Class 1210
APRIL, 1993

POWERLINK® AS
Remote Power Switching System

FILE: Distribution Product Catalog

SQUARE D

CLASS
1210

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
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APRIL, 1993

Part 1
Introduction to the POWERLINK® AS Remote Power Switching System

This catalog describes Square D's POWERLINK AS remote power switching system. The system offers panelboard "intelligence," remote circuit breaker switching, thermal-magnetic overcurrent protection and control in a single panelboard enclosure.

This catalog has four parts:

Part 1, **Introduction**, introduces the remote power switching system and provides an overview covering the following:

- System description
- System uses
- System feature summary

Part 2, **POWERLINK AS Circuit Breakers**, describes in detail all aspects of POWERLINK AS circuit breakers, including:

- Construction standards
- Ratings
- Remote control operation

Part 3, **POWERLINK AS System**, provides information on the features and specifications of the various components, in addition to the options available for the POWERLINK AS system. Selection data and other ordering information are also provided for the following components:

- QO(B)-AS and EHB-AS Circuit Breakers
- Control bus strips
- Power interface module
- Class 2 barrier kit
- Control modules.

Part 4, **Software and Network Configurations**, covers benefits, features, and minimum personal computer requirements to run POWERLINK AS application software. In addition, it includes four examples of networked systems:

- System 1—Basic Remote Control
- System 2—Basic and Network Remote Control
- System 3—Basic and Local Area Network Remote Control
- System 4---Basic and Automated Remote Control.

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
INTRODUCTION

SYSTEM DESCRIPTION

The POWERLINK AS remote power switching system combines in one enclosure remote switching capabilities and thermal-magnetic overcurrent protection not only for lighting, but for many types of loads. This integrated, modular system fits within Square D NQOD and NEHB panelboards and is the first such product to place "intelligence" inside the panelboard.

In addition to providing remote power switching and overcurrent protection, the POWERLINK AS system offers the capability to tie multiple panelboards together on a network. This provides centralized monitoring and control from PC-based software, as well as the ability to interface with POWERLOGIC® RS-485 networks and POWERLOGIC Power Monitoring and Control Systems. Whether it functions as a stand-alone unit or as part of a network, the POWERLINK AS system can be controlled from one or more remote locations. Up to 42 individual branch circuits can be controlled within a single panelboard.

A microprocessor-based control module provides the intelligence for the POWERLINK AS system, simplifying system configuration, monitoring, and control. Closed-loop communications are featured at two levels: one within the panelboard itself and one within an optional network of panelboards configured with the POWERLINK AS system software.

Standard components of the POWERLINK AS system include remote controlled circuit breakers, control bus strips, a power interface module, a Class 2 barrier kit, and a control module. Optional components include a control module with an internal time clock, DOS-based software, and a power interface module with RS-485 network capability.

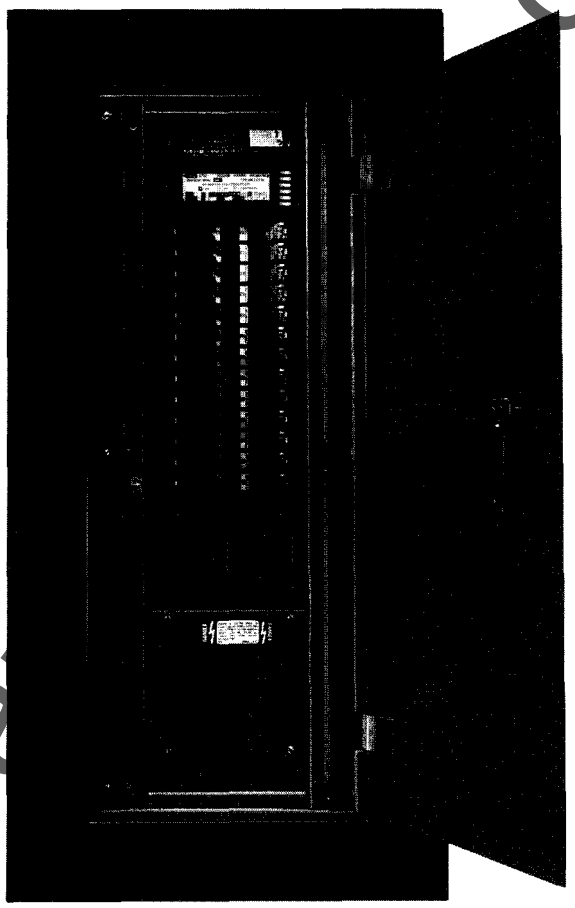
The components' modular "plug and play" construction simplifies designing, specifying, and installing a complete POWERLINK AS system. It eliminates wiring and wiring errors, thereby reducing installation time and costs, while enhancing reliability and offering expanded functionality.

The modular design also eliminates the need for separate interface cabinets, interposing relays, external control voltage circuits, external time clocks, or contactor devices. This is made possible by the integration of remote power switching capability, thermal-magnetic circuit breaker overcurrent protection, an internal power supply, communications, an optional internal time clock, and control functions in a single panelboard.

Other features of the POWERLINK AS system include the following:

- Advanced microprocessor-based control
- System reconfiguration and expansion flexibility
- Compatibility with Square D panelboards and networks
- Dependable performance and high level of reliability
- Compact, space-saving design

POWERLINK AS QO(B)-AS and EHB-AS circuit breakers are described in Part 2, and POWERLINK AS system components and panelboard compatibility are described in greater detail in Part 3.



NEHB POWERLINK AS PANELBOARD

SYSTEM USES

The POWERLINK AS system can be configured to meet specific needs for remote power switching and overcurrent protection. This makes it ideal for a variety of energy and load management, load shedding, and automated electrical control system applications.

It allows building owners, operators, and plant managers to efficiently manage lighting, as well as many other types of electrical loads, including:

- Displays
- Interior/Exterior signage
- Water heaters
- Water coolers
- HVAC units
- Electric strip heaters
- Exhaust fans
- Power drops
- Appliances
- Audio/Video equipment

All of these loads can be controlled remotely from one location. With an optional internal time clock, both lighting and other electrical loads can be switched automatically and independently.

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
INTRODUCTION

SYSTEM FEATURE SUMMARY

The POWERLINK AS system includes many advanced features for remote power switching and load control applications. The following list summarizes the key system features:

- True distributed control of up to 42 circuit breakers per panel
- Multi-zone configuration
- Compact packaging
- Self-contained components in single panelboard
  - New installations: 100A and 225A NQOD and NEHB
  - Retrofit: 100A and 225A NQOD and NEHB
- Ease of installation
  - Components feature modular "plug and play" construction,
  - Design eliminates wiring errors and saves time
- Simplified operation
  - Control module programming from integral keyboard, local or remote PC
  - No special programming skills required
  - Menu-driven program structure
  - External control device inputs via simple contact closure, or solid state equivalent
  - Easy reconfiguration without having to re-wire hard-wired control circuits
  - Full on-screen diagnostics
- Basic control module
  - Supertwist, high-resolution LCD screen with contrast adjustment
  - Internal non-volatile memory to store configuration data
  - Four-digit password access with three levels of security
  - Built-in diagnostics to monitor system performance
- Time-of-day control module
  - Time-of-day scheduling
  - Automated time override
  - 7-day weekly calendar
  - 365-day calendar with automatic daylight savings time adjustment and leap year correction
  - 32 holiday periods
  - 12/24 hour clock formats
  - Timed overrides
  - Flash/Blink notice feature prior to scheduled "off" event
- Power interface module
  - Eight hard-wired 2-wire maintained or 3-wire momentary external inputs (Class 2)
  - RS-232 port interfaces to input expansion cabinet offering up to 64 external inputs (Class 2)
  - Optional RS-485 network port for communications with personal computers and POWERLOGIC® devices

Part 2
POWERLINK AS Circuit Breakers

This part describes the construction standards, ratings, and remote control operations of POWERLINK AS circuit breakers.

POWERLINK® AS REMOTE POWER SWITCHING SYSTEM

POWERLINK AS CIRCUIT BREAKERS

CONSTRUCTION STANDARDS FOR POWERLINK AS CIRCUIT BREAKERS

The POWERLINK AS system uses a remote-controlled, thermal-magnetic circuit breaker to provide remote switching and overcurrent protection. This part describes the circuit breakers used with the POWERLINK AS system. For more detailed information on Square D's thermal-magnetic circuit breakers, refer to the Distribution Product Catalog Class 601, *Thermal-Magnetic/Magnetic Only Molded Case Circuit Breakers*.

GENERAL

POWERLINK AS remote-controlled, thermal-magnetic circuit breakers (hereafter referred to as POWERLINK AS circuit breakers) are designed to provide remote switching and overcurrent protection on ac voltage systems. They are available in 1-, 2-, and 3-pole construction. The 2- and 3-pole circuit breakers are common trip. An overcurrent condition on any given pole of the circuit breaker will cause all poles of the circuit breaker to open.

