAC
- BZ3 -
Z drive
Standard stop / fast stop

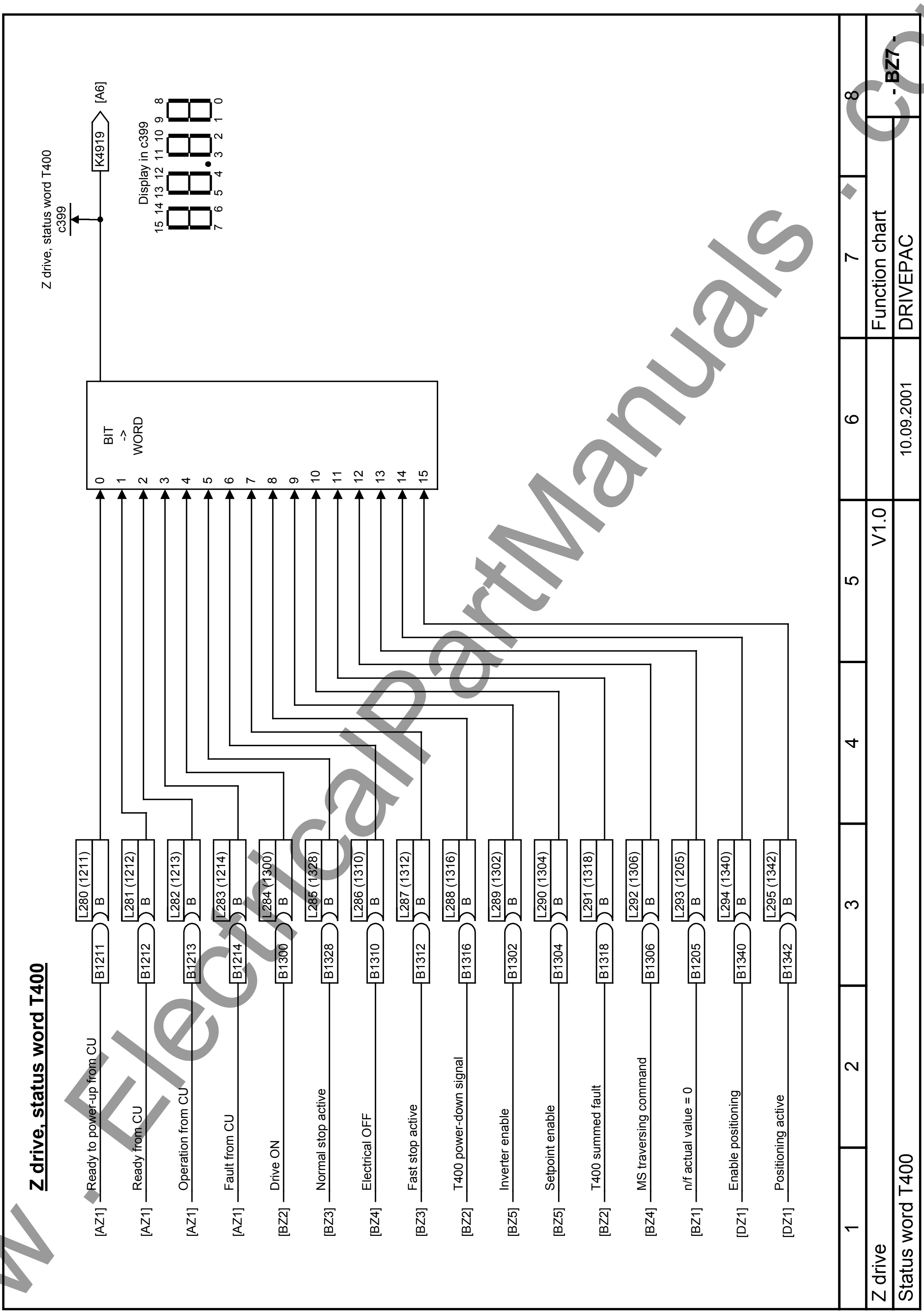

Z drive, electrical OFF / traversing command
[AX1]
Mechanical stop from CU
B2075
L111 (2075)
B
0
B1000
L112 (1000)
B
[AZ1]
OFF2 from CU (B1231)
0
B1000
L160 (1000)
B
[BZ2]
Drive ON (B1300)
0
B1000
L159 (1000)
B
[BZ2]
Drive ON (B1300)
[DZ1]
Positioning active (B1340)
[BZ2]
Drive ON (B1300)
≥1
&
&
&
≥1
≥1
[BZ2]
Drive OFF (B1301)
SET (Q=1)
RESET (Q=0)
Q
Q̄
Electrical OFF
No electrical OFF
B1310
[BZ2, BZ6, BZ7]
B1311
[BZ6]
Z MS positive traversing command
[CZ1]
Z MS negative traversing command
[CZ1]
≥1
≥1
0
1
1
Z MS traversing command
B1322
No Z MS traversing command
B1323
Z drive traversing command
B1306
[BZ6, BZ7, CZ2]
No Z drive traversing command
B1307
[BZ5]
1
2
3
4
5
6
7
8
Z drive
Electrical OFF / traversing command
V1.0
10.09.2001
Function chart
DRIVEPAC
- BZ4 -

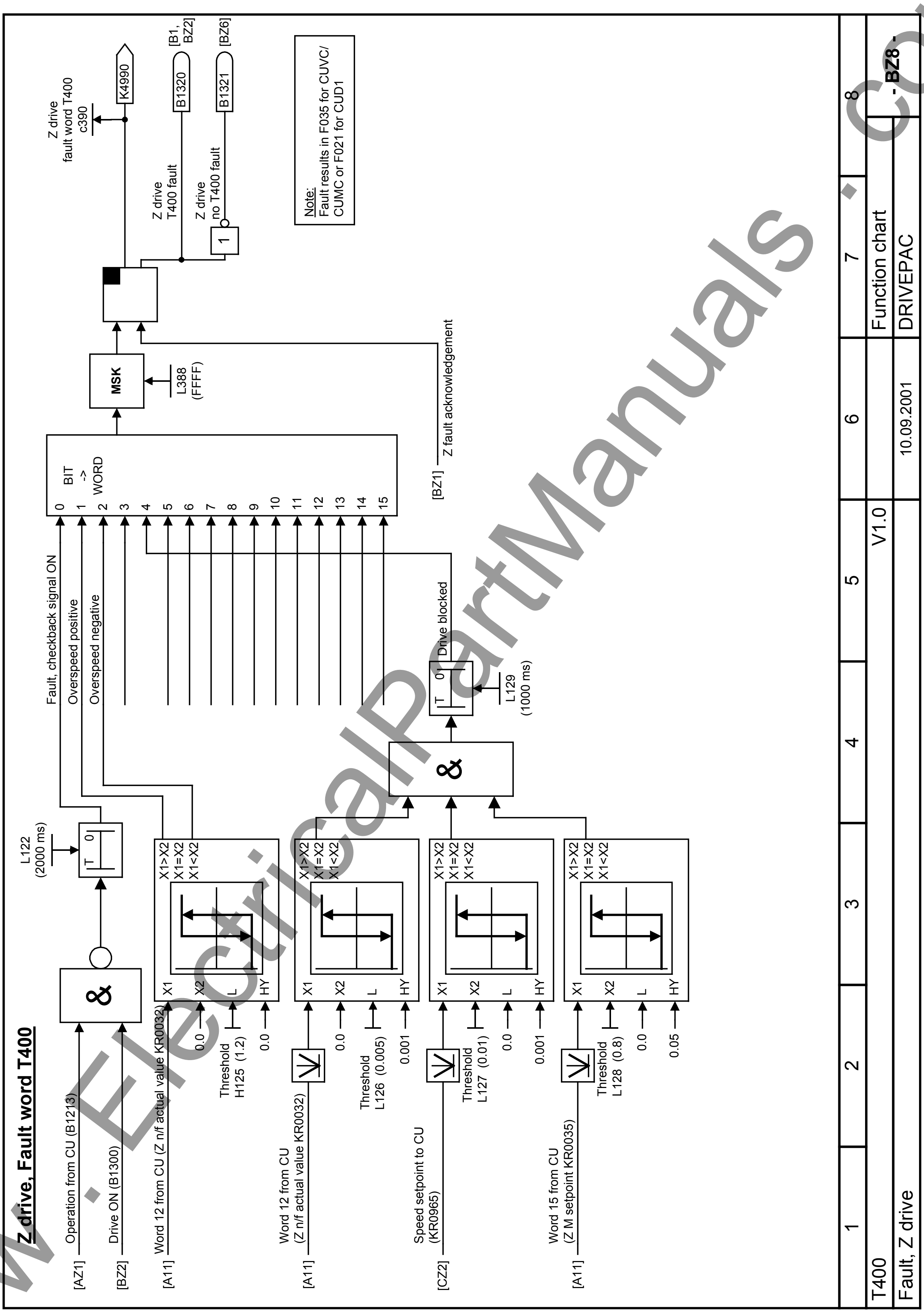
Z drive, inverter enable / setpoint enable



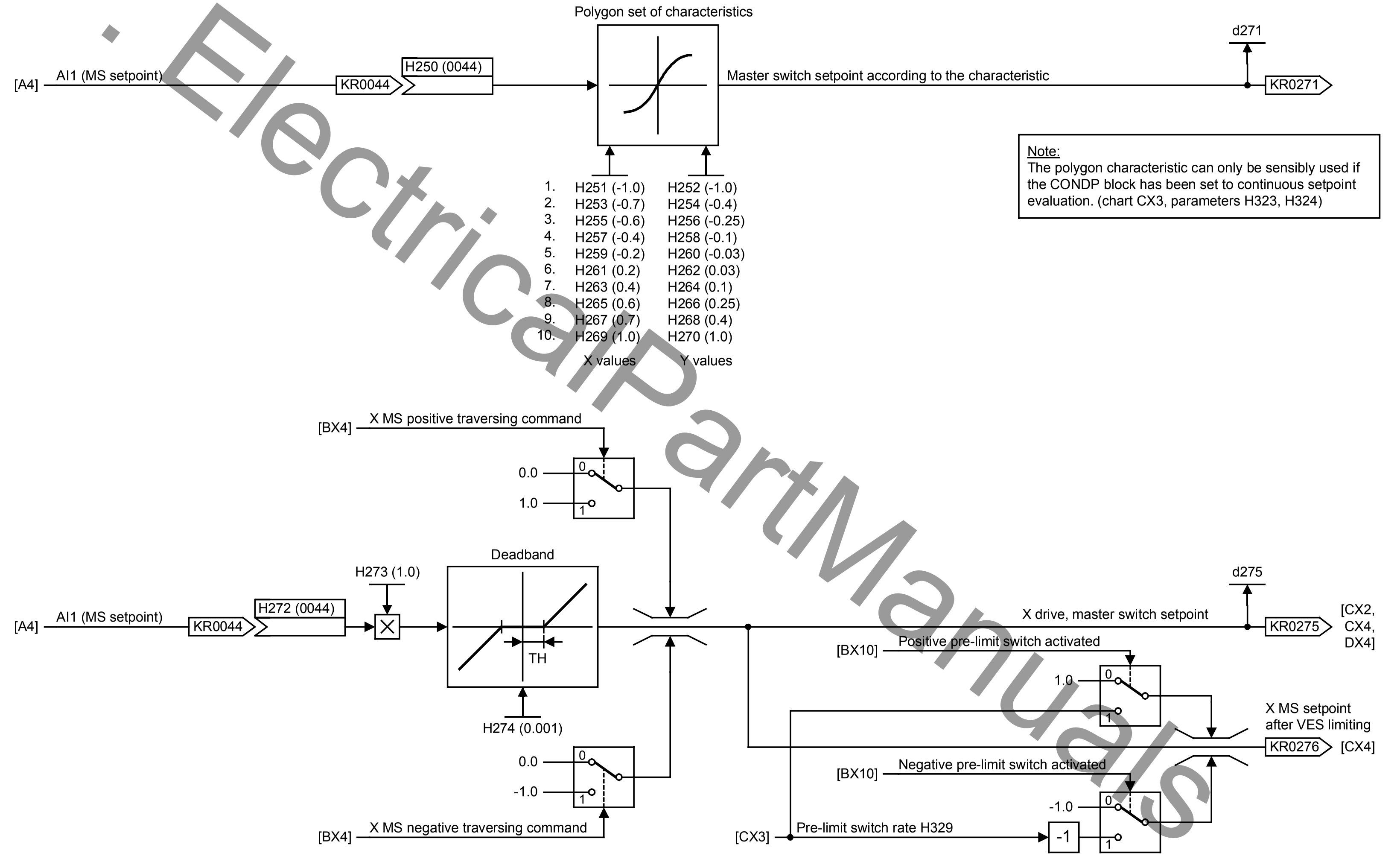
1	2	3	4	5	6	7	8
Z drive				V1.0		Function chart	**- BZ5 -**
Inverter enable, setpoint enable					10.09.2001	DRIVEPAC	


Z drive, control words to CU
[BZ2] Drive ON (B1300)
[BZ4] No electrical OFF (B1311)
[BZ3] No fast stop active (B1313)
[BZ5] Inverter enable (B1302)
[BZ5] Setpoint enable (B1304)
[BZ1] Fault acknowledgement
[BZ8] No T400 fault, X drive (B1321)
1
1
0
0
1
1
1
0
0
BIT -> WORD
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Z drive, control word 1 at CU
c391
K4911
[A5]
Note:
The bits in control word 1 are, for the specified connection in the CU, received in binectors B3100 - B3115.
Display in c391 and c392
15 14 13 12 11 10 9 8
7 6 5 4 3 2 1 0
[BZ4] No traversing command
B1307
L140 (1307)
B
0
B1000
L141 (1000)
B
0
B1000
L142 (1000)
B
0
B1000
L143 (1000)
B
0
B1000
L144 (1000)
B
0
B1000
L145 (1000)
B
0 1 0 1 1 0 1 1 0 0
BIT -> WORD
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Z drive, control word2 at CU
c392
K4912
[A5]
Note:
The bits in control word 2 are, for the specified connection in the CU, received in binectors B3400 - B3415.
1 2 3 4 5 6 7 8
Z drive
Control words to CU
V1.0
10.09.2001
Function chart
DRIVEPAC
- BZ6 -


Z drive, status word T400
[AZ1] Ready to power-up from CU B1211 L280 (1211) B
[AZ1] Ready from CU B1212 L281 (1212) B
[AZ1] Operation from CU B1213 L282 (1213) B
[AZ1] Fault from CU B1214 L283 (1214) B
[BZ2] Drive ON B1300 L284 (1300) B
[BZ3] Normal stop active B1328 L285 (1328) B
[BZ4] Electrical OFF B1310 L286 (1310) B
[BZ3] Fast stop active B1312 L287 (1312) B
[BZ2] T400 power-down signal B1316 L288 (1316) B
[BZ5] Inverter enable B1302 L289 (1302) B
[BZ5] Setpoint enable B1304 L290 (1304) B
[BZ2] T400 summed fault B1318 L291 (1318) B
[BZ4] MS traversing command B1306 L292 (1306) B
[BZ1] n/f actual value = 0 B1205 L293 (1205) B
[DZ1] Enable positioning B1340 L294 (1340) B
[DZ1] Positioning active B1342 L295 (1342) B
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
BIT -> WORD
Z drive, status word T400
c399
K4919
[A6]
Display in c399
15 14 13 12 11 10 9 8
7 6 5 4 3 2 1 0
1 2 3 4 5 6 7 8
V1.0
10.09.2001
Z drive
Status word T400
Function chart
DRIVEPAC
- BZ7 -


Z drive, Fault word T400
[AZ1] Operation from CU (B1213)
[BZ2] Drive ON (B1300)
&
L122 (2000 ms)
T 0
[A11] Word 12 from CU (Z n/f actual value KR0032)
Threshold H125 (1.2)
0.0
X1
X2
L
HY
X1>X2
X1=X2
X1<X2
[A11] Word 12 from CU (Z n/f actual value KR0032)
Threshold L126 (0.005)
0.0
0.001
[CZ2] Speed setpoint to CU (KR0965)
Threshold L127 (0.01)
0.0
0.001
[A11] Word 15 from CU (Z M setpoint KR0035)
Threshold L128 (0.8)
0.0
0.05
&
L129 (1000 ms)
Drive blocked
Fault, checkback signal ON
Overspeed positive
Overspeed negative
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
BIT -> WORD
MSK
L388 (FFFF)
[BZ1] Z fault acknowledgement
Z drive fault word T400 c390
K4990
Z drive T400 fault
B1320
[B1, BZ2]
Z drive no T400 fault
1
B1321
[BZ6]
Note: Fault results in F035 for CUVC/ CUMC or F021 for CUD1
1 2 3 4 5 6 7 8
T400
Fault, Z drive
V1.0
10.09.2001
Function chart
DRIVEPAC
- BZ8 -

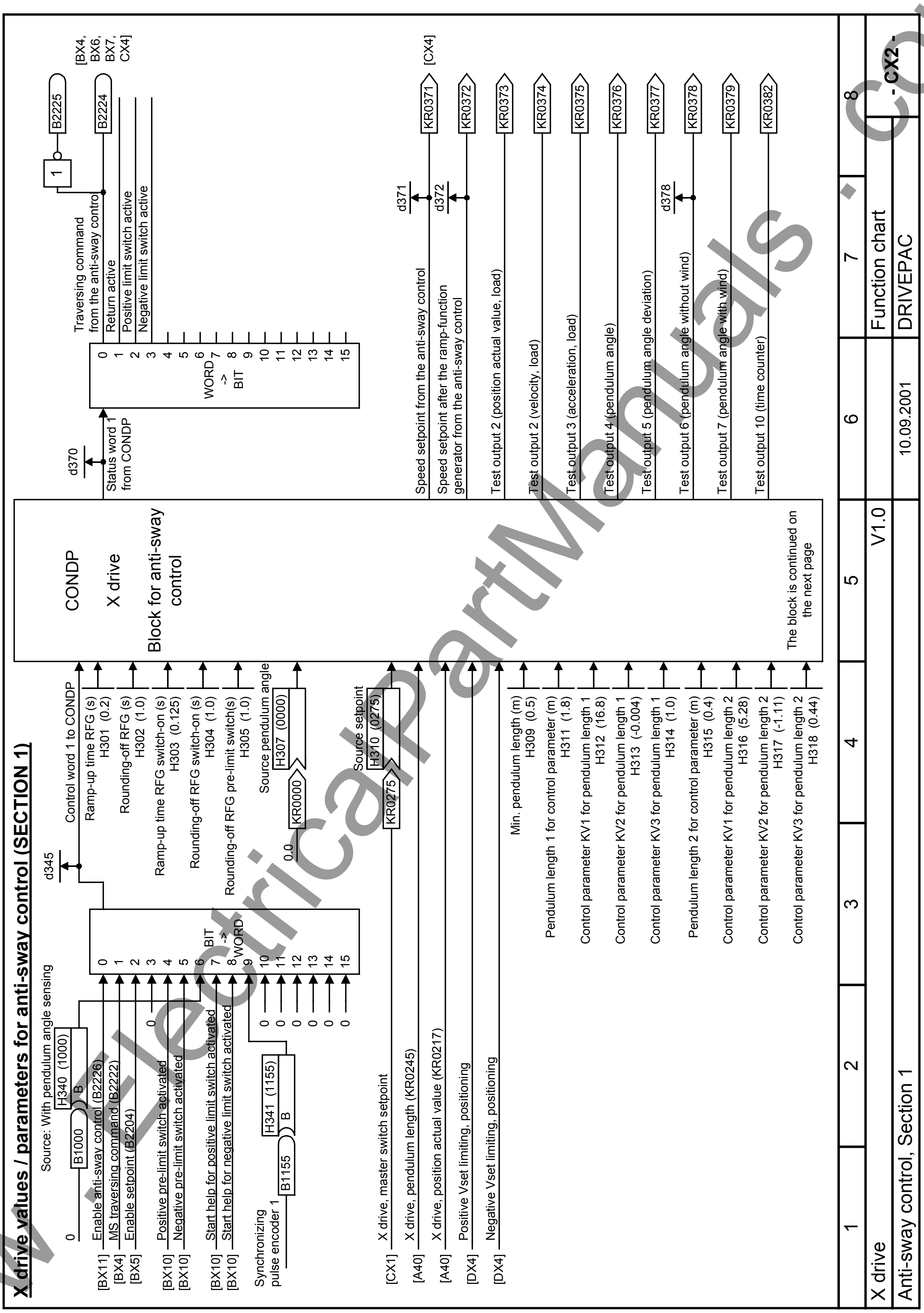
X drive master switch setpoint condition



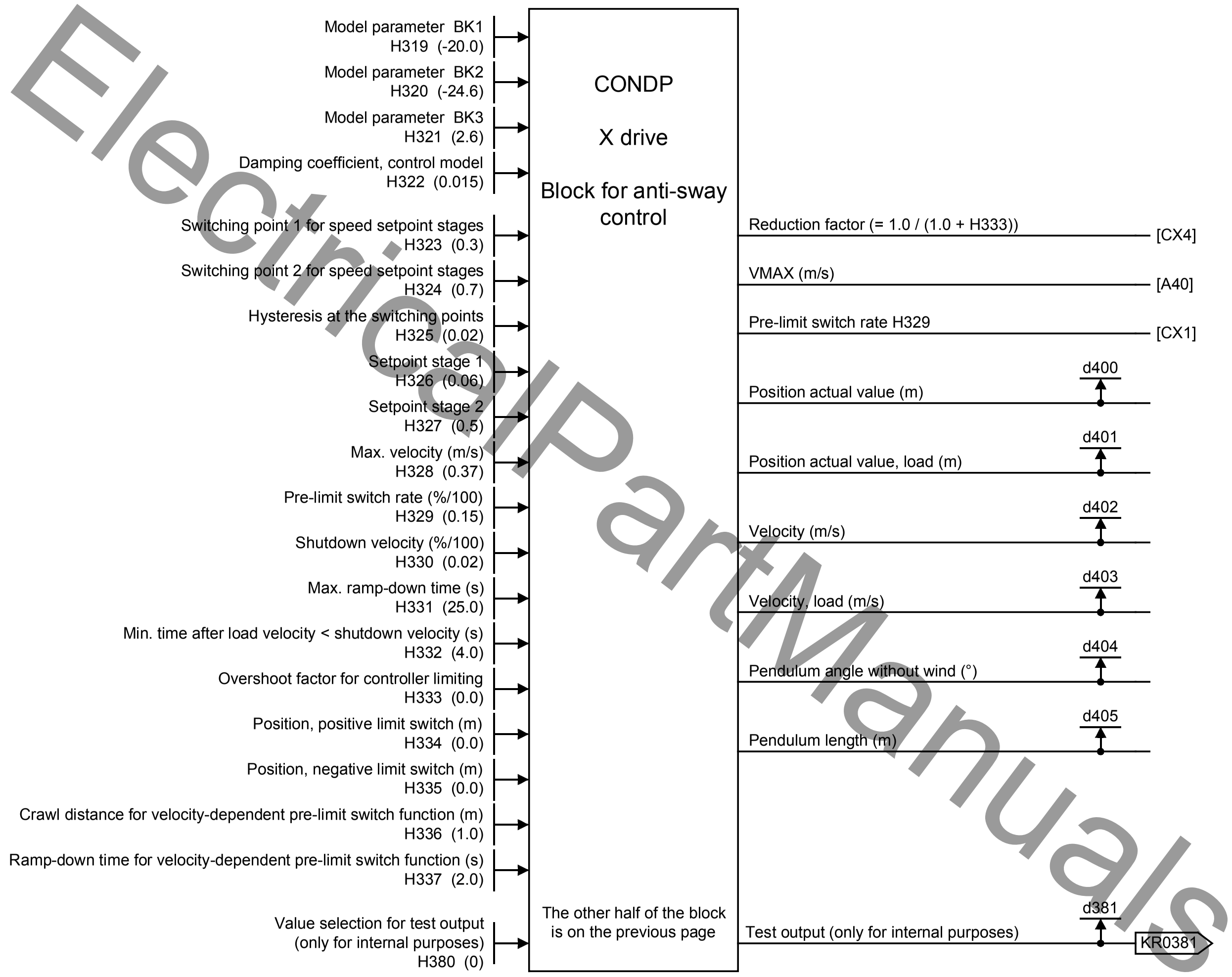
Note:
The polygon characteristic can only be sensibly used if the CONDP block has been set to continuous setpoint evaluation. (chart CX3, parameters H323, H324)

1 2 3 4 5 6 7 8

X drive V1.0 Function chart - CX1 -
Master switch setpoint conditioning 10.09.2001 DRIVEPAC

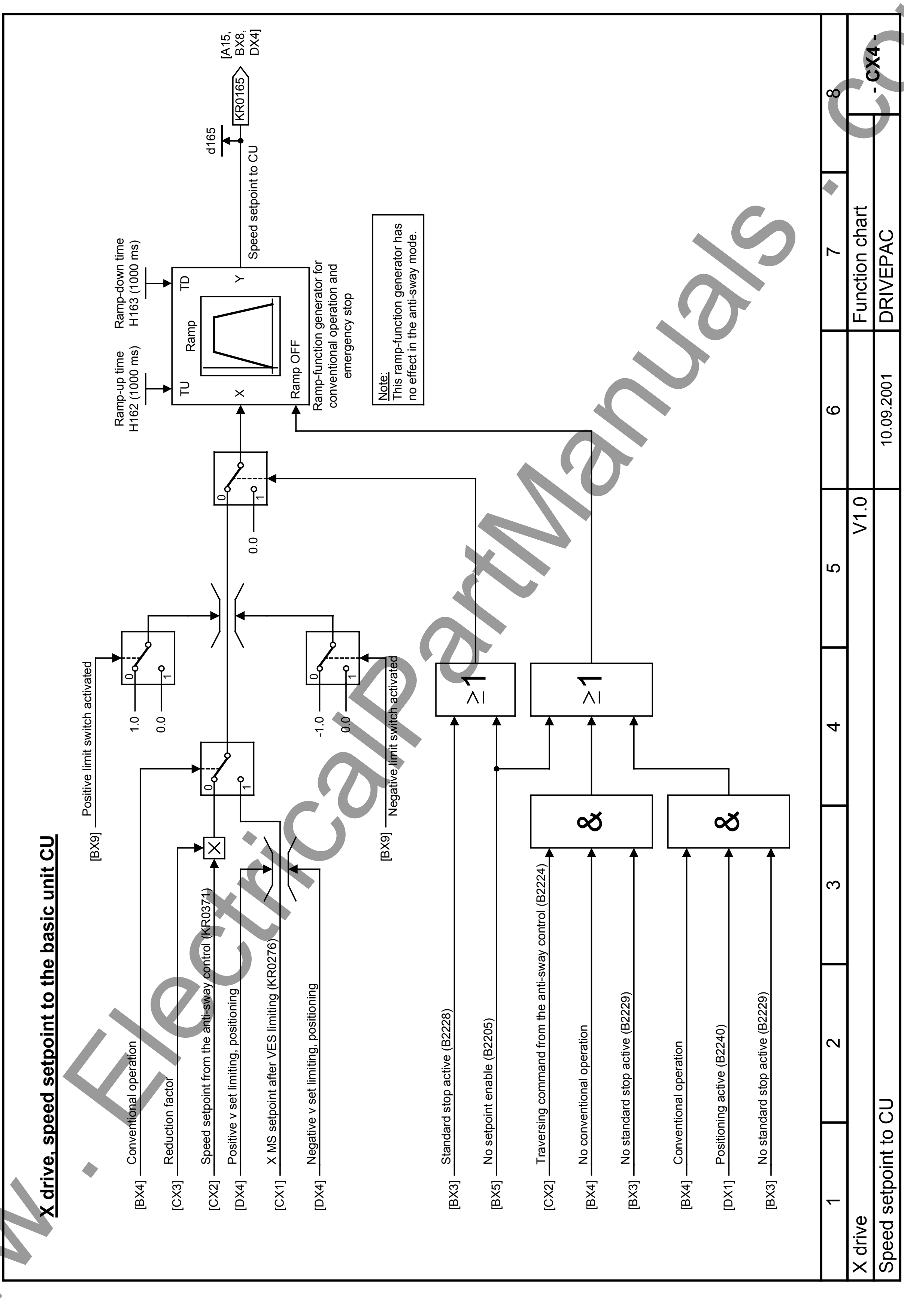

X drive values / parameters for anti-sway control (SECTION 1)
Source: With pendulum angle sensing
0
B1000
H340 (1000)
B
[BX11] Enable anti-sway control (B2226)
[BX4] MS traversing command (B2222)
[BX5] Enable setpoint (B2204)
0
[BX10] Positive pre-limit switch activated
[BX10] Negative pre-limit switch activated
[BX10] Start help for positive limit switch activated
[BX10] Start help for negative limit switch activated
Synchronizing pulse encoder 1
B1155
H341 (1155)
B
0
0
0
0
0
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
BIT -> WORD
d345
Control word 1 to CONDP
Ramp-up time RFG (s) H301 (0.2)
Rounding-off RFG (s) H302 (1.0)
Ramp-up time RFG switch-on (s) H303 (0.125)
Rounding-off RFG switch-on (s) H304 (1.0)
Rounding-off RFG pre-limit switch(s) H305 (1.0)
0.0
KR0000
Source pendulum angle H307 (0000)
[CX1] X drive, master switch setpoint
KR0275
Source setpoint H310 (0275)
[A40] X drive, pendulum length (KR0245)
[A40] X drive, position actual value (KR0217)
[DX4] Positive Vset limiting, positioning
[DX4] Negative Vset limiting, positioning
Min. pendulum length (m) H309 (0.5)
Pendulum length 1 for control parameter (m) H311 (1.8)
Control parameter KV1 for pendulum length 1 H312 (16.8)
Control parameter KV2 for pendulum length 1 H313 (-0.004)
Control parameter KV3 for pendulum length 1 H314 (1.0)
Pendulum length 2 for control parameter (m) H315 (0.4)
Control parameter KV1 for pendulum length 2 H316 (5.28)
Control parameter KV2 for pendulum length 2 H317 (-1.11)
Control parameter KV3 for pendulum length 2 H318 (0.44)
CONDP
X drive
Block for anti-sway control
The block is continued on the next page
d370
Status word 1 from CONDP
WORD -> BIT
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Traversing command from the anti-sway control
Return active
Positive limit switch active
Negative limit switch active
1
B2225
B2224
[BX4, BX6, BX7, CX4]
Speed setpoint from the anti-sway control
d371
KR0371
[CX4]
Speed setpoint after the ramp-function generator from the anti-sway control
d372
KR0372
Test output 2 (position actual value, load)
KR0373
Test output 2 (velocity, load)
KR0374
Test output 3 (acceleration, load)
KR0375
Test output 4 (pendulum angle)
KR0376
Test output 5 (pendulum angle deviation)
KR0377
Test output 6 (pendulum angle without wind)
d378
KR0378
Test output 7 (pendulum angle with wind)
KR0379
Test output 10 (time counter)
KR0382
1 2 3 4 5 6 7 8
V1.0
X drive
Anti-sway control, Section 1
10.09.2001
Function chart
DRIVEPAC
- CX2 -

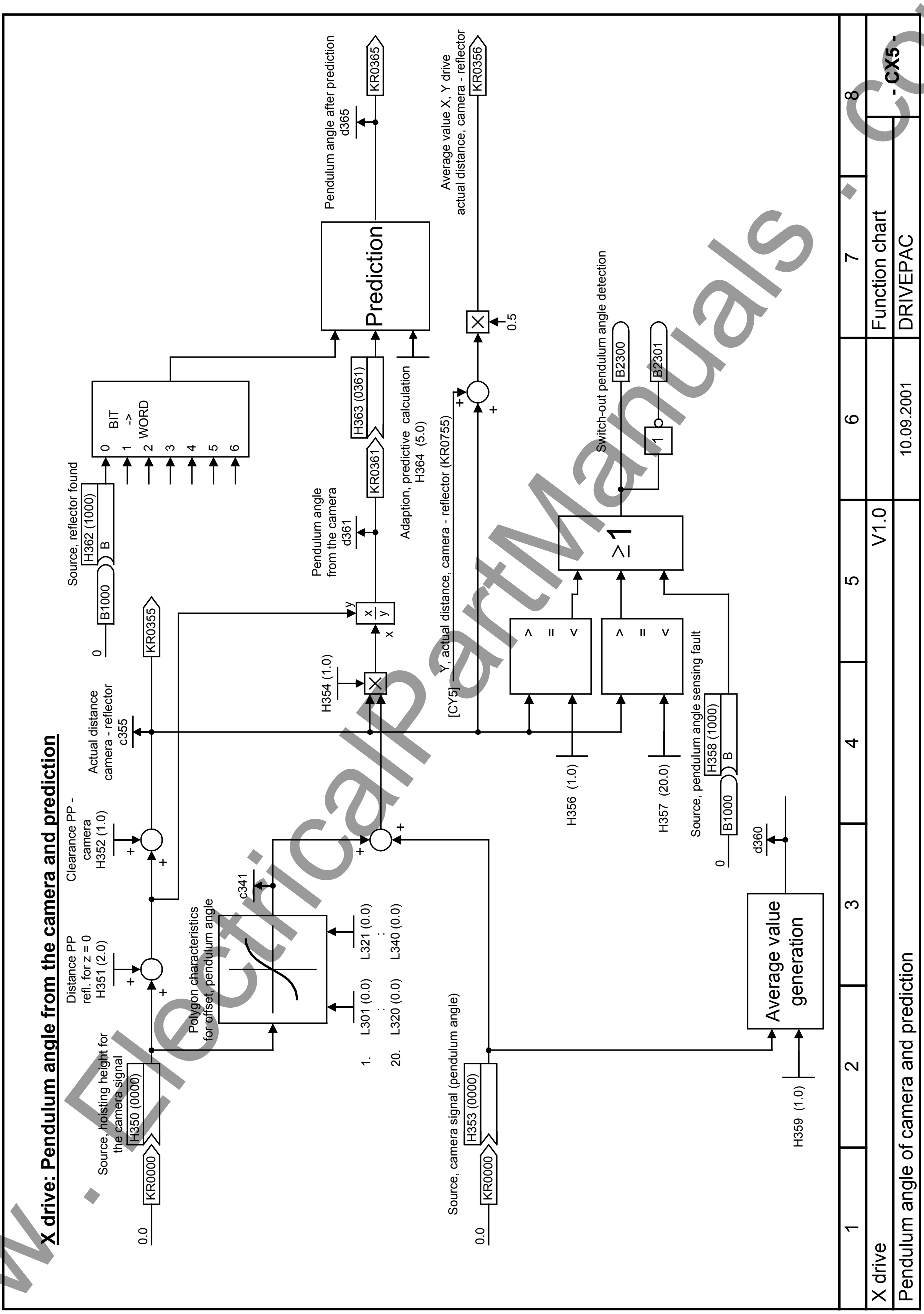
X drive values / parameters for anti-sway control (SECTION 2)



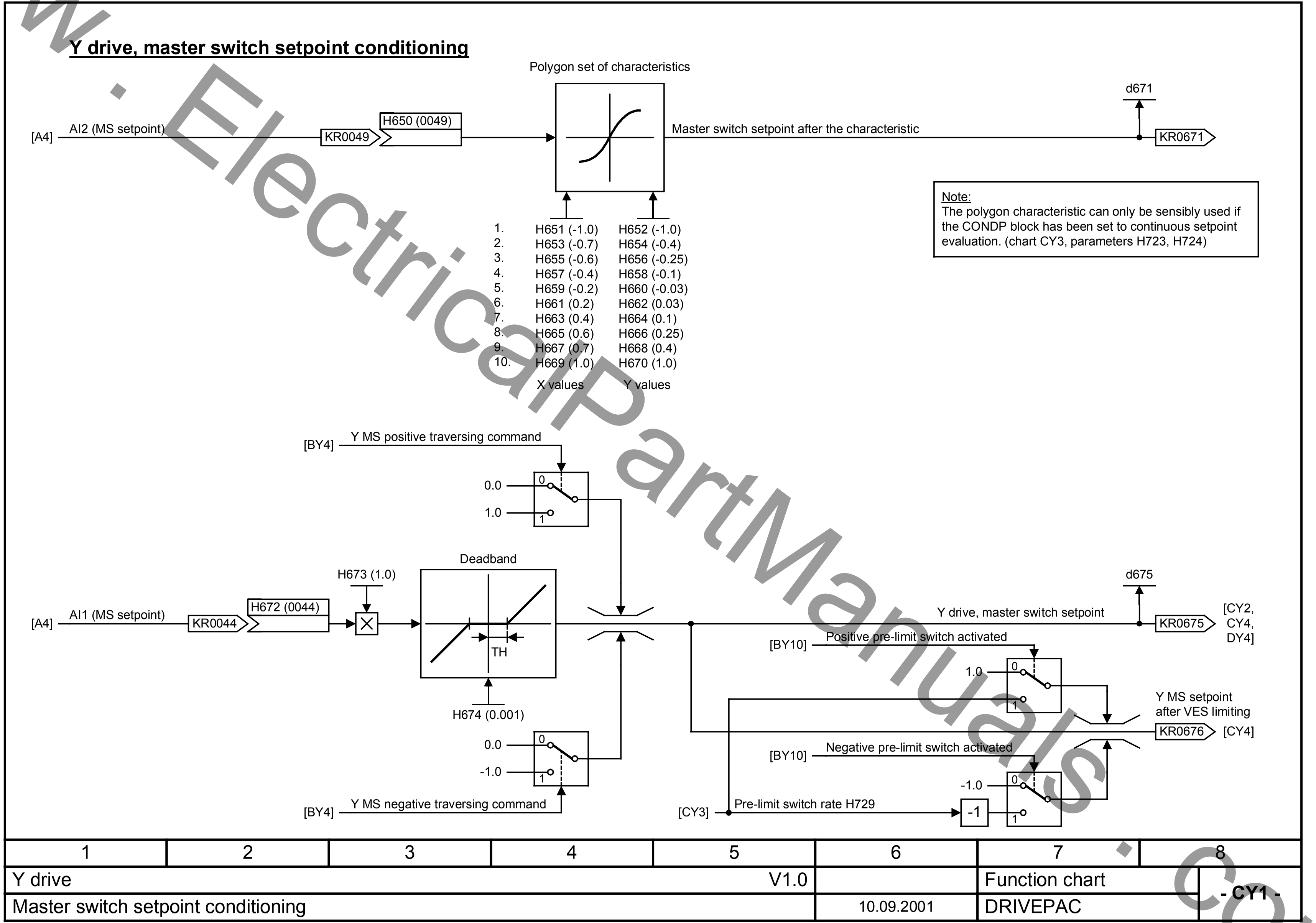
1	2	3	4	5	6	7	8

X drive V1.0 | Function chart | - CX3 -
Anti-sway control, Section 2 | 10.09.2001 | DRIVEPAC

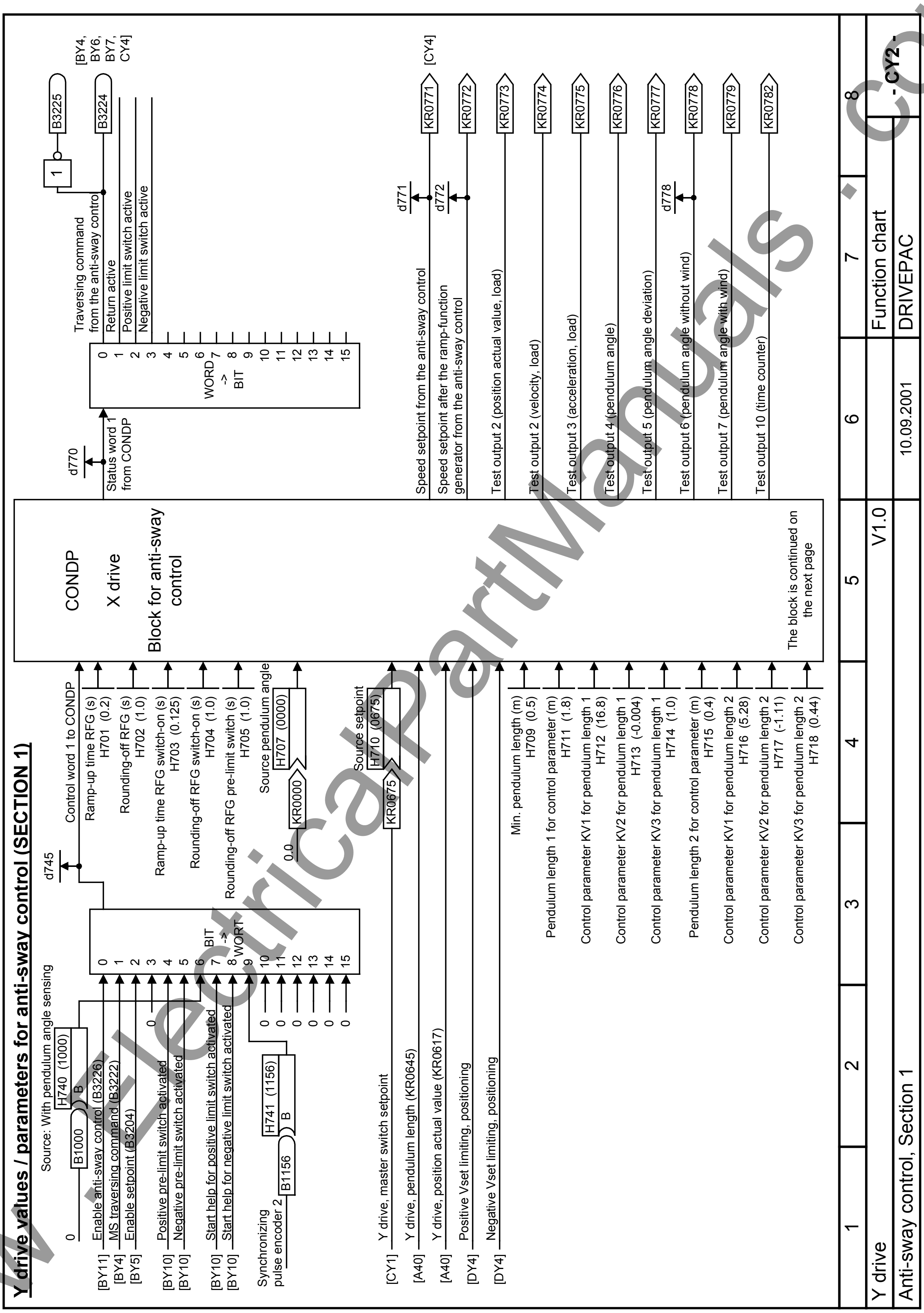

X drive, speed setpoint to the basic unit CU
[BX4] Conventional operation
[CX3] Reduction factor
[CX2] Speed setpoint from the anti-sway control (KR0371)
[DX4] Positive v set limiting, positioning
[CX1] X MS setpoint after VES limiting (KR0276)
[DX4] Negative v set limiting, positioning
[BX9] Positive limit switch activated
[BX9] Negative limit switch activated
1.0
0.0
-1.0
0.0
0
1
0.0
[BX3] Standard stop active (B2228)
[BX5] No setpoint enable (B2205)
[CX2] Traversing command from the anti-sway control (B2224)
[BX4] No conventional operation
[BX3] No standard stop active (B2229)
[BX4] Conventional operation
[DX1] Positioning active (B2240)
[BX3] No standard stop active (B2229)
&
&
≥1
≥1
Ramp-up time H162 (1000 ms)
Ramp-down time H163 (1000 ms)
TU
TD
Ramp
X
Y
Ramp OFF
Ramp-function generator for conventional operation and emergency stop
Speed setpoint to CU
d165
KR0165
[A15, BX8, DX4]
Note:
This ramp-function generator has no effect in the anti-sway mode.
1
2
3
4
5
6
7
8
V1.0
X drive
Speed setpoint to CU
10.09.2001
Function chart
DRIVEPAC
- CX4 -


X drive: Pendulum angle from the camera and prediction
0.0
KR0000
H350 (0000)
Source, hoisting height for the camera signal
Distance PP refl. for z = 0
H351 (2.0)
Clearance PP - camera
H352 (1.0)
Actual distance camera - reflector
c355
KR0355
Polygon characteristics for offset, pendulum angle
c341
1. L301 (0.0) L321 (0.0)
:
20. L320 (0.0) L340 (0.0)
H354 (1.0)
x/y
Pendulum angle from the camera
d361
KR0361
H363 (0361)
Adaption, predictive calculation
H364 (5.0)
0
B1000
H362 (1000)
B
Source, reflector found
BIT -> WORD
0 1 2 3 4 5 6
Prediction
Pendulum angle after prediction
d365
KR0365
0.0
KR0000
H353 (0000)
Source, camera signal (pendulum angle)
[CY5]
Y, actual distance, camera - reflector (KR0755)
0.5
Average value X, Y drive actual distance, camera - reflector
KR0356
H356 (1.0)
H357 (20.0)
> = <
> = <
≥1
1
Switch-out pendulum angle detection
B2300
B2301
0
B1000
H358 (1000)
B
Source, pendulum angle sensing fault
d360
Average value generation
H359 (1.0)
1 2 3 4 5 6 7 8
V1.0
X drive
Pendulum angle of camera and prediction
10.09.2001
Function chart
DRIVEPAC
- CX5 -

Y drive, master switch setpoint conditioning

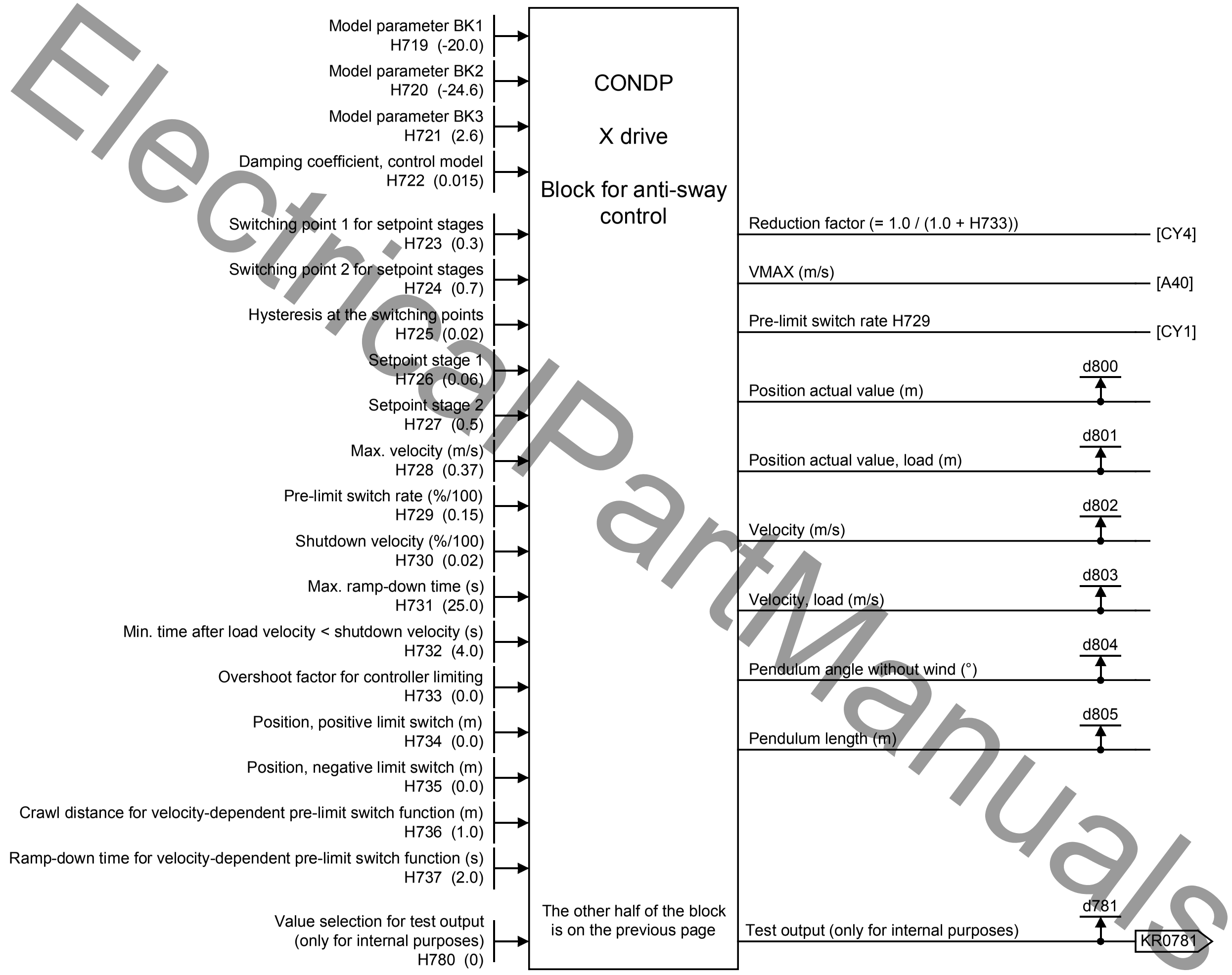


Note:
The polygon characteristic can only be sensibly used if the CONDP block has been set to continuous setpoint evaluation. (chart CY3, parameters H723, H724)



Y drive values / parameters for anti-sway control (SECTION 1)
Source: With pendulum angle sensing
0
B1000
H740 (1000)
B
[BY11] Enable anti-sway control (B3226)
[BY4] MS traversing command (B3222)
[BY5] Enable setpoint (B3204)
0
[BY10] Positive pre-limit switch activated
[BY10] Negative pre-limit switch activated
[BY10] Start help for positive limit switch activated
[BY10] Start help for negative limit switch activated
Synchronizing pulse encoder 2
B1156
H741 (1156)
B
0 0 0 0 0 0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
BIT -> WORT
d745
Control word 1 to CONDP
Ramp-up time RFG (s) H701 (0.2)
Rounding-off RFG (s) H702 (1.0)
Ramp-up time RFG switch-on (s) H703 (0.125)
Rounding-off RFG switch-on (s) H704 (1.0)
Rounding-off RFG pre-limit switch (s) H705 (1.0)
0.0
KR0000
Source pendulum angle
H707 (0000)
[CY1] Y drive, master switch setpoint
KR0675
Source setpoint
H710 (0675)
[A40] Y drive, pendulum length (KR0645)
[A40] Y drive, position actual value (KR0617)
[DY4] Positive Vset limiting, positioning
[DY4] Negative Vset limiting, positioning
Min. pendulum length (m) H709 (0.5)
Pendulum length 1 for control parameter (m) H711 (1.8)
Control parameter KV1 for pendulum length 1 H712 (16.8)
Control parameter KV2 for pendulum length 1 H713 (-0.004)
Control parameter KV3 for pendulum length 1 H714 (1.0)
Pendulum length 2 for control parameter (m) H715 (0.4)
Control parameter KV1 for pendulum length 2 H716 (5.28)
Control parameter KV2 for pendulum length 2 H717 (-1.11)
Control parameter KV3 for pendulum length 2 H718 (0.44)
CONDP
X drive
Block for anti-sway control
The block is continued on the next page
d770
Status word 1 from CONDP
WORD -> BIT
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Traversing command from the anti-sway control
Return active
Positive limit switch active
Negative limit switch active
1
B3225
B3224
[BY4, BY6, BY7, CY4]
Speed setpoint from the anti-sway control
d771
KR0771
[CY4]
Speed setpoint after the ramp-function generator from the anti-sway control
d772
KR0772
Test output 2 (position actual value, load)
KR0773
Test output 2 (velocity, load)
KR0774
Test output 3 (acceleration, load)
KR0775
Test output 4 (pendulum angle)
KR0776
Test output 5 (pendulum angle deviation)
KR0777
Test output 6 (pendulum angle without wind)
d778
KR0778
Test output 7 (pendulum angle with wind)
KR0779
Test output 10 (time counter)
KR0782
1 2 3 4 5 6 7 8
V1.0
Y drive
Anti-sway control, Section 1
10.09.2001
Function chart
DRIVEPAC
- CY2 -

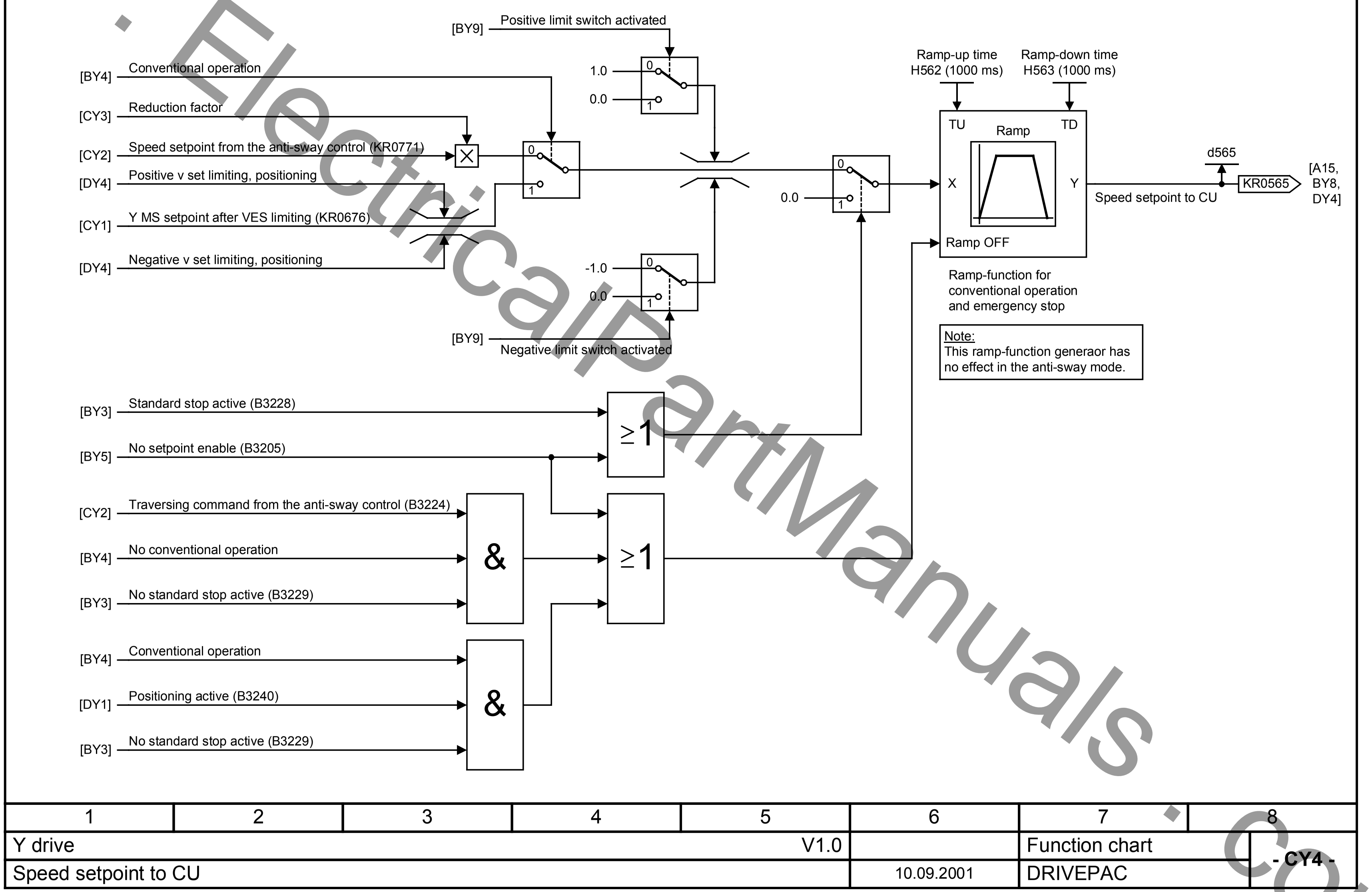
Y drive values / parameters for anti-sway control (SECTION 2)

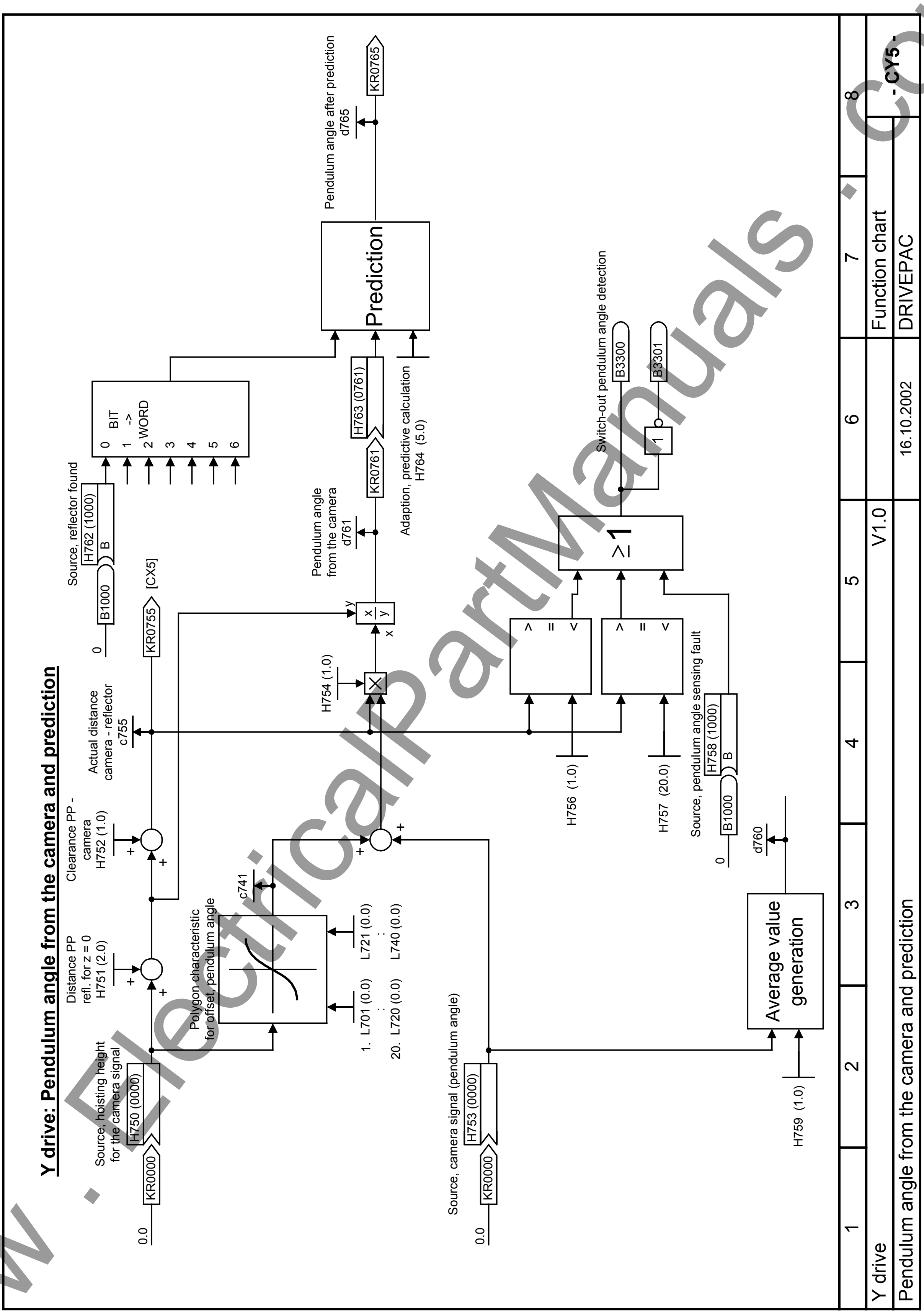


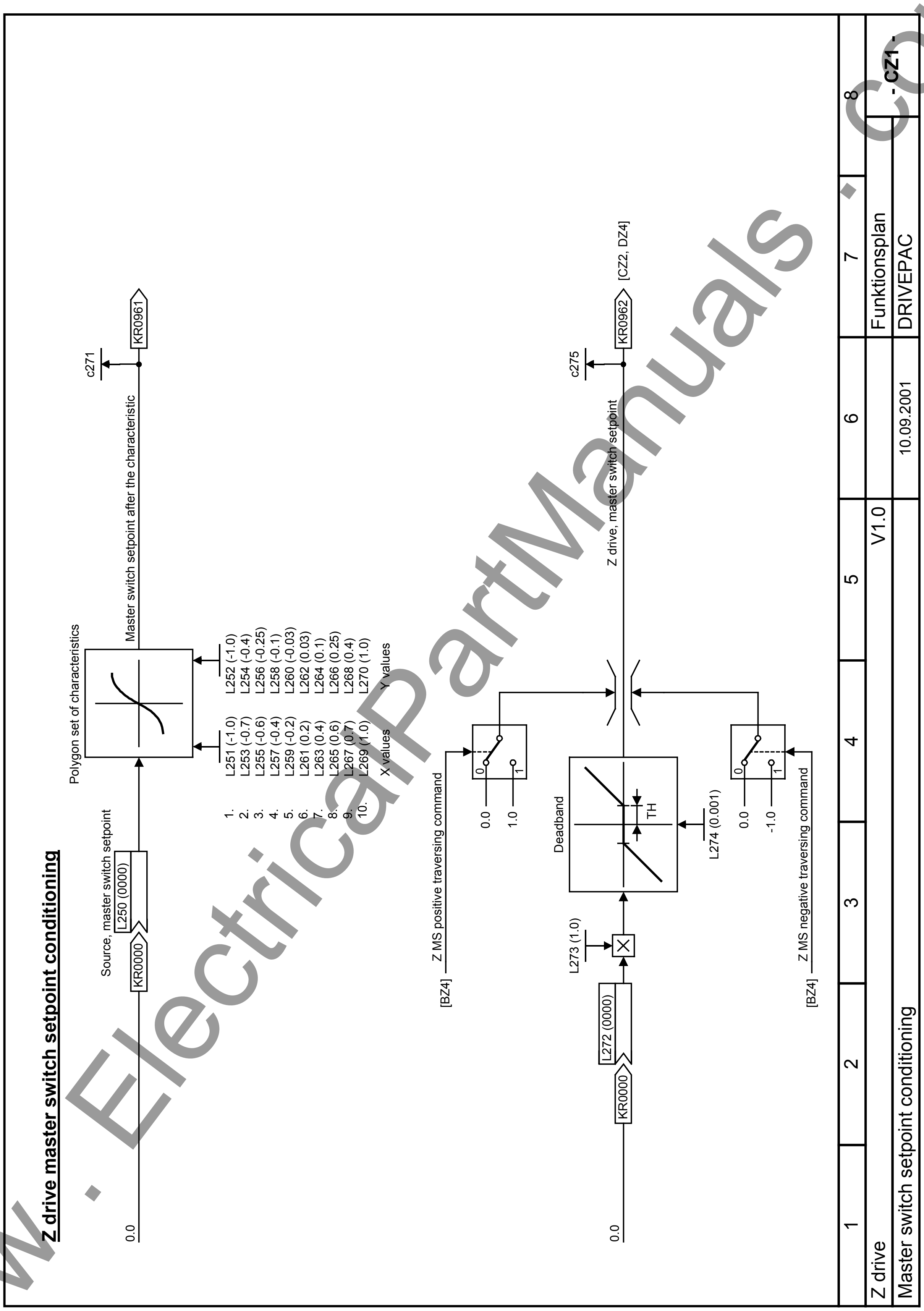
1	2	3	4	5	6	7	8

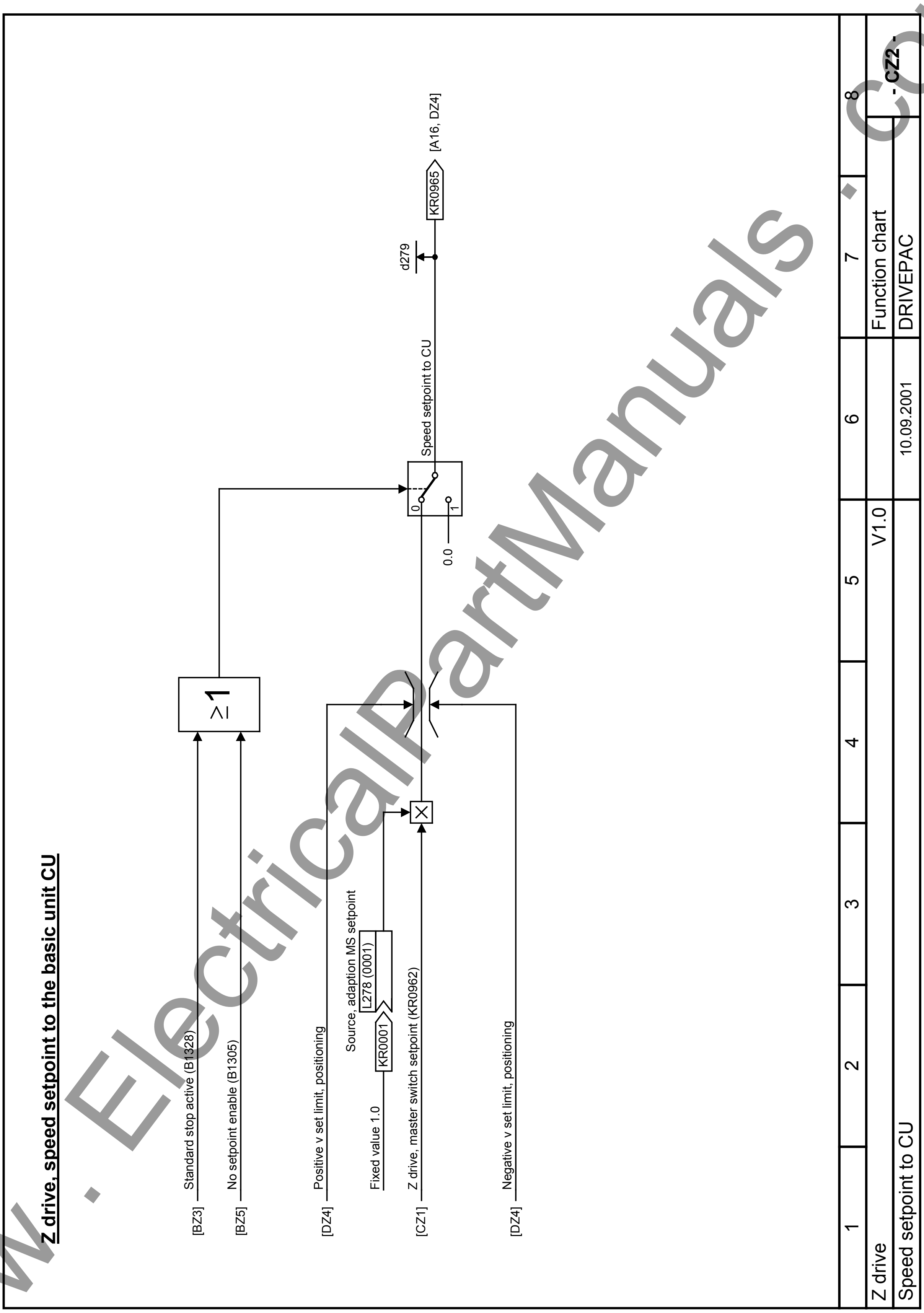
Y drive V1.0
Anti-sway control, Section 2
10.09.2001
Function chart
DRIVEPAC
- CY3 -

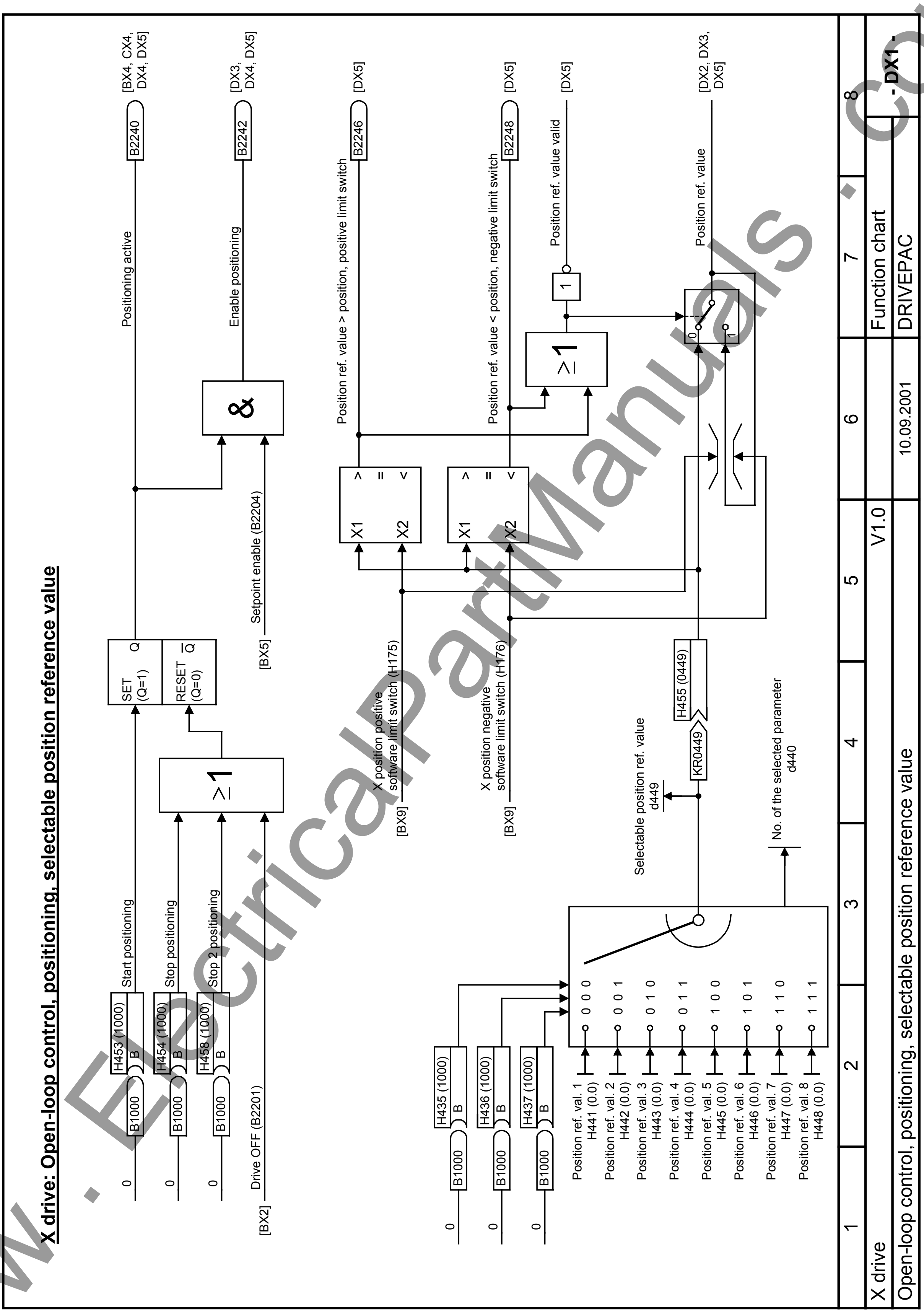
Y drive, speed setpoint at the basic unit CU




Y drive: Pendulum angle from the camera and prediction
0.0
KR0000
H750 (0000)
Source, hoisting height for the camera signal
Distance PP refl. for z = 0
H751 (2.0)
Clearance PP - camera
H752 (1.0)
Actual distance camera - reflector
c755
KR0755
[CX5]
0
B1000
B
H762 (1000)
Source, reflector found
0
1
2
3
4
5
6
BIT -> WORD
Polygon characteristic for offset, pendulum angle
c741
1. L701 (0.0)
:
20. L720 (0.0)
L721 (0.0)
:
L740 (0.0)
H754 (1.0)
x/y
y
x
Pendulum angle from the camera
d761
KR0761
H763 (0761)
Adaption, predictive calculation
H764 (5.0)
Prediction
Pendulum angle after prediction
d765
KR0765
0.0
KR0000
H753 (0000)
Source, camera signal (pendulum angle)
Average value generation
H759 (1.0)
d760
H756 (1.0)
H757 (20.0)
0
B1000
B
H758 (1000)
Source, pendulum angle sensing fault
>
=
<
≥1
1
Switch-out pendulum angle detection
B3300
B3301
+
1
2
3
4
5
6
7
8
V1.0
Y drive
Pendulum angle from the camera and prediction
16.10.2002
Function chart
DRIVEPAC
- CY5 -

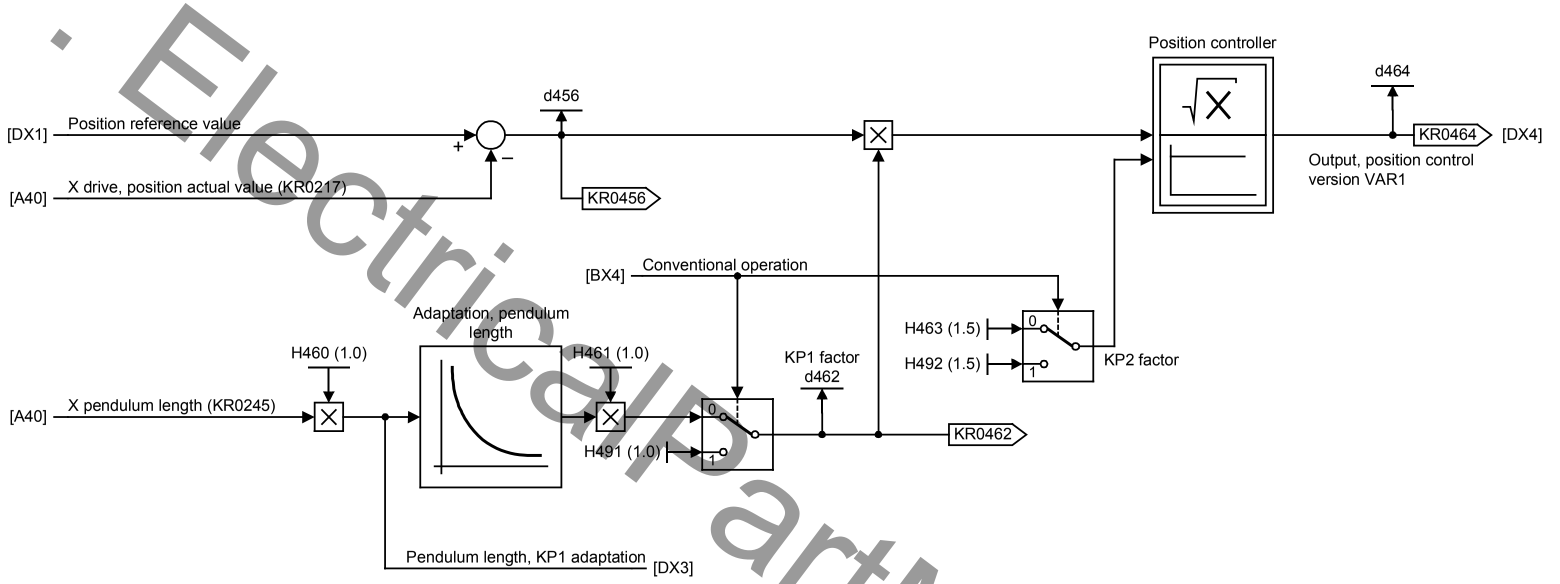

Z drive master switch setpoint conditioning
0.0
Source, master switch setpoint
KR0000
L250 (0000)
Polygon set of characteristics
Master switch setpoint after the characteristic
c271
KR0961
1. L251 (-1.0) L252 (-1.0)
2. L253 (-0.7) L254 (-0.4)
3. L255 (-0.6) L256 (-0.25)
4. L257 (-0.4) L258 (-0.1)
5. L259 (-0.2) L260 (-0.03)
6. L261 (0.2) L262 (0.03)
7. L263 (0.4) L264 (0.1)
8. L265 (0.6) L266 (0.25)
9. L267 (0.7) L268 (0.4)
10. L269 (1.0) L270 (1.0)
X values
Y values
[BZ4]
Z MS positive traversing command
0.0
1.0
0
1
0.0
KR0000
L272 (0000)
L273 (1.0)
Deadband
TH
L274 (0.001)
Z drive, master switch setpoint
c275
KR0962
[CZ2, DZ4]
[BZ4]
Z MS negative traversing command
0.0
-1.0
0
1
1
2
3
4
5
6
7
8
Z drive
Master switch setpoint conditioning
V1.0
10.09.2001
Funktionsplan
DRIVEPAC
- CZ1 -


Z drive, speed setpoint to the basic unit CU
[BZ3]
Standard stop active (B1328)
[BZ5]
No setpoint enable (B1305)
≥1
[DZ4]
Positive v set limit, positioning
Fixed value 1.0
KR0001
L278 (0001)
Source, adaption MS setpoint
[CZ1]
Z drive, master switch setpoint (KR0962)
[DZ4]
Negative v set limit, positioning
0
1
0.0
Speed setpoint to CU
d279
KR0965
[A16, DZ4]
1
2
3
4
5
6
7
8
Z drive
Speed setpoint to CU
V1.0
10.09.2001
Function chart
DRIVEPAC
- CZ2 -



X drive: Open-loop control, positioning, selectable position reference value

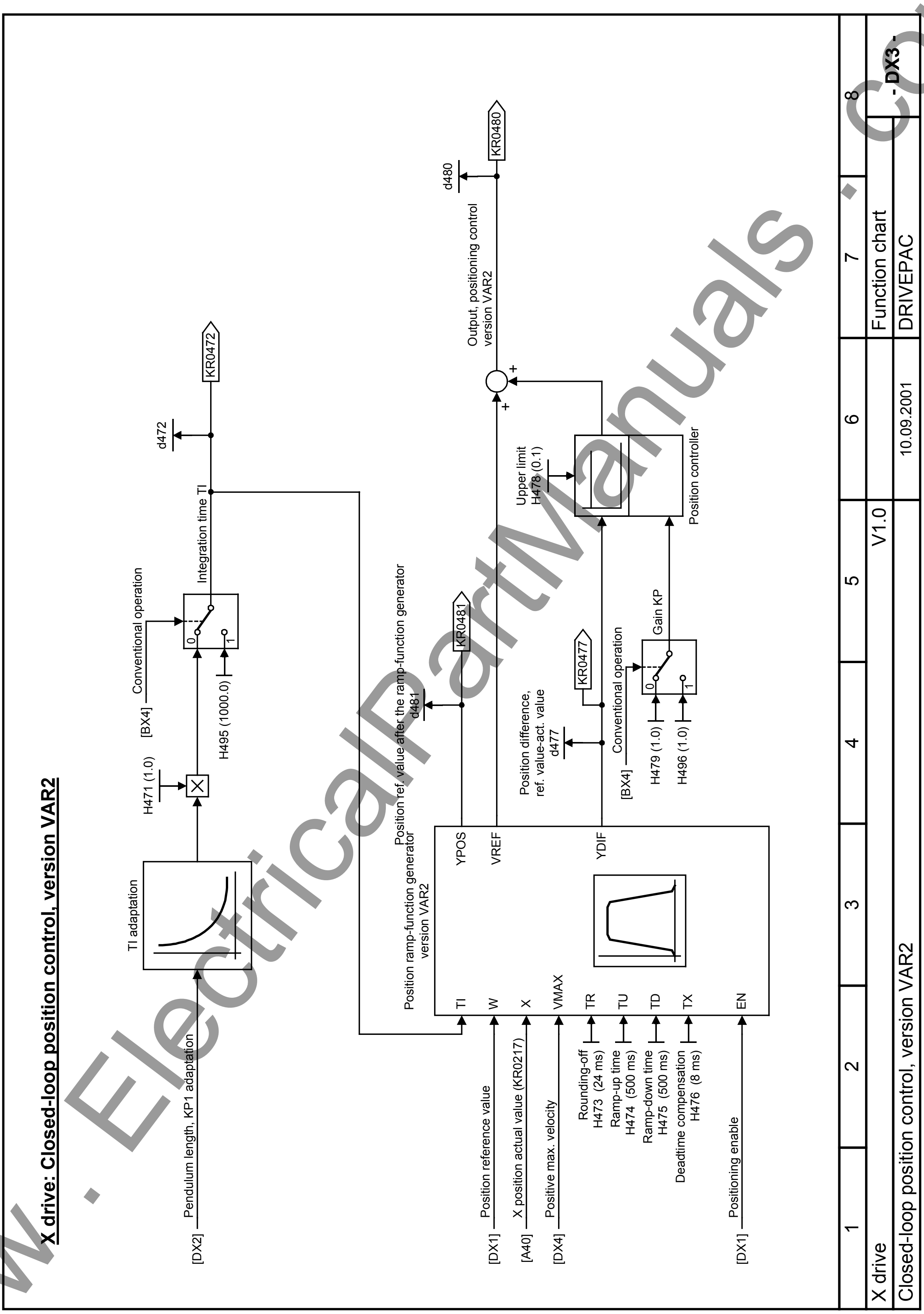
X drive: Closed-loop position control, version VAR1

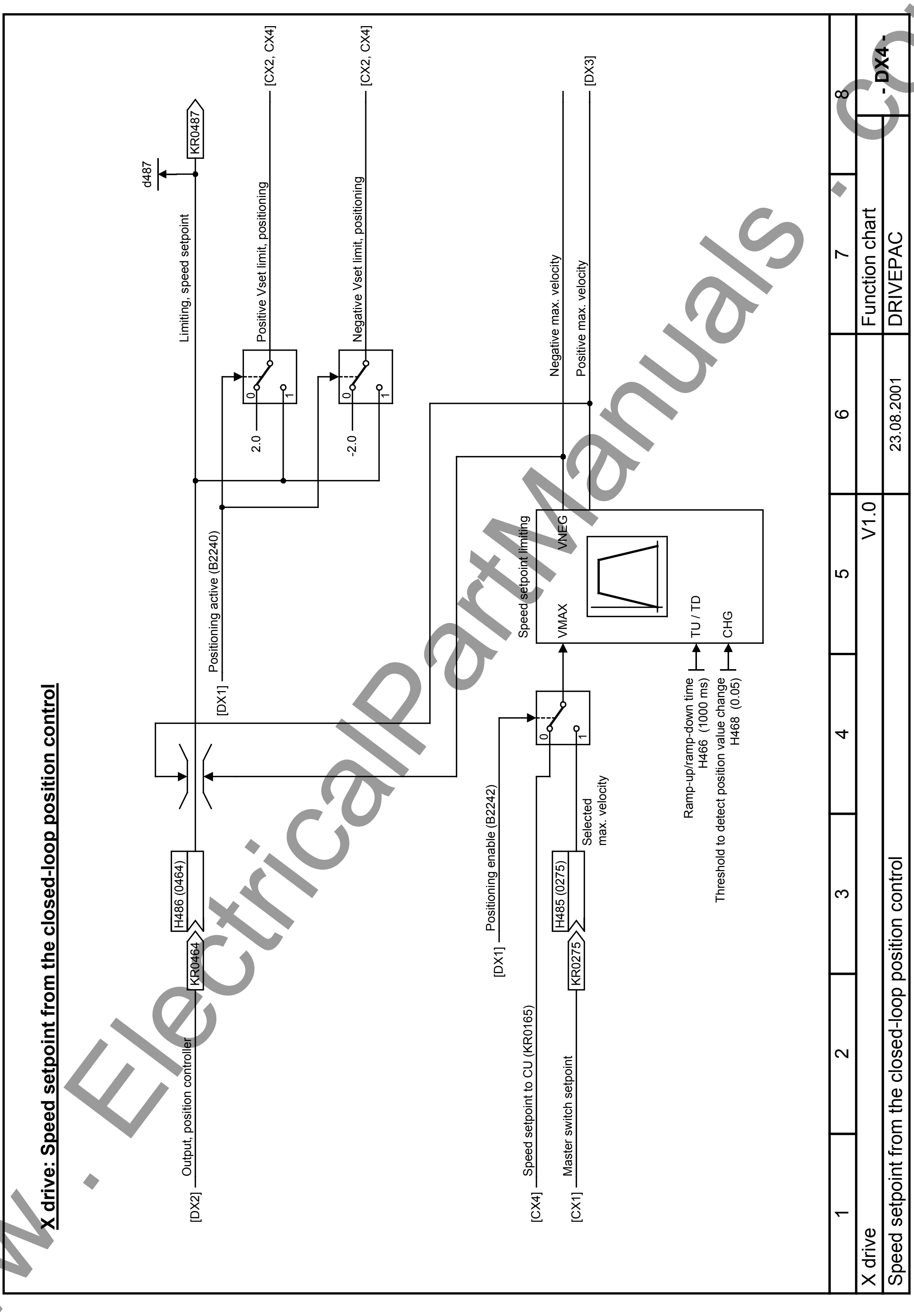


1	2	3	4	5	6	7	8

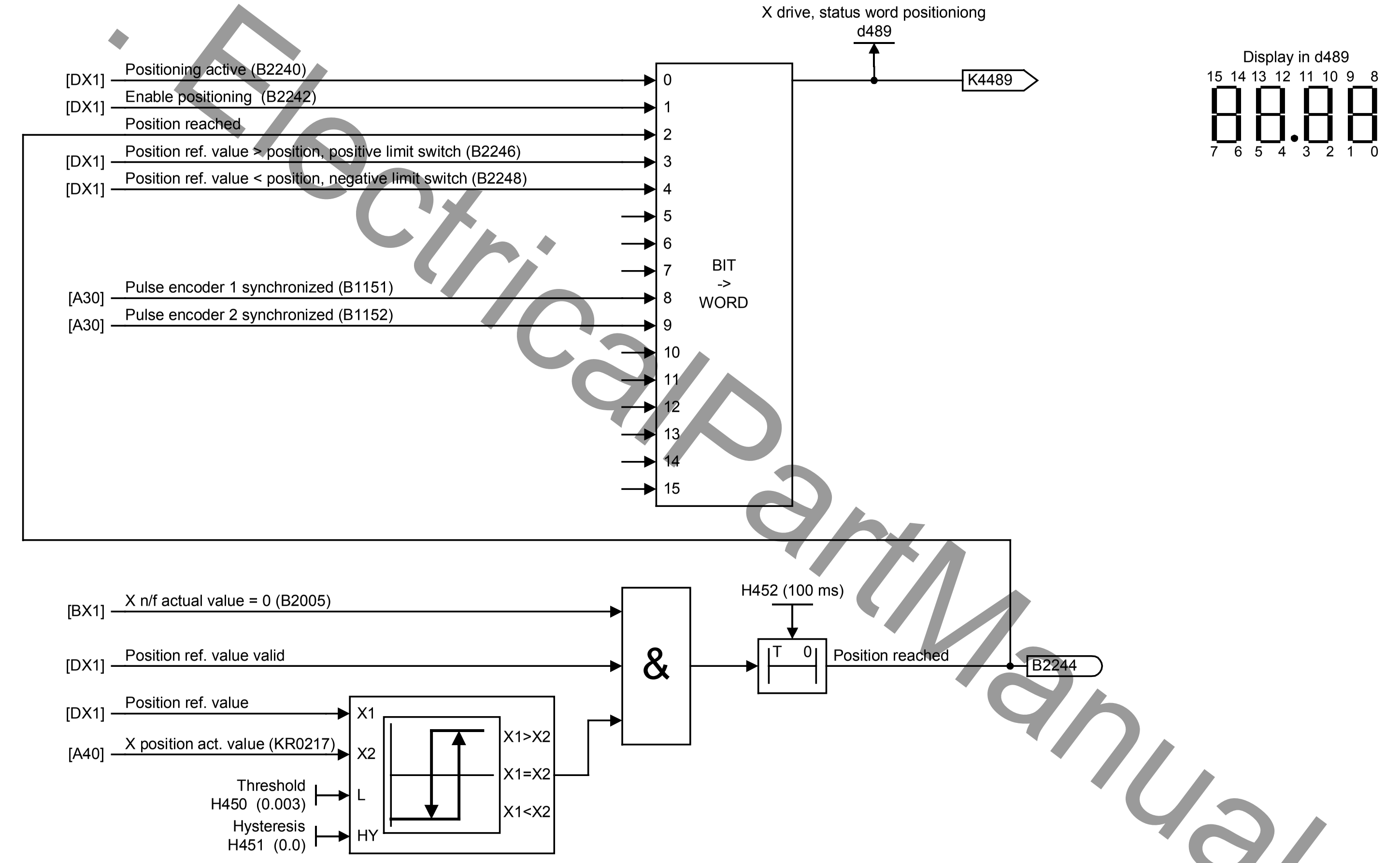
X drive V1.0 Function chart - DX2 -

Closed-loop position control, version VAR1 10.09.2001 DRIVEPAC


X drive: Closed-loop position control, version VAR2
[DX2]
Pendulum length, KP1 adaptation
TI adaptation
H471 (1.0)
[BX4]
Conventional operation
H495 (1000.0)
0
1
Integration time TI
d472
KR0472
Position ramp-function generator
version VAR2
Position ref. value after the ramp-function generator
d481
KR0481
TI
W
X
VMAX
TR
TU
TD
TX
EN
YPOS
VREF
YDIF
[DX1]
Position reference value
[A40]
X position actual value (KR0217)
[DX4]
Positive max. velocity
Rounding-off
H473 (24 ms)
Ramp-up time
H474 (500 ms)
Ramp-down time
H475 (500 ms)
Deadtime compensation
H476 (8 ms)
[DX1]
Positioning enable
Position difference,
ref. value-act. value
d477
KR0477
[BX4]
Conventional operation
H479 (1.0)
H496 (1.0)
Gain KP
Upper limit
H478 (0.1)
Position controller
+
+
Output, positioning control
version VAR2
d480
KR0480
1
2
3
4
5
6
7
8
X drive
Closed-loop position control, version VAR2
V1.0
10.09.2001
Function chart
DRIVEPAC
- DX3 -