POWERLINK AS circuit breakers are UL Listed and CSA Certified. They are manufactured and tested according to the following standards:

- UL Standard 489
- NEMA Standard AB-1-1986
- Canadian Standards Association (CSA) Standard 22.5 (QO(B) only)
- Federal Specification W-C-375B/GEN as Class 11a, 11b; 12a, 12b; and 13a, 13b

CONSTRUCTION

The cases of POWERLINK AS circuit breakers are constructed of a glass-reinforced insulating material that provides high dielectric strength. Current-carrying components are isolated from the breaker operating handle. The circuit breaker status window shows whether the circuit breaker is on, off, or tripped.

TRIPPING SYSTEM

POWERLINK AS circuit breakers have a permanent trip unit that contains a factory preset thermal (overload) trip element and a magnetic (short circuit) trip element in each pole. The thermal trip element is true rms sensing and is calibrated to carry the continuous current rating of the breaker at 40°C (104°F) free air ambient temperature. In accordance with the National Electrical Code, POWERLINK AS circuit breakers are intended to be applied at up to 80 percent of their continuous current rating.

OPERATING MECHANISM

POWERLINK AS circuit breakers have an over-center toggle mechanism that provides quick-make, quick-break operation and Square D's unique VISI-TRIP® circuit breaker trip indicator. The operating mechanism is trip-free. This means the circuit breaker will trip even though the operating handle may be restricted in the ON position. Without any restrictions, the operating handle moves to a position between ON and OFF when the circuit breaker is tripped. An internal cross-bar provides common tripping of all poles on 2- and 3-pole POWERLINK AS circuit breakers.

LOAD TERMINATIONS

All load lugs are UL Listed to accept solid or stranded and copper or aluminum conductors. Lugs are suitable for use with wire rated for 75°C (sized according to the 1993 National Electrical Code 75°C temperature rating).

RATINGS FOR POWERLINK AS CIRCUIT BREAKERS

The following POWERLINK AS circuit breaker ratings must meet or exceed the parameters of the electrical system on which the breakers are used.

TABLE 1
Ratings for POWERLINK AS Circuit Breakers

Catalog Number Prefix	Number of Poles	Voltage Rating	Continuous Current Rating	Ampere Interrupting Rating
QO(B)	1	120/240Vac	15A,20A,30A	10,000A
QO(B)	2	120/240Vac	15A,20A,30A	10,000A
QO(B)	3	240Vac	15A,20A,30A	10,000A
EHB	1	120Vac 277Vac	15A,20A,30A	65,000A 14,000A
EHB	2	120/240Vac 480Y/277Vac	15A,20A,30A	65,000A 14,000A
EHB	3	240Vac 480Y/277Vac	15A,20A,30A	65,000A 14,000A

VOLTAGE RATINGS

The voltage rating of POWERLINK AS circuit breakers is based on design parameters such as clearance of current-carrying parts and dielectric withstand tests, both through air and over surfaces. Voltage ratings indicate the maximum voltage of the electrical system on which the circuit breaker can be applied. For POWERLINK AS systems, UL Standard 489 recognizes the standard ratings shown in Table 1.

CONTINUOUS CURRENT RATINGS

The continuous current rating (or handle rating) of a circuit breaker is defined by NEMA as: "The maximum rms current, in amperes, at rated frequency which a device or assembly will carry continuously without exceeding the specified limits of observable temperature rise." POWERLINK AS circuit breakers have continuous current ampere ratings, as established by the 1993 NEC, Paragraph 240-6a, for 15A, 20A, and 30A devices.

POWERLINK AS circuit breakers are to be applied in accordance with the NEC for 80 percent continuous current ratings in the intended enclosure. The continuous current rating is indicated on the operating handle of each circuit breaker.

INTERRUPTING RATINGS

POWERLINK AS circuit breakers have interrupting ratings for each specific type: QO(B) or EHB, as shown in Table 1. The ampere interrupting rating of a circuit breaker is the highest current at rated voltage that the circuit breaker is intended to interrupt under standard test conditions and is expressed in rms symmetrical amperes. The interrupting rating is stamped into each POWERLINK AS circuit breaker case for each voltage rating.

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POWERLINK AS CIRCUIT BREAKERS

POWERLINK AS circuit breakers may be series rated, like standard QO(B) and NEHB breakers, with a panelboard main circuit breaker to obtain a higher short circuit current rating for an entire panelboard. For more information on NQOD and NEHB panelboard series ratings, refer to the Square D Digest 169, Section 6.

AMBIENT TEMPERATURE RATING

To comply with the requirements of UL Standard 489 and CSA Standard 22.5 (QO(B) only), POWERLINK AS circuit breakers are designed, built, calibrated, and tested for use on 60 Hertz (Hz) ac systems in a 40°C ambient temperature.

FREQUENCY RATING

The rated frequency for POWERLINK AS circuit breakers is 60Hz. Applying POWERLINK AS circuit breakers at frequencies above or below the rated frequency may possibly damage the circuit breaker electronic components or system electronics.

UL HACR RATING

All POWERLINK AS circuit breakers are UL Listed for use with heating, air conditioning, and refrigeration equipment having motor group combinations and marked for use with HACR-type circuit breakers.

SWITCHING DUTY RATING

POWERLINK QO(B)-AS and EHB-AS circuit breakers, rated 15A and 20A, are UL Listed for Switching Duty (SWD), making them suitable for switching fluorescent lighting loads. This switching duty rating applies only to QO(B)-AS and EHB-AS 15A and 20A circuit breakers in 1-, 2-, and 3-pole versions.

HID RATING

All POWERLINK AS circuit breakers are HID rated for use with high intensity discharge lighting. These lighting systems, which include high pressure sodium, metal halide, and mercury vapor, have inherently high inrush current characteristics, which require circuit breakers rated for such applications.

REMOTE CONTROL OPERATION

The following sections describe the components that provide remote switching capabilities for POWERLINK AS circuit breakers, as well as automatic or manual switching modes and circuit breaker status indication.

CIRCUIT BREAKER ELECTRONICS

POWERLINK QO(B)-AS and EHB-AS circuit breakers incorporate sophisticated electronics that execute control functions and commands given by the POWERLINK AS System Control Module. The primary function of the circuit breaker electronics is to deliver *"on"* and *"off"* pulse signals to the breakers internal 24Vdc motor that provides remote operation.

Circuit breaker electronics also provide positive feedback in the form of closed loop communication to the control module. Voltage sensing circuitry senses voltage between the phase ("hot") and neutral of the branch circuit, indicating whether the circuit breaker status is *"on"* or *"off"*. A six-pin connector provides a Class 1 communication path between the circuit breaker electronics and the control module via the control bus.

INTERNAL 24VDC MOTOR

POWERLINK AS circuit breakers contain an internal 24Vdc motor that drives the remote switching mechanism. The internal motor receives input signals in the form of momentary pulse waveforms from the POWERLINK AS Power Interface Module. The motor operates a switch mechanism, which opens or closes the circuit breaker contacts based on the polarity of the input signal.

REMOTE SWITCHING MECHANISM

All POWERLINK AS circuit breakers have a remote switching mechanism that consists of a gear-driven cam and a drive lever connected directly to the circuit breaker's moveable contact carrier. When the internal motor receives an *"on"* pulse or *"off"* pulse, the gear changes the position of the drive lever, which closes or opens the circuit breaker contacts.

SWITCHING MODE SELECTOR SWITCH

On the front of POWERLINK AS circuit breakers is a switching mode selector switch that places the circuit breaker in either AUTO or MANUAL switching mode. When the switching mode selector is in the down position (or AUTO mode) and the circuit breaker operating handle is in the ON position, the circuit breaker contacts may be remotely opened or closed via the internal 24Vdc motor and circuit breaker electronics. If the switching mode selector is in the out position (or MANUAL mode), the remote switching mechanism is disengaged, and the circuit breaker contacts default to the position as indicated by the circuit breake. operating handle. If the switching mode selector is initially in MANUAL mode, then depressed into the AUTO mode, the circuit breaker contacts default to the last state (open or closed) issued by the POWERLINK AS System Control Module. In the MANUAL mode, all POWERLINK AS circuit breakers are physically disengaged from the remote mechanism, which causes them to disregard signals from the POWERLINK AS System Control Module and operate the same as standard circuit breakers. When the circuit breaker operating handle is in the OFF or TRIPPED position and the switching mode selector is in either the AUTO or MANUAL mode, the circuit breaker cannot be remotely turned on or reset. When tripped, the circuit breaker must be reset using the circuit breaker operating handle.

QO(B) 1-POLE CIRCUIT BREAKER

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REMOTE POWER SWITCHING SYSTEM
POWERLINK AS CIRCUIT BREAKERS

The following table describes switching conditions of POWERLINK AS circuit breakers:

TABLE 2
POWERLINK AS Circuit Breaker Switching Conditions

CIRCUIT BREAKER INITIAL STATUS			ACTION	CIRCUIT BREAKER FINAL STATUS	
Switching Mode Selection Position	Circuit Breaker Handle Position	Initial Position of Circuit Breaker Contacts	Input Command from Controller	Final Position of Circuit Breaker Contacts	Resulting Action
AUTO or MANUAL	OFF	OPEN	ON or OFF	OPEN	None
AUTO	ON	OPEN	OFF	OPEN	None
AUTO	ON	OPEN	ON	CLOSED	Load ON
AUTO	ON	CLOSED	ON	CLOSED	None
AUTO	ON	CLOSED	OFF	OPEN	Load OFF
MANUAL	ON	OPEN	ON or OFF	CLOSED	Load ON
MANUAL	ON	CLOSED	ON or OFF	CLOSED	None
AUTO or MANUAL	TRIPPED	OPEN	ON or OFF	OPEN	None

CIRCUIT BREAKER STATUS INDICATOR WITH VISI-TRIP®

POWERLINK AS circuit breakers are equipped with Square D's unique VISI-TRIP circuit breaker trip indicator. The indicator window displays one of three colors to show circuit breaker contact status.