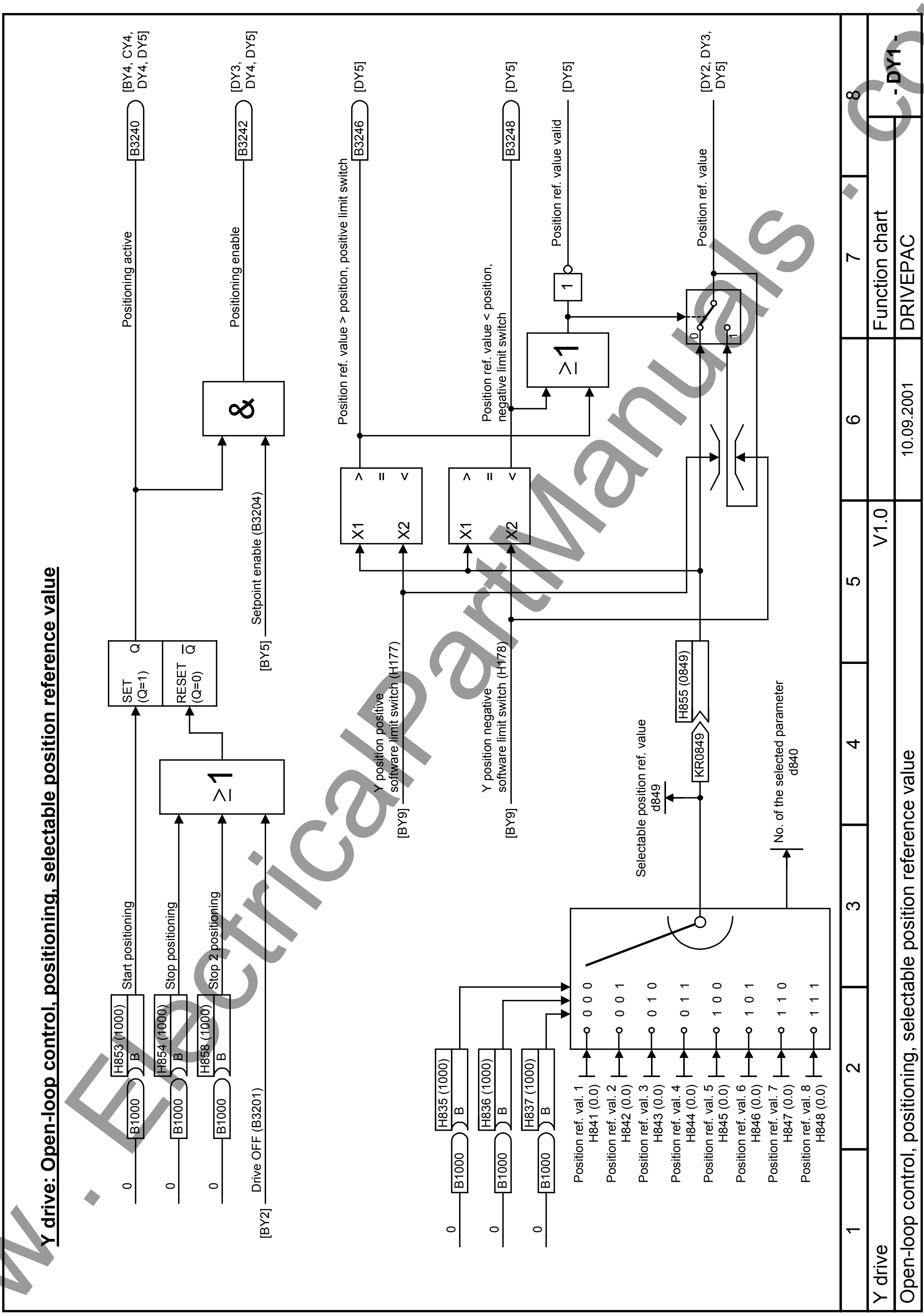

X drive: Speed setpoint from the closed-loop position control
[DX2]
Output, position controller
KR0464
H486 (0464)
d487
KR0487
Limiting, speed setpoint
[DX1]
Positioning active (B2240)
2.0
0
1
Positive Vset limit, positioning
[CX2, CX4]
-2.0
0
1
Negative Vset limit, positioning
[CX2, CX4]
[CX4]
Speed setpoint to CU (KR0165)
[CX1]
Master switch setpoint
KR0275
H485 (0275)
Selected max. velocity
[DX1]
Positioning enable (B2242)
0
1
Speed setpoint limiting
VMAX
VNEG
TU / TD
CHG
Ramp-up/ramp-down time H466 (1000 ms)
Threshold to detect position value change H468 (0.05)
Negative max. velocity
Positive max. velocity
[DX3]
1
2
3
4
5
6
7
8
X drive
Speed setpoint from the closed-loop position control
V1.0
23.08.2001
Function chart
DRIVEPAC
- DX4 -

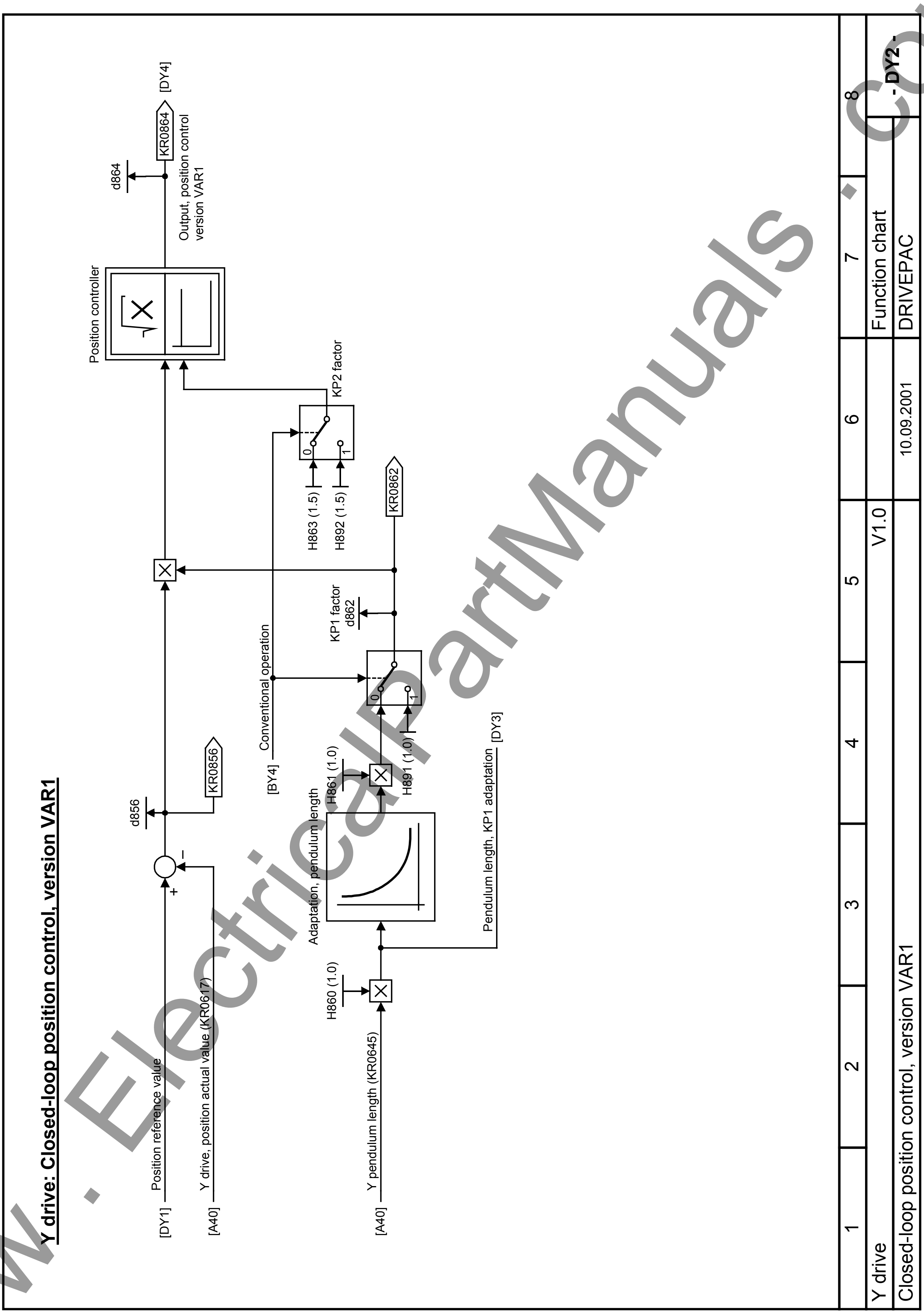
X drive, status word closed-loop position control

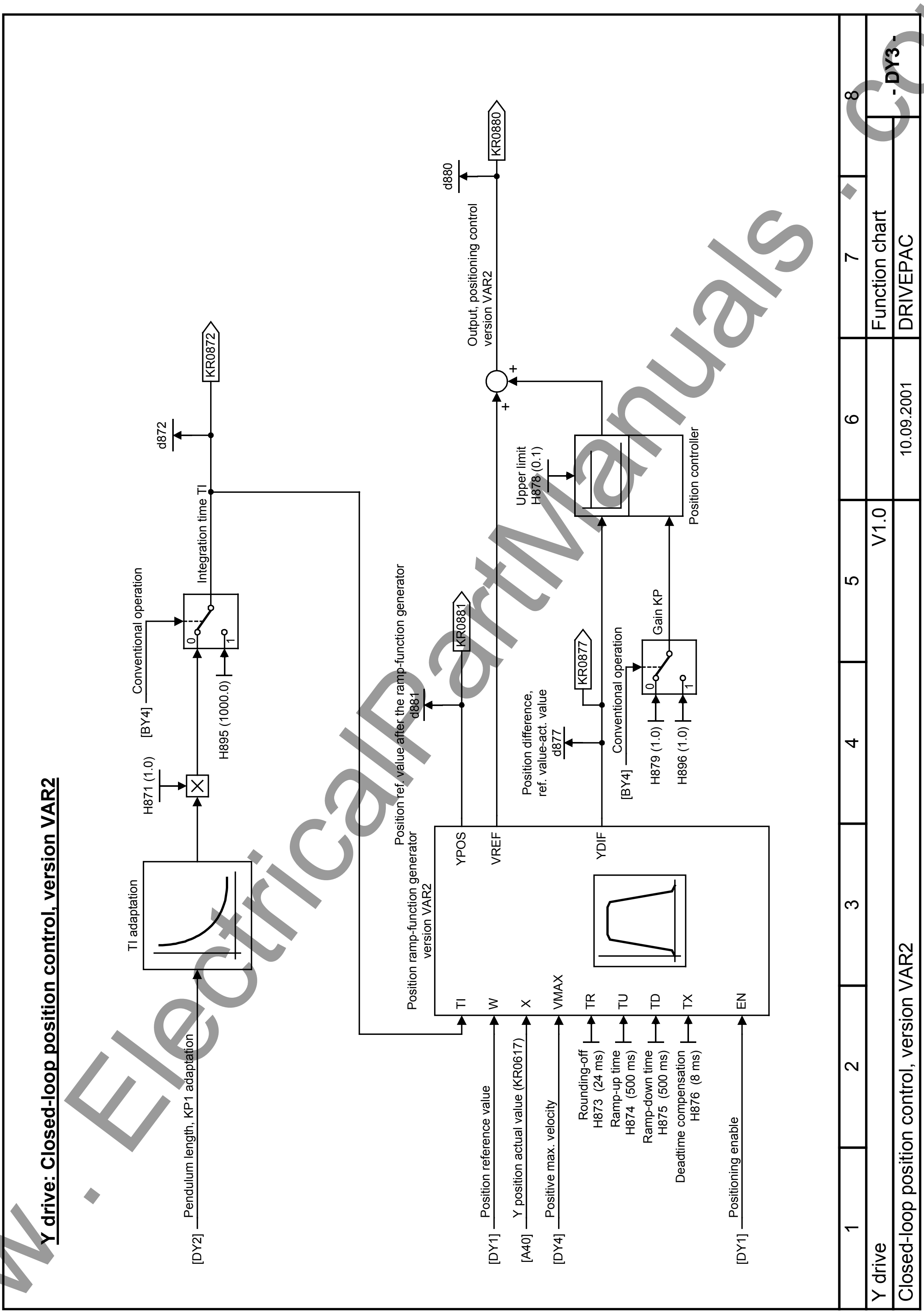


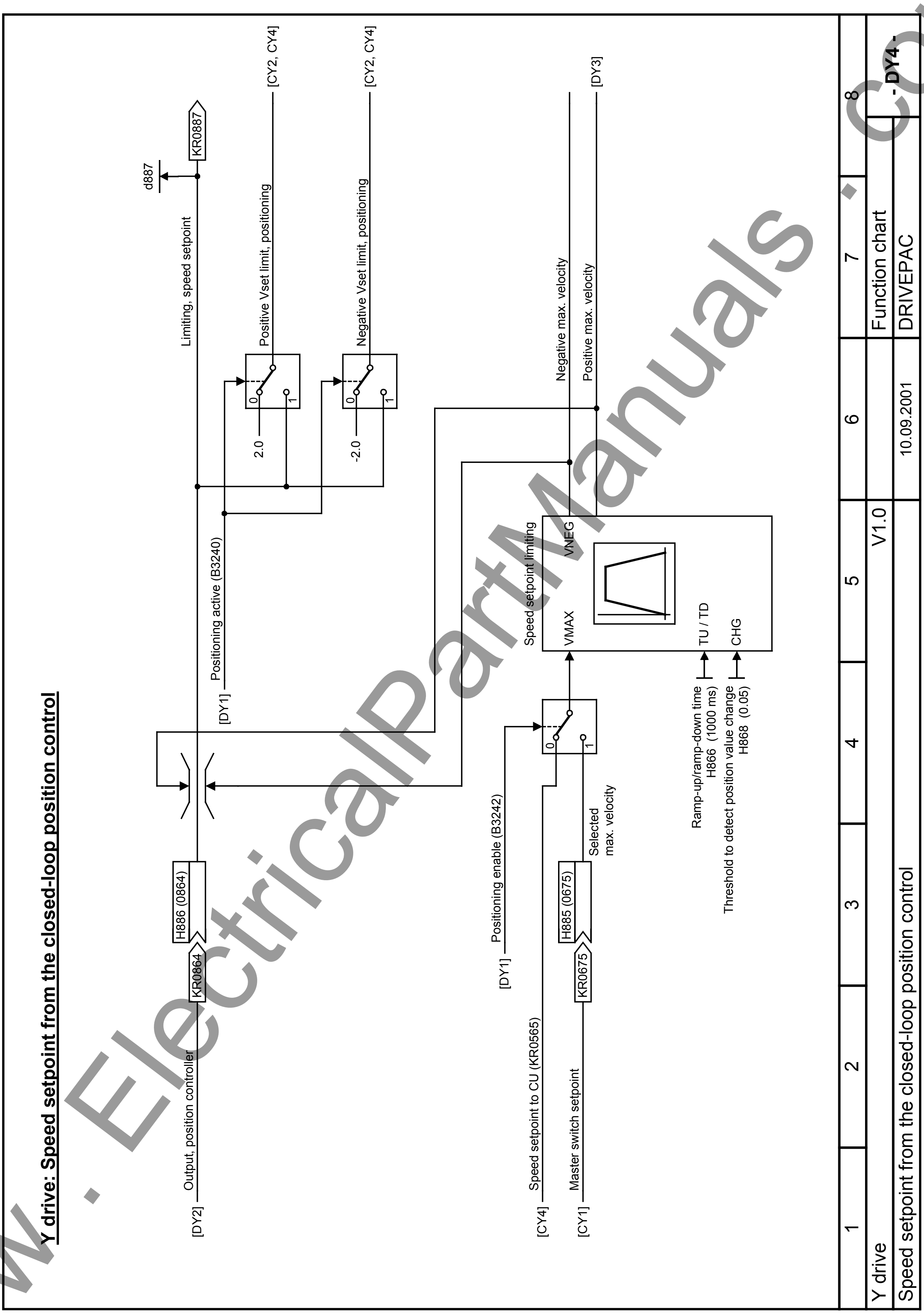
1	2	3	4	5	6	7	8

X drive V1.0 | Function chart | - DX5 -
Status word, closed-loop position control | 10.09.2001 | DRIVEPAC

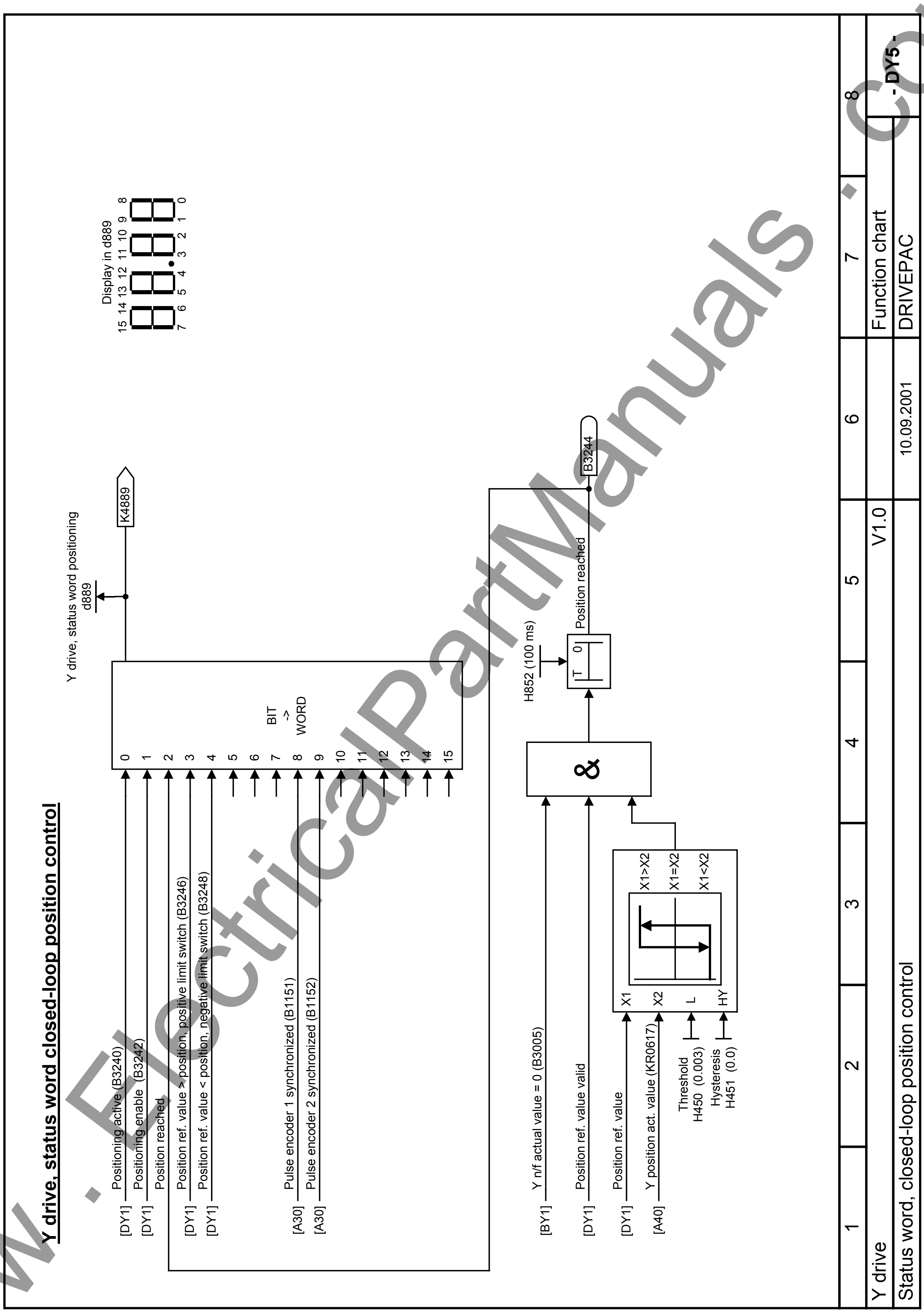

Y drive: Open-loop control, positioning, selectable position reference value
0
B1000
H853 (1000)
B
Start positioning
0
B1000
H854 (1000)
B
Stop positioning
0
B1000
H858 (1000)
B
Stop 2 positioning
[BY2]
Drive OFF (B3201)
≥1
SET (Q=1)
Q
RESET (Q=0)
Q̄
[BY5]
Setpoint enable (B3204)
&
Positioning active
B3240
[BY4, CY4, DY4, DY5]
Positioning enable
B3242
[DY3, DY4, DY5]
[BY9]
Y position positive software limit switch (H177)
[BY9]
Y position negative software limit switch (H178)
X1
X2
>
=
<
Position ref. value > position, positive limit switch
B3246
[DY5]
Position ref. value < position, negative limit switch
B3248
[DY5]
≥1
1
Position ref. value valid
[DY5]
Position ref. value
[DY2, DY3, DY5]
0
1
0
B1000
H835 (1000)
B
0
B1000
H836 (1000)
B
0
B1000
H837 (1000)
B
Position ref. val. 1 H841 (0.0)
Position ref. val. 2 H842 (0.0)
Position ref. val. 3 H843 (0.0)
Position ref. val. 4 H844 (0.0)
Position ref. val. 5 H845 (0.0)
Position ref. val. 6 H846 (0.0)
Position ref. val. 7 H847 (0.0)
Position ref. val. 8 H848 (0.0)
0 0 0
0 0 1
0 1 0
0 1 1
1 0 0
1 0 1
1 1 0
1 1 1
No. of the selected parameter d840
Selectable position ref. value d849
KR0849
H855 (0849)
1
2
3
4
5
6
7
8
V1.0
10.09.2001
Function chart
DRIVEPAC
- DY1 -
Y drive
Open-loop control, positioning, selectable position reference value

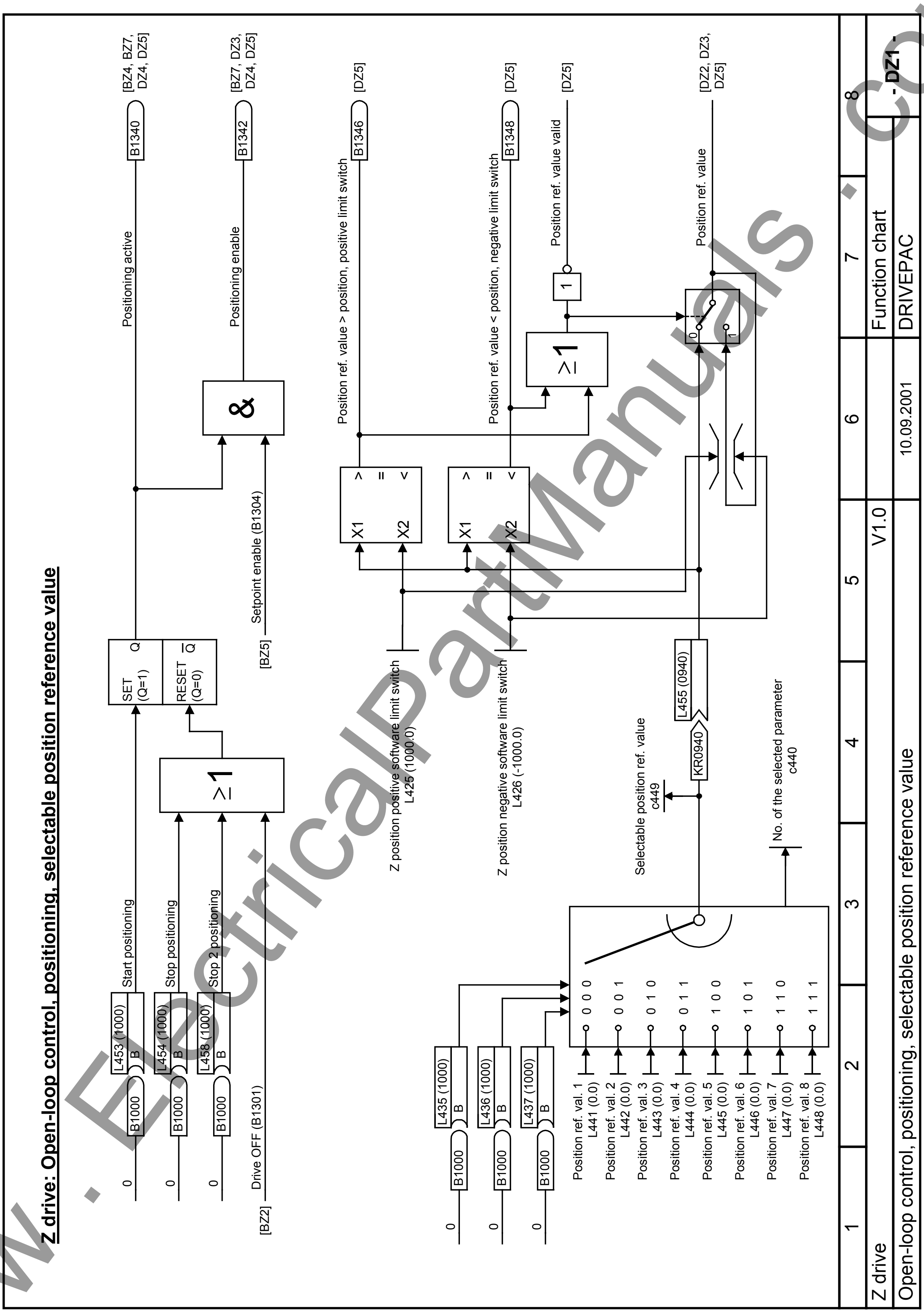

Y drive: Closed-loop position control, version VAR1
[DY1]
Position reference value
[A40]
Y drive, position actual value (KR0617)
[A40]
Y pendulum length (KR0645)
H860 (1.0)
Adaptation, pendulum length
Pendulum length, KP1 adaptation
[DY3]
H861 (1.0)
H891 (1.0)
0
1
+
–
d856
KR0856
[BY4]
Conventional operation
KP1 factor
d862
KR0862
H863 (1.5)
H892 (1.5)
0
1
KP2 factor
Position controller
d864
KR0864
[DY4]
Output, position control version VAR1
1
2
3
4
5
6
7
8
Y drive
Closed-loop position control, version VAR1
V1.0
10.09.2001
Function chart
DRIVEPAC
- DY2 -

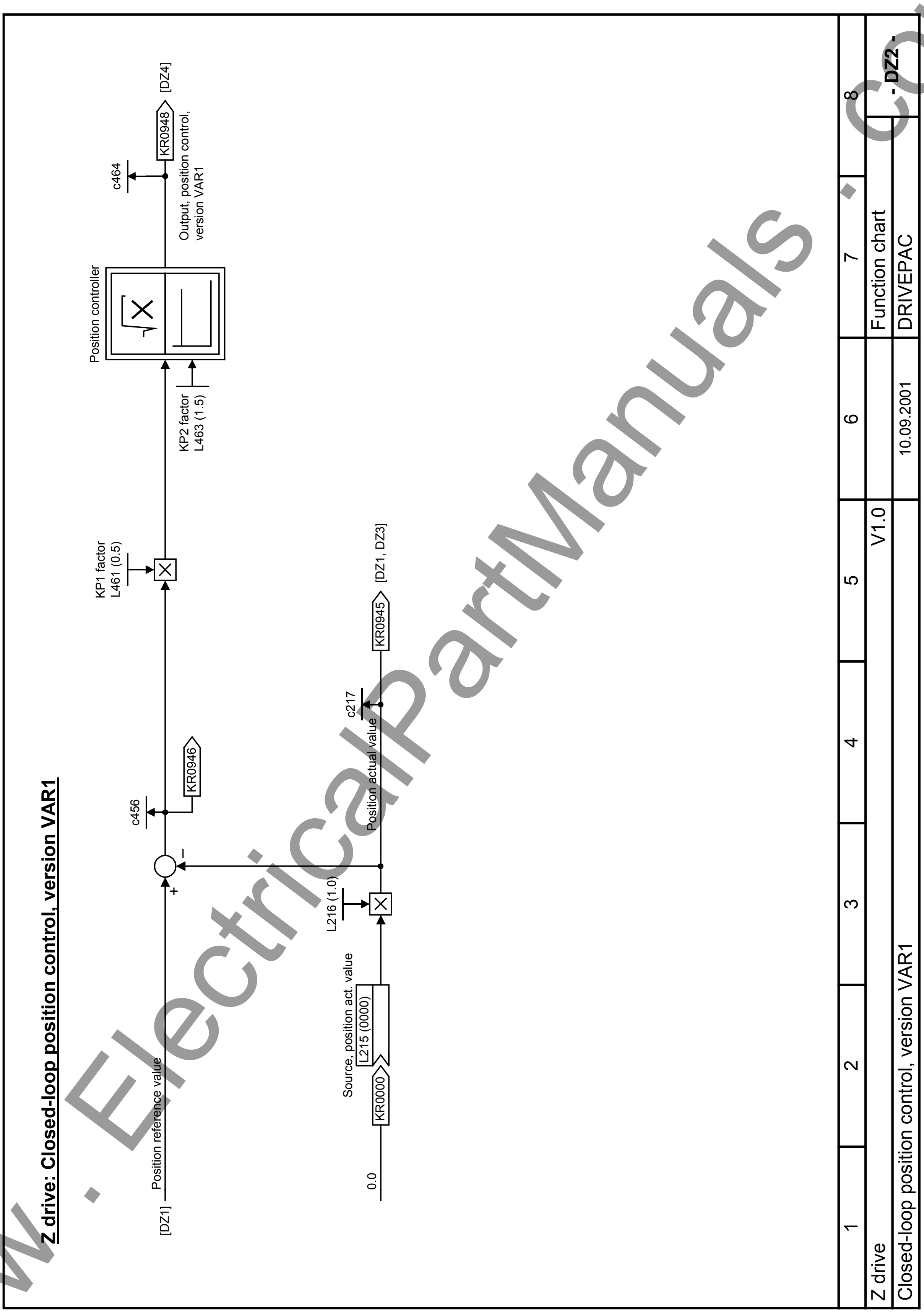

Y drive: Closed-loop position control, version VAR2
[DY2] Pendulum length, KP1 adaptation
TI adaptation
H871 (1.0)
[BY4] Conventional operation
H895 (1000.0)
0
1
Integration time TI
d872
KR0872
[DY1] Position reference value
[A40] Y position actual value (KR0617)
[DY4] Positive max. velocity
Rounding-off H873 (24 ms)
Ramp-up time H874 (500 ms)
Ramp-down time H875 (500 ms)
Deadtime compensation H876 (8 ms)
[DY1] Positioning enable
TI
W
X
VMAX
TR
TU
TD
TX
EN
YPOS
VREF
YDIF
Position ramp-function generator version VAR2
Position ref. value after the ramp-function generator
d881
KR0881
Position difference, ref. value-act. value
d877
KR0877
[BY4] Conventional operation
H879 (1.0)
H896 (1.0)
Gain KP
Upper limit H878 (0.1)
Position controller
+
+
Output, positioning control version VAR2
d880
KR0880
1
2
3
4
5
6
7
8
Y drive
Closed-loop position control, version VAR2
V1.0
10.09.2001
Function chart
DRIVEPAC
- DY3 -

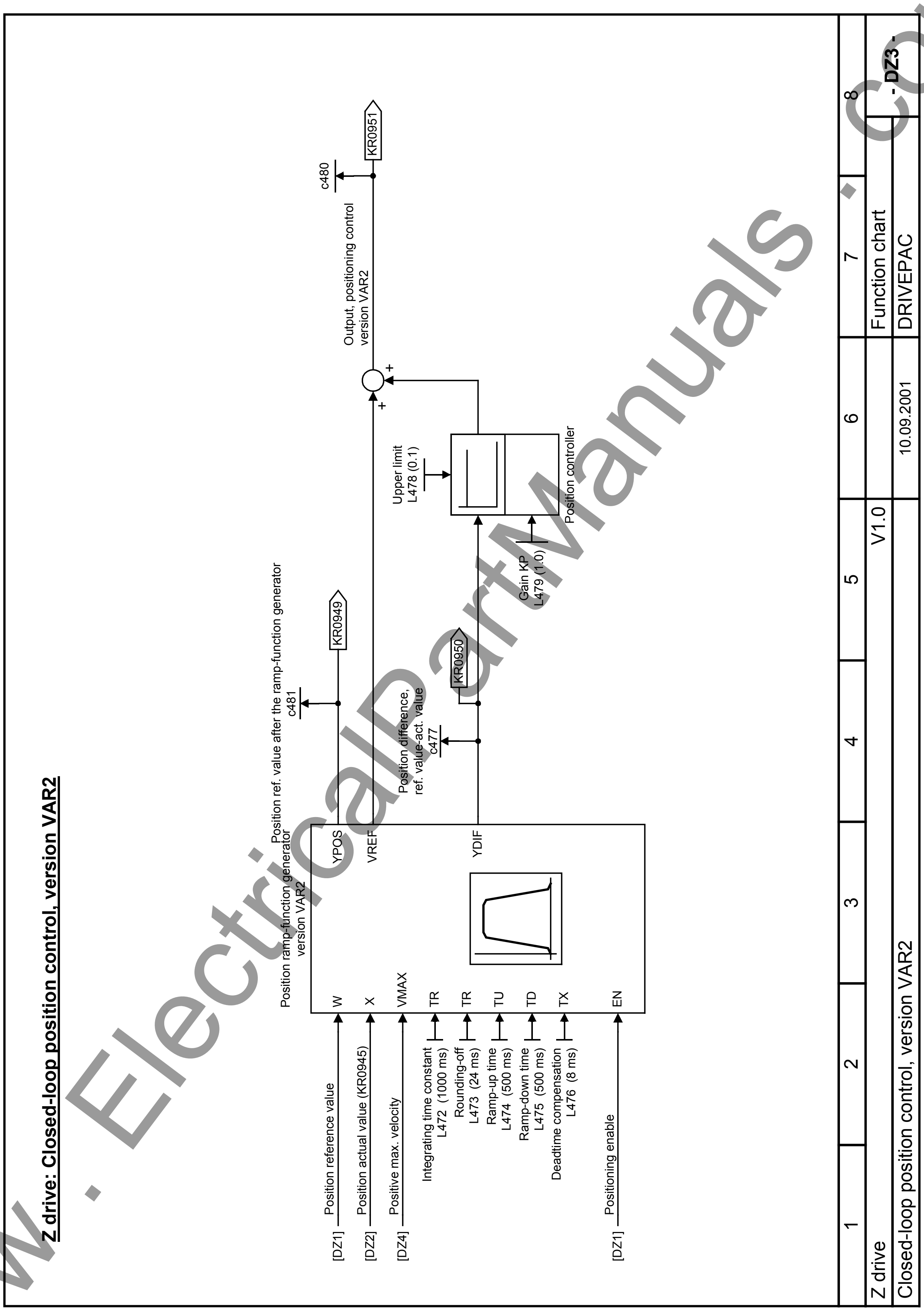


Y drive: Speed setpoint from the closed-loop position control

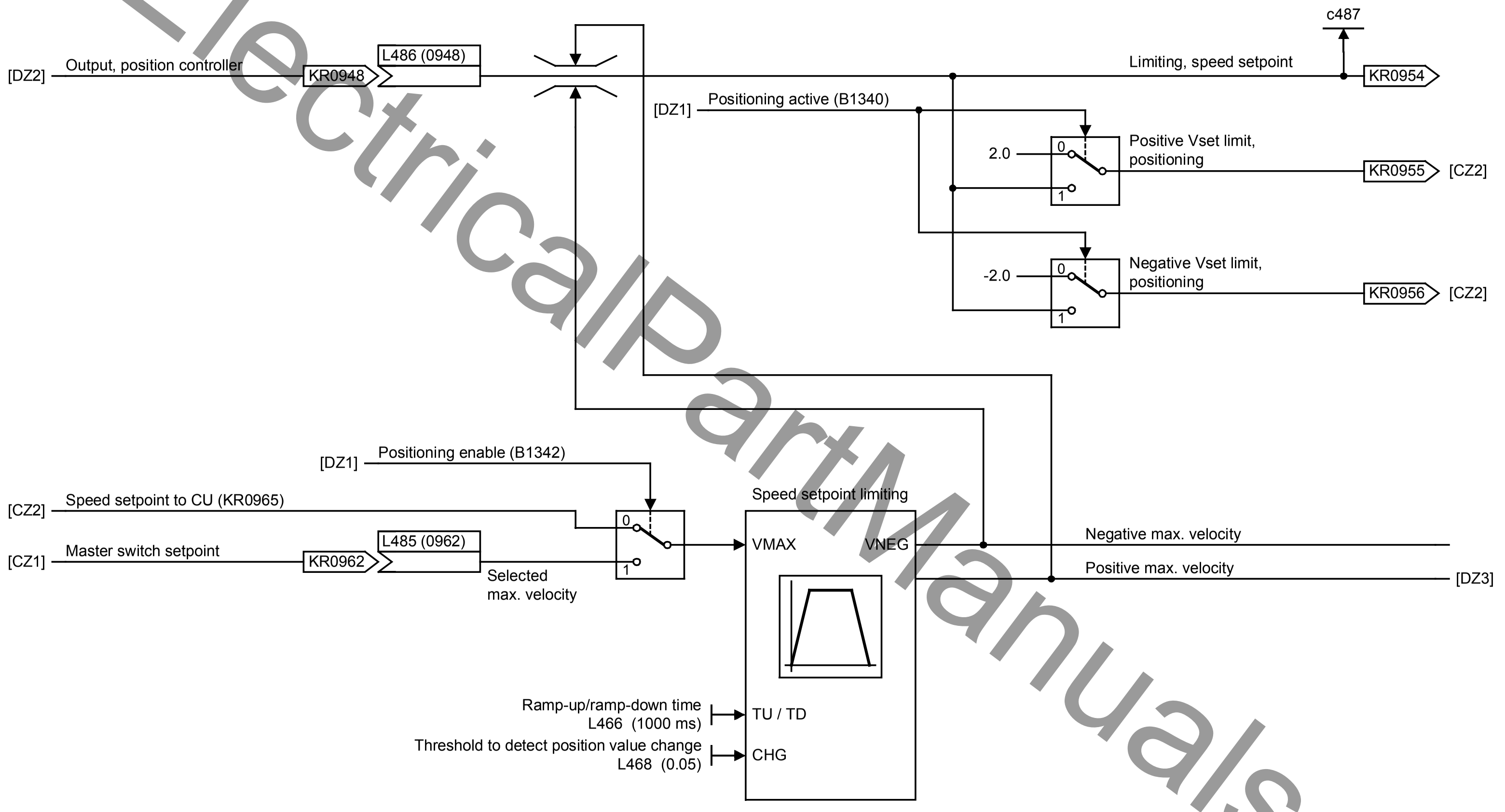

Y drive, status word closed-loop position control
[DY1] Positioning active (B3240)
[DY1] Positioning enable (B3242)
[DY1] Position reached
[DY1] Position ref. value > position, positive limit switch (B3246)
[DY1] Position ref. value < position, negative limit switch (B3248)
[A30] Pulse encoder 1 synchronized (B1151)
[A30] Pulse encoder 2 synchronized (B1152)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
BIT -> WORD
Y drive, status word positioning
d889
K4889
Display in d889
15 14 13 12 11 10 9 8
7 6 5 4 3 2 1 0
[BY1] Y n/f actual value = 0 (B3005)
[DY1] Position ref. value valid
[DY1] Position ref. value
[A40] Y position act. value (KR0617)
Threshold H450 (0.003)
Hysteresis H451 (0.0)
X1
X2
L
HY
X1>X2
X1=X2
X1<X2
&
H852 (100 ms)
T 0
Position reached
B3244
1 2 3 4 5 6 7 8
V1.0
Y drive
Status word, closed-loop position control
10.09.2001
Function chart
DRIVEPAC
- DY5 -


Z drive: Open-loop control, positioning, selectable position reference value
0
B1000
L453 (1000)
B
Start positioning
0
B1000
L454 (1000)
B
Stop positioning
0
B1000
L458 (1000)
B
Stop 2 positioning
[BZ2]
Drive OFF (B1301)
≥1
SET (Q=1)
Q
RESET (Q=0)
Q̄
[BZ5]
Setpoint enable (B1304)
&
Positioning active
B1340
[BZ4, BZ7, DZ4, DZ5]
Positioning enable
B1342
[BZ7, DZ3, DZ4, DZ5]
0
B1000
L435 (1000)
B
0
B1000
L436 (1000)
B
0
B1000
L437 (1000)
B
Position ref. val. 1 L441 (0.0)
Position ref. val. 2 L442 (0.0)
Position ref. val. 3 L443 (0.0)
Position ref. val. 4 L444 (0.0)
Position ref. val. 5 L445 (0.0)
Position ref. val. 6 L446 (0.0)
Position ref. val. 7 L447 (0.0)
Position ref. val. 8 L448 (0.0)
0 0 0
0 0 1
0 1 0
0 1 1
1 0 0
1 0 1
1 1 0
1 1 1
No. of the selected parameter c440
Selectable position ref. value c449
KR0940
L455 (0940)
Z position positive software limit switch L425 (1000.0)
Z position negative software limit switch L426 (-1000.0)
X1
X2
>
=
<
X1
X2
>
=
<
Position ref. value > position, positive limit switch
B1346
[DZ5]
Position ref. value < position, negative limit switch
B1348
[DZ5]
≥1
1
Position ref. value valid
[DZ5]
0
1
Position ref. value
[DZ2, DZ3, DZ5]
1
2
3
4
5
6
7
8
V1.0
Z drive
Open-loop control, positioning, selectable position reference value
10.09.2001
Function chart
DRIVEPAC
- DZ1 -

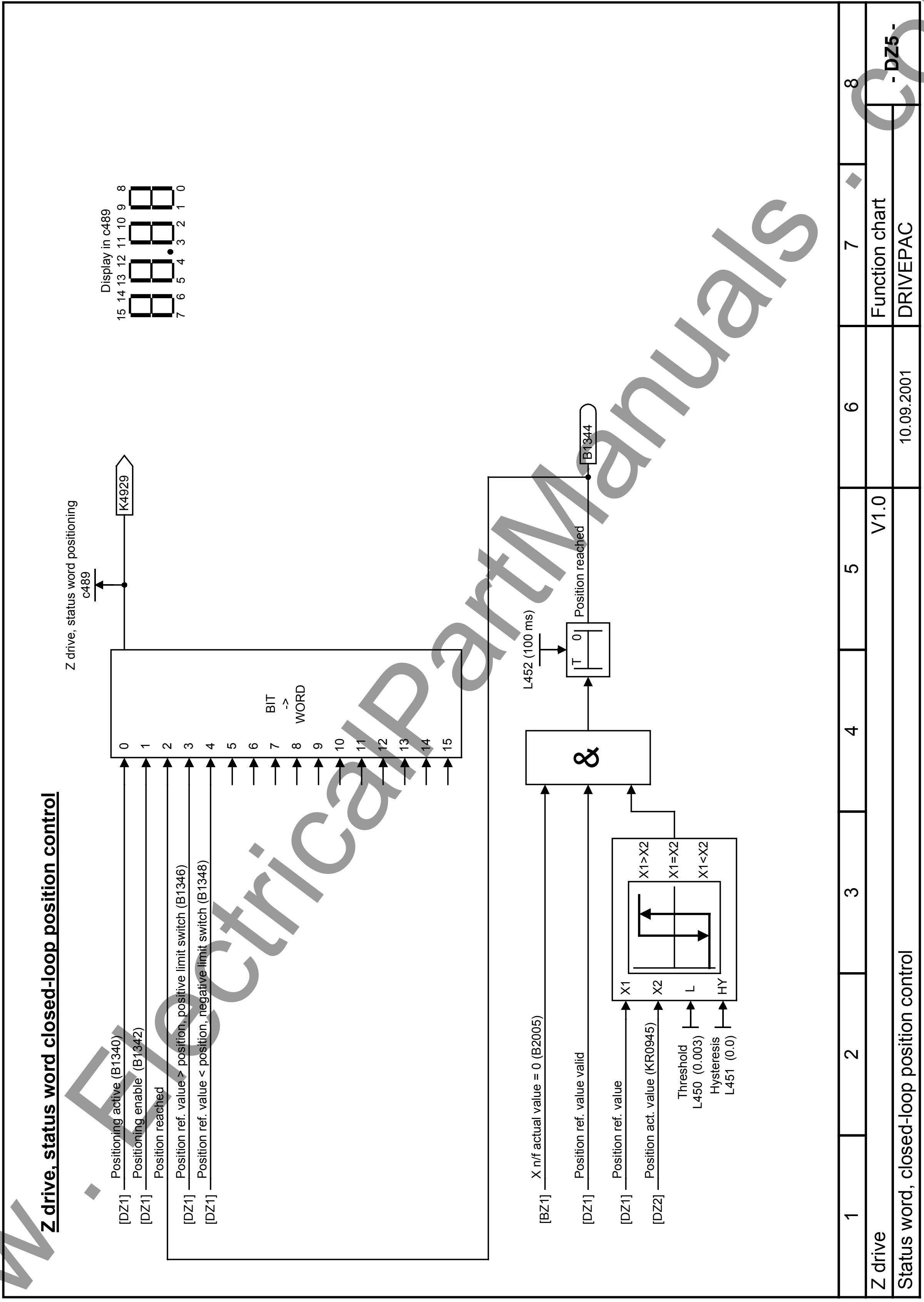

Z drive: Closed-loop position control, version VAR1
[DZ1]
Position reference value
+
−
c456
KR0946
KP1 factor
L461 (0.5)
KP2 factor
L463 (1.5)
Position controller
c464
KR0948
[DZ4]
Output, position control, version VAR1
0.0
KR0000
L215 (0000)
Source, position act. value
L216 (1.0)
Position actual value
c217
KR0945
[DZ1, DZ3]
1
2
3
4
5
6
7
8
Z drive
Closed-loop position control, version VAR1
V1.0
10.09.2001
Function chart
DRIVEPAC
- DZ2 -


Z drive: Closed-loop position control, version VAR2
[DZ1]
Position reference value
[DZ2]
Position actual value (KR0945)
[DZ4]
Positive max. velocity
Integrating time constant
L472 (1000 ms)
Rounding-off
L473 (24 ms)
Ramp-up time
L474 (500 ms)
Ramp-down time
L475 (500 ms)
Deadtime compensation
L476 (8 ms)
[DZ1]
Positioning enable
W
X
VMAX
TR
TR
TU
TD
TX
EN
Position ramp-function generator
version VAR2
YPOS
VREF
YDIF
Position ref. value after the ramp-function generator
c481
KR0949
Position difference,
ref. value-act. value
c477
KR0950
Gain KP
L479 (1.0)
Upper limit
L478 (0.1)
Position controller
+
+
Output, positioning control
version VAR2
c480
KR0951
1
2
3
4
5
6
7
8
Z drive
Closed-loop position control, version VAR2
V1.0
10.09.2001
Function chart
DRIVEPAC
- DZ3 -

Z drive: Speed setpoint from the closed-loop position control



1	2	3	4	5	6	7	8
Z drive				V1.0		Function chart	- DZ4 -
Speed setpoint from the closed-loop position control					10.09.2001	DRIVEPAC	


Z drive, status word closed-loop position control
[DZ1] Positioning active (B1340)
[DZ1] Positioning enable (B1342)
Position reached
[DZ1] Position ref. value > position, positive limit switch (B1346)
[DZ1] Position ref. value < position, negative limit switch (B1348)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
BIT -> WORD
Z drive, status word positioning
c489
K4929
Display in c489
15 14 13 12 11 10 9 8
7 6 5 4 3 2 1 0
[BZ1] X n/f actual value = 0 (B2005)
[DZ1] Position ref. value valid
[DZ1] Position ref. value
[DZ2] Position act. value (KR0945)
Threshold L450 (0.003)
Hysteresis L451 (0.0)
X1
X2
L
HY
X1>X2
X1=X2
X1<X2
&
L452 (100 ms)
T 0
Position reached
B1344
1 2 3 4 5 6 7 8
V1.0
Function chart
10.09.2001
DRIVEPAC
Z drive
Status word, closed-loop position control
- DZ5 -

3.2 Function description

The function charts 000 to 005 represent general information and instructions.
An overview of all of the available function charts in shown in function chart 000.
Some more complex function blocks which are used are described in function charts 001 and 002.
The most important symbols used are described function chart 003.
An overview of the SIMOLINK communications between X, Y and Z drive, with the pre-assigned, parameterized data transfer is shown in function chart 004.
An overview of peer-to-peer communications when using 6RA70 drive units is shown in function chart 005. Also here, the pre-assigned, parameterized data transfer between X, Y and Z drives is shown here.

3.2.1 Chart A1: General parameters

Language changeover

It is possible to toggle between German and English texts of the technology parameters in the DriveMonitor program using H000.

For the DriveMonitor function "Learning technology", the text language of the "learned" parameter depends on the setting of parameter H000.

When learning parameters using the DriveMonitor learning function, the correct language must be selected before starting the learning function.

H000 = 0: Learned database contains German parameter texts.

H000 = 1: Learned database contains English parameter texts.

After H000 has been changed, the unit must be powered-down and powered-up again; only then is the required language available.

The learning function of the DriveMonitor program is explained in Section 1.10.

Processor utilization

The approximate processor utilization can be viewed at display parameter d002.

The approximate utilization factor of T400 when the standard DRIVEPAC application software runs is 0.8. Values which lie significantly above this value (e. g. >> 1.0) indicate that there is a fault. The system fault word, subsequently described, must be checked.

System fault word

The system fault word in d003 indicates system faults and includes the following messages:

Table 3-2 Messages of the system fault word d003

Bit	Description	Cause	Remedy
0	Fatal system fault	Defective T400	Replace T400.
3	Task manager error	Processor utilization d002 >> 1.0	Replace T400.
4	Monitor fault	No communications to the serial interface	Replace T400.
5	Hardware monitoring responded	Defective T400 or hardware	Withdraw all of the cable connections to the T400, power-down the unit and power-up again. If there is still a fault condition: Replace T400.
6	Communications error	A communications module has not been inserted	If the communications module is inserted: Replace the hardware (T400, LBA, CBP2).

Selectable display parameters

The value, selected with parameters H970 to H978, is displayed using display parameters d971 to d979.

This can be used to view the contents of the connectors. For example, if it is necessary to view connector KR0565, then the value in d971 is displayed with H970 = 565.

The individual types - REAL or INTEGER - must be observed.

The existing connectors are described in the connector list (Section 5).

Establishing the factory setting

The EEPROM of the T400 can be erased using parameter H998 - therefore re-establishing the factory setting.

The procedure is described in Section 1.9.

3.2.2 Chart A2: Fixed setpoints

General fixed setpoints

These include constant fixed setpoints and the fixed setpoints which can be entered in parameters H078 – H086.

Fixed setpoints for offset, pendulum length

Fixed offset values can be set for the pendulum length using parameters H090 and H091.

These offset values take into account the difference between the measured hoisting height and the actual physical pendulum length.

Example: Refer to Section 6.2.8

Selecting the load center of gravity for pendulum length

Different load centers of gravity can either be permanently entered or continually entered using parameters H984 to H987. The particular load center of gravity is selected using binary-coded values which are set-up at H980 or H981. The selected value (available in KR0992) is used to calculate the pendulum length.

3.2.3 Chart A3: T400 digital inputs / digital outputs

The status of the digital inputs is read-in as word quantity.

The individual digital signals from the terminal can be inverted using H031. If, e.g. digital input 5 (terminal 57) is to be inverted, then H031 should be set to 0010.

Using the invert function, signals can be simulated which are not connected to digital inputs.

3.2.4 Chart A4: T400 analog inputs / analog outputs

Each of the 5 analog inputs can be adapted and smoothed.

The master switch of the X drive is connected to analog input 1 and the master switch of the Y drive to analog input 2.

It goes without saying that the velocity can also be entered via PROFIBUS DP.

The signals for the analog outputs can also be adapted and smoothed.

The conversion formula for the analog inputs is (e.g. for input 1):
d044 = V / 5 V * H041 – H042.

Example:
Input voltage V = 7.5 V; H041 = 0.5; H042 = 0.1. This means d044 = 0.65.

The conversion formula for the analog outputs is (e. g. for output 1):
V_{AD} = (output value + H922) / H923 * 5V

Example:
Output value = 0.75; H922 = 0.1; H923 = 0.5. This means that V_{AD} = 8.5V.

3.2.5 Chart A10, A11: Receiving data from the basic unit

The data received is dependent on the setting in the basic unit. The process data to the T400 must be appropriately set in the basic unit. This means that the basic unit must be parameterized as shown in Section 6.2.3 (P734 or U734).

The complete data transfer between T400 with X, Y and Z drive, including the SIMOLINK or peer-to-peer link, is shown in the function chart 004 or 005.

The basic unit sends 16-bit words to the T400, whereby the following applies for the normalization: 16384 ≙ 100 %.

However, the T400 uses 32-bit REAL values for arithmetic operations, whereby the following applies here: 100 % ≙ 1.0. The INTEGER values, received from the basic unit, can be converted into REAL values using special converter blocks. The following interrelationship applies:
Real value = NF * integer value / 16384, whereby NF = normalization factor (normally 1.0).

Example:
K4012 should be converted into REAL, whereby 16384 should correspond to 1.0.
L042 = 4012; normalization factor L072 = 1.0. The REAL value is available in KR0012.
If K4012 = 6127 (37.4 %) and the normalization factor is 1.0, then KR0012 = 0.374.

Two 16-bit receive words can also be combined to form a double word and converted into a REAL value. The following interrelationship applies:
Real value = NF * double word / 1 073 741 824, whereby NF = normalization factor.

Example:
Word 2 and 3 from CU should be a double word with the value 4000 8000 hex (= 1073774592).
The normalization factor should be 1.0.
L057 = 4012; L058 = 4013; L059 = 1.0. The REAL value is available in KR0041.
With the above values in the example (4000 8000 hex), the REAL value = 1.00003.

NOTE
The accuracy for the double word – REAL conversion cannot be maintained over the complete value range!

For a normalization 100 % ≙ 4000000hex ≙ 1.0 (normalization factor NF=1.0), the resolution of the REAL number is $1.2e^{-7}$.
A double word 4000 0080 hex, results in the T400, according to the example above, in a REAL value of 1.00000012. However, the precise calculation results in a REAL value of 1.000000119!

3.2.6 Charts A15, A16: Sending data to the basic unit

The 16 data words, sent from the T400, are received in the basic unit in the basic unit connectors K3001 to K3016.

The complete data transfer between T400 with X, Y and Z drives, including SIMOLINK or peer-to-peer coupling, is shown in function chart 004 or 005.

The T400 sends 16-bit words to the basic unit. In the basic unit, 16384 ≙ 100 % is used for the normalization.

In the T400, the normalization is 1.0 ≙ 100 %.

This means that REAL values can therefore be converted into INTEGER values.

The following interrelationship applies:
Integer value = real value * 16384 / NF, whereby NF = normalization factor (normally 1.0).

Example:
KR0165 should be converted into INTEGER, whereby 16384 should correspond to 1.0.
L942 = 165; normalization factor L972 = 1.0. The INTEGER value is available in K4942.
If KR0165 = 0.123 and the normalization factor is 1.0, then K4942 = 2015 (12.3 %).

A REAL value can also be converted into a double word, i.e. two 16-bit words.

The following interrelationship exists here: Double word = real value * 1073741824 / NF, whereby NF = normalization factor.

Example:
A real value of 1.0123 in KR0165 should be converted into a double word in connectors K4961 and K4962. The normalization factor should be 1.0.
L957 = 165; L987 = 1.0. The double word is 1 086 948 848, which corresponds to 40C9 85F0 hex. Connector K4961 has the value 40C9 hex, K4962 has the value 85F0 hex.

3.2.7 Chart A20: Receiving data from CBP (Profibus)

The CBP2 communications module allows data to be exchanged with a higher-level control (automation system) using PROFIBUS DP.

10 pieces of process data can be transferred using PPO type 5 via PROFIBUS.

Control word 1 is entered as word 1 and control word 2, as word 4.

All receive words are 16-bit words.

32-bit words can also be entered, combined, via word 2 / word 3, word 5 / word 6 and word 9 / word 10. This capability can be used, for example, to enter a precise position reference value.

The data, received as 16-bit integer values, with the exception of the two control words, are converted, using normalization factors, into REAL values for the T400.

The received 32-bit values are likewise normalized.

The following applies for 16-bit values: 4000h = 16383 = 100 %, the resolution is 0.0061035 %.
The following applies for 32-bit values: 40000000h = 1 073 741 824 = 100%, the resolution is 9.313e-8 %. However, in this case, the resolution after conversion into REAL values is not precise, generally only 0.000012 %.

Position reference values can either be entered as 16-bit values or as 32-bit values. They can be entered as integer number values or as percentage values.

The positions in the T400 are generally processed in the units [m].

The various input possibilities are shown in the subsequent examples.

Example 1: Word 2 from CBP = 16-bit position reference value with 100 % ≙ 20.0 m ≙ 16384

The following applies: KR0022 = receive value / 16384 * H070.
100 % corresponds to an integer value of 16384 and furthermore, for 100 % setpoint, connector KR0022 should be 20 m. The normalization factor is calculated as follows:

H070 = 20.0 * 16384 / 16384 = 20.000.

For an entered position reference value of 40.12 % (= 6573 dec), T400 receives the value:
KR0022 = 6573 / 16384 * 20.0 = 8.0237.

Example 2: Word 2 from CBP = 16-bit position reference value with 20.0 m ≙ 20000

The following applies: KR0022 = receive value / 16384 * H070.
The position reference value should be sent directly as 20000 (mm) and for this value, connector KR0022 should be 20 m. The normalization factor is as follows:
H070 = 20.0 * 16384 / 20000 = 16.384.

The T400 receives the following value for a position reference value of 8024 (8.024 m):
KR0022 = 8024 / 16384 * 16.384 = 8.024.

Example 3: Word 2 / word 3 from CBP = 32-bit position reference value with 100% ≙ 100.0 m ≙ 1073741824

The following applies: KR0037 = receive value / 1073741824 * H070.
100 % corresponds to an integer value of 1073741824 and, furthermore, for 100 % reference value, connector KR0037 should be 100 m. The normalization factor is calculated as follows:

H070 = 100.0 * 1073741824 / 1073741824 = 100.000.

For a position reference value of 40.12345 % (= 430822264 dec), T400 receives the following value:
KR0022 = 430822264 / 1073741824 * 100.0 = 40.12345.

NOTE

The accuracy for double word – REAL conversion cannot be maintained over the complete value range, refer to Section 3.2.5.

Example 4: Word 2 / word 3 from CBP = 32-bit position reference value with 100.0 m ≙ 1000000

The following applies: KR0037 = receive value / 1073741824 * H070.
The position reference value is directly sent as 1000000 (1/10 mm) and for this value, connector KR0037 should be 100 m. The normalization factor is calculated as follows:

H070 = 100.0 * 1073741824 / 1000000 = 107374.18

For position reference value of 401234 (40.1234 m), T400 receives the following value:
KR0037 = 401234 / 1073741824 * 107374.18 = 40.123399

3.2.8 Chart A22: Control words from CBP (Profibus)

From the 10 pieces of process data, received from CBP2, word 1 and word 4 are provided as control words.

The bit assignment can be freely selected. The individual bits are in binectors and can be freely interconnected.

NOTE

One of the bits of the word 1 must always be "1" as otherwise fault F116 (bus fault) is initiated.
We recommend that bit 10 (control requested) is always set to "1" in the higher-level control.

A recommended assignment of the two control words is subsequently specified with a reference to the required parameterization in the control.

Table 3-3 Recommended bit assignment of the Profibus control words from CBP

Bit	Comment	Target wiring	Target function chart
Control word 1, bit 0	Reserve		
Control word 1, bit 1	X drive, positive traversing command	H160 = 1022	Chart BX4
Control word 1, bit 2	X drive, negative traversing command	H159 = 1023	Chart BX4
Control word 1, bit 3	Y drive, positive traversing command	H560 = 1024	Chart BY4
Control word 1, bit 4	Y drive, negative traversing command	H559 = 1025	Chart BY4
Control word 1, bit 5	Z drive, positive traversing command	L160 = 1026	Chart BZ4
Control word 1, bit 6	Z drive, negative traversing command	L159 = 1027	Chart BZ4
Control word 1, bit 7	Fault acknowledgement	H100 = 1028 H500 = 1028 L100 = 1028	Chart BX1 Chart BY1 Chart BZ1
Control word 1, bit 8	X drive, start positioning	H453 = 1029	Chart DX1
Control word 1, bit 9	X drive, stop positioning	H454 = 1030	Chart DX1
Control word 1, bit 10	Control from control, always "1"		
Control word 1, bit 11	Y drive, start positioning	H853 = 1031	Chart DY1
Control word 1, bit 12	Y drive, stop positioning	H854 = 1032	Chart DY1
Control word 1, bit 13	Z drive, start positioning	L453 = 1033	Chart DZ1
Control word 1, bit 14	Z drive, stop positioning	L454 = 1034	Chart DZ1
Control word 1, bit 15	Reserve		
Control word 2, bit 0 – bit 15	Reserve		

3.2.9 Chart A25: Sending data to CBP (Profibus)

10 process data (16-bit INTEGER values) can be sent to CBP2 using PPO type 5. These 10 words can be freely selected via T400 parameters.

The setpoints and actual values, computed in the T400, are REAL values and must be converted into 16-bit (or 32-bit) INTEGER values so that they can be sent.

Example:
Word 2 at CBP should be the speed actual value for the X drive. The normalization in T400 is: 1.0 ≙ 100 %.
The following applies for the 16-bit integer values: 16384 ≙ 100 %.
The speed actual value is in connector KR0012. By parameterizing L932 = 12 and L961 = 1.0, the appropriate INTEGER value, which is in connector K4932, is formed from the REAL value.
This value is sent to the CBP2 as word 2 when H932 = 4932.

In order to send a 32-bit double word, the individual connectors of the double word must be placed in two consecutive words, e. g. word 2 and word 3.

Example:
The value converted from a REAL into a double word is in connectors K4991 (high byte) and K4992 (low byte). The REAL double word converter is shown on function chart A20.
For H932 = 4991 and H933 = 4992, the double word is sent to the CBP2 as word 2 and word 3.

3.2.10 Chart A30: T400 pulse encoder inputs

Here, the two pulse encoders which can be connected, are evaluated.

The signals from pulse encoder 1 can also be formed from the motor encoder connected at the basic unit, as the pulses from the basic unit are sent to the T400. However, parameter H203 must then be appropriately parameterized (operating mode, pulse evaluation IG1).

Pulse encoder input 1 parameter	Pulse encoder input 2 parameter	Description
H200	H600	Pulses per revolution: The pulse encoder supplies this number of pulses for one revolution. Example: For an encoder type with 1024 pulses/revolution, H200 = 1024.
H201	H601	Rated speed: Speed, at which the pulse encoder sensing block (NAV) supplies a value of 1.0. Example: In order to move at the rated velocity, the motor must rotate with 2964 RPM, i.e. H201 = 2964.
H202	H602	Number of rated pulses: Number of summed quadrupled pulses for which the pulse encoder sensing block (NAV) supplies the position actual value 1.0. Example: If, for 1000 pulse encoder revolutions, the crane traversing gear moves through a distance of 50 m, then the following applies H202 = 4 * H200 * 1000/50. For H200 = 1024, H202 = 81920. This means that after 1000 pulse encoder revolutions, 50.0 is available at d210.
H203	H603	Pulse encoder evaluation mode: The structure and bit assignment is specified below.

Hx03 / bit 0 : Encoder type

0	Encoder type 1	Two pulse tracks, shifted through 90 degrees with or without zero pulse track. Maximum track frequency: 1 MHz. The pulses are quadrupled.
1	Encoder type 2	One pulse track for each direction of rotation, without zero pulse track. Maximum track frequency: 2.5 MHz. The single pulses are counted.

Standard setting: Encoder type 1, i.e. bit 0 = 0

Hx03 / bit 1 – bit 3 : Filter parameterization

Filtering	Encoder type 1	Encoder type 2
0	No filtering	No filtering
>0	Noise signals up to the specified length are suppressed	
001	500 ns	125 ns
010	2 µs	Illegal / no filtering
011	8 µs	Illegal / no filtering
100	16 µs	Illegal / no filtering
>100	Illegal	Illegal / no filtering

Standard setting: 500 ns for encoder type 1, i.e. bit 1 = 1, bit 2 = 0, bit 3 = 0.

Hx03 / bit 4 : Setting mode S

0	The position actual value is set to the setting value if the "Set setting value" signal is 1
1	The setting value is subtracted from the position actual value if the "Set setting value" signal is 1

Standard setting: Bit 4 = 0.

Hx03 / bit 5 : Any

Standard setting: Bit 5 = 0.

Hx03 / bit 6 : Source, encoder tracks

0	From the terminal of the T400
1	From the basic unit to the T400

Standard setting:
Pulse encoder 1: When using the pulses (track A and track B) of the pulse encoder, connected to the basic unit, bit 6 = 1.
Pulse encoder 2: Bit 6 = 0.

Hx03 / bit 7 : Source, zero pulse

0	From the terminal of the T400
1	From the basic unit to the T400

Standard setting:
Pulse encoder 1: When using the zero pulse from the basic unit, bit 7 = 1.
Pulse encoder 2: Bit 7 = 0.

Hx03 / bit 8 – bit 15 : Correction of the standstill limit

Hexadecimal:	FD ... 7F
Corresponds to decimal:	-3 ... 127

Other values are limited.
Standard setting: No correction of the standstill limit, i.e. bit 8 – bit 15 = FE (= 1111 1110)

This means, that for a standard pre-setting the parameters, H203 = FEC2 and H603 = FE02.

NOTE

Parameters H200 – H203 (and H600 – H603) are INIT parameters, i.e. the parameterized values are only transferred if the unit is switched into a no-voltage condition.

Synchronizing the position actual value when closed-loop position control is requested

The position actual value can be synchronized to a specified value in the following ways:

A specific position actual value should be set when a Bero is passed.

To realize this, the Bero should be connected at the zero pulse terminal of the T400. The source of the zero pulses (bit 7 in H203 or H603) should be set at T400. The signal, selected with H195 (or H595) must be "1".

The setting value is entered into parameter H196 (or H596).

An enable range H197 (or H597) can be defined to suppress noise signals. This means that the zero pulse is only detected and recognized as being valid if the position actual value lies within a specific threshold around the setting value:

Only enabled, if (XACT < (SV + L)) AND (XACT > (SV – L))
where XACT = position actual value, SV = setting value, L = enable threshold.

To reference the system, the Bero must be passed over in conventional operation. The signal as to whether the system was referenced is in binector B1151 for pulse encoder 1 and in binector B1152 for pulse encoder 2. The display is realized using the status word, positioning (refer to the function chart DX5, DY5, DZ5).

The system is post-referenced each time that the Bero is passed over, i.e. the setting value is loaded each time the zero pulse is detected.

If the unit, and therefore the T400, is switched into a no-voltage condition, under normal operating conditions, the position actual value is reset to 0. This means that it must be again re-referenced.

However, using parameter H193 (or H593), the position actual value can be saved in the NOVRAM of the T400 module so that it is available after power-off and powering-up again. This means that the system does not have to be re-referenced.

NOTE

However, if the position changes when the system is powered-down, this cannot be detected!

The position actual value is also set to the setting value if the signal, selected with H194 (or H594), is "1".

For an explanation, the signals are specified for pulse encoder 1.

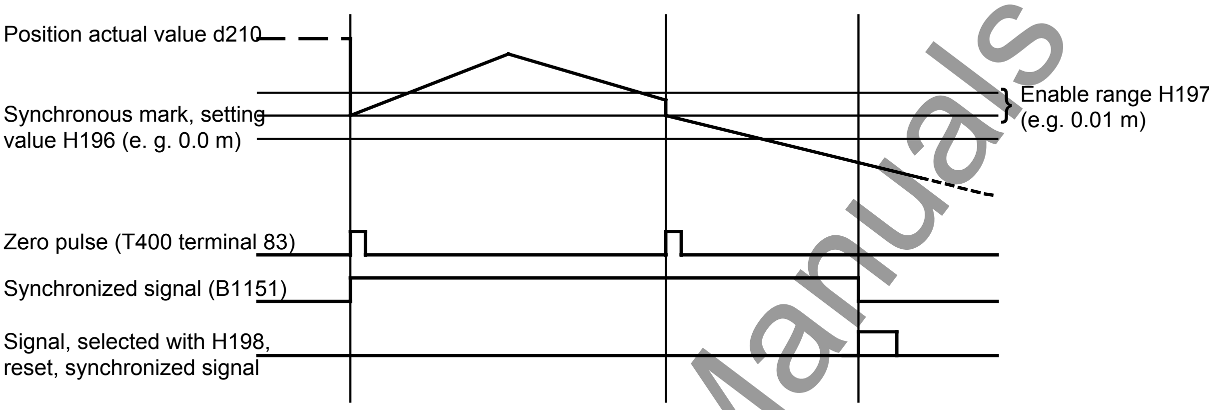


Fig. 3-3 Signals for pulse encoder 1

For this application, the coarse pulses are not evaluated. This is the reason that this version is not described any further.

Fault word, pulse encoder inputs 1 and 2

Faults/errors when parameterizing the pulse encoder inputs 1 and 2 are displayed in d211 or d611:

Bit 0	Configuring error: At least one of the inputs H200, H201, H202 (H600, H601, H602) is set to 0.
Bit 1	Configuring error, sampling time: The sampling time is > 20 ms
Bit 2	Fault, filter parameterization: An illegal value is specified in the filter parameterization in H203 (H603).
Bit 9	Fault, pulse counter overflow

The other bits of the fault word have no significance.

3.2.11 Chart A35: T400 absolute encoder inputs

The two absolute encoders, which can be connected, are evaluated here.

An absolute value encoder with SSI or EnDat interface can be connected.

We recommend a multi-turn encoder with 4096 steps per revolution and 4096 revolutions which can be differentiated between. A coded rotary encoder should be used.

The block used in the T400 software is called AENC.

Table 3-4 Connection terminals of the T400

T400 terminal	Significance
72	Absolute encoder 2, data +
73	Absolute encoder 2, data -
74	Absolute encoder 2, clock +
75	Absolute encoder 2, clock -
76	Absolute encoder 1, data +
77	Absolute encoder 1, data -
78	Absolute encoder 1, clock +
79	Absolute encoder 1, clock -

The absolute value encoder is set using the T400 technology parameters.

The data required can be taken from the manufacturer's Operating Instructions for the absolute value encoder.

The normalization of the position actual value using the technology parameters is described in Section 6.2.6, Commissioning Instructions.

NOTE

When the encoder is replaced, the position actual value must always be re-normalized.

Table 3-5 Setting parameters for absolute encoders. Examples are only shown for AENC 1.

Absolute encoder 1 parameter	Absolute encoder 2 parameter	Description
H220	H620	Number of steps which can be differentiated between per revolution (RPT) Example: H220 = 4096 (Operating Instructions, absolute encoder)
H221	H621	Number of revolutions which can be differentiated between (NOT): Only for multi-turn encoders. For single-turn encoders = 0. Example: A multi-turn encoder is used. H221 = 4096 (Operating Instructions, absolute encoder)
H222	H622	Leading zero bits (PZB): Number of non-relevant bits at the start of position value transfer. This is valid for SSI encoders, which is used to specify the different protocol versions. Example: H222 = 0 (Operating Instructions, absolute encoder)

Absolute encoder 1 parameter	**Absolute encoder 2 parameter**	**Description**
H223	H623	Position, alarm bit (ABP): Position of the alarm bits within the data transfer protocol of an SSI encoder. If there are no alarm bits available, then the following applies, ABP = 0. Example: H223 = 0 (Operating Instructions, absolute encoder)
H224	H624	Clock cycle frequency (MDF): Clock cycle frequency. There are four possible clock cycle frequencies for the data transfer. 0 : Clock cycle frequency = 100 kHz, period duration = 10 µs 1 : Clock cycle frequency = 500 kHz, period duration = 2 µs 2 : Clock cycle frequency = 1 MHz, period duration = 1 µs 3 : Clock cycle frequency = 2 MHz, period duration = 0.5 µs Example: H224 = 0 (Operating Instructions, absolute encoder)
H225	H625	Encoder type (MDT): Specifies the encoder type. The differentiation between coded rotary encoders and length measuring systems has an influence on the velocity output (parameters d234 and d634). 0 : SSI (code, rotary encoder) 1 : SSI (code, length measuring system) 2 : EnDat (code, rotary encoder) 3 : EnDat (code, length measuring system) 4 : SSI (code, length measuring system with range correction) 5 : EnDat (code, length measuring system with range correction) Example: H225 = 0 (Operating Instructions, absolute encoder)
H226	H626	Data coding (MDC): 0 : Binary code (permissible for EnDat and SSI) 1 : Gray code (permissible for SSI) 2 : Gray-excess code (permissible for SSI single-turn encoders) Example: H226 = 1 (Operating Instructions, absolute encoder)
H227	H627	Control word (CW): Bit 0 : Enables the parity monitoring for an SSI encoder. A check is made for even parity. The parity bit is directly transferred after the position value, i.e. as 14th bit or as 26th bit. 0 = no parity monitoring (permissible for SSI, EnDat) 1 = parity monitoring, even parity (permissible for SSI). Bit 1 : Resets the AENC block and deletes the fault messages and alarms as well as individual bits of the fault word. When an EnDat encoder is used, these alarms and alarm bits are reset. For SSI encoders, it is necessary to reset after connecting or powering-up the encoder. A 0 to 1 edge is required to reset. Example: H227 = 0000h (hex value, with all bits = 0, setting bit 0 from the Operating Instructions, absolute encoder)
H228	H628	Gear ratio (NFG): Takes into account a gear ratio between the coded rotary encoder and the drive system. The position values and the speed are converted to the drive system.

Absolute encoder 1 parameter	**Absolute encoder 2 parameter**	**Description**
		For a length measuring system, the gear ratio is not taken into account. The following applies: Position (drive) = gear ratio * position (encoder). Example: H228 = 1.0 (recommended setting)
H229	H629	Normalization factor for the position outputs (NFP): Normalization basis for the offset input (OFF). Example: H229 = 1.0 (recommended setting)
H230	H630	Normalization, speed (NFY) Example: H230 = 0.0 (recommended setting, speed output is not required)
H231	H631	Offset position (OFF): When an offset is entered which is ≠ 0, the encoder zero position is shifted. The offset value has the same normalization as the position outputs. It is subtracted from the position actual value. Example: H231 = ... (this must be determined from the position normalization, refer to Section 6.2.6)
H232	H632	Upper speed limit (LU): Maximum operating speed of the encoder where still valid position values can be determined. The data is realized in the normalization of the speed output (parameters d234 and d634). Example: H232 = 6000.0 (recommended setting, value is not relevant for the position actual value)
H240	H640	Offset for the number of revolutions: This is used to enter an offset for the number of revolutions (parameters d236 and d636). This determines the scaled position actual value. Example: H240 = ... (must be determined from the position normalization, refer to Section 6.2.6)
H241	H641	Scaling for position actual value: This normalizes the scaled position actual value (d242 or d642). Example: H241 = ... (must be determined from the position normalization, refer to Section 6.2.6)
H248	H648	Selects the scaling MUL/DIV: 0: The scaling factor H241 (or H641) is multiplied by the value supplied from AENC. 1: The value supplied from AENC is divided by the scaling factor H241 (or H641). The scaling factor must be assigned its inverse value: H241 = 1.0 / H241. The selection is required if the scaling factor is < 0.1 which would mean that a multiplication would be too inaccurate.

Absolute encoder 1 parameter	**Absolute encoder 2 parameter**	**Description**
		Example 1: H248 = 0 (the scaling factor determined from the position normalization H241 = 3.431 and can therefore be multiplied) Example 2: H248 = 1 (the scaling factor $H241_U$ = 0.01234, originally determined from the position normalization, is less than 0.1. The scaling factor to be entered, H241 = 1.0 / $H241_U$ = 81.037.
H249	H649	Offset, position actual value: The position can only be normalized, if a defined point has the position actual value 0.0. If this point is not at 0.0, then it is shifted to 0.0 using the offset. The following is true for AENC 1, if H248 = 0 : d242 = (d235 + d236 – H240) * H241 + H249. If H248 = 1: d242 = (d235 + d236 – H240) / H241 + H249. This is correspondingly true for AENC 2. Example: H249 = 10.0 (the reference point 1 for the position normalization is 10.0 m; however, it must be 0.0 and is therefore shifted using H249.

NOTE

Parameters H220 – H226 (or H620 – H626) are INIT parameters, i.e. parameterized values are only accepted if the unit was switched into a no-voltage condition.

Error code AENC, monitoring parameters d238, X axis and d638, Y axis:

In this case it involves a formal error for the input parameters (configuring error), communications error (possible erroneous encoder specifications) or an operating error.

Bit 0 - 1	Not specified
Bit 2	Communications error: The percentage of messages (telegrams) with parity /CRC error is, on the average, 10 % and more. The error bit is automatically reset if the error rate drops.
Bit 3	Communications error: At each position transfer, on the average, one parity or CRC error occurs (or more frequently). The error bit is automatically reset if the error rate drops.
Bit 4	Not specified
Bit 5	Parity check is only possible in the SSI mode
Bit 6	Illegal data coding
Bit 7	Illegal encoder type
Bit 8	Illegal clock cycle frequency
Bit 9	Format error: Contradictory or illegal data
Bit 10	Hardware address illegal or already assigned
Bit 11-15	Not specified

Fault word hardware AENC, monitoring parameter d239, X axis and d639, Y axis:

Fault status word of an EnDat encoder. The significance of the fault bits should be taken from the manufacturer's data sheets.

Normally, this fault word is = 0000h.

If an SSI encoder sends a set alarm bit, then the fault word is set to FFFFh.

3.2.12 Chart A40: Selecting position actual values and pendulum lengths

The closed-loop pendulum control requires both the position actual values as well as the pendulum length in meters [m].

The source of the position actual value for the X drive is selected using parameter H215.

The source of the pendulum length for the X drive is selected using parameter H243. The pendulum length is calculated from the height that the load has been hoisted, from the offset defined by the crane geometrical configuration, and from additional load-dependent summands (load center of gravity).

The corresponding parameters apply for the Y drive.

The position actual value and pendulum length must be entered into the anti-sway control in m (meters).

The values in the display parameters d217, d617, d245 and d645 have the units m.

NOTES

The position actual values from integration must be used if there are no position measurements available. This is generally the case in the manual.

For CUVC drive converters, it is not absolutely necessary to use the encoder on the motor shaft.

The position actual values are calculated from the frequency actual value supplied from the CUVC, and are required as input quantity to calculate the anti-sway control.

The position actual values from the integration can only be used in the manual mode! They replace neither pulse nor absolute value encoder for positioning!

3.2.13 Chart AX1 / AY1 / AZ1: Status words from the basic unit

A total of 16 words are received from the basic unit.

Two status words are received from the X, Y and Z drives: The first word is identical with the status word 1 of the basic unit; the second status word (special status word) is formed in the basic unit using suitable parameterization:
For CUVC and CUMC: U076,
for CUD1: U113.

The parameter setting is described in detail in Section 6.2.3, Commissioning.

3.2.14 Chart B1: Central fault in the T400

Fault messages are transferred from the T400 technology module to the basic unit and are displayed there as faults F116 to F131. The individual faults are described in Section 1.7.2, Fault messages.

3.2.15 Chart BX1 / BY1 / BZ1: Zero speed signal, fault acknowledgement

The signals for speed > 0, speed = 0 and speed < 0 are generated here.

The source signal for fault acknowledgment can be selected using parameters; furthermore, a fault can be acknowledged using the PMU basic unit operator panel (negative edge, fault from CU).

3.2.16 Chart BX2 / BY2 / BZ2: Power-on and power-off

The drive is normally powered-up using the signal "On/no mechanical stop", which can be selected using parameters. Depending on the application, other power-on conditions are conceivable.

The signal is connected at the basic unit of the X drive and is transferred to the T400 in the special status word.

Power-off can also be initiated as a result of several conditions, such as fault, electrical off, off after standard stop, off after fast stop, off from the basic unit.

The cause of the power-off command can be determined from the diagnostics word.

The drives of the X, Y and Z axes are normally interlocked with one another so that all of the drives are powered-down if one drive is powered-down. This interlocking can be removed, by masking-out bit12, bit13 and bit 14 = "0". Parameters H149, H549 and L149 should then be set to the value "8FFF".

- After the drive comes to a standstill at speed = 0, the mechanical brake closes and the motor is switched into a no-current condition.

3.2.17 Chart BX3 / BY3 / BZ3: standard stop, fast stop

Here, the signal is selected which should result in a standard stop. As default, the "Electrical stop" from the basic unit terminal is selected.

For a standard stop, the speed setpoint is ramped-down to a setpoint of zero 0 % and is shutdown when the zero speed signal is present.

Furthermore, a standard stop is initiated if the difference between the speed setpoint and speed actual value is too high (fault stop, also refer to function charts BX8, BY8).

The fast stop function can also be activated if an appropriate source signal is selected. For a fast stop, the speed setpoint is ramped-down to 0 % along a fast ramp, and is then shutdown.

For the default settings, the fast stop function is not used.

3.2.18 Chart BX4 / BY4 / BZ4: Electrical off, traversing command

The "Electrical off" signal is generated from the selected "Mechanical stop" signal (from the basic unit terminal). It is also set if there is an OFF2 from the basic unit. The drive is immediately switched into a torque-free condition and shutdown; the mechanical brakes close.

After the drive has been powered-up, it is moved using the traversing command.

Depending on the traversing command (positive or negative) and the master switch setpoint, it is either moved in the positive or negative direction.

The sign of the master switch setpoint must match the appropriate traversing command signal; otherwise the effective setpoint is limited to 0 (also refer to function charts CX1, CY1, CZ1).

The resulting traversing command is either generated using the master switch traversing command or it is set by activating the positioning.

The drive moves as long as the traversing command, formed in this way, is present.

If positioning is de-activated, the drive brakes down to speed 0 and then remains stationary. If a master switch traversing command is simultaneously entered after a delay time of approx. 1 s, the drive moves in the appropriate direction.

If neither master switch traversing command nor a positioning command is issued, then the drive is switched into a torque-free condition and the mechanical brakes are closed.

3.2.19 Chart BX5 / BY5 / BZ5: inverter enable, setpoint enable

The enable signal for the inverter is generated if there is a traversing command. This is withdrawn if the drive is shutdown after the "Close brake" signal; however, at the latest, after a parameterizable time (H155 or H555) if a traversing command is not present.

The setpoint enable signal can be internally generated or externally input.

If the setpoint enable is internally generated, i.e. in the T400 control (for X drive: H156 = 2202, H157 = 1000), then the setpoint is only enabled if the drive is in the operating (run) status, energization has been completed and the brake has been opened.

The internal inverter enable signal has no significance if the setpoint enable signal is externally input (for X drive: H156 = 1000, H157 = ...).

The setpoint enable also requires that the limit switches are enabled. The drive only starts to run after the setpoint has been enabled.

3.2.20 Chart BX6 / BY6 / BZ6: Control words to CU

Two control words are generated, which are sent to the basic unit CU.

The default, parameterized in the T400, is selected so that for the X drive, the control word 1 is sent to the basic unit as word 1 and control word 2 as word 4.

Control word 1 is structured exactly as the basic unit expects it. The control bits are received in the basic unit at binectors B3100 to B3115. They must be correctly interconnected corresponding to the control logic in the basic unit, refer to Section 6.2.3, Commissioning.

Control word 2 contains, on one hand, standard bits and on the other hand, freely selectable control signals which can be interconnected in the basic unit. The bits in control word 2 are received in the basic unit at binectors B3400 to B3415.

The control words for the Y drive are sent to the basic unit of the X drive as word 6 and word 9. From there, they are transferred to the Y drive via a fast coupling (SIMOLINK or peer-to-peer).

The control words for the Z drive are sent to the basic unit of the X drive as word 11 and word 14. From there, they are transferred to the Z drive via a fast coupling (SIMOLINK or peer-to-peer).

3.2.21 Chart BX7 / BY7 / BZ7: T400 status word

The T400 status word contains freely parameterizable status bits. The T400 status word is available in connector K4399 (X drive), K4799 (Y drive) and K4919 (Z drive) and can be further connected, e.g. using PROFIBUS DP (CBP).

3.2.22 Chart BX8 / BY8 / BZ8: T400 fault, X drive / Y drive

Drive-specific faults, which are generated in the T400, should shutdown the faulted drive.

In this case, the appropriate fault is generated in the basic unit using the control bit "External fault 1".

In the 6SE70 MASTERDRIVES, this is fault number F035; fault number F021 is displayed for the 6RA70 DC MASTER.

The individual faults are described in Section 1.7.2.

3.2.23 Chart BX9, BX10 / BY9, BY10: Pre limit switch, limit switch

The T400 evaluates the software limit switch and pre limit switch as well as the hardware limit switch and pre limit switch.

The software limit and the pre limit switch can only be evaluated when the position actual value is sensed. Generally, this is only the case for applications which have a closed-loop position control.

If the position actual value exceeds the position of the positive software limit switch or pre limit switch (this can be selected via parameter), then an appropriate signal is generated.

If the position actual value falls below the position of the negative software limit switch or pre limit switch, then an appropriate signal is also generated.

The software limit switches are also used by the closed-loop positioning control to monitor the entered position reference value.

The hardware limit switch and pre limit switch are digital signals which are generally connected to the T400 digital inputs.

Limit switch and pre limit switch signals must supply a range signal in the particular direction, e.g. the limit switch up to the mechanical end stop.

The pre limit switch signals are selected in the default setting of the T400 digital inputs. When the pre limit switch is actuated, the selected signal must be "1", otherwise it is necessary to invert the digital inputs (refer to Section 3.2.3).

The "Positive pre limit switch activated" signal is generated if the pre limit switch is actuated, if the direction of rotation is positive (n>0) and if the negative pre limit switch is not activated. It also set if the positive software pre limit switch is reached.

The "Negative pre limit switch activated" signal is generated if the pre limit switch is actuated, if the direction of rotation is negative (n<0) and if the positive pre limit switch is not activated. It is also set, if the negative software pre limit switch is reached.

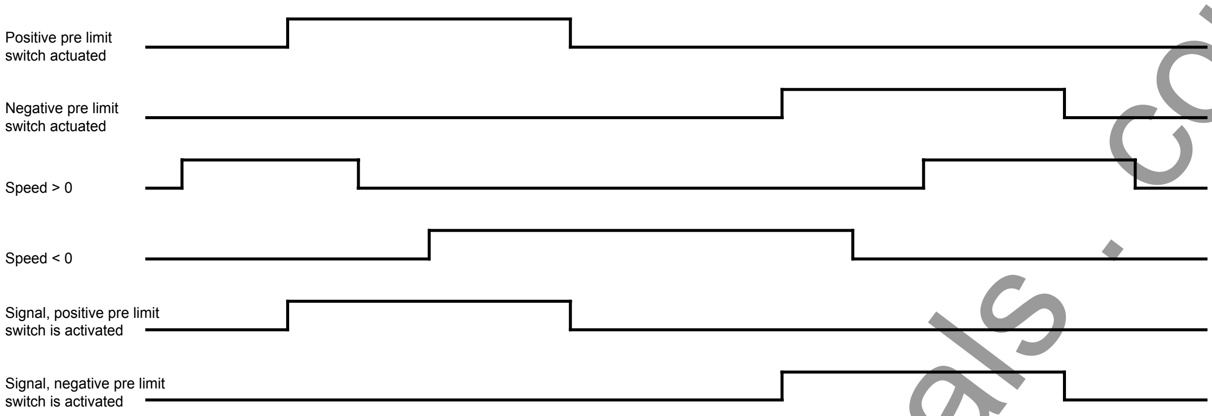


Fig. 3-4 Description of the pre limit switch signals

If the pre limit switch signals are activated, normally, the speed setpoint is reduced so that the drive only continues to move with a low velocity, also refer to function charts C.

The limit switch signals are selected in the default setting of the T400 digital inputs. When the limit switch is actuated, the selected signal must be "1", otherwise the digital inputs must be inverted (refer to Section 3.2.3).

If a limit switch is actuated, the particular direction of motion is immediately inhibited. The setpoint enable is withdrawn and the anti-sway control is disabled and the drive comes to a standstill. It must be assumed that the load will unavoidably oscillate.

As soon as the traversing command is withdrawn, depending on the direction of motion, the "Start help in the positive limit switch" or the "Start help in the negative limit switch" is set. This means that movement is only possible in the opposite direction away from the limit switch, even when the anti-sway control is activated.

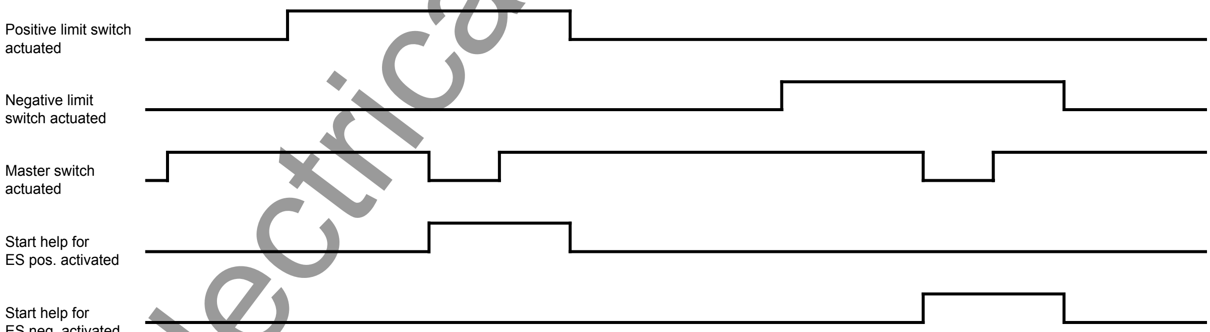


Fig. 3-5 Explanation of the limit switch signals

3.2.24 Chart BX11 / BY11: Enabling, anti-sway control

When the limit switches are activated, the anti-sway control release is withdrawn. Without this enable, the anti-sway control is not calculated and the speed setpoint is zero.

3.2.25 Chart CX1 / CY1 / CZ1: Conditioning master switch setpoints

In the default setting, it is assumed that the master switch setpoint comes from the T400 analog input. Other sources can also be parameterized.

When the master switch is in the zero position, the deadband element ensures that the master switch setpoint is precisely 0.

Depending on the traversing command, this value is only released for the specified direction of motion.

The characteristic adaption is generally used for sensitive crane operation for lower velocities. When the characteristic is used, H272 should be set to 271 (or H672 = 671).

NOTE

For X and Y drives, the polygon characteristic to adapt the master switch setpoint can only be practically used if the control module for pendulum movement damping CONDP is set to continuous setpoint evaluation (setting, parameter H323 or H723).

For conventional operation, without anti-sway control, a changeover is made to the pre limit switch velocity if a pre limit switch is activated.

3.2.26 Chart CX2, CX3 / CY2, CY3: Anti-sway control

A series of parameter settings are required for the anti-sway control (block CONDP), which are now subsequently described.

Input signals for the anti-sway control:

- Control word d345 or d745 with various control signals,
- Adapted master switch setpoint as a % / 100,
- Pendulum angle in rad (option, not used in the standard default),
- Pendulum length in m,
- Position actual value in m,
- Positive and negative speed setpoint limit (option, only when using the closed-loop position control).

The anti-sway control output signals are:

- Status word d370 or d770, among others, the "Traversing command" signal for the inverter enable,
- Speed setpoint for transfer to the basic unit,
- Various values for display and further processing, such as maximum velocity, reduction factor.

Control and open-loop control of the anti-sway control

The anti-sway control requires several control signals:

Bit 0	Anti-sway control enable	Block CONDP is calculated.
Bit 1	Master switch - traversing command	Enables the speed setpoint calculation
Bit 2	Setpoint enable	Enables the speed setpoint calculation
Bit 4	Positive pre limit switch activated	Limits the positive speed setpoint to the pre limit switch velocity
Bit 5	Negative pre limit switch activated	Limits the negative speed setpoint to the pre limit switch velocity
Bit 6	Pendulum angle present	When the pendulum angle is being measured, this bit must be "1" so that the measured value is included in the closed-loop control. If this bit is "0" then the control is operated just using the control model.
Bit 7	Start help in the positive limit switch activated	Inhibits the movement in the direction of the positive limit switch. Only the opposite direction is enabled.
Bit 8	Start help in the negative limit switch activated	Inhibits the movement in the direction of the negative limit switch. Only the opposite direction is enabled.

The "Anti-sway control" traversing command is set to "1" as soon as there is a master switch traversing command and a limit switch is not actuated.

When an operating limit switch is reached, the appropriate "Anti-sway control" traversing command is set to "0". The drive comes to an immediate standstill as for conventional operation. The start help is set after the master switch is in the zero position (also refer to BX10, BY10). It is now possible to move away from the limit switch, anti-sway controlled as soon as the master switch is moved in this direction.

If the anti-sway control traversing command is set and the master switch traversing command is no longer present, then the velocity or speed setpoint is reduced.

The speed setpoint is reduced so that the load comes to a standstill without any pendulum motion.

The traversing command "Anti-sway control" is deleted if the load velocity falls below the shutdown velocity H330 (H730). This must be at least the time set in H332 (H732).

The traversing command is deleted, at the latest if, after the start of the return motion, the time in H331 (H731) has expired.

Stepped switching for the master switch setpoint

In order to make it easier for the crane operator to operate the anti-sway control, it is practical to sub-divide the entered master switch setpoint into various steps for the load velocity. The principle of this step circuit is shown in the following diagram.

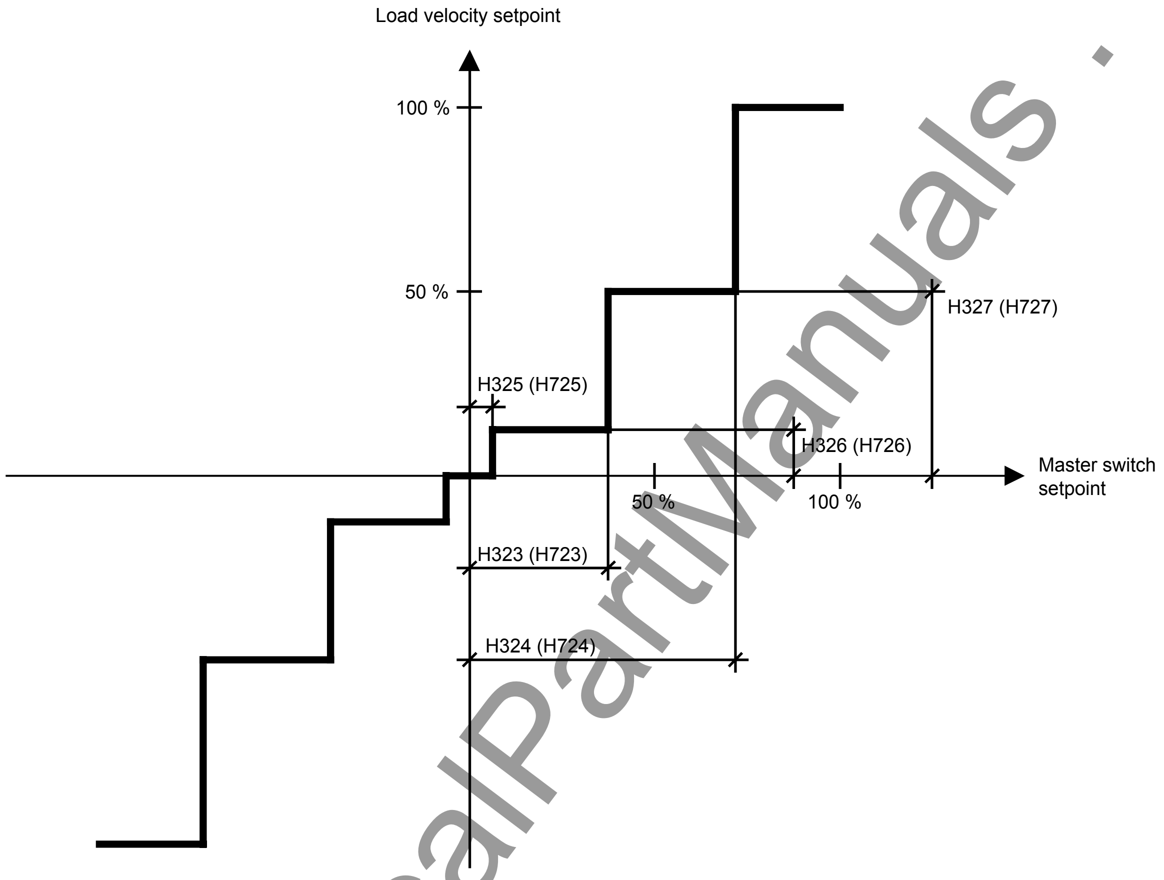


Fig. 3-6 Principle of the step circuit

Example:
If the master switch setpoint has a value of 35 %, then for the set parameters (H323=0.3, H327=0.5), the effective setpoint is = 50 %.

If a step circuit is not required, the setpoint can also be continually entered. The velocity setpoint after the steps, is then equal to the master switch setpoint.

In order to disable the step circuit, H323 must be set to 0 and H324 set to 0 for the X drive. For the Y drive, H723 must be set to 0 and H724 set to 0.

Setpoint limiting using the pre limit switches

When the pre limit switch is actuated, the velocity setpoint is limited to the pre limit switch velocity, parameter H329 (or H729). This applies for both the positive and negative direction of motion.

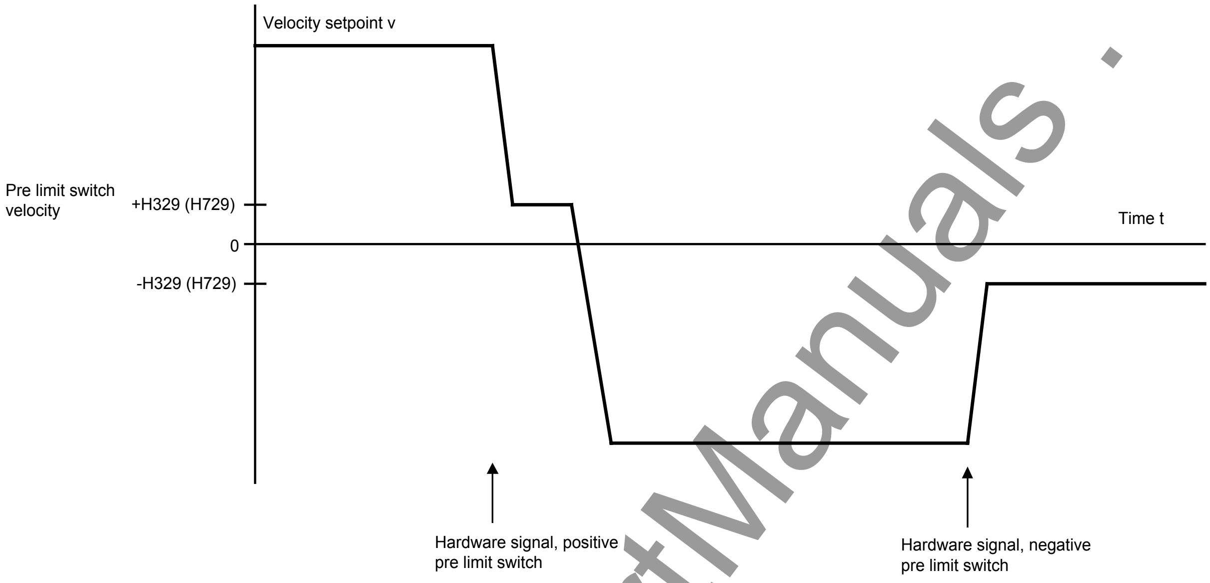


Fig. 3-7

It is also possible to set a velocity-dependent pre limit switch function in the anti-sway control block CONDP.

This function may only be set if the drive position actual value is sensed.

This function is only active in the manual mode; in the closed-loop position controlled mode, this function is inactive.

This function allows a higher velocity than the pre limit switch velocity also after the pre limit switch has been passed (H329 or H739). The velocity is limited to the calculated velocity dependent on the actual position.

The limit to the pre limit switch velocity only applies from a certain point onwards ("Start of the crawl distance").

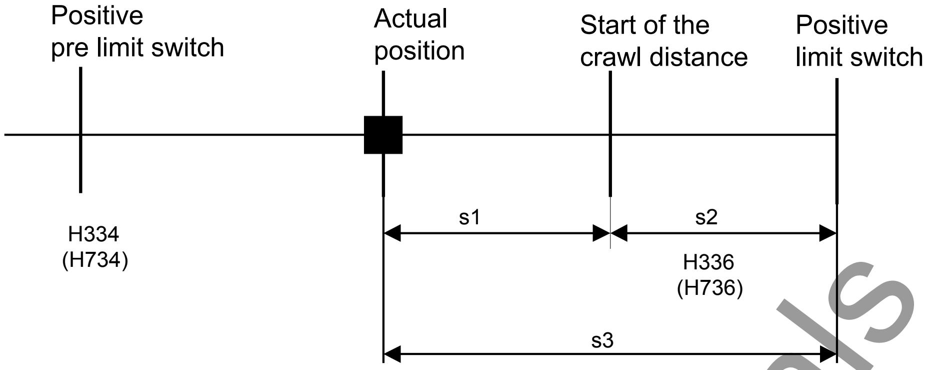


Fig. 3-8 Example for the velocity-dependent pre limit switch function

s1 = distance, actual position – start of the crawl distance
s2 = crawl distance
s3 = distance actual position – positive limit switch

Parameters H334 – H337 (or H734 – H737) should be set for this function.

The parameters for the ramp down time (H337 or H737) must be empirically determined. It specifies when the system starts to decelerate to the pre limit switch velocity, so that the drive is braked in time up to when it reaches the crawl distance.

In order to activate the velocity-dependent pre limit switch function, the parameters "Position, positive limit switch" (H334 or H734) and "Position, negative limit switch" (H335 or H735) should be set so that they are not equal.

Example:
H334 = 20.0 and H335 = -20.0: Function is activated for the X drive.
H334 = 0.0 and H335 = 0.0: Function is not activated (factory setting).

Ramp-function generator anti-sway control

The velocity setpoint is entered into the CONDP anti-sway control block via a ramp-function generator. There are three parameters which should be set for this block:

- Ramp-up time: H301 or H701,
- Rounding-off: H302 or H702,
- Rounding-off for the pre limit switch actuation: H305 or H705.

Setpoint limiting using the closed-loop position control

The velocity setpoint after the ramp-function generator is limited by the closed-loop position control output, if this is activated. If the closed-loop position control is disabled, then the entered setpoint limits are set to the maximum possible values.

◆ If the closed-loop position control is active, then the setpoint is only entered from the output of the closed-loop position control, i.e. the above mentioned setpoint conditioning is then of no significance.

Mathematical crane model

The required quantities of the load position, load velocity and load acceleration are calculated in the crane model from the input quantities, position actual value, pendulum angle (if available) and pendulum length.

The damping coefficient H322 (or H722) must always be set, refer to Section 6.2.8. If the pendulum angle is measured, then parameters H319 – H321 (or H719 – H721) should be set.

Load velocity controller

The load velocity controller specifies the typical speed setpoint characteristic for the anti-sway control.

A typical characteristic of the speed setpoint (= output, load velocity controller) is shown in the following diagram:

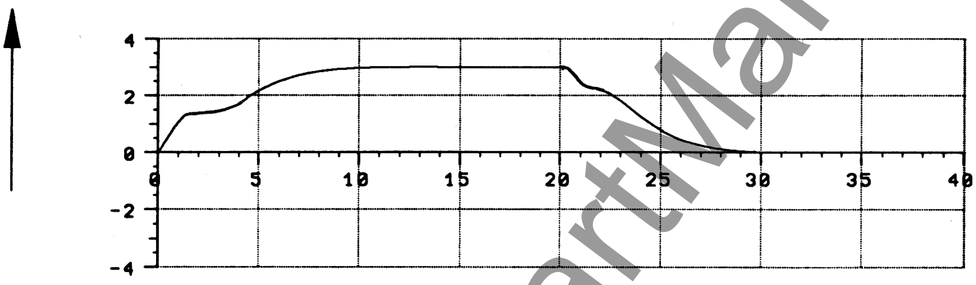


Fig. 3-9 Typical speed setpoint characteristic

The following parameters must be set for the load velocity controller for the characteristic shown:

- Pendulum length 1 in m: H311 (H711),
- Control parameter KV1 for pendulum length 1: H312 (H712),
- Control parameter KV2 for pendulum length 1: H313 (H713),
- Control parameter KV3 for pendulum length 1: H314 (H714),
- Pendulum length 2 in m: H315 (H715),
- Control parameter KV1 for pendulum length 2: H316 (H716),
- Control parameter KV2 for pendulum length 2: H317 (H717),
- Control parameter KV3 for pendulum length 2: H318 (H718).

Pendulum length 1 is the maximum pendulum length, pendulum length 2, the minimum pendulum length.

The control parameters are linearly interpolated depending on the actual pendulum length.

The setting of the parameters above is also explained in Section 6.2, Commissioning.

Ramp-function generator at power-on

This ramp-function generator is only effective if, for the first time, the traversing command or the setpoint enable is present. It is required in order to prevent a setpoint step, which can occur if the trolley or the crane traversing gear is stationary but the load velocity controller is already entering a speed setpoint as a result of the mathematical crane model.

Two parameters should be set for this ramp-function generator:

- Ramp-up time: H303 (H703),
- Rounding-off: H304 (H704).

3.2.27 Chart CX4, CY4, CZ2: Generating the speed setpoint to the basic unit

X and Y drives

In the anti-sway controlled mode, the speed setpoint is sent from the anti-sway control to the basic unit after the speed setpoint has been multiplied by a reduction factor. The limit switches are also taken into account here.

The ramp-function generator ramp is not active.

The reduction factor is calculated as a function of the overshoot factor (H333 or H733).

The magnitude of the overshoot factor H333 or H733 specifies the amount by which the "Speed setpoint from anti-sway control" exceeds the value of 1 during control operations. The reduction factor, generated from the overshoot factor, then reduces this speed setpoint so that 1.0 is not exceeded. The velocity of the crane, when stabilized, is correspondingly reduced.

Example:
Overshoot factor H333 = 0.1
Reduction factor = 1 / (1 + 0.1) = 0.91. This means that the maximum steady-state velocity is 91 % of the maximum velocity VMAX.

In the case of a standard stop signal, for instance, initiated by an electrical stop, the speed setpoint is ramped-down to zero using the "Ramp-function generator for conventional operation".

In conventional operation (without anti-sway control) this ramp-function generator is always active, i.e. setpoint changes are made using this ramp.

Z drive

The master switch setpoint of the Z drive (hoisting gear) is limited or replaced when positioning is switched-in. The speed setpoint is sent to the basic unit where it is limited by the pre limit switch and is then fed to the speed controller via the basic unit ramp-function generator.

The up and down ramps are set at the basic unit ramp-function generator.

3.2.28 Chart CX5, CY5: Pendulum angle from the camera and prediction

---

NOTE

For standard operation, this function is not required, as the anti-sway control does not require a pendulum angle.

If the pendulum angle is measured, a camera is used with a reflector which is mounted on the crane. The camera is mounted close to the pendulum point (PP) and the reflector is mounted on the upper side of the load suspension equipment.

The measured values from the camera are input into a PROFIBUS master via PROFIBUS DP and these are sent to the T400 via PROFIBUS.

The signals which the T400 require include

- Pendulum angle from the camera (this can be selected using H353 or H753),
- "Reflector found" digital signal (this can be selected using H362 or H762),
- "Error, pendulum angle sensing" digital signal (this can be selected using H358 or H758).

The value of the actual distance between the camera and reflector (KR0356) must be returned to the camera. The wiring as process data to PROFIBUS (e.g. H940 = 356) is necessary, also refer to function chart A25.

An offset of the pendulum angle, dependent on the hoisting height is taken into account using a polygon characteristic.

The signal, supplied from the camera is only valid for a specific range of the distance between the camera and reflector. The range limits are set in H356 (or H756) and H357 (or H757).

Outside this range, the pendulum angle sensing of the anti-sway control must be switched-out.

The camera measured value is generally supplied every 60 ms and the anti-sway control is however computed every 4.8 ms. This means that the pendulum angle for the anti-sway control is predicted.

When measuring the pendulum angle, for the anti-sway control, the following parameters must be set:

X drive:
H340 = 2301 (control bit "with pendulum angle sensing" for CONDP)
H307 = 365 (pendulum angle from the prediction for CONDP)

Y drive:
H740 = 3301 (control bit "with pendulum angle sensing" for CONDP)
H707 = 765 (pendulum angle from the prediction for CONDP)

3.2.29 Chart DX1, DY1, DZ1: Open-loop control, positioning

The positioning is activated with the signal selected using H453 (H853, L453). This starts the positioning operation.

The positioning is de-activated if the drive is off, using the signal, selected in H454 (H854, L454) or by the signal selected in H458 (H858, L458).

However, the drive is only positioned if the setpoint has been enabled.

The position reference value can be selected from eight fixed setpoints using three selectable bits.

The selected value is available in KR0449.

It is also possible to directly enter the position reference value via PROFIBUS at selection parameter H455 (or H855, L455).

Generally, the position actual value in [m] is used in the T400 which also means that the selected position reference value must have the units [m].

The entered position reference value is checked as to whether the software limit switch positions have been violated. If this is the case, the entered reference value is not accepted and the old reference value is used.

3.2.30 Chart DX2, DY2, DZ2: Closed-loop position control, version 1

For this version, the position reference value is compared to the position actual value. The difference is fed through an amplifier, whose factor KP1, in anti-sway controlled operation, is dependent on the pendulum length. The longer the pendulum length, then the lower is factor KP1.

A speed setpoint is generated using a P controller with the selectable factor KP2. This speed setpoint is available at connector KR0464 and can be interconnected, refer to function chart DX4.

This speed setpoint is automatically reduced, the closer that the position reference value and position actual value are.

This version is the preferred version for the X and Y drives, as, during positioning, the positioning velocity can be changed as required without the velocity being too high or too low close to the position target. The behavior when approaching the target point can be far better set than for version 2.

This version can also be used for the Z drive. In this case, the positioning operation takes somewhat longer than for version 2.

3.2.31 Chart DX3, DY3: Closed-loop position control, version 2

For this version, the position reference value at the start of the positioning enable is ramped using a position ramp-function generator so that essentially the position actual value tracks the reference value.

A P controller corrects any remaining difference.

In this case, the integration time TI of the ramp-function generator, in anti-sway controlled operation, depends on the pendulum length.

The speed setpoint thus generated is entered at connector KR0480 from where it can be interconnected, refer to function chart DX4.

The speed setpoint is 0 when the reference position has been reached.

NOTE

Parameters H474 (H874, L474) and H475 (H875, L475) must be greater than the value of H466 (H866, L466), refer to function chart DX4.

3.2.32 Chart DX4, DY4: Generating the speed setpoint for positioning

The position controller output is selected using parameter H486 (H886, L486) either with KR0464 (version 1) or KR0480 (version 2).

When positioning is active, this setpoint is transferred to the anti-sway control via a limit function.

The limits are entered from a ramp-function generator with selectable ramp time H466 (H866, L466).

If the positioning is not enabled, then the limits have the same value as the speed setpoint at the basic unit. Under normal operating conditions, this value is 0.

After positioning has been enabled, the limits are opened, via the ramp, to the selected maximum velocity. This means that the drive speed setpoint changes with the ramp time, which can be selected using H466 (H866, L466) up to the selected maximum velocity VMAX.

During the positioning operation, position reference values and maximum velocity can be changed. In order that no steps occur in the speed setpoint when the position reference value changes, the limit is increased from the actual reference value up to VMAX via the ramp.

A position reference value change is detected if the position reference value changes by the value entered in H468 (or H868, L468) within sampling time T2 (= 9.6 ms).

Example:
When positioning with VMAX = 2 m/s, the position changes in 9.6 ms by a maximum of 1.92 cm. A larger change therefore means that the position reference value has been externally changed.

This means that 0.019 is entered into parameter H468 in this example (entry in [m]).

NOTE

Closed-loop position control for the X and Y drives for anti-sway controlled operation is possible for conventional operation.

However, generally different parameters (KP, TI) must be set for the two modes. ◆

■

Parameter list

4

4.1 General information

The technology functions are set in the T400 using the technological parameters.

They are located in the parameter ranges between 1000 and 1999 and between 3000 and 3999.

At the basic unit operator panel and in the DriveMonitor program, these parameters are shown as Hxxx, dxxx, Lxxx and cxxx.

Table 4-1 Parameter display

Range	Display	Example	Significance
1000 ... 1999	Hxxx	H125	Parameter No. 1125 which can be changed
1000 ... 1999	dxxx	d411	Monitoring parameter No. 1411 (this cannot be changed)
3000 ... 3999	Lxxx	L234	Parameter No. 3234 which can be changed
3000 ... 3999	cxxx	c521	Monitoring parameter No. 3521 (this cannot be changed)

Information regarding PMU operator control

When the parameter numbers are scrolled up/down on the parameterizing unit display, initially, a differentiation is not made between 'd' and 'H' or 'c' and 'L' parameters. The correct letter ('d', 'H', 'c' or 'L') is only displayed with the parameter number after the raise or lower key has been released.

Information regarding OP1S operator control

In order to call a technology parameter, 1000 must be added to the parameter number of the 'd' and 'H' parameters; 3000 must be added to the 'c' and 'L' parameters.

Example:

In order to select parameter d010, parameter number 1025 must be entered.

Information regarding DriveMonitor operator control

The prerequisite is that the database for the DRIVEPAC technology type is available, and the start menu has been entered in the "Technology type" column of DriveMonitor.
Then, all technology parameters can be displayed with DriveMonitor and changed - also refer to Section 1.10.

4.2 Parameter list

4.2.1 Explanations

All of the parameters, which are used in the "DRIVEPAC anti sway control" program are listed in the following pages.

The list in the following general form:

Table 4-2 Parameter list

Parameter	Description	Data
Hxxx	Parameter name Explanation and if required information on the parameter CFC chart.block.I/O	WE: 0.0 Type: R [FP-A1] **INIT**
dxxx	Parameter name CFC chart.block.I/O	Type: W [FP-A1]

Explanations:

Hxxx, Lxxx:	Number of a parameter which can be changed
dxxx, cxxx:	Number of a display parameter
WE:	Factory setting of the parameter
[FP-A1]:	Reference to the function chart on which the parameter is shown.
INIT:	Initialization parameter; this is only accepted if the T400 has been switched into a no-voltage condition and was then powered-up again.
Type:	Data type: Refer to the following Table

Information on INIT parameters

- Initialization parameter - if a parameter value is changed, the change is only accepted if the T400 / the unit is powered-down and is then powered-up again.
- An additional reference is made in the function chart to the initialization parameters.
- After a download, e.g. to start commissioning, we recommend that the unit is powered-down and is then powered-up again.

Table 4-3 Parameter data types

Data type	Explanation	Value range	Resolution	Example for DriveMonitor display
B	Boolean quantity	0 or 1	1	1
I	Integer	-32768 ... 32767	1	16384
DI	Double integer	2147483648 ... 2147483647	1	12345689
R	Floating point number (real)	-3.4e+38 ... +3.4e+38	X * 1.2e-7 with X = any number in the value range	12345.678
W	Status word	0000h ... FFFFh	0001h	0011 1111 0000 0001
K-R	Connector selection, real value	0 ... 999 (integer)	1	25
K-I	Connector selection, integer / word	4000 ... 4999 (integer)	1	4000
K-B	Binector selection	1000 ... 3999 (integer)	1	1001

NOTE

The connector data types (K-R ,K-I, K-B) are integer data types with defined ranges.

4.2.2 Parameter

Parameter	Description	Data
H000	Language selection, technology parameter 0 = German, 1 = English When selecting the language, the information/instruction in Section 1.10.1 must be observed under "Procedure to learn the database"! PARCON.DRIVE.PLA	WE: 0 Type: I [FP-A1] **INIT**
d001	Software version PARCON.SWVER.Y	Type: R [FP-A1]
d002	T400 processor utilization PARCON.PSL.Y	Type: R [FP-A1]
d003	System fault word SIMADYN D Bit 3 : Fault, task administrator Bit 5 : Fault, hardware Bit 6 : Communications error Bit 10: User error PARCON.SIMS.QS	Type: W [FP-A1]
H005	Monitoring time, communications error CBP CONTR.FLT_COM_CB.T	WE: 100 [ms] Type: R [FP-A20]
H008	Mask, suppress fault word T400 Faults, which should lead to a fault, are coded bitwise. Bit assignment, refer to d010. CONTR.FLTW_MSK.I1	WE: 0hFFFF Type: W [FP-B1]
d010	Fault word T400 Bit 0 : F116 fault, communications CBP Bit 1 : F117 fault, communications CU Bit 2 : F118 fault, X drive Bit 3 : F119 fault, Y drive Bit 4 : F120 fault, Z drive Bit 5 : F121 Bit 6 : F122 fault, NAV block, pulse encoder 1 Bit 7 : F123 fault, AENC block, absolute value encoder 1 Bit 8 : F124 Bit 9 : F125 Bit 10: F126 Bit 11: F127 fault, NAV block, pulse encoder 2 Bit 12: F128 fault, AENC block, absolute value encoder 2 Bit 13: F129 Bit 14: F130 Bit 15: F131 CONTR.FLTW.QS	Type: W [FP-B1]

Parameter	Description	Data
d011	X drive, status word 1 from CU Word 1 from the basic unit. This depends on the basic unit parameter setting. Bit 0 : Ready to power-up Bit 1 : Ready Bit 2 : Run Bit 3 : Fault present Bit 4 : OFF2 not active Bit 5 : OFF3 not active Bit 6 : Power-on inhibit Bit 7 : Alarm present Bit 8 : No setpoint-actual value deviation Bit 9 : Always 1 Bit 10: Comparison value reached Bit 11: Fault, undervoltage Bit 12: Request control main contactor Bit 13: Ramp-function generator active Bit 14: Positive speed setpoint Bit 15: Kinetic buffering/flexible response active REC_CU.RECCU_W1.QS	Type: W [FP-A10]
d012	X drive n/f [Hz] actual value from CU Word 2 from the basic unit. This depends on the basic unit parameter setting. REC_CU.RECCU_W2.Y	Type: I [FP-A10]
d013	Word 3 from CU X drive, reserve. This depends on the basic unit parameter setting. REC_CU.RECCU_W3.Y	Type: I [FP-A10]
d014	X drive, special status word from CU Word 4 from the basic unit. This depends on the basic unit parameter setting. Bit 0 : Energization completed Bit 1 : Setpoint enable from the brake control Bit 2 : Inverter enable from the brake control Bit 3 : 0 Bit 4 : 0 Bit 5 : 0 Bit 6 : 0 Bit 7 : 0 Bit 8 : On / no mechanical stop Bit 9 : No electrical stop Bit 10: BICO2 selected from CU Bit 11: 0 Bit 12: 0 Bit 13: 0 Bit 14: 0 Bit 15: 0 REC_CU.RECCU_W4.QS	Type: W [FP-A10]
d015	Word 5 from CU Y drive, torque setpoint from CU. This depends on the basic unit parameter setting. REC_CU.RECCU_W5.Y	Type: I [FP-A10]

Parameter	Description	Data
d016	Y drive, status word 1 from CU Word 1 from the basic unit. This depends on the basic unit parameter setting. Bit 0 : Ready to power-up Bit 1 : Ready Bit 2 : Run Bit 3 : Fault present Bit 4 : OFF2 not active Bit 5 : OFF3 not active Bit 6 : Power-on inhibit Bit 7 : Alarm present Bit 8 : No setpoint-actual value deviation Bit 9 : Always 1 Bit 10: Comparison value reached Bit 11: Fault, undervoltage Bit 12: Request control main contactor Bit 13: Ramp-function generator active Bit 14: Positive speed setpoint Bit 15: Kinetic buffering/flexible response active REC_CU.RECCU_W6.QS	Type: W [FP-A10]
d017	Y drive n/f [Hz] actual value from CU This depends on the basic unit parameter setting. REC_CU.RECCU_W7.Y	Type: I [FP-A10]
d018	Word 8 from CU Y drive, reserve. This depends on the basic unit parameter setting. REC_CU.RECCU_W8.Y	Type: I [FP-A10]
d019	Y drive, special status word from CU Word 9 from the basic unit. This depends on the basic unit parameter setting. Bit 0 : Energization completed Bit 1 : Setpoint enable from the brake control Bit 2 : Inverter enable from the brake control Bit 3 : 0 Bit 4 : 0 Bit 5 : 0 Bit 6 : 0 Bit 7 : 0 Bit 8 : On / no mechanical stop Bit 9 : No electrical stop Bit 10: BICO2 selected from CU Bit 11: 0 Bit 12: 0 Bit 13: 0 Bit 14: 0 Bit 15: 0 REC_CU.RECCU_W9.QS	Type: W [FP-A10]
d020	Word 10 from CU Y drive, torque setpoint from CU. This depends on the basic unit parameter setting. REC_CU.RECCU_W10.Y	Type: I [FP-A10]

Parameter	Description	Data
d021	Word 1 from CBP Control word 1. Recommendation for bit assignment: Bit 0 : On / no mechanical stop X, Y, Z drive Bit 1 : Positive traversing command, X drive Bit 2 : Negative traversing command, X drive Bit 3 : Positive traversing command, Y drive Bit 4 : Negative traversing command, Y drive Bit 5 : Positive traversing command, Z drive Bit 6 : Negative traversing command, Z drive Bit 7 : Acknowledge fault Bit 8 : Start positioning, X drive Bit 9 : Stop positioning, X drive Bit 10: PZD control requested. This bit must always be "1". Bit 11: Start positioning, Y drive Bit 12: Stop positioning, Y drive Bit 13: Start positioning, Z drive Bit 14: Stop positioning, Z drive Bit 15: REC_CB.CW1.QS	Type: W [FP-A20]
d022	Word 2 from CBP Assignment possibility: X drive, position reference value or velocity setpoint as 16-bit quantity (100% = 4000 hex) REC_CB.REF2_N2.Y	Type: R [FP-A20]
d023	Word 3 from CBP Assignment possibility: X drive. Together with word 2: Low word for position reference value as 32-bit quantity (100% = 4000 0000 hex). Also refer to d037. REC_CB.REF3_N2.Y	Type: R [FP-A20]
d024	Word 4 from CBP Control word 2: Bit 0 : Bit 1 : Bit 2 : Bit 3 : Bit 4 : Bit 5 : Bit 6 : Bit 7 : Bit 8 : Bit 9 : Bit 10: Bit 11: Bit 12: Bit 13: Bit 14: Bit 15: REC_CB.CW2.QS	Type: W [FP-A20]

Parameter	Description	Data
d025	Word 5 from CBP Assignment possibility: Y drive, position reference value or velocity setpoint as 16-bit quantity (100% = 4000 hex) REC_CB.REF5_N2.Y	Type: R [FP-A20]
d026	Word 6 from CBP Assignment possibility: Y drive. Together with word 5: Low word for position reference value as 32-bit quantity (100% = 4000 0000 hex). Also refer to d038. REC_CB.REF6_N2.Y	Type: R [FP-A20]
d027	Word 7 from CBP Assignment possibility: Z drive, position reference value or velocity setpoint as 16-bit quantity (100% = 4000 hex) REC_CB.REF7_N2.Y	Type: R [FP-A20]
d028	Word 8 from CBP Reserve REC_CB.REF8_N2.Y	Type: R [FP-A20]
d029	Word 9 from CBP Assignment possibility: Z drive, position actual value as 16-bit quantity (100% = 4000 hex) REC_CB.REF9_N2.Y	Type: R [FP-A20]
d030	Word 10 from CBP Assignment possibility: Z drive. Together with word 9: Low word for position actual value as 32-bit quantity (100% = 4000 0000 hex). Also refer to d039. REC_CB.REF10_N2.Y	Type: R [FP-A20]
H031	Invert word, digital inputs T400 Inverts the input bits. Bit assignment, refer to d032. IQ_BIN.BININ_W3.I2	WE: 0000 Type: W [FP-A3]
d032	Digital inputs T400 Bit 0 : X pre limit switch (terminal 53) Bit 1 : X reserve (terminal 54) Bit 2 : X limit switch, positive (terminal 55) Bit 3 : X limit switch, negative (terminal 56) Bit 4 : Y pre limit switch (terminal 57) Bit 5 : Y reserve (terminal 58) Bit 6 : Y limit switch, positive (terminal 59) Bit 7 : Y limit switch, negative (terminal 60) Bit 8 : X master switch, traversing command (terminal 46) Bit 9 : Y master switch, traversing command (terminal 47) Bit 10: Reserve (terminal 48). Bidirectional, can be selected w/ H903 = 0 Bit 11: Reserve (terminal 49). Bidirectional, can be selected w/ H904 = 0 Bit 12: Reserve (terminal 84) Bit 13: Reserve (terminal 65) Bit 14: Bit 15: IQ_BIN.BININ_W3.QS	Type: W [FP-A3]

Parameter	Description	Data
d037	Word 2 + word 3 from CBP Assignment possibility: X drive. Position reference value as 32-bit quantity (100% = 4000 0000 hex). The low word is word 3, the high word is word 4. REC_CB.REF2_N4.Y	Type: R [FP-A20]
d038	Word 5 + word 6 from CBP Assignment possibility: Y drive. Position reference value as 32-bit quantity (100% = 4000 0000 hex). The low word is word 3, the high word is word 4. REC_CB.REF5_N4.Y	Type: R [FP-A20]
d039	Word 9 + word 10 from CBP Assignment possibility: Z drive. Position reference value as 32-bit quantity (100% = 4000 0000 hex). The low word is word 3, the high word is word 4. REC_CB.REF9_N4.Y	Type: R [FP-A20]
H041	Analog input 1, offset INP_ANA.ANI1_ADC.OFF	WE: 0.000 Type: R [FP-A4]
H042	Analog input 1, scaling factor INP_ANA.ANI1_ADC.SF	WE: 0.500 Type: R [FP-A4]
H043	Analog input 1, smoothing INP_ANA.ANI1.T	WE: 0 [ms] Type: R [FP-A4]
d044	Display, analog input 1 INP_ANA.ANI1.Y	Type: R [FP-A4]
H046	Analog input 2, offset INP_ANA.ANI2_ADC.OFF	WE: 0.000 Type: R [FP-A4]
H047	Analog input 2, scaling factor INP_ANA.ANI2_ADC.SF	WE: 0.500 Type: R [FP-A4]
H048	Analog input 2, smoothing INP_ANA.ANI2.T	WE: 0 [ms] Type: R [FP-A4]
d049	Display, analog input 2 INP_ANA.ANI2.Y	Type: R [FP-A4]
H051	Analog input 3, offset INP_ANA.ANI3_ADC.OFF	WE: 0.000 Type: R [FP-A4]
H052	Analog input 3, scaling factor INP_ANA.ANI3_ADC.SF	WE: 0.500 Type: R [FP-A4]
H053	Analog input 3, smoothing INP_ANA.ANI3.T	WE: 0 [ms] Type: R [FP-A4]

Parameter	Description	Data
d054	Display, analog input 3 INP_ANA.ANI3.Y	Type: R [FP-A4]
H056	Analog input 4, offset INP_ANA.ANI4_ADC.OFF	WE: 0.000 Type: R [FP-A4]
H057	Analog input 4, scaling factor INP_ANA.ANI4_ADC.SF	WE: 0.500 Type: R [FP-A4]
H058	Analog input 4, smoothing INP_ANA.ANI4.T	WE: 0 [ms] Type: R [FP-A4]
d059	Display, analog input 4 INP_ANA.ANI4.Y	Type: R [FP-A1]
H061	Analog input 5, offset INP_ANA.ANI5_ADC.OFF	WE: 0.000 Type: R [FP-A4]
H062	Analog input 5, scaling factor INP_ANA.ANI5_ADC.SF	WE: 0.500 Type: R [FP-A4]
H063	Analog input 5, smoothing INP_ANA.ANI5.T	WE: 0 [ms] Type: R [FP-A4]
d064	Display, analog input 5 INP_ANA.ANI5.Y	Type: R [FP-A4]
H070	Normalization, word 2 from CBP The following applies: d022 = H070 / 16384 * word2 or d037 = H070 / 1073741824 * (word2_word3) REC_CB.NFW2.X	WE: 1.000 Type: R [FP-A20]
H071	Normalization, word 3 from CBP The following applies: d023 = H071 / 16384 * word3 REC_CB.REF3_N2.NF	WE: 1.000 Type: R [FP-A20]
H072	Normalization, word 5 from CBP The following applies: d025 = H072 / 16384 * word5 or d038 = H072 / 1073741824 * (word5_word6) REC_CB.NFW5.X	WE: 1.000 Type: R [FP-A20]
H073	Normalization, word 6 from CBP The following applies: d026 = H073 / 16384 * word6 REC_CB.REF6_N2.NF	WE: 1.000 Type: R [FP-A20]
H074	Normalization, word 7 from CBP The following applies: d027 = H074 / 16384 * word7 REC_CB.REF7_N2.NF	WE: 1.000 Type: R [FP-A20]
H075	Normalization, word 8 from CBP The following applies: d028 = H075 / 16384 * word8 REC_CB.REF8_N2.NF	WE: 1.000 Type: R [FP-A20]

Parameter	Description	Data
H076	Normalization, word 9 from CBP The following applies: d029 = H076 / 16384 * word9 or d039 = H076 / 1073741824 * (word9_word10) REC_CB.NFW9.X	WE: 1.000 Type: R [FP-A20]
H077	Normalization, word 10 from CBP The following applies: d030 = H077 / 16384 * word10 REC_CB.REF10_N2.NF	WE: 1.000 Type: R [FP-A20]
H078	Fixed setpoint KR0078 REAL PARCON.KR0078.X	WE: 0.000 Type: R [FP-A2]
H079	Fixed setpoint KR0079 REAL PARCON.KR0079.X	WE: 0.000 Type: R [FP-A2]
H080	Fixed setpoint KR0080 REAL PARCON.KR0080.X	WE: 0.000 Type: R [FP-A2]
H081	Fixed setpoint KR0081 REAL PARCON.KR0081.X	WE: 0.000 Type: R [FP-A2]
H082	Fixed setpoint KR0082 REAL PARCON.KR0082.X	WE: 0.000 Type: R [FP-A2]
H083	Fixed setpoint KR0083 REAL PARCON.KR0083.X	WE: 0.000 Type: R [FP-A2]
H084	Fixed setpoint KR0084 REAL PARCON.KR0084.X	WE: 0.000 Type: R [FP-A2]
H085	Fixed setpoint K4085 INTEGER PARCON.K4085.X	WE: 0 Type: I [FP-A2]
H086	Fixed setpoint K4086 INTEGER PARCON.K4086.X	WE: 0 Type: I [FP-A2]
H090	Fixed setpoint, X offset pendulum length KR0090 REAL PARCON.KR0090.X	WE: 0.000 Type: R [FP-A2]
H091	Fixed setpoint, Y offset pendulum length KR0091 REAL PARCON.KR0091.X	WE: 0.000 Type: R [FP-A2]
H100	X, source binector fault acknowledgement 1 Pre assignment = B1028. Bit7 in word 1 from CBP. XCONTR.FLTACK.I2	WE: 1028 Type: K-B [FP-BX1]
H101	X, source binector fault acknowledgement 2 Pre assignment = B1000. Binector 0. XCONTR.FLTACK.I3	WE: 1000 Type: K-B [FP-BX1]

Parameter	Description	Data
H105	X, source binector power-up 1 Pre assignment = B2059. Bit 8 in word 4 from CU. XCONTR.DRON1.I1	WE: 2059 Type: K-B [FP-BX2]
H106	X, source binector power-up 2 Pre assignment = B1000. Binector 0. XCONTR.DRON1.I2	WE: 1000 Type: K-B [FP-BX2]
H108	X, source binector standard stop 1 Pre assignment = B2076. Inverted Bit 9 in word 4 from CU. XCONTR.STOP1.I1	WE: 2076 Type: K-B [FP-BX3]
H109	X, source binector standard stop 2 Pre assignment = B1000. Binector 0. XCONTR.STOP1.I2	WE: 1000 Type: K-B [FP-BX3]
H111	X, source binector electrical off 1 Pre assignment = B2075. Inverted Bit 8 in word 4 from CU. XCONTR.ELOFF1.I1	WE: 2075 Type: K-B [FP-BX4]
H112	X, source binector electrical off 2 Pre assignment = B1000. Binector 0. XCONTR.ELOFF1.I2	WE: 1000 Type: K-B [FP-BX4]
H114	X, source binector fast stop 1 Pre assignment = B1000. Binector 0. XCONTR.FASTSTOP1.I1	WE: 1000 Type: K-B [FP-BX3]
H115	X, source binector fast stop 2 Pre assignment = B1000. Binector 0. XCONTR.FASTSTOP1.I2	WE: 1000 Type: K-B [FP-BX3]
H122	X delay time up to fault, checkback signal drive on XCONTR.XFLT_FBCU.T	WE: 2000 [ms] Type: R [FP-BX8]
H125	X overspeed limit If the speed actual value reaches this threshold, the overspeed fault is generated. XCONTR.XOVR_SPEED.L	WE: 1.200 Type: R [FP-BX8]
H126	X threshold, speed actual value = 0 for drive blocked XCONTR.DBL_3.L	WE: 0.005 Type: R [FP-BX8]
H127	X threshold, speed setpoint for drive blocked Evaluation from |speed setpoint| > H127 XCONTR.DBL_7.M	WE: 0.010 Type: R [FP-BX8]
H128	X threshold, torque for drive blocked Evaluation of |torque| > H128 XCONTR.DBL_11.M	WE: 0.800 Type: R [FP-BX8]

Parameter	Description	Data
H129	X delay time up to the signal, drive blocked XCONTR.DBL.T	WE: 1000 [ms] Type: R [FP-BX8]
H130	X threshold, zero speed signal Signal n > 0, if the speed actual value > (H130+H131). Signal n = 0, if |speed actual value| < (H130-H131). Signal n < 0, if speed actual value < -(H130+H131). XCONTR.SPEED_ZERO.L	WE: 0.005 Type: R [FP-BX1]
H131	X hysteresis, zero speed signal XCONTR.SPEED_ZERO.HY	WE: 0.001 Type: R [FP-BX1]
H140	X, source binector FDS bit0 Pre assignment = B2207. No traversing command to CU. XCONTR.STW2_CU1.I1	WE: 2207 Type: K-B [FP-BX6]
H141	X, source binector FDS bit1 Pre assignment = B1000. Binector 0. Here, it is possible to send any T400 binector to the basic unit. X CONTR.STW2_CU1.I2	WE: 1000 Type: K-B [FP-BX6]
H142	X, source binector MDS bit0 Pre assignment = B1000. Binector 0. Here, it is possible to send any T400 binector to the basic unit. XCONTR.STW2_CU1.I3	WE: 1000 Type: K-B [FP-BX6]
H143	X, source binector MDS bit1 Pre assignment = B1000. Binector 0. Here, it is possible to send any T400 binector to the basic unit. XCONTR.STW2_CU1.I4	WE: 1000 Type: K-B [FP-BX6]
H144	X, source binector FSW bit0 Pre assignment = B1000. Binector 0. Here, it is possible to send any T400 binector to the basic unit. XCONTR.STW2_CU1.I5	WE: 1000 Type: K-B [FP-BX6]
H145	X, source binector FSW bit1 Pre assignment = B1000. Binector 0. Here, it is possible to send any T400 binector to the basic unit. XCONTR.STW2_CU1.I6	WE: 1000 Type: K-B [FP-BX6]
H149	X, mask switch-off signal T400 Bitwise coding of the states which caused the drive to be powered-down. Bit assignment, refer to d150. XCONTR.OFF.I2	WE: 0hFFFF Type: W [FP-BX2]

Parameter	Description	Data
d150	X off conditions T400 Bit 0 : T400 fault Bit 1 : Fault from CU Bit 2 : Electrical off Bit 3 : Off after fast stop Bit 4 : Bit 5 : Bit 6 : Bit 7 : Bit 8 : Off after standard stop Bit 9 : Power-on inhibit from the CU Bit 10: Bit 11: Bit 12: Bit 13: Power-off signal, Y drive Bit 14: Power-off signal, Z drive Bit 15: Edge, ready to power-up from CU XCONTR.OFF_1.QS	Type: W [FP-BX2]
d151	X diagnostics word, power-off Saves the condition as to why the drive was powered-down. Bit assignment as for d150. XCONTR.OFFSAV.QS	Type: W [FP-BX2]
H152	X threshold, speed setpoint <> speed actual value A fault stop is generated if this threshold is exceeded. XCONTR.FLT1.L	WE: 2.0 Type: R [FP-BX8]
H153	X hysteresis, speed setpoint <> speed actual value XCONTR.FLT1.HY	WE: 0.005 Type: R [FP-BX8]
H155	X time for forced shutdown after the traversing command has been withdrawn XCONTR.R_INVENA_3.T	WE: 4000 [ms] Type: R [FP-BX5]
H156	X, source binector setpoint enable internal Pre assignment = B2202. X inverter enable T400. XCONTR.SP_ENA1.I1	WE: 2202 Type: K-B [FP-BX4]
H157	X, source binector setpoint enable external Pre assignment = B1000. Binector 0. XCONTR.SP_ENA2.I2	WE: 1000 Type: K-B [FP-BX4]
H159	X, source binector master switch traversing command negative Pre assignment = B1121. Digital input T400 terminal 48. XSREF1.MS_CMDNEG_1.I1	WE: 1121 Type: K-B [FP-BX4]
H160	X, source binector master switch traversing command positive Pre assignment = B1119. Digital input T400 terminal 46. XSREF1.MS_CMDPOS_1.I1	WE: 1119 Type: K-B [FP-BX4]
H161	X, source binector conventional operation Pre assignment Pre assignment = B1000. Binector 0. XSREF2.MODE_CONVENT.I1	WE: 1000 Type: K-B [FP-BX4]

Parameter	Description	Data
H162	X ramp-up time, ramp, conventional operation XSREF2.VREF.TU	WE: 1000 [ms] Type: R [FP-CX4]
H163	X ramp-down time, ramp, conventional operation / fault stop XSREF2.VREF.TD	WE: 1000 [ms] Type: R [FP-CX4]
d165	X speed setpoint to CU XSREF2.VREFL.Y	Type: R [FP-CX4]
H170	X, source binector pre limit switch, positive Pre assignment = B1111. Digital input T400 terminal 53. XSREF1.PRELIM_POS_S.I1	WE: 1111 Type: K-B [FP-BX9]
H171	X, source binector pre limit switch, negative Pre assignment = B1112. Digital input T400 terminal 54. XSREF1.PRELIM_NEG_S.I1	WE: 1112 Type: K-B [FP-BX9]
H172	X, source binector limit switch, positive Pre assignment = B1113. Digital input T400 terminal 55. XSREF1.LIMSWI_POS_1.I1	WE: 1113 Type: K-B [FP-BX9]
H173	X, source binector limit switch, negative Pre assignment = B1114. Digital input T400 terminal 56. XSREF1.LIMSWI_NEG_1.I1	WE: 1114 Type: K-B [FP-BX9]
H175	X, position software limit switch positive [m] XSREF1.ES_POS.X	WE: 1000.0 Type: R [FP-BX9]
H176	X, position software limit switch negative [m] XSREF1.ES_NEG.X	WE: -1000.0 Type: R [FP-BX9]
H177	X, position software pre limit switch positive [m] XSREF1.VES_POS.X	WE: 1000.0 Type: R [FP-BX9]
H178	X, position software pre limit switch negative [m] XSREF1.VES_NEG.X	WE: -1000.0 Type: R [FP-BX9]
H179	X, source position actual value for limit switch evaluation XSREF1.ACT_POS.X	WE: 0 Type: K-R [FP-BX9]
H190	X, source binector, enable anti sway control Pre assignment = B1001. Binector 1. XSREF1.ENA_CTRL5.I2	WE: 1001 Type: K-B [FP-BX11]
H193	Enable data save, position actual value, pulse encoder 1 in the NOVRAM. This saves the position actual value and is also available after power failure. After T400 has been initialized, the saved value is set as position actual value. INP_NAV.XNAV_SNOV.I	WE: 0 Type: B [FP-A30]

Parameter	Description	Data
H194	Source, set position actual value, pulse encoder 1 Pre assignment = B1000. Binector 0. INP_NAV.XNAV_SET.I1	WE: 1000 Type: K-B [FP-A30]
H195	Source, synchronization, position actual value, pulse encoder 1 Pre assignment = B1000. Binector 0. INP_NAV.XNAV_SP.I1	WE: 1000 Type: K-B [FP-A30]
H196	Source, setting value for synchronizing pulse, pulse encoder 1 INP_NAV.XNAV_SV.X	WE: 0 Type: K-R [FP-A30]
H197	Range, enable zero pulse, pulse encoder 1 INP_NAV.XNAV_RNG.X	WE: 1000.0 Type: R [FP-A30]
H198	Source, reset synchronized signal, pulse encoder 1 Pre assignment = B1000. Binector 0. INP_NAV.XNAV_SYN_RESET.I2	WE: 1000 Type: K-B [FP-A30]
H200	Pulse encoder, pulses per revolution, pulse encoder 1 INP_NAV.XNAV.PR	WE: 1024 Type: I [FP-A30] **INIT**
H201	Pulse encoder, rated speed, pulse encoder 1 INP_NAV.XNAV.RS	WE: 3000.0 Type: R [FP-A30] **INIT**
H202	Pulse encoder, rated pulses, pulse encoder 1 Pulses, which must be received so that the relative position actual value is 1.0. INP_NAV.XNAV.RP	WE: 4096 Type: DI [FP-A30] **INIT**
H203	Pulse encoder mode, pulse encoder 1 Pre-setting: Pulses and zero pulse from CU. INP_NAV.XNAV.MOD	WE: FEC2 Type: W [FP-A30] **INIT**
d209	Pulse encoder, speed actual value, pulse encoder 1 Relative speed, whereby 1.0 = H201 value INP_NAV.XNAV.Y	Type: R [FP-A30]
d210	Position actual value, pulse encoder 1 INP_NAV.XNAV.YP	Type: R [FP-A30]
d211	Pulse encoder, error code, pulse encoder 1 INP_NAV.XNAV.YFC	Type: W [FP-A30]
d213	X position actual value from integration INP_NAV.XWACT2.Y	Type: R [FP-A40]
H215 ◆	X source, position actual value Pre assignment = KR0213. Connector, position from integration INP_NAV.XPOSACT.X1	WE: 213 Type: K-R [FP-A40]

Parameter	Description	Data
H216	X adaptation, position actual value If required, convert from the relative value to m INP_NAV.XPOSACT.X2	WE: 0.000 Type: R [FP-A40]
d217	X position actual value [m] INP_NAV.XPOSACT.Y	Type: R [FP-A40]
H220	Steps per revolution, absolute value encoder 1 INP_NAV.ZXAENC.RPT	WE: 4096 Type: I [FP-A35] **INIT**
H221	Number of revolutions, absolute value encoder 1 INP_NAV.ZXAENC.NOT	WE: 4096 Type: I [FP-A35] **INIT**
H222	Number of leading zero bits, absolute value encoder 1 INP_NAV.ZXAENC.PZB	WE: 0 Type: I [FP-A35] **INIT**
H223	Position, interrupt bit, absolute value encoder 1 INP_NAV.ZXAENC.ABP	WE: 0 Type: I [FP-A35] **INIT**
H224	Clock cycle frequency, absolute value encoder 1 INP_NAV.ZXAENC.MDF	WE: 0 Type: I [FP-A35] **INIT**
H225	Encoder type, absolute value encoder 1 INP_NAV.ZXAENC.MDT	WE: 0 Type: I [FP-A35] **INIT**
H226	Data coding, absolute value encoder 1 INP_NAV.ZXAENC.MDC	WE: 1 Type: I [FP-A35] **INIT**
H227	Control word, absolute value encoder 1 Bit0: Parity check, SSI Bit1: Fault reset INP_NAV.ZXBITS.IS	WE: 0h0000 Type: W [FP-A35]
H228	Gearbox ratio, absolute value encoder 1 INP_NAV.ZXAENC.NFG	WE: 1.000 Type: R [FP-A35]
H229	Normalization position, absolute value encoder 1 INP_NAV.ZXAENC.NFP	WE: 1.000 Type: R [FP-A35]
H230	Normalization speed, absolute value encoder 1 INP_NAV.ZXAENC.NFY	WE: 0.0 Type: R [FP-A35]
H231	Offset zero position, absolute value encoder 1 INP_NAV.ZXAENC.OFF	WE: 0.000 Type: R [FP-A35]

Parameter	Description	Data
H232	Max. speed, absolute value encoder 1 INP_NAV.ZXAENC.LU	WE: 6000.0 Type: R [FP-A35]
d234	Speed actual value, absolute value encoder 1 INP_NAV.ZXAENC.Y	Type: R [FP-A35]
d235	Position counter, absolute value encoder 1 INP_NAV.ZXAENC.YP	Type: R [FP-A35]
d236	Revolution counter, absolute value encoder 1 INP_NAV.ZXAENC.YRC	Type: R [FP-A35]
d238	Fault code, absolute value encoder 1 INP_NAV.ZXAENC.YFC	Type: W [FP-A35]
d239	Fault word, absolute value encoder 1 INP_NAV.ZXAENC.YF	Type: W [FP-A35]
H240	Offset for the number of revolutions, absolute value encoder 1 INP_NAV.ZXPOS1.X2	WE: 0.0 Type: R [FP-A35]
H241	Scaling factor, position actual value from absolute value encoder 1 Convert from relative value to m INP_NAV.ZXPOS3.X	WE: 1.000 Type: R [FP-A35]
d242	Position actual value [m] from absolute value encoder 1 INP_NAV.ZXPOS.Y	Type: R [FP-A35]
H243	X source, pendulum length X drive Pre assignment = KR0242. Connector position from absolute value encoder 1 INP_NAV.ZXPOSACT.X1	WE: 242 Type: K-R [FP-A40]
H244	X source, offset length for pendulum length [m] Pre assignment = KR0090. Connector, fixed setpoint in H090 INP_NAV.ZXPOSACT.X2	WE: 90 Type: K-R [FP-A40]
d245	X pendulum length [m] INP_NAV.ZXPOSACT.Y	Type: R [FP-A40]
H246	X source, offset length load, center of gravity for pendulum length [m] Pre assignment = KR0992. Connector, selection output, load center of gravity INP_NAV.ZXPOSACT.X3	WE: 992 Type: K-R [FP-A40]
H248	MUL/DIV selection for adaptation, position from absolute value encoder 1 H248 = 0: Scaling factor H241 is multiplied by the output value from AENC. H248 = 1: Scaling factor H241 is divided by the output value from AENC. INP_NAV.ZXPOS9.I	WE: 0 Type: B [FP-A35]

Parameter	Description	Data
H249	Offset, position actual value, absolute value encoder 1 H249 is added to the output value adapted with H248. INP_NAV.ZXPOS.X2	WE: 0.000 Type: R [FP-A35]
H250	X, source master switch position reference value/setpoint characteristic Pre assignment = KR044. T400 analog input 1. XSREF1.MS_SP_1.X	WE: 44 Type: K-R [FP-CX1]
H251	X MS characteristic A1 XSREF1.MS_SP_1.A1	WE: -1.000 Type: R [FP-CX1]
H252	X MS characteristic B1 XSREF1.MS_SP_1.B1	WE: -1.000 Type: R [FP-CX1]
H253	X MS characteristic A2 XSREF1.MS_SP_1.A2	WE: -0.700 Type: R [FP-CX1]
H254	X MS characteristic B2 XSREF1.MS_SP_1.B2	WE: -0.400 Type: R [FP-CX1]
H255	X MS characteristic A3 XSREF1.MS_SP_1.A3	WE: -0.600 Type: R [FP-CX1]
H256	X MS characteristic B3 XSREF1.MS_SP_1.B3	WE: -0.250 Type: R [FP-CX1]
H257	X MS characteristic A4 XSREF1.MS_SP_1.A4	WE: -0.400 Type: R [FP-CX1]
H258	X MS characteristic B4 XSREF1.MS_SP_1.B4	WE: -0.100 Type: R [FP-CX1]
H259	X MS characteristic A5 XSREF1.MS_SP_1.A5	WE: -0.200 Type: R [FP-CX1]
H260	X MS characteristic B5 XSREF1.MS_SP_1.B5	WE: -0.030 Type: R [FP-CX1]
H261	X MS characteristic A6 XSREF1.MS_SP_1.A6	WE: 0.200 Type: R [FP-CX1]
H262	X MS characteristic B6 XSREF1.MS_SP_1.B6	WE: 0.030 Type: R [FP-CX1]
H263	X MS characteristic A7 XSREF1.MS_SP_1.A7	WE: 0.400 Type: R [FP-CX1]
H264	X MS characteristic B7 XSREF1.MS_SP_1.B7	WE: 0.100 Type: R [FP-CX1]

Parameter	Description	Data
H265	X MS characteristic A8 XSREF1.MS_SP_1.A8	WE: 0.600 Type: R [FP-CX1]
H266	X MS characteristic B8 XSREF1.MS_SP_1.B8	WE: 0.250 Type: R [FP-CX1]
H267	X MS characteristic A9 XSREF1.MS_SP_1.A9	WE: 0.700 Type: R [FP-CX1]
H268	X MS characteristic B9 XSREF1.MS_SP_1.B9	WE: 0.400 Type: R [FP-CX1]
H269	X MS characteristic A10 XSREF1.MS_SP_1.A10	WE: 1.000 Type: R [FP-CX1]
H270	X MS characteristic B10 XSREF1.MS_SP_1.B10	WE: 1.000 Type: R [FP-CX1]
d271	X MS setpoint after the characteristic XSREF1.MS_SP_1.Y	Type: R [FP-CX1]
H272	X source, MS setpoint Pre assignment = KR0044. T400 analog input 1. XSREF1.MS_SP_2.X1	WE: 44 Type: K-R [FP-CX1]
H273	X factor, MS setpoint XSREF1.MS_SP_2.X2	WE: 1.000 Type: R [FP-CX1]
H274	X response value deadzone MS setpoint XSREF1.MS_SP_3.TH	WE: 0.001 Type: R [FP-CX1]
d275	X selected MS setpoint XSREF1.MS_SP.Y	Type: R [FP-CX1]
H280	X source binector T400 status word bit I1 Pre assignment = 2011. Ready to power-up from CU. XCONTR.XSTAT.I1	WE: 2011 Type: K-B [FP-BX7]
H281	X source binector T400 status word bit I2 Pre assignment = 2012. Ready from CU. XCONTR.XSTAT.I2	WE: 2012 Type: K-B [FP-BX7]
H282	X source binector T400 status word bit I3 Pre assignment = 2013. Operation from CU. XCONTR.XSTAT.I3	WE: 2013 Type: K-B [FP-BX7]
H283	X source binector T400 status word bit I4 Pre assignment = 2014. Fault from CU. XCONTR.XSTAT.I4	WE: 2014 Type: K-B [FP-BX7]

Parameter	Description	Data
H284	X source binector T400 status word bit I5 Pre assignment = 2200. Drive on. XCONTR.XSTAT.I5	WE: 2200 Type: K-B [FP-BX7]
H285	X source binector T400 status word bit I6 Pre assignment = 2228. Standard stop active. XCONTR.XSTAT.I6	WE: 2228 Type: K-B [FP-BX7]
H286	X source binector T400 status word bit I7 Pre assignment = 2210. Electrical off. XCONTR.XSTAT.I7	WE: 2210 Type: K-B [FP-BX7]
H287	X source binector T400 status word bit I8 Pre assignment = 2212. Fast stop active. XCONTR.XSTAT.I8	WE: 2212 Type: K-B [FP-BX7]
H288	X source binector T400 status word bit I9 Pre assignment = 2216. T400 power-off signal. XCONTR.XSTAT.I9	WE: 2216 Type: K-B [FP-BX7]
H289	X source binector T400 status word bit I10 Pre assignment = 2202. Inverter enable. XCONTR.XSTAT.I10	WE: 2202 Type: K-B [FP-BX7]
H290	X source binector T400 status word bit I11 Pre assignment = 2204. Setpoint enable. XCONTR.XSTAT.I11	WE: 2204 Type: K-B [FP-BX7]
H291	X source binector T400 status word bit I12 Pre assignment = 2218. T400 group fault. XCONTR.XSTAT.I12	WE: 2218 Type: K-B [FP-BX7]
H292	X source binector T400 status word bit I13 Pre assignment = 2222. MS traversing command/positioning command. XCONTR.XSTAT.I13	WE: 2222 Type: K-B [FP-BX7]
H293	X source binector T400 status word bit I14 Pre assignment = 2005. Speed = 0. XCONTR.XSTAT.I14	WE: 2005 Type: K-B [FP-BX7]
H294	X source binector T400 status word bit I15 Pre assignment = 2226. Enable anti sway control. XCONTR.XSTAT.I15	WE: 2226 Type: K-B [FP-BX7]
H295	X source binector T400 status word bit I16 Pre assignment = 2224. Traversing command from the anti sway control. XCONTR.XSTAT.I16	WE: 2224 Type: K-B [FP-BX7]
H301	X ramp-up time, ramp-function generator XSPAR.X01.X	WE: 0.2 [s] Type: R [FP-CX2]

Parameter	Description	Data
H302	X rounding-off, ramp-function generator XSPAR.X02.X	WE: 1.000 [s] Type: R [FP-CX2]
H303	X ramp-up time, ramp-function generator, power-on XSPAR.X03.X	WE: 0.125 [s] Type: R [FP-CX2]
H304	X rounding-off, ramp-function generator, power-on XSPAR.X04.X	WE: 1.000 [s] Type: R [FP-CX2]
H305	X rounding-off, ramp-function generator pre limit switch XSPAR.X05.X	WE: 1.000 [s] Type: R [FP-CX2]
H307	X source pendulum angle Pre assignment: KR0000. Connector 0.0 XSPAR.X07.X	WE: 0 Type: K-R [FP-CX2]
H309	X minimum pendulum length [m] XSPAR.X09.X	WE: 0.500 [m] Type: R [FP-CX2]
H310	X source, velocity setpoint Pre assignment: KR0275. Selected master switch setpoint. XSPAR.X10.X	WE: 275 Type: K-R [FP-CX2]
H311	X pendulum length 1 for control parameter v controller [m] XSPAR.X11.X	WE: 1.8 Type: R [FP-CX2]
H312	X control parameter KV1 for pendulum length 1 XSPAR.X12.X	WE: 16.8 Type: R [FP-CX2]
H313	X control parameter KV2 for pendulum length 1 XSPAR.X13.X	WE: -0.004 Type: R [FP-CX2]
H314	X control parameter KV3 for pendulum length 1 XSPAR.X14.X	WE: 1.0 Type: R [FP-CX2]
H315	X pendulum length 2 for control parameter v controller [m] XSPAR.X15.X	WE: 0.4 Type: R [FP-CX2]
H316	X control parameter KV1 for pendulum length 2 XSPAR.X16.X	WE: 5.280 Type: R [FP-CX2]
H317	X control parameter KV2 for pendulum length 2 XSPAR.X17.X	WE: -1.110 Type: R [FP-CX2]
H318	X control parameter KV3 for pendulum length 2 XSPAR.X18.X	WE: 0.44 Type: R [FP-CX2]
H319 ◆	X model parameter BK1 XSPAR.X19.X	WE: -20.0 Type: R [FP-CX2]

Parameter	Description	Data
H320	X model parameter BK22 XSPAR.X20.X	WE: -24.6 Type: R [FP-CX2]
H321	X model parameter BK3 XSPAR.X21.X	WE: 2.60 Type: R [FP-CX2]
H322	X damping coefficient model XSPAR.X22.X	WE: 0.015 Type: R [FP-CX2]
H323	X switching point 1 velocity setpoint If parameters H323 = 0.0 and H324 are set to 0.0, then the stepping circuit is de-activated. The setpoint for the anti sway control is continually entered. XSPAR.X23.X	WE: 0.3 Type: R [FP-CX3]
H324	X switching point 2 velocity setpoint If parameters H323 = 0.0 and H324 are set to 0.0, then the stepping circuit is de-activated. The setpoint for the anti sway control is continually entered. XSPAR.X24.X	WE: 0.7 Type: R [FP-CX3]
H325	X hysteresis at the switching points XSPAR.X25.X	WE: 0.02 Type: R [FP-CX3]
H326	X setpoint stage 1 XSPAR.X26.X	WE: 0.06 Type: R [FP-CX3]
H327	X setpoint stage 2 XSPAR.X27.X	WE: 0.5 Type: R [FP-CX3]
H328	X maximum velocity [m/s] XSPAR.X28.X	WE: 0.37 Type: R [FP-CX3]
H329	X pre limit switch velocity Entered as a %/100 of the maximum velocity. XSPAR.X29.X	WE: 0.15 Type: R [FP-CX3]
H330	X shutdown velocity Entered as a %/100 of the maximum velocity. XSPAR.X30.X	WE: 0.02 Type: R [FP-CX3]
H331	X maximum ramp-down time XSPAR.X31.X	WE: 25.0 [s] Type: R [FP-CX3]
H332	X minimum time after load velocity < shutdown velocity XSPAR.X32.X	WE: 4.0 [s] Type: R [FP-CX3]
H333	X overshoot factor for controller limiting XSPAR.X33.X	WE: 0.0 Type: R [FP-CX3]

Parameter	Description	Data
H334	X position of the positive limit switch [m] This parameter is only of interest if the velocity-dependent pre limit switch function is required. The velocity-dependent pre limit switch function is only enabled if H334 <> H335. XSPAR.X36.X	WE: 0.0 Type: R [FP-CX3]
H335	X position of the negative limit switch [m] This parameter is only of interest if the velocity-dependent pre limit switch function is required. The velocity-dependent pre limit switch function is only enabled if H334 <> H335. XSPAR.X37.X	WE: 0.0 Type: R [FP-CX3]
H336	X crawl distance for the velocity-dependent pre limit switch function [m] Distance, actual position to the limit switch where pre limit switch velocity applies. This parameter is only of interest if the velocity-dependent pre limit switch function is required. XSPAR.X36.X	WE: 1.0 Type: R [FP-CX3]
H337	X ramp-down time for velocity-dependent pre limit switch function. This parameter is only of interest if the velocity-dependent pre limit switch function is required. XSPAR.X39.X	WE: 2.0 [s] Type: R [FP-CX3]
H340	X, source closed-loop control with pendulum angle sensing Pre assignment = B1000. Binector 0. XSPAR.IW1.I7	WE: 1000 Type: K-B [FP-CX2]
H341	X, source synchronizing pulse for anti sway control Pre assignment = B1155. Binector, synchronizing pulse from pulse encoder 1. XSPAR.IW1.I10	WE: 1155 Type: K-B [FP-CX2]
d345	X drive, control word 1 to CONDP Control word for the anti sway control. Bit 0 : Enable anti sway control Bit 1 : Master switch (MS) traversing command Bit 2 : Enable setpoint Bit 3 : 0 Bit 4 : Pre limit switch positive, activated Bit 5 : Pre limit switch negative, activated Bit 6 : With pendulum angle sensing (can be selected with H340) Bit 7 : Start help for positive limit switch active Bit 8 : Start help for negative limit switch active Bit 9 : Synchronizing pulse for X position (can be selected with H341) Bit 10: 0 Bit 11: 0 Bit 12: 0 Bit 13: 0 Bit 14: 0 Bit 15: 0 XSPAR.IW1.QS	Type: W [FP-CX2]

Parameter	Description	Data
H350	X, source, hoisting height for camera signal Pre assignment = KR0000. Connector 0.0. XSPRDI.Z_ACT.X1	WE: 0 Type: K-R [FP-CX5]
H351	X, distance, pendulum point – reflector for hoisting height 0 [m] XSPRDI.PHI_1.X2	WE: 2.0 Type: R [FP-CX5]
H352	X, distance, pendulum point – camera [m] XSPRDI.D_OPT.X2	WE: 1.0 Type: R [FP-CX5]
H353	X source, angular signal from camera Pre assignment = KR0000. Connector 0.0. XSPRDI.PHICAM.X1	WE: 0 Type: K-R [FP-CX5]
H354	X adaptation factor K_OPT for camera pendulum angle Optical normalization factor. Adaptation factor which is used to convert the signal, supplied from the camera, to the pendulum angle [rad]. XSPRDI.PHIACT_3.X2	WE: 1.0 Type: R [FP-CX5]
d355	X display: Actual distance, camera – reflector D_OPT XSPRDI.D_OPT.Y	Type: R [FP-CX5]
H356	X minimum distance, D_OPT for message [m] If D_OPT falls below this value, then binector B2301 is set to 0. This means that the pendulum angle sensing can be disabled in the anti sway control (with H340 = 2301). XSPRDI.SENSOFF_1.X2	WE: 1.0 Type: R [FP-CX5]
H357	X maximum distance, D_OPT for message [m] If D_OPT falls below this value, then binector B2301 is set to 0. This means that the pendulum angle sensing can be disabled in the anti sway control (with H340 = 2301). XSPRDI.SENSOFF_3.X2	WE: 20.0 Type: R [FP-CX5]
H358	X source, bit, fault camera for signal Pre assignment = B1000. Binector 0. Using this selected bit, binector B2301 is set to 0. This allows the pendulum angle sensing to be disabled in the anti sway control (with H340 = 2301). XSPRDI.SENSOFF.I3	WE: 1000 Type: K-B [FP-CX5]
H359	X, start average value generation, determining the offset for the camera signal For 1, an average value of the pendulum angle offset is displayed in d360, which can be included in the offset characteristic. XSPRDI.OFFS_1.I1	WE: 0 Type: B [FP-CX5]
d360	X display: Pendulum angle offset to determine the offset characteristic XSPRDI.OFFS_15.Y	Type: R [FP-CX5]
d361	X display: Adapted pendulum angle from the camera [rad] XSPRDI.PHIACT.Y	Type: R [FP-CX5]

Parameter	Description	Data
H362	X, source bit reflector found for predictor Pre assignment = B1000. Binector 0. This selected bit signals the predictor as to whether the camera supplied a measured value of the pendulum angle. XSPRDI.IW1.I1	WE: 1000 Type: K-B [FP-CX5]
H363	X, source pendulum angle for predictor Pre assignment = KR0361= adapted pendulum angle from the camera. XSPRDI.PHI_PRDICT.X01	WE: 361 Type: K-R [FP-CX5]
H364	X adaptation, predictive calculation, predictor This can control the predictive calculation of the predictor. XSPRDI.PHI_PRDICT.X02	WE: 5.0 Type: R [FP-CX5]
d365	X display: Pendulum angle after prediction [rad] XSPRDI.PHIACT.Y	Type: R [FP-CX5]
d370	X drive, status word 1 from CONDP Status word of the anti sway control. Bit 0 : Traversing command from anti sway control Bit 1 : Down ramp active Bit 2 : Limit switch positive, active Bit 3 : Limit switch negative, active Bit 4 : 0 Bit 5 : 0 Bit 6 : 0 Bit 7 : 0 Bit 8 : 0 Bit 9 : 0 Bit 10: 0 Bit 11: 0 Bit 12: 0 Bit 13: 0 Bit 14: 0 Bit 15: 0 XSREF2.QW1S.QS	Type: W [FP-CX2]
d371	X display: Speed setpoint, anti sway control Output value of the anti sway control XSREF2.Y01.Y	Type: R [FP-CX2]
d372	X display: Speed setpoint after the ramp-function generator, anti sway control Output value of the anti sway control ramp-function generator XSREF2.Y12.Y	Type: R [FP-CX2]
d378	X display: Test output 6 (pendulum angle without wind) [rad] XSREF2.Y07.Y	Type: R [FP-CX2]
H380	X value selection for test output, anti sway control Only for internal diagnostics. The selected value is displayed in d381. XSREF2.IW3.X	WE: 0 Type: R [FP-CX3]
d381	X display: Test variable, anti sway control XSREF2.Y15.Y	Type: R [FP-CX3]

Parameter	Description	Data
H388	Mask, suppress fault word T400 X drive Fault which should lead to a fault are coded bitwise. Bit assignment, refer to d390. An external fault is generated in the basic unit; for CUVC/CUMC = F035, for CUD1 = F021. XCONTR.FLTW_MSK.I1	WE: 0hFFFF Type: W [FP-BX8]
d390	Fault word T400 X drive Bit 0: Fault, checkback signal drive on Bit 1: Fault, overspeed positive Bit 2: Fault, overspeed negative Bit 3: Fault stop Bit 4: Drive blocked Bit 5: Bit 6: Bit 7 : Bit 8 : Bit 9 : Bit 10: Bit 11: Bit 12: Bit 13: Bit 14: Bit 15: XCONTR.FLTW.QS	Type: W [FP-BX8]
d391	Control word 1 to X drive Bit 0: On / no OFF1 Bit 1: No OFF2 Bit 2: No OFF3 Bit 3: Enable inverter Bit 4: Enable ramp-function generator Bit 5: No ramp-function generator stop Bit 6: Enable setpoint Bit 7 : Acknowledge fault Bit 8 : Jogging, bit 0 Bit 9 : Jogging, bit 1 Bit 10: PZD control Bit 11: Pos. direction of rotation Bit 12: Neg. direction of rotation Bit 13: Motorized potentiometer, raise Bit 14: Motorized potentiometer, lower Bit 15: No external fault XCONTR.STW1_CU.QS	Type: W [FP-BX6]