Indicator Color	Circuit Breaker Contact Status
White	Circuit breaker contacts are closed
Green	Circuit breaker contacts are open
Red	VISI-TRIP indicator, circuit breaker is tripped

REMOTE CIRCUIT BREAKER ENDURANCE

QO(B)-AS and EHB-AS circuit breakers have an electrical life of 200,000 remote operations (at 80% load and 0.8 power factor). The number of years the circuit breakers yield based on the number of operations per day.

TABLE 3
Calculated Electrical Endurance (Years)

QO(B)AS and EHBAS Circuit Breakers	
Number of Operations/Day	Endurance/Years
1	547
2	273
3	182
4	136
5	109
6	91
7	78
8	68
9	60
10	54
11	49
12	45
13	42
14	39
15	36

Note: One operation is defined as either from closed to open to closed, or from open to closed to open.

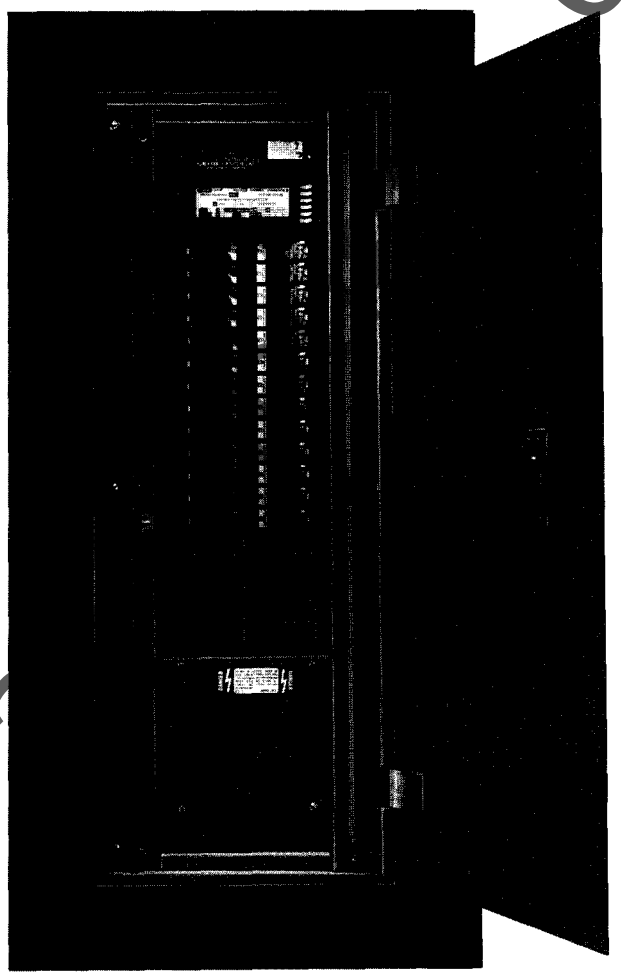
Part 3
POWERLINK AS System

This part describes the various components of the POWERLINK AS remote power switching system and their individual functions. Features, selection data, specifications, and dimensions are included, in addition to information on the types of panelboards used with the POWERLINK AS system.

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
POWERLINK AS SYSTEM

GENERAL OVERVIEW

The POWERLINK AS system incorporates features of five discrete components into one package that fits inside a single Square D panelboard enclosure. As a result, it eliminates the need for separate devices such as time clocks, photocells, contactors, sensors, and other traditional relay devices and power switching components. This modular design also allows connection to RS-485 networks and POWERLOGIC Power Monitoring and Control Systems as described in Part 1, System Description.



NEHB POWERLINK AS PANELBOARD

BASIC COMPONENTS

The five basic components of the POWERLINK AS system include QO(B)-AS and EHB-AS circuit breakers, control bus strips, a power interface module, a Class 2 barrier kit, and a control module.

POWERLINK AS PANELBOARDS

The POWERLINK AS system fits within new or existing Square D panelboards. For new applications, it can be configured with NQOD or NEHB panelboards. POWERLINK AS components are compatible with NQOD panelboards that supply systems up to 240Vac with 225A (maximum) main breakers or main lugs.

POWERLINK AS system components may be mounted only in standard 20-inch wide NEMA Type 1 enclosures. For more detailed information on Square D's NQOD and NEHB panelboards, refer to the Distribution Product Catalogs entitled, NQOD Circuit Breaker Panelboards and NEHB Circuit Breaker Panelboards.

For retrofit applications, the POWERLINK AS system can be installed in existing 100A and 225A NQOD and NEHB panelboards. The system is *not* suitable for use with QO load centers, NQO, or NQOB interiors, 400A or 600A NQOD or NEHB panels, column-width panels, panelboard interiors in 14-inch wide enclosures, or panelboards in outdoor-type enclosures.

COMPATIBLE VOLTAGE DISTRIBUTION SYSTEMS

POWERLINK AS panelboards are compatible with a variety of voltage distribution systems. The QO(B) and EHB circuit breaker voltage sensing circuitry requires connection to the neutral assembly located inside the panelboard. Therefore, three-phase three-wire delta, and corner-grounded delta systems are *not* compatible with the POWERLINK AS system. The following table lists voltage distribution systems compatible with POWERLINK AS panelboards and system electronics:

TABLE 4
POWERLINK AS Compatible Voltage Distribution Systems

Distribution System Type	Distribution System Characteristics	Distribution Voltage			
		Phase To Phase Max.	Phase To Neutral Max.	Phase To Phase Min.	Phase To Neutral Min.
"WYE" SYSTEM	3-phase/4-wire	480 Volts	277 Volts	208 Volts	120 Volts
CENTER TAP DELTA	3-phase/4-wire	240 Volts	208 Volts	N/A	120 Volts
OPEN DELTA	3-phase/4-wire	240 Volts	208 Volts	N/A	120 Volts

Single-phase, three-wire systems may be considered subsets of the systems described above, and are compatible with POWERLINK AS panelboards and system electronics, provided the system has a separate integral neutral.

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
QO(B)-AS CIRCUIT BREAKERS

QO(B)-AS CIRCUIT BREAKERS

This section contains specific information on the features, selection data, accessories, and dimensions of POWERLINK QO(B)-AS circuit breakers. For general information on construction standards, ratings, and remote control operations of POWERLINK AS circuit breakers, refer to Part 2, *POWERLINK AS Circuit Breakers.*

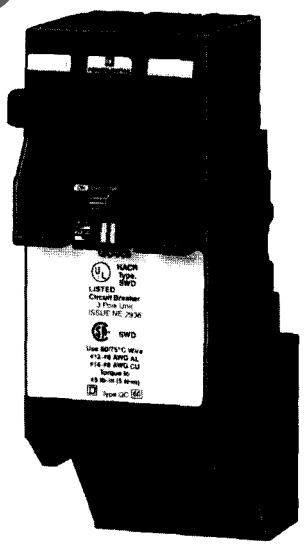
FEATURES

POWERLINK QO(B)-AS circuit breakers combine remote switching and overcurrent protection capabilities. They have the following features:

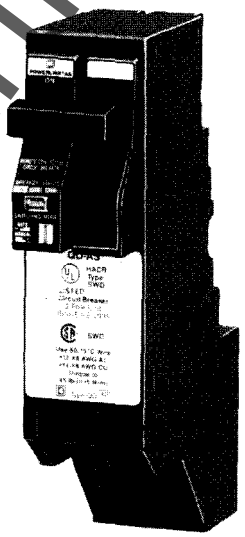
- Circuit breaker construction allows mounting in new or existing 100A and 225A NQOD panelboards with 20" wide enclosures, (NEMA Type 1).
- Control bus plug provides Class 1 control signal to/from circuit breaker.
- Circuit breaker status window displays On, Off, or Tripped conditions and includes a VISI-TRIP® circuit breaker trip indicator.
- Switching mode selector switch allows circuit breakers to be placed in manual or automatic switching modes.
- Internal 24Vdc motor provides quiet, reliable operation.
- Latching design allows circuit breaker to maintain present status should power failure occur. Latching design also reduces power consumption compared to electrically-held devices.
- Circuit breaker has an electrical life of 200,000 remote switching operations at 80% load and 0.8 power factor.

Following are selection data, catalog numbers, accessories, and dimensions for the QO(B)AS circuit breakers.