Parameter	Description	Data
d392	Control word 2 to X drive Bit 0: No traversing command (H140=2207) Bit 1: Reserve (H141=1000) Bit 2: Reserve (H142=1000) Bit 3: Reserve (H143=1000) Bit 4: Reserve (H144=1000) Bit 5: Reserve (H145=1000) Bit 6: 0 Bit 7 : Enable restart on the fly Bit 8 : Enable droop Bit 9 : Enable speed controller Bit 10: No external fault 2 Bit 11: Slave drive (closed-loop torque control) Bit 12: No external alarm 1 Bit 13: No external alarm 2 Bit 14: Select BICO set 2 Bit 15: Checkback signal, main contactor XCONTR.STW2_CU.QS	Type: W [FP-BX6]
d399	X drive, T400 status word Bit 0 : Selectable with H280. Pre assignment: Ready to switch-on from CU Bit 1 : Selectable with H281. Pre assignment: Ready from CU Bit 2 : Selectable with H282. Pre assignment: Run from CU Bit 3 : Selectable with H283. Pre assignment: Fault from CU Bit 4 : Selectable with H284. Pre assignment: Drive on Bit 5 : Selectable with H285. Pre assignment: Standard stop active Bit 6 : Selectable with H286. Pre assignment: Electrical off Bit 7 : Selectable with H287. Pre assignment: Fast stop active Bit 8 : Selectable with H288. Pre assignment: T400 power-off signal Bit 9 : Selectable with H289. Pre assignment: Inverter enable Bit 10: Selectable with H290. Pre assignment: Setpoint enable Bit 11: Selectable with H291. Pre assignment: T400 group fault Bit 12: Selectable with H292. Pre assignment: MS traversing command/ positioning command Bit 13: Selectable with H293. Pre assignment: Speed = 0 Bit 14: Selectable with H294. Pre assignment: Enable anti sway control Bit 15: Selectable with H295. Pre assignment: Traversing command from anti sway control XCONTR.XSTAT.QS	Type: W [FP-BX7]
d400	X display: Position actual value [m] XSREF2.POS.Y	Type: R [FP-CX3]
d401	X display: Position actual value, load [m] XSREF2.POS_LOAD.Y	Type: R [FP-CX3]
d402	X display: Velocity actual value [m/s] XSREF2.VACT.Y	Type: R [FP-CX3]
d403	X display: Velocity actual value, load [m/s] XSREF2.VACT_LOAD.Y	Type: R [FP-CX3]
d404	X display: Pendulum angle without wind [degrees] XSREF2.PHI.Y	Type: R [FP-CX3]

Parameter	Description	Data
d405	X display: Pendulum length [m] XSREF2.PLEN.Y	Type: R [FP-CX3]
H435	X source, bit 0 position selection Pre assignment = B1000. Binector 0. XPOSI.SEL_WREF_1.I1	WE: 1000 Type: K-B [FP-DX1]
H436	X source, bit 1 position selection Pre assignment = B1000. Binector 0. XPOSI.SEL_WREF_1.I2	WE: 1000 Type: K-B [FP-DX1]
H437	X source, bit 2 position selection Pre assignment = B1000. Binector 0. XPOSI.SEL_WREF_1.I3	WE: 1000 Type: K-B [FP-DX1]
d440	X parameter number of the selected reference position XPOSI.NO_SEL_WREF.Y	Type: R [FP-DX1]
H441	X position reference value 1 [m] This is selected if binectors in H435=0, H436=0, H437=0. XPOSI.SEL_WREF.X1	WE: 0.000 Type: R [FP-DX1]
H442	X position reference value 2 [m] This is selected if binectors in H435=1, H436=0, H437=0. XPOSI.SEL_WREF.X2	WE: 0.000 Type: R [FP-DX1]
H443	X position reference value 3 [m] This is selected if binectors in H435=0, H436=1, H437=0. XPOSI.SEL_WREF.X3	WE: 0.000 Type: R [FP-DX1]
H444	X position reference value 4 [m] This is selected if binectors in H435=1, H436=1, H437=0. XPOSI.SEL_WREF.X4	WE: 0.000 Type: R [FP-DX1]
H445	X position reference value 5 [m] This is selected if binectors in H435=0, H436=0, H437=1. XPOSI.SEL_WREF.X5	WE: 0.000 Type: R [FP-DX1]
H446	X position reference value 6 [m] This is selected if binectors in H435=1, H436=0, H437=1. XPOSI.SEL_WREF.X6	WE: 0.000 Type: R [FP-DX1]
H447	X position reference value 7 [m] This is selected if binectors in H435=0, H436=1, H437=1. XPOSI.SEL_WREF.X7	WE: 0.000 Type: R [FP-DX1]
H448	X position reference value 8 [m] This is selected if binectors in H435=1, H436=1, H437=1. XPOSI.SEL_WREF.X8	WE: 0.000 Type: R [FP-DX1]
d449	X selected position reference value [m] XPOSI.SEL_WREF.Y	Type: R [FP-DX1]

Parameter	Description	Data
H450	X threshold value for position reached [m] Positioning is reset when this threshold is fallen below. XPOSI.ENPOS_1.L	WE: 0.003 Type: R [FP-DX5]
H451	X hysteresis for position reached [m] Hysteresis for H450. XPOSI.ENPOS_1.L	WE: 0.000 Type: R [FP-DX5]
H452	X time delay for position reached Time delay for H450. XPOSI.ENPOS_4.T	WE: 100 [ms] Type: R [FP-DX5]
H453	X source, start positioning Pre assignment = B1000. Binector 0. XPOSI.ENPOSA1.I1	WE: 1000 Type: K-B [FP-DX1]
H454	X source, stop positioning Pre assignment = B1000. Binector 0. XPOSI.ENPOS_5.I1	WE: 1000 Type: K-B [FP-DX1]
H455	X source, position reference value [m] Pre assignment = K0449. Selected fixed position reference value. XPOSI.WREF.X	WE: 449 Type: K-R [FP-DX1]
d456	X position reference, setpoint actual value [m] XPOSI.WDIF.Y	Type: R [FP-DX2]
H458	X source stop 2 positioning Pre assignment = B1000. Binector 0. XPOSI.ENPOS_5.I2	WE: 1000 Type: K-B [FP-DX1]
H460	X KP1 adaptation 1 Before the characteristic. XPOSI.KPADAP_1.X2	WE: 1.0 Type: R [FP-DX2]
H461	X KP1 adaptation 2 After the characteristic. XPOSI.KPADAP.X2	WE: 1.0 Type: R [FP-DX2]
d462	X adapted KP1 position controller XPOSI.KP1.Y	Type: R [FP-DX2]
H463	X gain KP2 position controller XPOSI.KP2.X1	WE: 1.5 Type: R [FP-DX2]
d464	X output position controller XPOSI.VPOS1.Y	Type: R [FP-DX2]
H466 ◆	X ramp time, V setpoint positioning XPOSI.VMAX_TU.X	WE: 1000 [ms] Type: R [FP-DX4]

Parameter	Description	Data
H468	X threshold to detect position reference value change XPOSI.WREFCHG_1.L	WE: 0.05 Type: R [FP-DX4]
H471	X TI adaptation 2 After the characteristic. XPOSIVAR2.TI_ADAP.X2	WE: 1.0 Type: R [FP-DX3]
d472	X adapted TI position controller version 2 XPOSIVAR2.TI.Y	Type: R [FP-DX3]
H473	X rounding-off time TR position controller version 2 XPOSIVAR2.TIME_RND.X	WE: 24.0 [ms] Type: R [FP-DX3]
H474	X ramp-up time TU position controller version 2 XPOSIVAR2.TIME_UP.X	WE: 500.0 [ms] Type: R [FP-DX3]
H475	X ramp-down time TD position controller version 2 XPOSIVAR2.TIME_DOWN.X	WE: 500.0 [ms] Type: R [FP-DX3]
H476	X deadtime compensation TX position controller version 2 XPOSIVAR2.TIME_DCOMP.X	WE: 8.0 [ms] Type: R [FP-DX3]
d477	X position difference setpoint-actual value [m] position controller version 2 XPOSIVAR2.PDIF_1.Y	Type: R [FP-DX3]
H478	X upper limit position controller version 2 XPOSIVAR2.LIMP.X	WE: 0.1 Type: R [FP-DX3]
H479	X gain KP position controller version 2 XPOSIVAR2.KP.X1	WE: 1.0 Type: R [FP-DX3]
d480	X output position controller version 2 XPOSIVAR2.VREFLIM.Y	Type: R [FP-DX3]
d481	X output position ramp-function generator version 2 XPOSIVAR2.POS_RFG.Y	Type: R [FP-DX3]
H485	X source, maximum velocity for positioning Pre assignment = K0275. Connector 275, master switch setpoint. XPOSI.VMAXP.Y	WE: 275 Type: K-R [FP-DX4]
H486	X source, speed setpoint from positioning Pre assignment = K0464. Connector 464, position controller version 1. XPOSI.V_LLPOS.X	WE: 464 Type: K-R [FP-DX4]
d487	X speed setpoint from positioning XPOSI.V_LLPOS.Y	Type: R [FP-DX4]

Parameter	Description	Data
d489	X drive, status word positioning Bit 0 : Positioning active Bit 1 : Positioning enabled Bit 2 : Position reference value = actual value Bit 3 : Position reference value > position limit switch positive Bit 4 : Position reference value < position limit switch negative Bit 5 : Bit 6 : Bit 7 : Bit 8 : Pulse encoder 1 synchronized Bit 9 : Pulse encoder 2 synchronized Bit 10: Bit 11: Bit 12: Bit 13: Bit 14: Bit 15: XPOSI.STATPOS.QS	Type: W [FP-DX5]
H491	X gain KP1 position controller, conventional operation XPOSI.KP1.X2	WE: 1.0 Type: R [FP-DX2]
H492	X gain KP2 position controller, conventional operation XPOSI.KP2.X2	WE: 1.5 Type: R [FP-DX2]
H495	X integral time TI position controller version 2, conventional operation XPOSIVAR2.TI.X2	WE: 1000 [ms] Type: R [FP-DX3]
H496	X gain KP position controller version 2, conventional operation XPOSIVAR2.KP.X2	WE: 1.0 Type: R [FP-DX3]
H500	Y source binector fault acknowledgment 1 Pre assignment = B1028. Bit7 in word 1 from CBP. YCONTR.FLTACK.I2	WE: 1028 Type: K-B [FP-BY1]
H501	Y source binector fault acknowledgment 2 Pre assignment = B1000. Binector 0. YCONTR.FLTACK.I3	WE: 1000 Type: K-B [FP-BY1]
H505	Y source binector power-on 1 Pre assignment = B2059. Bit 8 in word 4 from CU. YCONTR.DRON1.I1	WE: 2059 Type: K-B [FP-BY2]
H506	Y source binector power-on 2 Pre assignment = B1000. Binector 0. YCONTR.DRON1.I2	WE: 1000 Type: K-B [FP-BY2]
H508	Y source binector standard stop 1 Pre assignment = B3076. Inverted bit 9 in word 9 from CU. YCONTR.STOP1.I1	WE: 3076 Type: K-B [FP-BY3]
H509	X source binector standard stop 2 Pre assignment = B1000. Binector 0. XCONTR.STOP1.I2	WE: 1000 Type: K-B [FP-BY3]

Parameter	Description	Data
H511	Y source binector electrical off 1 Pre assignment = B3065. Inverted bit 8 in word 9 from CU. YCONTR.ELOFF1.I1	WE: 2075 Type: K-B [FP-BY4]
H512	Y source binector electrical off 2 Pre assignment = B1000. Binector 0. YCONTR.ELOFF1.I2	WE: 1000 Type: K-B [FP-BY4]
H514	Y source binector fast stop 1 Pre assignment = B1000. Binector 0. YCONTR.FASTSTOP1.I1	WE: 1000 Type: K-B [FP-BY3]
H515	Y source binector fast stop 2 Pre assignment = B1000. Binector 0. YCONTR.FASTSTOP1.I2	WE: 1000 Type: K-B [FP-BY3]
H522	Y delay time up to fault, checkback signal drive on YCONTR.YFLT_FBCU.T	WE: 2000 [ms] Type: R [FP-BY8]
H525	Y overspeed limit If the speed actual value reaches this threshold, the overspeed fault is generated. YCONTR.YOVR_SPEED.L	WE: 1.200 Type: R [FP-BY8]
H526	Y threshold, speed actual value = 0 for drive blocked YCONTR.DBL_3.L	WE: 0.005 Type: R [FP-BY8]
H527	Y threshold, speed setpoint for drive blocked Evaluation of |speed setpoint| > H527 YCONTR.DBL_7.M	WE: 0.010 Type: R [FP-BY8]
H528	Y threshold, torque for drive blocked Evaluation of |torque| > H528 YCONTR.DBL_11.M	WE: 0.800 Type: R [FP-BY8]
H529	Y delay time until the drive blocked signal YCONTR.DBL.T	WE: 1000 [ms] Type: R [FP-BY8]
H530	Y threshold, zero speed signal Signal n > 0, if the speed actual value > (H530+H531). Signal n = 0, if |speed actual value| < (H530-H531). Signal n < 0, if speed actual value < -(H530+H531). YCONTR.SPEED_ZERO.L	WE: 0.005 Type: R [FP-BY1]
H531	Y hysteresis, zero speed signal YCONTR.SPEED_ZERO.HY	WE: 0.001 Type: R [FP-BY1]
H540	Y source binector FDS bit0 Pre assignment = B3207. No traversing command to CU. YCONTR.STW2_CU1.I1	WE: 3207 Type: K-B [FP-BY6]

Parameter	Description	Data
H541	Y source binector FDS bit1 Pre assignment = B1000. Binector 0. Here, it is possible to send any T400 binector to the basic unit. YCONTR.STW2_CU1.I2	WE: 1000 Type: K-B [FP-BY6]
H542	Y source binector MDS bit0 Pre assignment = B1000. Binector 0. Here, it is possible to send any T400 binector to the basic unit. YCONTR.STW2_CU1.I3	WE: 1000 Type: K-B [FP-BY6]
H543	Y source binector MDS bit1 Pre assignment = B1000. Binector 0. Here, it is possible to send any T400 binector to the basic unit. YCONTR.STW2_CU1.I4	WE: 1000 Type: K-B [FP-BY6]
H544	Y source binector FSW bit0 Pre assignment = B1000. Binector 0. Here, it is possible to send any T400 binector to the basic unit. YCONTR.STW2_CU1.I5	WE: 1000 Type: K-B [FP-BY6]
H545	Y source binector FDS bit0 Pre assignment = B1000. Binector 0. Here, it is possible to send any T400 binector to the basic unit. YCONTR.STW2_CU1.I6	WE: 1000 Type: K-B [FP-BY6]
H549	Y mask power-off signal T400 Bitwise coding of the states which lead to the drive being powered-down. Bit assignment, refer to d550. YCONTR.OFF.I2	WE: 0hFFFF Type: W [FP-BY2]
d550	Y off conditions T400 Bit 0 : T400 fault Bit 1 : Fault from CU Bit 2 : Electrical off Bit 3 : Off after fast stop Bit 4 : Bit 5 : Bit 6 : Bit 7 : Bit 8 : Off after standard stop Bit 9 : Power-on inhibit from CU Bit 10: Bit 11: Bit 12: Power-off signal, X drive Bit 13: Bit 14: Power-off signal, Z drive Bit 15: Edge, ready to power-up from CU YCONTR.OFF_1.QS	Type: W [FP-BY2]

Parameter	Description	Data
d551	Y diagnostics word, power-down This saves the condition while the drive was powered-down. Bit assignment as for d550. YCONTR.OFFSAV.QS	Type: W [FP-BY2]
H552	Y threshold, speed setpoint <> speed actual value A fault stop is generated if this threshold is exceeded. YCONTR.FLT1.L	WE: 2.0 Type: R [FP-BY8]
H553	Y hysteresis, speed setpoint <> speed actual value YCONTR.FLT1.HY	WE: 0.005 Type: R [FP-BY8]
H555	Y time for forced power-off after the traversing command has been withdrawn YCONTR.R_INVENA_3.T	WE: 4000 [ms] Type: R [FP-BY5]
H556	Y source, binector setpoint enable internal Pre assignment = B3202. Y inverter enable T400. YCONTR.SP_ENA1.I1	WE: 3202 Type: K-B [FP-BY4]
H557	Y source, binector setpoint enable external Pre assignment = B1000. Binector 0. YCONTR.SP_ENA2.I2	WE: 1000 Type: K-B [FP-BY4]
H559	Y source, binector master switch traversing command, negative Pre assignment = B1122. Digital input T400, terminal 49. YSREF1.MS_CMDNEG_1.I1	WE: 1122 Type: K-B [FP-BY4]
H560	Y source, binector master switch traversing command, positive Pre assignment = B1120. Digital input T400, terminal 47. YSREF1.MS_CMDPOS_1.I1	WE: 1120 Type: K-B [FP-BY4]
H561	Y source, binector conventional operation Pre assignment = B1000. Binector 0. YSREF2.MODE_CONVENT.I1	WE: 1000 Type: K-B [FP-BY4]
H562	Y ramp-up time, ramp conventional operation YSREF2.VREF.TU	WE: 1000 [ms] Type: R [FP-CY4]
H563	Y ramp-down time, ramp conventional operation / fault stop YSREF2.VREF.TD	WE: 1000 [ms] Type: R [FP-CY4]
d565	Y speed setpoint to CU YSREF2.VREFL.Y	Type: R [FP-CY4]
H570	Y source, binector pre limit switch positive Pre assignment = B1115. Digital input T400, terminal 57. YSREF1.PRELIM_POS_S.I1	WE: 1115 Type: R [FP-BY9]
H571	Y source, binector pre limit switch negative Pre assignment = B1116. Digital input T400, terminal 58. YSREF1.PRELIM_NEG_S.I1	WE: 1116 Type: R [FP-BY9]

Parameter	Description	Data
H572	Y source, binector limit switch positive Pre assignment = B1117. Digital input T400, terminal 59. YSREF1.LIMSWI_POS_1.I1	WE: 1117 Type: R [FP-BY9]
H573	Y source, binector limit switch negative Pre assignment = B1118. Digital input T400, terminal 60. YSREF1.LIMSWI_NEG_1.I1	WE: 1118 Type: R [FP-BY9]
H575	Y position software limit switch positive [m] YSREF1.ES_POS.X	WE: 1000.0 Type: R [FP-BY9]
H576	Y position software limit switch negative [m] YSREF1.ES_NEG.X	WE: -1000.0 Type: R [FP-BY9]
H577	Y position software pre limit switch positive [m] YSREF1.VES_POS.X	WE: 1000.0 Type: R [FP-BY9]
H578	Y position software pre limit switch negative [m] YSREF1.VES_NEG.X	WE: -1000.0 Type: R [FP-BY9]
H579	Y source position actual value for limit switch evaluation YSREF1.ACT_POS.X	WE: 0 Type: K-R [FP-BY9]
H590	Y source, binector enable anti sway control Pre assignment = B1001. Binector 1. YSREF1.ENA_CTRL5.I2	WE: 1001 Type: K-B [FP-BY9]
H593	Enable data save, position actual value, pulse encoder 2 in the NOVRAM. This saves the position actual value and is also available after power failure. After T400 has been initialized, the saved value is set as position actual value. INP_NAV.YNAV_SNOV.I	WE: 0 Type: B [FP-A30]
H594	Source, set position actual value, pulse encoder 2 Pre assignment = B1000. Binector 0. INP_NAV.YNAV_SET.I1	WE: 1000 Type: K-B [FP-A30]
H595	Source, synchronization, position actual value, pulse encoder 2 Pre assignment = B1000. Binector 0. INP_NAV.YNAV_SP.I1	WE: 1000 Type: K-B [FP-A30]
H596	Source, setting value for synchronizing pulse, pulse encoder 2 INP_NAV.YNAV_SV.X	WE: 0 Type: K-R [FP-A30]
H597	Range, enable zero pulse, pulse encoder 2 INP_NAV.YNAV_RNG.X	WE: 1000.0 Type: R [FP-A30]
H598 ◆	Source, reset synchronized signal, pulse encoder 2 Pre assignment = B1000. Binector 0. INP_NAV.YNAV_SYN_RESET.I2	WE: 1000 Type: K-B [FP-A30]

Parameter	Description	Data
H600	Pulse encoder, pulses per revolution, pulse encoder 2 INP_NAV.YNAV.PR	WE: 1024 Type: I [FP-A30] **INIT**
H601	Pulse encoder, rated speed, pulse encoder 2 INP_NAV.YNAV.RS	WE: 3000.0 Type: R [FP-A30] **INIT**
H602	Pulse encoder, rated pulses, pulse encoder 2 Pulses, which must be received so that the relative position actual value is 1.0. INP_NAV.YNAV.RP	WE: 4096 Type: DI [FP-A30] **INIT**
H603	Pulse encoder mode, pulse encoder 2 Pre-setting: Pulses and zero pulse from CU. INP_NAV.YNAV.MOD	WE: FE02 Type: W [FP-A30] **INIT**
d609	Pulse encoder, speed actual value, pulse encoder 2 Relative speed, whereby 1.0 = H601 value INP_NAV.YNAV.Y	Type: R [FP-A30]
d610	Position actual value, pulse encoder 2 INP_NAV.YPOSACT.YP	Type: R [FP-A30]
d611	Pulse encoder, error code, pulse encoder 2 INP_NAV.YNAV.YFC	Type: W [FP-A30]
d613	Y position actual value from integration INP_NAV.YWACT2.Y	Type: R [FP-A40]
H615	Y source, position actual value Pre assignment = KR0613. Connector, position from integration INP_NAV.YPOSACT.X1	WE: 613 Type: R [FP-A40]
H616	Y adaptation, position actual value If required, convert from the relative value to m INP_NAV.YPOSACT.X2	WE: 0.000 Type: R [FP-A40]
d617	Y position actual value [m] INP_NAV.YPOSACT.Y	Type: R [FP-A40]
H620	Steps per revolution, absolute value encoder 2 INP_NAV.ZYAENC.RPT	WE: 4096 Type: I [FP-A35] **INIT**
H621	Number of revolutions, absolute value encoder 2 INP_NAV.ZYAENC.NOT	WE: 4096 Type: I [FP-A35] **INIT**
H622	Number of leading zero bits, absolute value encoder 2 INP_NAV.ZYAENC.PZB	WE: 0 Type: I [FP-A35] **INIT**

Parameter	Description	Data
H623	Position, interrupt bit, absolute value encoder 2 INP_NAV.ZYAENC.ABP	WE: 0 Type: I [FP-A35] **INIT**
H624	Clock cycle frequency, absolute value encoder 2 INP_NAV.ZYAENC.MDF	WE: 0 Type: I [FP-A35] **INIT**
H625	Encoder type, absolute value encoder 2 INP_NAV.ZYAENC.MDT	WE: 0 Type: I [FP-A35] **INIT**
H626	Data coding, absolute value encoder 2 INP_NAV.ZYAENC.MDC	WE: 1 Type: I [FP-A35] **INIT**
H627	Control word, absolute value encoder 2 Bit0: Parity check SSI Bit1: Fault reset INP_NAV.ZYBITS.IS	WE: 0h0000 Type: W [FP-A35]
H628	Y-AENC2 Gearbox ratio, absolute value encoder 2 INP_NAV.ZYAENC.NFG	WE: 1.000 Type: R [FP-A35]
H629	Y-AENC2 Normalization position, absolute value encoder 2 INP_NAV.ZYAENC.NFP	WE: 1.000 Type: R [FP-A35]
H630	Y-AENC2 Normalization speed, absolute value encoder 2 INP_NAV.ZYAENC.NFY	WE: 0.000 Type: R [FP-A35]
H631	Y-AENC2 Offset zero position, absolute value encoder 2 INP_NAV.ZYAENC.OFF	WE: 0.000 Type: R [FP-A35]
H632	Y-AENC2 Max. speed, absolute value encoder 2 INP_NAV.ZYAENC.LU	WE: 6000.0 Type: R [FP-A35]
d634	Y-AENC2 Speed actual value, absolute value encoder 2 Relative speed, whereby 1.0 = H630 value INP_NAV.ZYAENC.Y	Type: R [FP-A35]
d635	Position counter, absolute value encoder 2 INP_NAV.ZYAENC.YP	Type: R [FP-A35]
d636	Revolution counter, absolute value encoder 2 INP_NAV.ZYAENC.YRC	Type: R [FP-A35]
d638	Fault code, absolute value encoder 2 INP_NAV.ZYAENC.YFC	Type: W [FP-A35]
d639	Fault word, absolute value encoder 2 INP_NAV.ZYAENC.YF	Type: W [FP-A35]

Parameter	Description	Data
H640	Offset for the number of revolutions, absolute value encoder 2 INP_NAV.ZYPOS1.X2	WE: 0.0 Type: R [FP-A35]
H641	Scaling factor, position actual value from absolute value encoder 2 Convert from relative value to m INP_NAV.ZYPOS3.X	WE: 0.000 Type: R [FP-A35]
d642	Position actual value [m] from absolute value encoder 1 INP_NAV.ZYPOS.Y	Type: R [FP-A35]
H643	Y source, pendulum length Y drive Pre assignment = KR0642. Connector position from absolute value encoder 2 INP_NAV.ZYPOSACT.X1	WE: 642 Type: K-R [FP-A40]
H644	Y source, offset length for pendulum length [m] Pre assignment = KR0091. Connector, fixed setpoint in H091 INP_NAV.ZYPOSACT.X2	WE: 91 Type: K-R [FP-A40]
d645	Y pendulum length [m] INP_NAV.ZYPOSACT.Y	Type: R [FP-A40]
H646	Y source, offset length load, center of gravity for pendulum length [m] Pre assignment = KR0992. Connector, selection output, load center of gravity INP_NAV.ZYPOSACT.X3	WE: 992 Type: K-R [FP-A40]
H648	MUL/DIV selection for adaptation, position from absolute value encoder 2 H648 = 0: Scaling factor H241 is multiplied by the output value from AENC. H648 = 1: Scaling factor H641 is divided by the output value from AENC. INP_NAV.ZYPOS9.I	WE: 0 Type: B [FP-A35]
H649	Offset, position actual value, absolute value encoder 2 H649 is added to the output value adapted with H648. INP_NAV.ZYPOS.X2	WE: 0.000 Type: R [FP-A35]
H650	Y, source master switch position reference value/setpoint characteristic Pre assignment = KR049. T400 analog input 2. YSREF1.MS_SP_1.X	WE: 49 Type: K-R [FP-CY1]
H651	Y MS characteristic A1 YSREF1.MS_SP_1.A1	WE: -1.000 Type: R [FP-CY1]
H652	Y MS characteristic B1 YSREF1.MS_SP_1.B1	WE: -1.000 Type: R [FP-CY1]
H653	Y MS characteristic A2 YSREF1.MS_SP_1.A2	WE: -0.700 Type: R [FP-CY1]
H654	Y MS characteristic B2 YSREF1.MS_SP_1.B2	WE: -0.400 Type: R [FP-CY1]

Parameter	Description	Data
H655	Y MS characteristic A3 YSREF1.MS_SP_1.A3	WE: -0.600 Type: R [FP-CY1]
H656	Y MS characteristic B3 YSREF1.MS_SP_1.B3	WE: -0.250 Type: R [FP-CY1]
H657	Y MS characteristic A4 YSREF1.MS_SP_1.A4	WE: -0.400 Type: R [FP-CY1]
H658	Y MS characteristic B4 YSREF1.MS_SP_1.B4	WE: -0.100 Type: R [FP-CY1]
H659	Y MS characteristic A5 YSREF1.MS_SP_1.A5	WE: -0.200 Type: R [FP-CY1]
H660	Y MS characteristic B5 YSREF1.MS_SP_1.B5	WE: -0.030 Type: R [FP-CY1]
H661	Y MS characteristic A6 YSREF1.MS_SP_1.A6	WE: 0.200 Type: R [FP-CY1]
H662	Y MS characteristic B6 YSREF1.MS_SP_1.B6	WE: 0.030 Type: R [FP-CY1]
H663	Y MS characteristic A7 YSREF1.MS_SP_1.A7	WE: 0.400 Type: R [FP-CY1]
H664	Y MS characteristic B7 YSREF1.MS_SP_1.B7	WE: 0.100 Type: R [FP-CY1]
H665	Y MS characteristic A8 YSREF1.MS_SP_1.A8	WE: 0.600 Type: R [FP-CY1]
H666	Y MS characteristic B8 YSREF1.MS_SP_1.B8	WE: 0.250 Type: R [FP-CY1]
H667	Y MS characteristic A9 YSREF1.MS_SP_1.A9	WE: 0.700 Type: R [FP-CY1]
H668	Y MS characteristic B9 YSREF1.MS_SP_1.B9	WE: 0.400 Type: R [FP-CY1]
H669	Y MS characteristic A10 YSREF1.MS_SP_1.A10	WE: 1.000 Type: R [FP-CY1]
H670	Y MS characteristic B10 YSREF1.MS_SP_1.B10	WE: 1.000 Type: R [FP-CY1]
d671	Y MS setpoint after the characteristic YSREF1.MS_SP_1.Y	Type: R [FP-CY1]

Parameter	Description	Data
H672	Y source, MS setpoint Pre assignment = KR0049. T400 analog input 2. YSREF1.MS_SP_2.X1	WE: 49 Type: K-R [FP-CY1]
H673	Y factor, MS setpoint YSREF1.MS_SP_2.X2	WE: 1.000 Type: R [FP-CY1]
H674	Y response value deadzone MS setpoint YSREF1.MS_SP_3.TH	WE: 0.001 Type: R [FP-CY1]
d675	Y selected MS setpoint YSREF1.MS_SP.Y	Type: R [FP-CY1]
H680	Y source, binector T400 status word bit I1 Pre assignment = 3011. Ready to power-up from CU. YCONTR.XSTAT.I1	WE: 3011 Type: K-B [FP-BY7]
H681	Y source, binector T400 status word bit I2 Pre assignment = 3012. Ready from CU. YCONTR.XSTAT.I2	WE: 3012 Type: K-B [FP-BY7]
H682	Y source, binector T400 status word bit I3 Pre assignment = 3013. Operation from CU. YCONTR.XSTAT.I3	WE: 3013 Type: K-B [FP-BY7]
H683	Y source, binector T400 status word bit I4 Pre assignment = 3014. Fault from CU. YCONTR.XSTAT.I4	WE: 3014 Type: K-B [FP-BY7]
H684	Y source, binector T400 status word bit I5 Pre assignment = 3200. Drive on. YCONTR.XSTAT.I5	WE: 3200 Type: K-B [FP-BY7]
H685	Y source, binector T400 status word bit I6 Pre assignment = 3228. Standard stop active. YCONTR.XSTAT.I6	WE: 3228 Type: K-B [FP-BY7]
H686	Y source, binector T400 status word bit I7 Pre assignment = 3210. Electrical off. YCONTR.XSTAT.I7	WE: 3210 Type: K-B [FP-BY7]
H687	Y source, binector T400 status word bit I8 Pre assignment = 3212. Fast stop active. YCONTR.XSTAT.I8	WE: 3212 Type: K-B [FP-BY7]
H688	Y source, binector T400 status word bit I9 Pre assignment = 3216. T400 power-off signal. YCONTR.XSTAT.I9	WE: 3216 Type: K-B [FP-BY7]
H689	Y source, binector T400 status word bit I10 Pre assignment = 3202. Inverter enable. YCONTR.XSTAT.I10	WE: 3202 Type: K-B [FP-BY7]

Parameter	Description	Data
H690	Y source, binector T400 status word bit I11 Pre assignment = 3204. Setpoint enable. YCONTR.XSTAT.I11	WE: 3204 Type: K-B [FP-BY7]
H691	Y source, binector T400 status word bit I12 Pre assignment = 3218. T400 group fault. YCONTR.XSTAT.I12	WE: 3218 Type: K-B [FP-BY7]
H692	Y source, binector T400 status word bit I13 Pre assignment = 3222. MS traversing command/positioning command. YCONTR.XSTAT.I13	WE: 3222 Type: K-B [FP-BY7]
H693	Y source, binector T400 status word bit I14 Pre assignment = 3005. Speed = 0. YCONTR.XSTAT.I14	WE: 3005 Type: K-B [FP-BY7]
H694	Y source, binector T400 status word bit I15 Pre assignment = 3226. Enable anti sway control. YCONTR.XSTAT.I15	WE: 3226 Type: K-B [FP-BY7]
H695	Y source, binector T400 status word bit I16 Pre assignment = 3224. Traversing command from the anti sway control. YCONTR.XSTAT.I16	WE: 3224 Type: K-B [FP-BY7]
H701	Y ramp-up time, ramp-function generator YSPAR.X01.X	WE: 0.2 [s] Type: R [FP-CY2]
H702	Y rounding-off, ramp-function generator YSPAR.X02.X	WE: 1.000 [s] Type: R [FP-CY2]
H703	Y ramp-up time, ramp-function generator, power-on YSPAR.X03.X	WE: 0.125 [s] Type: R [FP-CY2]
H704	Y rounding-off, ramp-function generator, power-on YSPAR.X04.X	WE: 1.000 [s] Type: R [FP-CY2]
H705	Y rounding-off, ramp-function generator pre limit switch YSPAR.X05.X	WE: 1.000 [s] Type: R [FP-CY2]
H707	Y source pendulum angle Pre assignment: KR0000. Connector 0.0 YSPAR.X07.X	WE: 0 Type: K-R [FP-CY2]
H709	Y minimum pendulum length [m] YSPAR.X09.X	WE: 0.500 Type: R [FP-CY2]
H710	Y source, velocity setpoint Pre assignment: KR0675. Selected master switch setpoint. YSPAR.X10.X	WE: 675 Type: K-R [FP-CY2]
H711	Y pendulum length 1 for control parameter v controller [m] YSPAR.X11.X	WE: 1.8 Type: R [FP-CY2]

Parameter	Description	Data
H712	Y control parameter KV1 for pendulum length 1 YSPAR.X12.X	WE: 16.8 Type: R [FP-CY2]
H713	Y control parameter KV2 for pendulum length 1 YSPAR.X13.X	WE: -0.004 Type: R [FP-CY2]
H714	Y control parameter KV3 for pendulum length 1 YSPAR.X14.X	WE: 1.0 Type: R [FP-CY2]
H715	Y pendulum length 2 for control parameter v controller [m] YSPAR.X15.X	WE: 0.4 Type: R [FP-CY2]
H716	Y control parameter KV1 for pendulum length 2 YSPAR.X16.X	WE: 5.280 Type: R [FP-CY2]
H717	Y control parameter KV2 for pendulum length 2 YSPAR.X17.X	WE: -1.11 Type: R [FP-CY2]
H718	Y control parameter KV3 for pendulum length 2 YSPAR.X18.X	WE: 0.44 Type: R [FP-CY2]
H719	Y model parameter BK1 YSPAR.X19.X	WE: -20.0 Type: R [FP-CY2]
H720	Y model parameter BK2 YSPAR.X20.X	WE: -24.6 Type: R [FP-CY2]
H721	Y model parameter BK3 YSPAR.X21.X	WE: 2.60 Type: R [FP-CY2]
H722	Y damping coefficient model YSPAR.X22.X	WE: 0.015 Type: R [FP-CY2]
H723	Y switching point 1 velocity setpoint If parameters H723 = 0.0 and H724 are set to 0.0, then the stepping circuit is de-activated. The setpoint for the anti sway control is continually entered. YSPAR.X23.X	WE: 0.3 Type: R [FP-CY3]
H724	Y switching point 2 velocity setpoint If parameters H723 = 0.0 and H724 are set to 0.0, then the stepping circuit is de-activated. The setpoint for the anti sway control is continually entered. YSPAR.X24.X	WE: 0.7 Type: R [FP-CY3]
H725	Y hysteresis at the switching points YSPAR.X25.X	WE: 0.02 Type: R [FP-CY3]
H726	Y setpoint stage 1 YSPAR.X26.X	WE: 0.06 Type: R [FP-CY3]

Parameter	Description	Data
H727	Y setpoint stage 2 YSPAR.X27.X	WE: 0.5 Type: R [FP-CY3]
H728	Y maximum velocity [m/s] YSPAR.X28.X	WE: 0.37 Type: R [FP-CY3]
H729	Y pre limit switch velocity Entered as a %/100 of the maximum velocity. YSPAR.X29.X	WE: 0.15 Type: R [FP-CY3]
H730	Y shutdown velocity Entered as a %/100 of the maximum velocity. YSPAR.X30.X	WE: 0.02 Type: R [FP-CY3]
H731	Y maximum ramp-down time YSPAR.X31.X	WE: 25.0 [s] Type: R [FP-CY3]
H732	Y minimum time after load velocity < shutdown velocity YSPAR.X32.X	WE: 4.0 [s] Type: R [FP-CY3]
H733	Y overshoot factor for controller limiting YSPAR.X33.X	WE: 0.0 Type: R [FP-CY3]
H734	Y position of the positive limit switch [m] This parameter is only of interest if the velocity-dependent pre limit switch function is required. The velocity-dependent pre limit switch function is only enabled if H734 <> H735. YSPAR.X36.X	WE: 0.0 Type: R [FP-CY3]
H735	Y position of the negative limit switch [m] This parameter is only of interest if the velocity-dependent pre limit switch function is required. The velocity-dependent pre limit switch function is only enabled if H734 <> H735. YSPAR.X37.X	WE: 0.0 Type: R [FP-CY3]
H736	Y crawl distance for the velocity-dependent pre limit switch function [m] Distance, actual position to the limit switch where pre limit switch velocity applies. This parameter is only of interest if the velocity-dependent pre limit switch function is required. YSPAR.X36.X	WE: 1.0 Type: R [FP-CY3]
H737	Y ramp-down time for velocity-dependent pre limit switch function. This parameter is only of interest if the velocity-dependent pre limit switch function is required. YSPAR.X39.X	WE: 2.0 [s] Type: R [FP-CY3]
H740	Y, source closed-loop control with pendulum angle sensing Pre assignment = B1000. Binector 0. YSPAR.IW1.I7	WE: 1000 Type: K-B [FP-CY2]

Parameter	Description	Data
H741	Y, source synchronizing pulse for anti sway control Pre assignment = B1156. Binector, synchronizing pulse from pulse encoder 2. YSPAR.IW1.I10	WE: 1156 Type: K-B [FP-CY2]
d745	Y drive, control word 1 to CONDP Control word for the anti sway control. Bit 0 : Enable anti sway control Bit 1 : Master switch (MS) traversing command Bit 2 : Enable setpoint Bit 3 : 0 Bit 4 : Pre limit switch positive, activated Bit 5 : Pre limit switch negative, activated Bit 6 : With pendulum angle sensing (can be selected with H740) Bit 7 : Start help for positive limit switch active Bit 8 : Start help for negative limit switch active Bit 9 : Synchronizing pulse for Y position (can be selected with H741) Bit 10: 0 Bit 11: 0 Bit 12: 0 Bit 13: 0 Bit 14: 0 Bit 15: 0 XSPAR.IW1.QS	Type: W [FP-CY2]
H750	Y, source, hoisting height for camera signal Pre assignment = KR0000. Connector 0.0. YSPRDI.Z_ACT.X1	WE: 0 Type: K-R [FP-CY5]
H751	Y, distance, pendulum point – reflector for hoisting height 0 [m] YSPRDI.PHI_1.X2	WE: 2.0 Type: R [FP-CY5]
H752	Y, distance, pendulum point – camera [m] YSPRDI.D_OPT.X2	WE: 1.0 Type: R [FP-CY5]
H753	Y, source, angular signal from camera Pre assignment = KR0000. Connector 0.0. YSPRDI.PHICAM.X1	WE: 0 Type: K-R [FP-CY5]
H754	Y adaptation factor K_OPT for camera pendulum angle Optical normalization factor. Adaptation factor which is used to convert the signal, supplied from the camera, to the pendulum angle [rad]. YSPRDI.PHIACT_3.X2	WE: 1.0 Type: R [FP-CY5]
d755	Y display: Actual distance, camera – reflector D_OPT YSPRDI.D_OPT.Y	Type: R [FP-CY5]
H756	Y minimum distance, D_OPT for message [m] If D_OPT falls below this value, then binector B3301 is set to 0. This means that the pendulum angle sensing can be disabled in the anti sway control (with H740 = 3301). YSPRDI.SENSOFF_1.X2	WE: 1.0 Type: R [FP-CY5]

Parameter	Description	Data
H757	Y maximum distance, D_OPT for message [m] If D_OPT falls below this value, then binector B3301 is set to 0. This means that the pendulum angle sensing can be disabled in the anti sway control (with H740 = 3301). YSPRDI.SENSOFF_3.X2	WE: 20.0 Type: R [FP-CY5]
H758	Y source, bit, fault camera for signal Pre assignment = B1000. Binector 0. Using this selected bit, binector B3301 is set to 0. This allows the pendulum angle sensing to be disabled in the anti sway control (with H740 = 3301). XSPRDI.SENSOFF.I3	WE: 1000 Type: K-B [FP-CY5]
H759	Y, start average value generation, determining the offset for the camera signal For 1, an average value of the pendulum angle offset is displayed in d760, which can be included in the offset characteristic. YSPRDI.OFFS_1.I1	WE: 0 Type: B [FP-CY5]
d760	Y display: Pendulum angle offset to determine the offset characteristic YSPRDI.OFFS_15.Y	Type: R [FP-CY5]
d761	Y display: Adapted pendulum angle from the camera [rad] YSPRDI.PHIACT.Y	Type: R [FP-CY5]
H762	Y, source bit reflector found for predictor Pre assignment = B1000. Binector 0. This selected bit signals the predictor as to whether the camera supplied a measured value of the pendulum angle. YSPRDI.IW1.I1	WE: 1000 Type: K-B [FP-CY5]
H763	Y, source pendulum angle for predictor Pre assignment = KR0761= adapted pendulum angle from the camera. YSPRDI.PHI_PRDICT.X01	WE: 761 Type: K-R [FP-CY5]
H764	Y adaptation, predictive calculation, predictor This can control the predictive calculation of the predictor. YSPRDI.PHI_PRDICT.X02	WE: 5.0 Type: R [FP-CY5]
d765	Y display: Pendulum angle after prediction [rad] YSPRDI.PHIACT.Y	Type: R [FP-CY5]

Parameter	Description	Data
d770	Y drive, status word 1 from CONDP Status word of the anti sway control. Bit 0 : Traversing command from anti sway control Bit 1 : Down ramp active Bit 2 : Limit switch positive, active Bit 3 : Limit switch negative, active Bit 4 : 0 Bit 5 : 0 Bit 6 : 0 Bit 7 : 0 Bit 8 : 0 Bit 9 : 0 Bit 10: 0 Bit 11: 0 Bit 12: 0 Bit 13: 0 Bit 14: 0 Bit 15: 0 YSREF2.QW1S.QS	Type: W [FP-CY2]
d771	Y display: Speed setpoint, anti sway control Output value of the anti sway control YSREF2.Y01.Y	Type: R [FP-CY2]
d772	Y display: Speed setpoint after the ramp-function generator, anti sway control Output value of the anti sway control ramp-function generator YSREF2.Y12.Y	Type: R [FP-CY2]
d778	Y display: Test output 6 (pendulum angle without wind) [rad] YSREF2.Y07.Y	Type: R [FP-CY2]
H780	Y value selection for test output, anti sway control Only for internal diagnostics. The selected value is displayed in d781. YSREF2.IW3.X	WE: 0 Type: R [FP-CY3]
d781	Y display: Test variable, anti sway control YSREF2.Y15.Y	Type: R [FP-CY3]
H788	Mask, suppress fault word T400 Y drive Fault which should lead to a fault are coded bitwise. Bit assignment, refer to d790. An external fault is generated in the basic unit; for CUVC/CUMC = F035, for CUD1 = F021. YCONTR.FLTW_MSK.I1	WE: 0hFFFF Type: W [FP-BY8]

Parameter	Description	Data
d790	Fault word T400 Y drive Bit 0: Fault, checkback signal drive on Bit 1: Fault, overspeed positive Bit 2: Fault, overspeed negative Bit 3: Fault stop Bit 4: Drive blocked Bit 5: Bit 6: Bit 7 : Bit 8 : Bit 9 : Bit 10: Bit 11: Bit 12: Bit 13: Bit 14: Bit 15: YCONTR.FLTW.QS	Type: W [FP-BY8]
d791	Control word 1 to Y drive Bit 0: On / no OFF1 Bit 1: No OFF2 Bit 2: No OFF3 Bit 3: Enable inverter Bit 4: Enable ramp-function generator Bit 5: No ramp-function generator stop Bit 6: Enable setpoint Bit 7 : Acknowledge fault Bit 8 : Jogging, bit 0 Bit 9 : Jogging, bit 1 Bit 10: PZD control Bit 11: Pos. direction of rotation Bit 12: Neg. direction of rotation Bit 13: Motorized potentiometer, raise Bit 14: Motorized potentiometer, lower Bit 15: No external fault YCONTR.STW1_CU.QS	Type: W [FP-BY6]
d792	Control word 2 to Y drive Bit0: No traversing command (H540=3207) Bit 1: Reserve (H541=1000) Bit 2: Reserve (H542=1000) Bit 3: Reserve (H543=1000) Bit 4: Reserve (H544=1000) Bit 5: Reserve (H545=1000) Bit 6: 0 Bit 7 : Enable restart on the fly Bit 8 : Enable droop Bit 9 : Enable speed controller Bit 10: No external fault 2 Bit 11: Slave drive (closed-loop torque control) Bit 12: No external alarm 1 Bit 13: No external alarm 2 Bit 14: Select BICO set 2 Bit 15: Checkback signal, main contactor YCONTR.STW2_CU.QS	Type: W [FP-BY6]

Parameter	Description	Data
d799	Y drive T400 status word Bit 0 : Selectable with H680. Pre assignment: Ready to switch-on from CU Bit 1 : Selectable with H681. Pre assignment: ready from CU Bit 2 : Selectable with H682. Pre assignment: Run from CU Bit 3 : Selectable with H683. Pre assignment: Fault from CU Bit 4 : Selectable with H684. Pre assignment: Drive on Bit 5 : Selectable with H685. Pre assignment: Standard stop active Bit 6 : Selectable with H686. Pre assignment: Electrical off Bit 7 : Selectable with H687. Pre assignment: Fast stop active Bit 8 : Selectable with H688. Pre assignment: T400-power-off signal Bit 9 : Selectable with H689. Pre assignment: Inverter enable Bit 10: Selectable with H690. Pre assignment: Setpoint enable Bit 11: Selectable with H691. Pre assignment: T400 group fault Bit 12: Selectable with H692. Pre assignment: MS traversing command / positioning command Bit 13: Selectable with H693. Pre assignment: Speed = 0 Bit 14: Selectable with H694. Pre assignment: Enable anti-sway control Bit 15: Selectable with H695. Pre assignment: Traversing command from anti sway control YCONTR.YSTAT.QS	Type: W [FP-BY7]
d800	Y display: Position actual value [] YSREF2.POS.Y	Type: R [FP-CY3]
d801	Y display: Position actual value, load [m] YSREF2.POS_LOAD.Y	Type: R [FP-CY3]
d802	Y display: Velocity actual value [m/s] YSREF2.VACT.Y	Type: R [FP-CY3]
d803	Y display: Velocity actual value, load [m/s] YSREF2.VACT_LOAD.Y	Type: R [FP-CY3]
d804	Y display: Pendulum angle without wind [degrees] YSREF2.PHI.Y	Type: R [FP-CY3]
d805	Y display: Pendulum length [m] YSREF2.PLEN.Y	Type: R [FP-CY3]
H835	Y source, bit 0 position selection Pre assignment = B1000. Binector 0. YPOSI.SEL_WREF_1.I1	WE: 1000 Type: K-B [FP-DY1]
H836	Y source, bit 1 position selection Pre assignment = B1000. Binector 0. YPOSI.SEL_WREF_1.I2	WE: 1000 Type: K-B [FP-DY1]
H837	Y source, bit 2 position selection Pre assignment = B1000. Binector 0. YPOSI.SEL_WREF_1.I3	WE: 1000 Type: K-B [FP-DY1]
d840	Y parameter number of the selected reference position YPOSI.NO_SEL_WREF.Y	Type: R [FP-DY1]

Parameter	Description	Data
H841	Y position reference value 1 [m] This is selected if binectors in H835=0, H836=0, H837=0. YPOSI.SEL_WREF.X1	WE: 0.000 Type: R [FP-DY1]
H842	Y position reference value 2 [m] This is selected if binectors in H835=1, H836=0, H837=0. YPOSI.SEL_WREF.X2	WE: 0.000 Type: R [FP-DY1]
H843	Y position reference value 3 [m] This is selected if binectors in H835=0, H836=1, H837=0. YPOSI.SEL_WREF.X3	WE: 0.000 Type: R [FP-DY1]
H844	Y position reference value 4 [m] This is selected if binectors in H835=1, H836=1, H837=0. YPOSI.SEL_WREF.X4	WE: 0.000 Type: R [FP-DY1]
H845	Y position reference value 5 [m] This is selected if binectors in H835=0, H836=0, H837=1. YPOSI.SEL_WREF.X5	WE: 0.000 Type: R [FP-DY1]
H846	Y position reference value 6 [m] This is selected if binectors in H835=1, H836=0, H837=1. YPOSI.SEL_WREF.X6	WE: 0.000 Type: R [FP-DY1]
H847	Y position reference value 7 [m] This is selected if binectors in H835=0, H836=1, H837=1. YPOSI.SEL_WREF.X7	WE: 0.000 Type: R [FP-DY1]
H848	Y position reference value 8 [m] This is selected if binectors in H835=1, H836=1, H837=1. YPOSI.SEL_WREF.X8	WE: 0.000 Type: R [FP-DY1]
d849	Y selected position reference value [m] YPOSI.SEL_WREF.Y	Type: R [FP-DY1]
H850	Y threshold value for position reached [m] Positioning is reset when this threshold is fallen below. YPOSI.ENPOS_1.L	WE: 0.003 Type: R [FP-DY5]
H851	Y hysteresis for position reached [m] Hysteresis for H850. YPOSI.ENPOS_1.L	WE: 0.000 Type: R [FP-DY5]
H852	Y time delay for position reached Time delay for H850. YPOSI.ENPOS_4.T	WE: 100 [ms] Type: R [FP-DY5]
H853	Y source, start positioning Pre assignment = B1000. binector 0. YPOSI.ENPOSA1.I1	WE: 1000 Type: K-B [FP-DY1]

Parameter	Description	Data
H854	Y source, stop positioning Pre assignment = B1000. binector 0. YPOSI.ENPOS_5.I1	WE: 1000 Type: K-B [FP-DY1]
H855	Y source, position reference value [m] Pre assignment = K0849. Selected fixed position reference value. YPOSI.WREF.X	WE: 849 Type: K-R [FP-DY1]
d856	Y position reference, setpoint actual value [m] YPOSI.WDIF.Y	Type: R [FP-DY2]
H858	Y source stop 2 positioning Pre assignment = B1000. binector 0. YPOSI.ENPOS_5.I2	WE: 1000 Type: K-B [FP-DY1]
H860	Y KP1 adaptation 1 Before the characteristic. YPOSI.KPADAP_1.X2	WE: 1.0 Type: R [FP-DY2]
H861	Y KP1-Adaption 2 After the characteristic. YPOSI.KPADAP.X2	WE: 1.0 Type: R [FP-DY2]
d862	Y adapted KP1 position controller YPOSI.KP1.Y	Type: R [FP-DY2]
H863	Y gain KP2 position controller YPOSI.KP2.X2	WE: 1.5 Type: R [FP-DY2]
d864	Y output position controller YPOSI.VPOS1.Y	Type: R [FP-DY2]
H866	Y ramp time, V setpoint positioning YPOSI.VMAX_TU.X	WE: 1000 [ms] Type: R [FP-DY4]
H868	Y threshold to detect position reference value change [m] YPOSI.WREFCHG_1.L	WE: 0.05 Type: R [FP-DY4]
H871	Y TI adaptation 2 After the characteristic. YPOSIVAR2.TI_ADAP.X2	WE: 1.0 Type: R [FP-DY3]
d872	Y adapted TI position controller version 2 YPOSIVAR2.TI.Y	Type: R [FP-DY3]
H873	Y rounding-off time TR position controller version 2 YPOSIVAR2.TIME_RND.X	WE: 24.0 [ms] Type: R [FP-DY3]
H874	Y ramp-up time TU position controller version 2 YPOSIVAR2.TIME_UP.X	WE: 500.0 [ms] Type: R [FP-DY3]

Parameter	Description	Data
H875	Y ramp-down time TU position controller version 2 YPOSIVAR2.TIME_DOWN.X	WE: 500.0 [ms] Type: R [FP-DY3]
H876	Y deadtime compensation TX position controller version 2 YPOSIVAR2.TIME_DCOMP.X	WE: 8.0 [ms] Type: R [FP-DY3]
d877	Y position difference setpoint-actual value [m] position controller version 2 YPOSIVAR2.PDIF_1.Y	Type: R [FP-DY3]
H878	Y upper limit position controller version 2 YPOSIVAR2.LIMP.X	WE: 0.1 Type: R [FP-DY3]
H879	Y gain KP position controller version 2 XPOSIVAR2.KP.X1	WE: 1.0 Type: R [FP-DY3]
d880	Y output position controller version 2 YPOSIVAR2.VREFLIM.Y	Type: R [FP-DY3]
d881	Y output position ramp-function generator version 2 YPOSIVAR2.POS_RFG.Y	Type: R [FP-DY3]
H885	Y source, maximum velocity for positioning Pre assignment = K0675. Connector 675, master switch setpoint. YPOSI.VMAXP.Y	WE: 675 Type: K-R [FP-DY4]
H886	Y source, speed setpoint from positioning Pre assignment = K0464. Connector 464, position controller version 1. YPOSI.V_LLPOS.X	WE: 864 Type: K-R [FP-DY4]
d887	Y speed setpoint from positioning YPOSI.V_LLPOS.Y	Type: R [FP-DY4]
d889	Y drive, status word positioning Bit 0 : Positioning active Bit 1 : Positioning enabled Bit 2 : Position reference value = actual value Bit 3 : Position reference value > position limit switch positive Bit 4 : Position reference value < position limit switch negative Bit 5 : Bit 6 : Bit 7 : Bit 8 : Pulse encoder 1 synchronized Bit 9 : Pulse encoder 2 synchronized Bit 10: Bit 11: Bit 12: Bit 13: Bit 14: Bit 15: YPOSI.STATPOS.QS	Type: W [FP-DY5]
H891	Y gain KP1 position controller, conventional operation YPOSI.KP1.X2	WE: 1.0 Type: R [FP-DY2]

Parameter	Description	Data
H892	Y gain KP2 position controller, conventional operation YPOSI.KP2.X2	WE: 1.5 Type: R [FP-DY2]
H895	Y integral time TI position controller version 2, conventional operation YPOSIVAR2.TI.X2	WE: 1000 [ms] Type: R [FP-DY3]
H896	Y gain KP position controller version 2, conventional operation YPOSIVAR2.KP.X2	WE: 1.0 Type: R [FP-DY3]
H903	T400 terminal –X.48 as digital output "1" = digital output, "0" = digital input IQ_BIN.BINIQ.DI3	WE: 0 Type: R [FP-A3]
H904	T400 terminal –X.49 as digital output "1" = digital output, "0" = digital input IQ_BIN.BINIQ.DI4	WE: 0 Type: R [FP-A3]
H907	Source, digital output –X.48 Only effective if H903=1. Pre assignment = 1000. Binector 0. IQ_BIN.BINIQ.I3	WE: 1000 Type: K-B [FP-A3]
H908	Source, digital output –X.49 Only effective if H904=1. Pre assignment = 1000. Binector 0. IQ_BIN.BINIQ.I4	WE: 1000 Type: K-B [FP-A3]
H909	Source, digital output –X.50 Pre assignment = B1000. Binector 0. IQ_BIN.BINIQ.I5	WE: 1000 Type: K-B [FP-A3]
H910	Source, digital output –X.51 Pre assignment = B1000. Binector 0. IQ_BIN.BINIQ.I6	WE: 1000 Type: K-B [FP-A3]
H920	Source, analog output 1 Pre assignment = KR0012. X n/f [Hz] actual value from CU. OUT_ANA.ANA1.PT1.X	WE: 12 Type: K-R [FP-A4]
H921	Smoothing, analog output 1 OUT_ANA.ANA1.PT1.T	WE: 0 [ms] Type: R [FP-A4]
H922	Offset, analog output 1 OUT_ANA.ANA1.OFF	WE: 0.000 Type: R [FP-A4]
H923	Scaling factor, analog output 1 OUT_ANA.ANA1.SF	WE: 0.500 Type: R [FP-A4]
H925	Source, analog output 2 Pre assignment = KR0017. Y n/f [Hz] actual value from CU. OUT_ANA.ANA2.PT1.X	WE: 17 Type: K-R [FP-A4]
H926	Smoothing, analog output 2 OUT_ANA.ANA2.PT1.T	WE: 0 [ms] Type: R [FP-A4]

Parameter	Description	Data
H927	Offset, analog output 2 OUT_ANA.ANA2.OFF	WE: 0.000 Type: R [FP-A4]
H928	Scaling factor, analog output 2 OUT_ANA.ANA2.SF	WE: 0.500 Type: R [FP-A4]
H931	Source, send word 1 to CB Pre assignment = K4399. X T400 status word. SEN_CB.SENCB_W1.I1	WE: 4399 Type: K-I [FP-A25]
H932	Source, send word 2 to CB Pre assignment = K4932. Output, real-integer converter (X n/f [Hz] actual value from CU). SEN_CB.SENCB_W2.X	WE: 4932 Type: K-I [FP-A25]
H933	Source, send word 3 to CB Pre assignment = K4933. Output, real-integer converter (X position actual value). SEN_CB.SENCB_W3.X	WE: 4933 Type: K-I [FP-A25]
H934	Source, send word 4 to CB Pre assignment = K4799. Y T400 status word. SEN_CB.SENCB_W4.I1	WE: 4799 Type: K-I [FP-A25]
H935	Source, send word 5 to CB Pre assignment = K4935. Output, real-integer converter (Y n/f [Hz] actual value from CU). SEN_CB.SENCB_W5.X	WE: 4935 Type: K-I [FP-A25]
H936	Source, send word 6 to CB Pre assignment = K4919. Z T400 status word. SEN_CB.SENCB_W6.I1	WE: 4919 Type: K-I [FP-A25]
H937	Source, send word 7 to CB Pre assignment = K4937. Output, real-integer converter (Z n/f [Hz] actual value from CU). SEN_CB.SENCB_W7.X	WE: 4937 Type: K-I [FP-A25]
H938	Source, send word 8 to CB Pre assignment = K4938. Output, real-integer converter (Y position actual value). SEN_CB.SENCB_W8.X	WE: 4938 Type: K-I [FP-A25]
H939	Source, send word 9 to CB Pre assignment = K4000. Value 0. SEN_CB.SENCB_W9.I1	WE: 4000 Type: K-I [FP-A25]
H940	Source, send word 10 to CB Pre assignment = K4940. Output, real-integer converter (Z position actual value). SEN_CB.SENCB_W10.X	WE: 4940 Type: K-I [FP-A25]

Parameter	Description	Data
H941	Source, send word 1 to CU Pre assignment = K4391. X control word 1 to CU. SEN_CU.SENCU_W1.X	WE: 4391 Type: K-R [FP-A15]
H942	Source, send word 2 to CU Pre assignment = K4942. Output, real-integer converter (X speed setpoint to CU). SEN_CU.SENCU_W2.X	WE: 4942 Type: K-I [FP-A15]
H943	Source, send word 3 to CU Pre assignment = K4943. Output, real-integer converter (0.0) SEN_CU.SENCU_W3.X	WE: 4943 Type: K-I [FP-A15]
H944	Source, send word 4 to CU Pre assignment = K4392. X control word 2 to CU. SEN_CU.SENCU_W4.X	WE: 4392 Type: K-I [FP-A15]
H945	Source, send word 5 to CU Pre assignment = K4945. Output, real-integer converter (0.0) SEN_CU.SENCU_W5.X	WE: 4945 Type: K-I [FP-A15]
H946	Source, send word 6 to CU Pre assignment = K4791. Y control word 1 to CU. SEN_CU.SENCU_W6.X	WE: 4791 Type: K-I [FP-A15]
H947	Source, send word 7 to CU Pre assignment = K4947. Output, real-integer converter (Y speed setpoint to CU). SEN_CU.SENDCU_W7.X	WE: 4947 Type: K-I [FP-A15]
H948	Source, send word 8 to CU Pre assignment = K4948. Output, real-integer converter (0.0) SEN_CU.SENCU_W8.X	WE: 4948 Type: K-I [FP-A15]
H949	Source, send word 9 to CU Pre assignment = K4792. Y control word 2 to CU. SEN_CU.SENCU_W9.X	WE: 4792 Type: K-I [FP-A15]
H950	Source, send word 10 to CU Pre assignment = K4950. Output, real-integer converter (0.0) SEN_CU.SENDCU_W10.X	WE: 4950 Type: K-I [FP-A15]
H951	Source, send word 11 to CU Pre assignment = K4911. Z control word 1 to CU. SEN_CU.SENCU_W11.X	WE: 4911 Type: K-I [FP-A16]
H952	Source, send word 12 to CU Pre assignment = K4952. Output, real-integer converter (Z speed setpoint to CU). SEN_CU.SENCU_W12.X	WE: 4952 Type: K-I [FP-A16]

Parameter	Description	Data
H953	Source, send word 13 to CU Pre assignment = K4953. Output, real-integer converter (0.0) SEN_CU.SENCU_W13.X	WE: 4953 Type: K-I [FP-A16]
H954	Source, send word 14 to CU Pre assignment = K4912. Z control word 2 to CU. SEN_CU.SENCU_W14.X	WE: 4912 Type: K-I [FP-A16]
H955	Source, send word 15 to CU Pre assignment K4955. Output, real-integer converter (0.0) SEN_CU.SENCU_W15.X	WE: 4955 Type: K-I [FP-A16]
H956	Source, send word 16 to CU Pre assignment = K4956. Output, real-integer converter (0.0) SEN_CU.SENCU_W16.X	WE: 4956 Type: K-I [FP-A16]
H970	Source, free monitoring parameter, real Pre assignment = KR0000. Connector 0. PARCON.REAL1.X	WE: 0 Type: K-R [FP-A1]
d971	Display free monitoring parameter, real PARCON.REAL1.Y	Type: R [FP-A1]
H972	Source, free monitoring parameter, integer Pre assignment = K4000. Connector 0. PARCON.INTEGER.X	WE: 4000 Type: K-I [FP-A1]
d973	Display free monitoring parameter, integer PARCON.INTEGER.Y	Type: I [FP-A1]
H974	Source, free monitoring parameter, word Pre assignment = K4000. Connector 0. PARCON.WORD.I1	WE: 4000 Type: W [FP-A1]
d975	Display free monitoring parameter, word PARCON.WORD.QS	Type: W [FP-A1]
H976	Source, free monitoring parameter, real Pre assignment = KR0000. Connector 0. PARCON.REAL2.X	WE: 0 Type: K-R [FP-A1]
d977	Display free monitoring parameter real PARCON.REAL2.Y	Type: R [FP-A1]
H978	Source, free monitoring parameter, real Pre assignment = KR0000. Connector 0. PARCON.REAL3.X	WE: 0 Type: K-R [FP-A1]
d979	Display free monitoring parameter, real PARCON.REAL3.Y	Type: R [FP-A1]

Parameter	**Description**	**Data**
H980	Source, bit0 select load center of gravity Pre assignment = B1000. Binector 0. PARCON.SEL_LOCE_1.I1	WE: 1000 Type: K-B [FP-A2]
H981	Source, bit1 select load center of gravity Pre assignment = B1000. Binector 0. PARCON.SEL_LOCE_1.I2	WE: 1000 Type: K-B [FP-A2]
d983	Parameter number of the selected load center of gravity PARCON.NO_SEL_LOCE.Y	Type: R [FP-A2]
H984	Position load center of gravity 1 [m] This is selected if binectors in H980=0, H981=0. PARCON.SEL_LOCE.X1	WE: 0.000 Type: R [FP-A2]
H985	Position, load center of gravity 2 [m] This is selected if binectors in H980=1, H981=0. PARCON.SEL_LOCE.X2	WE: 0.000 Type: R [FP-A2]
H986	Position, load center of gravity 3 [m] This is selected if binectors in H980=0, H981=1. PARCON.SEL_LOCE.X3	WE: 0.000 Type: R [FP-A2]
H987	Position, load center of gravity 4 [m] This is selected if binectors in H980=1, H981=1. PARCON.SEL_LOCE.X4	WE: 0.000 Type: R [FP-A2]
d992	Selected load center of gravity PARCON.SEL_LOCE.Y	Type: R [FP-A2]
H998	Code to erase EEPROM An entry 165 erases the EEPROM. H998 must then be again set to 0. The unit must be powered-down. PARCON.EEPDEL1.X1	WE: 0 Type: I [FP-A1]

Parameter	Description	Data
c011	Z drive, status word 1 from CU Word 11 from the basic unit. This depends on the basic unit parameter setting. Bit 0 : Ready to power-up Bit 1 : Ready Bit 2 : Run Bit 3 : Fault present Bit 4 : OFF2 not active Bit 5 : OFF3 not active Bit 6 : Power-on inhibit Bit 7 : Alarm present Bit 8 : No setpoint-actual value deviation Bit 9 : Always 1 Bit 10: Comparison value reached Bit 11: Fault, undervoltage Bit 12: Request control main contactor Bit 13: Ramp-function generator active Bit 14: Positive speed setpoint Bit 15: Kinetic buffering/flexible response active REC_CU.RECCU_W11.QS	Type: W [FP-A1]
c012	Z drive n/f [Hz] actual value from CU Word 12 from the basic unit. This depends on the basic unit parameter setting. REC_CU.RECCU_W12.Y	Type: I [FP-A11]
c013	Word 13 from CU Z drive, reserve. This depends on the basic unit parameter setting. REC_CU.RECCU_W13.Y	Type: I [FP-A11]
c014	Z drive, special status word from CU Word 14 from the basic unit. This depends on the basic unit parameter setting. Bit 0 : Energization completed Bit 1 : Setpoint enable from the brake control Bit 2 : Inverter enable from the brake control Bit 3 : 0 Bit 4 : 0 Bit 5 : 0 Bit 6 : 0 Bit 7 : 0 Bit 8 : On / no mechanical stop Bit 9 : No electrical stop Bit 10: BICO2 selected from CU Bit 11: 0 Bit 12: 0 Bit 13: 0 Bit 14: 0 Bit 15: 0 REC_CU.RECCU_W14.QS	Type: W [FP-A11]
c015	Word 15 from CU Z drive, torque setpoint from CU. This depends on the basic unit parameter setting. REC_CU.RECCU_W15.Y	Type: I [FP-A11]

Parameter	Description	Data
c016	Word 16 from CU Z drive, reserve. This depends on the basic unit parameter setting. REC_CU.RECCU_W16.Y	Type: I [FP-A11]
L041	Source, input integer-real converter KR0011 Pre assignment = K4011. Word 1 from CU. REC_CU.RCU1.X	WE: 4011 Type: K-I [FP-A10]
L042	Source, input integer-real converter KR0012 Pre assignment = K4012. Word 2 from CU. REC_CU.RCU2.X	WE: 4012 Type: K-I [FP-A10]
L043	Source, input integer-real converter KR0013 Pre assignment = K4013. Word 3 from CU. REC_CU.RCU3.X	WE: 4013 Type: K-I [FP-A10]
L044	Source, input integer-real converter KR0014 Pre assignment = K4014. Word 4 from CU. REC_CU.RCU4.X	WE: 4014 Type: K-I [FP-A10]
L045	Source, input integer-real converter KR0015 Pre assignment = K4015. Word 5 from CU. REC_CU.RCU5.X	WE: 4015 Type: K-I [FP-A10]
L046	Source, input integer-real converter KR0016 Pre assignment = K4016. Word 6 from CU. REC_CU.RCU6.X	WE: 4016 Type: K-I [FP-A10]
L047	Source, input integer-real converter KR0017 Pre assignment = K4017. Word 7 from CU. REC_CU.RCU7.X	WE: 4017 Type: K-I [FP-A10]
L048	Source, input integer-real converter KR0018 Pre assignment = K4018. Word 8 from CU. REC_CU.RCU8.X	WE: 4018 Type: K-I [FP-A10]
L049	Source, input integer-real converter KR0019 Pre assignment = K4019. Word 9 from CU. REC_CU.RCU9.X	WE: 4019 Type: K-I [FP-A10]
L050	Source, input integer-real converter KR0020 Pre assignment = K4020. Word 10 from CU. REC_CU.RCU10.X	WE: 4020 Type: K-I [FP-A10]
L051	Source, input integer-real converter KR0031 Pre assignment = K4031. Word 11 from CU. REC_CU.RCU11.X	WE: 4031 Type: K-I [FP-A11]
L052	Source, input integer-real converter KR0032 Pre assignment = K4032. Word 12 from CU. REC_CU.RCU12.X	WE: 4032 Type: K-I [FP-A11]

Parameter	Description	Data
L053	Source, input integer-real converter KR0033 Pre assignment = K4033. Word 13 from CU. REC_CU.RCU13.X	WE: 4033 Type: K-I [FP-A11]
L054	Source, input integer-real converter KR0034 Pre assignment = K4034. Word 14 from CU. REC_CU.RCU14.X	WE: 4034 Type: K-I [FP-A11]
L055	Source, input integer-real converter KR0035 Pre assignment = K4035. Word 15 from CU. REC_CU.RCU15.X	WE: 4035 Type: K-I [FP-A11]
L056	Source, input integer-real converter KR0036 Pre assignment = K4036. Word 16 from CU. REC_CU.RCU16.X	WE: 4036 Type: K-I [FP-A11]
L057	Source, high word for double word-real converter KR0041 Pre assignment = K4000. Connector 0. REC_CU.RCU_N4_1.XWH	WE: 4000 Type: K-I [FP-A11]
L058	Source, low word for double word-real converter KR0041 Pre assignment = K4000. Connector 0. REC_CU.RCU_N4_1.XWL	WE: 4000 Type: K-I [FP-A11]
L059	Normalization for double word-real converter KR0041 The following applies: KR0041 = L059 / 1073741824 * (double word) REC_CU.RCU_N4_1A.NF	WE: 1.000 Type: R [FP-A11]
L060	Source, high word for double word-real converter KR0042 Pre assignment = K4000. Connector 0. REC_CU.RCU_N4_2.XWH	WE: 4000 Type: K-I [FP-A11]
L061	Source, low word for double word-real converter KR0042 Pre assignment = K4000. Connector 0. REC_CU.RCU_N4_2.XWL	WE: 4000 Type: K-I [FP-A11]
L062	Normalization for double word-real converter KR0042 The following applies: KR0042 = L062 / 1073741824 * (double word) REC_CU.RCU_N4_2A.NF	WE: 1.000 Type: R [FP-A11]
L063	Source, high word for double word-real converter KR0043 Pre assignment = K4000. Connector 0. REC_CU.RCU_N4_3.XWH	WE: 4000 Type: K-I [FP-A11]
L064	Source, low word for double word-real converter KR0043 Pre assignment = K4000. Connector 0. REC_CU.RCU_N4_3.XWL	WE: 4000 Type: K-I [FP-A11]
L065	Normalization for double word-real converter KR0043 The following applies: KR0043 = L065 / 1073741824 * (double word) REC_CU.RCU_N4_3A.NF	WE: 1.000 Type: R [FP-A11]

Parameter	Description	Data
L071	Normalization for integer-real converter KR0011 The following applies: KR0011 = L041 / 16384 * (integer value) REC_CU.RCU1.NF	WE: 1.000 Type: R [FP-A10]
L072	Normalization for integer-real converter KR0012 The following applies: KR0012 = L042 / 16384 * (integer value) REC_CU.RCU2.NF	WE: 1.000 Type: R [FP-A10]
L073	Normalization for integer-real converter KR0013 The following applies: KR0013 = L043 / 16384 * (integer value) REC_CU.RCU3.NF	WE: 1.000 Type: R [FP-A10]
L074	Normalization for integer-real converter KR0014 The following applies: KR0014 = L044 / 16384 * (integer value) REC_CU.RCU4.NF	WE: 1.000 Type: R [FP-A10]
L075	Normalization for integer-real converter KR0015 The following applies: KR0015 = L045 / 16384 * (integer value) REC_CU.RCU5.NF	WE: 1.000 Type: R [FP-A10]
L076	Normalization for integer-real converter KR0016 The following applies: KR0016 = L046 / 16384 * (integer value) REC_CU.RCU6.NF	WE: 1.000 Type: R [FP-A10]
L077	Normalization for integer-real converter KR0017 The following applies: KR0017 = L047 / 16384 * (integer value) REC_CU.RCU7.NF	WE: 1.000 Type: R [FP-A10]
L078	Normalization for integer-real converter KR0018 The following applies: KR0018 = L048 / 16384 * (integer value) REC_CU.RCU8.NF	WE: 1.000 Type: R [FP-A10]
L079	Normalization for integer-real converter KR0019 The following applies: KR0019 = L049 / 16384 * (integer value) REC_CU.RCU9.NF	WE: 1.000 Type: R [FP-A10]
L080	Normalization for integer-real converter KR0020 The following applies: KR0020 = L050 / 16384 * (integer value) REC_CU.RCU10.NF	WE: 1.000 Type: R [FP-A10]
L081	Normalization for integer-real converter KR0031 The following applies: KR0031 = L051 / 16384 * (integer value) REC_CU.RCU11.NF	WE: 1.000 Type: R [FP-A11]
L082	Normalization for integer-real converter KR0032 The following applies: KR0032 = L052 / 16384 * (integer value) REC_CU.RCU12.NF	WE: 1.000 Type: R [FP-A11]
L083	Normalization for integer-real converter KR0033 The following applies: KR0033 = L053 / 16384 * (integer value) REC_CU.RCU13.NF	WE: 1.000 Type: R [FP-A11]

Parameter	Description	Data
L084	Normalization for integer-real converter KR0034 The following applies: KR0034 = L054 / 16384 * (integer value) REC_CU.RCU14.NF	WE: 1.000 Type: R [FP-A11]
L085	Normalization for integer-real converter KR0035 The following applies: KR0035 = L055 / 16384 * (integer value) REC_CU.RCU15.NF	WE: 1.000 Type: R [FP-A11]
L086	Normalization for integer-real converter KR0036 The following applies: KR0036 = L056 / 16384 * (integer value) REC_CU.RCU16.NF	WE: 1.000 Type: R [FP-A11]
L100	Z, source binector fault acknowledgement 1 Pre assignment = B1000. Binector 0. ZCONTR.FLTACK.I2	WE: 1000 Type: K-B [FP-BZ1]
L101	Z, source binector fault acknowledgement 2 Pre assignment = B1000. Binector 0. ZCONTR.FLTACK.I3	WE: 1000 Type: K-B [FP-BZ1]
L105	Z, source binector power-on 1 Pre assignment = B2059. Bit 8 in word 4 from CU. ZCONTR.DRON1.I1	WE: 2059 Type: K-B [FP-BZ2]
L106	Z, source binector power-on 2 Pre assignment = B1000. Binector 0. ZCONTR.DRON1.I2	WE: 1000 Type: K-B [FP-BZ2]
L108	Z, source binector standard stop 1 Pre assignment = B1276. Inverted bit 9 in word 14 from CU. ZCONTR.STOP1.I1	WE: 1276 Type: K-B [FP-BZ3]
L109	Z, source binector standard stop 2 Pre assignment = B1000. Binector 0. ZCONTR.STOP1.I2	WE: 1000 Type: K-B [FP-BZ3]
L111	Z, source binector electrical off 1 Pre assignment = B2075. Inverted bit 8 in word 4 from CU. ZCONTR.ELOFF1.I1	WE: 2075 Type: K-B [FP-BZ4]
L112	Z, source binector electrical off 2 Pre assignment = B1000. Binector 0. ZCONTR.ELOFF1.I2	WE: 1000 Type: K-B [FP-BZ4]
L114	Z, source binector fast stop 1 Pre assignment = B1000. Binector 0. ZCONTR.FASTSTOP1.I1	WE: 1000 Type: K-B [FP-BZ3]
L115	Z, source binector fast stop 2 Pre assignment = B1000. Binector 0. ZCONTR.FASTSTOP1.I2	WE: 1000 Type: K-B [FP-BZ3]

Parameter	Description	Data
L122	X, delay time up to fault checkback signal drive on ZCONTR.XFLT_FBCU.T	WE: 2000 [ms] Type: R [FP-BZ8]
L125	Z, overspeed limit If the speed actual value reaches this threshold, the overspeed fault is generated. ZCONTR.XOVR_SPEED.L	WE: 1.200 Type: R [FP-BZ8]
L126	Z, threshold speed actual value = 0 for drive blocked ZCONTR.DBL_3.L	WE: 0.005 Type: R [FP-BZ8]
L127	Z, threshold speed setpoint for drive blocked Evaluation of |speed setpoint| > L127 ZCONTR.DBL_7.M	WE: 0.010 Type: R [FP-BZ8]
L128	Z, threshold torque for drive blocked Evaluation of |torque| > L128 ZCONTR.DBL_11.M	WE: 0.800 Type: R [FP-BZ8]
L129	Z, delay time until signal, drive blocked ZCONTR.DBL.T	WE: 1000 [ms] Type: R [FP-BZ8]
L130	Z, threshold zero speed signal Signal n > 0, if the speed actual value > (L130+L131). Signal n = 0, if |speed actual value| < (L130-L131). Signal n < 0, if speed actual value < -(L130+L131). ZCONTR.SPEED_ZERO.L	WE: 0.005 Type: R [FP-BZ1]
L131	Z, hysteresis zero speed signal ZCONTR.SPEED_ZERO.HY	WE: 0.001 Type: R [FP-BZ1]
L140	Z, source binector FDS bit0 Pre assignment = B1307. No traversing command to CU. ZCONTR.STW2_CU1.I1	WE: 1307 Type: K-B [FP-BZ6]
L141	Z, source binector FDS bit1 Pre assignment = B1000. Binector 0. Here, it is possible to send any T400 binector to the basic unit T400-binector. Z CONTR.STW2_CU1.I2	WE: 1000 Type: K-B [FP-BZ6]
L142	Z, source binector MDS bit0 Pre assignment = B1000. Binector 0. Here, it is possible to send any T400 binector to the basic unit. ZCONTR.STW2_CU1.I3	WE: 1000 Type: K-B [FP-BZ6]
L143	Z, source binector MDS bit1 Pre assignment = B1000. Binector 0. Here, it is possible to send any T400 binector to the basic unit. ZCONTR.STW2_CU1.I4	WE: 1000 Type: K-B [FP-BZ6]

Parameter	Description	Data
L144	Z, source binector FSW bit0 Pre assignment = B1000. Binector 0. Here, it is possible to send any T400 binector to the basic unit. ZCONTR.STW2_CU1.I5	WE: 1000 Type: K-B [FP-BZ6]
L145	Z, source binector FSW bit1 Pre assignment = B1000. Binector 0. Here, it is possible to send any T400 binector to the basic unit. ZCONTR.STW2_CU1.I6	WE: 1000 Type: K-B [FP-BZ6]
L149	Z, mask power-down signal T400 The statuses, which cause the drive to be shutdown, are coded bitwise. Bit assignment, refer to c150. ZCONTR.OFF.I2	WE: 0hFFFF Type: W [FP-BZ2]
c150	Z, off conditions T400 Bit 0 : T400 fault Bit 1 : Fault from CU Bit 2 : Electrical off Bit 3 : Off after fast stop Bit 4 : Bit 5 : Bit 6 : Bit 7 : Bit 8 : Off after standard stop Bit 9 : Power-on inhibit from the CU Bit 10: Bit 11: Bit 12: Power-off signal, X drive Bit 13: Power-off signal, Y drive Bit 14: Bit 15: Edge, ready to power-up from CU ZCONTR.OFF_1.QS	Type: W [FP-BZ2]
c151	Z, diagnostics word, power-off Saves the condition as to why the drive was powered-down. Bit assignment as for c150. ZCONTR.OFFSAV.QS	Type: W [FP-BZ2]
L155	Z, time for forced shutdown after the traversing command has been withdrawn ZCONTR.R_INVENA_3.T	WE: 4000 [ms] Type: R [FP-BZ5]
L156	Z, source binector setpoint enable internal Pre assignment = B1302. Z inverter enable T400. ZCONTR.SP_ENA1.I1	WE: 1302 Type: K-B [FP-BZ4]
L157	Z, source binector setpoint enable external Pre assignment = B1000. Binector 0. ZCONTR.SPA_ENA.I2	WE: 1000 Type: K-B [FP-BZ4]

Parameter	Description	Data
L159	Z, source binector master switch traversing command negative Pre assignment = B1000. Binector 1. ZSREF1.MS_CMDNEG_1.I1	WE: 1000 Type: K-B [FP-BZ4]
L160	Z, source binector master switch traversing command positive Pre assignment = B1000. Binector 1. ZSREF1.MS_CMDPOS_1.I1	WE: 1000 Type: K-B [FP-BZ4]
L215	Z, source position actual value Pre assignment = KR0000. Connector 0.0. ZPOSI.WACT.X1	WE: 0 Type: K-R [FP-DZ2]
L216	Z, adaptation position actual value If required, convert from relative value to m ZPOSI.WACT.X2	WE: 1.000 Type: R [FP-DZ2]
c217	Z, position actual value [m] ZPOSI.WACT.Y	Type: R [FP-DZ2]
L250	Z, source master switch setpoint characteristic Pre assignment = KR0000. Connector 0.0. ZSREF.MS_SP_1.X	WE: 0 Type: K-R [FP-CZ1]
L251	Z, MS characteristic A1 ZSREF.MS_SP_1.A1	WE: -1.000 Type: R [FP-CZ1]
L252	Z, MS characteristic B1 ZSREF.MS_SP_1.B1	WE: -1.000 Type: R [FP-CZ1]
L253	Z, MS characteristic A2 ZSREF.MS_SP_1.A2	WE: -0.700 Type: R [FP-CZ1]
L254	Z, MS characteristic B2 ZSREF.MS_SP_1.B2	WE: -0.400 Type: R [FP-CZ1]
L255	Z, MS characteristic A3 ZSREF.MS_SP_1.A3	WE: -0.600 Type: R [FP-CZ1]
L256	Z, MS characteristic B3 ZSREF.MS_SP_1.B3	WE: -0.250 Type: R [FP-CZ1]
L257	Z, MS characteristic A4 ZSREF.MS_SP_1.A4	WE: -0.400 Type: R [FP-CZ1]
L258	Z, MS characteristic B4 ZSREF.MS_SP_1.B4	WE: -0.100 Type: R [FP-CZ1]
L259	Z, MS characteristic A5 ZSREF.MS_SP_1.A5	WE: -0.200 Type: R [FP-CZ1]

Parameter	Description	Data
L260	Z, MS characteristic B5 ZSREF.MS_SP_1.B5	WE: -0.030 Type: R [FP-CZ1]
L261	Z, MS characteristic A6 ZSREF.MS_SP_1.A6	WE: 0.200 Type: R [FP-CZ1]
L262	Z, MS characteristic B6 ZSREF.MS_SP_1.B6	WE: 0.030 Type: R [FP-CZ1]
L263	Z, MS characteristic A7 ZSREF.MS_SP_1.A7	WE: 0.400 Type: R [FP-CZ1]
L264	Z, MS characteristic B7 ZSREF.MS_SP_1.B7	WE: 0.100 Type: R [FP-CZ1]
L266	Z, MS characteristic B8 ZSREF.MS_SP_1.B8	WE: 0.250 Type: R [FP-CZ1]
L267	Z, MS characteristic A9 ZSREF.MS_SP_1.A9	WE: 0.700 Type: R [FP-CZ1]
L268	Z, MS characteristic B9 ZSREF.MS_SP_1.B9	WE: 0.400 Type: R [FP-CZ1]
L269	Z, MS characteristic A10 ZSREF.MS_SP_1.A10	WE: 1.000 Type: R [FP-CZ1]
L270	Z, MS characteristic B10 ZSREF.MS_SP_1.B10	WE: 1.000 Type: R [FP-CZ1]
c271	Z, MS setpoint after the characteristic ZSREF.MS_SP_1.Y	Type: R [FP-CZ1]
L272	Z, source MS setpoint Pre assignment = KR0000. Connector 0.0. ZSREF.MS_SP_2.X1	WE: 0 Type: K-R [FP-CZ1]
L273	Z, factor MS setpoint ZSREF.MS_SP_2.X2	WE: 1.000 Type: R [FP-CZ1]
L274	Z, response value deadzone MS setpoint ZSREF.MS_SP_3.TH	WE: 0.001 Type: R [FP-CZ1]
c275	Z, selected MS setpoint ZSREF.MS_SP.Y	Type: R [FP-CZ1]
L278	Z, source adaptation MS setpoint Pre assignment = KR0001. Connector 1.0. ZSREF.VREF1.X2	WE: 1 Type: K-R [FP-CZ2]

Parameter	Description	Data
c279	Z, speed setpoint to CU ZSREF.VREFCU.Y	Type: R [FP-CZ2]
L280	Z, source binector T400 status word bit I1 Pre assignment = 1211. Ready to power-up from CU. ZCONTR.XSTAT.I1	WE: 1211 Type: K-B [FP-BZ7]
L281	Z, source binector T400 status word bit I2 Pre assignment = 1212. Ready from CU. ZCONTR.XSTAT.I2	WE: 1212 Type: K-B [FP-BZ7]
L282	Z, source binector T400 status word bit I3 Pre assignment = 1213. Run from CU. ZCONTR.XSTAT.I3	WE: 1213 Type: K-B [FP-BZ7]
L283	Z, source binector T400 status word bit I4 Pre assignment = 1214. Fault from CU. ZCONTR.XSTAT.I4	WE: 1214 Type: K-B [FP-BZ7]
L284	Z, source binector T400 status word bit I5 Pre assignment = 1300. Drive on. ZCONTR.XSTAT.I5	WE: 1300 Type: K-B [FP-BZ7]
L285	Z, source binector T400 status word bit I6 Pre assignment = 1328. Standard stop active. ZCONTR.XSTAT.I6	WE: 1328 Type: K-B [FP-BZ7]
L286	Z, source binector T400 status word bit I7 Pre assignment = 1310. Electrical off. ZCONTR.XSTAT.I7	WE: 1310 Type: K-B [FP-BZ7]
L287	Z, source binector T400 status word bit I8 Pre assignment = 1312. Fast stop active. ZCONTR.XSTAT.I8	WE: 1312 Type: K-B [FP-BZ7]
L288	Z, source binector T400 status word bit I9 Pre assignment = 1316. T400 power-down signal. ZCONTR.XSTAT.I9	WE: 1316 Type: K-B [FP-BZ7]
L289	Z, source binector T400 status word bit I10 Pre assignment = 1302. Inverter enable. ZCONTR.XSTAT.I10	WE: 1302 Type: K-B [FP-BZ7]
L290	Z, source binector T400 status word bit I11 Pre assignment = 1304. Setpoint enable. ZCONTR.XSTAT.I11	WE: 1304 Type: K-B [FP-BZ7]
L291	Z, source binector T400 status word bit I12 Pre assignment = 1318. T400 group fault. ZCONTR.XSTAT.I12	WE: 1318 Type: K-B [FP-BZ7]

Parameter	Description	Data
L292	Z, source binector T400 status word bit I13 Pre assignment = 1306. MS traversing command/positioning command. ZCONTR.XSTAT.I13	WE: 1306 Type: K-B [FP-BZ7]
L293	Z, source binector T400 status word bit I14 Pre assignment = 1205. Speed = 0. ZCONTR.XSTAT.I14	WE: 1205 Type: K-B [FP-BZ7]
L294	Z, source binector T400 status word bit I15 Pre assignment = 1340. Enable positioning ZCONTR.XSTAT.I15	WE: 1340 Type: K-B [FP-BZ7]
L295	Z, source binector T400 status word bit I16 Pre assignment = 1344. Signal, position reference value = position actual value. ZCONTR.XSTAT.I16	WE: 1344 Type: K-B [FP-BZ7]
L301	X, camera angle offset characteristic A1 XSPRDI.OFFS_PLI.A1	WE: 0.000 Type: R [FP-CX5]
L302	X, camera angle offset characteristicA2 XSPRDI.OFFS_PLI.A2	WE: 0.000 Type: R [FP-CX5]
L303	X, camera angle offset characteristic A3 XSPRDI.OFFS_PLI.A3	WE: 0.000 Type: R [FP-CX5]
L304	X, camera angle offset characteristic A4 XSPRDI.OFFS_PLI.A4	WE: 0.000 Type: R [FP-CX5]
L305	X, camera angle offset characteristic A5 XSPRDI.OFFS_PLI.A5	WE: 0.000 Type: R [FP-CX5]
L306	X, camera angle offset characteristic A6 XSPRDI.OFFS_PLI.A6	WE: 0.000 Type: R [FP-CX5]
L307	X, camera angle offset characteristic A7 XSPRDI.OFFS_PLI.A7	WE: 0.000 Type: R [FP-CX5]
L308	X, camera angle offset characteristic A8 XSPRDI.OFFS_PLI.A8	WE: 0.000 Type: R [FP-CX5]
L309	X, camera angle offset characteristic A9 XSPRDI.OFFS_PLI.A9	WE: 0.000 Type: R [FP-CX5]
L310	X, camera angle offset characteristic A10 XSPRDI.OFFS_PLI.A10	WE: 0.000 Type: R [FP-CX5]
L311	X, camera angle offset characteristic A11 XSPRDI.OFFS_PLI.A11	WE: 0.000 Type: R [FP-CX5]
L312	X, camera angle offset characteristic A12 XSPRDI.OFFS_PLI.A12	WE: 0.000 Type: R [FP-CX5]

Parameter	Description	Data
L313	X, camera angle offset characteristic A13 XSPRDI.OFFS_PLI.A13	WE: 0.000 Type: R [FP-CX5]
L314	X, camera angle offset characteristic A14 XSPRDI.OFFS_PLI.A14	WE: 0.000 Type: R [FP-CX5]
L315	X, camera angle offset characteristic A15 XSPRDI.OFFS_PLI.A15	WE: 0.000 Type: R [FP-CX5]
L316	X, camera angle offset characteristic A16 XSPRDI.OFFS_PLI.A16	WE: 0.000 Type: R [FP-CX5]
L317	X, camera angle offset characteristic A17 XSPRDI.OFFS_PLI.A17	WE: 0.000 Type: R [FP-CX5]
L318	X, camera angle offset characteristic A18 XSPRDI.OFFS_PLI.A18	WE: 0.000 Type: R [FP-CX5]
L319	X, camera angle offset characteristic A19 XSPRDI.OFFS_PLI.A19	WE: 0.000 Type: R [FP-CX5]
L320	X, camera angle offset characteristic A20 XSPRDI.OFFS_PLI.A20	WE: 0.000 Type: R [FP-CX5]
L321	X, camera angle offset characteristic B1 XSPRDI.OFFS_PLI.B1	WE: 0.000 Type: R [FP-CX5]
L322	X, camera angle offset characteristic B2 XSPRDI.OFFS_PLI.B2	WE: 0.000 Type: R [FP-CX5]
L323	X, camera angle offset characteristic B3 XSPRDI.OFFS_PLI.B3	WE: 0.000 Type: R [FP-CX5]
L324	X, camera angle offset characteristic B4 XSPRDI.OFFS_PLI.B4	WE: 0.000 Type: R [FP-CX5]
L325	X, camera angle offset characteristic B5 XSPRDI.OFFS_PLI.B5	WE: 0.000 Type: R [FP-CX5]
L326	X, camera angle offset characteristic B6 XSPRDI.OFFS_PLI.B6	WE: 0.000 Type: R [FP-CX5]
L327	X, camera angle offset characteristic B7 XSPRDI.OFFS_PLI.B7	WE: 0.000 Type: R [FP-CX5]
L328	X, camera angle offset characteristic B8 XSPRDI.OFFS_PLI.B8	WE: 0.000 Type: R [FP-CX5]
L329	X, camera angle offset characteristic B9 XSPRDI.OFFS_PLI.B9	WE: 0.000 Type: R [FP-CX5]

Parameter	Description	Data
L330	X, camera angle offset characteristic B10 XSPRDI.OFFS_PLI.B10	WE: 0.000 Type: R [FP-CX5]
L331	X, camera angle offset characteristic B11 XSPRDI.OFFS_PLI.B11	WE: 0.000 Type: R [FP-CX5]
L332	X, camera angle offset characteristic B12 XSPRDI.OFFS_PLI.B12	WE: 0.000 Type: R [FP-CX5]
L333	X, camera angle offset characteristic B13 XSPRDI.OFFS_PLI.B13	WE: 0.000 Type: R [FP-CX5]
L334	X, camera angle offset characteristic B14 XSPRDI.OFFS_PLI.B14	WE: 0.000 Type: R [FP-CX5]
L335	X, camera angle offset characteristic B15 XSPRDI.OFFS_PLI.B15	WE: 0.000 Type: R [FP-CX5]
L336	X, camera angle offset characteristic B16 XSPRDI.OFFS_PLI.B16	WE: 0.000 Type: R [FP-CX5]
L337	X, camera angle offset characteristic B17 XSPRDI.OFFS_PLI.B17	WE: 0.000 Type: R [FP-CX5]
L338	X, camera angle offset characteristic B18 XSPRDI.OFFS_PLI.B18	WE: 0.000 Type: R [FP-CX5]
L339	X, camera angle offset characteristic B19 XSPRDI.OFFS_PLI.B19	WE: 0.000 Type: R [FP-CX5]
L340	X, camera angle offset characteristic B20 XSPRDI.OFFS_PLI.B20	WE: 0.000 Type: R [FP-CX5]
c341	X, output camera angle offset characteristic XSPRDI.OFFS_PLI.Y	Type: R [FP-CX5]
L388	Mask, suppress fault word T400 Z drive Faults, which should lead to a fault, are coded bitwise. Bit assignment, refer to d390. An external fault is generated in the basic unit; for CUVC/CUMC = F035, for CUD1 = F021. ZCONTR.FLTW_MSK.I1	WE: 0hFFFF Type: W [FP-BZ8]

Parameter	Description	Data
c390	Fault word T400 Z drive Bit 0: Fault, checkback signal drive on Bit 1: Fault, overspeed positive Bit 2: Fault, overspeed negative Bit 3: Fault stop Bit 4: Drive blocked Bit 5: Bit 6: Bit 7 : Bit 8 : Bit 9 : Bit 10: Bit 11: Bit 12: Bit 13: Bit 14: Bit 15: ZCONTR.FLTW.QS	Type: W [FP-BZ8]
c391	Control word 1 to Z drive Bit 0: On / no OFF1 Bit 1: No OFF2 Bit 2: No OFF3 Bit 3: Enable inverter Bit 4: Enable ramp-function generator Bit 5: No ramp-function generator stop Bit 6: Enable setpoint Bit 7 : Acknowledge fault Bit 8 : Jogging, bit 0 Bit 9 : Jogging, bit 1 Bit 10: PZD control Bit 11: Pos. direction of rotation Bit 12: Neg. direction of rotation Bit 13: Motorized potentiometer, raise Bit 14: Motorized potentiometer, lower Bit 15: No external fault ZCONTR.STW1_CU.QS	Type: W [FP-BZ6]
c392	Control word 2 to Z drive Bit 0: No traversing command (L140=1307) Bit 1: Reserve (L141=1000) Bit 2: Reserve (L142=1000) Bit 3: Reserve (L143=1000) Bit 4: Reserve (L144=1000) Bit 5: Reserve (L145=1000) Bit 6: 0 Bit 7 : Enable restart on the fly Bit 8 : Enable droop Bit 9 : Enable speed controller Bit 10: No external fault 2 Bit 11: Slave drive (closed-loop torque control) Bit 12: No external alarm 1 Bit 13: No external alarm 2 Bit 14: Select BICO set 2 Bit 15: Checkback signal, main contactor ZCONTR.STW2_CU.QS	Type: W [FP-BZ6]

Parameter	Description	Data
c399	Z drive, T400 status word Bit 0 : Selectable with L280. Pre assignment: Ready to power-up from CU Bit 1 : Selectable with L281. Pre assignment: Ready from CU Bit 2 : Selectable with L282. Pre assignment: Run from CU Bit 3 : Selectable with L283. Pre assignment: Fault from CU Bit 4 : Selectable with L284. Pre assignment: Drive on Bit 5 : Selectable with L285. Pre assignment: Standard stop active Bit 6 : Selectable with L286. Pre assignment: Electrical off Bit 7 : Selectable with L287. Pre assignment: Fast stop active Bit 8 : Selectable with L288. Pre assignment: T400 power-off signal Bit 9 : Selectable with L289. Pre assignment: Inverter enable Bit 10: Selectable with L290. Pre assignment: Setpoint enable Bit 11: Selectable with L291. Pre assignment: T400 group fault Bit 12: Selectable with L292. Pre assignment: MS traversing command / positioning command Bit 13: Selectable with L293. Pre assignment: Speed = 0 Bit 14: Selectable with L294. Pre assignment: Enable positioning Bit 15: Selectable with L295. Pre assignment: Signal, position reference value = position actual value ZCONTR.ZSTAT.QS	Type: W [FP-BZ7]
L425	Z, position software limit switch positive [m] ZPOSI.ES_POS.X	WE: 1000.0 Type: R [FP-DZ1]
L426	Z, position software limit switch negative [m] ZPOSI.ES_NEG.X	WE: -1000.0 Type: R [FP-DZ1]
L435	Z, source bit0 position selection Pre assignment = B1000. Binector 0. ZPOSI.SEL_WREF_1.I1	WE: 1000 Type: K-B [FP-DZ1]
L436	Z, source bit1 position selection Pre assignment = B1000. Binector 0. ZPOSI.SEL_WREF_1.I2	WE: 1000 Type: K-B [FP-DZ1]
L437	Z, source bit2 position selection Pre assignment = B1000. Binector 0. ZPOSI.SEL_WREF_1.I3	WE: 1000 Type: K-B [FP-DZ1]
c440	Z, parameter number of the selected reference position ZPOSI.NO_SEL_WREF.Y	Type: R [FP-DZ1]
L441	Z, position reference value 1 [m] This is selected if binectors in L435=0, L436=0, L437=0. ZPOSI.SEL_WREF.X1	WE: 0.000 Type: R [FP-DZ1]
L442	Z, position reference value 2 [m] This is selected if binectors in L435=1, L436=0, L437=0. ZPOSI.SEL_WREF.X2	WE: 0.000 Type: R [FP-DZ1]
L443	Z, position reference value 3 [m] This is selected if binectors in L435=0, L436=1, L437=0. ZPOSI.SEL_WREF.X3	WE: 0.000 Type: R [FP-DZ1]

Parameter	Description	Data
L444	Z, position reference value 4 [m] This is selected if binectors in L435=1, L436=1, L437=0. ZPOSI.SEL_WREF.X4	WE: 0.000 Type: R [FP-DZ1]
L445	Z, position reference value 5 [m] This is selected if binectors in L435=0, L436=0, L437=1. ZPOSI.SEL_WREF.X5	WE: 0.000 Type: R [FP-DZ1]
L446	Z, position reference value 6 [m] This is selected if binectors in L435=1, L436=0, L437=1. ZPOSI.SEL_WREF.X6	WE: 0.000 Type: R [FP-DZ1]
L447	Z, position reference value 7 [m] This is selected if binectors in L435=0, L436=1, L437=1. ZPOSI.SEL_WREF.X7	WE: 0.000 Type: R [FP-DZ1]
L448	Z, position reference value 8 (m) This is selected if binectors in L435=1, L436=1, L437=1. ZPOSI.SEL_WREF.X8	WE: 0.000 Type: R [FP-DZ1]
c449	Z, selected position reference value [m] ZPOSI.SEL_WREF.Y	Type: R [FP-DZ1]
L450	Z, threshold value for position reached [m] If this threshold is fallen below, positioning is reset. ZPOSI.ENPOS_1.L	WE: 0.003 Type: R [FP-DZ5]
L451	Z, hysteresis for position reached [m] Hysteresis for L450. ZPOSI.ENPOS_1.L	WE: 0.000 Type: R [FP-DZ5]
L452	Z, time delay for position reached Time delay for L450. ZPOSI.ENPOS_4.T	WE: 100 [ms] Type: R [FP-DZ5]
L453	Z, source start positioning Pre assignment = B1000. Binector 0. ZPOSI.ENPOSA1.I1	WE: 1000 Type: K-B [FP-DZ1]
L454	Z, source stop positioning Pre assignment = B1000. Binector 0. ZPOSI.ENPOS_5.I1	WE: 1000 Type: K-B [FP-DZ1]
L455	Z, source position reference value [m] Pre assignment = KR0940. Selected fixed position reference value. ZPOSI.WREF.X	WE: 940 Type: K-R [FP-DZ1]
c456	Z, position difference, setpoint-actual value [m] ZPOSI.WDIF.Y	Type: R [FP-DZ2]

Parameter	Description	Data
L458	Z, source stop 2 positioning Pre assignment = B1000. Binector 0. ZPOSI.ENPOS_5.I2	WE: 1000 Type: K-B [FP-DZ1]
L461	Z, gain KP1 position controller ZPOSI.WDIF_KP1.KP	WE: 0.5 Type: R [FP-DZ2]
L463	Z, gain KP2 position controller ZPOSI.VREG.KP	WE: 1.5 Type: R [FP-DZ2]
c464	Z, output position controller ZPOSI.VPOS1.Y	Type: R [FP-DZ2]
L466	Z, ramp time V setpoint, positioning ZPOSI.VMAX_TU.X	WE: 1000 [ms] Type: R [FP-DZ4]
L468	Z, threshold to detect position reference value change [m] ZPOSI.WREFCHG_1.L	WE: 0.05 Type: R [FP-DZ4]
L472	Z, Integrating time constant TI position controller version 2 ZPOSIVAR2.TIME_I.X	WE: 1000 [ms] Type: R [FP-DZ3]
L473	Z, rounding-off time TR position controller version 2 ZPOSIVAR2.TIME_RND.X	WE: 24.0 [ms] Type: R [FP-DZ3]
L474	Z, ramp-up time TU position controller version 2 ZPOSIVAR2.TIME_UP.X	WE: 500.0 [ms] Type: R [FP-DZ3]
L475	Z, ramp-down time TD position controller version 2 ZPOSIVAR2.TIME_DOWN.X	WE: 500.0 [ms] Type: R [FP-DZ3]
L476	Z, deadtime compensation TX position controller version 2 ZPOSIVAR2.TIME_DCOMP.X	WE: 8.0 [ms] Type: R [FP-DZ3]
c477	Z, position difference, reference value-actual value [m] position controller version 2 ZPOSIVAR2.PDIF_1.Y	Type: R [FP-DZ3]
L478	Z, upper limit position controller version 2 ZPOSIVAR2.LIMP.X	WE: 0.1 Type: R [FP-DZ3]
L479	Z, gain KP position controller version 2 ZPOSIVAR2.POSREG.KP	WE: 1.0 Type: R [FP-DZ3]
c480	Z, output position controller version 2 ZPOSIVAR2.VREFLIM.Y	Type: R [FP-DZ3]
c481	Z, output position ramp-function generator version 2 ZPOSIVAR2.POS_RFG.Y	Type: R [FP-DZ3]

Parameter	Description	Data
L485	Z, source maximum velocity for positioning Pre assignment = KR0962. Connector 962, master switch setpoint. ZPOSI.VMAXP.Y	WE: 962 Type: K-R [FP-DZ4]
L486	Z, source speed setpoint from positioning Pre assignment = K0948. Connector 948, position controller version 1. ZPOSI.V_LLPOS.X	WE: 948 Type: K-R [FP-DZ4]
c487	Z, speed setpoint from positioning ZPOSI.V_LLPOS.Y	Type: R [FP-DZ4]
c489	Z, drive, status word positioning Bit 0 : Positioning active Bit 1 : Positioning enabled Bit 2 : Position reference value = actual value Bit 3 : Position reference value > position limit switch positive Bit 4 : Position reference value < position limit switch negative Bit 5 : Bit 6 : Bit 7 : Bit 8 : Pulse encoder 1 synchronized Bit 9 : Pulse encoder 2 synchronized Bit 10: Bit 11: Bit 12: Bit 13: Bit 14: Bit 15: ZPOSI.STATPOS.QS	Type: W [FP-DZ5]
L701	Y, camera angle offset characteristic A1 YSPRDI.OFFS_PLI.A1	WE: 0 .000 Type: R [FP-CY5]
L702	Y, camera angle offset characteristic A2 YSPRDI.OFFS_PLI.A2	WE: 0.000 Type: R [FP-CY5]
L703	Y, camera angle offset characteristic A3 YSPRDI.OFFS_PLI.A3	WE: 0.000 Type: R [FP-CY5]
L704	Y, camera angle offset characteristic A4 YSPRDI.OFFS_PLI.A4	WE: 0.000 Type: R [FP-CY5]
L705	Y, camera angle offset characteristic A5 YSPRDI.OFFS_PLI.A5	WE: 0.000 Type: R [FP-CY5]
L706	Y, camera angle offset characteristic A6 YSPRDI.OFFS_PLI.A6	WE: 0.000 Type: R [FP-CY5]
L707	Y, camera angle offset characteristic A7 YSPRDI.OFFS_PLI.A7	WE: 0.000 Type: R [FP-CY5]
L708	Y, camera angle offset characteristic A8 YSPRDI.OFFS_PLI.A8	WE: 0.000 Type: R [FP-CY5]

Parameter	Description	Data
L709	Y, camera angle offset characteristic A9 YSPRDI.OFFS_PLI.A9	WE: 0.000 Type: R [FP-CY5]
L710	Y, camera angle offset characteristic A10 YSPRDI.OFFS_PLI.A10	WE: 0.000 Type: R [FP-CY5]
L711	Y, camera angle offset characteristic A11 YSPRDI.OFFS_PLI.A11	WE: 0.000 Type: R [FP-CY5]
L712	Y, camera angle offset characteristic A12 YSPRDI.OFFS_PLI.A12	WE: 0.000 Type: R [FP-CY5]
L713	Y, camera angle offset characteristic A13 YSPRDI.OFFS_PLI.A13	WE: 0.000 Type: R [FP-CY5]
L714	Y, camera angle offset characteristic A14 YSPRDI.OFFS_PLI.A14	WE: 0.000 Type: R [FP-CY5]
L715	Y, camera angle offset characteristic A15 YSPRDI.OFFS_PLI.A15	WE: 0.000 Type: R [FP-CY5]
L716	Y, camera angle offset characteristic A16 YSPRDI.OFFS_PLI.A16	WE: 0.000 Type: R [FP-CY5]
L717	Y, camera angle offset characteristic A17 YSPRDI.OFFS_PLI.A17	WE: 0.000 Type: R [FP-CY5]
L718	Y, camera angle offset characteristic A18 YSPRDI.OFFS_PLI.A18	WE: 0.000 Type: R [FP-CY5]
L719	Y, camera angle offset characteristic A19 YSPRDI.OFFS_PLI.A19	WE: 0.000 Type: R [FP-CY5]
L720	Y, camera angle offset characteristic A20 YSPRDI.OFFS_PLI.A20	WE: 0.000 Type: R [FP-CY5]
L721	Y, camera angle offset characteristic B1 YSPRDI.OFFS_PLI.B1	WE: 0.000 Type: R [FP-CY5]
L722	Y, camera angle offset characteristic B2 YSPRDI.OFFS_PLI.B2	WE: 0.000 Type: R [FP-CY5]
L723	Y, camera angle offset characteristic B3 YSPRDI.OFFS_PLI.B3	WE: 0.000 Type: R [FP-CY5]
L724	Y, camera angle offset characteristic B4 YSPRDI.OFFS_PLI.B4	WE: 0.000 Type: R [FP-CY5]
L725	Y, camera angle offset characteristic B5 YSPRDI.OFFS_PLI.B5	WE: 0.000 Type: R [FP-CY5]

Parameter	Description	Data
L726	Y, camera angle offset characteristic B6 YSPRDI.OFFS_PLI.B6	WE: 0.000 Type: R [FP-CY5]
L727	Y, camera angle offset characteristic B7 YSPRDI.OFFS_PLI.B7	WE: 0.000 Type: R [FP-CY5]
L728	Y, camera angle offset characteristic B8 YSPRDI.OFFS_PLI.B8	WE: 0.000 Type: R [FP-CY5]
L729	Y, camera angle offset characteristic B9 YSPRDI.OFFS_PLI.B9	WE: 0.000 Type: R [FP-CY5]
L730	Y, camera angle offset characteristic B10 YSPRDI.OFFS_PLI.B10	WE: 0.000 Type: R [FP-CY5]
L731	Y, camera angle offset characteristic B11 YSPRDI.OFFS_PLI.B11	WE: 0.000 Type: R [FP-CY5]
L732	Y, camera angle offset characteristic B12 YSPRDI.OFFS_PLI.B12	WE: 0.000 Type: R [FP-CY5]
L733	Y, camera angle offset characteristic B13 YSPRDI.OFFS_PLI.B13	WE: 0.000 Type: R [FP-CY5]
L734	Y, camera angle offset characteristic B14 YSPRDI.OFFS_PLI.B14	WE: 0.000 Type: R [FP-CY5]
L735	Y, camera angle offset characteristic B15 YSPRDI.OFFS_PLI.B15	WE: 0.000 Type: R [FP-CY5]
L736	Y, camera angle offset characteristic B16 YSPRDI.OFFS_PLI.B16	WE: 0.000 Type: R [FP-CY5]
L737	Y, camera angle offset characteristic B17 YSPRDI.OFFS_PLI.B17	WE: 0.000 Type: R [FP-CY5]
L738	Y, camera angle offset characteristic B18 YSPRDI.OFFS_PLI.B18	WE: 0.000 Type: R [FP-CY5]
L739	Y, camera angle offset characteristic B19 YSPRDI.OFFS_PLI.B19	WE: 0.000 Type: R [FP-CY5]
L740	Y, camera angle offset characteristic B20 YSPRDI.OFFS_PLI.B20	WE: 0.000 Type: R [FP-CY5]
c741	Y, output camera angle offset characteristic ◆ YSPRDI.OFFS_PLI.Y	Type: R [FP-CY5]
L931	Source, input real-integer converter K4931 Pre assignment = KR0000. Connector 0.0 SEN_CB.SCB1.X	WE: 0 Type: K-R [FP-A25]

Parameter	Description	Data
L932	Source, input real-integer converter K4932 Pre assignment = KR0012. Word 2 from CU (X n/f [Hz] actual value from CU) SEN_CB.SCB2.X	WE: 12 Type: K-R [FP-A25]
L933	Source, input real-integer converter K4933 Pre assignment = KR0217. X selected position actual value. SEN_CB.SCB3.X	WE: 217 Type: K-R [FP-A25]
L934	Source, input real-integer converter K4934 Pre assignment = KR0000. Connector 0.0 SEN_CB.SCB4.X	WE: 0 Type: K-R [FP-A25]
L935	Source, input real-integer converter K4935 Pre assignment = KR0017. Word 7 from CU (Y n/f [Hz] actual value from) SEN_CB.SCB5.X	WE: 17 Type: K-R [FP-A25]
L936	Source, input real-integer converter K4936 Pre assignment = KR0000. Connector 0.0 SEN_CB.SCB6.X	WE: 0 Type: K-R [FP-A25]
L937	Source, input real-integer converter K4937 Pre assignment = KR0032. Word 12 from CU (Z n/f [Hz] actual value from) SEN_CB.SCB7.X	WE: 32 Type: K-R [FP-A25]
L938	Source, input real-integer converter K4938 Pre assignment = KR0617. Y selected position actual value. SEN_CB.SCB8.X	WE: 617 Type: K-R [FP-A25]
L939	Source, input real-integer converter K4939 Pre assignment = KR0000. Connector 0.0 SEN_CB.SCB9.X	WE: 0 Type: K-R [FP-A25]
L940	Source, input real-integer converter K4940 Pre assignment = KR0945. Z selected position actual value. SEN_CB.SCB10.X	WE: 945 Type: K-R [FP-A25]
L941	Source, input real-integer converter K4941 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU1.X	WE: 0 Type: K-R [FP-A15]
L942	Source, input real-integer converter K4942 Pre assignment = KR0165. X n/f [Hz] setpoint to CU. SEN_CU.SCU2.X	WE: 165 Type: K-R [FP-A15]
L943	Source, input real-integer converter K4943 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU3.X	WE: 0 Type: K-R [FP-A15]
L944	Source, input real-integer converter K4944 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU4.X	WE: 0 Type: K-R [FP-A15]

Parameter	Description	Data
L945	Source, input real-integer converter K4945 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU5.X	WE: 0 Type: K-R [FP-A15]
L946	Source, input real-integer converter K4946 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU6.X	WE: 0 Type: K-R [FP-A15]
L947	Source, input real-integer converter K4947 Pre assignment = KR0565. Y n/f [Hz] setpoint to CU. SEN_CU.SCU7.X	WE: 565 Type: K-R [FP-A15]
L948	Source, input real-integer converter K4948 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU8.X	WE: 0 Type: K-R [FP-A15]
L949	Source, input real-integer converter K4949 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU9.X	WE: 0 Type: K-R [FP-A15]
L950	Source, input real-integer converter K4950 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU10.X	WE: 0 Type: K-R [FP-A15]
L951	Source, input real-integer converter K4951 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU11.X	WE: 0 Type: K-R [FP-A16]
L952	Source, input real-integer converter K4952 Pre assignment = KR0000. Z n/f [Hz] setpoint to CU. SEN_CU.SCU12.X	WE: 965 Type: K-R [FP-A16]
L953	Source, input real-integer converter K4953 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU13.X	WE: 0 Type: K-R [FP-A16]
L954	Source, input real-integer converter K4954 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU14.X	WE: 0 Type: K-R [FP-A16]
L955	Source, input real-integer converter K4955 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU15.X	WE: 0 Type: K-R [FP-A16]
L956	Source, input real-integer converter K4956 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU16.X	WE: 0 Type: K-R [FP-A16]
L957	Source, input real-double word converter K4961/K4962 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU_N4_1.X	WE: 0 Type: K-R [FP-A16]

Parameter	Description	Data
L958	Source, input real-double word converter K4963/K4964 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU_N4_2.X	WE: 0 Type: K-R [FP-A16]
L959	Source, input real-double word converter K4965/K4966 Pre assignment = KR0000. Connector 0.0 SEN_CU.SCU_N4_3.X	WE: 0 Type: K-R [FP-A16]
L961	Normalization for real-integer converter K4931 The following applies: K4931 = 16384 * (real value) / L961 SEN_CB.SCB1.NF	WE: 1.000 Type: R [FP-A20]
L962	Normalization for real-integer converter K4932 The following applies: K4932 = 16384 * (real value) / L962 SEN_CB.SCB2.NF	WE: 1.000 Type: R [FP-A20]
L963	Normalization for real-integer converter K4933 The following applies: K4933 = 16384 * (real value) / L963 SEN_CB.SCB3.NF	WE: 1.000 Type: R [FP-A20]
L964	Normalization for real-integer converter K4934 The following applies: K4934 = 16384 * (real value) / L964 SEN_CB.SCB4.NF	WE: 1.000 Type: R [FP-A20]
L965	Normalization for real-integer converter K4935 The following applies: K4935 = 16384 * (real value) / L965 SEN_CB.SCB5.NF	WE: 1.000 Type: R [FP-A20]
L966	Normalization for real-integer converter K4936 The following applies: K4936 = 16384 * (real value) / L966 SEN_CB.SCB6.NF	WE: 1.000 Type: R [FP-A20]
L967	Normalization for real-integer converter K4937 The following applies: K4937 = 16384 * (real value) / L967 SEN_CB.SCB7.NF	WE: 1.000 Type: R [FP-A20]
L968	Normalization for real-integer converter K4938 The following applies: K4938 = 16384 * (real value) / L968 SEN_CB.SCB8.NF	WE: 1.000 Type: R [FP-A20]
L969	Normalization for real-integer converter K4939 The following applies: K4939 = 16384 * (real value) / L969 SEN_CB.SCB9.NF	WE: 1.000 Type: R [FP-A20]
L970	Normalization for real-integer converter K4940 The following applies: K4940 = 16384 * (real value) / L970 SEN_CB.SCB10.NF	WE: 1.000 Type: R [FP-A20]
L971	Normalization for real-integer converter K4941 The following applies: K4941 = 16384 * (real value) / L971 SEN_CU.SCU1.NF	WE: 1.000 Type: R [FP-A15]

Parameter	Description	Data
L972	Normalization for real-integer converter K4942 The following applies: K4942 = 16384 * (real value) / L972 SEN_CU.SCU2.NF	WE: 1.000 Type: R [FP-A15]
L973	Normalization for real-integer converter K4943 The following applies: K4943 = 16384 * (real value) / L973 SEN_CU.SCU3.NF	WE: 1.000 Type: R [FP-A15]
L974	Normalization for real-integer converter K4944 The following applies: K4944 = 16384 * (real value) / L974 SEN_CU.SCU4.NF	WE: 1.000 Type: R [FP-A15]
L975	Normalization for real-integer converter K4945 The following applies: K4945 = 16384 * (real value) / L975 SEN_CU.SCU5.NF	WE: 1.000 Type: R [FP-A15]
L976	Normalization for real-integer converter K4946 The following applies: K4946 = 16384 * (real value) / L976 SEN_CU.SCU6.NF	WE: 1.000 Type: R [FP-A15]
L977	Normalization for real-integer converter K4947 The following applies: K4947 = 16384 * (real value) / L977 SEN_CU.SCU7.NF	WE: 1.000 Type: R [FP-A15]
L978	Normalization for real-integer converter K4948 The following applies: K4948 = 16384 * (real value) / L978 SEN_CU.SCU8.NF	WE: 1.000 Type: R [FP-A15]
L979	Normalization for real-integer converter K4949 The following applies: K4949 = 16384 * (real value) / L979 SEN_CU.SCU9.NF	WE: 1.000 Type: R [FP-A15]
L980	Normalization for real-integer converter K4950 The following applies: K4950 = 16384 * (real value) / L980 SEN_CU.SCU10.NF	WE: 1.000 Type: R [FP-A15]
L981	Normalization for real-integer converter K4951 The following applies: K4951 = 16384 * (real value) / L981 SEN_CU.SCU11.NF	WE: 1.000 Type: R [FP-A16]
L982	Normalization for real-integer converter K4952 The following applies: K4952 = 16384 * (real value) / L982 SEN_CU.SCU12.NF	WE: 1.000 Type: R [FP-A16]
L983	Normalization for real-integer converter K4953 The following applies: K4953 = 16384 * (real value) / L983 SEN_CU.SCU13.NF	WE: 1.000 Type: R [FP-A16]
L984	Normalization for real-integer converter K4954 The following applies: K4954 = 16384 * (real value) / L984 SEN_CU.SCU14.NF	WE: 1.000 Type: R [FP-A16]

Parameter	Description	Data
L985	Normalization for real-integer converter K4955 The following applies: K4955 = 16384 * (real value) / L985 SEN_CU.SCU15.NF	WE: 1.000 Type: R [FP-A16]
L986	Normalization for real-integer converter K4956 The following applies: K4956 = 16384 * (real value) / L986 SEN_CU.SCU16.NF	WE: 1.000 Type: R [FP-A16]
L987	Normalization for real-double word converter K4961/K4962 The following applies: K4961 = High word[1073741824 * (real value) / L987]; K4962 = Low word[...] SEN_CU.SCU_N4_1.NF	WE: 1.000 Type: R [FP-A16]
L988	Normalization for real-double word converter K4963/K4964 The following applies: K4963 = High word[1073741824 * (real value) / L988]; K4964 = Low word[...] SEN_CU.SCU_N4_2.NF	WE: 1.000 Type: R [FP-A16]
L989	Normalization for real-double word converter K4965/K4966 The following applies: K4965 = High word[1073741824 * (real value) / L989]; K4966 = Low word[...] SEN_CU.SCU_N4_3.NF	WE: 1.000 Type: R [FP-A16]
L991	Source, input real-double word converter K4991/K4992 Pre assignment = KR0000. Connector 0.0 SEN_CB.SCB_N4_1.X	WE: 0 Type: K-R [FP-A20]
L992	Normalization for real-double word converter K4991/K4992 The following applies: K4991 = High word[1073741824 * (real value) / L992]; K4992 = Low word[...] SEN_CB.SCB_N4_1.NF	WE: 1.000 Type: R [FP-A20]
L993	Source, input real-double word converter K4993/K4994 Pre assignment = KR0000. Connector 0.0 SEN_CB.SCB_N4_2.X	WE: 0 Type: K-R [FP-A20]
L994	Normalization for real-double word converter K4993/K4994 The following applies: K4993 = High word[1073741824 * (real value) / L994]; K4994 = Low word[...] SEN_CB.SCB_N4_2.NF	WE: 1.000 Type: R [FP-A20]
L995	Source, input real-double word converter K4995/K4996 Pre assignment = KR0000. Connector 0.0 SEN_CB.SCB_N4_3.X	WE: 0 Type: K-R [FP-A20]
L996	Normalization for real-double word converter K4995/K4996 The following applies: K4995 = High word[1073741824 * (real value) / L996]; K4996 = Low word[...] SEN_CB.SCB_N4_3.NF	WE: 1.000 Type: R [FP-A5]

■

Connectors

5

5.1 The connector principle

In order to achieve the greatest possible flexibility of the module, some control signals aren't permanently connected with one another, but can be configured for the various applications.

Signals are shown in the connector list which can be connected-up by applying the appropriate parameterization.

There are three different connector types:

Type	Name	Range
Real connectors	KRxxxx	0000 – 0999
Integer/hex connectors	Kxxxx	4000 – 4999
Binectors	Bxxxx	1000 – 3999

Connectors are connected-up by entering the connector number into the source parameter.

Example:
H970 = 44 means that the value of the T400 analog input 1 is displayed in display parameter d971 (refer to Section 3, function charts A1, A4)

5.2 The connector list

The connector list is structured as follows:

KR0000	Constant 0.000	[FP-A2]	PARCON.KR0000.Y

Explanations:

KR0000:	Connector with number 0
[FP-A2]:	Reference to the function chart on which the connector is generated.
PARCON.KR0000.Y:	CFC chart.Block.I/O (connection)

5.2.1 REAL connectors

Number	Explanation	F Chart	CFC chart.Block I/O
KR0000	Constant 0.000	[FP-A2]	PARCON.KR0000.Y
KR0001	Constant 1.000	[FP-A2]	PARCON.KR0001.Y
KR0002	Constant -1.000	[FP-A2]	PARCON.KR0002.Y
KR0011	Integer-real converter for word 1 from CU	[FP-A10]	REC_CU.RCU1.Y
KR0012	Integer-real converter for word2 from CU (X n/f [Hz] actual value)	[FP-A10]	REC_CU.RCU2.Y
KR0013	Integer-real converter for word 3 from CU	[FP-A10]	REC_CU.RCU3.Y
KR0014	Integer-real converter for word 4 from CU	[FP-A10]	REC_CU.RCU4.Y
KR0015	Integer-real converter for word 5 from CU (X torque setpoint)	[FP-A10]	REC_CU.RCU5.Y
KR0016	Integer-real converter for word 6 from CU	[FP-A10]	REC_CU.RCU6.Y
KR0017	Integer-real converter for word 7 from CU (Y n/f [Hz] actual value)	[FP-A10]	REC_CU.RCU7.Y
KR0018	Integer-real converter for word 8 from CU	[FP-A10]	REC_CU.RCU8.Y
KR0019	Integer-real converter for word 9 from CU	[FP-A10]	REC_CU.RCU9.Y
KR0020	Integer-real converter for word 10 from CU (Y torque setpoint)	[FP-A10]	REC_CU.RCU10.Y
KR0022	Word 2 from CBP (X position reference value or speed setpoint, 16-bit word)	[FP-A20]	REC_CB.REF2_N2.Y
KR0023	Word 3 from CBP	[FP-A20]	REC_CB.REF3_N2.Y
KR0025	Word 5 from CBP (Y position reference value or speed setpoint, 16-bit word)	[FP-A20]	REC_CB.REF5_N2.Y
KR0026	Word 6 from CBP	[FP-A20]	REC_CB.REF6_N2.Y
KR0027	Word 7 from CBP (Z position reference value or speed setpoint, 16-bit word)	[FP-A20]	REC_CB.REF7_N2.Y
KR0028	Word 8 from CBP	[FP-A20]	REC_CB.REF8_N2.Y
KR0029	Word 9 from CBP (Z position actual value, 16-bit word)	[FP-A20]	REC_CB.REF9_N2.Y
KR0030	Word 10 from CBP	[FP-A20]	REC_CB.REF10_N2.Y
KR0031	Integer-real converter for word 11 from CU	[FP-A11]	REC_CU.RCU11.Y
KR0032	Integer-real converter for word 12 from CU (Z n/f [Hz] actual value)	[FP-A11]	REC_CU.RCU12.Y
KR0033	Integer-real converter for word 13 from CU	[FP-A11]	REC_CU.RCU13.Y
KR0034	Integer-real converter for word 14 from CU	[FP-A11]	REC_CU.RCU14.Y
KR0035	Integer-real converter for word 15 from CU (Z torque setpoint)	[FP-A11]	REC_CU.RCU15.Y
KR0036	Integer-real converter for word 16 from CU	[FP-A11]	REC_CU.RCU16.Y
KR0037	Word 2 / word 3 from CBP (X setpoint, 32-bit word)	[FP-A20]	REC_CB.REF2_N4.Y
KR0038	Word 5 / word 6 from CBP (Y setpoint, 32-bit word)	[FP-A20]	REC_CB.REF5_N4.Y
KR0039	Word 9 / word 10 from CBP (Z position actual value, 32-bit word)	[FP-A20]	REC_CB.REF9_N4.Y
KR0041	Double word-real converter for CU words	[FP-A11]	REC_CU.RCU_N4_1A.Y
KR0042	Double word-real converter for CU words	[FP-A11]	REC_CU.RCU_N4_2A.Y

Number	Explanation	F Chart	CFC chart.Block I/O
KR0043	Double word-real converter for CU words	[FP-A11]	REC_CU.RCU_N4_3A.Y
KR0044	Analog input 1 (X master switch setpoint)	[FP-A4]	INP_ANA.ANI1.Y
KR0049	Analog input 2 (Y master switch setpoint)	[FP-A4]	INP_ANA.ANI2.Y
KR0054	Analog input 3	[FP-A4]	INP_ANA.ANI3.Y
KR0059	Analog input 4	[FP-A4]	INP_ANA.ANI4.Y
KR0064	Analog input 5	[FP-A4]	INP_ANA.ANI5.Y
KR0078	Fixed setpoint H078 REAL	[FP-A2]	PARCON.KR0078.Y
KR0079	Fixed setpoint H079 REAL	[FP-A2]	PARCON.KR0079.Y
KR0080	Fixed setpoint H080 REAL	[FP-A2]	PARCON.KR0080.Y
KR0081	Fixed setpoint H081 REAL	[FP-A2]	PARCON.KR0081.Y
KR0082	Fixed setpoint H082 REAL	[FP-A2]	PARCON.KR0082.Y
KR0083	Fixed setpoint H083 REAL	[FP-A2]	PARCON.KR0083.Y
KR0084	Fixed setpoint H084 REAL	[FP-A2]	PARCON.KR0084.Y
KR0090	Fixed setpoint, X offset pendulum length H090 REAL	[FP-A2]	PARCON.KR0090.Y
KR0091	Fixed setpoint, Y offset pendulum length H091 REAL	[FP-A2]	PARCON.KR0091.Y
KR0165	X speed setpoint to CU	[FP-CX4]	XSREF2.VREFL.Y
KR0209	Speed actual value, pulse encoder 1	[FP-A30]	INP_NAV.XNAV.Y
KR0210	Position actual value, pulse encoder 1	[FP-A30]	INP_NAV.XNAV.YP
KR0213	X position actual value, integration concept	[FP-A40]	INP_NAV.XWACT2.Y
KR0217	Position actual value [m] X drive	[FP-A40]	INP_NAV.XPOSACT.Y
KR0234	Speed actual value, absolute value encoder 1	[FP-A35]	INP_NAV.ZXAENC.Y
KR0235	Position counter, absolute value encoder 1	[FP-A35]	INP_NAV.ZXAENC.YP
KR0236	Revolution counter, absolute value encoder 1	[FP-A35]	INP_NAV.ZXAENC.YRC
KR0242	Position actual value [m] absolute value encoder 1	[FP-A35]	INP_NAV.ZXPOS.Y
KR0245	X drive, pendulum length [m]	[FP-A40]	INP_NAV.ZXPOSACT.Y
KR0271	X, MS setpoint after characteristic	[FP-CX1]	XSREF1_MS_SP_1.Y
KR0275	X, MS setpoint	[FP-CX1]	XSREF1.MS_SP.Y
KR0276	X, MS setpoint after pre limit switch limit	[FP-CX1]	XSREF1.MS_SPV.Y
KR0355	X, actual distance, camera – reflector D_OPT	[FP-CX5]	XSPRDI.D_OPT.Y
KR0356	Average value X, Y of the actual distance, camera – reflector D_OPT	[FP-CX5]	XSPRDI.D_OPTM.Y
KR0361	X, adapted pendulum angle from the camera	[FP-CX5]	XSPRDI.PHIACT.Y
KR0365	X, pendulum angle after prediction	[FP-CX5]	XSPRDI.PHI_PRDICT.Y01
KR0371	X, speed setpoint anti sway control	[FP-CX2]	XSREF2.Y01.Y
KR0372	X, speed setpoint after the ramp-function generator, anti sway control	[FP-CX2]	XSREF2.Y12.Y
KR0373	X, position actual value, load control model [m]	[FP-CX2]	XSREF2.Y02.Y
KR0374	X, velocity actual value, load control model [m/s]	[FP-CX2]	XSREF2.Y03.Y
KR0375	X, acceleration, load control model [m/s2]	[FP-CX2]	XSREF2.Y04.Y
KR0376	X, pendulum angle, control model [rad]	[FP-CX2]	XSREF2.Y05.Y
KR0377	X, pendulum angle error, control model [rad]	[FP-CX2]	XSREF2.Y06.Y
KR0378	X, pendulum angle without wind [rad]	[FP-CX2]	XSREF2.Y07.Y

Number	Explanation	F Chart	CFC chart.Block I/O
KR0379	X, pendulum angle with wind [rad]	[FP-CX2]	XSREF2.Y08.Y
KR0381	X, test output CONDP	[FP-CX3]	XSREF2.Y15.Y
KR0382	X, time counter [s]	[FP-CX2]	XSREF2.Y09.Y
KR0449	X, selected position reference value [m]	[FP-DX1]	XPOSI.SEL_WREF.Y
KR0456	X, position difference, setpoint-actual value [m]	[FP-DX2]	XPOSI.WDIF.Y
KR0462	X, adapted KP1 position controller	[FP-DX2]	XPOSI.KP1.Y
KR0464	X, output, position controller (version 1)	[FP-DX2]	XPOSI.VPOS1.Y
KR0472	X, adapted TI position controller, version 2	[FP-DX3]	XPOSIVAR2.TI.Y
KR0477	X, position difference, setpoint-actual value [m] position controller, version 2	[FP-DX3]	XPOSIVAR2.PDIF_1.Y
KR0480	X, output, position controller version 2	[FP-DY3]	XPOSIVAR2.VREFLIM.Y
KR0481	X, output, position ramp-function generator version 2	[FP-DY3]	XPOSIVAR2.POS_RFG.Y
KR0487	X, speed setpoint from positioning	[FP-DY4]	XPOSI.V_LLPOS.Y
KR0565	Y, speed setpoint to CU	[FP-CY4]	YSREF2.VREFL.Y
KR0609	Speed actual value, pulse encoder 2	[FP-A30]	INP_NAV.YNAV.Y
KR0610	Position actual value, pulse encoder 2	[FP-A30]	INP_NAV.YNAV.YP
KR0613	Y, position actual value, integration concept	[FP-A40]	INP_NAV.YWACT2.Y
KR0617	Position actual value [m] Y drive	[FP-A40]	INP_NAV.YPOSACT.Y
KR0634	Speed actual value, absolute value encoder 2	[FP-A35]	INP_NAV.ZYAENC.Y
KR0635	Position counter, absolute value encoder 2	[FP-A35]	INP_NAV.ZYAENC.YP
KR0636	Revolution counter, absolute value encoder 2	[FP-A35]	INP_NAV.ZYAENC.YRC
KR0642	Position actual value [m] absolute value encoder 2	[FP-A35]	INP_NAV.ZYPOS.Y
KR0645	Y drive, pendulum length [m]	[FP-A40]	INP_NAV.ZYPOSACT.Y
KR0671	Y, MS setpoint after characteristic	[FP-CY1]	YSREF1_MS_SP_1.Y
KR0675	Y, MS setpoint	[FP-CY1]	YSREF1.MS_SP.Y
KR0676	Y, MS setpoint after pre limit switch limit	[FP-CY1]	YSREF1.MS_SPV.Y
KR0755	Y, actual distance, camera – reflector D_OPT	[FP-CY5]	YSPRDI.D_OPT.Y
KR0761	Y, adapted pendulum angle from the camera	[FP-CY5]	YSPRDI.PHIACT.Y
KR0765	Y, pendulum angle after prediction	[FP-CY5]	YSPRDI.PHI_PRDICT.Y01
KR0771	Y, speed setpoint, anti sway control	[FP-CY2]	YSREF2.Y01.Y
KR0772	Y, speed setpoint after the ramp function generator anti sway control	[FP-CY2]	YSREF2.Y12.Y
KR0773	Y, position actual value, load control model [m]	[FP-CY2]	YSREF2.Y02.Y
KR0774	Y, velocity actual value, load control model [m/s]	[FP-CY2]	YSREF2.Y03.Y
KR0775	Y, acceleration, load control model [m/s2]	[FP-CY2]	YSREF2.Y04.Y
KR0776	Y, pendulum angle, control model [rad]	[FP-CY2]	YSREF2.Y05.Y
KR0777	Y, pendulum angle error, control model [rad]	[FP-CY2]	YSREF2.Y06.Y
KR0778	Y, pendulum angle without wind [rad]	[FP-CY2]	YSREF2.Y07.Y
KR0779	Y, pendulum angle with wind [rad]	[FP-CY2]	YSREF2.Y08.Y
KR0781	Y, test output CONDP	[FP-CY3]	YSREF2.Y15.Y
KR0782	Y, time counter [s]	[FP-CY2]	YSREF2.Y09.Y
KR0849	Y, selected position reference value [m]	[FP-DY1]	YPOSI.SEL_WREF.Y

Number	Explanation	F Chart	CFC chart.Block I/O
KR0856	Y, position difference, reference value-actual value [m]	[FP-DY2]	YPOSI.WDIF.Y
KR0862	Y, adapted KP1 position controller	[FP-DY2]	YPOSI.KP1.Y
KR0864	Y, output position controller (version 1)	[FP-DY2]	YPOSI.VPOS1.Y
KR0872	Y, adapted TI position controller, version 2	[FP-DY3]	YPOSIVAR2.TI.Y
KR0877	Y, position difference, setpoint-actual value [m], position controller, version 2	[FP-DY3]	YPOSIVAR2.PDIF_1.Y
KR0880	Y, output position controller, version 2	[FP-DY3]	YPOSIVAR2.VREFLIM.Y
KR0881	Y, output position ramp-function generator, version 2	[FP-DY3]	YPOSIVAR2.POS_RFG.Y
KR0887	Y, speed setpoint from positioning	[FP-DY4]	YPOSI.V_LLPOS.Y
KR0940	Z, selected position reference value [m]	[FP-DZ1]	ZPOSI.SEL_WREF.Y
KR0945	Z, position actual value [m]	[FP-DZ2]	ZPOSI.WACT.Y
KR0946	Z, position difference, reference value-actual value [m]	[FP-DZ2]	ZPOSI.WDIF.Y
KR0948	Z, output position controller (version 1)	[FP-DZ2]	ZPOSI.VPOS1.Y
KR0949	Z, output, position ramp-function generator, version 2	[FP-DZ3]	ZPOSIVAR2.POS_RFG.Y
KR0950	Z, position difference, reference value-actual value [m] position controller, version 2	[FP-DZ3]	ZPOSIVAR2.PDIF_1.Y
KR0951	Z, output position controller, version 2	[FP-DZ3]	ZPOSIVAR2.VREFLIM.Y
KR0954	Z, speed setpoint from positioning	[FP-DZ4]	ZPOSI.V_LLPOS.Y
KR0955	Z, positive Vset limiting, positioning	[FP-DZ4]	ZPOSI.VPOS_LU.Y
KR0956	Z, negative Vset limiting, positioning	[FP-DZ4]	ZPOSI.VPOS_LL.Y
KR0961	Z, MS setpoint after characteristic	[FP-CZ1]	ZSREF.MS_SP_1.Y
KR0962	Z, MS setpoint	[FP-CZ1]	ZSREF.MS_SP.Y
KR0965	Z, speed setpoint to CU	[FP-CZ2]	ZSREF.VREFCU.Y
KR0992	Selected position, load center of gravity [m]	[FP-A2]	PARCON.SEL_LOCE.Y

5.2.2 BINARY binectors

Number	Explanation	F Chart	CFC chart.Block I/O
B1000	Constant 0	[FP-A2]	PARCON.B1000.Q
B1001	Constant 1	[FP-A2]	PARCON.B1001.Q
B1002	Start bit after power is connected	---	PARCON.START.Q
B1021	Bit0, word 1 from CBP	[FP-A22]	REC_CB.STW1_CB.Q1
B1022	Bit1, word 1 from CBP	[FP-A22]	REC_CB.STW1_CB.Q2
B1023	Bit2, word 1 from CBP	[FP-A22]	REC_CB.STW1_CB.Q3
B1024	Bit3, word 1 from CBP	[FP-A22]	REC_CB.STW1_CB.Q4
B1025	Bit4, word 1 from CBP	[FP-A22]	REC_CB.STW1_CB.Q5
B1026	Bit5, word 1 from CBP	[FP-A22]	REC_CB.STW1_CB.Q6
B1027	Bit6, word 1 from CBP	[FP-A22]	REC_CB.STW1_CB.Q7
B1028	Bit7, word 1 from CBP (acknowledge fault)	[FP-A22]	REC_CB.STW1_CB.Q8
B1029	Bit8, word 1 from CBP	[FP-A22]	REC_CB.STW1_CB.Q9
B1030	Bit9, word 1 from CBP	[FP-A22]	REC_CB.STW1_CB.Q10
B1031	Bit10, word 1 from CBP (control, PZD, always "1")	[FP-A22]	REC_CB.STW1_CB.Q11
B1032	Bit11, word 1 from CBP	[FP-A22]	REC_CB.STW1_CB.Q12
B1033	Bit12, word 1 from CBP	[FP-A22]	REC_CB.STW1_CB.Q13
B1034	Bit13, word 1 from CBP	[FP-A22]	REC_CB.STW1_CB.Q14
B1035	Bit14, word 1 from CBP	[FP-A22]	REC_CB.STW1_CB.Q15
B1036	Bit15, word 1 from CBP	[FP-A22]	REC_CB.STW1_CB.Q16
B1037	Inverted bit0, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q1
B1038	Inverted bit1, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q2
B1039	Inverted bit2, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q3
B1040	Inverted bit3, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q4
B1041	Inverted bit4, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q5
B1042	Inverted bit5, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q6
B1043	Inverted bit6, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q7
B1044	Inverted bit7, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q8
B1045	Inverted bit8, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q9
B1046	Inverted bit9, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q10
B1047	Inverted bit10, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q11
B1048	Inverted bit11, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q12
B1049	Inverted bit12, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q13
B1050	Inverted bit13, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q14
B1051	Inverted bit14, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q15
B1052	Inverted bit15, word 1 from CBP	[FP-A22]	REC_CB.STW1N_CB.Q16
B1061	Bit0, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q1
B1062	Bit1, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q2
B1063	Bit2, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q3
B1064	Bit3, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q4
B1065	Bit4, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q5
B1066	Bit5, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q6

Number	Explanation	F Chart	CFC chart.Block I/O
B1067	Bit6, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q7
B1068	Bit7, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q8
B1069	Bit8, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q9
B1070	Bit9, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q10
B1071	Bit10, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q11
B1072	Bit11, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q12
B1073	Bit12, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q13
B1074	Bit13, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q14
B1075	Bit14, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q15
B1076	Bit15, word 4 from CBP	[FP-A22]	REC_CB.STW2_CB.Q16
B1077	Inverted bit0, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q1
B1078	Inverted bit1, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q2
B1079	Inverted bit2, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q3
B1080	Inverted bit3, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q4
B1081	Inverted bit4, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q5
B1082	Inverted bit5, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q6
B1083	Inverted bit6, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q7
B1084	Inverted bit7, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q8
B1085	Inverted bit8, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q9
B1086	Inverted bit9, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q10
B1087	Inverted bit10, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q11
B1088	Inverted bit11, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q12
B1089	Inverted bit12, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q13
B1090	Inverted bit13, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q14
B1091	Inverted bit14, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q15
B1092	Inverted bit15, word 4 from CBP	[FP-A22]	REC_CB.STW2N_CB.Q16
B1111	X, pre limit switch (digital input, term. –X53)	[FP-A3]	IQ_BIN.BININ_W.Q1
B1112	X, reserve(digital input, term. –X54)	[FP-A3]	IQ_BIN.BININ_W.Q2
B1113	X, limit switch, positive (digital input, term. –X55)	[FP-A3]	IQ_BIN.BININ_W.Q3
B1114	X, limit switch, negative (digital input, term. –X56)	[FP-A3]	IQ_BIN.BININ_W.Q4
B1115	Y, pre limit switch (digital input, term. –X57)	[FP-A3]	IQ_BIN.BININ_W.Q5
B1116	Y, reserve (digital input, term. –X58)	[FP-A3]	IQ_BIN.BININ_W.Q6
B1117	Y, limit switch, positive (digital input, term. –X59)	[FP-A3]	IQ_BIN.BININ_W.Q7
B1118	Y, limit switch, negative (digital input, term. –X60)	[FP-A3]	IQ_BIN.BININ_W.Q8
B1119	X, traversing command, positive (digital input, term. –X46)	[FP-A3]	IQ_BIN.BININ_W.Q9
B1120	Y, traversing command, positive (digital input, term. –X47)	[FP-A3]	IQ_BIN.BININ_W.Q10
B1121	X, traversing command, negative (bidirectional, digital input, term. –X48)	[FP-A3]	IQ_BIN.BININ_W.Q11
B1122	Y, traversing command, negative (bidirectional, digital input, term. –X49)	[FP-A3]	IQ_BIN.BININ_W.Q12
B1123	Reserve	[FP-A3]	IQ_BIN.BININ_W.Q13
B1124	Reserve	[FP-A3]	IQ_BIN.BININ_W.Q14
B1125	Reserve	[FP-A3]	IQ_BIN.BININ_W.Q15

Number	Explanation	F Chart	CFC chart.Block I/O
B1126	Reserve	[FP-A3]	IQ_BIN.BININ_W.Q16
B1127	B1111 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q1
B1128	B1112 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q2
B1129	B1113 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q3
B1130	B1114 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q4
B1131	B1115 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q5
B1132	B1116 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q6
B1133	B1117 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q7
B1134	B1118 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q8
B1135	B1119 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q9
B1136	B1120 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q10
B1137	B1121 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q11
B1138	B1122 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q12
B1139	B1123 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q13
B1140	B1124 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q14
B1141	B1125 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q15
B1142	B1126 inverted	[FP-A3]	IQ_BIN.BININ_WINV.Q16
B1151	Signal, synchronized, pulse encoder 1	[FP-A30]	INP_NAV.XNAV_SYNC.Q
B1152	Signal, synchronized, pulse encoder 2	[FP-A30]	INP_NAV.YNAV_SYNC.Q
B1153	B1151 inverted	[FP-A30]	INP_NAV.XNAV_SYNC.QN
B1154	B1152 inverted	[FP-A30]	INP_NAV.YNAV_SYNC.QN
B1155	Synchronizing pulse, pulse encoder 1	[FP-A30]	INP_NAV.XNAV.SS
B1156	Synchronizing pulse, pulse encoder 2	[FP-A30]	INP_NAV.YNAV.SS
B1160	T400 group error	[FP-B1]	CONTR.FLTW_5.Q
B1161	No T400 group error	[FP-B1]	CONTR.NOT_FLT.Q
B1204	Z, speed n>0	[FP-BZ1]	ZCONTR.SPEED_ZERO.QU
B1205	Z, speed n=0	[FP-BZ1]	ZCONTR.SPEED_ZERO.QM
B1206	Z, speed n<0	[FP-BZ1]	ZCONTR.SPEED_ZERO.QL
B1211	Z, ready to power-up from CU	[FP-AZ1]	REC_CU.ZSW1.Q1
B1212	Z, ready from CU	[FP-AZ1]	REC_CU.ZSW1.Q2
B1213	Z, run from CU	[FP-AZ1]	REC_CU.ZSW1.Q3
B1214	Z, fault from CU	[FP-AZ1]	REC_CU.ZSW1.Q4
B1215	Z, no OFF2 active from CU	[FP-AZ1]	REC_CU.ZSW1.Q5
B1216	Z, no OFF3 active from CU	[FP-AZ1]	REC_CU.ZSW1.Q6
B1217	Z, power-on inhibit from CU	[FP-AZ1]	REC_CU.ZSW1.Q7
B1218	Z, alarm from CU	[FP-AZ1]	REC_CU.ZSW1.Q8
B1219	Z, SW1 bit Q9 from CU	[FP-AZ1]	REC_CU.ZSW1.Q9
B1220	Z, SW1 bit Q10 from CU	[FP-AZ1]	REC_CU.ZSW1.Q10
B1221	Z, SW1 bit Q11 from CU	[FP-AZ1]	REC_CU.ZSW1.Q11
B1222	Z, SW1 bit Q12 from CU	[FP-AZ1]	REC_CU.ZSW1.Q12
B1223	Z, SW1 bit Q13 from CU	[FP-AZ1]	REC_CU.ZSW1.Q13
B1224	Z, SW1 bit Q14 from CU	[FP-AZ1]	REC_CU.ZSW1.Q14
B1225	Z, SW1 bit Q15 from CU	[FP-AZ1]	REC_CU.ZSW1.Q15
B1226	Z, SW1 bit Q16 from CU	[FP-AZ1]	REC_CU.ZSW1.Q16

Number	Explanation	F Chart	CFC chart.Block I/O
B1227	B1211 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q1
B1228	B1212 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q2
B1229	B1213 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q3
B1230	B1214 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q4
B1231	B1215 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q5
B1232	B1216 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q6
B1233	B1217 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q7
B1234	B1218 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q8
B1235	B1219 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q9
B1236	B1220 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q10
B1237	B1221 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q11
B1238	B1222 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q12
B1239	B1223 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q13
B1240	B1224 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q14
B1241	B1225 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q15
B1242	B1226 inverted	[FP-AZ1]	REC_CU.ZSW1N.Q16
B1251	Z, restart-on-the-fly or excitation active from CU	[FP-AZ1]	REC_CU.ZSWS.Q1
B1251	Z, setpoint enable from brake control from CU	[FP-AZ1]	REC_CU.ZSWS.Q2
B1253	Z, inverter enable from brake control from CU	[FP-AZ1]	REC_CU.ZSWS.Q3
B1254	Z, special status word from CU. Bit Q4	[FP-AZ1]	REC_CU.ZSWS.Q4
B1255	Z, special status word from CU. Bit Q5	[FP-AZ1]	REC_CU.ZSWS.Q5
B1256	Z, special status word from CU. Bit Q6	[FP-AZ1]	REC_CU.ZSWS.Q6
B1257	Z, special status word from CU. Bit Q7	[FP-AZ1]	REC_CU.ZSWS.Q7
B1258	Z, CU terminal 7 BI5: Checkback signal, brake open	[FP-AZ1]	REC_CU.ZSWS.Q8
B1259	Z, special status word from CU. Bit Q9	[FP-AZ1]	REC_CU.ZSWS.Q9
B1260	Z, CU terminal 9 BI7: No electrical stop	[FP-AZ1]	REC_CU.ZSWS.Q10
B1261	Z, special status word from CU. Bit Q11; BICO2 selected	[FP-AZ1]	REC_CU.ZSWS.Q11
B1262	Z, special status word from CU. Bit Q12	[FP-AZ1]	REC_CU.ZSWS.Q12
B1263	Z, special status word from CU. Bit Q13	[FP-AZ1]	REC_CU.ZSWS.Q13
B1264	Z, special status word from CU. Bit Q14	[FP-AZ1]	REC_CU.ZSWS.Q14
B1265	Z, special status word from CU. Bit Q15	[FP-AZ1]	REC_CU.ZSWS.Q15
B1266	Z, special status word from CU. Bit Q16	[FP-AZ1]	REC_CU.ZSWS.Q16
B1267	B1251 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q1
B1268	B1252 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q2
B1269	B1253 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q3
B1270	B1254 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q4
B1271	B1255 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q5
B1272	B1256 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q6
B1273	B1257 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q7
B1274	B1258 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q8
B1275	B1259 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q9
B1276	B1260 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q10

Number	Explanation	F Chart	CFC chart.Block I/O
B1277	B1261 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q11
B1278	B1262 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q12
B1279	B1263 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q13
B1280	B1264 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q14
B1281	B1265 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q15
B1282	B1266 inverted	[FP-AZ1]	REC_CU.ZSWSN.Q16
B1300	Z, drive on	[FP-BZ2]	ZCONTR.DRON.Q
B1301	Z, drive off	[FP-BZ2]	ZCONTR.DRON.QN
B1302	Z, drive, inverter enable	[FP-BZ5]	ZCONTR.INVENA.Q
B1303	Z, drive, no inverter enable	[FP-BZ5]	ZCONTR.INVENA.QN
B1304	Z, drive, setpoint enable	[FP-BZ5]	ZCONTR.SP_ENA.Q
B1305	Z, drive, no setpoint enable	[FP-BZ5]	ZCONTR.NOT_SP_ENA.Q
B1306	Z, drive, traversing command	[FP-BZ4]	ZCONTR.DCOM.Q
B1307	Z, drive, no traversing command	[FP-BZ4]	ZCONTR.NOT_DCOM.Q
B1310	Z, drive, electrical off	[FP-BZ4]	ZCONTR.ELOFF.Q
B1311	Z, drive, no electrical off	[FP-BZ4]	ZCONTR.ELOFF.QN
B1312	Z, drive, fast stop active	[FP-BZ3]	ZCONTR.FASTSTOP.Q
B1313	Z, drive, no fast stop active	[FP-BZ3]	ZCONTR.FASTSTOP.QN
B1314	Z, drive, off after fast stop	[FP-BZ3]	ZCONTR.FSTOP_OFF.Q
B1316	Z, drive, T400 power-off signal	[FP-BZ3]	ZCONTR.OFF.Q
B1318	Z, drive, T400 fault or T400 group fault	[FP-BZ2]	ZCONTR.T400FLT.Q
B1320	Z, drive, T400 fault	[FP-BZ8]	ZCONTR.FLTW_5.Q
B1321	Z, drive, no T400 fault	[FP-BZ8]	ZCONTR.NOT_FLT.Q
B1322	Z, drive, master switch, traversing command	[FP-BZ4]	ZSREF.MS_COMMAND.Q
B1323	Z, drive, no master switch, traversing command	[FP-BZ4]	ZSREF.NOT_MS_COMMAND.Q
B1328	Z, drive, standard stop active	[FP-BZ3]	ZCONTR.STOP.Q
B1329	Z, drive, no standard stop active	[FP-BZ3]	ZCONTR.STOP.QN
B1330	Z, drive, off after standard stop	[FP-BZ3]	ZCONTR.STOP_OFF.Q
B1340	Z, drive, positioning active	[FP-DZ1]	ZPOSI.ENPOSA.Q
B1342	Z, drive, enable positioning	[FP-DZ1]	ZPOSI.ENPOS.Q
B1344	Z, drive, position reference value = actual value	[FP-DZ5]	ZPOSI.ENPOS_4.Q
B1346	Z, drive, position reference value > position, limit switch positive	[FP-DZ1]	ZPOSI.M_WREFP.QU
B1348	Z, drive, position reference value < position, limit switch negative	[FP-DZ1]	ZPOSI.M_WREFN.QL
B2004	X, speed n>0	[FP-BX1]	XCONTR.SPEED_ZERO.QU
B2005	X, speed n=0	[FP-BX1]	XCONTR.SPEED_ZERO.QM
B2006	X, speed n<0	[FP-BX1]	XCONTR.SPEED_ZERO.QL
B2011	X, ready to power-up from CU	[FP-AX1]	REC_CU.XSW1.Q1
B2012	X, ready from CU	[FP-AX1]	REC_CU.XSW1.Q2
B2013	X, run from CU	[FP-AX1]	REC_CU.XSW1.Q3
B2014	X, fault from CU	[FP-AX1]	REC_CU.XSW1.Q4
B2015	X, no OFF2 active from CU	[FP-AX1]	REC_CU.XSW1.Q5
B2016	X no OFF3 active from CU	[FP-AX1]	REC_CU.XSW1.Q6

Number	Explanation	F Chart	CFC chart.Block I/O
B2017	X, power-on inhibit from CU	[FP-AX1]	REC_CU.XSW1.Q7
B2018	X, alarm from CU	[FP-AX1]	REC_CU.XSW1.Q8
B2019	X, SW1 bit Q9 from CU	[FP-AX1]	REC_CU.XSW1.Q9
B2020	X, SW1 bit Q10 from CU	[FP-AX1]	REC_CU.XSW1.Q10
B2021	X, SW1 bit Q11 from CU	[FP-AX1]	REC_CU.XSW1.Q11
B2022	X, SW1 bit Q12 from CU	[FP-AX1]	REC_CU.XSW1.Q12
B2023	X, SW1 bit Q13 from CU	[FP-AX1]	REC_CU.XSW1.Q13
B2024	X, SW1 bit Q14 from CU	[FP-AX1]	REC_CU.XSW1.Q14
B2025	X, SW1 bit Q15 from CU	[FP-AX1]	REC_CU.XSW1.Q15
B2026	X, SW1 bit Q16 from CU	[FP-AX1]	REC_CU.XSW1.Q16
B2027	B2011 inverted	[FP-AX1]	REC_CU.XSW1N.Q1
B2028	B2012 inverted	[FP-AX1]	REC_CU.XSW1N.Q2
B2029	B2013 inverted	[FP-AX1]	REC_CU.XSW1N.Q3
B2030	B2014 inverted	[FP-AX1]	REC_CU.XSW1N.Q4
B2031	B2015 inverted	[FP-AX1]	REC_CU.XSW1N.Q5
B2032	B2016 inverted	[FP-AX1]	REC_CU.XSW1N.Q6
B2033	B2017 inverted	[FP-AX1]	REC_CU.XSW1N.Q7
B2034	B2018 inverted	[FP-AX1]	REC_CU.XSW1N.Q8
B2035	B2019 inverted	[FP-AX1]	REC_CU.XSW1N.Q9
B2036	B2020 inverted	[FP-AX1]	REC_CU.XSW1N.Q10
B2037	B2021 inverted	[FP-AX1]	REC_CU.XSW1N.Q11
B2038	B2022 inverted	[FP-AX1]	REC_CU.XSW1N.Q12
B2039	B2023 inverted	[FP-AX1]	REC_CU.XSW1N.Q13
B2040	B2024 inverted	[FP-AX1]	REC_CU.XSW1N.Q14
B2041	B2025 inverted	[FP-AX1]	REC_CU.XSW1N.Q15
B2042	B2026 inverted	[FP-AX1]	REC_CU.XSW1N.Q16
B2051	X, restart-on-the-fly or excitation active CU	[FP-AX1]	REC_CU.XSWS.Q1
B2052	X, setpoint enable from the brake control from CU	[FP-AX1]	REC_CU.XSWS.Q2
B2053	X, inverter enable from brake control from CU	[FP-AX1]	REC_CU.XSWS.Q3
B2054	X, special status word from CU. Bit Q4	[FP-AX1]	REC_CU.XSWS.Q4
B2055	X, special status word from CU. Bit Q5	[FP-AX1]	REC_CU.XSWS.Q5
B2056	X, special status word from CU. Bit Q6	[FP-AX1]	REC_CU.XSWS.Q6
B2057	X, special status word from CU. Bit Q7	[FP-AX1]	REC_CU.XSWS.Q7
B2058	X, CU terminal 7 BI5: Checkback signal, brake open	[FP-AX1]	REC_CU.XSWS.Q8
B2059	X, CU terminal 8 BI6: On/no mechanical stop	[FP-AX1]	REC_CU.XSWS.Q9
B2060	X, CU terminal 9 BI7: No electrical stop	[FP-AX1]	REC_CU.XSWS.Q10
B2061	X, special status word from CU. Bit Q11; BICO2 selected	[FP-AX1]	REC_CU.XSWS.Q11
B2062	X, special status word from CU. Bit Q12	[FP-AX1]	REC_CU.XSWS.Q12
B2063	X, special status word from CU. Bit Q13	[FP-AX1]	REC_CU.XSWS.Q13
B2064	X, special status word from CU. Bit Q14	[FP-AX1]	REC_CU.XSWS.Q14
B2065	X, special status word from CU. Bit Q15	[FP-AX1]	REC_CU.XSWS.Q15
B2066	X special status word from CU. Bit Q16	[FP-AX1]	REC_CU.XSWS.Q16

Number	Explanation	F Chart	CFC chart.Block I/O
B2067	B2051 inverted	[FP-AX1]	REC_CU.XSWSN.Q1
B2068	B2052 inverted	[FP-AX1]	REC_CU.XSWSN.Q2
B2069	B2053 inverted	[FP-AX1]	REC_CU.XSWSN.Q3
B2070	B2054 inverted	[FP-AX1]	REC_CU.XSWSN.Q4
B2071	B2055 inverted	[FP-AX1]	REC_CU.XSWSN.Q5
B2072	B2056 inverted	[FP-AX1]	REC_CU.XSWSN.Q6
B2073	B2057 inverted	[FP-AX1]	REC_CU.XSWSN.Q7
B2074	B2058 inverted	[FP-AX1]	REC_CU.XSWSN.Q8
B2075	B2059 inverted	[FP-AX1]	REC_CU.XSWSN.Q9
B2076	B2060 inverted	[FP-AX1]	REC_CU.XSWSN.Q10
B2077	B2061 inverted	[FP-AX1]	REC_CU.XSWSN.Q11
B2078	B2062 inverted	[FP-AX1]	REC_CU.XSWSN.Q12
B2079	B2063 inverted	[FP-AX1]	REC_CU.XSWSN.Q13
B2080	B2064 inverted	[FP-AX1]	REC_CU.XSWSN.Q14
B2081	B2065 inverted	[FP-AX1]	REC_CU.XSWSN.Q15
B2082	B2066 inverted	[FP-AX1]	REC_CU.XSWSN.Q16
B2200	X, drive on	[FP-BX2]	XCONTR.DRON.Q
B2201	X, drive off	[FP-BX2]	XCONTR.DRON.QN
B2202	X, drive, inverter enable	[FP-BX5]	XCONTR.INVENA.Q
B2203	X, drive, no inverter enable	[FP-BX5]	XCONTR.INVENA.QN
B2204	X, drive, setpoint enable	[FP-BX5]	XCONTR.SP_ENA.Q
B2205	X, drive, no setpoint enable	[FP-BX5]	XCONTR.NOT_SP_ENA.Q
B2206	X, drive, traversing command	[FP-BX4]	XCONTR.DCOM.Q
B2207	X, drive, no traversing command	[FP-BX4]	XCONTR.NOT_DCOM.Q
B2210	X, drive, electrical off	[FP-BX4]	XCONTR.ELOFF.Q
B2211	X, drive, no electrical off	[FP-BX4]	XCONTR.ELOFF.QN
B2212	X, drive, fast stop active	[FP-BX3]	XCONTR.FASTSTOP.Q
B2213	X, drive, no fast stop active	[FP-BX3]	XCONTR.FASTSTOP.QN
B2214	X, drive, off after fast stop	[FP-BX3]	XCONTR.FSTOP_OFF.Q
B2216	X, drive, T400 power-off signal	[FP-BX2]	XCONTR.OFF.Q
B2218	X, drive, T400 fault or T400 group fault	[FP-BX2]	XCONTR.T400FLT.Q
B2220	X, drive, T400 fault	[FP-BX8]	XCONTR.FLTW_5.Q
B2221	X, drive, no T400 fault	[FP-BX8]	XCONTR.NOT_FLT.Q
B2222	X, drive, master switch, traversing command	[FP-BX4]	XSREF.MS_COMMAND.Q
B2223	X, drive, no master switch, traversing command	[FP-BX4]	XSREF.NOT_MS_COMMAND.Q
B2224	X, drive, traversing command anti sway control	[FP-CX2]	XSREF2.QW1.Q1
B2225	X, drive, no traversing command anti sway control	[FP-CX2]	XSREF2.NOT_CFK.Q
B2226	X, drive, enable anti sway control	[FP-BX11]	XSREF1.ENA_CTRL.Q
B2227	X, drive, no enable anti sway control	[FP-BX11]	XSREF1.NOT_ENA_CTRL.Q
B2228	X, drive, standard stop active	[FP-BX3]	XCONTR.STOP.Q
B2229	X, drive, no standard stop active	[FP-BX3]	XCONTR.STOP.QN
B2230	X, drive, off after standard stop	[FP-BX3]	XCONTR.STOP_OFF.Q
B2240	X, drive, positioning active	[FP-DX1]	XPOSI.ENPOSA.Q

Number	Explanation	F Chart	CFC chart.Block I/O
B2242	X, drive, enable positioning	[FP-DX1]	XPOSI.ENPOS.Q
B2244	X, drive, position reference value = actual value	[FP-DX1]	XPOSI.ENPOS_4.Q
B2246	X, drive, position reference value > position limit switch positive	[FP-DX1]	XPOSI.M_WREFP.QU
B2248	X, drive, position reference value < position limit switch negative	[FP-DX1]	XPOSI.M_WREFN.QL
B2300	X, shutdown sensor (pendulum angle from camera)	[FP-CX5]	XSPRDI.SENSOFF.Q
B2301	X, no shutdown sensor (pendulum angle from camera)	[FP-CX5]	XSPRDI.NOT_SENSOFF.Q
B3004	Y, speed n>0	[FP-BY1]	YCONTR.SPEED_ZERO.QU
B3005	Y, speed n=0	[FP-BY1]	YCONTR.SPEED_ZERO.QM
B3006	Y, speed n<0	[FP-BY1]	YCONTR.SPEED_ZERO.QL
B3011	Y, ready to power-up from CU	[FP-AY1]	REC_CU.YSW1.Q1
B3012	Y, ready from CU	[FP-AY1]	REC_CU.YSW1.Q2
B3013	Y, run from CU	[FP-AY1]	REC_CU.YSW1.Q3
B3014	Y, fault from CU	[FP-AY1]	REC_CU.YSW1.Q4
B3015	Y, no OFF2 active from CU	[FP-AY1]	REC_CU.YSW1.Q5
B3016	Y, no OFF3 active from CU	[FP-AY1]	REC_CU.YSW1.Q6
B3017	Y, power-on inhibit from CU	[FP-AY1]	REC_CU.YSW1.Q7
B3018	Y, alarm from CU	[FP-AY1]	REC_CU.YSW1.Q8
B3019	Y, SW1 bit Q9 from CU	[FP-AY1]	REC_CU.YSW1.Q9
B3020	Y, SW1 bit Q10 from CU	[FP-AY1]	REC_CU.YSW1.Q10
B3021	Y, SW1 bit Q11 from CU	[FP-AY1]	REC_CU.YSW1.Q11
B3022	Y, SW1 bit Q12 from CU	[FP-AY1]	REC_CU.YSW1.Q12
B3023	Y, SW1 bit Q13 from CU	[FP-AY1]	REC_CU.YSW1.Q13
B3024	Y, SW1 bit Q14 from CU	[FP-AY1]	REC_CU.YSW1.Q14
B3025	Y, SW1 bit Q15 from CU	[FP-AY1]	REC_CU.YSW1.Q15
B3026	Y, SW1 bit Q16 from CU	[FP-AY1]	REC_CU.YSW1.Q16
B3027	B3011 inverted	[FP-AY1]	REC_CU.YSW1N.Q1
B3028	B3012 inverted	[FP-AY1]	REC_CU.YSW1N.Q2
B3029	B3013 inverted	[FP-AY1]	REC_CU.YSW1N.Q3
B3030	B3014 inverted	[FP-AY1]	REC_CU.YSW1N.Q4
B3031	B3015 inverted	[FP-AY1]	REC_CU.YSW1N.Q5
B3032	B3016 inverted	[FP-AY1]	REC_CU.YSW1N.Q6
B3033	B3017 inverted	[FP-AY1]	REC_CU.YSW1N.Q7
B3034	B3018 inverted	[FP-AY1]	REC_CU.YSW1N.Q8
B3035	B3019 inverted	[FP-AY1]	REC_CU.YSW1N.Q9
B3036	B3020 inverted	[FP-AY1]	REC_CU.YSW1N.Q10
B3037	B3021 inverted	[FP-AY1]	REC_CU.YSW1N.Q11
B3038	B3022 inverted	[FP-AY1]	REC_CU.YSW1N.Q12
B3039	B3023 inverted	[FP-AY1]	REC_CU.YSW1N.Q13
B3040	B3024 inverted	[FP-AY1]	REC_CU.YSW1N.Q14
B3041	B3025 inverted	[FP-AY1]	REC_CU.YSW1N.Q15
B3042	B3026 inverted	[FP-AY1]	REC_CU.YSW1N.Q16

Number	Explanation	F Chart	CFC chart.Block I/O
B3051	Y, restart-on-the-fly or excitation active from CU	[FP-AY1]	REC_CU.YSWS.Q1
B3052	Y, setpoint enable from brake control from CU	[FP-AY1]	REC_CU.YSWS.Q2
B3053	Y, inverter enable from brake control from CU	[FP-AY1]	REC_CU.YSWS.Q3
B3054	Y, special status word from CU. Bit Q4	[FP-AY1]	REC_CU.YSWS.Q4
B3055	Y, special status word from CU. Bit Q5	[FP-AY1]	REC_CU.YSWS.Q5
B3056	Y, special status word from CU. Bit Q6	[FP-AY1]	REC_CU.YSWS.Q6
B3057	Y, special status word from CU. Bit Q7	[FP-AY1]	REC_CU.YSWS.Q7
B3058	X, CU terminal 7 BI5: Checkback signal, brake open	[FP-AY1]	REC_CU.YSWS.Q8
B3059	X, CU terminal 8 BI6: On/no mechanical stop	[FP-AY1]	REC_CU.YSWS.Q9
B3060	X, CU terminal 9 BI7: No electrical stop	[FP-AY1]	REC_CU.YSWS.Q10
B3061	Y, special status word from CU. Bit Q11; BICO2 selected	[FP-AY1]	REC_CU.YSWS.Q11
B3062	Y, special status word from CU. Bit Q12	[FP-AY1]	REC_CU.YSWS.Q12
B3063	Y, special status word from CU. Bit Q13	[FP-AY1]	REC_CU.YSWS.Q13
B3064	Y, special status word from CU. Bit Q14	[FP-AY1]	REC_CU.YSWS.Q14
B3065	Y, special status word from CU. Bit Q15	[FP-AY1]	REC_CU.YSWS.Q15
B3066	Y, special status word from CU. Bit Q16	[FP-AY1]	REC_CU.YSWS.Q16
B3059	Y, no inverter enable from brake control CU	[FP-AY1]	REC_CU.YNOT_INVENA_BR.Q
B3065	Y, inverted CU, terminal 8 BI6: Mechanical stop	[FP-AY1]	REC_CU.Y_MECHSTOP.Q
B3066	Y, inverted CU, terminal 9 BI7: Electrical stop	[FP-AY1]	REC_CU.Y_ELSTOP.Q
B3067	B3051 inverted	[FP-AY1]	REC_CU.XSWSN.Q1
B3068	B3052 inverted	[FP-AY1]	REC_CU.XSWSN.Q2
B3069	B3053 inverted	[FP-AY1]	REC_CU.XSWSN.Q3
B3070	B3054 inverted	[FP-AY1]	REC_CU.XSWSN.Q4
B3071	B3055 inverted	[FP-AY1]	REC_CU.XSWSN.Q5
B3072	B3056 inverted	[FP-AY1]	REC_CU.XSWSN.Q6
B3073	B3057 inverted	[FP-AY1]	REC_CU.XSWSN.Q7
B3074	B3058 inverted	[FP-AY1]	REC_CU.XSWSN.Q8
B3075	B3059 inverted	[FP-AY1]	REC_CU.XSWSN.Q9
B3076	B3060 inverted	[FP-AY1]	REC_CU.XSWSN.Q10
B3077	B3061 inverted	[FP-AY1]	REC_CU.XSWSN.Q11
B3078	B3062 inverted	[FP-AY1]	REC_CU.XSWSN.Q12
B3079	B3063 inverted	[FP-AY1]	REC_CU.XSWSN.Q13
B3080	B3064 inverted	[FP-AY1]	REC_CU.XSWSN.Q14
B3081	B3065 inverted	[FP-AY1]	REC_CU.XSWSN.Q15
B3082	B3066 inverted	[FP-AY1]	REC_CU.XSWSN.Q16
B3200	Y, drive on	[FP-BY2]	YCONTR.DRON.Q
B3201	Y, drive off	[FP-BY2]	YCONTR.DRON.QN
B3202	Y, drive, inverter enable	[FP-BY5]	YCONTR.INVENA.Q
B3203	Y, drive, no inverter enable	[FP-BY5]	YCONTR.INVENA.QN
B3204	Y, drive, setpoint enable	[FP-BY5]	YCONTR.SP_ENA.Q
B3205	Y, drive, no setpoint enable	[FP-BY5]	YCONTR.NOT_SP_ENA.Q
B3206	Y, drive, traversing command	[FP-BY4]	YCONTR.DCOM.Q

Number	Explanation	F Chart	CFC chart.Block I/O
B3207	Y, drive, no traversing command	[FP-BY4]	YCONTR.NOT_DCOM.Q
B3210	Y, drive, electrical off	[FP-BY4]	YCONTR.ELOFF.Q
B3211	Y, drive, no electrical off	[FP-BY4]	YCONTR.ELOFF.QN
B3212	Y, drive, fast stop active	[FP-BY3]	YCONTR.FASTSTOP.Q
B3213	Y, drive, no fast stop active	[FP-BY3]	YCONTR.FASTSTOP.QN
B3214	Y, drive, off after fast stop	[FP-BY3]	YCONTR.FSTOP_OFF.Q
B3216	Y, drive, T400 power-off signal	[FP-BY2]	YCONTR.OFF.Q
B3218	Y, drive, T400 fault or T400 group fault	[FP-BY2]	YCONTR.T400FLT.Q
B3220	Y, drive, T400 fault	[FP-BY8]	YCONTR.FLTW_5.Q
B3221	Y, drive, no T400 fault	[FP-BY8]	YCONTR.NOT_FLT.Q
B3222	Y, drive, master switch, traversing command	[FP-BY4]	YSREF.MS_COMMAND.Q
B3223	Y, drive, no master switch, traversing command	[FP-BY4]	YSREF.NOT_MS_COMMAND.Q
B3224	Y, drive, traversing command anti sway control	[FP-CY2]	YSREF2.QW1.Q1
B3225	Y, drive, no traversing command anti sway control	[FP-CY2]	YSREF2.NOT_CFK.Q
B3226	Y, drive, enable anti sway control	[FP-BY11]	YSREF1.ENA_CTRL.Q
B3227	Y, drive, no enable anti sway control	[FP-BY11]	YSREF1.NOT_ENA_CTRL.Q
B3228	Y, drive, standard stop active	[FP-BY3]	YCONTR.STOP.Q
B3229	Y, drive, no standard stop active	[FP-BY3]	YCONTR.STOP.QN
B3230	Y, drive, off after normal stop	[FP-BY3]	YCONTR.STOP_OFF.Q
B3240	Y, drive, positioning active	[FP-DY1]	YPOSI.ENPOSA.Q
B3242	Y, drive, enable positioning	[FP-DY1]	YPOSI.ENPOS.Q
B3244	Y, drive, position reference value = actual value	[FP-DY1]	YPOSI.ENPOS_4.Q
B3246	Y, drive, position reference value > position limit switch positive	[FP-DY1]	YPOSI.M_WREFP.QU
B3248	Y, drive, position reference value < position limit switch negative	[FP-DY1]	YPOSI.M_WREFN.QL
B3300	Y, shutdown sensor (pendulum angle from camera)	[FP-CY5]	YSPRDI.SENSOFF.Q
B3301	Y, no shutdown sensor (pendulum angle from camera)	[FP-CY5]	YSPRDI.NOT_SENSOFF.Q

5.2.3 INTEGER/WORD connectors

Number	Explanation	F Chart	CFC chart.Block I/O
K4000	Constant 0 / 0000hex	[FP-A2]	PARCON.K4000.Y
K4001	Constant 16384 / 4000hex	[FP-A2]	PARCON.K4001.Y
K4002	Constant –1 / FFFFhex	[FP-A2]	PARCON.K4002.Y
K4010	Fault word T400 (refer to d010)	[FP-B1]	CONTR.FLTW.QS
K4011	Word 1 from CU (X, status word 1 from CU)	[FP-A10]	REC_CU.RECCU_W1.QS
K4012	Word 2 from CU	[FP-A10]	REC_CU.RECCU_W2.Y
K4013	Word 3 from CU	[FP-A10]	REC_CU.RECCU_W3.Y
K4014	Word 4 from CU (X, special status word from CU)	[FP-A10]	REC_CU.RECCU_W4.QS
K4015	Word 5 from CU	[FP-A10]	REC_CU.RECCU_W5.Y
K4016	Word 6 from CU (Y, status word 1 from CU)	[FP-A10]	REC_CU.RECCU_W6.QS
K4017	Word 7 from CU	[FP-A10]	REC_CU.RECCU_W7.Y
K4018	Word 8 from CU	[FP-A10]	REC_CU.RECCU_W8.Y
K4019	Word 9 from CU (Y, special status word from CU)	[FP-A10]	REC_CU.RECCU_W9.QS
K4020	Word 10 from CU	[FP-A10]	REC_CU.RECCU_W10.Y
K4021	Word 1 from CBP (control word 1 from CBP)	[FP-A20]	REC_CB.CW1.QS
K4022	Word 2 from CBP	[FP-A20]	REC_CB.RECCB2.Y
K4023	Word 3 from CBP	[FP-A20]	REC_CB.RECCB3.Y
K4024	Word 4 from CBP (control word 2 from CBP)	[FP-A20]	REC_CB.CW2.QS
K4025	Word 5 from CBP	[FP-A20]	REC_CB.RECCB5.Y
K4026	Word 6 from CBP	[FP-A20]	REC_CB.RECCB6.Y
K4027	Word 7 from CBP	[FP-A20]	REC_CB.RECCB7.Y
K4028	Word 8 from CBP	[FP-A20]	REC_CB.RECCB8.Y
K4029	Word 9 from CBP	[FP-A20]	REC_CB.RECCB9.Y
K4030	Word 10 from CBP	[FP-A20]	REC_CB.RECCB10.Y
K4031	Word 11 from CU (Z, status word 1 from CU)	[FP-A11]	REC_CU.RECCU_W11.QS
K4032	Word 12 from CU	[FP-A11]	REC_CU.RECCU_W12.Y
K4033	Word 13 from CU	[FP-A11]	REC_CU.RECCU_W13.Y
K4034	Word 14 from CU (Z, special status word from CU)	[FP-A11]	REC_CU.RECCU_W14.QS
K4035	Word 15 from CU	[FP-A11]	REC_CU.RECCU_W15.Y
K4036	Word 16 from CU	[FP-A11]	REC_CU.RECCU_W16.Y
K4085	Fixed setpoint, H4085 INTEGER / WORD	[FP-A2]	PARCON.K4085.Y
K4086	Fixed setpoint, H4086 INTEGER / WORD	[FP-A2]	PARCON.K4086.Y
K4390	X, drive, fault word T400 (refer to d390)	[FP-BX8]	XCONTR.FLTW.QS
K4391	X, drive, control word 1 (refer to d391)	[FP-BX6]	XCONTR.STW1.QS
K4392	X, drive, control word 2 (refer to d392)	[FP-BX6]	XCONTR.STW2.QS
K4399	X, drive, T400 status word (refer to d399)	[FP-BX7]	XCONTR.XSTAT.QS
K4489	X, drive, status word positioning (refer to d489)	[FP-DX5]	XPOSI.STATPOS.QS
K4790	Y, drive, fault word T400 (refer to d790)	[FP-BY8]	YCONTR.FLTW.QS
K4791	Y, drive, control word 1 (refer to d791)	[FP-BY6]	YCONTR.STW1.QS
K4792	Y, drive, control word 2 (refer to d792)	[FP-BY6]	YCONTR.STW2.QS
K4799	Y, drive, T400 status word (refer to d799)	[FP-BY7]	YCONTR.YSTAT.QS
K4889	Y, drive, status word positioning (refer to d889)	[FP-DX5]	YPOSI.STATPOS.QS

Number	Explanation	F Chart	CFC chart.Block I/O
K4911	Z, drive, control word 1 (refer to c391)	[FP-BZ6]	ZCONTR.STW1.QS
K4912	Z, drive, control word 2 (refer to c392)	[FP-BZ6]	ZCONTR.STW2.QS
K4919	Z, drive, T400 status word (refer to c399)	[FP-BZ7]	ZCONTR.ZSTAT.QS
K4929	Z, drive, status word positioning (refer to c489)	[FP-DZ5]	ZPOSI.STATPOS.QS
K4931	Real-integer converter for word 1 to CBP	[FP-A25]	SEN_CB.SCB1.Y
K4932	Real-integer converter for word 2 to CBP	[FP-A25]	SEN_CB.SCB2.Y
K4933	Real-integer converter for word 3 to CBP	[FP-A25]	SEN_CB.SCB3.Y
K4934	Real-integer converter for word 4 to CBP	[FP-A25]	SEN_CB.SCB4.Y
K4935	Real-integer converter for word 5 to CBP	[FP-A25]	SEN_CB.SCB5.Y
K4936	Real-integer converter for word 6 to CBP	[FP-A25]	SEN_CB.SCB6.Y
K4937	Real-integer converter for word 7 to CBP	[FP-A25]	SEN_CB.SCB7.Y
K4938	Real-integer converter for word 8 to CBP	[FP-A25]	SEN_CB.SCB8.Y
K4939	Real-integer converter for word 9 to CBP	[FP-A25]	SEN_CB.SCB9.Y
K4940	Real-integer converter for word 10 to CBP	[FP-A25]	SEN_CB.SCB10.Y
K4941	Real-integer converter for word 1 to CU	[FP-A15]	SEN_CU.SCU1.Y
K4942	Real-integer converter for word 2 to CU	[FP-A15]	SEN_CU.SCU2.Y
K4943	Real-integer converter for word 3 to CU	[FP-A15]	SEN_CU.SCU3.Y
K4944	Real-integer converter for word 4 to CU	[FP-A15]	SEN_CU.SCU4.Y
K4945	Real-integer converter for word 5 to CU	[FP-A15]	SEN_CU.SCU5.Y
K4946	Real-integer converter for word 6 to CU	[FP-A15]	SEN_CU.SCU6.Y
K4947	Real-integer converter for word 7 to CU	[FP-A15]	SEN_CU.SCU7.Y
K4948	Real-integer converter for word 8 to CU	[FP-A15]	SEN_CU.SCU8.Y
K4949	Real-integer converter for word 9 to CU	[FP-A15]	SEN_CU.SCU9.Y
K4950	Real-integer converter for word 10 to CU	[FP-A15]	SEN_CU.SCU10.Y
K4951	Real-integer converter for word 11 to CU	[FP-A16]	SEN_CU.SCU11.Y
K4952	Real-integer converter for word 12 to CU	[FP-A16]	SEN_CU.SCU12.Y
K4953	Real-integer converter for word 13 to CU	[FP-A16]	SEN_CU.SCU13.Y
K4954	Real-integer converter for word 14 to CU	[FP-A16]	SEN_CU.SCU14.Y
K4955	Real-integer converter for word 15 to CU	[FP-A16]	SEN_CU.SCU15.Y
K4956	Real-integer converter for word 16 to CU	[FP-A16]	SEN_CU.SCU16.Y
K4961	High word of the real-double word converter for CU	[FP-A16]	SEN_CU.SCU_N4_1A.YWH
K4962	Low word of the real-double word converter for CU	[FP-A16]	SEN_CU.SCU_N4_1A.YWL
K4963	High word of the real-double word converter for CU	[FP-A16]	SEN_CU.SCU_N4_2A.YWH
K4964	Low word of the real-double word converter for CU	[FP-A16]	SEN_CU.SCU_N4_2A.YWL
K4965	High word of the real-double word converter for CU	[FP-A16]	SEN_CU.SCU_N4_3A.YWH
K4966	Low word of the real-double word converter for CU	[FP-A16]	SEN_CU.SCU_N4_3A.YWL
K4990	Z, drive, fault word T400 (refer to c390)	[FP-BZ8]	ZCONTR.FLTW.QS
K4991	High word of the real-double word converter for CBP	[FP-A20]	SEN_CB.SCB_N4_1A.YWH
K4992	Low word of the real-double word converter for CBP	[FP-A20]	SEN_CB.SCB_N4_1A.YWL
K4993	High word of the real-double word converter for CBP	[FP-A20]	SEN_CB.SCB_N4_2A.YWH
K4994	Low word of the real-double word converter for CBP	[FP-A20]	SEN_CB.SCB_N4_2A.YWL
K4995	High word of the real-double word converter for CBP	[FP-A20]	SEN_CB.SCB_N4_3A.YWH
K4996	Low word of the real-double word converter for CBP	[FP-A20]	SEN_CB.SCB_N4_3A.YWL

■

Commissioning

6

WARNING

6SE70/6RA70 drive converters are operated with high voltages.
Hazardous voltages can still be present in the drive unit up to 5 minutes after it has been powered-down and disconnected from the supply. This is due to the DC link capacitors.
Only qualified, appropriately trained personnel may commission the unit.
When working on a unit which is powered-up:

- Do not touch or come into contact with live parts and components.
- Never insert or remove modules or connecting cables.
- Use the correct equipment.