QO120AS (1-POLE)



QO220AS (2-POLE)



QO320AS (3-POLE)

POWERLINK QO(B)-AS Circuit Breakers
UL Listed Mechanical Accessories—Class 690

Breaker Prefix	Number of Poles	Catalog Number
Handle Accessories		
Handle Lock-off		
QO(B)	1,2,3	HLO1
Handle Padlock Attachment		
QO(B)	1,2,3	QOASPA

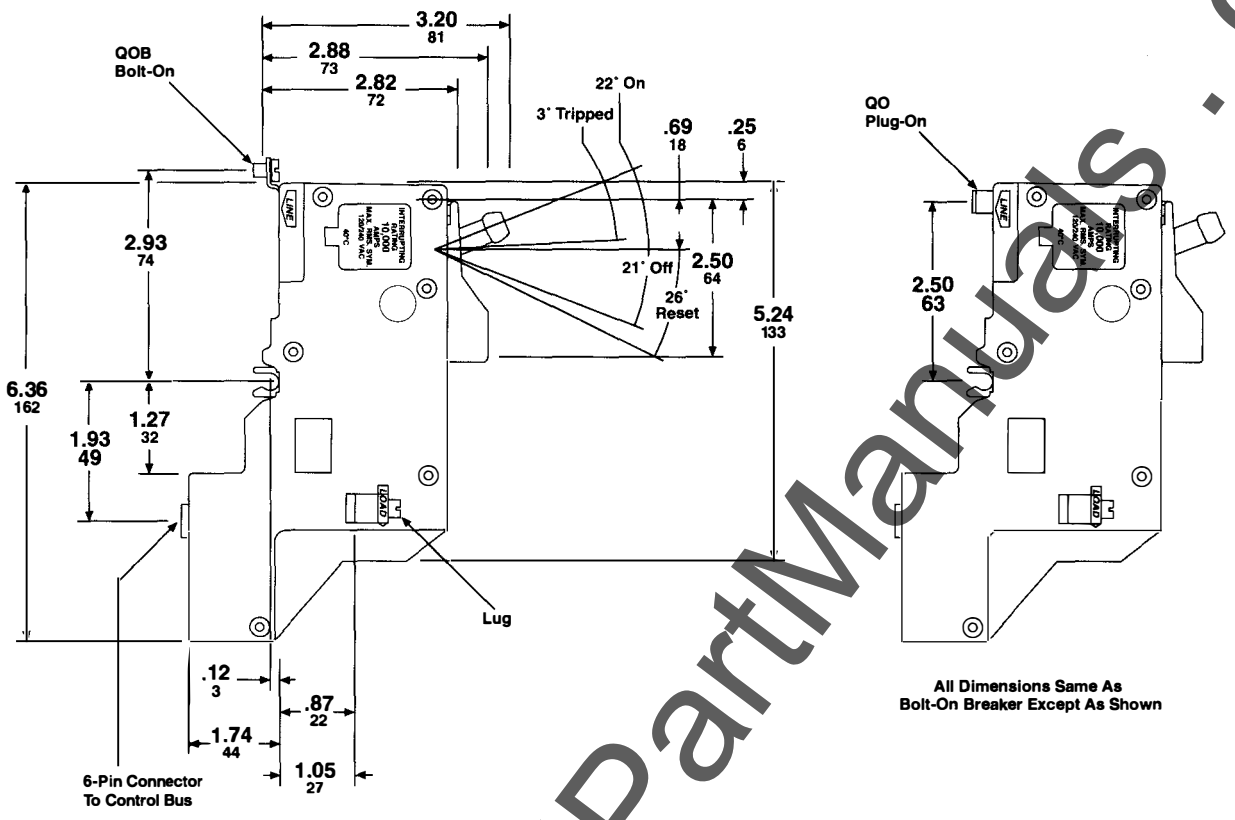
SELECTION DATA
QO/QOB-AS Plug-on or Bolt-on Remote Controlled Circuit Breakers—UL Listed

Ampere Rating	One-Pole 120/240Vac - 10,000 AIR		Two-Pole 120/240Vac - 10,000 AIR		Three-Pole 240Vac - 10,000 AIR		Lug Wire Size▼
	Plug-on Catalog No.	Bolt-on Catalog. No.	Plug-on Catalog No.	Bolt-on Catalog No.	Plug-on Catalog No.	Bolt-on Catalog No.	
15	QO115AS ●▲	QOB115AS ●▲	QO215AS ●▲	QOB215AS ●▲	QO315AS ●▲	QOB315AS ●▲	(1) #12-8 Al (1) or (2) #14-10Cu
20	QO120AS ●▲	QOB120AS ●▲	QO220AS ●▲	QOB220AS ●▲	QO320AS ●▲	QOB320AS ●▲	
30	QO130AS ●	QOB130AS ●	QO230AS ●	QOB230AS ●	QO330AS ●	QOB330AS ●	

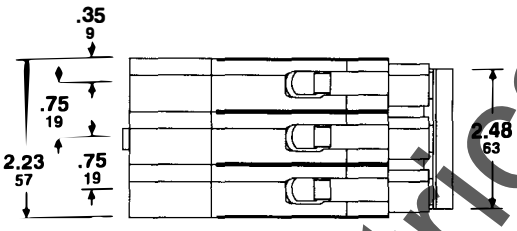
All are UL listed as HACR type for use with air conditioning, heating, and refrigeration equipment having motor group combinations and marked for use with HACR type circuit breakers.

▲ UL Listed as SWD (switching duty) rated. Suitable for switching 120Vac fluorescent lighting loads.
● HID rated for use with high intensity discharge lighting systems.
▼ Suitable for use with 60°C or 75°C conductors.

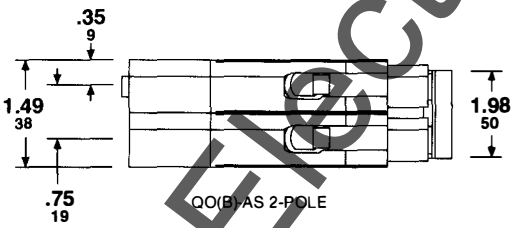
POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
QO(B)-AS CIRCUIT BREAKERS
DIMENSIONS



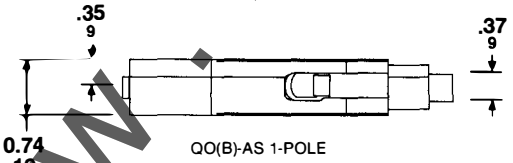
All Dimensions Same As
Bolt-On Breaker Except As Shown



QO(B)-AS 3-POLE



QO(B)-AS 2-POLE



QO(B)-AS 1-POLE

Dual Dimensions: **INCHES**
Millimeters

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
EHB-AS CIRCUIT BREAKERS

EHB-AS CIRCUIT BREAKERS

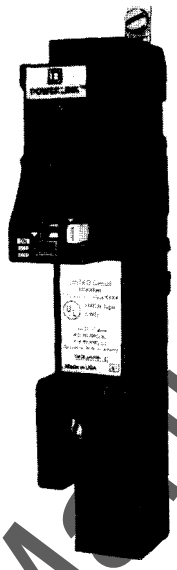
This section contains specific information on the features, selection data, accessories, and dimensions of POWERLINK® EHB-AS circuit breakers. For general information on construction standards, ratings, and remote control operations of POWERLINK AS circuit breakers, refer to Part 2, *POWERLINK A S Circuit Breakers.*

FEATURES

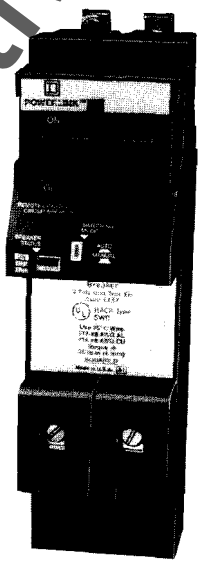
POWERLINK EHB-AS circuit breakers combine remote switching and overcurrent protection capabilities. They provide the following features:

- Circuit breaker construction allows mounting in new or existing 100A and 225A NEHB panelboards with 20" wide enclosures, (NEMA Type 1).
- Control bus plug provides Class 1 control signal to/from circuit breaker.
- Circuit breaker status window displays On, Off, or Tripped conditions and includes a VISI-TRIP® circuit breaker trip indicator.
- Switching mode selector switch allows circuit breakers to be placed in manual or automatic switching modes.
- Internal 24Vdc motor provides quiet, reliable operation.
- Latching design allows circuit breaker to maintain present status should power failure occur.
- Circuit breaker has an electrical life of 200,000 remote switching operations at 80% load and 0.8 power factor.

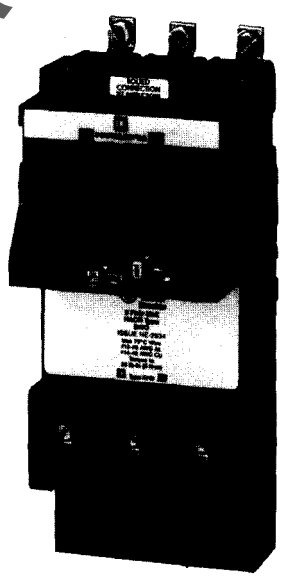
Following are selection data, catalog numbers, accessories, and dimensions for the EHB-AS circuit breakers.