WARNING

In order to commission the T400 module, the basic unit itself must be ready to run and be fully functional. This means that the speed controller or frequency controller must have been optimized.
The drive can rotate when certain optimization work is carried-out. All of the rotating parts and components must be partitioned off and protected so that personnel cannot be injured.

The information/instructions and regulations specified in the Operating Instructions of the basic units apply. To commission the T400 module, a functioning basic unit is required (refer to the Manual).

6.1 Inserting the modules

The T400 is inserted in the basic unit of the X drive. Communications with the Y drive and with the Z drive are established via the SIMOLINK coupling for the 6SE70 or peer-to-peer coupling for 6RA70.

WARNING

Only qualified, appropriately trained personnel may replace the modules.

It is not permissible to withdraw or insert modules under voltage.

If these warnings are not carefully observed, this can result in death, severe bodily injury or significant material damage.

CAUTION

The modules contain components which can be destroyed by electrostatic discharge. Before coming into contact or touching an electronic module the human body must first be electrically discharged. This can be done, by touching immediately beforehand a conductive, grounded object (e.g. bare metal cabinet parts). The potential bonding should as far as possible be maintained.

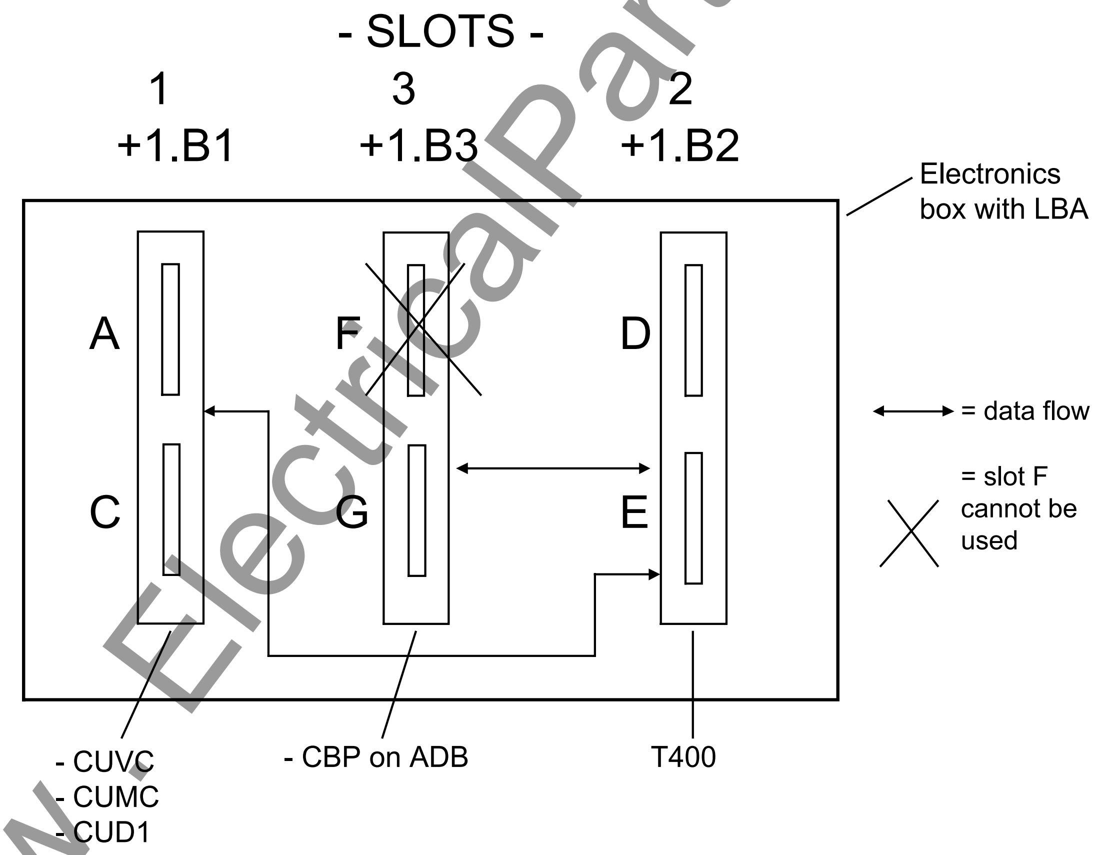


Fig. 6-1 Slots in the electronics box for use with T400

6.1.1 X drive modules

The basic unit must be equipped with a T400 technology processor and if required with an interface module (adapter board ADB with Profibus communications module CBP2).

The LBA bus adapter is always required.

Table 6-1 X drive. Slots for the option modules in the electronics box

Slots in the electronics box		**Modules**
+1.B1	Basic electronics module with slot A / slot C	- CUVC: With SLB and if required, EB1 - CUMC: SLB in slot A, SBP in slot C - CUD1 with CUD2
+1.B3	Slot F / slot G	- ADB with CBP2, CBP2 in the lower slot of the ADB (= slot G)
+1.B2	Technology module	- T400

6.1.2 Y drive, Z drive modules

6.1.2.1 Y drive (Z drive) MASTERDRIVES 6SE70

For 6SE70, only the SLB SIMOLINK module has to be used.

It may be necessary to use a CBP2 Profibus communications module or an EB1 terminal expansion.

For the Z drive, the EB1 terminal expansion is always required.

Table 6-2 Y, Z drive. Slots for the option modules in the electronics box

Slot in the electronics box		**Modules**
+1.B1	Basic electronics module with slot A / slot C	- CUVC: With SLB and if required, EB1 - CUMC: SLB in slot A, SBP in slot C - CUD1 with CUD2
+1.B3	Slot F / slot G	
+1.B2	Slot D / slot E	- ADB with EB1 and if required, CBP2

6.2 Commissioning

We urgently recommend that the DriveMonitor program is used to set the basic units and technology parameters. If there are still no database file and factory setting file for the T400 technology parameters, then these should first be created using the DriveMonitor learning function or factory setting/upread.

The procedure is explained in Section 1.9 or 1.10.

The principle commissioning procedure is subsequently shown:

6.2.1 Checking the T400 technology module

6.2.2 Commissioning the basic unit

6.2.3 Parameterizing the basic unit for operation with T400

6.2.4 Defining the interfaces

6.2.5 Commissioning the control

6.2.6 Pulse encoder and absolute value encoder at T400 (if required)

6.2.7 Parameterizing the setpoint inputs

6.2.8 Commissioning the anti sway control

6.2.9 Commissioning the closed-loop position control (if required)

6.2.1 Checking the T400 technology module

If the T400 technology module is inserted in the basic unit, then the basic unit (CU) automatically identifies this once the control voltage has been switched-in.

The T400 status can be checked using the three LEDs.

- The **red LED** indicates that the program is being executed on the T400.
- The **yellow LED** indicates that there is a communications link between the T400 and CU.
- The **green LED** indicates that there is a communications link between the T400 and the CBP (only for Profibus communications).

When a T400-generated fault occurs (F116 - F131 or possibly F035 or F021), initially, this fault should be suppressed so that the basic unit can be set. It can be masked-out using H008 = 0000, H388 = 0000, H788 = 0000.

These fault masks must be re-activated later when the T400 is operational.

Also refer to Section 1.7, Faults and fault messages.

Additional information can be taken from the brief description of the T400.

6.2.2 Commissioning the basic unit

We recommend that the DriveMonitor program is used to set all of the parameters.

The drive can be operated from the PMU operator panel when it is being commissioned. In this case, the reserve data set must be selected in the basic unit.

The reserve data set is activated with P590 = 1. For P590 = 0, the basic data set is active, which must be selected in the standard operating mode.

The basic unit parameters must be set in accordance with the Commissioning Instructions of the basic unit manual.

The factory setting for the basic unit must be established; refer to the Operating Instructions, basic unit, Section parameterizing steps.

Safety functions

Before the crane drive is powered-up, there must be an **emergency stop switch** close to the operating position in order that the drive can be quickly brought to a standstill if incorrect entries are made. Emergency stop switches must be connected to the basic unit and parameterized for fast stop (OFF3):
e. g. terminal -X101:5; P559.001 = 14; P559.002 = 14.

Alternatively, the emergency stop switch can be connected in series with the "On/no mechanical stop" to the basic unit terminal. This input is parameterized for electrical off (OFF2):
e. g. terminal -X101:7; P556.001 = 18; P556.002 = 18.

Furthermore the **emergency limit switches** must, for example, be connected to the main contactor and to a mechanical brake. The best solution is to interlock them with the "On/no mechanical stop" signal.

The function of the above specified safety measures must be guaranteed and carefully checked!

6.2.2.1 Commissioning the 6SE70 basic unit

Generally, the access authorization (parameter P053) for the parameterization should be checked. The factory setting P053 = 6 allows DriveMonitor and the PMU operator panel to be parameterized.

P100 should be set to 4 when using an encoder mounted on the motor shaft. If the drive is operated closed-loop frequency controlled without an encoder connected to the motor, P100 = 3. (only CUVC!)

WARNING

The motor can rotate when the following commissioning steps of the basic unit are carried-out:

Motor identification routine for SIMOVERT 6SE70 CUVC
For a motor identification routine at standstill (P115 = 2), the motor aligns itself (max ± $^1/_4$ motor revolution). The motor rotor can be locked so that it does not rotate.

6.2.2.2 Commissioning the SIMOREG DC MASTER 6RA70 basic unit

Parameter P051 should be set to 40 so that access authorization is provided for parameterization.

All of the parameters can be viewed for the setting P052 = 3.

Additional commissioning steps can be read about in the 6RA70 Operating Instructions.

WARNING

The motor can rotate when the following commissioning steps of the basic unit are taken:

- Optimization run for pre-control and current controller for armature and field
  Parameter setting: P051 = 25
- Optimization run for field weakening
  Parameter setting: P051 = 27

6.2.2.3 Speed controller optimization

After the commissioning steps, described in the basic unit Operating Instructions have been carried-out, the speed controller should be optimized so that the speed actual value follows the speed setpoint with the best possible dynamic response.

The following parameters must be determined and set when optimizing the speed controller:

	Parameter 6SE70 CUVC/CUMC	**Parameter 6RA70 CUD1**
Smoothing, speed actual value Tgl	P223	P200
Proportional gain KP	P235	P225
Integral action time TN	P240	P226

The system deviation of the speed controller (CUVC: K152) is output at analog output 1, shown in the following diagram. A 1% setpoint step is entered at the speed controller input to optimize it.

The speed controller must be set according to the absolute value optimum.

The result should look like this:

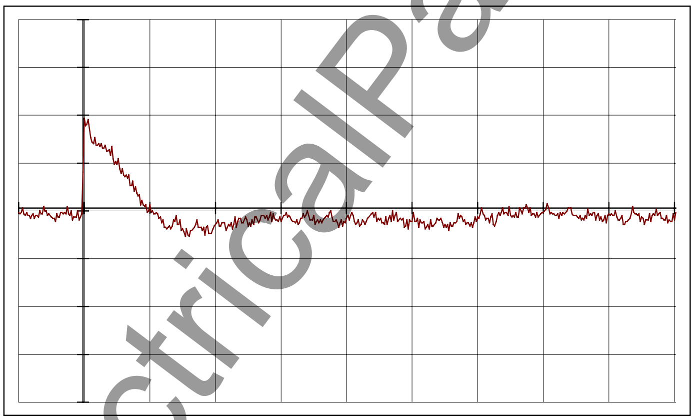


Fig. 6-2 *File:nregopt.bin, window 12/12, trace: 50mV/div 100ms/div title: KP=70, TN=0.5s, Tgl=24ms [opt]*

6.2.3 Parameterizing the basic unit for operation with T400

6.2.3.1 Commissioning the 6SE70 basic unit for operation with T400

The parameter lists, provided in Attachment A1, should be downloaded into the basic unit using the DriveMonitor program. It is assumed that the necessary signals are connected to the correct basic unit terminals:

Digital signal	Terminal	Comment	Parameter	
No fault	-X101:3	Output	P651.001 = 107 P651.002 = 107	
Open brake	-X101:4	Output	P652.001 = 275 P652.001 = 275	
Acknowledge fault or fast stop during the commissioning phase	-X101:5	Input	Fault acknowledgement P559.001 = 1 P559.002 = 1 P566.001 = 14 P566.002 = 14	Fast stop = 14 = 14 = 0 = 0
Checkback signal, brake open	-X101:6	Input Only if the brake provides a checkback signal	P612 = 16 P613 = 17	
On/no mechanical stop	-X101:7	Input	P556.001 = 18 P556.002 = 18 U076.009 = 18	
No electrical stop	-X101:8	Input	U076.010 = 20	

The Z drive additionally requires a terminal expansion EB1 to evaluate the limit switch and pre limit switch signals.

For the EB1 of the Z drive, the following terminal assignment is assumed:

Signal	Terminal	Comment	Parameter
Limit switch, positive	40	Input Limit switch actuated = "0"	U168 = 5113 U223.001 = 5113 U261.001 = 5113
Limit switch, negative	41	Input Limit switch actuated = "0"	U172 = 5115 U223.002 = 5115 U261.002 = 5115
Pre limit switch, positive	42	Input Pre limit switch actuated = "0"	U166 = 5117
Pre limit switch, negative	43	Input Pre limit switch actuated = "0" Bidirectional, P669.001 = 0!	U170 = 5105
Traversing command, positive *1)	44	Input Bidirectional, P669.002 = 0!	U076.004 = 5107
Traversing command, negative *1)	45	Input Bidirectional, P669.003 = 0!	U076.005 = 5109

*1) The traversing input signals can also be sent another way to the T400, e.g. via Profibus.

Furthermore it is assumed that the SIMOLINK data transfer between X, Y and Z drives has been set according to function chart 004 in Section 3.

The following download files must first be downloaded into the basic unit:

Drive axis	CUVC file name	CUMC file name
X drive	DPVCX00.DNL	DPMCX00.DNL
Y drive	DPVCY00.DNL	DPMCY00.DNL
Z drive	DPVCZ00.DNL	DPMCZ00.DNL

NOTES

The appropriate parameters must be modified if the terminal assignment differs from that specified above, or if SIMOLINK data transfer has been set.

When parameterizing P575, fault F035 can occur, refer to Section 1.7.2. T400 generates this fault. Fault word d390 (X drive) or d790 (Y drive) and c390 (Z drive) should be checked. If required, the faults should be suppressed using H388 or H788, L388.

The following parameters should be set after the above specified basic file has been downloaded.

Table 6-3 Other 6SE70 parameter settings

Parameter	Value, X drive	Value, Y drive	Value, Z drive	Description
P223	...	...	...	Smoothing, n/f [Hz] actual value Determined from the speed controller optimization
P235	...	...	...	Speed controller KP Determined from the speed controller optimization
P240	...	...	...	Speed controller TN Determined from the speed controller optimization
P353	...	...	...	Speed adjustment: Motor revolutions in order to operate at rated velocity $n_N = (v_N * i) / (\pi * d)$ Using parameter P353, the speed setpoints and actual values should be normalized so that 100% corresponds to the rated velocity or maximum velocity. (normalization in T400: 100% $\triangleq$ 1.0)

Parameter	Value, X drive	Value, Y drive	Value, Z drive	Description
P380	110.0	110.0	110.0	Motor temperature alarm °C. The parameter should only be set if the motor has PTC thermistors, which are then connected to the drive converter. The specified temperatures are valid for temperature rise Class B.
P381.001	120.0	120.0	120.0	Motor temperature fault °C. Refer to P380.
P559.001	14 or 1	14 or 1	14 or 1	Source, OFF3, e.g. from terminal –X101.5 (fast stop). During the commissioning phase, a fast stop signal must be connected to the basic unit (terminal 5, digital input B0014) in order to be able to quickly bring the drive to zero speed if incorrect entries are made (emergency stop switch). After commissioning has been completed, the emergency stop switch can be removed; in this case, P559 must be set to 1. Terminal 5 (digital input B0014) can then be used as input for fault acknowledgement. In this case, parameter P566 should be set to 14. Faults can also be acknowledged at the PMU operator panel (key P).
P559.002	14 or 1	14 or 1	14 or 1	Source, OFF3 reserve operation (from terminal –X101.5 or no OFF3) Refer to P559.001
P566.001	0 or 14	0 or 14	0 or 14	Source, fault acknowledgement (no acknowledgement or from terminal –X101.5) Refer to P559.001
P566.002	0 or 14	0 or 14	0 or 14	Source, fault acknowledgement (no acknowledgement or from terminal –X101.5) Refer to P559.001
P605	2 or 1	2 or 1	2 or 1	Brake with checkback signal or without checkback signal. P605 should be set to1 if there is no brake checkback signal. P605 should be set to 2 if there is a brake checkback signal. This "Brake is open" signal must then be connected to terminal 6 (digital input, B0016). If there is no mechanical brake, this must be set in this application, P605=1 and not P605=0, as otherwise several enable signals would be missing.

Parameter	Value, X drive	Value, Y drive	Value, Z drive	Description
P722	1000 or 0	1000 or 0	1000 or 0	CB telegram failure time. A value of 0 should be set if there is no PROFIBUS coupling (CBP module).
P741	10 or 0	10 or 0	10 or 0	SLB telegram failure time. The value should be set to 0 if there is no SIMOLINK coupling.
P743	0, 2 or 3	0, 2 or 3	0, 2 or 3	SIMOLINK node. If there is only the X drive, no SIMOLINK: 0. If there are X and Y drives: 2. If there are X, Y and Z drives: 3
P918	...	...	...	PROFIBUS node address
U001.001	0	0	15.0	Pre limit switch velocity. Only enter for the Z drive.
U001.002	0	0	15.0	Pre limit switch velocity.

For CUVC units, the following parameters should be set depending on closed-loop speed control or closed-loop frequency control. Parameters P216, P223, P313, P314, P315 and P471 are recommended values.

Table 6-4 Parameters for closed-loop speed control and closed-loop frequency control

Speed control	Frequency control	Comment
P100 = 4	P100 = 3	Control type can be changed (only in P060=5)
P216 = 0	P216 = 4.8	Smoothing n/f [Hz] actual pre control
P223 = ...	P223 = 10.0	Smoothing n/f [Hz] actual value; for closed-loop speed control from the speed controller optimization run
P278 = 80.0	P278 = 0.0	Steady-state torque, closed-loop frequency control
P313 = 5.0	P313 = 15.0	Changeover frequency, EMF-I model
P314 = 50.0	P314 = 50.0	Influence, changeover threshold, EMF-I model
P315 = ...	P315 = 0.3	KP EMF controller (this is automatically set for closed-loop speed control)
P471 = 0	P471 = 0.1	KP n/f [Hz] controller pre-control

The above parameters are combined in the file DPVC_10.DNL (for CUVC) or DPMC_10.DNL (for CUMC) and can also be adapted offline using DriveMonitor and downloaded into the basic unit.

6.2.3.2 Commissioning the SIMOREG 6RA70 basic unit for operation with T400

The parameter lists, provided in Attachment A1, should be downloaded into the basic unit using the DriveMonitor program. It is assumed that the required signals are connected to the correct basic unit terminals:

Digital signal	Terminal	Comment	Parameter
On/no mechanical stop	-X171:36	Input	P656.001 = 10 P656.002 = 10 U113.009 = 10
24 V jumper	-X171:37	Input, no shutdown	---
24 V jumper	-X171:38	Input, operating enable	---
No electrical stop	-X171:39	Input	U113.010 = 16
Fast stop during the commissioning phase	-X171:40	Input	P659.001 = 18 P659.002 = 18
Acknowledge fault	-X171:41	Input	P666.001 = 20 P666.002 = 20
No fault	-X171:46	Output	P771 = 107
Open brake	-X171:48	Output	P772 = 250 (Z drive: 9352)

The Z drive additionally requires a terminal expansion EB1 to evaluate the limit switch and pre limit switch signals.

For the EB1 of the Z drive, the following terminal assignment is assumed:

Signal	Terminal	Comment	Parameter
Limit switch, positive	40	Input. Limit switch actuated = "0"	U243 = 5113 U320.001 = 5113 U400.001 = 5113
Limit switch, negative	41	Input. Limit switch actuated = "0"	U247 = 5115 U320.002 = 5115 U400.002 = 5115
Pre limit switch, positive	42	Input. Pre limit switch actuated = "0"	U241 = 5117
Pre limit switch, negative	43	Input. Pre limit switch actuated = "0" Bidirectional, P769.001 = 0!	U245 = 5105
Traversing command, positive [*1)]	44	Bidirectional, P769.002 = 0!	U113.004 = 5107
Traversing command, negative [*1)]	45	Bidirectional, P769.003 = 0!	U113.005 = 5109

*1) The traversing command signals can also be sent to the T400 differently, e.g. via Profibus.

Furthermore, it is assumed that peer-to-peer data transfer is set between the X, Y and Z drives according to the function chart 005 in Section 3.

The following download files must first be downloaded into the basic unit:

Drive axis	CUD1 file name
X drive	DPD1X00.DNL
Y drive	DPD1Y00.DNL
Z drive	DPD1Z00.DNL

NOTES

The appropriate parameters must be changed if there are deviations from the terminal assignment, specified above or for peer-to-peer data transfer.

When parameterizing P675, fault F021 can occur, refer to Section 1.7.2. T400 generates this fault. The fault word d390 (X drive) or d790 (Y drive) and c390 (Z drive) should be checked. If required, the faults should be suppressed with H388 or H788, L388.

The following parameters should be set after the basic file, mentioned above, has been downloaded.

Table 6-5 Additional 6RA70 parameter settings

Parameter	Value, X drive	Value, Y drive	Value, Z drive	Description
P143.001	...	...	...	Maximum speed for speed adjustment, pulse encoder: Motor revolutions in order to traverse with the rated velocity $n_N = (v_N * i) / (\pi * d)$ The speed setpoints and actual values are normalized so that 100 % = the rated velocity or maximum velocity. Parameter P143 only applies when using a pulse encoder (not an analog tachometer).
P143.002	...	...	...	Maximum speed for speed calibration, reserve operation (= P143.001)
P200.001	...	...	...	Smoothing, n/f [Hz] actual value Determined from the speed controller optimization
P200.002	...	...	...	Smoothing, n/f [Hz] actual value, reserve operation (= P200.001)
P225.001	...	...	...	Speed controller KP Determined from the speed controller optimization
P225.002	...	...	...	Speed controller KP, reserve operation (= P225.001)

Parameter	Value, X drive	Value, Y drive	Value, Z drive	Description
P226.001	...	...	...	Speed controller TN Determined from the speed controller optimization
P226.002	...	...	...	Speed controller TN, reserve operation (= P226.001)
P411.001	0	0	15.0	Pre limit switch velocity
P411.002	0	0	15.0	Pre limit switch velocity
P490.001	...	...	...	Selects the temperature sensor (terminal 22/23) The temperatures for alarm, fault are only of significance if the motor has PTC resistors, which are then connected to the basic unit. More detailed information can be taken from the basic unit Operating Instructions.
P490.002	...	...	...	Selects the temperature sensor (terminal 204/205)
P491.001	...	...	...	Motor temperature, alarm °C
P491.002	...	...	...	Motor temperature, alarm °C, reserve operation
P492.001	...	...	...	Motor temperature, fault °C
P492.002	...	...	...	Motor temperature, fault °C, reserve operation
P659.001	18 or 1	18 or 1	18 or 1	Source OFF3, e.g. from terminal – X163.40 (fast stop) During the commissioning phase, a fast stop signal must be connected to the basic unit (terminal 40, digital input B0018) so that the drive can be quickly stopped (emergency stop switch). The emergency stop switch can be removed after the system has been commissioned; in this case, P659 must be set to 1.
P659.002	18 or 1	18 or 1	18 or 1	Source OFF3 reserve operation (refer to P659.001)
P790	1 or 0	1 or 0	1 or 0	Peer-to-peer coupling SST2 on. If there is only the X drive: Value = 0. If there are X and Y drives: Value = 1.
P800	1 or 0	0	0	Peer-to-peer coupling SST3 on. If there is no Z drive: Value = 0. If there is a Z drive: Value = 1.
P918	...	...	...	PROFIBUS node address

Parameter	Value, X drive	Value, Y drive	Value, Z drive	Description
U710.001	0	0	0	To initialize the PROFIBUS parameters, this parameter must be set to 0. After initialization, it is automatically reset to 1.
U722.001	1000 or 0	1000 or 0	1000 or 0	CB telegram failure time. If there is no PROFIBUS coupling (CBP module), the value 0 should be set.

The above parameters are combined in the DPD1_10.DNL file and can also be adapted offline using DriveMonitor and then downloaded into the basic unit.

6.2.4 Defining the interfaces

There are 2 ways to control the standard application software of the DRIVEPAC anti sway control system:

- Control via terminals,
- Control via PROFIBUS DP
  Comment:
  Mixed operation using terminals and PROFIBUS DP is possible.

When the basic unit is appropriately parameterized (U076 or U113, Section 6.2.3), the basic unit digital inputs are also made available to the T400.

There, they are available in binectors which can be connected to the T400 control by appropriately parameterizing them; refer to function charts AX1, AY1, AZ1 in Section 3.

The default assignment is listed in Attachment A2, and more precisely for

- Terminal assignment T400, basic unit
- Data transfer T400 with the basic unit
- Data transfer T400 with the CBP2 communications module (for PROFIBUS).

The plant concept determines how the required signals are made available to the T400 program.

Various plant concepts are shown in Section 7.

6.2.5 Commissioning the control

This section describes how the necessary control signals are selected.

In order that the drive can be correctly operated, the basic drive parameters, specified in 6.2.3, must have been set.

6.2.5.1 Fault evaluation and interlocking

A check should first be made as to whether the drive has any faults.

The faults, which can be generated in the T400 program (F116 – F131, F035 or F021) are shown in Section 1.7.2.

The fault masks H008, H388, H788 and L388 should be set so that all of the relevant faults/errors can be signaled. In the standard case, the setting is FFFFh.

The interlocking of drives X, Y and Z is determined using parameters H149, H549 and L149.
The interlocking is withdrawn if bits 13, 14 and 15 in these parameters are suppressed:

Bit 13 = 0	No interlocking with X drive	Y drive and Z drive can be operated even if the X drive is not running.
Bit 13 = 1	Interlocking with X drive	Y drive and Z drive can only be operated if also the X drive can be operated.
Bit 14 = 0	No interlocking with Y drive	X drive and Z drive can be operated even if the Y drive is not running.
Bit 14 = 1	Interlocking with Y drive	X drive and Z drive can only be operated if also the Y drive can be operated.
Bit 15 = 0	No interlocking with Z drive	X drive and Y drive can be operated even if the Z drive is not running.
Bit 15 = 1	Interlocking with Z drive	X drive and Y drive can only be operated if also the Z drive can be operated.

For specific configurations, the above mentioned parameters should be set so that a non-existent drive has no effect on the operation of the existing drives:

Only X drive available	H149 = 8FFF		H788 = 0000	L388 = 0000
Only X and Y drive available	H149 = BFFF	H549 = BFFF		L388 = 0000
Only X and Z drive available	H149 = DFFF	L149 = DFFF	H788 = 0000	

6.2.5.2 Selecting either conventional operation or with anti sway control

Initially, we recommend that the control is set-up in the conventional mode, i.e. without anti sway control. This is because uncontrolled movement is possible if the anti sway control parameters are incorrectly set.

X drive. T400 parameter: H161 = Source, conventional operation	Comment
H161 = 1001	Fixed binector 1, conventional

Y drive. T400 parameter: H561 = Source, conventional operation	Comment
H561 = 1001	Fixed binector 1, conventional

6.2.5.3 Hardware limit switches

The hardware limit switches for positive direction and negative direction must be connected to the T400 digital inputs. The drive is stopped when a limit switch is reached or passed. Then, only motion in the opposite direction is possible.

X drive. T400 parameter: H172 = Source, limit switch positive	Comment
H172 = 1113	Hardware signal T400 digital input, terminal 55.

X drive. T400 parameter: H173 = Source, limit switch negative	Comment
H173 = 1114	Hardware signal T400 digital input, terminal 56.

Y drive. T400 parameter: H572 = Source, limit switch positive	Comment
H572 = 1117	Hardware signal T400 digital input, terminal 59.

Y drive. T400 parameter: H573 = Source, limit switch negative	Comment
H573 = 1118	Hardware signal T400 digital input, terminal 60.

The control logic expects positive logic (limit switch active = 1). It may be necessary to correspondingly invert the digital inputs using parameter H031.

The hardware limit switches of the Z drive are connected to the terminal expansion EB1 in the basic unit, refer to Section 6.2.3. They are evaluated in the basic unit of the Z drive.

6.2.5.4 Hardware pre limit switches

The hardware pre limit switches for the positive direction and the negative direction must be connected to the T400 digital inputs.

When a limit switch is reached or passed, the drive moves with a lower velocity. Full velocity is possible when traversing in the opposite direction.

X drive. T400 parameter: H170 = Source, pre limit switch positive	Comment
H170 = 1111	Hardware signal T400 digital input, terminal 53.

X drive. T400 parameter: H171 = Source, pre limit switch negative	Comment
H171 = 1112	Hardware signal T400 digital input, terminal 54.

Y drive. T400 parameter: H570 = Source, pre limit switch positive	Comment
H570 = 1115	Hardware signal T400 digital input, terminal 57.

Y drive. T400 parameter: H571 = Source, pre limit switch negative	Comment
H571 = 1116	Hardware signal T400 digital input, terminal 58.

The control logic expects positive logic (limit switch active = 1). It may be necessary to appropriately invert the digital inputs using parameter H031.

The hardware limit switches of the Z drive are connected to the terminal expansion EB1 in the basic unit, refer to Section 6.2.3. They are evaluated in the basic unit of the Z drive.

6.2.5.5 Powering-up / powering-down

When powered-down, the drive is in the power-on inhibit status. If mechanical brakes are available, these are closed.

The drive receives the on command with the signal "On/no mechanical stop" =1 and it is then in the ready status. The brakes are still closed.

6SE70: Power-on inhibit = display 008 on the PMU,
Ready = display 011 on the PMU.

6RA70: Power-on inhibit = display o10 on the PMU,
Ready = display 01 on the PMU.

NOTE

Switch into the factory setting – if available – the X drive, Y drive and Z drive with the same signal.

If an external control is used instead of the T400 control, the powered-up status must still be detected in the T400. This can be realized by evaluating the "Operation from CU" bit.

Setting versions:

X drive. T400 parameter: H105 = Source, power-on 1	Comment
H105 = 2049	Hardware signal at X basic unit, terminal –X101:7
H105 = 2013	Digital signal "Operation from CU", if an external control is used

Y drive. T400 parameter: H505 = Source, power-on 1	Comment
H505 = 2049	Hardware signal at X basic unit, terminal –X101:7
H505 = 3013	Digital signal "Operation from CU", if an external control is used

Z drive. T400 parameter: L105 = Source, power-on 1	Comment
L105 = 2049	Hardware signal at X basic unit, terminal –X101:7
L105 = 1213	Digital signal "Operation from CU", if an external control is used

The drive immediately receives the off command with the "On/no mechanical stop" = 0 signal - i.e. a mechanical stop. The brakes close and the drive is in the power-on inhibit state (008 to PMU).

Setting versions:

X drive. T400 parameter: H111 = Source, electrical off 1	Comment
H111 = 2075	Inverted HW signal at the X basic unit, terminal –X101:7
H111 = 2029	"No operation from CU", if an external control is being used

Y drive. T400 parameter: H511 = Source, electrical off 1	Comment
H511 = 2075	Inverted HW signal at the Y basic unit, terminal –X101:7
H511 = 3029	"No operation from CU", if an external control is being used

Z drive. T400 parameter: L111 = Source, electrical off 1	Comment
L111 = 2075	Inverted HW signal at the Y basic unit, terminal X101:7
L111 = 1229	"No operation from CU", if an external control is being used

A fault step is generated with the "Electrical stop" signal.

The drive goes down to speed 0 (without the anti sway control activated) (standard stop) and then powers-down. Fault F035 for CUVC/CUMC or F021 for CUD1, is generated.

The Z drive can only initiate a standard stop - however it does not output a fault number.

X drive. T400 parameter: H108 = Source, standard stop 1	Comment
H108 = 2076	Inverted HW signal at the X basic unit, terminal –X101:8

Y drive. T400 parameter: H508 = Source, standard stop 1	Comment
H508 = 3076	Inverted HW signal at the Y basic unit, terminal –X101:7

Z drive. T400 parameter: L108 = Source, standard stop 1	Comment
L108 = 1276	Inverted HW signal at the Z basic unit, terminal –X101:7

6.2.5.6 Traversing command

If an external control is used instead of the T400 control, the traversing commands must be output in parallel to the T400, as the anti sway control requires these.

With the internal control of the T400, initially, the inverter is enabled with the traversing command (operating enable). After the motor has been magnetized (for induction motors), the brakes are opened and the setpoint is enabled.

If the entered speed setpoint remains at 0, the drive remains closed-loop controlled at 0 speed.

WARNING

The drive runs with the specified speed after the traversing command has been output!

The traversing commands for direction 1 (positive) and for direction 2 (negative) can be separately processed. However, it is only possible to operate with one traversing command. The direction is defined by the sign of the master switch setpoint.

X drive. T400 parameter: H159 = Source, traversing command negative	Comment
H159 = 1121	Hardware signal, T400 digital input, terminal 48
H159 = 1119	Hardware signal, T400 digital input, terminal 46 Identical with the positive traversing command, if there is only 1 traversing command.
H159 = 1023	Control signal from Profibus. Word 1, bit 2

X drive. T400 parameter: H160 = Source, traversing command positive	Comment
H160 = 1119	Hardware signal, T400 digital input, terminal 46
H160 = 1022	Control signal from Profibus. Word 1, bit 1

Y drive. T400 parameter: H559 = Source, traversing command negative	Comment
H559 = 1122	Hardware signal, T400 digital input, terminal 49
H559 = 1120	Hardware signal, T400 digital input, terminal 47 Identical with the positive traversing command if there is only 1 traversing command.
H559 = 1025	Control signal from Profibus. Word 1, bit 4

Y drive. T400 parameter: H560 = Source, traversing command positive	Comment
H560 = 1120	Hardware signal, T400 digital input, terminal 47
H560 = 1024	Control signal from Profibus. Word 1, bit 3

Z drive. T400 parameter: H559 = Source, traversing command negative	Comment
H559 = 1254	Hardware signal at the Z basic unit, EB1 terminal 44. The prerequisite is the basic unit parameterization for CUVC/CUMC: U076.04 = 5107, and for CUD1: U113.04 = 5107
H559 = 1027	Control signal from Profibus. Word 1, bit 6

Z drive. T400 parameter: H560 = Source, traversing command positive	Comment
H560 = 1255	Hardware signal at the Z basic unit, EB1 terminal 46. The prerequisite is the basic unit parameterization for CUVC/CUMC: U076.05 = 5111, and for CUD1: U113.05 = 5111
H560 = 1026	Control signal from Profibus. Word 1, bit 5

If the traversing command is withdrawn, the drive speed setpoint is ramped-down. At speed n = 0, the setpoint is inhibited, the brakes closed and the inverter inhibited. The drive is then in the ready state (PMU display 011 or o1).

In the anti-sway controlled mode (not conventional) the resulting traversing command is available longer than that entered, i.e. after the master switch has been released, a traversing command is still present.

The shutdown criterium is a load velocity = 0 and not trolley or traversing velocity = 0.

The traversing command is always withdrawn, at the latest, after the time in H331 (for X drive) or H731 (for Y drive) has expired.

6.2.5.7 Setpoint enable

If an external control is being used instead of the T400 control, the setpoint can be directly enabled from the external control.

X drive. Using the internal control	Comment
H156 = 2202	The inverter is enabled from the internal control
H157 = 1000	No external setpoint enable

X drive. External control	Comment
H156 = 1000	The inverter is enabled from the internal control
H157 = 1069	The setpoint is enabled externally, e.g. bit 8, word 4 from CBP (Profibus)

Y drive. Using the internal control	Comment
H556 = 3202	The inverter is enabled from the internal control
H557 = 1000	No external setpoint enable

Y drive. External control	Comment
H556 = 1000	The inverter is enabled from the internal control
H557 = 1070	The setpoint is enabled externally, e.g. bit 9, word 4 from CBP (Profibus)

Z drive. Using the internal control	Comment
L156 = 1302	The inverter is enabled from the internal control
L157 = 1000	No external setpoint enable

Z drive. External control	Comment
L156 = 1000	The inverter is enabled from the internal control
L157 = 1071	The setpoint is enabled externally, e. g. bit 10, word 4 from CBP (Profibus)

After the drive was powered-up (status 011 for 6SE70) it moves with the specified speed setpoint with the traversing command and the setpoint enable.

6.2.6 Pulse encoder and absolute value encoder at T400

The T400 allows 2 pulse encoders and 2 absolute value encoders to be connected.

It is now shown how the position actual value is normalized, which is generated from pulse encoder input 1, furthermore, how the position actual value is normalized which is received from the absolute value encoder input 1.

The settings for pulse encoder input 2 and absolute value encoder 2 are made according to the same concept.

NOTE

After the pulse encoder and absolute value encoder inputs have been parameterized, the unit must be powered-down and powered-up again so that the values are accepted (INIT values)

6.2.6.1 Parameterizing pulse encoder input 1

If pulse encoder input 1 should supply the position actual value for a drive, the following parameters must be entered - also refer to Section 3.2.10 and function chart A30.

H200	Pulses per revolution	From the pulse encoder data sheet, e.g. 1024 pulses per revolution
H202	Number of rated pulses	Example: The ratio, pulse encoder revolution to velocity is given: i = 13 revolutions per m. H202 is calculated as follows: 4 * H200 * i H202 = 4 * 1024 * 13 = 53248
H203	Mode, pulse encoder	Example: Pulse encoder 1 should supply the position actual value for the X drive. The pulses are received from the motor encoder via the basic unit (bit 6 = 1), the synchronizing pulse from the hardware reference point is connected to the T400, terminal 83 (bit 7 = 0). All of the other settings are standard as specified in Section 3.2.10. H203 = FE42

H193	Enable data save, position actual value in the NOVRAM	Example: H193 = 1 The position actual value is saved in the NOVRAM and is therefore available after the T400 is powered-down and powered-up again. The value only represents the actual position if the drive was no longer moved after the position actual value was saved. (If H193 = 0, then the system must be re-referenced after power-down and power-up again. This means that it must be conventionally moved over the hardware reference point so that the synchronizing pulse is detected.)
H195	Source, synchronizing position actual value	Example: H195 = 1001, fixed bit "1". The setting value is set when the synchronizing pulse is detected as position actual value.
H196	Source, setting value for synchronizing pulse	Example: H196 = 80, the setting value is the fixed setpoint H080. If the hardware reference point is 10.0 m, then the setting value H080 = 10.0.
H197	Range, enable synchronizing pulse	Example: H197 = 0.05. The setting value is only set if the synchronizing pulse is received within the ± 5 cm from the hardware reference point. With the above specified values, between 9.95 m and 10.05 m.

NOTE

H200 – H203 are INIT values, i.e. T400 must be powered-down after parameter changes have been made.

After this parameter has been entered a check must be made as to whether the length displayed in d210 coincides with the actual length.

In this case, the drive must be moved over the hardware reference point conventionally through a defined distance.

Example:
Hardware reference point = 10.0 m.
After the reference point has been passed, d210 must be set to 10.0 m. If this was not the case, the synchronizing pulse was not detected. The hardware should then be checked together with the above mentioned parameter settings.

The real distance from the hardware reference point to the actual position should be 20.0 m.
20.0 must be located in d210. If not, H202 must be adapted:
H202 = H202old * d210 / 20.0.

H202 is an INIT value which means that T400 must be powered-down. The check should then be repeated.

6.2.6.2 Parameterizing the absolute value encoder input 1

If absolute value encoder input 1 should supply the position actual value for the X drive, the following parameter settings must be entered, also refer to Section 3.2.11 and function chart A35.

Parameters H220 to H227 should be set from the data sheet of the encoder or the encoder type.

NOTE

These are INIT values, i.e. T400 must be powered-down after parameter changes have been made.

Parameters H231, H240, H241, H248 and H249 must be determined during the distance normalization procedure.

Procedure when normalizing the distance

1 Prerequisites:
H231 = 0.0 (offset, zero position).
H240 = 0.0 (offset, number of revolutions).
H241 = 1.0 (scaling factor).
H248 = 0 (multiplication of the scaling factor).
Example: The defined first position should be 10.0 m: H249 = 10.0.
These values should first be entered.

2 Move to the first position (in this case, 10.0 m). The first position is now used as virtual zero.
Read-off d235 and enter into H231.
Read-off d236 and enter into H240.
10.0 must now be in d242 (position actual value in [m]).

3 Move to any defined second position. The distance to the first position must be known (measured with a tape measure).
Read-off d242.

4 The distance measured with the tape measure is assumed to be 15.0 m, i.e. the second position is 10.0 m + 15.0 m
= 25.0 m.

The scaling factor H241 must now be determined. Furthermore, it must be checked as to whether the scaling factor H241 must be multiplied or divided. It is multiplied if it is greater than 0.1; it is divided, if it less than 0.1. For multiplication, H248 should be set to 0 and for division, H248 should be set to 1.

Example 1:
The value in d242 for the second position should be 15.83.
H241 should be calculated: H241 = (distance2 – distance1) / (d242 – distance1);
with distance1 = first position and distance2 = second position.
Distance1 = 10.0. Distance2 = 25.0, d242 = 15.83.
This means that H241 = 15.0 / (15.83 – 10.0) = 2.573.
This value is greater than 0.1; therefore H248 is left at 0.

Example 2:
The value in d242 for the second position should be 2345.6.
Then H241 = 15.0 / (2345.6 – 10.0) = 0.0064223.
This value is less than 0.1.
This means that H248 is set to 1 and H241 = 1 /0.0064223 = 155.707.

5 **Check:** Move to the "first position" and read-off d242 (in this case, d242 = 10.0). Then move to the "second position" and read-off d242 (in this case, d242 = 25.0).

6.2.7 Parameterizing the setpoint inputs

The main setpoint or the master switch setpoint can come from an analog input or via Profibus:

X drive. T400 parameter: H272 = Source, main speed setpoint	Comment
H272 = 44	T400 analog input 1, terminal 90, 91
H272 = 22	Word 2 from Profibus

Y drive. T400 parameter: H672 = Source, main speed setpoint	Comment
H672 = 49	T400 analog input 1, terminal 92, 93
H672 = 25	Word 5 from Profibus

Z drive. T400 parameter: L272 = Source, main speed setpoint	Comment
L272 = 54	T400 analog input 3, terminal 94, 89
L272 = 27	Word 7 from Profibus

NOTE
The setpoint is only transferred if a traversing command is present. The setpoint which has been transferred is displayed in parameters d275 (d675, c275).

In the anti sway controlled mode (non conventional mode), for the X and Y drive, the anti sway control influences the additional setpoint characteristic.

In the conventional mode, the setpoint is transferred to the basic unit via a ramp-function generator (display parameter d165 for X, d565 for Y). The ramp-up time is set in H162 (H562) and the ramp-down time in H163 (H563), refer to function chart CX4 (CY4).

For the Z drive, the speed setpoint is transferred to the basic unit without ramp-function generator (display parameter c279). The ramp-function generator of the basic unit is used (parameter P462, P464 for CUVC/CUMC or P303, P304 for CUD1).

6.2.8 Commissioning the anti sway control

The anti sway control can only be set for the X and Y drives.

6.2.8.1 Selecting the position actual value and pendulum length

The anti sway control of the X drive requires the position actual value and the pendulum length; the Y drive also requires the position actual value and pendulum length, also refer to function chart A40 in Section 3.
These signals can be received from various sources, which can be selected using H215, H243, H615 and H643:

Position actual value, X drive (can be monitored in parameter d217, units [m])		
Source	**Parameterization**	**Comment**
No position measurement (default)	H215 = 213	There is only one motor encoder which cannot be used to measure the position, or it involves a drive with CUVC basic unit which is operated with closed-loop frequency control (there is no motor encoder). The position actual value is calculated for the anti sway control. *1)
Pulse encoder 1 (terminals 81 – 85)	H215 = 210	Here, the motor pulse encoder pulses can be received from the basic unit, depending on the setting of H203 (mode, pulse encoder 1, refer to Section 3.2.10).
Pulse encoder 2 (terminals 62 – 66)	H215 = 610	
Absolute value encoder 1 (terminals 76 – 79)	H215 = 242	
Absolute value encoder 2 (terminals 72 – 75)	H215 = 642	

Position actual value, Y drive (can be monitored in parameter d617, units [m])		
Source	**Parameterization**	**Comment**
No position measurement (default)	H615 = 613	There is only one motor encoder which cannot be used to measure the position, or it involves a drive with CUVC basic unit which is operated with closed-loop frequency control (there is no motor encoder). The position actual value is calculated for the anti sway control. *1)
Pulse encoder 1 (terminals 81 – 85)	H615 = 210	
Pulse encoder 2 (terminals 62 – 66)	H615 = 610	
Absolute value encoder 1 (terminals 76 – 79)	H615 = 242	
Absolute value encoder 2 (terminals 72 – 75)	H615 = 642	

Pendulum length, X drive (can be monitored in parameter d245, units [m]) **Pendulum length X = hoisting gear distance + offset_X + offset_load center of gravity**		
Source	**Parameterization**	**Comment**
Profibus, e.g. word 9	H243 = 29	Observe the normalization factor for conversion to meters. For word 9: H076.
Pulse encoder 1 (terminals 81 – 85)	H243 = 210	Distance, which the hoisting gear moves
Pulse encoder 2 (terminals 62 – 66)	H243 = 610	Distance, which the hoisting gear moves
Absolute value encoder 1 (terminals 76 – 79) (default)	H243 = 242	Distance, which the hoisting gear moves
Absolute value encoder 2 (terminals 72 – 75)	H243 = 642	Distance, which the hoisting gear moves

Pendulum length, Y drive (can be monitored in parameter d645, units [m]) **Pendulum length Y = hoisting gear distance + offset_Y + offset_load center of gravity**		
Source	**Parameterization**	**Comment**
Profibus, e.g. word 10	H643 = 30	Observe the normalization factor for conversion to meters. For word 10: H077
Pulse encoder 1 (terminals 81 – 85)	H643 = 210	Distance, which the hoisting gear moves
Pulse encoder 2 (terminals 62 – 66)	H643 = 610	Distance, which the hoisting gear moves
Absolute value encoder 1 (terminals 76 – 79)	H643 = 242	Distance, which the hoisting gear moves
Absolute value encoder 2 (terminals 72 – 75) (default)	H643 = 642	Distance, which the hoisting gear moves

NOTES

*1) The position actual value must be calculated so that for the specified velocity, the correct distance is moved through.

The calculated distance is correct if the speed normalization in the basic unit (CUVC/CUMC: P353, or CUD1: P143) has been correctly calibrated and adjusted to the maximum velocity (H328 for X drive or H728 for Y drive).

This can be checked by conventionally moving the drive (without anti sway control, H161 = 1001 or H561 = 1001) through a specific distance, e. g. 5 m. This distance must then also be displayed in parameter d217 or d617.

If there is deviation > 10 %, then parameter H328 or H728 should be checked and re-set as well as the speed calibration in the basic unit.

IMPORTANT

H216 (for X drive) and H616 (for Y drive) have the value 0 in the factory setting. These parameters must be set so that the position actual value in d217 or d617 is available in the units [m]. Normally, the setting H216 = 1.0 and H616 = 1.0 should be selected.

6.2.8.2 Setting and normalizing the pendulum length for X drive and Y drive

Generally, the pendulum lengths for the X drive and Y drive are different which means that they must be separately set. The pendulum length comprises the distance moved by the hoisting gear, a correction factor and a correction factor for the load center of gravity.
The hoisting gear distance can be used to calculate both pendulum lengths.

The hoisting gear distance should = 0 m at the upper limit switch. If the load suspension equipment is at the floor level, then the hoisting gear distance is z_{max}.

The correction factor is the difference between the hoisting gear distance and the physical pendulum length.
The physical pendulum length is determined by moving the load suspension equipment to a center (average) hoisting height and, in the conventional mode, initially making it oscillate in the X axis. The time for 10 pendulum oscillations is measured using a stopwatch. The stopwatch should be started and stopped where the pendulum oscillation reverses. The pendulum period is T_{PX} = measuring time / 10.
The physical pendulum length is calculated as follows

$l_{phys} = T_{PX}^2 * 9.81 / (4 * \pi^2)$; for e.g. T_{PX}=3.0 s l_{phys} = 2.24 m is obtained.

The following still applies: Correction factor = $l_{phys} - l_{HX}$.

If the hoisting height, read-off in parameter d245, e.g. l_{HX} = 2 m, then the X correction factor = 0.24 m. The X correction factor can be entered into H090 and added to the hoisting gear distance using H244 = 90.
The value of the physical pendulum length must now be in d245.

The Y correction factor is determined using the same technique as the X correction factor. The oscillation to determine the pendulum period must be made in the Y axis.
The Y correction factor can be entered into H091 and be added to the hoisting gear distance using H644 = 91.
The value of the physical pendulum length must now be in d645.

There is a common correction factor for the load center of gravity for the X and Y drives.
The load center of gravity correction factor is required if the physical pendulum length significantly changes as soon as a load is connected to the load suspension equipment. This correction factor is also determined using the pendulum trial described above. The correction factor is obtained from the change of the physical pendulum length with and without load.

The correction factor of the load center of gravity is entered into H984; it is then added to the hoisting gear distance and correction factor.
Up to four different correction factors can be entered for the load center of gravity (parameters H984 – H987). Two control bits, which can be selected with H980 and H981 are used to make this selection.

T400 parameters	Comment
H980	Source, bit0 select correction factor, load center of gravity
H981	Source, bit1 select correction factor, load center of gravity
d983	Displays the selected parameter number (984 – 987)
H984	Correction factor 1st selected, if bit0 = 0 and bit1 = 0
H985	Correction factor 2nd selected, if bit0 = 1 and bit1 = 0
H986	Correction factor 2nd selected, if bit0 = 0 and bit1 = 1
H987	Correction factor 2nd selected, if bit0 = 1 and bit1 = 1
d992	Selected correction factor

Furthermore, a continuous correction factor can be entered for the load center of gravity using selection parameters H246 and H646 (function chart A40).

6.2.8.3 Entering the control parameters for the anti sway control

The values of the maximum velocity in m/s, the largest occurring pendulum length and the smallest occurring pendulum length in m are important when determining the subsequent parameters.

The speed calibration (adjustment) in the basic unit (for CUVC/CUMC: P353, or CUD1: P143) must be made so that for 100 % (CUVC basic unit parameter r447) or 1.0 (T400 parameter, X drive d165) setpoint, the system moves with the maximum velocity.

The table indicates which parameters must be set. The parameters which are not mentioned, between H301 – H333 or H701 – H733, can remain at the factory setting.

X drive parameters	Y drive parameters	Comment
H309	H709	Pre-setting (default) 0.5 m. Must then only be set to the lowest possible pendulum length, if this is less than 0.5 m.
H311	H711	Largest occurring pendulum length 1 in m
H312	H712	KV1. control parameter 1 for pendulum length 1
H313	H713	KV2. control parameter 2 for pendulum length 1
H314	H714	KV3. control parameter 3 for pendulum length 1
H315	H715	Lowest occurring pendulum length 2 in m
H316	H716	KV1. control parameter 1 for pendulum length 2
H317	H717	KV2. control parameter 2 for pendulum length 2
H318	H718	KV3. control parameter 3 for pendulum length 2
H322	H722	Damping coefficient of the crane model
H328	H728	Maximum velocity in m/s
H333	H733	Overshoot factor for controller limiting

The control parameters KV1, KV2, KV3 are essentially dependent on the pendulum length and the maximum velocity.

The values for KV1, KV2 and KV3 can be empirically determined using the following formulas:

- KV1 = (1.2 / vmax) * lp
- KV3 = lp / 28
- KV2 = (KV3 – 1) / vmax

with vmax = max. velocity [m/s], lp = pendulum length [m].

Example for X drive: vmax = 0.65 m/s; lp1 = 10 m; lp2 = 2 m.

H311 = 10.0 (longest pendulum length lp1).
H312 = 18.462 (KV1 for lp1)
H313 = -0.989 (KV2 for lp1)
H314 = 0.357 (KV3 for lp1)
H315 = 2.0 (longest pendulum length lp2).
H316 = 3.692 (KV1 for lp2)
H317 = -1.429 (KV2 for lp2)
H318 = 0.071 (KV3 for lp2)
H328 = 0.65 (maximum velocity)

NOTE

Under certain circumstances, the crane can run-on for a very long time after a traversing command has been withdrawn (i.e. after the master switch has been released).
The reason for this could be that the value of control parameter KV3 is too low.
In this case, KV3 must be set higher so that the run-on time is reduced.
For pendulum length lp1, $KV3_1$ can be set to 0.8; for pendulum length lp2, $KV3_2$ can be set to 0.3. The associated parameters $KV2_1$ and $KV2_2$ must be calculated and set according to the previously specified formula.
After the settings have been changed, the traversing characteristic (speed setpoint or speed actual value) should be traced on an oscilloscope. The KV3 parameters should be reduced if the overshoot is too high, exceeding 100 %.

The damping coefficient of the crane model (H322, H722) is set so that the oscillation in the calculation model decays just like a real oscillation.

Generally, these parameters can be kept at the factory setting.

Normally, the overshoot factor H333, H733 can be kept at 0.0. If a value is set, e.g. 0.05, then the maximum steady-state velocity is only 95 % of the maximum velocity.

However, a control margin is obtained, which again compensates for the disadvantage of a lower rated velocity.

NOTE

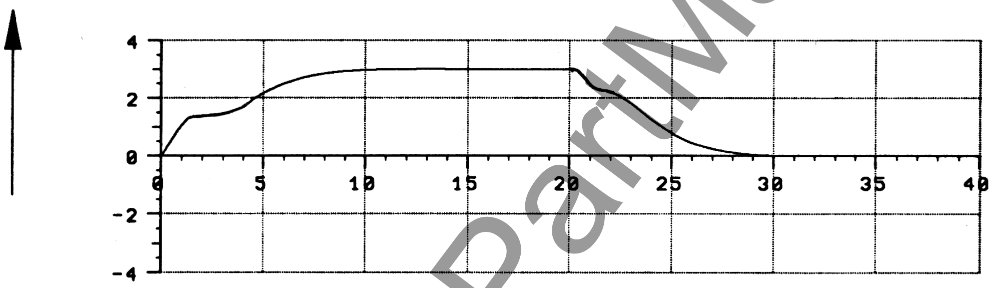
The conventional mode, if set must be again disabled with H161 = 1000 (or H561 = 1000) so that the anti sway control is activated.

After setting all of the anti sway control parameters, the load should now be moved without any pendulum motion (sway), if a traversing command and a setpoint are entered.

If pendulum motion (sway) does occur, the following must be checked:

- Is the pendulum length correct? (check using parameters d245 and d645)
- Has the speed been correctly calibrated, i.e. is maximum velocity reached at 100% setpoint?
- Are the control parameters incorrect? Using an oscilloscope, check the traversing characteristic (speed setpoint, e.g. connector KR0165).

The curve characteristic should look roughly like this:



A characteristic as shown above must be possible by suitably changing KV1, KV2 and KV3. The oscillation (sway) is then dampened.

Information on parameterization when sensing the pendulum angle from a camera system

For the exceptional case that the pendulum angle is sensed, additional parameter settings are required:

X drive, parameter	Y drive, parameter	Comment
H307 = 365	H707 = 765	Source, pendulum angle = prediction output
H319	H719	Calculation model parameter BK1
H320	H720	Calculation model parameter BK2
H321	H721	Calculation model parameter BK3
H340 = 2301	H740 = 3301	Switch-in pendulum angle sensing (measurement o.k.)
H350	H750	Source, hoisting height, e.g. KR0242, position actual value
H351	H751	Distance, pendulum point – reflector for a hoisting height of 0 m
H352	H752	Distance, pendulum point – camera
H353	H753	Source, pendulum angle from the camera (generally from PROFIBUS)
H354	H754	Adaption factor, optical normalization factor K_OPT. Factor to convert the camera signal into a pendulum angle [rad]
H356	H756	Lower range limit for a valid camera signal
H357	H757	Upper range limit for a valid camera signal
H358	H758	Source, digital signal "Fault, pendulum angle sensing" (from PROFIBUS)
H362	H762	Source, digital signal "Reflector found"; the measured value is calculated in the prediction function (signal from PROFIBUS, approx. every 60 ms).
L301 – L340	L701 – L740	Polygon set of characteristics for the pendulum angle offset

Information and instructions to set these parameters can be obtained by contacting the A&D MC PM2 specialist department.

6.2.9 Commissioning the closed-loop position control

The closed-loop position control only has to be set if positioning is required.

If closed-loop position control is used, a CBP2 communications module is required.

For certain plants, under certain circumstances, the CBP2 is not required (e. g. only an X drive with CUVC or CUMC basic unit and terminal expansion EB1).

In this case, the user himself defines the input and output signals.

6.2.9.1 Selecting the position actual value

The position actual value can be received from several sources, as explained in Section 6.2.8.1:
- pulse encoder connection at T400 (2 inputs),
- pulse encoder connection at the motor (1 input, only for X drive),
- absolute value encoder at T400 (2 inputs).

It is also conceivable that the position actual value comes from PROFIBUS DP (this could be critical as a result of the slower data transfer) or from the basic unit (CUMC or CUD1). These two versions are not described in any more detail here.

The position actual value is selected using the following parameters, also refer to Section 6.2.8.1:

Parameter	Comment	Function chart in Section 3
H215	Position actual value for closed-loop position control and for anti sway control of the X drive	A40
H615	Position actual value for closed-loop position control and for anti sway control of the Y drive	A40
L215	Position actual value for the closed-loop position control of the Z drive	DZ2

The selected position actual value has the units [m].

When using a pulse encoder or absolute value encoder, the settings, as described in Section 6.2.6, must be made.

6.2.9.2 Selecting the position reference value

The position reference value is selected using H455 or H855:

X drive. T400 parameter: H455 = Source, position reference value	Comment
H455 = 22	Word 2 from Profibus *1)
H455 = 37	Word 2 and word 3 from Profibus *1)
H455 = 449	Reference position which can be selected using 3 control bits *2)

Y drive. T400 parameter: H855 = Source, position reference value	Comment
H855 = 25	Word 5 from Profibus *1)
H455 = 38	Word 5 and word 6 from Profibus *1)
H855 = 849	Reference position which can be selected using 3 control bits *2)

Z drive. T400 parameter: L455 = Source, position reference value	Comment
L455 = 27	Word 7 from Profibus *1)
L455 = 940	Reference position which can be selected using 3 control bits *2)

NOTES

*1) Observe the normalization factor when converting to meters!

- Example 1: The received value 5000 should correspond to 50.00 m.
  Normalization factor, word 2:
  H070 = 16384 / 5000 * 50.0 = 163.84.
- Example 2: The received value 16384 (100%) should correspond to 50.00 m.
  Normalization factor, word 2:
  H070 = 16384 / 16384 * 50.0 = 50.0.
- Example 3: The received value 1000000 should correspond to 100.0000 m.
  This value is received as double word in word 2 (high word) and word 3 (low word).
  Normalization factor H070 = 1073741824 / 1000000 * 100.0000 = 107374.180.
  Note: In this example, H070 cannot be calculated with any more accuracy, as the resolution of REAL numbers in the T400 only includes 8 digits.
- Example 4: The received value 1073741824 (100%) should correspond to 100.0000 m .
  The word is received as double word in word 2 (high word) and word 3 (low word). Normalization factor
  H070 = 1073741824 / 1073741824 * 100.0000 = 100.000.

*2) Up to 8 different position reference values can be selected using three control bits.
For more detailed information, refer to function chart DX1, DY1, DZ1 in Section 3.

6.2.9.3 Positioning control (open-loop)

For positioning, a traversing command is not required, but instead a starting signal. Positioning is completed if a stop signal is entered.

X drive. T400 parameter: H453 = Source, start positioning	Comment
H453 = 1119	Hardware signal, T400 digital input, terminal 46, identical to the traversing command signal, positive
H453 = 1029	Control signal from Profibus. Word 1, bit 8

X drive. T400 parameter: H454 = Source, stop positioning	Comment
H454 = 1135	Inverted hardware signal, T400 digital input, terminal 46, identical to "No traversing command"
H454 = 1030	Control signal from Profibus. Word 1, bit 9

Y drive. T400 parameter: H853 = Source, start positioning	Comment
H853 = 1120	Hardware signal, T400 digital input, terminal 47, identical to the traversing command signal, positive
H853 = 1032	Control signal from Profibus. Word 1, bit 11

Y drive. T400 parameter: H854 = Source, stop positioning	Comment
H854 = 1136	Inverted hardware signal, T400 digital input, terminal 47, identical to "No traversing command"
H854 = 1033	Control signal from Profibus. Word 1, bit 12

Z drive. T400 parameter: L453 = Source, start positioning	Comment
L453 = 1034	Control signal from Profibus. Word 1, bit 13

Z drive. T400 parameter: L454 = Source, stop positioning	Comment
L454 = 1035	Control signal from Profibus. Word 1, bit 14

With the "Start positioning" command, the inverter is first enabled. After the motor has been magnetized (for induction motors), the brakes are opened and the setpoint is enabled.
The drive remains stationary, closed-loop controlled if the entered speed setpoint is still 0.

WARNING

After the "Start positioning" command, the drive runs with the specified speed!

If the "Stop positioning" command is output, the drive speed setpoint is ramped-down. At speed n = 0, the setpoint is inhibited, the brakes closed and the inverter inhibited. The drive is then in the ready state (PMU display 011).

6.2.9.4 Position controller setting

We recommend that the position controller, version 1 is used, as it is easier to set the parameters.

Version 1 or 2 is set using parameter H486 or H886. Independent of version 1 or 2, the source for the maximum positioning velocity can be set using parameter H485 or H885.

X drive. T400 parameter: H486 = Source, position controller output	Comment
H486 = 464	Version 1
H486 = 480	Version 2
H485 = 275	Maximum positioning velocity is limited by the main setpoint (master switch).
H485 = 82	The maximum positioning velocity is limited by the fixed setpoint, H082

Y drive. T400 parameter: H886 = Source, position controller output	Comment
H886 = 864	Version 1
H886 = 880	Version 2
H885 = 675	Maximum positioning velocity is limited by the main setpoint (master switch).
H885 = 83	The maximum positioning velocity is limited by the fixed setpoint, H083

Z drive. T400 parameter: L486 = Source, position controller output	Comment
L486 = 948	Version 1
L486 = 951	Version 2
L485 = 962	Maximum positioning velocity is limited by the main setpoint (master switch).
L485 = 84	The maximum positioning velocity is limited by the fixed setpoint, H084

Only the X drive is described in the following text: The corresponding applies for the Y and Z drives.

For version 1, essentially, the following parameters must be set and checked:

X drive T400 parameters	Comment
H460	Adapts the gain factor as a function of the pendulum length. H460 = 2 / l_{PMAX} with l_{PMAX} = maximum pendulum length. If l_{PMAX} = 20 m, then H460 = 0.1.
H461	For anti-sway controlled operation: Gain factor KP1 (this defines the initiation point for the speed setpoint limiting)
H491	In conventional operation: Gain factor KP1 (this defines the initiation point for the speed setpoint limiting)
d462	Effective gain factor KP1
H463	In anti-sway controlled operation: Gain factor KP2 (defines the positioning dynamic response at the target point)
H492	In conventional operation: Gain factor KP2 (defines the positioning dynamic response at the target point)
H466	Ramp-up time for a speed setpoint after the start of positioning (default, 1000 ms)

KP1 and KP2 must be defined by making positioning trials.

As initial values, KP1 and KP2 can be defined as follows:

In conventional operation, KP1 = 2 / vmax / TH, whereby vmax. = maximum velocity and TH = ramp-down time, which the drive requires, under ideal conditions, to decelerate from vmax to 0.

Example:
vmax = 1.75 m/s, TH = 1.5 s (this means that the acceleration a = vmax/TH = 1.167 m/s²).
KP1 = 2 / 1.75 / 1.5 = 0.762 .

1. :Anti sway controlled operation, H161 = 1000

For anti sway controlled operation, it is possible to start with 0.5 * KP1. The pendulum length should be set to the maximum pendulum length. The factor KP2 can be set to KP2 = 2.

This means that H461 = 0.381, d462 must also be 0.381.

Furthermore, H463 = 2.0.

Positioning is now possible using these initial values. If overshoot occurs at the target position, then KP1 (H461) must be reduced until an asymptotic approach is obtained.

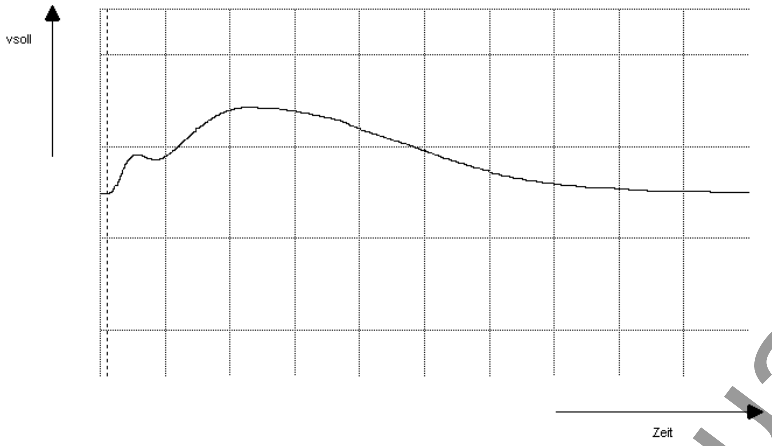


Fig. 6-3 Asymptotic approach to 0 speed at the target position

If pendulum motion is observed at the target point, then KP2 should be reduced (KP1 can then be set somewhat greater).

The following generally applies: The smaller that KP1 and KP2 are, then the slower is positioning. KP1 and KP2 should be set so that the target position is approached so that no overshoot occurs.
The accuracy is the highest here.

Positioning must be repeated for various pendulum lengths. If overshoot does not occur at the maximum pendulum length, then normally, overshoot does not occur for shorter pendulum lengths. However, if overshoot occurs, KP1, KP2 must be reduced.

2.: Conventional operation, H161 = 1001

In conventional operation, according to the example above, KP1 = 0.762 and KP2 = 2.0.
This means that H491 is set to 0.762 and H492 to 2.0.

Positioning is now possible with these initial values for KP1 and KP2. If overshoot is seen at the target position, then KP1 (H461) must be reduced until asymptotic approach is realized.

If pendulum motion is observed at the target point, then KP2 should be reduced (KP1 can then be set somewhat greater).

The following generally applies: The smaller that KP1 and KP2 are, then the slower is positioning. KP1 and KP2 should be set so that the target position is approached so that no overshoot occurs.

The accuracy is also the highest here.

For version 2, essentially, the following parameters must be set or checked:

X drive T400 parameters	Comment
H460	Adapts the gain factor depending on the pendulum length. H460 = 2 / maximum pendulum length (for max. pendulum length = 20.0 m: H460 = 0.1).
H471	In anti-sway controlled operation: Integration time, position ramp-function generator TI
H495	In conventional operation: Integration time, position ramp-function generator TI
d472	Effective integrating time TI
H473	Rounding-off time, TR speed setpoint ramp-function generator
H474	Ramp-up time, TH speed setpoint ramp-function generator
H475	Ramp-down time, TD speed setpoint ramp-function generator
H478	Upper limit, position controller
H479	In anti-sway controlled operation: Gain, KP position controller
H496	In conventional operation: Gain, KP position controller

H471 and H479 or H495 and H496 should be adjusted until the target position is approached without overshoot - but the target position should still be approached quickly.

Positioning in the anti-sway controlled mode should be repeated for various pendulum lengths.

■

Essential drive structures and circuit examples

7

Using specific examples, the user will be provided support about which signals must be connected.

7.1 Definitions

- For a crane with only one anti-sway controlled axis:
  According to the definition in these Operating Instructions, this is always the X axis.
- For a crane with two anti-sway controlled axes:
  The crane traversing gear (gantry traversing gear) is always the X axis and the trolley traversing gear is always the Y axis.
- The hoisting gear is always the Z axis.

7.2 Operational versions of the DRIVEPAC anti-sway control

The following configurations include the hardware components required and indicate the slots in the basic unit electronics box for the various operational versions with DRIVEPAC.
Refer to Section 1.4 for ordering data for the units.

Explanations

CUVC:	Basic unit processor Vector Control 6SE70
CUMC:	Basic unit processor Motion Control 6SE70
CUD1:	Basic unit processor 6RA70 DC-MASTER
CUD2:	Terminal expansion for CUD1
T400:	Technology module
SLB:	Supplementary module, SIMOLINK communications
CBP2:	Supplementary module, PROFIBUS DP communications
EB1:	Supplementary module, terminal expansion for CUVC, CUMC, CUD1
ADB:	Adapter board to accept two supplementary modules
LBA:	Local Bus Adapter to accept T400 and adapter module (adapter board) in the electronics box of the basic unit. The LBA is required as soon as slots 2 and/or 3 are required.
SBx:	Motor encoder module for CUMC. The slot in LBA is always slot C. There are motor encoders for resolver evaluation (SBR1, SBR2), for encoder evaluation (SBM1, SBM2) and for pulse encoders (SBP).

NOTE

The slots numbers are explained in Section 6.1.

Version 0.1: Manual operation, single operation X, Y, or Z drive without T400. CUVC.

Drive		
Slot		
1	3	2
CUVC A: EB1 C: ---		

Version 0.2: Manual operation, single operation X, Y, or Z drive without T400. CUMC.

Drive		
Slot		
1	3	2
CUMC A: EB1 C: SBx		

Version 0.3: Manual operation, single operation X, Y, or Z drive without T400. CUD1 with CUD2.

Drive		
Slot		
1	3	2
CUD1 with CUD2		ADB D: EB1 E: ---

Version 1.1: Manual operation, X drive. CUVC.

X drive		
Slot		
1	3	2
CUVC A: --- C: ---		T400

Version 1.2: Manual operation, X drive. CUMC.

X drive		
Slot		
1	3	2
CUMC A: --- C: SBx		T400

Version 1.3: Manual operation, X drive. CUD1 with CUD2.

X drive		
Slot		
1	3	2
CUD1 with CUD2		T400

Version 2.1: Manual operation, X and Y drive. CUVC.

X drive		
Slot		
1	3	2
CUVC A: SLB C: ---		T400

Y drive		
Slot		
1	3	2
CUVC A: SLB C: ---		

Version 2.2: Manual operation, X and Y drive. CUMC.

X drive		
Slot		
1	3	2
CUVC A: SLB C: SBx		T400

Y drive		
Slot		
1	3	2
CUVC A: SLB C: SBx		

Version 2.3: Manual operation, X and Y drive. CUD1 with CUD2.

X drive		
Slot		
1	3	2
CUD1 with CUD2		T400

Y drive		
Slot		
1	3	2
CUD1 with CUD2		

Version 3.1: Closed-loop position controlled operation, X drive. CUVC.

X drive		
Slot		
1	3	2
CUVC A: --- C: ---	ADB F: --- G: CBP2	T400

Version 3.2: Closed-loop position controlled operation, X drive. CUMC.

X drive		
Slot		
1	3	2
CUVC A: --- C: SBx	ADB F: --- G: CBP2	T400

Version 3.3: Closed-loop position controlled operation, X drive. CUD1 with CUD2.

X drive		
Slot		
1	3	2
CUD1 with CUD2	ADB F: --- G: CBP2	T400

Version 4.1: Closed-loop position controlled operation, X and Y drive. CUVC.

X drive		
Slot		
1	3	2
CUVC A: SLB C: ---	ADB F: --- G: CBP2	T400

Y drive		
Slot		
1	3	2
CUVC A: SLB C: CBP2		

Version 4.2: Closed-loop position controlled operation, X and Y drive. CUMC.

X drive		
Slot		
1	3	2
CUVC A: SLB C: SBx	ADB F: --- G: CBP2	T400

Y drive		
Slot		
1	3	2
CUVC A: SLB C: SBx		ADB D: CBP2 E: ---

Version 4.3: Closed-loop position controlled operation, X and Y drive. CUD1 with CUD2.

X drive		
Slot		
1	3	2
CUD1 with CUD2	ADB F: --- G: CBP2	T400

Y drive		
Slot		
1	3	2
CUD1 with CUD2		ADB D: CBP2 E: ---

Version 5.1: Closed-loop position controlled operation or manual operation X drive and closed-loop position controlled operation, Z drive. CUVC.

X drive		
Slot		
1	3	2
CUVC A: SLB C: ---	ADB F: --- G: CBP2	T400

Z drive		
Slot		
1	3	2
CUVC A: SLB C: EB1		ADB D: CBP2 E: ---

Version 5.2: Closed-loop position controlled operation or manual operation X drive and closed-loop position controlled operation, Z drive. CUMC.

X drive		
Slot		
1	3	2
CUVC A: SLB C: SBx	ADB F: --- G: CBP2	T400

Z drive		
Slot		
1	3	2
CUVC A: SLB C: SBx		ADB D: EB1 E: CBP2

Version 5.3: Closed-loop position controlled operation or manual operation X drive and closed-loop position controlled operation, Z drive. CUD1 with CUD2.

X drive		
Slot		
1	3	2
CUD1 with CUD2	ADB F: --- G: CBP2	T400

Z drive		
Slot		
1	3	2
CUD1 with CUD2		ADB D: EB1 E: CBP2

Version 6.1: Closed-loop position controlled operation or manual operation X and Y drive and closed-loop position controlled operation, Z drive. CUVC.

X drive		
Slot		
1	3	2
CUVC A: SLB C: ---	ADB F: --- G: CBP2	T400

Y drive		
Slot		
1	3	2
CUVC A: SLB C: CBP2		

Z drive		
Slot		
1	3	2
CUVC A: SLB C: EB1		ADB D: CBP2 E: ---

Version 6.2: Closed-loop position controlled operation or manual operation X and Y drive and closed-loop position controlled operation, Z drive. CUMC.

X drive		
Slot		
1	3	2
CUVC A: SLB C: SBx	ADB F: --- G: CBP2	T400

Y drive		
Slot		
1	3	2
CUVC A: SLB C: SBx		ADB D: CBP2 E: ---

Z drive		
Slot		
1	3	2
CUVC A: SLB C: SBx		ADB D: EB1 E: CBP2

Version 6.3: Closed-loop position controlled operation or manual operation X and Y drive and closed-loop position controlled operation, Z drive. CUD1 with CUD2.

X drive		
Slot		
1	3	2
CUD1 with CUD2	ADB F: --- G: CBP2	T400

Y drive		
Slot		
1	3	2
CUD1 with CUD2		ADB D: CBP2 E: ---

Z drive		
Slot		
1	3	2
CUD1 with CUD2		ADB D: EB1 E: CBP2

Information regarding the previous configurations

- Versions 0.1, 0.2 and 0.3 are mainly intended for the pre-commissioning phase if the drive is to be used without a T400.
- For versions 3.1, 3.2 and 3.3 under certain circumstances communications module CBP2 is not required. This is because control signals for positioning and the selection signal for the position reference value can be entered via free T400 digital inputs (of the Y drive which is not used).
- For versions 4.1, 4.2 and 4.3, the CBP2 communications module for CUVC devices can, under certain circumstances, be eliminated if an additional terminal expansion EB1 is inserted in slot C of the CUVC.
  Control signals for positioning and selection signals for the position reference value can be entered via this EB1.
  For an X drive, for CUMC and CUD1 units, it is not possible to insert an EB1 as slot C is not available.

Additional information

- Other versions (e.g. mixing the various unit types) are possible under certain circumstances.
  These configurations and unit equipping are not described here and must be implemented by the user himself.
- The CBP2 communications module can also be used in the X drive in the manual mode, if a PROFIBUS DP coupling is required.
- CUVC units can also be operated in the closed-loop frequency control without motor encoder.
- The pendulum length is calculated from the position actual value of the hoisting gear (Z drive).
  An absolute value encoder or pulse encoder is required to sense this position actual value.
  The pendulum length can also be externally entered (e.g. via PROFIBUS).
- The position actual value of the X and Y drive for the anti-sway control can be approximately calculated from the speed and frequency actual value.
  An absolute value encoder or pulse encoder must be used for the closed-loop position control.

The T400 has two absolute value encoder connections and two pulse encoder connections.
The preferred versions of the position actual value sensing are shown below:

Version	Source, position actual value for the Z drive (closed-loop position control Z, determining the pendulum length)	Source, position actual value for the X drive	Source, position actual value for the Y drive
Manual operation. X drive	Absolute value encoder 1 or PROFIBUS DP	---	---
Manual operation. X and Y drives	Absolute value encoder 1 or PROFIBUS DP	---	---
Closed-loop position control X drive	Absolute value encoder 1 or PROFIBUS DP	Absolute value encoder 2, absolute value encoder 1 or pulse encoder 1	---
Closed-loop position control X and Y drives	Absolute value encoder 1 or PROFIBUS DP	Pulse encoder 1 or absolute value encoder 1	Pulse encoder 2 or absolute value encoder 2
Closed-loop position control X and Z drives	Absolute value encoder 1 or PROFIBUS DP or Z basic unit *)	Absolute value encoder 2, absolute value encoder 1, or pulse encoder 1	---
Closed-loop position control X, Y and Z drives	Absolute value encoder 1 or PROFIBUS DP or Z basic unit *)	Pulse encoder 1 or absolute value encoder 1	Pulse encoder 2 or absolute value encoder 2

*) This is only valid, if the Z drive is a CUMC unit with absolute value encoder connection (module SBMx).

NOTE

The position must be referenced when using a pulse encoder for the position actual value sensing. A Bero proximity switch is required at the hardware reference point.

7.3 Application examples

7.3.1 Example, version 0.1: Single operation without T400. CUVC. Example, version 0.2: Single operation without T400. CUMC.

This version is mainly intended for the pre-commissioning phase if the drive is to be used without a T400. The drive is either operated with closed-loop frequency control (CUVC) or V/Hz control (CUMC).

Anti-sway control is not possible in this case.

Typical specifications:

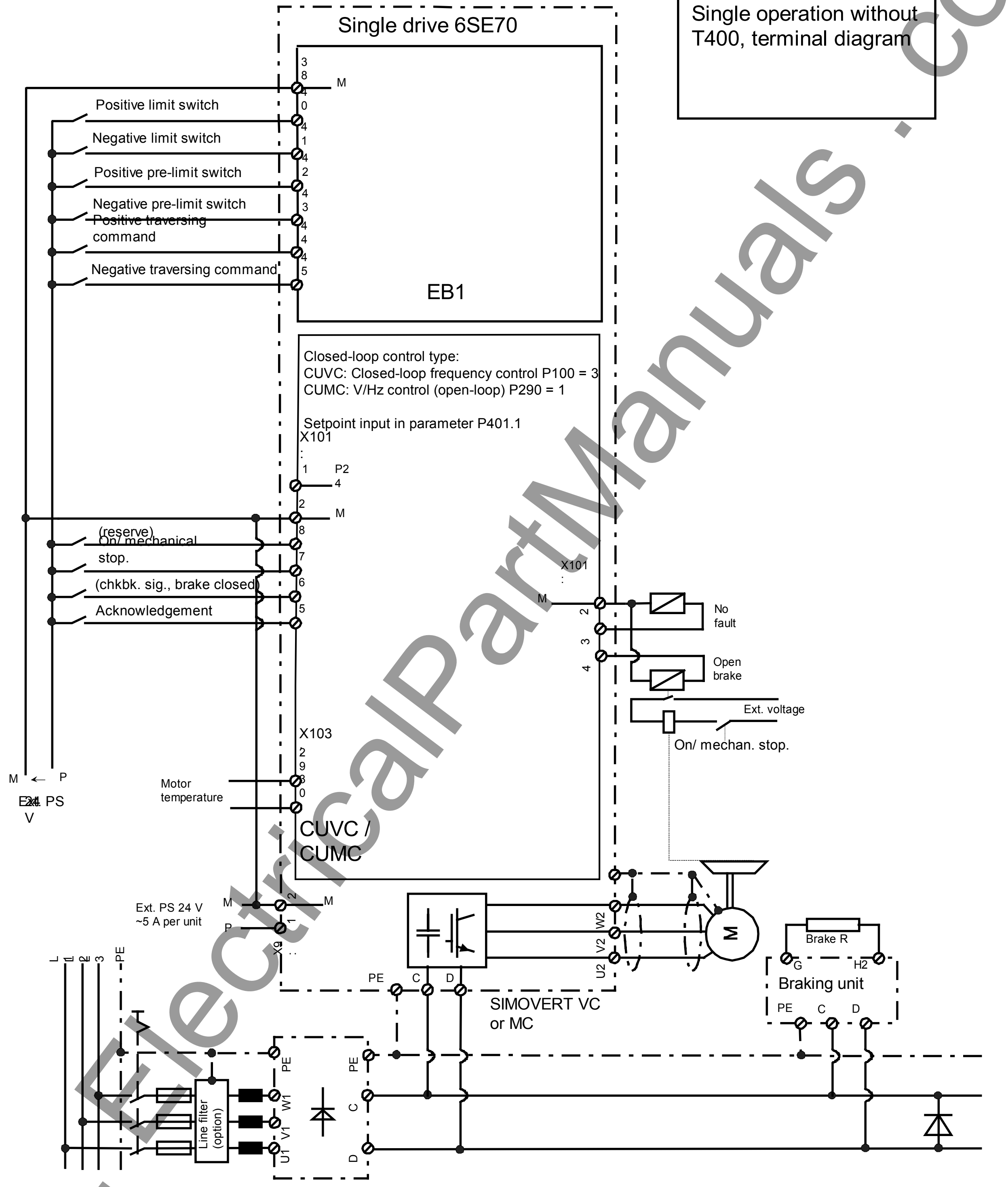
- The ratio between motor revolutions and velocity is to be:
  i = 26 motor revolutions/m
- The maximum velocity is to be 1.0 m/s.

Signals required:

- Positive traversing command.
- Negative traversing command.
- On/no mechanical stop ("1" = on, "0" = mechanical stop).
- Fault acknowledgement.
- Positive pre-limit switch signal.
- Negative pre-limit switch signal.
- Positive limit switch signal.
- Negative limit switch signal.

Circuit concept

Single operation without T400, terminal diagram



1st step: Installing the modules in the 6SE70

The modules should be installed as described in the circuit concept for version 0.1 or 0.2 in Section 7.2.

For CUMC, a SBx pulse encoder module is not required, as the drive, in this version is operated with V/Hz control.

2nd step: Basic unit settings

These should be made as described in Section 6.2:

- Establish the factory setting
- The motor data and motor identification should be carried-out. The procedure is described in the Operating Instructions of the basic unit.
  For CUVC: The closed-loop frequency control mode should be set, P100 = 3.
  For CUMC: The V/Hz control should be set, P290 = 1
  This means that the drive can be operated without a motor encoder.
- The speed adjustment should be entered into parameter P353.001.
  With the specified example value:
  P353 = 1.0 m/s * 60 s/min * 26 1/m = 1560 RPM.
- The unit-specific file should be downloaded using DriveMonitor:
  For CUVC: File, DPVC001.
  For CUMC: File, DPMC001.
  The contents of these files are shown in Attachment A1.

Traversing operation with the above mentioned settings

The main contactor of the rectifier/regenerative feedback unit is closed using the signal "On/no mechanical stop" = 1. Furthermore, the mechanical brake is enabled so that it can be opened.
The drive inverter is also powered-up and is then in status 011 (ready).

The mechanical brake is opened by entering the traversing command. After this, the drive moves in the specified direction with the specified setpoint (value in parameter P401.001).

When the traversing command is withdrawn, the drive is ramped down to 0 speed along the ramp-function generator, the brake is then closed and the inverter inhibited.

For "On/no mechanical stop" = 0 (i.e. mechanical stop), the I/R unit is shutdown by opening the main contactor.

7.3.2 Example, version 1.1: Manual operation, X drive. CUVC. Example, version 1.2: Manual operation, X drive. CUMC.

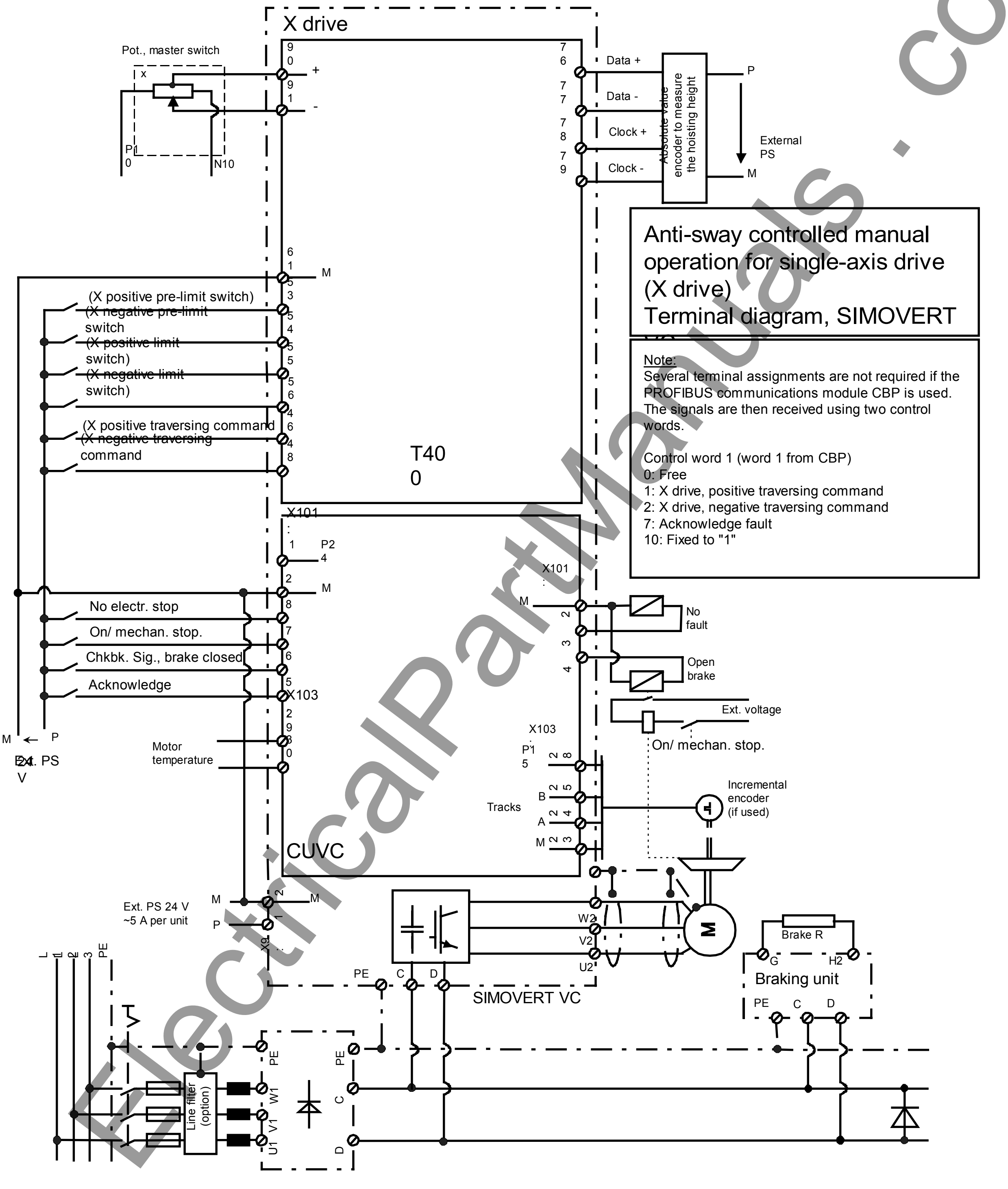
Typical specifications

- For CUVC: The drive does not have a motor encoder, it is operated in the closed-loop frequency controlled mode.
  For CUMC: The drive has a pulse encoder as motor encoder and is operated in the closed-loop speed controlled mode.
- The position actual value of the hoisting gear is sensed using the absolute value encoder connection 1 of the T400.
  This calculates the pendulum length.
  The maximum pendulum length should be 12.0 m and the minimum pendulum length should be 2.5 m.
- The maximum traversing velocity should be v_{MAX} = 1.0 m/s.
- The ratio between the motor revolutions and velocity should be:
  i_X = 26 motor revolutions/m

Signals required

- Master switch setpoint, X drive (analog n/f [Hz] setpoint).
- Positive traversing command, X drive.
- Negative traversing command, X drive.
- Positive pre-limit switch signal, X drive.
- Negative pre-limit switch signal, X drive.
- Positive limit switch signal, X drive.
- Negative limit switch signal, X drive.
- On/no mechanical stop ("1" = on, "0" = mechanical stop).
- No electrical stop ("0" = electrical stop).
- Fault acknowledgement.
- Position actual value, traversing gear (signals from the absolute value encoder).

Circuit concept, CUVC

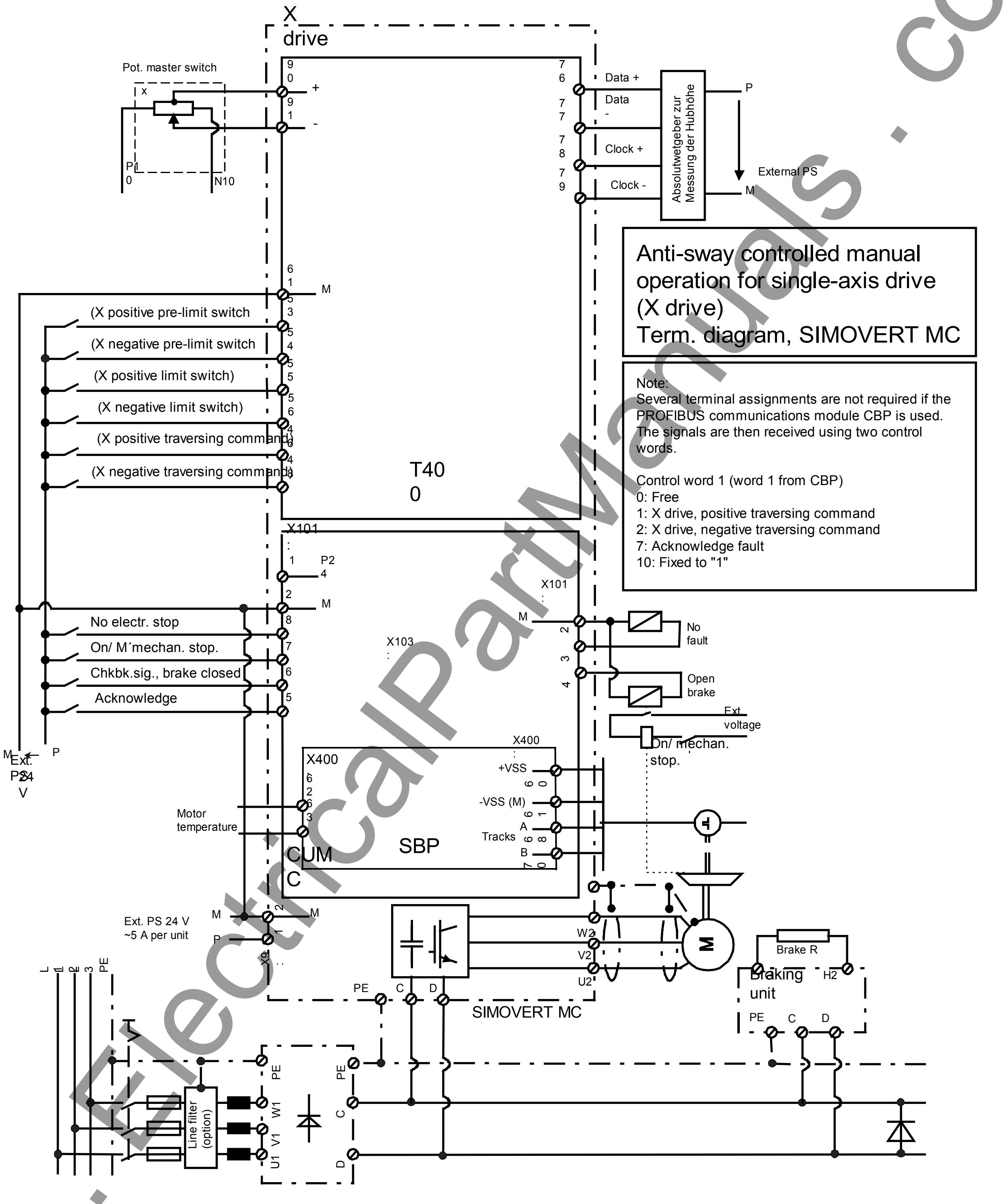


Anti-sway controlled manual operation for single-axis drive (X drive)
Terminal diagram, SIMOVERT

Note:
Several terminal assignments are not required if the PROFIBUS communications module CBP is used. The signals are then received using two control words.

Control word 1 (word 1 from CBP)
0: Free
1: X drive, positive traversing command
2: X drive, negative traversing command
7: Acknowledge fault
10: Fixed to "1"

Circuit concept, CUMC



Anti-sway controlled manual operation for single-axis drive (X drive)
Term. diagram, SIMOVERT MC

Note:
Several terminal assignments are not required if the PROFIBUS communications module CBP is used. The signals are then received using two control words.

Control word 1 (word 1 from CBP)
0: Free
1: X drive, positive traversing command
2: X drive, negative traversing command
7: Acknowledge fault
10: Fixed to "1"

1st step: Installing the modules in the 6SE70

The modules should be installed in the 6SE70 as described in the circuit concept for version 1.1 or 1.2 in Section 7.2.

2nd step: Basic unit settings

Proceed as described in Section 6.2:

- The motor data and motor identification routines should be carried-out. The procedure is described in the Operating Instructions of the basic unit.
  For CUVC: Closed-loop frequency control should be set, P100 = 3.
  For CUMC: The closed-loop current control and closed-loop speed control should be set, P290 = 0.
  The speed controller should be optimized.
- The speed adjustment should be entered into parameter P353.001.
  With the typical specifications:
  P353 = 1.0 m/s * 60 s/min * 26 1/m = 1560 RPM.
- The unit-specific file should be downloaded using DriveMonitor:
  For CUVC: File, DPVCX00.
  For CUMC: File, DPMCX00.
  The contents of these files are shown in Appendix A1.
- Additional parameters should be set as described in Section 6.2.3:

CUVC	CUMC	Comment
P216 = 4.8		CUVC setting for closed-loop frequency control, P100 = 3
P223 = 10.0	P223 = ...	Control parameter, speed controller (actual value smoothing)
P235 = ...	P235 = ...	Control parameter, speed controller (KP)
P240 = ...	P240 = ...	Control parameter, integral action time (TN)
P278 = 0.0		CUVC setting for closed-loop frequency control, P100 = 3
P313 = 5.0		CUVC setting for closed-loop frequency control, P100 = 3
P315 = 0.3		CUVC setting for closed-loop frequency control, P100 = 3
P380 = ...	P380 = ...	Threshold for motor temperature alarm
P381 = ...	P381 = ...	Threshold for motor temperature fault
P471 = 0.1		CUVC setting for closed-loop frequency control, P100 = 3
P559.001 = 14 or P559.001 = 1	P559.001 = 14 or P559.001 = 1	During commissioning: Switch for OFF3 to terminal –X101.5. After commissioning: No OFF3 from the terminal.
P566.001 = 0 or P566.001 = 14	P566.001 = 0 or P566.001 = 14	During commissioning: No fault acknowledgement from the terminal. After commissioning: Fault acknowledgement to terminal –X101.5.
P605 = ...	P605 = ...	Brake without checkback signal or with checkback signal
P741 = 0	P741 = 0	No SIMOLINK communications
P743 = 0	P743 = 0	No SIMOLINK communications

The above list is included in the DriveMonitor file DPVC_10 for CUVC units and DPMC_10 for CUMC units. The parameters can be modified offline and downloaded into the unit.

3rd step: Entering the T400 technology parameters

The following parameters must be set:

Parameter (X)	Comment
H008 = FFFE or H008 = FFFF	Suppress bit0 if there are no PROFIBUS DP communications. Do not suppress bit0 for PROFIBUS DP communications.
H149 = 8FFF	De-activate interlocking with Y and Z drives, as these drives are not available.
H788 = 0000	Y drive, suppress fault monitoring as there is no Y drive.
L388 = 0000	Z drive, suppress fault monitoring as there is no Z drive.
H031 = 000F	Invert T400 digital inputs (terminals 53-56) due to limit switch logic.
H159 = ...	Source for negative traversing command. For operation via terminals: H159 = 1121; factory setting. If PROFIBUS DP communications are used: H159 = 1023 (control word 1, bit 2).
H160 = ...	Source for positive traversing command. For operation via terminals: H160 = 1119; factory setting. If PROFIBUS DP communications are used: H160 = 1022 (control word 1, bit 1).
H220 – H226	Parameters of the absolute value encoder AENC1. These depend on the absolute value encoder type (data sheet)
H231, H240, H241, H248 and H249	Settings to calibrate the position actual value from the absolute value encoder. These parameters must be determined and set by making appropriate measurements, refer to Section 6.2.6.2
H216 = 1.0	Evaluation, converting the position actual value in d217 in [m]
H272 = 44	Main setpoint from analog input 1 (master switch setpoint with 100 % ≙ 10 V)
H090 = ...	Offset, pendulum length X drive. Must be determined (difference, hoisting height – physical pendulum length, refer to Section 6.2.8.2)
H311 = 12.0	Maximum pendulum length (typical value from the specifications)
H312 = 8.34	KV1 control parameter for pendulum length 12.0 m. Calculation formula, refer to Section 6.2.8.3
H313 = -0.1	KV2 control parameter for pendulum length 12.0 m
H314 = 0.84	KV3 control parameter for pendulum length 12.0 m
H315 = 2.5	Min. pendulum length (typical value from the specifications)
H316 = 5.93	KV1 control parameter for pendulum length 2.5 m. Calculation formula, refer to Section 6.2.8.3
H317 = -0.1	KV2 control parameter for pendulum length 2.5 m
H318 = 0.82	KV3 control parameter for pendulum length 2.5 m
H322 = 0.015	Damping coefficient. Generally this is factory setting
H328 = 1.0	Maximum velocity v_{MAX} = 1.0 m/s (typical value specifications)
H333 = 0.05	Overshoot factor so that there is a control margin of 5 %.
H931 – H940, L931 – L940	Option: If PROFIBUS DP communications are being used, this allows the values, sent to the automation, to be selected (refer to FP-A25).

The above list is included in the DriveMonitor file DPT4_10.DNL. The parameters can be changed offline and downloaded into the unit.

Traversing operation with the above specified settings

The main contactor of the rectifier/regenerative feedback unit is closed using the signal "On/no mechanical stop" = 1. Furthermore, the mechanical brake is enabled so that it can be opened.
The X drive inverter is also powered-up and is then in status 011 (ready for operation).

The mechanical brake is opened by entering the traversing command. After this, the drive moves in the specified direction with the master switch setpoint, adapted by the anti-sway control.

When the traversing command is withdrawn, the drive decelerates down to 0 speed via the ramp-function generator of the anti-sway control, the brake is then closed and the inverter inhibited.

For "On/no mechanical stop" = 0 (i.e. mechanical stop), the rectifier/regenerative feedback unit is shutdown by opening the main contactor.

7.3.3 Example, version 2.1: Manual operation X and Y drive. CUVC. Example, version 2.2: Manual operation X and Y drive. CUMC.

Typical specifications

For CUVC: Both of the drives do not have a motor encoder, they are operated in the closed-loop frequency controlled mode.
For CUMC: Both drives have a pulse encoder as motor encoder, they are operated in the closed-loop speed controlled mode.

The position actual value of the hoisting gear is sensed via absolute value encoder connection 1 of the T400.
This calculates the pendulum length.
The maximum pendulum length should be 12.0 m, the minimum pendulum length should be 2.5 m.

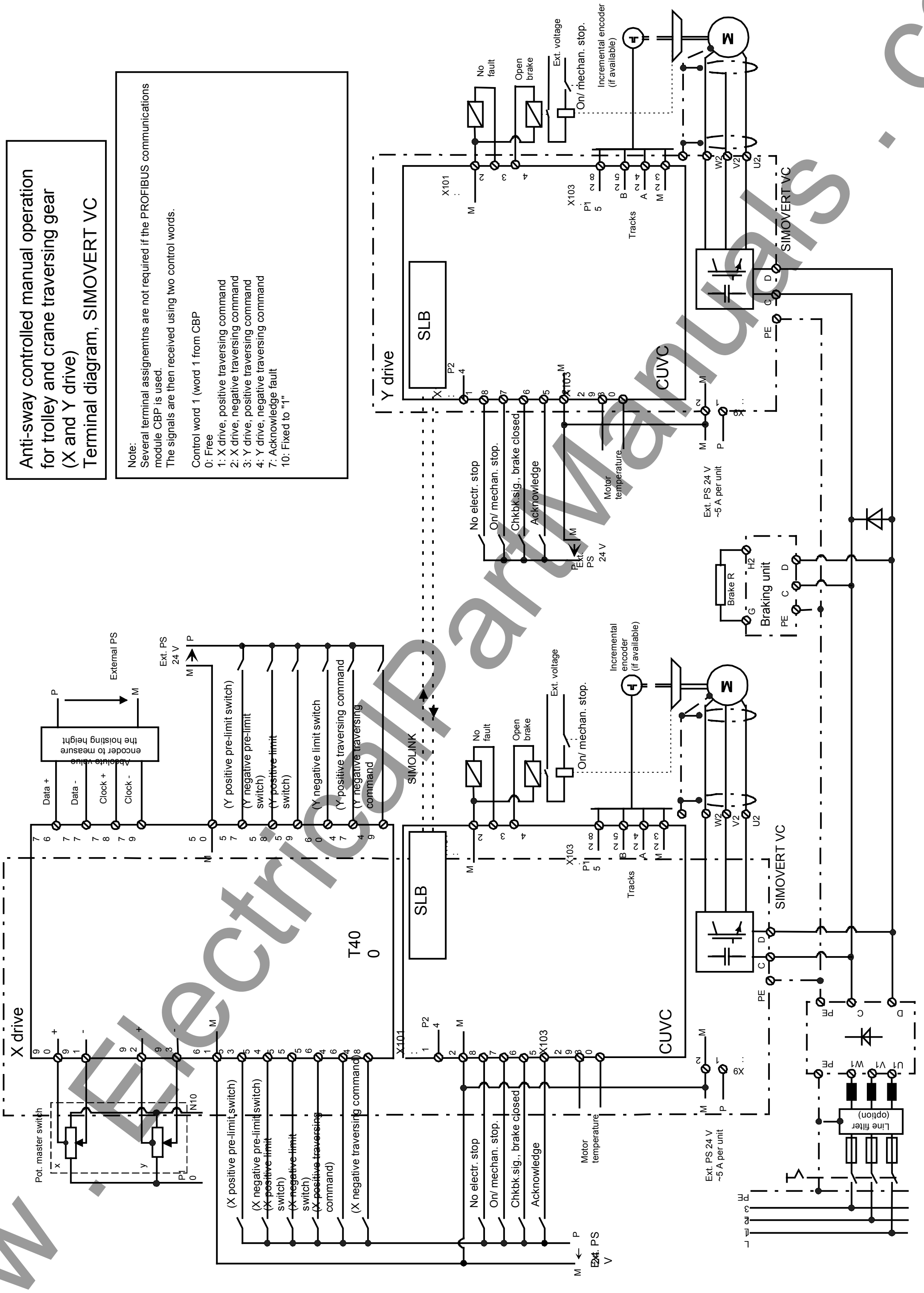
The maximum traversing velocity for both axes X and Y should be: v_{MAX} = 1.0 m/s.

The ratio between the motor revolutions and velocity should be:
For X drive: i_X = 26 motor revolutions/m,
For Y drive: i_Y = 18 motor revolutions/m

Signals required

- Master switch setpoint, X drive (analog n/f [Hz] setpoint).
- No electrical stop, X drive ("0" = electrical stop).
- Positive traversing command, X drive.
- Negative traversing command, X drive.
- Positive pre-limit switch signal, X drive.
- Negative pre-limit switch signal, X drive.
- Positive limit switch signal, X drive.
- Negative limit switch signal, X drive.
- Master switch setpoint, Y drive (analog n/f [Hz] setpoint).
- No electrical stop, Y drive ("0" = electrical stop).
- Positive traversing command, Y drive.
- Negative traversing command, Y drive.
- Positive pre-limit switch signal, Y drive.
- Negative pre-limit switch signal, Y drive.
- Positive limit switch signal, Y drive.
- Negative limit switch signal, Y drive.
- On/no mechanical stop X and Y drive ("1" = on, "0" = mechanical stop).
- Fault acknowledgement.
- Position actual value, hoisting gear (signals from the absolute value encoder).

Circuit concept, CUVC

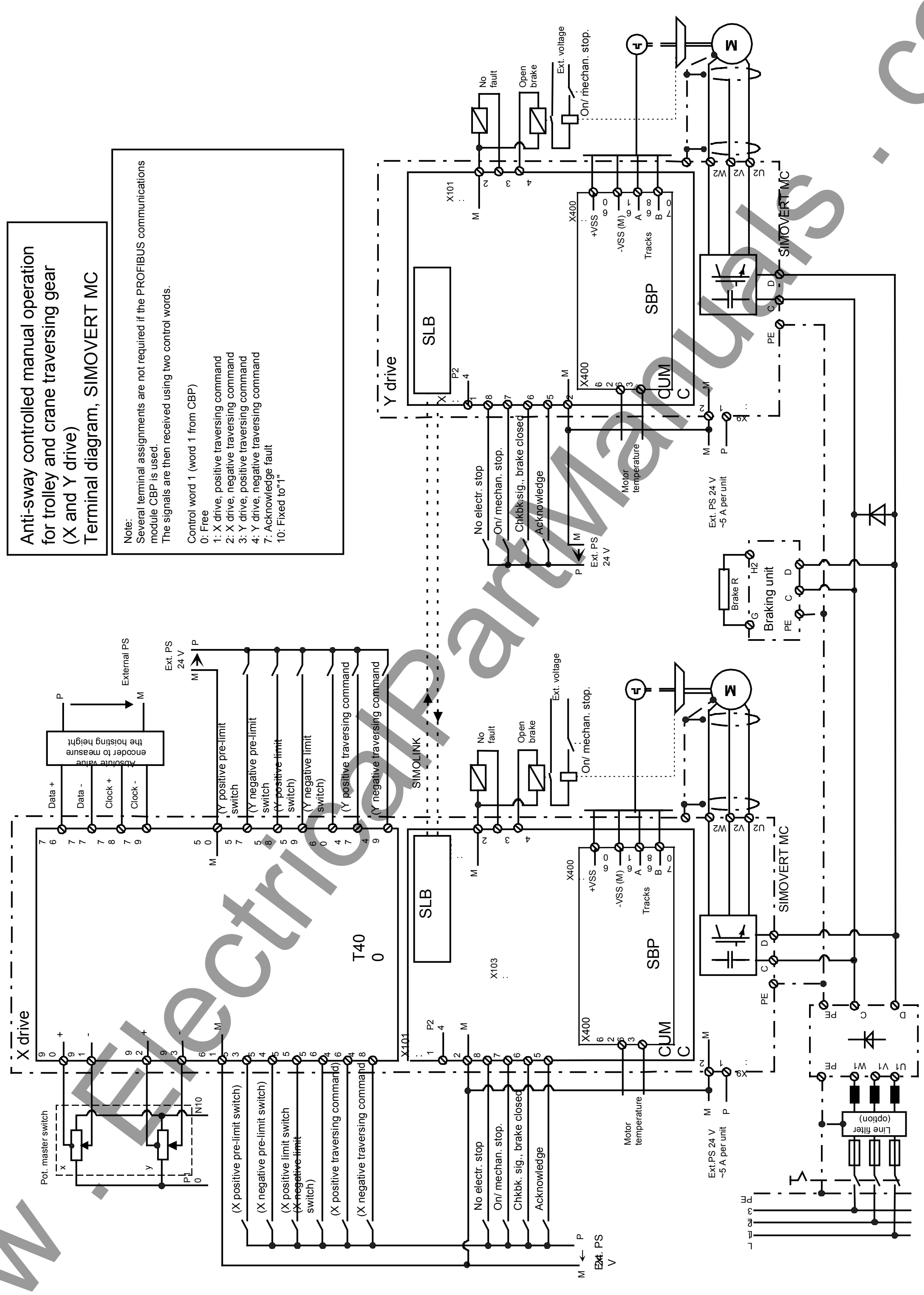


Anti-sway controlled manual operation
for trolley and crane traversing gear
(X and Y drive)
Terminal diagram, SIMOVERT VC

Note:
Several terminal assignemtns are not required if the PROFIBUS communications module CBP is used.
The signals are then received using two control words.

Control word 1 (word 1 from CBP
0: Free
1: X drive, positive traversing command
2: X drive, negative traversing command
3: Y drive, positive traversing command
4: Y drive, negative traversing command
7: Acknowledge fault
10: Fixed to "1"

Circuit concept, CUMC



1st step: Installing the modules in 6SE70

The modules should be installed in the 6SE70 as described in the circuit concept for version 1.1 or 1.2 in Section 7.2.

2nd step: Basic unit settings

Proceed as described in Section 6.2:

- The motor data and motor identification routines should be carried-out. The procedure is described in the Operating Instructions of the basic unit.
  For CUVC: Closed-loop frequency control should be set, P100 = 3.
  For CUMC: The closed-loop current control and closed-loop speed control should be set, P290 = 0.
  The speed controller should be optimized.
- The speed adjustment should be entered into parameter P353.001.
  With the typical specifications:
  For X drive: P353 = 1.0 m/s * 60 s/min * 26 1/m = 1560 RPM.
  For Y drive: P353 = 1.0 m/s * 60 s/min * 18 1/m = 1080 RPM.
- The unit-specific file should be downloaded using DriveMonitor:
  For CUVC: File, DPVCX00 for X drive, file DPVCY00 for Y drive.
  For CUMC: File, DPMCX00 for X drive, file DPMCY00 for Y drive.
  The contents of these files are shown in Appendix A1.
- Additional parameters should be set for X and Y drives, as described in Section 6.2.3:

CUVC	CUMC	Comment
P216 = 4.8		CUVC setting for closed-loop frequency control P100=3
P223 = 10	P223 = ...	Control parameter, speed controller (actual value smoothing)
P235 = ...	P235 = ...	Control parameter, speed controller (KP)
P240 = ...	P240 = ...	Control parameter, integral action time (TN)
P278 = 0.0		CUVC setting for closed-loop frequency control, P100=3
P313 = 5.0		CUVC setting for closed-loop frequency control, P100=3
P315 = 0.3		CUVC setting for closed-loop frequency control, P100=3
P380 = ...	P380 = ...	Threshold for motor temperature alarm
P381 = ...	P381 = ...	Threshold for motor temperature fault
P471 = 0.1		CUVC setting for closed-loop frequency control, P100=3
P559.001 = 14 or P559.001 = 1	P559.001 = 14 or P559.001 = 1	During commissioning: Switch for OFF3 to terminal –X101.5. After commissioning: No OFF3 from the terminal.
P566.001 = 0 or P566.001 = 14	P566.001 = 0 or P566.001 = 14	During commissioning: No fault acknowledgement from the terminal. After commissioning: Fault acknowledgement to –X101.5.
P605 = ...	P605 = ...	Brake without checkback signal or with checkback signal
P741 = 10	P741 = 10	SIMOLINK communications, telegram failure time
P743 = 2	P743 = 2	No. of SIMOLINK nodes

The above list is included in the DriveMonitor file DPVC_20 for CUVC units and DPMC_20 for CUMC units. The parameters can be modified offline and downloaded into the unit.

3rd step: Entering the T400 technology parameters

The following parameters must be set:

Parameter (X, Y)	Comment
H008 = FFFE or H008 = FFFF	Suppress bit0 if there are no PROFIBUS DP communications. Do not suppress bit0 for PROFIBUS DP communications.
H149 = BFFF	Deactivate interlocking with X and Z drives, as these drives are not available.
H549 = BFFF	Deactivate interlocking with Y and Z drives, as these drives are not available.
L388 = 0000	Suppress Z drive, fault monitoring as the Z drive is not used.
H031 = 00FF	Invert T400 digital inputs (terminals 53-60) due to limit switch logic.
H159 = ...	X source for negative traversing command. For terminal operation: H159 = 1121; factory setting. If PROFIBUS DP communications: H159 = 1023 (control word 1, bit 2).
H160 = ...	X source for positive traversing command. For terminal operation: H160 = 1119; factory setting. If PROFIBUS DP communications: H160 = 1022 (control word 1, bit 1).
H559 = ...	Y source for positive traversing command. For terminal operation: H559 = 1122; factory setting. If PROFIBUS DP communications: H559 = 1025 (control word 1, bit 4).
H560 = ...	Y source for negative traversing command. For terminal operation: H560 = 1120; factory setting. If PROFIBUS DP communications: H560 = 1024 (control word 1, bit 3).
H220 – H226	Parameters of the absolute value encoder AENC1. These depend on the absolute value encoder type (data sheet)
H231, H240, H241, H248 and H249	Settings to calibrate the position actual value from the absolute value encoder. These parameters must be determined and set by making appropriate measurements, refer to Section 6.2.6.2
H216 = 1.0	Evaluation, converting the position actual value in d217 in [m]
H272 = 44	X main setpoint from analog input 1 (master switch setpoint with 100% ≙ 10 V)
H672 = 49	Y main setpoint from analog input 2 (master switch setpoint with 100% ≙ 10 V)
H090, H091	Offset, pendulum length X drive, Y drive. This must be determined (difference between the hoisting height – physical pendulum length, refer to Section 6.2.8.2)
H311 = 12,0	X maximum pendulum length (typical value from the specifications)
H312 = 8.34	X KV1 control parameter for pendulum length 12.0 m. Calculation formula, refer to Section 6.2.8.3
H313 = -0.1	X KV2 control parameter for pendulum length 12.0 m
H314 = 0.84	X KV3 control parameter for pendulum length 12.0 m
H315 = 2.5	X minimum pendulum length (typical value from the specifications)
H316 = 5.93	X KV1 control parameters for pendulum length 2.5 m. Calculation formula, refer to Section 6.2.8.3
H317 = -0.1	X KV2 control parameters for pendulum length 2.5 m

Parameter (X, Y)	Comment
H318 = 0.82	X KV3 control parameters for pendulum length 2.5 m
H322 = 0.015	X damping coefficient. This is generally the factory setting
H328 = 1.0	X maximum velocity v_{MAX} = 1.0 m/s (typical value, specifications)
H333 = 0.05	X overshoot factor so that there is a control margin of 5 %.
H711 = 12.0	Y maximum pendulum length (typical value from the specifications)
H712 = 8.34	Y KV1 control parameter for pendulum length 12.0 m. Calculation formula, refer to Section 6.2.8.3
H713 = -0.1	Y KV2 control parameter for pendulum length 12.0 m
H714 = 0.84	Y KV3 control parameter for pendulum length 12.0 m
H715 = 2.5	Y minimum pendulum length (typical value from the specifications)
H716 = 5.93	Y KV1 control parameter for pendulum length 2.5 m. Calculation formula, refer to Section 6.2.8.3
H717 = -0.1	Y KV2 control parameter for pendulum length 2.5 m
H718 = 0.82	Y KV3 control parameter for pendulum length 2.5 m
H722 = 0.015	Y damping coefficient. Generally = factory setting
H728 = 1.0	Y maximum velocity v_{MAX} = 1.0 m/s (typical value, specifications)
H733 = 0.05	Y overshoot factor so that there is a control margin of 5 %.
H931 – H940, L931 – L940	Option: If PROFIBUS DP communications are available, this can be used to select values sent to the automation (refer to FP-A25).

The above list is included in the DriveMonitor file DPT4_20.DNL. The parameters can be modified offline and downloaded into the unit.

All of the parameters, which are not listed, should be left in their factory setting. They already have correct values for the particular configuration.

Traversing operation with the above specified settings

The main contactor of the rectifier/regenerative feedback unit is closed using the signal "On/no mechanical stop" = 1. Furthermore, the mechanical brake is enabled so that it can be opened.
The X drive and Y drive inverters are also powered-up and are then in status 011 (ready for operation).

The mechanical brakes are opened by entering the traversing command. After this the drives move in the specified direction with the master switch setpoint, adapted by the anti-sway control.

When the traversing command is withdrawn, the drive decelerates down to 0 speed via the ramp-function generator of the anti-sway control. The brake is then closed and the inverter inhibited.

- For "On/no mechanical stop" = 0 (i.e. mechanical stop), the rectifier/regenerative feedback unit is shutdown by opening the main contactor.

7.3.4 Example, version 4.1: Closed-loop position controlled operation, X and Y drives. CUVC. Example, version 4.2: Closed-loop position controlled operation, X and Y drives. CUMC.

Typical specifications

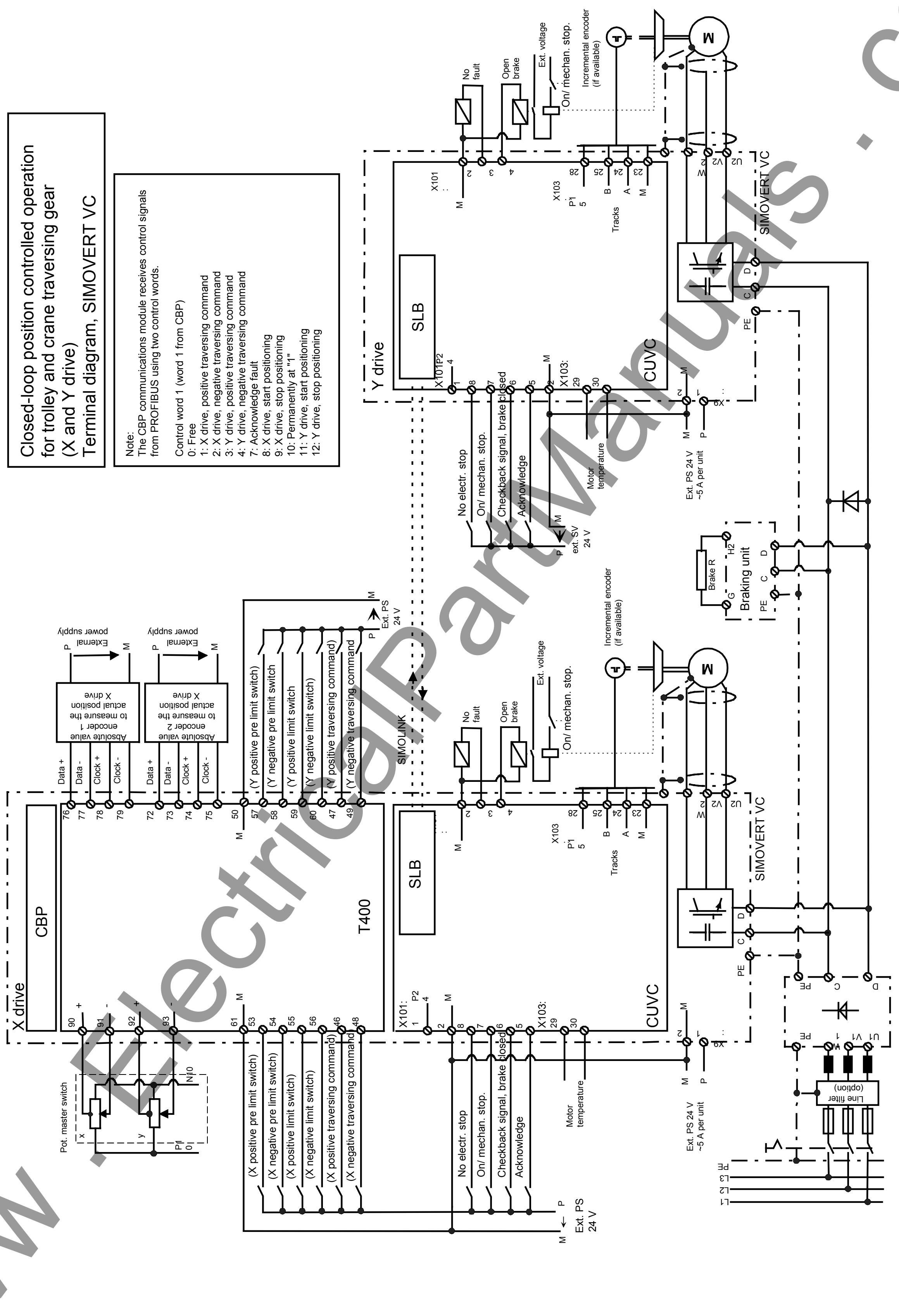
- For CUVC: Both of the drives do not have a motor encoder, they are operated in the closed-loop frequency controlled mode.
  For CUMC: Both drives have a pulse encoder as motor encoder, they are operated in the closed-loop speed controlled mode.
- The position actual value of the X drive is sensed using absolute value encoder connection 1 of the T400.
  The position actual value of the Y drive is sensed using absolute value encoder connection2 of the T400.
- The position actual value of the hoisting gear is received in the T400 via PROFIBUS DP.
  This calculates the pendulum length.
  The maximum pendulum length should be 12.0 m, the minimum pendulum length should be 2.5 m.
- The maximum traversing velocity for both axes X and Y should be: v_{MAX} = 1.0 m/s.
- The ratio between the motor revolutions and velocity should be:
  For X drive: i_X = 26 motor revolutions/m,
  For Y drive: i_Y = 18 motor revolutions/m
- The software limit switches are at –20.0 m (neg. LS) and 20.0 m (pos. LS).

Signals required

- Master switch setpoint, X drive (analog n/f [Hz] setpoint).
- Position reference value, X drive (from PROFIBUS).
- Position actual value, X drive (from absolute value encoder connection 1)
- No electrical stop, X drive ("0" = electrical stop).
- Positive traversing command, X drive.
- Negative traversing command, X drive.
- Positive pre limit switch signal, X drive.
- Negative pre limit switch signal, X drive.
- Positive limit switch signal, X drive.
- Negative limit switch signal, X drive.
- Start positioning, X drive.
- Stop positioning, X drive.
- Master switch setpoint, Y drive (analog n/f [Hz] setpoint).
- Position reference value, Y drive (from PROFIBUS).
- Position actual value, Y drive (from absolute value encoder connection 2)

- No electrical stop, Y drive ("0" = electrical stop).
- Positive traversing command, Y drive.
- Negative traversing command, Y drive.
- Positive pre limit switch signal, Y drive.
- Negative pre limit switch signal, Y drive.
- Positive limit switch signal Y drive.
- Negative limit switch signal Y drive.
- Start positioning, Y drive.
- Stop positioning, Y drive.
- On/no mechanical stop, X and Y drives ("1" = on, "0" = mechanical stop).
- Fault acknowledgement.
- Position actual value, hoisting gear (from PROFIBUS).

Circuit concept, axes X , Y CUVC

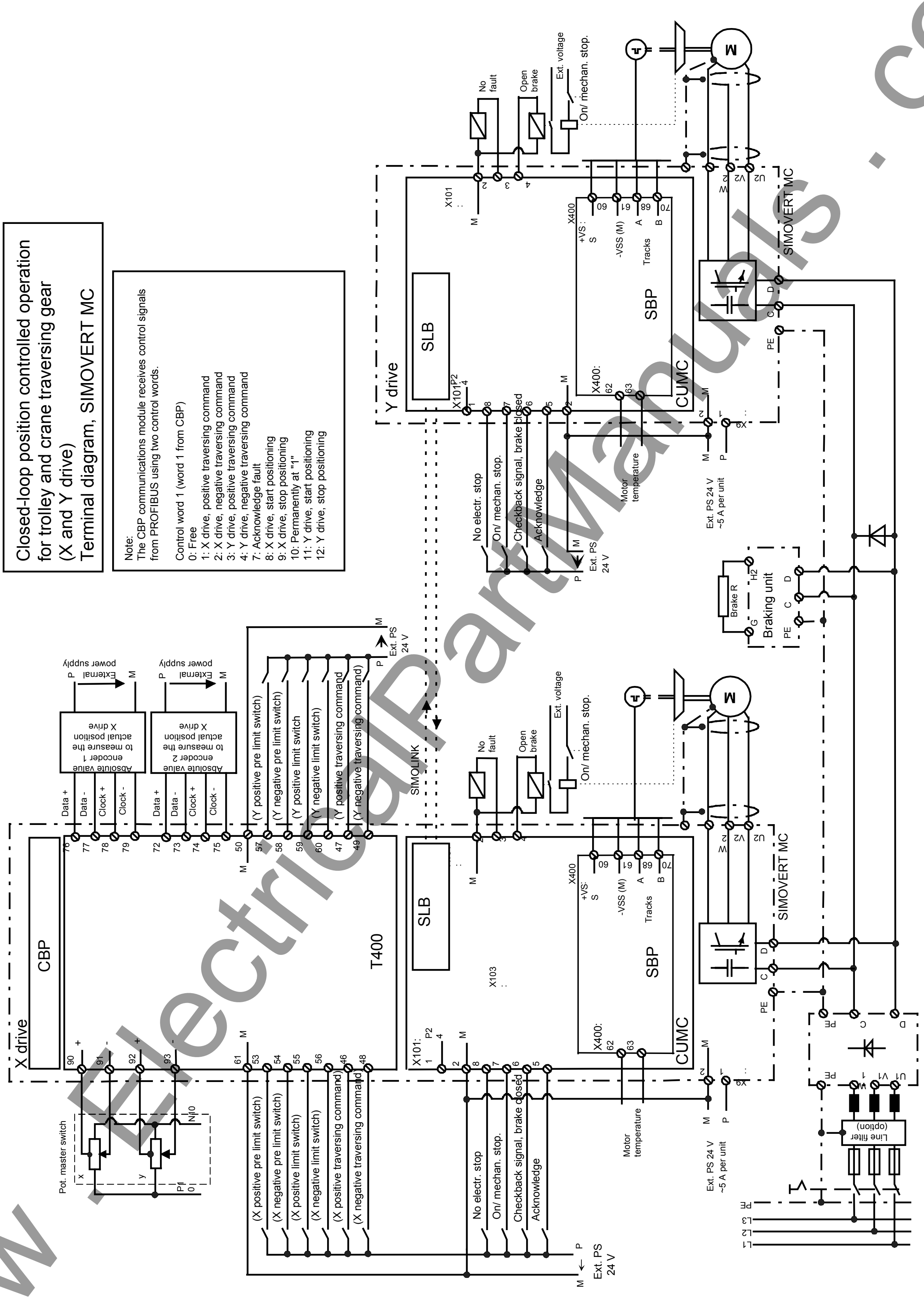


Closed-loop position controlled operation
for trolley and crane traversing gear
(X and Y drive)
Terminal diagram, SIMOVERT VC

Note:
The CBP communications module receives control signals from PROFIBUS using two control words.

Control word 1 (word 1 from CBP)
0: Free
1: X drive, positive traversing command
2: X drive, negative traversing command
3: Y drive, positive traversing command
4: Y drive, negative traversing command
7: Acknowledge fault
8: X drive, start positioning
9: X drive, stop positioning
10: Permanently at "1"
11: Y drive, start positioning
12: Y drive, stop positioning

Circuit concept, axes X , Y CUMC



Closed-loop position controlled operation
for trolley and crane traversing gear
(X and Y drive)
Terminal diagram, SIMOVERT MC

Note:
The CBP communications module receives control signals from PROFIBUS using two control words.

Control word 1 (word 1 from CBP)
0: Free
1: X drive, positive traversing command
2: X drive, negative traversing command
3: Y drive, positive traversing command
4: Y drive, negative traversing command
7: Acknowledge fault
8: X drive, start positioning
9: X drive, stop positioning
10: Permanently at "1"
11: Y drive, start positioning
12: Y drive, stop positioning

1st step: Installing the module in 6SE70

The modules should be installed in the 6SE70 as described in the circuit concept for version 4.1 or 4.2, in Section 7.2.

2nd step: Basic unit settings

Proceed as described in Section 6.2:

- The motor data and motor identification routines should be run. The procedure is described in the Operating Instructions of the basic unit.
  For CUVC: Closed-loop frequency control should be set, P100 = 3.
  For CUMC: The closed-loop current control and closed-loop speed control should be set, P290 = 0.
  The speed controller should be optimized.
- The speed adjustment should be entered into parameter P353.001. With the typical specifications:
  For X drive: P353 = 1.0 m/s * 60 s/min * 26 1/m = 1560 RPM.
  For Y drive: P353 = 1.0 m/s * 60 s/min * 18 1/m = 1080 RPM.
- The unit-specific file should be downloaded using DriveMonitor:
  For CUVC: File, DPVCX00 for X drive, file DPVCY00 for Y drive.
  For CUMC: File, DPMCX00 for X drive, file DPMCY00 for Y drive.
  The contents of these files are shown in Appendix A1.
- Additional parameters should be set for X and Y drives, as described in Section 6.2.3:

CUVC	CUMC	Comment
P216 = 4.8		CUVC setting for closed-loop frequency control P100=3
P223 = 10	P223 = ...	Control parameter, speed controller (actual value smoothing)
P235 = ...	P235 = ...	Control parameter, speed controller (KP)
P240 = ...	P240 = ...	Control parameter, integral action time (TN)
P278 = 0.0		CUVC setting for closed-loop frequency control, P100=3
P313 = 5.0		CUVC setting for closed-loop frequency control, P100=3
P315 = 0.3		CUVC setting for closed-loop frequency control, P100=3
P380 = ...	P380 = ...	Threshold for motor temperature alarm
P381 = ...	P381 = ...	Threshold for motor temperature fault
P471 = 0.1		CUVC setting for closed-loop frequency control, P100=3
P559.001 = 14 or P559.001 = 1	P559.001 = 14 or P559.001 = 1	During commissioning: Switch for OFF3 to terminal –X101.5. After commissioning: No OFF3 from the terminal.
P566.001 = 0 or P566.001 = 14	P566.001 = 0 or P566.001 = 14	During commissioning: No fault acknowledgement from the terminal. After commissioning: Fault acknowledgement to –X101.5.
P605 = ...	P605 = ...	Brake without checkback signal or with checkback signal
P741 = 10	P741 = 10	SIMOLINK communications, telegram failure time
P743 = 2	P743 = 2	No. of SIMOLINK nodes

The above list is included in the DriveMonitor file DPVC_40 for CUVC units and DPMC_40 for CUMC units. The parameters can be modified offline and downloaded into the unit.

3rd step: Entering the T400 technology parameters

The following parameters must be set:

Parameter (X, Y)	Comment
H008 = FFFF	Do not suppress bit0 for PROFIBUS DP communications.
H149 = BFFF	De-activate X interlocking with the Z drive, as this drive is not used.
H549 = BFFF	De-activate Y interlocking with the Z drive, as this drive is not used.
L388 = 0000	Suppress Z drive, fault monitoring as the Z drive is not used.
H031 = 00FF	Invert T400 digital inputs (terminals 53-60) due to limit switch logic.
H175 = 20.0	X position, positive software limit switch (typical value from the specifications)
H176 = -20.0	X position, negative software limit switch (typical value from the specifications)
H179 = 242	X position actual value to evaluate the software limit switch
H575 = 20.0	Y position, positive software limit switch (typical value from the specifications)
H576 = -20.0	Y position, negative software limit switch (typical value from the specifications)
H579 = 642	Y position actual value to evaluate the software limit switch
H159 = 1023	X, source for negative traversing command. PROFIBUS DP control word 1, bit 2.
H160 = 1022	X, source for positive traversing command. PROFIBUS DP control word 1, bit 1.
H559 = 1025	Y, source for negative traversing command. PROFIBUS DP control word 1, bit 4.
H560 = 1024	Y, source for positive traversing command. PROFIBUS DP control word 1, bit 3.
H220 – H226	X position actual value. Parameters of the absolute value encoder AENC1. These depend on the absolute value encoder type (data sheet)
H231, H240, H241, H248 and H249	X settings to calibrate the position actual value from the absolute value encoder. These parameters must be determined and set by making appropriate measurements, refer to Section 6.2.6.2
H620 – H626	Y position actual value. Parameters of the absolute value encoder AENC2. These depend on the absolute value encoder type (data sheet)
H631, H640, H641, H648 and H649	Y settings to calibrate the position actual value from the absolute value encoder. These parameters must be determined and set by making appropriate measurements, refer to Section 6.2.6.2
H215 = 242	Source, X position actual value from absolute value encoder 1
H216 = 1.0	Evaluation, converting the position actual value in d217 in [m]
H272 = 44	X main setpoint from analog input 1 (master switch setpoint with 100% ≙ 10V)
H615 = 642	Source, Y position actual value from absolute value encoder 2
H616 = 1.0	Evaluation, converting the position actual value in d617 in [m]
H672 = 49	Y main setpoint from analog input 2 (master switch setpoint with 100% ≙ 10V)
H090, H091	Offset, pendulum length X drive, Y drive. This must be determined (difference between the hoisting height – physical pendulum length, refer to Section 6.2.8.2)
H311 = 12.0	X maximum pendulum length (typical value from the specifications)
H312 = 8.34	X KV1 control parameter for pendulum length 12.0 m. Calculation formula, refer to Section 6.2.8.3
H313 = -0.1	X KV2 control parameter for pendulum length 12.0 m
H314 = 0.84	X KV3 control parameter for pendulum length 12.0 m
H315 = 2.5	X minimum pendulum length (typical value from the specifications)

Parameter (X, Y)	Comment
H316 = 5.93	X KV1 control parameter for pendulum length 2.5 m. Calculation formula, refer to Section 6.2.8.3
H317 = -0.1	X KV2 control parameter for pendulum length 2.5 m
H318 = 0.82	X KV3 control parameter for pendulum length 2.5 m
H322 = 0.015	X damping coefficient. This is generally the factory setting
H328 = 1.0	X max. velocity v_{MAX} = 1.0 m/s (typical value from the specifications)
H333 = 0.05	X overshoot factor so that there is a control margin of 5%.
H711 = 12.0	Y maximum pendulum length (typical value from the specifications)
H712 = 8.34	Y KV1 control parameter for pendulum length 12.0 m. Calculation formula, refer to Section 6.2.8.3
H713 = -0.1	Y KV2 control parameter for pendulum length 12.0 m
H714 = 0.84	Y KV3 control parameter for pendulum length 12.0 m
H715 = 2.5	Y minimum pendulum length (typical value from the specifications)
H716 = 5.93	Y KV1 control parameter for pendulum length 2.5 m. Calculation formula, refer to Section 6.2.8.3
H717 = -0.1	Y KV2 control parameter for pendulum length 2.5 m
H718 = 0.82	Y KV3 control parameter for pendulum length 2.5 m
H722 = 0.015	Y damping coefficient. This is generally the factory setting
H728 = 1.0	Y max. velocity v_{MAX} = 1.0 m/s (typical value from the specifications)
H733 = 0.05	Y overshoot factor so that there is a control margin of 5%.
H453 = 1029	X start positioning. PROFIBUS DP control word 1, bit 8.
H454 = 1030	X stop positioning. PROFIBUS DP control word 1, bit 9.
H455 = 22	X position reference value from word 2 from PROFIBUS DP.
H070 = 30.0	X normalization factor for word 2 from PROFIBUS DP. Example: 16384 from PROFIBUS should correspond to 30 m -> factor = 30.0.
H460 = 0.167	X adaptation, pendulum length for KP1. Calculation: Adaptation = 2/maximum pendulum length = 2/12.0 = 0.167.
H461 = 0.167	X adaptation KP1 factor for position controller. Calculated from 0.5 * 2 * v_{MAX} / T_H = 0.5 * 1 * 2.0 / 1.5 = 0.167. This involves an initial value. The optimum KP1 must be found by making various trials.
H463 = 1.5	X KP2 factor for position controller. This must be determined using various trials.
H082 = 1.0	X, Y max. velocity v_{MAX} = 1.0 m/s as fixed setpoint
H485 = 82	X selection max. velocity for positioning (fixed setpoint H082).
H486 = 464	X selection, position controller version 1
H491 = 0.167	X KP1 factor for conventional (non anti-sway controlled) operation. Calculation: Refer to H461.
H492 = 1.5	X KP2 factor for conventional (non anti-sway controlled) operation. Calculation: Refer to H463.
H853 = 1032	Y start positioning. PROFIBUS DP control word 1, bit 11.
H854 = 1033	Y stop positioning. PROFIBUS DP control word 1, bit 12.
H855 = 25	Y position reference value from word 5 from PROFIBUS

Parameter (X, Y)	Comment
H072 = 20.0	Y normalization factor for word 5 from PROFIBUS. Example: 16384 from PROFIBUS should correspond to 20 m -> factor = 20.0.
H860 = 0.167	Y adaptation pendulum length for KP1. Calculation: Adaptation = 2/max. pendulum length = 2/12.0 = 0.167.
H861 = 0.333	Y adaptation KP1 factor for position controller. Calculated from 0.5 * 2 * v_{MAX} / T_H = 0.5 * 1 * 2.0 / 1.5 = 0.167. This involves an initial value. The optimum KP1 must be found by making various trials.
H863 = 1.5	Y KP2 factor for position controller. This must be determined using various trials.
H885 = 82	Y selection, max. velocity for positioning (fixed setpoint H082).
H886 = 864	Y selection, position controller version 1
H891 = 0.167	Y KP1 factor for conventional (non anti-sway controlled) operation. Calculation: Refer to H861.
H892 = 1.5	Y KP2 factor for conventional (non anti-sway controlled) operation. Calculation: Refer to H863.
H931 – H940, L931 – L940	Select the values sent to the automation (refer to FP-A25).

The above list is included in the DriveMonitor file DPT4_40.DNL. The parameters can be modified offline and downloaded into the unit.

All of the parameters which are not listed should be left in the factory setting. They already have correct values for the particular configuration.

Traversing operation with the above specified settings

The main contactor of the rectifier/regenerative feedback unit is closed using the signal "On/no mechanical stop" = 1. Furthermore, the mechanical brake is enabled so that it can be opened.
The inverters of the X drive and Y drive are also powered-up and are then in status 011 (ready for operation).

The mechanical brake is opened by entering the traversing command. After this, the drive moves in the specified direction with the master switch setpoint, adapted by the anti-sway control.

When the traversing command is withdrawn, the drive decelerates down to 0 speed via the ramp-function generator of the anti-sway control. The brake is then closed and the inverter inhibited.

The mechanical brakes are also opened by entering the signal "Start positioning". The position reference value is then approached with the specified maximum velocity. The velocity is reduced close to the position target.
The drive stops when the signal "Stop positioning" is entered. At speed = 0, the brake is closed and the inverter is inhibited.

For "On/no mechanical stop" = 0 (i.e. mechanical stop) the rectifier/regenerative feedback unit is shutdown by opening the main contactor.

7.3.5 Example, version 6.1: Closed-loop position controlled operation X, Y, Z drives. CUVC. Example, version 6.2: Closed-loop position controlled operation X, Y, Z drives. CUMC.

Typical specifications

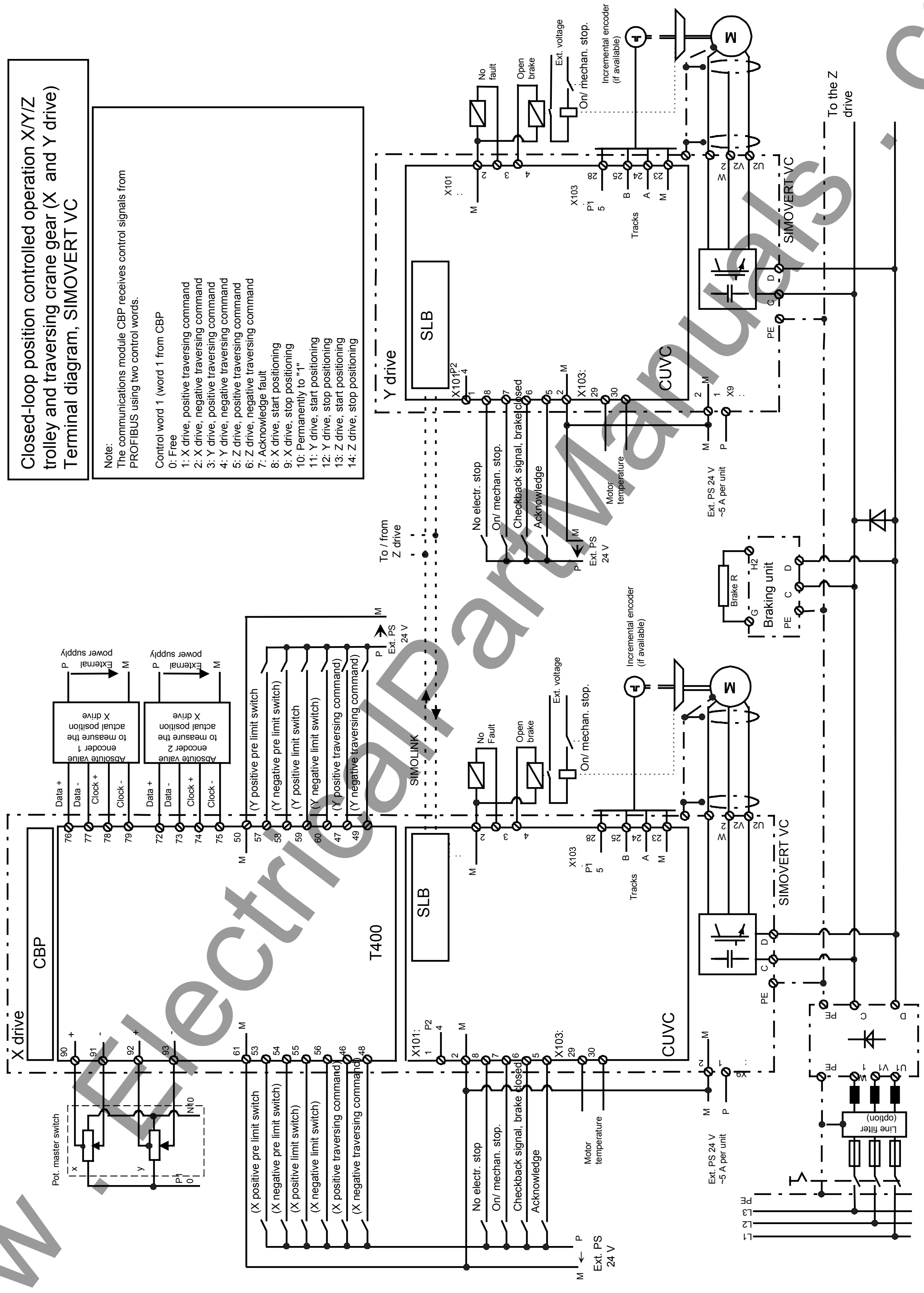
- For CUVC: All of the three drives do not have a motor encoder, they are operated in the closed-loop frequency controlled mode.
  For CUMC: All of the three drives have a pulse encoder as motor encoder, they are operated in the closed-loop speed controlled mode.
- The position actual value of the X drive is sensed via the absolute value encoder connection 1 of the T400.
  The position actual value of the Y drive is sensed via the absolute value encoder connection 2 of the T400.
- The position actual value of the Z drive (hoisting gear) is received from the T400 via PROFIBUS DP.
  In addition to the closed-loop position control, the pendulum length is calculated for the anti-sway control of the X and Y drives.
  The maximum pendulum length should be 12.0 m, the minimum pendulum length should be 2.5 m.
- The maximum traversing velocity for both axes X and Y should be: v_{MAX} = 1.0 m/s and for the Z drive v_{MAXZ} = 0.8 m/s.
- The ratio between the motor revolutions and velocity should be:
  For X drive: i_X = 26 motor revolutions/m,
  For Y drive: i_Y = 18 motor revolutions /m,
  For Z drive: i_Z = 20 motor revolutions /m.
- The software limit switches of the X and Y drive are at –20.0 m (neg. LS) and 20.0 m (pos. LS).
- The software limit switches of the Z drive are at 0 m (neg. LS) and 12 m (pos. LS).

Signals required

- Master switch setpoint, X drive (analog n/f [Hz] setpoint).
- Position reference value, X drive (from PROFIBUS).
- Position actual value, X drive (from absolute value encoder connection 1)
- No electrical stop, X drive ("0" = electrical stop).
- Positive traversing command, X drive.
- Negative traversing command, X drive.
- Positive pre limit switch signal, X drive.
- Negative pre limit switch signal, X drive.
- Positive limit switch signal, X drive
- Negative limit switch signal, X drive.
- Start positioning, X drive.
- Stop positioning, X drive.

- Master switch setpoint, Y drive (analog n/f [Hz] setpoint).
- Position reference value, Y drive (from PROFIBUS).
- Position actual value, Y drive (from absolute value encoder connection 2)
- No electrical stop, Y drive ("0" = electrical stop).
- Positive traversing command, Y drive.
- Negative traversing command, Y drive.
- Positive pre limit switch signal, Y drive.
- Negative pre limit switch signal, Y drive.
- Positive limit switch signal, Y drive.
- Negative limit switch signal, Y drive.
- Start positioning, Y drive.
- Stop positioning, Y drive.
- Master switch setpoint, Z drive (analog n/f [Hz] setpoint).
- Position reference value, Z drive (from PROFIBUS).
- Position actual value, Z drive (from PROFIBUS)
- Positive traversing command, Z drive.
- Negative traversing command, Z drive.
- Positive pre limit switch signal, Z drive.
- Negative pre limit switch signal, Z drive.
- Positive limit switch signal, Z drive.
- Negative limit switch signal, Z drive.
- Start positioning, Z drive.
- Stop positioning, Z drive.
- On/no mechanical stop X, Y and Z drives
  ("1" = on, "0" = mechanical stop).
- Fault acknowledgement.

Circuit concept, X, Y, Z - X+Y VC

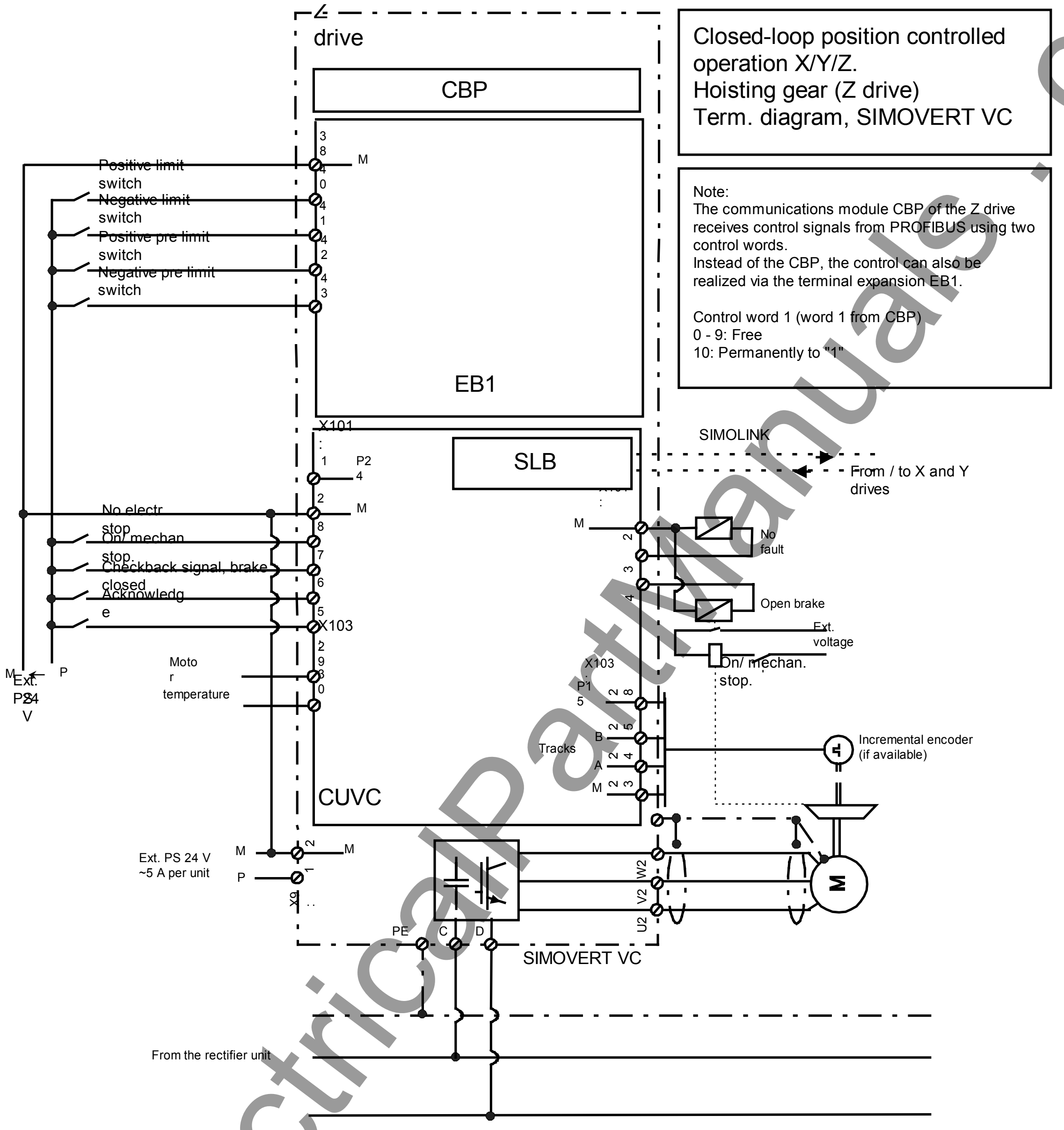


Closed-loop position controlled operation X/Y/Z trolley and traversing crane gear (X and Y drive)
Terminal diagram, SIMOVERT VC

Note:
The communications module CBP receives control signals from PROFIBUS using two control words.

Control word 1 (word 1 from CBP
0: Free
1: X drive, positive traversing command
2: X drive, negative traversing command
3: Y drive, positive traversing command
4: Y drive, negative traversing command
5: Z drive, positive traversing command
6: Z drive, negative traversing command
7: Acknowledge fault
8: X drive, start positioning
9: X drive, stop positioning
10: Permanently to "1"
11: Y drive, start positioning
12: Y drive, stop positioning
13: Z drive, start positioning
14: Z drive, stop positioning

Circuit concept, X, Y, Z - Z VC

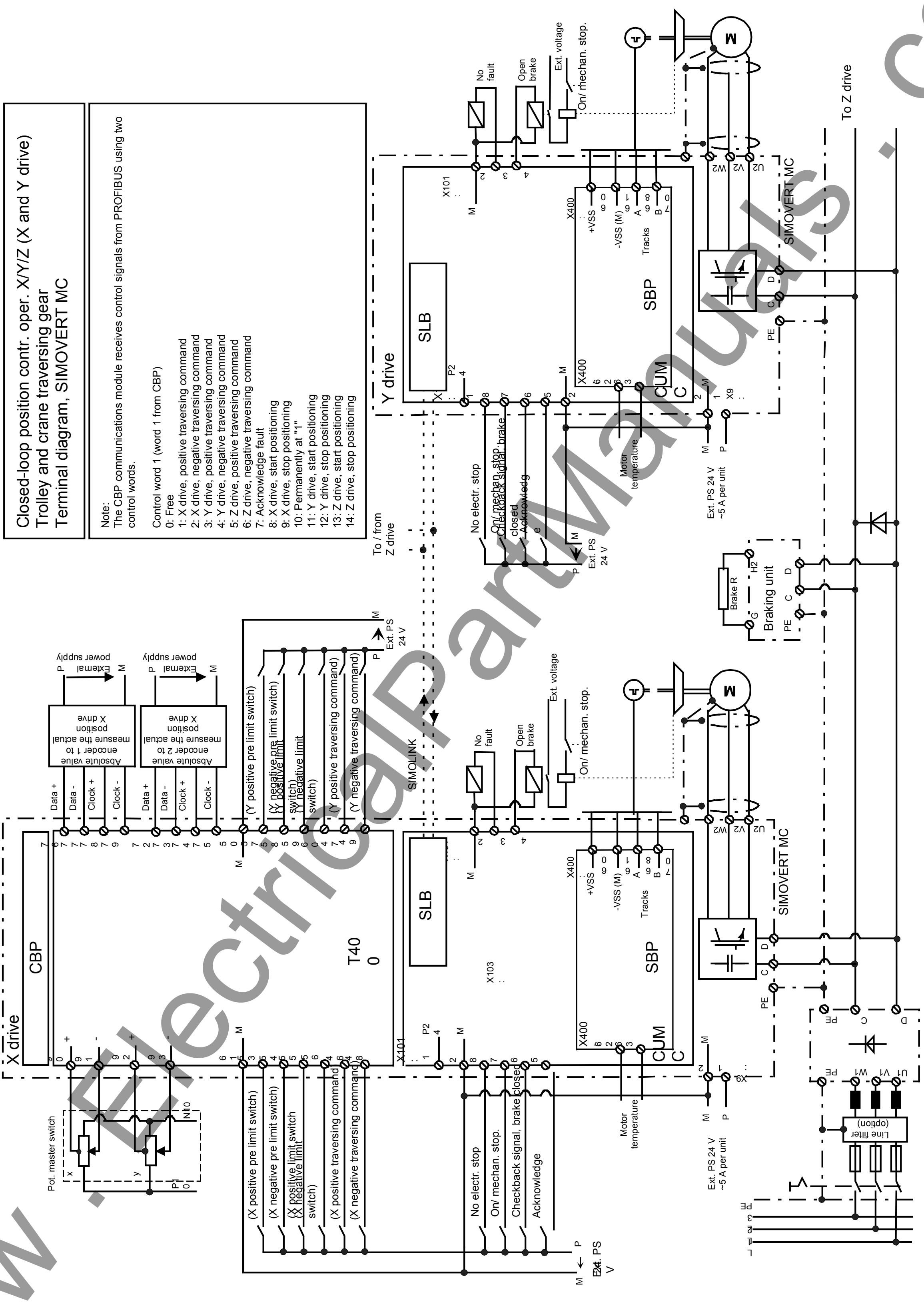


Closed-loop position controlled operation X/Y/Z.
Hoisting gear (Z drive)
Term. diagram, SIMOVERT VC

Note:
The communications module CBP of the Z drive receives control signals from PROFIBUS using two control words.
Instead of the CBP, the control can also be realized via the terminal expansion EB1.

Control word 1 (word 1 from CBP)
0 - 9: Free
10: Permanently to "1"

Circuit concept, X, Y, Z X+Y - MC

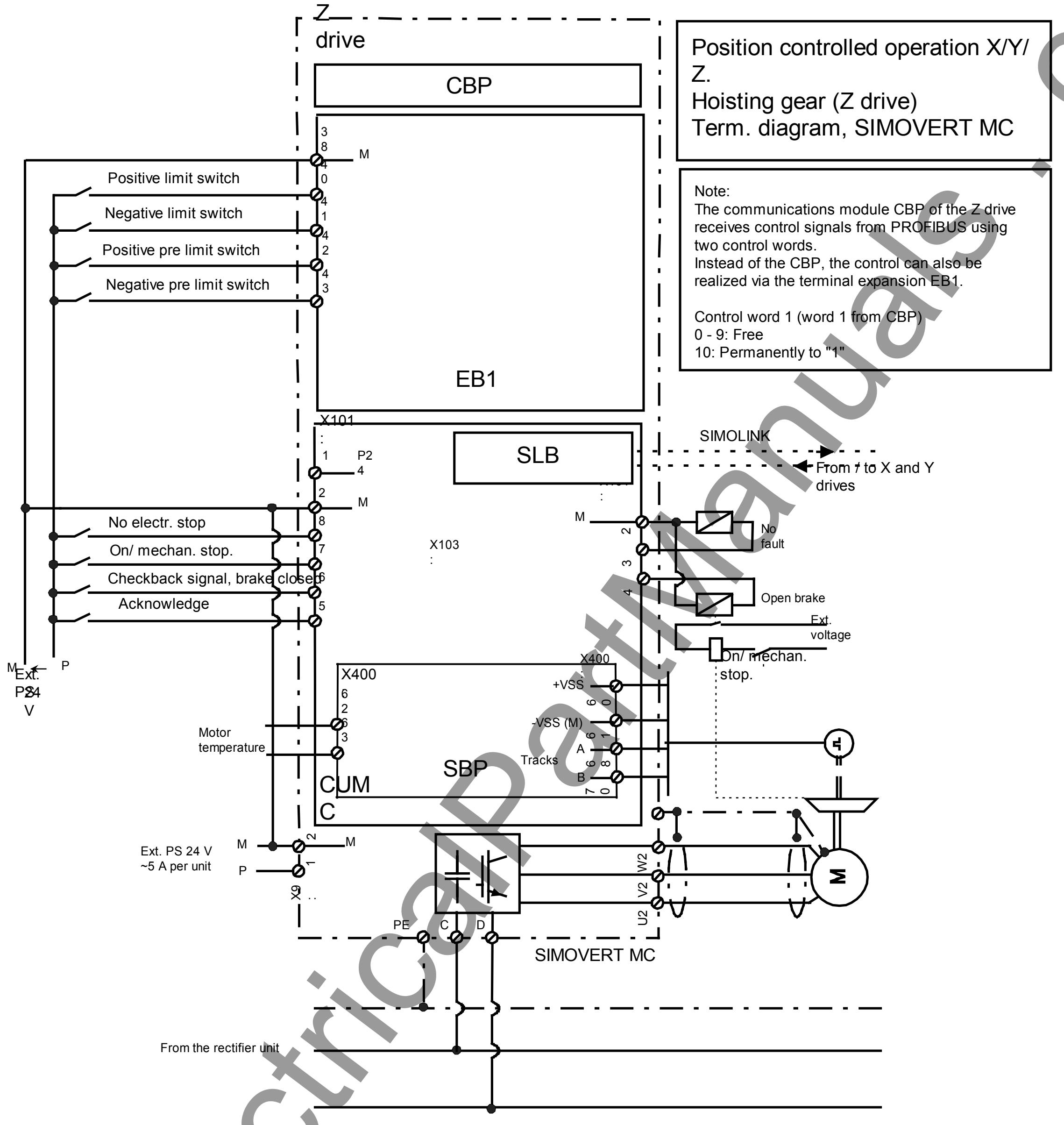


Closed-loop position contr. oper. X/Y/Z (X and Y drive)
Trolley and crane traversing gear
Terminal diagram, SIMOVERT MC

Note:
The CBP communications module receives control signals from PROFIBUS using two control words.

Control word 1 (word 1 from CBP)
0: Free
1: X drive, positive traversing command
2: X drive, negative traversing command
3: Y drive, positive traversing command
4: Y drive, negative traversing command
5: Z drive, positive traversing command
6: Z drive, negative traversing command
7: Acknowledge fault
8: X drive, start positioning
9: X drive, stop positioning
10: Permanently at "1"
11: Y drive, start positioning
12: Y drive, stop positioning
13: Z drive, start positioning
14: Z drive, stop positioning

Circuit concept, X, Y, Z – Z MC



Position controlled operation X/Y/ Z.
Hoisting gear (Z drive)
Term. diagram, SIMOVERT MC

Note:
The communications module CBP of the Z drive receives control signals from PROFIBUS using two control words.
Instead of the CBP, the control can also be realized via the terminal expansion EB1.

Control word 1 (word 1 from CBP)
0 - 9: Free
10: Permanently to "1"

1st step: Installing the modules in the 6SE70

The modules should be installed in the 6SE70 as described in the circuit concept for version 6.1 or 6.2 in Section 7.2.