EHB14020AS
(1-POLE)



EHB24020AS
(2-POLE)



EHB34020AS
(3-POLE)

POWERLINK EHB-AS Circuit Breakers
UL Listed Mechanical Accessories—Class 690

Handle Accessories

Breaker Prefix	Number of Poles	Catalog Number
Handle Lock-off		
EHB	1,2,3	HLO1
Handle Padlock Attachment		
EHB	1,2,3	EHASPA

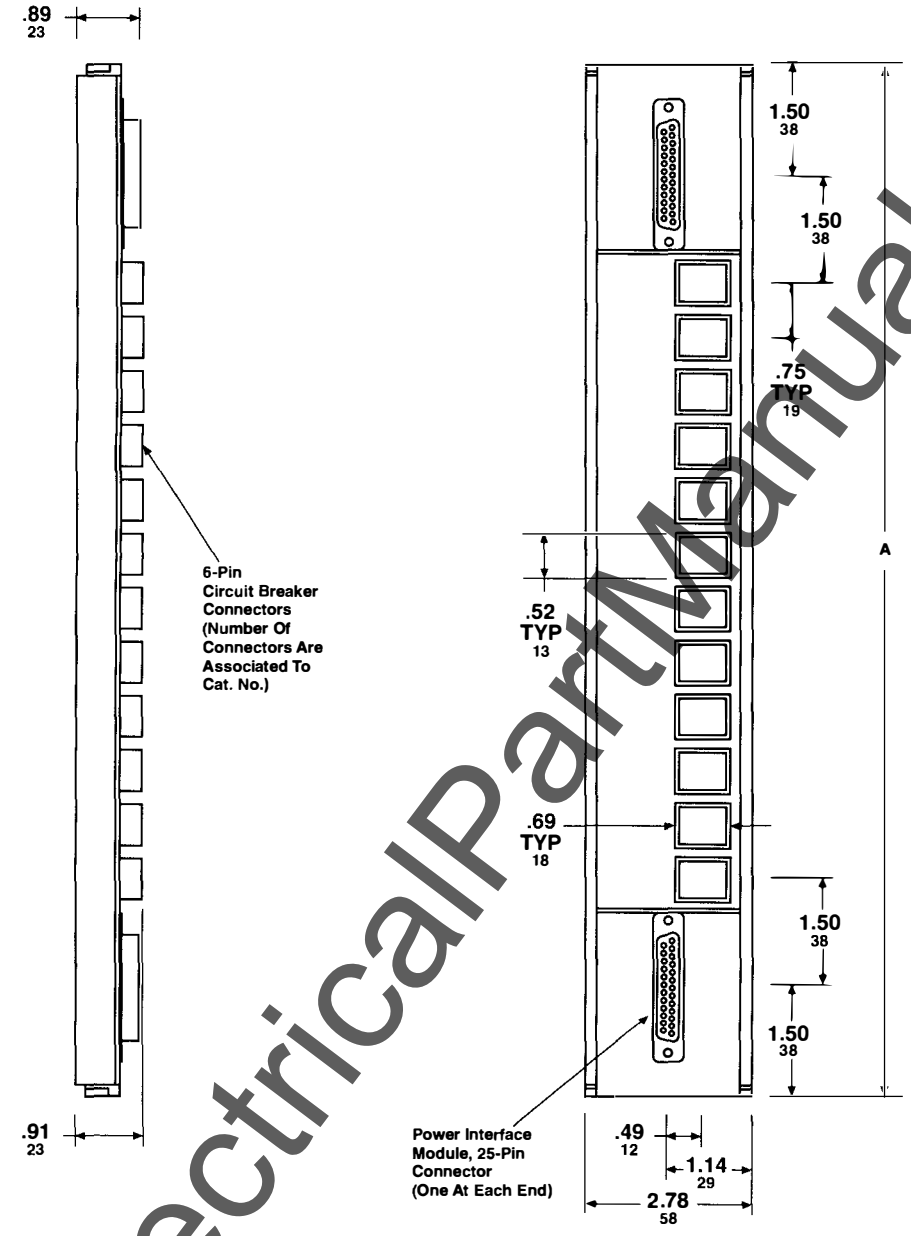
SELECTION DATA
EHB-AS Bolt-On Remote Controlled Circuit Breakers—UL Listed

Ampere Rating	One-Pole 277Vac - 14,000 AIR 120Vac - 65,000 AIR	Two-Pole 480Y/277Vac - 14,000 AIR 120/240Vac - 65,000 AIR	Three-Pole 480Y/277Vac - 14,000 AIR 240Vac - 65,000 AIR	Lug Wire Size▼
	Catalog No.	Catalog No.	Catalog No.	
15	EHB14015AS ●▲	EHB24015AS ●▲	EHB34015AS ●▲	(1) #12-8 Al (1) or (2) #14-10 Cu
20	EHB14020AS ●▲	EHB24020AS ●▲	EHB34020AS ●▲	
30	EHB14030AS ●	EHB24030AS ●	EHB34030AS ●	

All are UL Listed as HACR type for use with air conditioning, heating, and refrigeration equipment having motor group combinations and marked for use with HACR type circuit breakers.

▲ UL listed as SWD (switching duty) rated. Suitable for switching fluorescent lighting loads.
● HID rated for use with high intensity discharge lighting systems.
▼ Suitable for use with 75°C conductors.

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
NQOD-ASB CONTROL BUS
DIMENSIONS

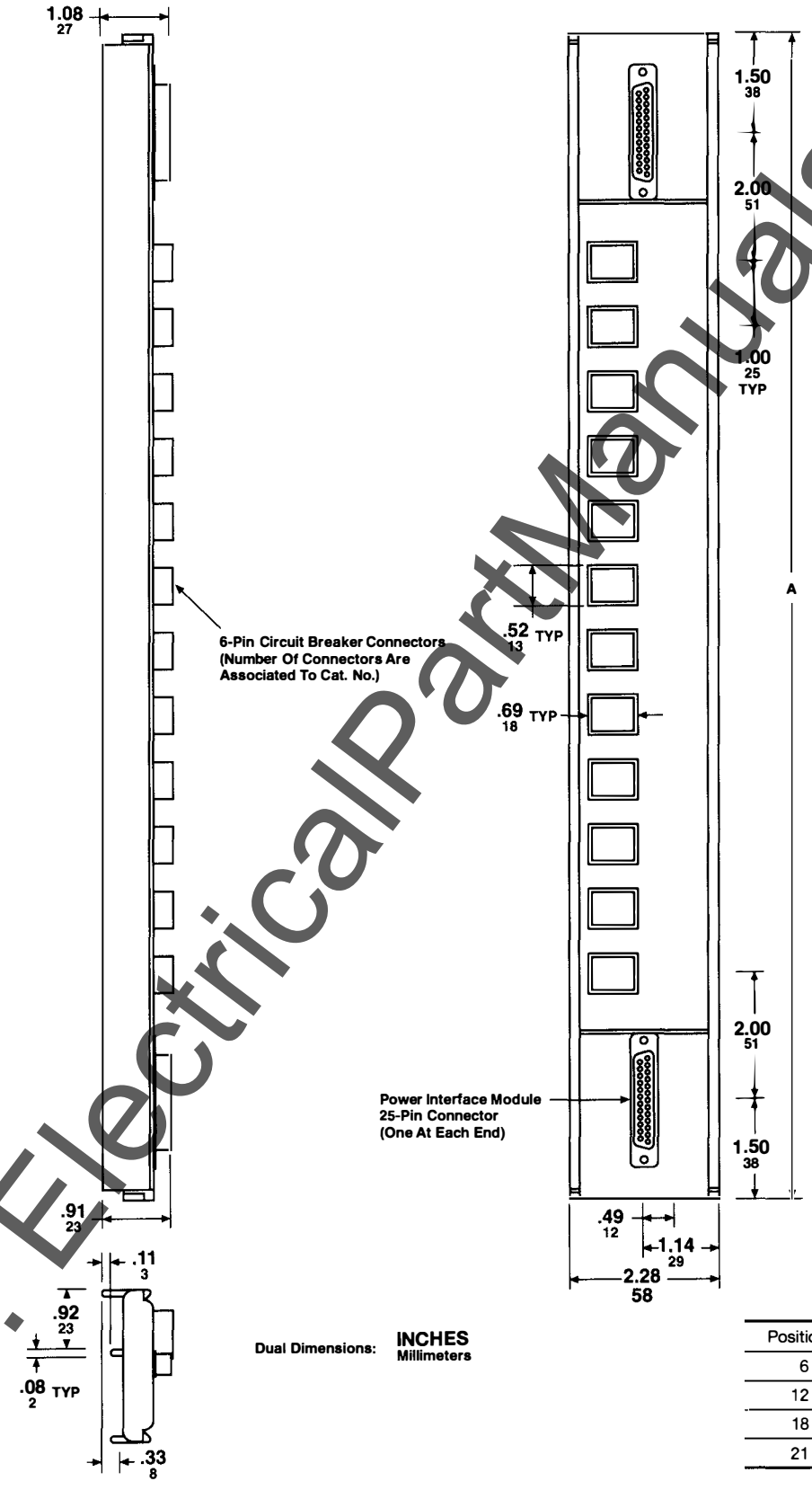


Dual Dimensions: **INCHES** / Millimeters

DIMENSIONS

Positions	A Inches	mm
7	10.50	267
9	12.00	305
12	14.25	362
18	18.75	476
21	21.00	533

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
NEHB-ASB CONTROL BUS
DIMENSIONS