2nd step: Basic unit settings

Proceed as described in Section 6.2:

- The motor data and motor identification routines should be run. The procedure is described in the Operating Instructions of the basic unit.
  For CUVC: Closed-loop frequency control should be set, P100 = 3.
  For CUMC: The closed-loop current control and closed-loop speed control should be set, P290 = 0.
  The speed controller should be optimized.
- The speed adjustment should be entered into parameter P353.001. With the typical specifications:
  For X drive: P353 = 1.0 m/s * 60 s/min * 26 1/m = 1560 RPM.
  For Y drive: P353 = 1.0 m/s * 60 s/min * 18 1/m = 1080 RPM.
  For Z drive: P353 = 0.8 m/s * 60 s/min * 20 1/m = 960 RPM.
- The unit-specific file should be downloaded using DriveMonitor:
  For CUVC: File, DPVCX00 for X drive, file DPVCY00 for Y, file DPVCZ00 for Z drive.
  For CUMC: File, DPMCX00 for X drive, file DPMCY00 for Y drive, DPMCZ00 for Z drive.
  The contents of these files are shown in Appendix A1.
- Additional parameters should be set for X, Y and Z drives as described in Section 6.2.3:

CUVC	CUMC	Comment
P216 = 4.8		CUVC setting for closed-loop frequency control P100 = 3
P223 = 10	P223 = ...	Control parameter, speed controller (actual value smoothing)
P235 = ...	P235 = ...	Control parameter, speed controller (KP)
P240 = ...	P240 = ...	Control parameter, integral action time (TN)
P278 = 0.0		CUVC setting for closed-loop frequency control P100 = 3
P313 = 5.0		CUVC setting for closed-loop frequency control P100 = 3
P315 = 0.3		CUVC setting for closed-loop frequency control P100 = 3
P380 = ...	P380 = ...	Threshold for motor temperature alarm
P381 = ...	P381 = ...	Threshold for motor temperature fault
P471 = 0.1		CUVC setting for closed-loop frequency control P100 = 3
P559.001 = 14 or P559.001 = 1	P559.001 = 14 or P559.001 = 1	During commissioning: Switch for OFF3 to terminal –X101.5. After commissioning: No OFF3 from the terminal.
P566.001 = 0 or P566.001 = 14	P566.001 = 0 or P566.001 = 14	During commissioning: No fault acknowledgement from the terminal. After commissioning: Fault acknowledgement to terminal –X101.5.
P605 = ...	P605 = ...	Brake without checkback signal or with checkback signal
P741 = 10	P741 = 10	SIMOLINK communications, telegram failure time
P743 = 3	P743 = 3	No. of SIMOLINK nodes

The above list is included in the DriveMonitor file DPVC_60 for CUVC units and DPMC_60 for CUMC units. The parameters can be modified offline and downloaded into the unit.

3rd step: Entering the T400 technology parameters

Parameter (X,Y,Z)	Comment
H008 = FFFF	Do not suppress bit0 for PROFIBUS DP communications.
H031 = 00FF	Invert T400 digital inputs (terminals 53 - 60) due to the limit switch logic.
H175 = 20.0	X position, positive software limit switch (typical value from the specifications)
H176 = -20.0	X position, negative software limit switch (typical value from the specifications)
H179 = 242	X position actual value for evaluating software limit switch
H575 = 20.0	Y position, positive software limit switch (typical value from the specifications)
H576 = -20.0	Y position, negative software limit switch (typical value from the specifications)
H579 = 642	Y position actual value for evaluating software limit switch
H159 = 1023	X source for negative traversing command. PROFIBUS DP control word 1, bit 2.
H160 = 1022	X source for positive traversing command. PROFIBUS DP control word 1, bit 1.
H559 = 1025	Y source for negative traversing command. PROFIBUS DP control word 1, bit 4.
H560 = 1024	Y source for positive traversing command. PROFIBUS DP control word 1, bit 3.
L159 = 1027	Z source for negative traversing command. PROFIBUS DP control word 1, bit 6.
L160 = 1026	Z source for positive traversing command. PROFIBUS DP control word 1, bit 5.
H220 – H226	X position actual value. Parameters of the absolute value encoder AENC1. These depend on the absolute value encoder type (data sheet)
H231, H240, H241, H248 and H249	X settings to calibrate the position actual value from the absolute value encoder. These parameters must be determined and set by making appropriate measurements, refer to Section 6.2.6.2
H620 – H626	Y position actual value. Parameters of the absolute value encoder AENC2. These depend on the absolute value encoder type (data sheet)
H631, H640, H641, H648 and H649	Y settings to calibrate the position actual value from the absolute value encoder. These parameters must be determined and set by making appropriate measurements, refer to Section 6.2.6.2
H215 = 242	Source, X position actual value from absolute value encoder 1
H216 = 1.0	Evaluation, converting position actual value in d217 in [m]
H272 = 44	X main setpoint from analog input 1 (master switch setpoint with 100 % ≙ 10 V)
H615 = 642	Source, Y position actual value from absolute value encoder 2
H616 = 1.0	Evaluation, converting position actual value in d617 in [m]
H672 = 49	Y main setpoint from analog input 2 (master switch setpoint with 100 % ≙ 10 V)
L272 = 54	Z main setpoint from analog input 3 (master switch setpoint with 100 % ≙ 10 V)
H090, H091	Offset, pendulum length X drive, Y drive. The following must be determined (difference between the hoisting height – physical pendulum length, refer to Section 6.2.8.2)
H311 = 12.0	X maximum pendulum length (typical value from the specifications)
H312 = 8.34	X KV1 control parameter for pendulum length 12.0 m. Calculation formula, refer to Section 6.2.8.3

Parameter (X,Y,Z)	**Comment**
H313 = -0.1	X KV2 control parameter for pendulum length 12.0 m
H314 = 0.84	X KV3 control parameter for pendulum length 12.0 m
H315 = 2.5	X minimum pendulum length (typical value from the specifications)
H316 = 5.93	X KV1 control parameter for pendulum length 2.5 m. Calculation formula, refer to Section 6.2.8.3
H317 = -0.1	X KV2 control parameter for pendulum length 2.5 m
H318 = 0.82	X KV3 control parameter for pendulum length 2.5 m
H322 = 0.015	X damping coefficient. This is generally the factory setting
H328 = 1.0	X maximum velocity v_{MAX} = 2.0 m/s (typical value from the specifications)
H333 = 0.05	X overshoot factor, so that there is a control reserve of 5 %.
H711 = 12.0	Y maximum pendulum length (typical value from the specifications)
H712 = 8.34	Y KV1 control parameter for pendulum length 12.0 m. Calculation formula, refer to Section 6.2.8.3
H713 = -0.1	Y KV2 control parameter for pendulum length 12.0 m
H714 = 0.84	Y KV3 control parameter for pendulum length 12.0 m
H715 = 2.5	Y mum pendulum length (typical value from the specifications)
H716 = 5.93	Y KV1 control parameter for pendulum length 2.5 m. Calculation formula, refer to Section 6.2.8.3
H717 = -0.1	Y KV2 control parameter for pendulum length 2.5 m
H718 = 0.82	Y KV3 control parameter for pendulum length 2.5 m
H722 = 0.015	Y damping coefficient. This is generally the factory setting
H728 = 1.0	Y maximum velocity v_{MAX} = 2.0 m/s (typical value from the specifications)
H733 = 0.05	Y overshoot factor, so that there is a control reserve of 5 %.
H453 = 1029	X start positioning. PROFIBUS DP control word 1, bit 8.
H454 = 1030	X stop positioning. PROFIBUS DP control word 1, bit 9.
H455 = 22	X position reference value from word 2 from PROFIBUS
H070 = 30.0	X normalization factor for word 2 from PROFIBUS. Example: 16384 from PROFIBUS should correspond to 30 m -> factor = 30.0.
H460 = 0.167	X adaptation, pendulum length for KP1. Calculation: Adaptation = 2/maximum pendulum length = 2/12.0 = 0.167.
H461 = 0.167	X adaptation KP1 factor for position controller. Calculated from 0.5 * 2 * v_{MAX} / T_H = 0.5 * 2 * 1.0 / 1.5 = 0.167. This involves an initial value. The right KP1 must be found using various trials.
H463 = 1.5	X KP2 factor for position controller. This must be determined using various trials.
H082 = 1.0	X, Y maximum velocity v_{MAX} = 1.0 m/s as fixed setpoint
H485 = 82	X selection max. velocity for positioning (fixed setpoint H082).
H486 = 464	X selection position controller version 1
H491 = 0.167	X KP1 factor for conventional (non sway-controlled) operation. Calculation: Refer to H461.
H492 = 1.5	X KP2 factor for conventional (non sway-controlled) operation. Calculation: Refer to H463.

Parameter (X,Y,Z)	**Comment**
H853 = 1032	Y start positioning. PROFIBUS DP control word 1, bit 11.
H854 = 1033	Y stop positioning. PROFIBUS DP control word 1, bit 12.
H855 = 25	Y position reference value from word 5 from PROFIBUS
H072 = 20.0	Y normalization factor for word 5 from PROFIBUS. Example: 16384 from PROFIBUS should correspond to 20 m -> factor = 20.0.
H860 = 0.167	Y adaptation, pendulum length for KP1. Calculation: Adaptation = 2/ maximum pendulum length = 2/12.0 = 0.167.
H861 = 0.167	Y adaptation KP1 factor for position controller. Calculated from 0.5 * 2 * v_{MAX} / T_H = 0.5 * 2 * 1.0 / 1.5 = 0.167. This involves an initial value. The right KP1 must be found using various trials.
H863 = 1.5	X KP2 factor for position controller. This must be determined using various trials.
H885 = 82	Y selection max. velocity for positioning (fixed setpoint H082).
H486 = 864	Y selection position controller version 1
H891 = 0.167	Y KP1 factor for conventional (non sway-controlled) operation. Calculation: Refer to H861.
H892 = 1.5	Y KP2 factor for conventional (non sway-controlled) operation. Calculation: Refer to H863.
L425 = 12.0	Z position, positive software limit switch (typical value from the specifications)
L426 = 0.0	Z position, negative software limit switch (typical value from the specifications)
L215 = 29	Z position actual value from word 9 from PROFIBUS
H076 = 10.0	Z normalization factor for word 9 from PROFIBUS. Example: 16384 from PROFIBUS should correspond to 10 m -> factor = 10.0.
L453 = 1034	Z start positioning. PROFIBUS DP control word 1, bit 8.
L454 = 1035	Z stop positioning. PROFIBUS DP control word 1, bit 9.
L455 = 27	Z position reference value from word 7 from PROFIBUS
H074 = 10.0	Z normalization factor for word 7 from PROFIBUS. Example: 16384 from PROFIBUS should correspond to 10 m -> factor = 10.0.
L461 = 0.667	Z adaptation KP1 factor for position controller. Calculated from 0.5 * 2 * v_{MAX} / T_H = 0.5 * 2 * 1.0 / 1.5 = 0.667. This involves an initial value. The right KP1 must be found using various trials.
L463 = 1.5	Z KP2 factor for position controller. This must be determined using various trials.
H083 = 1.0	Z maximum velocity v_{MAX} = 1.0 m/s as fixed setpoint
L485 = 83	Z selection max. velocity for positioning (fixed setpoint H083).
L486 = 948	Z selection position controller version 1
H931 – H940, L931 – L940	Selection of the values sent to the automation (refer to FP-A25).

The above list is included in the DriveMonitor file DPT4_60.DNL. The parameters can be modified offline and downloaded into the unit.

All of the parameters which are not listed should be left at the factory setting. They already have correct values for the particular configuration.

Traversing operation with the above specified settings

The main contactor of the rectifier/regenerative feedback unit is closed using the signal "On/no mechanical stop" = 1. Furthermore, the mechanical brake is enabled so that it can be opened.
The X drive, Y drive and Z drive inverters are also powered-up and are then in status 011 (ready for operation).

The mechanical brake is opened by entering the traversing command. After this, the drive moves in the specified direction with the master switch setpoint, adapted by the anti-sway control.

When the traversing command is withdrawn, the drive decelerates down to 0 speed via the ramp-function generator of the anti-sway control, the brake is then closed and the inverter inhibited.

The mechanical brakes are also opened by entering the "Start positioning" signal. The position reference value is then approached with the specified maximum velocity. The velocity is reduced close to the position target.

The drive stops when the position actual value reaches the position reference value, or if the "Stop positioning" signal is entered.
At speed = 0, the brake is closed and the inverter is inhibited.

For "On/no mechanical stop" = 0 (i.e. mechanical stop) the rectifier/regenerative feedback unit is shutdown by opening the main contactor.

■

Changes

8

The changes in the software versions are described here.

The current software version of the program on the T400 is indicated in parameter d001.

Version 1.0

Basic version dated 23.07.2001.

Version 1.1

New version dated 30.08.2002.

1. Integration of a filter in the CONDP block.
The filter is only required if the pendulum angle is measured with a camera.
In this case, the closed-loop control can be effected with a filter (L345 = 1001 for the X drive or L745 = 1001 for the Y drive), or it can be effected without a filter (L345 = 1000 for the X drive or L745 = 1000 for the Y drive).
The filter setting can only be carried out in consultation with the specialist Siemens department.
New parameters: L345, L350 – L386, L745, L750 – L786.

2. Change in the "Reflector found" evaluation logic for the predictor. This change is only significant if a camera is used to measure the pendulum angle.

3. Corrections.

Source wiring for T400 binary outputs:
T400 terminal 51: Selection with parameter H901.
T400 terminal 52: Selection with parameter H910.

New connector KR005 (processor utilization) for test purposes.

Status bits are calculated in RECCB.
Status bits are calculated in RECCU in T1.

■

Appendix A1: DriveMonitor lists which can be downloaded

A1

Overview of the DriveMonitor files which can be downloaded

Section	File name	Valid for device type	Comment
A1.1	DPVCX00.DNL	6SE70 CUVC	X drive, basic file for operation with T400
	DPVCY00.DNL	6SE70 CUVC	Y drive, basic file for operation with T400
	DPVCZ00.DNL	6SE70 CUVC	Z drive, basic file for operation with T400
A1.2	DPMCX00.DNL	6SE70 CUMC	X drive, basic file for operation with T400
	DPMCY00.DNL	6SE70 CUMC	Y drive, basic file for operation with T400
	DPMCZ00.DNL	6SE70 CUMC	Z drive, basic file for operation with T400
A1.3	DPD1X00.DNL	6RA70 CUD1	X drive, basic file for operation with T400
	DPD1Y00.DNL	6RA70 CUD1	Y drive, basic file for operation with T400
	DPD1Z00.DNL	6RA70 CUD1	Z drive, basic file for operation with T400
A1.4	DPVC001.DNL	6SE70 CUVC	Single operation without T400
A1.5	DPMC001.DNL	6SE70 CUMC	Single operation without T400

A1.1 CUVC - basic unit parameters DPVCX00 (X drive), DPVCY00 (Y drive), DPVCZ00 (Z drive)

Parameter	Value, X drive DPVCX00	Value, Y drive DPVCY00	Value, Z drive DPVCZ00	Description	
P443.001	3002	7009	501	Source, speed setpoint (from T400 / SIMOLINK / limiter LIM174.Y)	BDS
P443.002	2002	2002	2002	Reserve operation. Source, speed setpoint (from DriveMonitor / PC)	BDS
P462.001	0.0	0.0	2.0	Ramp-up time	FDS
P462.002	5.0	5.0	5.0	Reserve operation. Ramp-up time	FDS
P464.001	0.0	0.0	2.0	Ramp-down time	FDS
P464.002	5.0	5.0	5.0	Reserve operation. Ramp-down time	FDS
P466.001	1.0	1.0	1.0	Ramp-down time, OFF3	FDS
P554.001	3100	7100	7300	Source, power-on (T400 / SIMOLINK)	BDS
P554.002	5	5	5	Reserve operation. Source power-on (PMU)	BDS
P555.001	3101	7101	7301	Source, OFF2 (T400 / SIMOLINK)	BDS
P555.002	1	1	1	Reserve operation. Source OFF2	BDS
P556.001	18	18	18	Source, OFF2 from terminal –X101.7 (mechanical stop)	BDS
P556.002	18	18	18	Reserve operation. Source OFF2 (from terminal –X101.7)	BDS
P557.001	1	1	1	Source, OFF2	BDS
P557.002	1	1	1	Reserve operation. Source OFF2	BDS
P558.001	3102	7102	7302	Source, OFF3 (T400 / SIMOLINK)	BDS
P558.002	1	1	1	Reserve operation. Source OFF3	BDS
P560.001	1	1	1	Source, OFF3	BDS
P560.002	1	1	1	Reserve operation. Source OFF3	BDS
P561.001	3103	7103	7303	Source, inverter enable (T400 / SIMOLINK)	BDS
P561.002	278	278	278	Reserve operation. Source, inverter enable (from the brake control)	BDS
P562.001	1	1	622	Source, enable ramp-function generator (Z: Limit switch evaluation, OR145.Q)	BDS
P562.002	1	1	622	Reserve operation. Source, enable RFG (Z: Limit switch evaluation, OR145.Q)	BDS
P563.001	1	1	1	Source, no RFG stop	BDS
P563.002	1	1	1	Reserve operation. Source, no RFG stop	BDS
P564.001	3106	7106	7306	Source, setpoint enable (T400 / SIMOLINK)	BDS
P564.002	277	277	277	Reserve operation. Source, setpoint enable (from brake control)	BDS
P565.001	3107	7107	7307	Source, fault acknowledgement (T400 / SIMOLINK)	BDS
P565.002	3107	7107	7307	Reserve operation, source fault acknowledgement (T400 / SIMOLINK)	BDS
P575.001	3115	7115	7315	External fault 1 (from T400)	BDS
P576.002	1	1	1	Source, FDS bit0 (permanently 1 for reserve operation)	BDS
P607	1.0 s	1.0 s	1.0 s	Time between "Close brake" and inhibit firing pulses. (Please observe the influence on P801 !)	
P608.001	104	104	104	Command 1 to open brake (run)	
P608.002	1	1	1	Command 2 to open brake (permanently 1)	

Parameter	**Value, X drive DPVCX00**	**Value, Y drive DPVCY00**	**Value, Z drive DPVCZ00**	**Description**	
P609.001	105	105	105	Command 1 to immediately close brake (no operation)	
P609.002	0	0	645	Command 2 to immediately close brake (Z: Limit switch evaluation INV146.Q)	
P612	16	16	16	Source, brake open (terminal –X101.6)	
P613	17	17	17	Source, brake closed (inverted terminal –X101.6)	
P614	601	601	601	Source, close holding brake (from AND078.Source: BICO1 AND no traversing command from T400)	
P615	148	148	148	Source, braking threshold 2 = n/f [Hz] actual value	
P651.001	107	107	107	Source, digital output, no fault (terminal –X101.3)	BDS
P651.002	107	107	107	Source, digital output, no fault (terminal –X101.3)	BDS
P652.001	275	275	275	Source, digital output, open brake (terminal –X101.4)	BDS
P652.002	275	275	275	Source, digital output, open brake (terminal –X101.4)	BDS
P669.001	---	---	0	EB1 terminal 43 is an input !	
P669.002	---	---	0	EB1 terminal 44 is an input !	
P669.003	---	---	0	EB1 terminal 45 is an input !	
P734.001	32	---	---	Word 1 to T400. X status word 1	
P734.002	148	---	---	Word 2 to T400. X n/f [Hz] actual value	
P734.003	0	---	---	Word 3 to T400. X reserve	
P734.004	431	---	---	Word 4 to T400. X special status word U076/K431	
P734.005	165	---	---	Word 5 to T400. X torque setpoint	
P734.006	7001	---	---	Word 6 to T400. Y status word 1	
P734.007	7009	---	---	Word 7 to T400. Y n/f [Hz] actual value	
P734.008	7006	---	---	Word 8 to T400. Y reserve	
P734.009	7002	---	---	Word 9 to T400. Y special status word U076/K431	
P734.010	7010	---	---	Word 10 to T400. Y torque setpoint	
P734.011	7003	---	---	Word 11 to T400. Z status word 1	
P734.012	7011	---	---	Word 12 to T400. Z n/f [Hz] actual value	
P734.013	7008	---	---	Word 13 to T400. Z reserve	
P734.014	7004	---	---	Word 14 to T400. Z special status word U076/K431	
P734.015	7012	---	---	Word 15 to T400. Z torque setpoint	
P734.016	0	---	---	Word 16 to T400.	
P740.001	0	1	2	Address, SIMOLINK bus	
P742	1	1	1	SLB send power	
P744.001	0	0	0	Lower slot for SLB (slot A)	
P745.001	8	8	8	Number of channels, SIMOLINK	
P746.001	0.8	0.8	0.8	SLB cycle time	
P749.001	1.0	0.0	0.0	Read address, SIMOLINK channel 1	
P749.002	2.1	0.1	0.1	Read address, SIMOLINK channel 2	
P749.003	1.2	0.2	0.2	Read address, SIMOLINK channel 3	
P749.004	2.3	0.3	0.3	Read address, SIMOLINK channel 4	
P749.005	1.4	0.4	0.4	Read address, SIMOLINK channel 5	
P749.006	2.5	0.5	0.5	Read address, SIMOLINK channel 6	
P749.007	1.6	0.6	0.6	Read address, SIMOLINK channel 7	

Parameter	Value, X drive DPVCX00	Value, Y drive DPVCY00	Value, Z drive DPVCZ00	Description	
P749.008	2.7	0.7	0.7	Read address, SIMOLINK channel 8	
P751.001	3006	32	0	Send word 1 to SIMOLINK (Y control word 1 T400 / Y status word 1 CU)	
P751.002	3009	431	0	Send word 2 to SIMOLINK (Y control word 2 T400 / Y special status word CU)	
P751.003	3011	0	32	Send word 3 to SIMOLINK (Z control word 1 T400 / Z status word 1 CU)	
P751.004	3014	0	431	Send word 4 an SIMOLINK (Z control word 2 T400 / Z special status word CU)	
P751.005	3008	0	0	Send word 5 to SIMOLINK (Y reserve)	
P751.006	0	0	0	Send word 6 to SIMOLINK	
P751.007	3013	0	0	Send word 7 to SIMOLINK (Z reserve)	
P751.008	0	0	0	Send word 8 to SIMOLINK	
P751.009	3007	148	0	Send word 9 to SIMOLINK (Y n/f [Hz] set / Y n/f [Hz] actual)	
P751.010	3010	165	0	Send word 10 to SIMOLINK (Z word 10 T400 / Z torque setpoint)	
P751.011	3012	0	148	Send word 11 to SIMOLINK (Z n/f [Hz] set / Z n/f [Hz] actual)	
P751.012	3015	0	165	Send word 12 to SIMOLINK (Z word 15 T400 / Z torque setpoint)	
P751.013	0	0	0	Send word 13 to SIMOLINK	
P751.014	0	0	0	Send word 14 to SIMOLINK	
P751.015	0	0	0	Send word 15 to SIMOLINK	
P751.016	0	0	0	Send word 16 to SIMOLINK	
P800.001	0.4	0.4	0.4	Shutdown value after off	
P800.002	0.4	0.4	0.4	Shutdown value after off	
P801.001	1.1 s	1.1 s	1.1 s	Shutdown value after off (≈ P607+0.1)	
P801.002	1.1 s	1.1 s	1.1 s	Shutdown value after off (≈ P607+0.1)	
U021.001	1	1	1	B401 = BICO1 selected	FDS
U076.001	255	255	255	Bit0 SSW: Energization completed	
U076.002	277	277	277	Bit1 SSW: Setpoint enable, brake control	
U076.003	278	278	278	Bit2 SSW: Inverter enable, brake control	
U076.004	0	0	5107	Bit3 SSW: Z: Traversing command, positive (EB1 terminal)	
U076.005	0	0	5109	Bit4 SSW: Z: Traversing command, negative (EB1 terminal)	
U076.006	0	0	0	Bit5 SSW:	
U076.007	0	0	0	Bit6 SSW:	
U076.008	0	0	0	Bit7 SSW:	
U076.009	18	18	18	Bit8 SSW: BI5, term.7, on/no mechanical stop	
U076.010	20	20	20	Bit9 SSW: BI6, term.8, no electrical stop	
U076.011	641	641	641	Bit10 SSW: BICO1 not selected	
U076.012	0	0	0	Bit11 SSW:	
U076.013	0	0	0	Bit12 SSW:	
U076.014	0	0	0	Bit13 SSW:	
U076.015	0	0	0	Bit14 SSW:	
U076.016	0	0	0	Bit15 SSW:	

Parameter	**Value, X drive DPVCX00**	**Value, Y drive DPVCY00**	**Value, Z drive DPVCZ00**	**Description**	
U098	---	---	401	INV084.X = pre limit switch velocity	
U130.001	---	---	522	LIM174.LU= NSW119.Y	
U130.002	---	---	7011	LIM174.X = n/f [Hz] setpoint from SIMOLINK	
U130.003	---	---	524	LIM174.LL = NSW160.Y	
U166	---	---	5117	NSW085.I = pre limit switch, positive (EB1 terminal)	
U167.001	---	---	401	NSW085.X1 = pre limit switch velocity	
U167.002	---	---	1	NSW085.X2 = 100 %	
U168	---	---	5113	NSW119.I = limit switch, positive (EB1 terminal)	
U169.001	---	---	0	NSW119.X1 = 0 %	
U169.002	---	---	521	NSW119.X = NSW085.Y (changeover switch, VES velocity)	
U170	---	---	5105	NSW121.I = pre limit switch, negative (EB1 terminal)	
U171.001	---	---	458	NSW121.X1= INV084.Y (negative VES velocity)	
U171.002	---	---	3	NSW121.X2 = -100 %	
U172	---	---	5115	NSW160.I = limit switch, negative (EB1 terminal)	
U173.001	---	---	0	NSW160.X1 = 0 %	
U173.002	---	---	523	NSW160.X2= NSW121.Y (changeover switch, VES velocity)	
U221.001	401	401	401	AND078.I1 = BICO1 selected	
U221.002	3400	7200	7400	AND078.I2 = no traversing command from T400	
U221.003	1	1	1	AND078.I3 = 1	
U223.01	---	---	5113	AND089.I3 = limit switch, positive (EB1 terminal)	
U223.02	---	---	5115	AND089.I3 = limit switch, negative (EB1 terminal)	
U223.03	---	---	1	AND089.I3 = 1	
U224.01	---	---	681	AND109.I1 = NAND092.Q (limit switch actuated)	
U224.02	---	---	7400	AND109.I2 = no traversing command from SIMOLINK	
U224.03	---	---	1	AND109.I3 = 1	
U242.01	---	---	503	OR145.I1 = RSR136.Q (start help active)	
U242.02	---	---	603	OR145.I2 = AND089.Q (limit switch o.k.)	
U242.03	---	---	0	OR145.I3 = 0	
U251	401	401	401	NOT108 = BICO1 selected	
U255	---	---	622	NOT146.I = OR145.Q (start help active or ES o.k.)	
U261.01	---	---	5113	NAND092.I1 = limit switch, positive (EB1 terminal)	
U261.02	---	---	5115	NAND092.I2 = limit switch, negative (EB1 terminal)	
U261.03	---	---	1	NAND092.I3 = 1	
U282.01	---	---	604	RSR.S = AND109.Q (ES actuated and no traversing command)	
U282.02	---	---	603	RSR.R = AND089.Q (limit switch o.k.)	
U950.48	6	6	6	FSV048	
U950.78	6	6	6	AND078	
U950.84	---	---	4	INV084	
U950.85	---	---	4	NSW085	
U950.89	---	---	4	AND089	
U950.92	---	---	4	NAND092	

Parameter	**Value, X drive DPVCX00**	**Value, Y drive DPVCY00**	**Value, Z drive DPVCZ00**	**Description**	
U951.08	6	6	6	NOT108	
U951.09	---	---	4	AND109	
U951.19	---	---	4	NSW119	
U951.21	---	---	4	NSW121	
U951.36	---	---	4	RSR136	
U951.45	---	---	4	OR145	
U951.46	---	---	4	NOT146	
U951.60	---	---	4	NSW160	
U951.74	---	---	4	LIM174	
U952.89	6	6	6	Special status word K431	
U953.04	---	---	4	EB1 digital inputs / outputs	
U953.05	---	---	4	EB1 digital inputs	
U953.48	6	6	6	Brake control	

A1.2 CUMC - basic unit parameters DPMCX00 (X drive), DPMCY00 (Y drive), DPMCZ00 (Z drive)

Parameter	Value, X drive DPMCX00	Value, Y drive DPMCY00	Value, Z drive DPMCZ00	Description	
P443.001	3002	7009	501	Source, speed setpoint (from T400 / SIMOLINK / limiter LIM174.Y)	BDS
P443.002	2002	2002	2002	Reserve operation. Source, speed setpoint (from DriveMonitor / PC)	BDS
P462.001	0.0	0.0	2.0	Ramp-up time	FDS
P462.002	5.0	5.0	5.0	Reserve operation. Ramp-up time	FDS
P464.001	0.0	0.0	2.0	Ramp-down time	FDS
P464.002	5.0	5.0	5.0	Reserve operation. Ramp-down time	FDS
P554.001	3100	7100	7300	Source, power-on (T400 / SIMOLINK)	BDS
P554.002	5	5	5	Reserve operation. Source, power-on (PMU)	BDS
P555.001	3101	7101	7301	Source, OFF2 (T400 / SIMOLINK)	BDS
P555.002	1	1	1	Reserve operation. Source OFF2	BDS
P556.001	18	18	18	Source, OFF2 from terminal –X101.7 (mechanical stop)	BDS
P556.002	18	18	18	Reserve operation. Source OFF2 (from terminal –X101.7)	BDS
P557.001	1	1	1	Source, OFF2	BDS
P557.002	1	1	1	Reserve operation. Source OFF2	BDS
P558.001	3102	7102	7302	Source, OFF3 (T400 / SIMOLINK)	BDS
P558.002	1	1	1	Reserve operation. Source OFF3	BDS
P560.001	1	1	1	Source, OFF3	BDS
P560.002	1	1	1	Reserve operation. Source OFF3	BDS
P561.001	3103	7103	7303	Source, inverter enable (T400 / SIMOLINK)	BDS
P561.002	278	278	278	Reserve operation. Source, inverter enable (from the brake control)	BDS
P562.001	1	1	622	Source, enable ramp-function generator (Z: Limit switch evaluation OR145.Q)	BDS
P562.002	1	1	622	Reserve operation. Source, enable RFG (Z: Limit switch evaluation OR145.Q)	BDS
P563.001	1	1	1	Source, no RFG stop	BDS
P563.002	1	1	1	Reserve operation. Source, no RFG stop	BDS
P564.001	3106	7106	7306	Source, setpoint enable (T400 / SIMOLINK)	BDS
P564.002	277	277	277	Reserve operation. Source, setpoint enable (from the brake control)	BDS
P565.001	3107	7107	7307	Source, fault acknowledgement (T400 / SIMOLINK)	BDS
P565.002	3107	7107	7307	Reserve operation, source fault acknowledgement (T400 / SIMOLINK)	BDS
P575.001	3115	7115	7315	External fault 1 (from T400)	BDS
P576.002	1	1	1	Source, FDS bit0 (permanently 1 for reserve operation)	BDS
P607	1.0 s	1.0 s	1.0 s	Time between "Close brake" and the firing pulses inhibited. (Observe effect on P801 !)	
P608.001	104	104	104	Command 1 to open brake (run)	
P608.002	1	1	1	Command 2 to open brake (permanently 1)	
P609.001	105	105	105	Command 1 to immediately close brake (no operation)	

Parameter	**Value, X drive DPMCX00**	**Value, Y drive DPMCY00**	**Value, Z drive DPMCZ00**	**Description**	
P609.002	0	0	645	Command 2 to immediately close brake (Z: Limit switch evaluation INV146.Q)	
P612	16	16	16	Source, brake open (terminal –X101.6)	
P613	17	17	17	Source, brake closed (inverted terminal –X101.6)	
P614	601	601	601	Source, close holding brake (from AND078.Q: BICO1 AND no traversing command from T400)	
P615	91	91	91	Source, braking threshold 2 = n/f [Hz] actual value	
P651.001	107	107	107	Source, digital output, no fault (terminal –X101.3)	BDS
P651.002	107	107	107	Source, digital output, no fault (terminal –X101.3)	BDS
P652.001	275	275	275	Source, digital output, open brake (terminal –X101.4)	BDS
P652.002	275	275	275	Source, digital output, open brake (terminal –X101.4)	BDS
P669.001	---	---	0	EB1 terminal 43 is input !	
P669.002	---	---	0	EB1 terminal 44 is input !	
P669.003	---	---	0	EB1 terminal 45 is input !	
P734.001	32	---	---	Word 1 to T400. X status word 1	
P734.002	91	---	---	Word 2 to T400. X n/f [Hz] actual value	
P734.003	0	---	---	Word 3 to T400. X reserve	
P734.004	431	---	---	Word 4 to T400. X special status word U076/K431	
P734.005	165	---	---	Word 5 to T400. X torque setpoint	
P734.006	7001	---	---	Word 6 to T400. Y status word 1	
P734.007	7009	---	---	Word 7 to T400. Y n/f [Hz] actual value	
P734.008	7006	---	---	Word 8 to T400. Y reserve	
P734.009	7002	---	---	Word 9 to T400. Y special status word U076/K431	
P734.010	7010	---	---	Word 10 to T400. Y torque setpoint	
P734.011	7003	---	---	Word 11 to T400. Z status word 1	
P734.012	7011	---	---	Word 12 to T400. Z n/f [Hz] actual value	
P734.013	7008	---	---	Word 13 to T400. Z reserve	
P734.014	7004	---	---	Word 14 to T400. Z special status word U076/K431	
P734.015	7012	---	---	Word 15 to T400. Z torque setpoint	
P734.016	0	---	---	Word 16 to T400.	
P740	0	1	2	Address, SIMOLINK bus	
P742	1	1	1	SLB send power	
P744	0	0	0	Lower slot for SLB (slot A)	
P745	8	8	8	Number of channels, SIMOLINK	
P746	0.8	0.8	0.8	SLB cycle time	
P749.001	1.0	0.0	0.0	Read address, SIMOLINK channel 1	
P749.002	2.1	0.1	0.1	Read address, SIMOLINK channel 2	
P749.003	1.2	0.2	0.2	Read address, SIMOLINK channel 3	
P749.004	2.3	0.3	0.3	Read address, SIMOLINK channel 4	
P749.005	1.4	0.4	0.4	Read address, SIMOLINK channel 5	
P749.006	2.5	0.5	0.5	Read address, SIMOLINK channel 6	
P749.007	1.6	0.6	0.6	Read address, SIMOLINK channel 7	
P749.008	2.7	0.7	0.7	Read address, SIMOLINK channel 8	

Parameter	Value, X drive DPMCX00	Value, Y drive DPMCY00	Value, Z drive DPMCZ00	Description	
P751.001	3006	32	0	Send word 1 to SIMOLINK (Y control word 1 T400 / Y status word 1 CU)	
P751.002	3009	431	0	Send word 2 to SIMOLINK (Y control word 2 T400 / Y special status word CU)	
P751.003	3011	0	32	Send word 3 to SIMOLINK (Z control word 1 T400 / Z status word 1 CU)	
P751.004	3014	0	431	Send word 4 to SIMOLINK (Z control word 2 T400 / Z special status word CU)	
P751.005	3008	0	0	Send word 5 to SIMOLINK (Y reserve)	
P751.006	0	0	0	Send word 6 to SIMOLINK	
P751.007	3013	0	0	Send word 7 to SIMOLINK (Z reserve)	
P751.008	0	0	0	Send word 8 to SIMOLINK	
P751.009	3007	91	0	Send word 9 to SIMOLINK (Y n/f [Hz] set / Y n/f [Hz] actual)	
P751.010	3010	165	0	Send word 10 to SIMOLINK (Z word 10 T400 / Z torque setpoint)	
P751.011	3012	0	91	Send word 11 to SIMOLINK (Z n/f [Hz] set / Z n/f [Hz] actual)	
P751.012	3015	0	165	Send word 12 to SIMOLINK (Z word 15 T400 / Z torque setpoint)	
P751.013	0	0	0	Send word 13 to SIMOLINK	
P751.014	0	0	0	Send word 14 to SIMOLINK	
P751.015	0	0	0	Send word 15 to SIMOLINK	
P751.016	0	0	0	Send word 16 to SIMOLINK	
P800.001	0.4	0.4	0.4	Shutdown value after off	
P800.002	0.4	0.4	0.4	Shutdown value after off	
P801.001	1.1 s	1.1 s	1.1 s	Shutdown time after off (≈ P607+0.1)	
P801.002	1.1 s	1.1 s	1.1 s	Shutdown time after off (≈ P607+0.1)	
U021.001	1	1	1	B401 = BICO1 selected	FDS
U076.001	255	255	255	Bit0 SSW: Energization completed	
U076.002	277	277	277	Bit1 SSW: Setpoint enable, brake control	
U076.003	278	278	278	Bit2 SSW: Inverter enable, brake control	
U076.004	0	0	5107	Bit3 SSW: Z: Traversing command, positive (EB1 terminal)	
U076.005	0	0	5109	Bit4 SSW: Z: Traversing command, negative (EB1 terminal)	
U076.006	0	0	0	Bit5 SSW:	
U076.007	0	0	0	Bit6 SSW:	
U076.008	0	0	0	Bit7 SSW:	
U076.009	18	18	18	Bit8 SSW: BI5, term.7, on/no mechanical stop	
U076.010	20	20	20	Bit9 SSW: BI6, term.8, no electrical stop	
U076.011	641	641	641	Bit10 SSW: BICO1 not selected	
U076.012	0	0	0	Bit11 SSW:	
U076.013	0	0	0	Bit12 SSW:	
U076.014	0	0	0	Bit13 SSW:	
U076.015	0	0	0	Bit14 SSW:	

Parameter	**Value, X drive DPMCX00**	**Value, Y drive DPMCY00**	**Value, Z drive DPMCZ00**	**Description**	
U076.016	0	0	0	Bit15 SSW:	
U098	---	---	401	INV084.X = pre limit switch velocity	
U130.001	---	---	522	LIM174.LU= NSW119.Y	
U130.002	---	---	7011	LIM174.X = n/f [Hz] setpoint from SIMOLINK	
U130.003	---	---	524	LIM174.LL = NSW160.Y	
U166	---	---	5117	NSW085.I = limit switch, positive (EB1 terminal)	
U167.001	---	---	401	NSW085.X1 = pre limit switch velocity	
U167.002	---	---	1	NSW085.X2 = 100 %	
U168	---	---	5113	NSW119.I = limit switch, positive (EB1 terminal)	
U169.001	---	---	0	NSW119.X1 = 0 %	
U169.002	---	---	521	NSW119.X = NSW085.Y (changeover switch, VES velocity)	
U170	---	---	5105	NSW121.I = pre limit switch, negative (EB1 terminal)	
U171.001	---	---	458	NSW121.X1= INV084.Y (negative VES velocity)	
U171.002	---	---	3	NSW121.X2 = -100 %	
U172	---	---	5115	NSW160.I = limit switch, negative (EB1 terminal)	
U173.001	---	---	0	NSW160.X1 = 0 %	
U173.002	---	---	523	NSW160.X2= NSW121.Y (changeover switch, VES velocity)	
U221.001	401	401	401	AND078.I1 = BICO1 selected	
U221.002	3400	7200	7400	AND078.I2 = no traversing command from T400	
U221.003	1	1	1	AND078.I3 = 1	
U223.01	---	---	5113	AND089.I3 = limit switch, positive (EB1 terminal)	
U223.02	---	---	5115	AND089.I3 = limit switch, negative (EB1 terminal)	
U223.03	---	---	1	AND089.I3 = 1	
U224.01	---	---	681	AND109.I1 = NAND092.Q (limit switch actuated)	
U224.02	---	---	7400	AND109.I2 = no traversing command from SIMOLINK	
U224.03	---	---	1	AND109.I3 = 1	
U242.01	---	---	503	OR145.I1 = RSR136.Q (start help active)	
U242.02	---	---	603	OR145.I2 = AND089.Q (limit switch o.k.)	
U242.03	---	---	0	OR145.I3 = 0	
U251	401	401	401	NOT108 = BICO1 selected	
U255	---	---	622	NOT146.I = OR145.Q (start help active or ES o.k.)	
U261.01	---	---	5113	NAND092.I1 = limit switch, positive (EB1 terminal)	
U261.02	---	---	5115	NAND092.I2 = limit switch, negative (EB1 terminal)	
U261.03	---	---	1	NAND092.I3 = 1	
U282.01	---	---	604	RSR.S = AND109.Q (ES actuated and no traversing command)	
U282.02	---	---	603	RSR.R = AND089.Q (limit switch o.k.)	
U950.48	6	6	6	FSV048	
U950.78	6	6	6	AND078	
U950.84	---	---	4	INV084	

Parameter	**Value, X drive DPMCX00**	**Value, Y drive DPMCY00**	**Value, Z drive DPMCZ00**	**Description**	
U950.85	---	---	4	NSW085	
U950.89	---	---	4	AND089	
U950.92	---	---	4	NAND092	
U951.08	6	6	6	NOT108	
U951.09	---	---	4	AND109	
U951.19	---	---	4	NSW119	
U951.21	---	---	4	NSW121	
U951.36	---	---	4	RSR136	
U951.45	---	---	4	OR145	
U951.46	---	---	4	NOT146	
U951.60	---	---	4	NSW160	
U951.74	---	---	4	LIM174	
U952.89	6	6	6	Special status word K431	
U953.04	---	---	4	EB1 digital inputs / outputs	
U953.05	---	---	4	EB1 digital inputs	
U953.48	6	6	6	Brake control	

A1.3 CUD1 - basic unit parameter DPD1X00 (X drive), DPD1Y00 (Y drive), DPD1Z00 (Z drive)

Parameter	**Value, X drive DPD1X00**	**Value, Y drive DPD1Y00**	**Value, Z drive DPD1Z00**	**Description**	
P080	2	2	2	Mechanical brake as operating brake	
P087	-0.05	-0.05	-0.05	Brake opening time (s)	
P088	1.0	1.0	1.0	Brake closing time (s)	
P303.001	0.0	0.0	2.0	Ramp-up time	FDS
P303.002	5.0	5.0	5.0	Ramp-up time, reserve operation	FDS
P304.001	0.0	0.0	2.0	Ramp-down time	FDS
P304.002	5.0	5.0	5.0	Ramp-down time, reserve operation	FDS
P402.001	110.0	110.0	110.0	Fixed setpoint, maximum speed	FDS
P402.002	110.0	110.0	110.0	Fixed setpoint, maximum speed reserve operation	FDS
P421.001	1	1	1	B421 = BICO1 selected	FDS
P443.001	3002	6002	9167	Source, speed setpoint (from T400 / peer SST2 / limiter LIM065.Y)	BDS
P443.002	2002	2002	2002	Reserve operation. Source, speed setpoint (from DriveMonitor / PC)	BDS
P642.001	402	402	402	Max. speed 1.1 * rated system speed n_N	
P643.001	9	9	9	Max. speed 1.1 * rated system speed n_N	
P654.001	3100	6100	6100	Source, power-on (T400 / peer SST2)	BDS
P654.002	2100	2100	2100	Reserve operation. Source, power-on (DriveMonitor)	BDS
P655.001	3101	6101	6101	Source, OFF2 (T400 / peer SST2)	BDS
P655.002	1	1	1	Reserve operation. Source OFF2	BDS
P656.001	10	10	10	Source, OFF2 from terminal –X171.36 (mechanical stop)	BDS
P656.002	10	10	10	Reserve operation. Source OFF2 (from terminal –X171.36)	BDS
P657.001	1	1	1	Source, OFF2	BDS
P657.002	1	1	1	Reserve operation. Source OFF2	BDS
P658.001	3102	6102	6102	Source, OFF3 (T400 / peer SST2)	BDS
P658.002	1	1	1	Reserve operation. Source OFF3	BDS
P660.001	1	1	1	Source, OFF3	BDS
P660.002	1	1	1	Reserve operation. Source OFF3	BDS
P661.001	3103	6103	6103	Source, operating enable (T400 / peer SST2)	BDS
P661.002	1	1	1	Reserve operation. Source operating enable	BDS
P662.001	1	1	9380	Source, enable RFG (from OR150, start help or ES o.k.)	BDS
P662.002	1	1	9380	Reserve operation. Source, enable RFG (from OR150)	BDS
P663.001	1	1	1	Source, no RFG stop	BDS
P663.002	1	1	1	Reserve operation. Source, no RFG stop	BDS
P664.001	3106	6106	6106	Source, setpoint enable (T400 / peer SST2)	BDS
P664.002	1	1	1	Reserve operation. Source, setpoint enable	BDS
P665.001	3107	6107	6107	Source, fault acknowledgement (T400 / peer SST2)	BDS

Parameter	**Value, X drive DPD1X00**	**Value, Y drive DPD1Y00**	**Value, Z drive DPD1Z00**	**Description**	
P665.002	3107	6107	6107	Reserve operation. Source, fault acknowledgement (T400 / peer SST2)	BDS
P666.001	20	20	20	Source, fault acknowledgement (from terminal –X163.41)	BDS
P666.002	20	20	20	Reserve operation. Source, fault acknowledgement (from terminal –X163.41)	BDS
P675.001	3115	6115	6115	External fault 1 (from T400)	BDS
P676.002	1	1	1	Source, FDS bit0 (permanently 1 for reserve operation)	BDS
P771	107	107	107	Source, digital output, no fault (terminal –X171.46)	BDS
P772	250	250	9352	Source, digital output, open brake (terminal –X171.48)	BDS
P791	5	5	5	Peer SST2: Number of words	
P793	8	8	8	Peer SST2: Baud rate (8 = 38400 baud)	
P794.001	3006	32	32	Send word 1 to peer SST2 (Y control word 1 T400 / Y, Z status word 1 CU)	
P794.002	3007	167	167	Send word 2 to peer SST2 (Y n set / Y, Z n actual)	
P794.003	3008	0	0	Send word 3 to peer SST2 (Y word 8 T400 / Y, Z reserve)	
P794.004	3009	9113	9113	Send word 4 to peer SST2 (Y control word 2 T400 / Y, Z special status word)	
P794.005	3010	145	145	Send word 5 to peer SST2 (Y word 10 T400 / Y, Z torque setpoint)	
P797	1.0	1.0	1.0	Peer SST2: Telegram monitoring time (s)	
P801	5	---	---	Peer SST3: Number of words	
P803	8	---	---	Peer SST3: Baud rate (8 = 38400 baud)	
P804.001	3011	---	---	Send word 1 to peer SST3 (Z control word 1)	
P804.002	3012	---	---	Send word 2 to peer SST3 (Z n set)	
P804.003	3013	---	---	Send word 3 to peer SST3 (Z word 13 T400)	
P804.004	3014	---	---	Send word 4 to peer SST3 (Z control word 2 T400)	
P804.005	3015	---	---	Send word 5 to peer SST3 (Z word 15 T400)	
P807	1.0	---	---	Peer SST3: Telegram monitoring time (s)	
U113.001	1	1	1	Bit0 SSW: Permanently 1	
U113.002	9580	9580	9580	Bit1 SSW: Setpoint enable after open brake (from PDE240.Q)	
U113.003	1	1	1	Bit2 SSW: Permanently 1	
U113.004	0	0	5107	Bit3 SSW: Z: Traversing command, positive	
U113.005	0	0	5109	Bit4 SSW: Z: Traversing command, negative	
U113.006	0	0	0	Bit5 SSW:	
U113.007	0	0	0	Bit6 SSW:	
U113.008	0	0	0	Bit7 SSW:	
U113.009	10	10	10	Bit8 SSW: -X171:36 ON / no mechanical stop	
U113.010	16	16	16	Bit9 SSW: -X171:39 no electrical stop	
U113.011	9450	9450	9450	Bit10 SSW: BICO1 not selected	
U113.012	0	0	0	Bit11 SSW:	

Parameter	**Value, X drive DPD1X00**	**Value, Y drive DPD1Y00**	**Value, Z drive DPD1Z00**	**Description**	
U113.013	0	0	0	Bit12 SSW:	
U113.014	0	0	0	Bit13 SSW:	
U113.015	0	0	0	Bit14 SSW:	
U113.016	0	0	0	Bit15 SSW:	
U135	---	---	411	INV035.X = pre limit switch velocity	
U175.01	---	---	9211	LIM065.LU = NSW091.Y (upper limit, n set)	
U175.02	---	---	6002	LIM065.X = speed setpoint from PEER	
U175.03	---	---	9213	LIM065.LL = NSW093.Y (lower limit, n set)	
U240.001	---	---	411	NSW090.X1 = pre limit switch velocity	
U240.002	---	---	1	NSW090.X2 = 100 %	
U241	---	---	5117	NSW090.I = pre limit switch, positive (EB1 terminal)	
U242.001	---	---	0	NSW091.X1 = 0 %	
U242.002	---	---	9210	NSW091.X2 = NSW090.Y (changeover switch VES velocity)	
U243	---	---	5113	NSW091.I = limit switch, positive (EB1 terminal)	
U244.001	---	---	9135	NSW092.X1 = negative pre limit switch velocity	
U244.002	---	---	3	NSW092.X2 = -100 %	
U245	---	---	5105	NSW092.I = pre limit switch, negative (EB1 terminal)	
U246.001	---	---	0	NSW093.X1 = 0 %	
U246.002	---	---	9212	NSW093.X2 = NSW092.Y (changeover switch VES velocity)	
U247	---	---	5115	NSW093.I = limit switch, negative (EB1 terminal)	
U320.01	---	---	5113	AND120.I1 = limit switch, positive (EB1 terminal)	
U320.02	---	---	5115	AND120.I2 = limit switch, negative (EB1 terminal)	
U320.03	---	---	1	AND120.I3 = 1	
U321.01	---	---	9470	AND121.I1 = AND120.Q (limit switch actuated)	
U321.02	---	---	6400	AND121.I2 = no traversing command from PEER	
U321.03	---	---	1	AND121.I3 = 1	
U322.01	---	---	250	AND122.I1 = open brake (from the brake control)	
U322.02	---	---	9380	AND122.I2 = OR150.Q (start help active or LS o.k)	
U322.03	---	---	1	AND122.I3 = 1	
U350.01	---	---	9550	OR150.I1 = RSR215.Q (start help active)	
U350.02	---	---	9350	OR150.I2 = AND120.Q (limit switch o.k.)	
U380	421	421	421	INV180.I = BICO1 selected	
U400.01	---	---	5113	NAND200.I1 = limit switch, positive (EB1 terminal)	
U400.02	---	---	5115	NAND200.I2 = limit switch, negative (EB1 terminal)	
U400.03	---	---	1	NAND200.I3 = 1	
U415.01	---	---	9351	RSR215.S = AND121.Q (LS actuated and no traversing command.)	
U415.02	---	---	9350	RSR215.R = AND120.Q (limit switch o.k.)	
U440	250	250	250	PDE240.I = open brake (from the brake control)	
U441	0.150	0.150	0.150	PDE240.T: Open deceleration – SW enable [s]	

Parameter	**Value, X drive DPD1X00**	**Value, Y drive DPD1Y00**	**Value, Z drive DPD1Z00**	**Description**	
U734.001	32	---	---	Word 1 to T400. X status word 1	
U734.002	167	---	---	Word 2 to T400. X speed actual value	
U734.003	0	---	---	Word 3 to T400. X reserve	
U734.004	9113	---	---	Word 4 to T400. X special status word U113/K9113	
U734.005	145	---	---	Word 5 to T400. X torque setpoint	
U734.006	6001	---	---	Word 6 to T400. Y status word 1	
U734.007	6002	---	---	Word 7 to T400. Y speed actual value	
U734.008	6003	---	---	Word 8 to T400. Y reserve	
U734.009	6004	---	---	Word 9 to T400. Y special status word U113/K9113	
U734.010	6005	---	---	Word 10 to T400. Y torque setpoint	
U734.011	9001	---	---	Word 11 to T400. Z status word 1	
U734.012	9002	---	---	Word 12 to T400. Z speed actual value	
U734.013	9003	---	---	Word 13 to T400. Z reserve	
U734.014	9004	---	---	Word 14 to T400. Z special status word U113/K9113	
U734.015	9005	---	---	Word 15 to T400. Z torque setpoint	
U734.016	0	---	---	Word 16 to T400.	
U769.001	---	---	0	EB1 terminal 43 is input !	
U769.002	---	---	0	EB1 terminal 44 is input !	
U769.003	---	---	0	EB1 terminal 45 is input !	

A1.4 Single operation without T400 for CUVC – basic unit parameter PVC001

Parameter	Value DPVC001	Description	
P216.001	4.8 ms	Closed-loop frequency control. Smoothing n/f [Hz] actual value pre control	MDS
P223.001	10.0 ms	Closed-loop frequency control. Smoothing n/f [Hz] actual value	MDS
P278.001	0.0	Closed-loop frequency control. Steady-state torque, closed-loop frequency control	MDS
P313.001	15.0	Closed-loop frequency control. Changeover frequency, EMK-I model	MDS
P315.001	0.3	Closed-loop frequency control. KP EMK controller	MDS
P401.001	10.0	Setpoint for single operation	FDS
P443.001	501	Source, speed setpoint (from LIM174.Y, setpoint limiting ES, VES)	BDS
P462.001	5.0	Ramp-up time	FDS
P464.001	5.0	Ramp-down time	FDS
P466.001	3.0	Ramp-down time, OFF3	FDS
P471.001	0.1	Closed-loop frequency control. Scaling n/f [Hz] controller pre control	MDS
P554.001	530	Source, power-on (from PDE095.Q)	BDS
P555.001	18	Source, OFF2 (from terminal –X101.7, mechanical stop)	BDS
P556.001	1	Source, OFF2	BDS
P557.001	1	Source, OFF2	BDS
P558.001	1	Source, OFF3	BDS
P560.001	1	Source, OFF3	BDS
P561.001	601	Source, inverter enable (from AND078.Q)	BDS
P562.001	621	Source, enable RFG (from OR123.Q, start help active or limit switch o.k.)	BDS
P563.001	1	Source, no RFG stop	BDS
P564.001	608	Source, setpoint enable (from AND161.Q)	BDS
P565.001	14	Source, fault acknowledgement (from terminal –X101.5)	BDS
P571.001	5107	Source, enable positive direction of rotation (from EB1 terminal 44, pos. traversing command)	BDS
P572.001	5109	Source, enable negative direction of rotation (from EB1 terminal 45, neg. traversing command)	BDS
P605	1	Brake without checkback signal	
P607	1.0 s	Time between "Close brake" and inhibit firing pulses. (observe the effect on P801)	
P608.001	104	Command 1 to open brake (operation)	
P608.002	607	Command 2 to open brake (from AND144.Q, traversing command)	
P609.001	105	Command 1 to immediately close brake (no operation)	
P609.002	644	Command 2 to immediately close brake (from NOT137. source, limit switch)	
P609.003	106	Command 3 to immediately close brake (fault)	
P612	645	Source, checkback signal brake open (from NOT146.Q, inverted B016)	
P613	16	Source, checkback signal brake closed (from digital input –X101.6)	
P614	609	Source, close holding brake (from AND162.Q, no traversing command & n = 0)	
P615	148	Source, braking threshold 2 = n/f [Hz] actual value	
P617	1.0 s	Time for the "Close brake" command after n = 0 signal (effect on P801!)	
P651.001	107	Source, digital output, no fault (terminal –X101.3)	BDS
P652.001	275	Source, digital output, open brake (terminal –X101.4)	BDS
P669.001	0	Source, EB1 terminal 43 is input	

Parameter	Value DPVC001	Description	
P669.002	0	Source, EB1 terminal 44 is input	
P669.003	0	Source, EB1 terminal 45 is input	
P800.001	0.4	Shutdown value after off	
P801.001	2.1 s	Shutdown time after off (≈ P617+P607+0.1)	
U001.01	10.0	Pre limit switch velocity	
U098	401	INV084.I = pre limit switch velocity	
U130.01	522	LIM174.LU = NSW119.Y (upper setpoint limiting)	
U130.02	41	LIM174.X = fixed setpoint P401.01	
U130.03	524	LIM174.LL = NSW160.Y (lower setpoint limiting)	
U166	5117	NSW085.I = digital input EB1 terminal 42 (pre limit switch, positive)	
U167.01	401	NSW085.X1 = pre limit switch velocity	
U167.02	1	NSW085.X2 = 100 %	
U168	5113	NSW119.I = digital input EB1 terminal 40 (limit switch, positive)	
U169.01	0	NSW119.X1 = 0 %	
U169.02	521	NSW119.X2 = NSW085.Y (changeover switch, VES velocity)	
U170	5105	NSW121.I = digital input EB1 terminal 43 (pre limit switch, negative)	
U171.01	458	NSW121.X1 = INV084.Y (negative pre limit switch velocity)	
U171.02	3	NSW121.X2 = 100 %	
U172	5115	NSW160.I = digital input EB1 terminal 41 (limit switch, negative)	
U173.01	0	NSW160.X1 = 0 %	
U173.02	523	NSW160.X2 = NSW121.Y (changeover switch negative VES velocity)	
U221.01	619	AND078.I1 = OR090.Q (traversing command or inverter enable from brake control)	
U221.02	530	AND078.I2 = PDE095.Q (no OFF1)	
U221.03	18	AND078.I3 = digital input, terminal 7 (no mechanical stop)	
U223.01	5107	AND089.I1 = digital input EB1 terminal 44 (traversing command, positive)	
U223.02	5113	AND089.I2 = digital input EB1 terminal 40 (limit switch, positive)	
U223.03	1	AND089.I3 = 1	
U224.01	5109	AND109.I1 = digital input EB1 terminal 45 (traversing command, negative)	
U224.02	5115	AND109.I2 = digital input EB1 terminal 41 (limit switch, negative)	
U224.03	1	AND109.I3 = 1	
U227.01	620	AND144.I1 = OR091.Q (traversing command and LS)	
U227.02	1	AND144.I2 = 1	
U227.03	107	AND144.I3 = no fault	
U228.01	607	AND161.I1 = AND144.Q (traversing command)	
U228.02	277	AND161.I2 = setpoint enable from brake control	
U228.03	1	AND161.I3 = 1	
U229.01	643	AND162.I1 = INV111.Q (no traversing command)	
U229.02	282	AND162.I2 = zero speed signal from the brake control	
U229.03	1	AND162.I3 = 1	
U230.01	681	AND179.I1 = NAND092.Q (limit switch actuated)	
U230.02	646	AND179.I2 = NOT111.Q (no traversing command)	
U230.03	1	AND179.I3 = 1	
U231.01	5113	AND180.I1 = digital input EB1 terminal 40 (limit switch, positive)	
U231.02	5115	AND180.I2 = digital input EB1 terminal 41 (limit switch, negative)	

Parameter	**Value DPVC001**	**Description**	
U231.03	1	AND180.I3 = 1	
U239.01	607	OR090.I1 = AND144.Q (traversing command)	
U239.02	278	OR090.I2 = inverter enable from brake control	
U240.01	603	OR091.I1 = AND089.Q (traversing command positive and LS pos.)	
U240.02	604	OR091.I2 = AND109.Q (traversing command negative and LS neg.)	
U241.01	505	OR123.I1 = RSR149.Q (starting help active)	
U241.02	611	OR123.I2 = AND180.Q (limit switch o.k.)	
U253	607	NOT111.I = AND144.Q (traversing command)	
U254	621	NOT137.I = OR123.Q (start help active or limit switch o.k.)	
U255	16	NOT146.I = digital input, terminal –X101.6 (checkback signal, brake closed)	
U261.01	5113	NAND092.I1 = digital input EB1 terminal 40 (limit switch, positive)	
U261.02	5115	NAND092.I2 = digital input EB1 terminal 41 (limit switch, negative)	
U261.03	1	NAND092.I3 = 1	
U283.01	610	RSR149.S = AND179.Q (limit switch actuated and no traversing command)	
U283.02	611	RSR149.R = AND180.Q (limit switch o.k.)	
U293	18	PDE095.I = digital input, terminal 7 (no mechanical stop)	
U294.001	0.5 s	PDE095 delay time	
U950.78	4	AND078	
U950.84	4	INV084	
U950.85	4	NSW085	
U950.89	4	AND089	
U950.90	4	OR090	
U950.91	4	OR091	
U950.92	4	NAND092	
U950.95	4	PDE095	
U951.09	4	AND109	
U951.11	4	NOT111	
U951.19	4	NSW119	
U951.21	4	NSW121	
U951.23	4	OR123	
U951.37	4	NOT137	
U951.44	4	AND144	
U951.46	4	NOT146	
U951.49	4	RSR149	
U951.60	4	NSW160	
U951.61	4	AND161	
U951.62	4	AND162	
U951.74	4	LIM174	
U951.79	4	AND179	
U951.80	4	AND180	
U953.04	4	EB1 digital inputs / outputs	
U953.05	4	EB1 digital inputs	
U953.48	4	Calculating the brake control in 16*T0	

A1.5 Single operation without T400 for CUMC – basic unit parameter DPMC001

Parameter	Value DPMC001	Description	
P401.001	10.0	Setpoint for single operation	FDS
P443.001	501	Source, speed setpoint (from LIM174.Y, setpoint limiting LS, VES)	BDS
P462.001	5.0	Ramp-up time	FDS
P464.001	5.0	Ramp-down time	FDS
P554.001	530	Source, power-on (from PDE095.Q)	BDS
P555.001	18	Source, OFF2 (from terminal –X101.7, mechanical stop)	BDS
P556.001	1	Source, OFF2	BDS
P557.001	1	Source, OFF2	BDS
P558.001	1	Source, OFF3	BDS
P560.001	1	Source, OFF3	BDS
P561.001	601	Source, inverter enable (from AND078.Q)	BDS
P562.001	621	Source, enable RFG (from OR123.Q, start help active or limit switch o.k.)	BDS
P563.001	1	Source, no RFG stop	BDS
P564.001	608	Source, setpoint enable (from AND161.Q)	BDS
P565.001	14	Source, fault acknowledgement (from terminal –X101.5)	BDS
P571.001	5107	Source, enable positive direction of rotation (from EB1 terminal 44, pos. traversing command)	BDS
P572.001	5109	Source, enable negative direction of rotation (from EB1 terminal 45, neg. traversing command)	BDS
P605	1	Brake without checkback signal	
P607	1.0 s	Time between "Close brake" and inhibit firing pulses. (observe the effect on P801)	
P608.001	104	Command 1 to open brake (operation)	
P608.002	607	Command 2 to open brake (from AND144.Q, traversing command)	
P609.001	105	Command 1 to immediately close brake (no operation)	
P609.002	644	Command 2 to immediately close brake (from NOT137.Q, limit switch)	
P609.003	106	Command 3 to immediately close brake (fault)	
P612	645	Source, checkback signal, brake open (from NOT146.Q, inverted B016)	
P613	16	Source, checkback signal brake closed (from digital input –X101.6)	
P614	609	Source, close holding brake (from AND162.Q, no traversing command & n=0)	
P615	150	Source, braking threshold 2 = n/f [Hz] setpoint, for u/f [Hz] characteristic	
P617	1.0 s	Time for "Close brake" command after n = 0 signal (effect on P801!)	
P651.001	107	Source, digital output, no fault (terminal –X101.3)	BDS
P652.001	275	Source, digital output, open brake (terminal –X101.4)	BDS
P669.001	0	Source, EB1 terminal 43 is input	
P669.002	0	Source, EB1 terminal 44 is input	
P669.003	0	Source, EB1 terminal 45 is input	
P800.001	0.4	Shutdown value after off	
P801.001	2.1 s	Shutdown time after off (≈ P617+P607+0.1)	
U001.01	10.0	Pre limit switch velocity	

Parameter	**Value DPMC001**	**Description**	
U098	401	INV084.I = pre limit switch velocity	
U130.01	522	LIM174.LU = NSW119.Y (upper setpoint limiting)	
U130.02	41	LIM174.X = fixed setpoint P401.01	
U130.03	524	LIM174.LL = NSW160.Y (lower setpoint limiting)	
U166	5117	NSW085.I = digital input EB1 terminal 42 (pre limit switch, positive)	
U167.01	401	NSW085.X1 = pre limit switch velocity	
U167.02	1	NSW085.X2 = 100 %	
U168	5113	NSW119.I = digital input EB1 terminal 40 (limit switch, positive)	
U169.01	0	NSW119.X1 = 0 %	
U169.02	521	NSW119.X2 = NSW085.Y (changeover switch, VES velocity)	
U170	5105	NSW121.I = digital input EB1 terminal 43 (pre limit switch, negative)	
U171.01	458	NSW121.X1 = INV084.Y (negative pre limit switch velocity)	
U171.02	3	NSW121.X2 = 100 %	
U172	5115	NSW160.I = digital input EB1 terminal 41 (limit switch, negative)	
U173.01	0	NSW160.X1 = 0 %	
U173.02	523	NSW160.X2 = NSW121.Y (changeover switch negative VES velocity)	
U221.01	619	AND078.I1 = OR090.Q (traversing command or inverter enable from the brake control)	
U221.02	530	AND078.I2 = PDE095.Q (no OFF1)	
U221.03	18	AND078.I3 = digital input terminal 7 (no mechanical stop)	
U223.01	5107	AND089.I1 = digital input EB1 terminal 44 (traversing command, positive)	
U223.02	5113	AND089.I2 = digital input EB1 terminal 40 (limit switch, positive)	
U223.03	1	AND089.I3 = 1	
U224.01	5109	AND109.I1 = digital input EB1 terminal 45 (traversing command, negative)	
U224.02	5115	AND109.I2 = digital input EB1 terminal 41 (limit switch, negative)	
U224.03	1	AND109.I3 = 1	
U227.01	620	AND144.I1 = OR091.Q (traversing command and LS)	
U227.02	1	AND144.I2 = 1	
U227.03	107	AND144.I3 = no fault	
U228.01	607	AND161.I1 = AND144.Q (traversing command)	
U228.02	277	AND161.I2 = setpoint enable from brake control	
U228.03	1	AND161.I3 = 1	
U229.01	643	AND162.I1 = INV111.Q (no traversing command)	
U229.02	282	AND162.I2 = zero speed signal from the brake control	
U229.03	1	AND162.I3 = 1	
U230.01	681	AND179.I1 = NAND092.Q (limit switch actuated)	
U230.02	646	AND179.I2 = NOT111.Q (no traversing command)	
U230.03	1	AND179.I3 = 1	
U231.01	5113	AND180.I1 = digital input EB1 terminal 40 (limit switch, positive)	
U231.02	5115	AND180.I2 = digital input EB1 terminal 41 (limit switch, negative)	
U231.03	1	AND180.I3 = 1	
U239.01	607	OR090.I1 = AND144.Q (traversing command)	

Parameter	**Value DPMC001**	**Description**	
U239.02	278	OR090.I2 = inverter enable from the brake control	
U240.01	603	OR091.I1 = AND089.Q (traversing command positive and LS pos.)	
U240.02	604	OR091.I2 = AND109.Q (traversing command negative and LS neg.)	
U241.01	505	OR123.I1 = RSR149.Q (start help active)	
U241.02	611	OR123.I2 = AND180.Q (limit switch o.k.)	
U253	607	NOT111.I = AND144.Q (traversing command)	
U254	621	NOT137.I = OR123.Q (start help active or limit switch o.k.)	
U255	16	NOT146.I = digital input, terminal –X101.6 (checkback signal, brake closed)	
U261.01	5113	NAND092.I1 = digital input EB1 terminal 40 (limit switch, positive)	
U261.02	5115	NAND092.I2 = digital input EB1 terminal 41 (limit switch, negative)	
U261.03	1	NAND092.I3 = 1	
U283.01	610	RSR149.S = AND179.Q (limit switch actuated and no traversing command)	
U283.02	611	RSR149.R = AND180.Q (limit switch o.k.)	
U293	18	PDE095.I = digital input, terminal 7 (no mechanical stop)	
U294.001	0.5 s	PDE095 delay time	
U950.78	4	AND078	
U950.84	4	INV084	
U950.85	4	NSW085	
U950.89	4	AND089	
U950.90	4	OR090	
U950.91	4	OR091	
U950.92	4	NAND092	
U950.95	4	PDE095	
U951.09	4	AND109	
U951.11	4	NOT111	
U951.19	4	NSW119	
U951.21	4	NSW121	
U951.23	4	OR123	
U951.37	4	NOT137	
U951.44	4	AND144	
U951.46	4	NOT146	
U951.49	4	RSR149	
U951.60	4	NSW160	
U951.61	4	AND161	
U951.62	4	AND162	
U951.74	4	LIM174	
U951.79	4	AND179	
U951.80	4	AND180	
U953.04	4	EB1 digital inputs / outputs	
U953.05	4	EB1 digital inputs	
U953.48	4	Calculating the brake control in 16*T0	

■

Appendix A2: Interface definition

A2

A2.1 Terminal assignment T400, basic unit

Default assignment of the T400 digital inputs

Terminal	Description	Binector
-X.53	Drive X, pre limit switch positive	B1111
-X.54	Drive X, pre limit switch negative	B1112
-X.55	Drive X, limit switch positive	B1113
-X.56	Drive X, limit switch negative	B1114
-X.57	Drive Y, pre limit switch positive	B1115
-X.58	Drive Y, pre limit switch negative	B1116
-X.59	Drive Y, limit switch positive	B1117
-X.60	Drive Y, limit switch negative	B1118
-X.46	Drive X, traversing command MS positive	B1119
-X.47	Drive Y, traversing command MS positive	B1120
-X.48	Drive X, traversing command MS negative	B1121
-X.49	Drive Y, traversing command MS negative	B1122

Default assignment of the T400 digital outputs

Terminal	Description	Parameterization
-X.51	Reserve.	H909 = 1000
-X.52	Reserve.	H910 = 1000

Default assignment of the basic units – digital inputs CUVC, CUMC

Terminal	Description	Binector
-X101:5	Acknowledge fault Fast stop during the commissioning phase	B0014
-X101:6	Checkback signal, brake open	B0016
-X101:7	On / no mechanical stop	B0018
-X101:8	No electrical stop	B0020
-X101:9	Reserve. Only for CUVC !	B0022

Default assignment of the basic units – digital outputs CUVC, CUMC

Terminal	Description	Parameterization
-X101:3	No fault	P651.001 = 107 P651.002 = 107
-X101:4	Open brake	P651.001 = 275 P651.001 = 275

Default assignment of the basic units – digital inputs CUD1 (6RA70)

Terminal	Description	Binector
-X171:36	On / no mechanical stop	B0010
-X171:37	Always "1". (power-up/shutdown)	B0012
-X171:38	Always "1". (operating enable)	B0014
-X171:39	No electrical stop (and reset, actual position)	B0016
-X163:40	Fast stop during the commissioning phase	B0018
-X163:41	Acknowledge fault	B0020
-X163:42		B0022
-X163:43		B0024

Default assignment of the basic units – digital outputs CUD1 (6RA70)

Terminal	Description	Parameterization
-X171:46	No fault	P771 = 107
-X171:48	Open brake	P772 = 250

Default, EB1 terminal assignment for Z drive

Z drive EB1 terminal	Z drive comment	Z drive binector
40	Limit switch, positive	B5113
41	Limit switch, negative	B5115
42	Pre limit switch, positive	B5117
43	Pre limit switch, negative. P669.1 = 0 (no output)	B5105
44	Traversing command, positive. P669.2 = 0 (no output)	B5107
45	Traversing command, negative. P669.3 = 0 (no output)	B5109
46	Reserve. Bi-directional. P669.4 = ...	B5111

A2.2 Data transfer, T400 – basic unit CU

Default assignment of the 16 data words from the CU to T400

No.	Signal (T400 data received from CU)	Parameterization 6SE70 basic unit	Parameterization 6RA70 basic unit	Connect. binector	No. of para.
1	X drive, status word 1 0: Ready to power-up 1: Ready 2: Run 3: Fault present 4: No OFF2 present 5: No OFF3 present 6: Power-on inhibit 7: Alarm present 8: No setpoint-act. value deviation detected 9: PZD control requested 10: Comparison value reached 11: Fault, undervoltage 12: 13: Ramp-function generator active 14: Positive speed setpoint 15: Kinetic buffering active	P734.01 = 32	U734.1 = 32	K4011 B2011 B2012 B2013 B2014 B2015 B2016 B2017 B2018 B2019 B2020 B2021 B2022 B2023 B2024 B2025 B2026	d011
2	X drive, n/f [Hz] actual value	P734.02 = 148 (91)	U734.2 = 167	K4012	d012
3	X drive, reserve	P734.03 = 0	U734.03 = 0	K4013	d013
4	X drive, special status word 0: Energization completed 1: Setpoint enable from brake control 2: Inverter enable from brake control 3: 4: 5: 6: 7: 8: GG-BI (on/no mechanical stop) 9: GG-BI (no electrical stop) 10: BDS-2 selected (reserve data set) 11: 12: 13: 14: 15:	P734.04 = 431 U076.01 = 255 U076.02 = 277 U076.03 = 278 U076.04 = 0 (5107) U076.05 = 0 (5109) U076.06 = 0 U076.07 = 0 U076.08 = 0 U076.9 = 18 U076.10 = 20 U076.11 = 641 U076.12 = 0 U076.13 = 0 U076.14 = 0 U076.15 = 0 U076.16 = 0	U734.04 = 9113 U113.01 = 1 U113.02 = 9580 U113.03 = 1 U113.04 = 0 (5107) U113.05 = 0 (5109) U113.06 = 0 U113.07 = 0 U113.08 = 0 U113.9 = 10 U113.10 = 16 U113.11 = 9450 U113.12 = 0 U113.13 = 0 U113.14 = 0 U113.15 = 0 U113.16 = 0	K4014 B2051 B2052 B2053 B2054 B2055 B2056 B2057 B2058 B2059 B2060 B2061 B2062 B2063 B2064 B2065 B2066	d014
5	X drive, torque setpoint	P734.05 = 165	U734.05 = 145	K4015	d015
6	Y drive, status word 1 0: Ready to power-up 1: Ready 2: Run 3: Fault present 4: No OFF2 present 5: No OFF3 present 6: Power-on inhibit 7: Alarm present 8: No setpoint-act. value deviation detected 9: PZD control requested 10: Comparison value reached 11: Fault, undervoltage 12: 13: Ramp-function generator active 14: Positive speed setpoint 15: Kinetic buffering active	P734.06 = 7001	U734.06 = 6001	K4016 B3011 B3012 B3013 B3014 B3015 B3016 B3017 B3018 B3019 B3020 B3021 B3022 B3023 B3024 B3025 B3026	d016
7	Y drive, n/f [Hz] actual value	P734.07 = 7009	U734.07 = 6002	K4017	d017

No.	Signal (T400 data received from CU)	Parameterization 6SE70 basic unit	Parameterization 6RA70 basic unit	Connect. binector	No. of para.
8	Y drive, reserve	P734.08 = 7006	U734.08 = 6003	K4018	d018
9	Y drive, special status word	P734.09 = 7002	U734.09 = 6004	K4019	d019
	0: Energization completed			B3051	
	1: Setpoint enable from brake control			B3052	
	2: Inverter enable from brake control			B3053	
	3:			B3054	
	4:			B3055	
	5:			B3056	
	6:			B3057	
	7:			B3058	
	8: GG-BI (on/no mechanical stop)			B3059	
	9: GG-BI (no electrical stop)			B3060	
	10: BDS-2 selected (reserve data set)			B3061	
	11:			B3062	
	12:			B3063	
	13:			B3064	
	14:			B3065	
	15:			B3066	
10	Y drive, torque setpoint	P734.10 = 7010	U734.10 = 6005	K4020	d020
11	Z drive, status word 1	P734.11 = 7003	U734.11 = 9001	K4031	c011
	0: Ready to power-up			B1211	
	1: Ready			B1212	
	2: Run			B1213	
	3: Fault present			B1214	
	4: No OFF2 present			B1215	
	5: No OFF3 present			B1216	
	6: Power-on inhibit			B1217	
	7: Alarm present			B1218	
	8: No setpoint-act. value deviation detected			B1219	
	9: PZD control requested			B1220	
	10: Comparison value reached			B1221	
	11: Fault, undervoltage			B1222	
	12:			B1223	
	13: Ramp-function generator active			B1224	
	14: Positive speed setpoint			B1225	
	15: Kinetic buffering active			B1226	
12	Z drive, n/f [Hz] actual value	P734.12 = 7011	U734.12 = 9002	K4032	c012
13	Z drive, reserve	P734.13 = 7008	U734.13 = 9003	K4033	c013
14	Z drive, special status word	P734.14 = 7004	U734.14 = 9004	K4034	c014
	0: Energization completed			B1251	
	1: Setpoint enable from brake control			B1252	
	2: Inverter enable from brake control			B1253	
	3:			B1254	
	4:			B1255	
	5:			B1256	
	6:			B1257	
	7:			B1258	
	8: GG-BI (on/no mechanical stop)			B1259	
	9: GG-BI (no electrical stop)			B1260	
	10: BDS-2 selected (reserve data set)			B1261	
	11:			B1262	
	12:			B1263	
	13:			B1264	
	14:			B1265	
	15:			B1266	
15	Z drive, torque setpoint	P734.15 = 7012	U734.15 = 9005	K4035	c015
16	Reserve	P734.16 = 0	U734.16 = 0	K4036	c016

Default assignment of the 16 data words sent from T400 to CU

No.	Signal (T400 data sent to CU)	Parameterization T400		Connector, binector in the basic unit
1	X drive, control word 1	H941 = 4391	L941 = 0	K3001
	0: On / not OFF1			B3100
	1: No OFF2			B3101
	2: No OFF3			B3102
	3: Enable inverter			B3103
	4: = 1st enable, ramp-function generator			B3104
	5: = 1st ramp-function generator start			B3105
	6: Enable setpoint			B3106
	7: Fault acknowledgement			B3107
	8: = 0. jogging bit 0			B3108
	9: = 0. jogging bit 1			B3109
	10: = 1. control requested			B3110
	11: = 1. enable positive direction of rotation			B3111
	12: = 1. enable negative direction of rotation			B3112
	13: = 0. motorized potentiometer, raise			B3113
	14: = 0. motorized potentiometer, lower			B3114
	15: No T400 fault X drive			B3115
2	X drive, n/f [Hz] setpoint	H942 = 4942	L942 = 165	K3002
3	X drive, reserve	H943 = 4943	L943 = 0	K3003
4	X drive, control word 2	H944 = 4392		K3004
	0: H140 = 2207. no traversing command.			B3400
	1: H141 = 1000			B3401
	2: H142 = 1000			B3402
	3: H143 = 1000			B3403
	4: H144 = 1000			B3404
	5: H145 = 1000			B3405
	6: = 0			B3406
	7: = 1			B3407
	8: = 0			B3408
	9: = 1			B3409
	10: = 1			B3410
	11: = 0			B3411
	12: = 1			B3412
	13: = 1			B3413
	14: = 0			B3414
	15: = 0			B3415
5	X drive, reserve	H945 = 4945	L945 = 0	K3005
6	Y drive, control word 1	H946 = 4791		K3006
	0: On / not OFF1			
	1: No OFF2			
	2: No OFF3			
	3: Enable inverter			
	4: = 1st enable, ramp-function generator			
	5: = 1st ramp-function generator start			
	6: Enable setpoint			
	7: Fault acknowledgement			
	8: = 0. jogging bit 0			
	9: = 0. jogging bit 1			
	10: = 1. control requested			
	11: = 1. enable positive direction of rotation			
	12: = 1. enable negative direction of rotation			
	13: = 0. motorized potentiometer, raise			
	14: = 0. motorized potentiometer, lower			
	15: No T400 fault Y drive			
7	Y drive, n/f [Hz] setpoint	H947 = 4947	L947 = 565	K3007
8	Y drive, reserve	H948 = 4948	L948 = 0	K3008

No.	Signal (T400 data sent to CU)	Parameterization T400		Connector, binector in the basic unit
9	Y drive, control word 2 0: H540 = 3207. no traversing command. 1: H541 = 1000 2: H542 = 1000 3: H543 = 1000 4: H544 = 1000 5: H545 = 1000 6: = 0 7: = 1 8: = 0 9: = 1 10: = 1 11: = 0 12: = 1 13: = 1 14: = 0 15: = 0	H949 = 4792		K3009
10	Y drive, reserve	H950 = 4950	L950 = 0	K3010
11	Z drive, control word 1 0: On / not OFF1 1: No OFF2 2: No OFF3 3: Enable inverter 4: = 1st enable, ramp-function generator 5: = 1st ramp-function generator start 6: Enable setpoint 7: Fault acknowledgement 8: = 0. jogging bit 0 9: = 0. jogging bit 1 10: = 1. control requested 11: = 1. enable positive direction of rotation 12: = 1. enable negative direction of rotation 13: = 0. motorized potentiometer, raise 14: = 0. motorized potentiometer, lower 15: No T400 fault Z drive	H951 = 4911		K3011
12	Z drive, n/f [Hz] setpoint	H952 = 4952	L952 = 965	K3012
13	Z drive, reserve	H953 = 4953	L953 = 0	K3013
14	Z drive, control word 2 0: L140 = 1307. no traversing command. 1: L141 = 1000 2: L142 = 1000 3: L143 = 1000 4: L144 = 1000 5: L145 = 1000 6: = 0 7: = 1 8: = 0 9: = 1 10: = 1 11: = 0 12: = 1 13: = 1 14: = 0 15: = 0	H954 = 4912		K3014
15	Z drive, reserve	H955 = 4955	L955 = 0	K3015
16	Reserve	H956 = 4956	L956 = 0	K3016

A2.3 Data transfer T400 – automation (PROFIBUS, CBP2)

Recommended assignment of the 10 process data from the automation to T400

No.	Signal (T400 data received from CBP)	Comment	Connector binector	Diaplay par.
1	Control word 1		K4021	d021
	0:		B1021	
	1: X drive, traversing command, positive		B1022	
	2: X drive, traversing command, negative		B1023	
	3: Y drive, traversing command, positive		B1024	
	4: Y drive, traversing command, negative		B1025	
	5: Z drive, traversing command, positive		B1026	
	6: Z drive, traversing command, negative		B1027	
	7: Acknowledge fault		B1028	
	8: X drive, start positioning		B1029	
	9: X drive, stop positioning		B1030	
	10: PZD control (this must always be "1")		B1031	
	11: Y drive, start positioning		B1032	
	12: Y drive, stop positioning		B1033	
	13: Z drive, start positioning		B1034	
	14: Z drive, stop positioning		B1035	
	15:		B1036	
2	X drive, main setpoint	Position reference value or speed setpoint	K4022	d022
3	X drive, reserve		K4023	d023
4	Control word 2 (reserve)		K4024	d024
	0:		B1061	
	1:		B1062	
	2:		B1063	
	3:		B1064	
	4:		B1065	
	5:		B1066	
	6:		B1067	
	7:		B1068	
	8:		B1069	
	9:		B1070	
	10:		B1071	
	11:		B1072	
	12:		B1073	
	13:		B1074	
	14:		B1075	
	15:		B1076	
5	Y drive, main setpoint	Position reference value or speed setpoint	K4025	d025
6	Y drive, reserve		K4026	d026
7	Z drive, main setpoint	Speed setpoint, master switch setpoint	K4027	d027
8	Reserve		K4028	d028
9	Z drive, position actual value		K4029	d029
10	Z drive, reserve		K4030	d030

Default assignment of the 10 process data from T400 to the automation

No.	Selection parameter	Default signal (T400 data sent to CBP)	Parameterization	
1	H931 / L931	X drive, T400 status word	H931 = 4399	
2	H932 / L932	X drive, n/f [Hz] actual value from CU	H932 = 4932	L932 = 12
3	H933 / L933	X drive, position actual value	H933 = 4933	L933 = 217
4	H934 / L934	Y drive, T400 status word	H934 = 4799	
5	H935 / L935	Y drive, n/f [Hz] actual value from CU	H935 = 4935	L935 = 17
6	H936 / L936	Z drive, T400 status word	H936 = 4919	
7	H937 / L937	Z drive, n/f [Hz] actual value from CU	H937 = 4937	L937 = 32
8	H938 / L938	Y drive, position actual value	H938 = 4938	L938 = 617
9	H939 / L939	0	H939 = 4000	
10	H940 / L940	Z drive, position actual value	H940 = 4940	L940 = 945

■

Up until now the following Editions have been published:

Edition	Internal Item No.
AA	A5E00143385
AB	A5E00143385

Edition AB comprises the following sections:

Section		Changes	No. of pages	Edition date
	Safety information/instructions	First Edition	4	03.2002
1	Overview	Reviewed edition	18	10.2002
2	T400 technology module	First Edition	3	03.2002
3	Function description	Reviewed edition	119	10.2002
4	Parameter list	Reviewed edition	82	10.2002
5	Connectors	First Edition	17	03.2002
6	Commissioning	Reviewed edition	40	10.2002
7	Essential drive structures and connection examples	First Edition	41	03.2002
8	Changes	Reviewed edition	1	10.2002
A1	DriveMonitor lists which can be downloaded	First Edition	21	03.2002
A2	Interface definition	Reviewed edition	8	10.2002

Group: Automation and Drives (A&D)
Division: Variable-Speed Drive Systems
Postfach 3269, D-91050 Erlangen

Siemens Aktiengesellschaft

Subject to change

Bestell.-Nr.:/Order No.: 6GA7100-3BA76
Printed in the federal Republic of Germany
10.2002