Dual Dimensions: **INCHES** / Millimeters

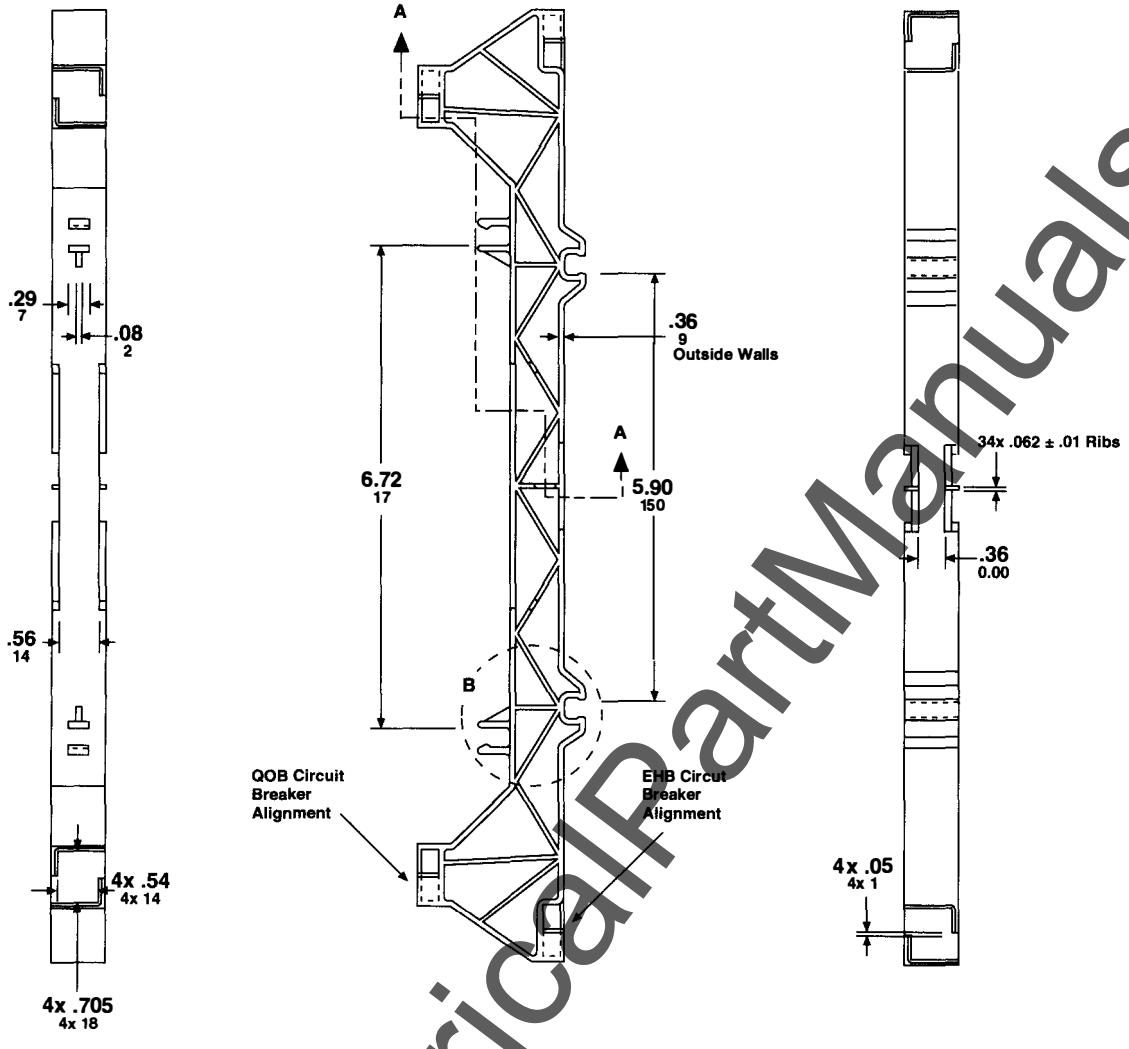
DIMENSIONS

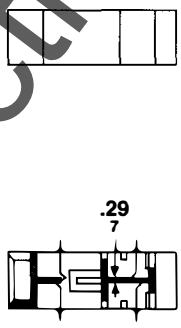
Positions	A Inches	mm
6	12.00	305
12	18.00	457
18	24.00	610
21	27.00	686

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM

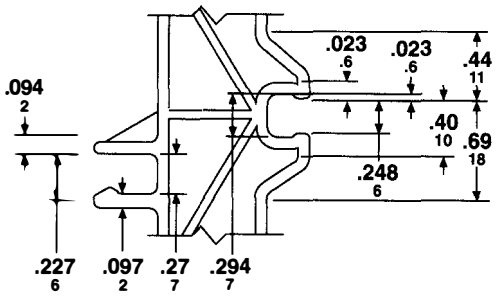
COMBINATION NQOD-ASB AND NEHB-ASB CONTROL BUS ALIGNMENT TOOL

DIMENSIONS





SECTION A-A



DETAIL B

Dual Dimensions: INCHES
Millimeters

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
POWER INTERFACE MODULE

POWER INTERFACE MODULE

The POWERLINK AS power interface module obtains its power directly from the panelboard main bus. As a result, there are several models available. Selection depends upon the panelboard type and facility distribution system voltage. The power interface module occupies six pole spaces, and mounts to the panelboard interior. Once the panelboard interior dead-front trim is in place, the control module plugs onto the power interface module.

POWER INTERFACE MODULE

FEATURES

The power interface module provides voltage sources for circuit breakers and system electronics, monitors the status of Type AS circuit breakers, and reports the status to the control module. In addition, the power interface module has input terminations for connection to external control devices. The module includes the following features:

- One power supply furnishes 24Vdc power for remote circuit breaker switching.
- A second power supply furnishes 5Vdc power for the control module system electronics, eight hard-wired inputs and the RS-232 input expansion port.
- A third power supply furnishes 5Vdc isolated power for the eight hard-wired inputs and optional RS-485 data communications network.
- Sequencing operation with programmable stagger delay eliminates voltage sags when multiple circuit breakers are switched as a group.
- On-board EEPROM allows a programmed condition to be assigned if control module is removed.

  User-defined programmed conditions include:
  - All circuit breakers signalled to switch on (default)
  - All circuit breakers signalled to switch off
  - Maintain all circuit breakers in present state, no change
- Input terminal board accepts up to eight external inputs with the following characteristics:

  – 2-wire maintained – 3-wire momentary.
- Inputs are isolated from output circuits. Inputs have an internal 5Vdc power source, which eliminates the need for a separate control voltage transformer.
- RS-485 network option allows POWERLINK AS systems to operate over a network.
- Module can be mounted at either the top or bottom of the panelboard interior (requires six pole spaces).
- Input terminal compartment has 3 openings for terminations of the Class 2 barrier kit.
- An RS-232 port provides the means for interfacing to an optional input expansion cabinet, which supports up to 64 hard-wired inputs from external control devices.

Following are selection data, catalog numbers and dimensions for the power interface module.

SELECTION DATA

Power Interface Modules for NQOD Panelboards

Module Type	Voltage Range	Catalog Number
Standard Network	208 Vac, 240Vac 208 Vac, 240Vac	NQOD242ASP NQOD242ASP-N

Power Interface Modules for NEHB Panelboards

Module Type	Voltage Range	Catalog Number
Standard Standard	208 Vac, 240Vac 480Y/277Vac	NEHB242ASP ▲ NEHB442ASP
Network Network	208 Vac, 240Vac 480Y/277Vac	NEHB242ASP-N ▲ NEHB442ASP-N

▲ Special order only

SPECIFICATIONS

Operating Voltage:

NQOD242ASP(N) and
NEHB242ASP(N) ..... 187Vac to 264Vac
NEHB442ASP(N) ..... 432Vac to 528Vac
Number of Inputs ..... 8 points independent expandable to 64
Input Type ..... 2-wire maintained or 3-wire momentary. No external control voltage required. Mechanical contact input or solid state equivalent.
Input Terminals ..... 3 per input
Terminal Wire Range ..... #22-18 AWG Cu
NEC Circuit Classification ..... Class 2 Remote Control

Network Port Specifications:

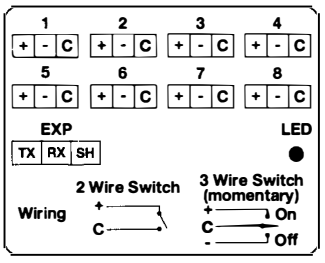
Network Port Type [ASP(N) Models] ..... One RS-485
Number of Terminals ..... Five
Terminal Wire Range ..... #22-18 AWG Cu
NEC Circuit Classification ..... Class 2 Remote Control

Input Expansion Port Specifications:

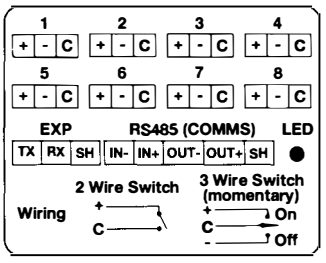
Port Type ..... One RS-232
Number of Terminals ..... Three
Terminal Wire Range ..... #22-18 AWG Cu
NEC Circuit Classification ..... Class 2 Remote Control

Environmental Specifications:

Operating Temperature (ambient) ..... -5°C to +40°C
Storage Temperature (ambient) ..... -20°C to +85°C
Operating Humidity ..... 5% to 95% (non-condensating)

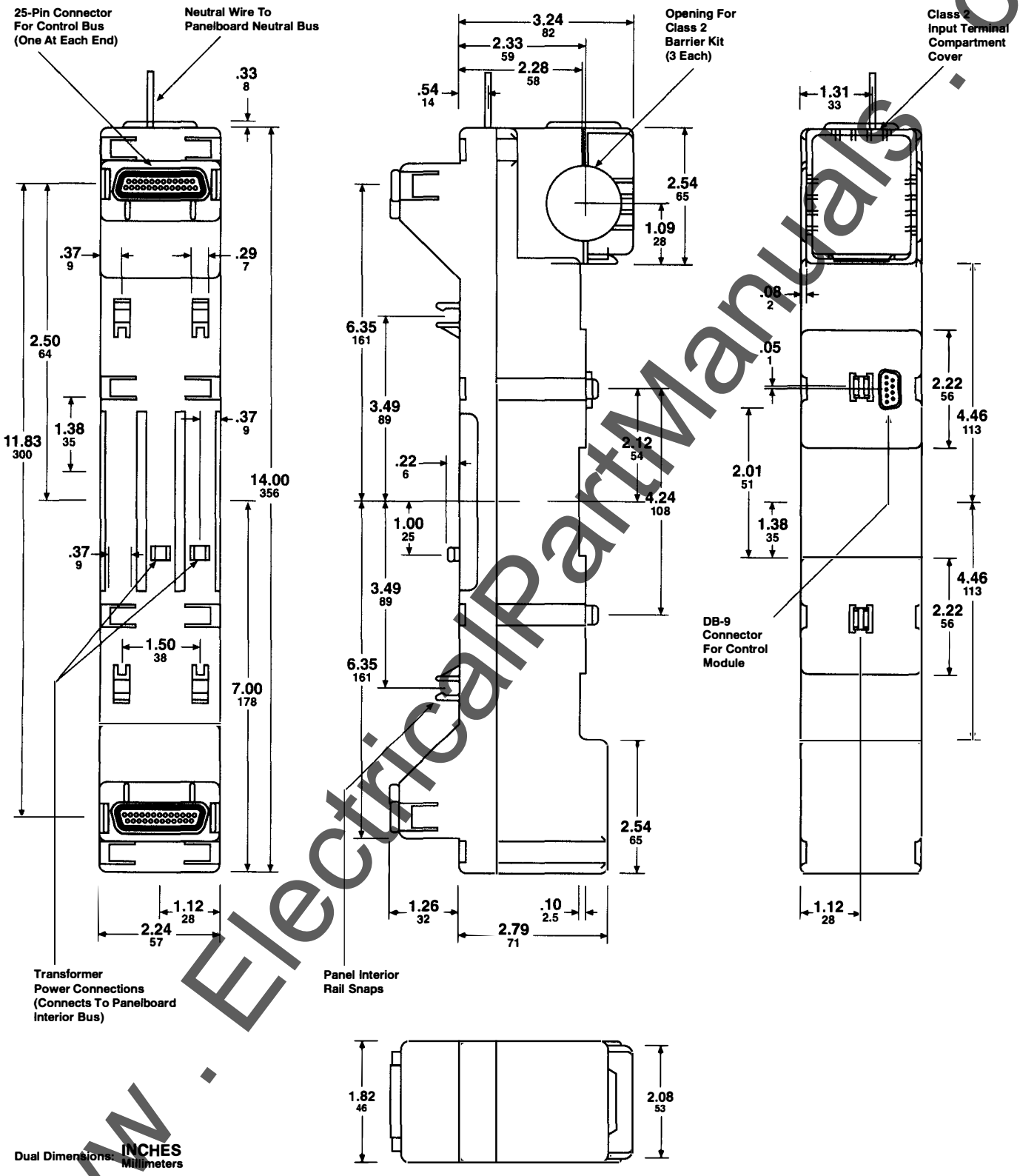


INPUT TERMINAL COMPARTMENT POWER INTERFACE MODULE (STANDARD)



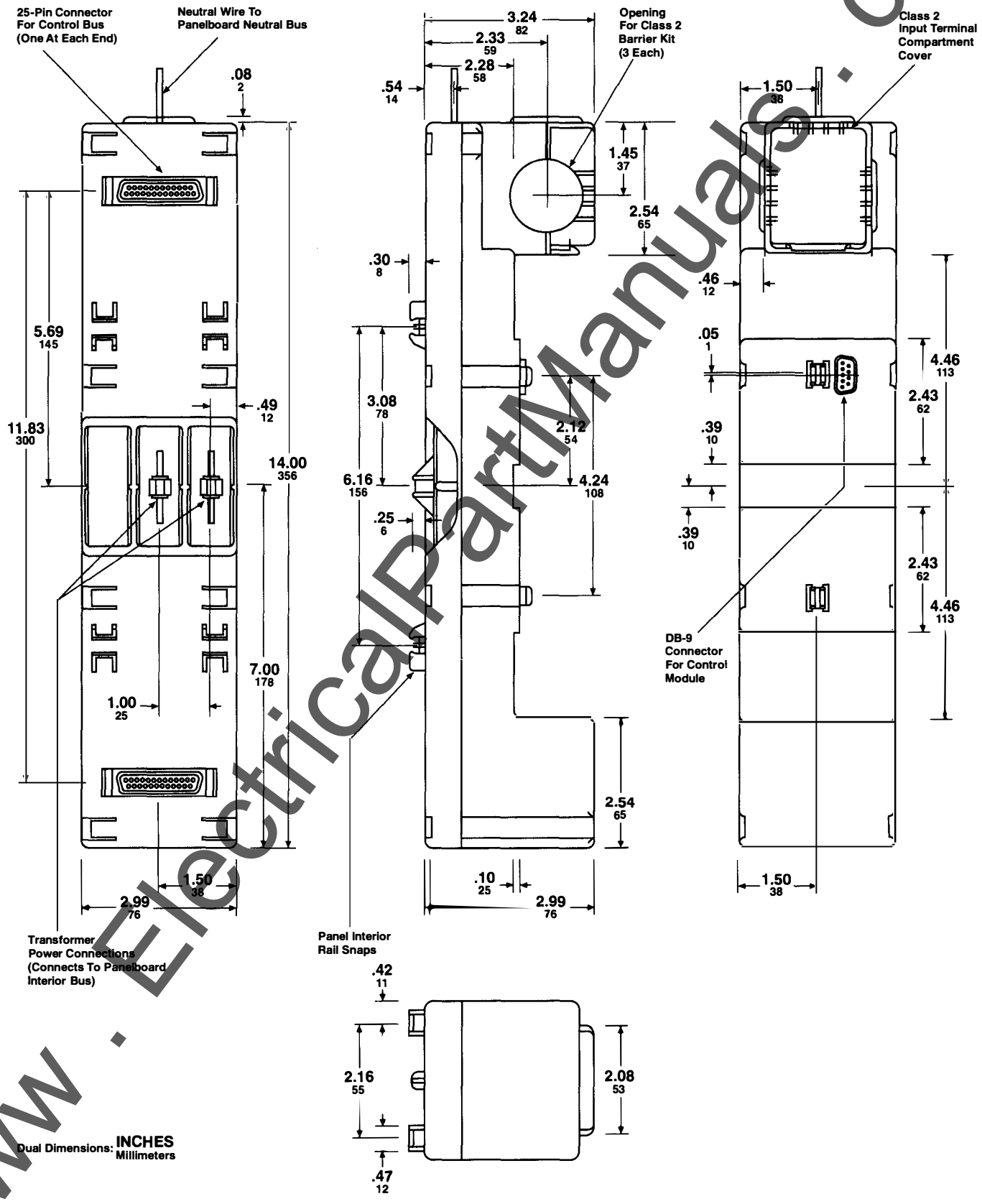
INPUT TERMINAL COMPARTMENT POWER INTERFACE MODULE (NETWORK)

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
NQOD POWER INTERFACE MODULE
DIMENSIONS



Dual Dimensions: INCHES / Millimeters

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
NEHB POWER INTERFACE MODULE
DIMENSIONS

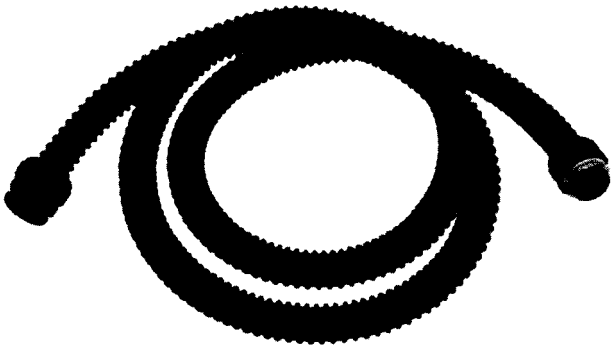


Dual Dimensions: INCHES Millimeters

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
CLASS 2 BARRIER KIT

CLASS 2 BARRIER KIT

The Class 2 barrier kit includes a flexible, UL Listed barrier tube that separates Class 2 low-voltage external control wiring from line voltage conductors within the panelboard gutter.



ASBK-S CLASS 2 BARRIER KIT

FEATURES

The Class 2 barrier kit has the following features:

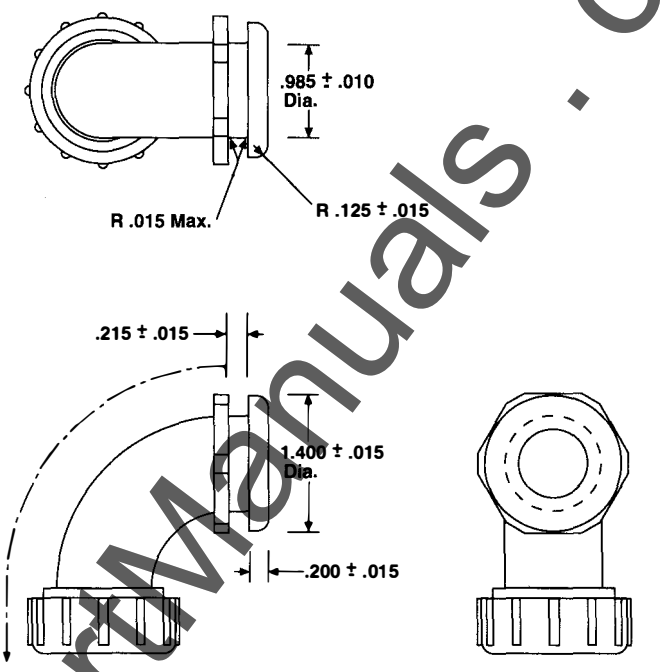
- UL Listed barrier tubing allows Class 2 conductors to occupy same gutter area as line-voltage conductors.
- Accommodates Class 2 wiring from external control devices and RS-485 network cable in a common raceway.
- Barrier tubing extends from panelboard tub endwall to the input terminal compartment on the power interface module.
- Kits include:
  - 0.75" tube in six-foot lengths
  - 0.75" box coupling compression fitting
  - Choice of straight-in or 90° power interface module fittings
- The six-foot tube may be cut to desired length and the compression fitting may be re-attached to the end of the tube.
- Up to two barriers, one straight-in and one 90 degree, may be attached to input terminal compartment on power interface module. Meets requirements of 1993 NEC article 725-52.

Following are the selection data, catalog numbers and dimensions of the Class 2 barrier kit.

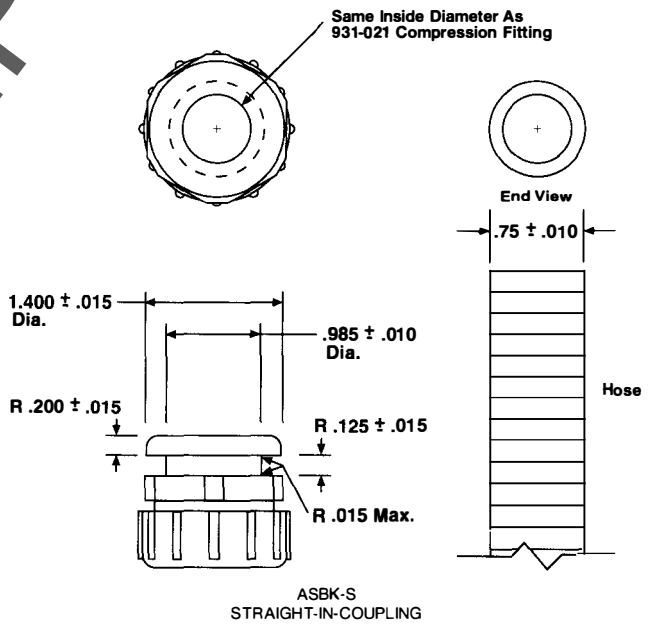
SELECTION DATA

Description	Catalog Number
Barrier with straight-in coupling	ASBK-S
Barrier with 90 degree coupling	ASBK-B

DIMENSIONS



ASBK-B
90 DEGREE COUPLING

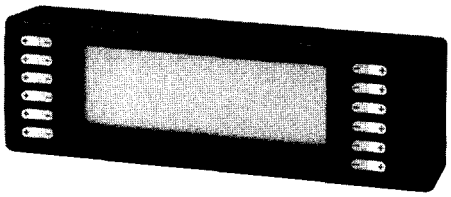


ASBK-S
STRAIGHT-IN-COUPLING

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
CONTROL MODULES

CONTROL MODULES

The intelligence of the POWERLINK AS system comes from its resident microprocessor-based control module, which directs and simplifies the operation of the POWERLINK AS system. An optional time-of-day control module for the POWERLINK AS system makes it possible to schedule automatic switching of lighting and electrical equipment for individual circuits.



AS42CM-T CONTROL MODULE

FEATURES

The following chart details the features of both the basic and optional time-of-day control modules.

System Features	Basic Control Module	Time-of-Day Module
Hardware		
Large supertwist LCD screen with contrast adjustment	✔	✔
24 button keypad	✔	✔
RS232 serial interface	✔	✔
EEPROM for configuration/ command storage	✔	✔
Super capacitor for 30 days time clock and status backup		✔
Manual reset	✔	✔
Monitor Mode		
Breaker status	✔	✔
Setup Mode		
12/24 hour clock format		✔
365 day calendar with leap year correction		✔
Daylight savings		✔
Sunrise/Sunset with select offset		✔
Holidays periods		✔
Zone setup	✔	✔
Password	✔	✔
Input type	✔	✔
Panel data	✔	✔
Communications settings	✔	✔
Stagger delay	✔	✔
Flash/Blink notice		✔
Program Mode		
Time-of-Day scheduling		✔
Input based override	✔	✔
Timed input override		✔
Override Mode		
Breaker override	✔	✔
Zone override	✔	✔
Run/Halt/Hold modes	✔	✔
Diagnostics Mode		
Memory	✔	✔
Communications	✔	✔
Event log		✔
Access log		✔
Reset	✔	✔
Clear Program	✔	✔

SELECTION DATA

Description	Catalog Number
Basic module	AS42CM
Time-of-Day module	AS42CM-T

ACCESSORIES

Description	Catalog Number
Serial cable for local connection to control module from personal computer, via male 9-pin connector.	AS42CM-SC
Power supply for desktop programming of control module.	AS42CM-DPK

SPECIFICATIONS

Screen.....Supertwist LCD with contrast adjustment
Serial Port.....One RS-232 for connection to IBM-compatible PC

Environmental Specifications:

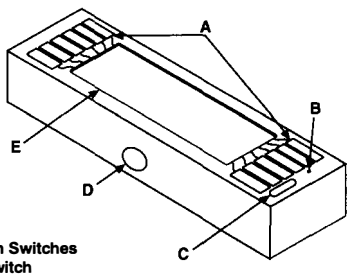
Operating Temperature (ambient).....-5°C to +40°C
Storage Temperature (ambient).....-20°C to +85°C
Operating Humidity .....5% to 95% (non-condensating)

CONTROL MODULE PROGRAMMING OVERVIEW

Introduction

The control module can control up to 42 independent circuits using POWERLINK AS remote-controlled circuit breakers. Control signals can originate externally from external inputs or digital communications, or internally from data entered into the control module.

The control module displays system status and program information using an LCD screen (E). System configuration information and programming are performed using the module selection (+ and -) switches (A). Screen contrast can be adjusted to the desired value using the module's contrast control (C). A manual reset button (B) can be used to reset the system. (Refer to Figure 1.)



A - Selection Switches
B - Reset Switch
C - Contrast Control
D - Communication Port
E - LCD Screen

FIGURE 1 – CONTROL MODULE ARCHITECTURE

POWERLINK® AS REMOTE POWER SWITCHING SYSTEM
CONTROL MODULES

Entering the Program
The control module program can be entered using the control module LCD screen and selection switches or through a temporary link using the RS-232 communication port (D), (Refer to Figure 1).

If the system is connected to a network, the program can also be entered by means of an IBM®-compatible PC on the network. If programming by means of a PC, programming instructions provided with the PLK-101 software should be followed.

Programming can be performed while the control module is installed in a POWERLINK AS panelboard, or it can be performed at a remote location with the control module plugged into a desktop programming kit (Catalog No. AS42CM-DPK), and using an IBM-compatible PC, with PLK-101 software.

Events
Circuit breakers are turned on or off based on an event. A control module will accept up to 256 programmed events. Events can be on automatic control, such as time of day, or signalled by an input change (e.g., moving a light switch from on to off). Output signals are sent from the control module to the circuit breakers, turning them on or off.

Overrides
An override changes the state of an output independent of the control module program. Three types of overrides may be initiated from the control module:

- Override Breaker—selects an individual circuit breaker
- Override Zone—selects a group of circuit breakers
- Override All Breakers—selects all POWERLINK AS circuit breakers.

Override conditions may be selected as temporary, which will be in effect until the next event, or continuous, which remains in effect until released.

Individual circuit breakers have the switching mode selector switch, which takes priority over overrides initiated from the control module. Refer to Part 2, *POWERLINK AS Circuit Breakers, Switching Mode Selector Switch* for additional information.

Operating Modes
There are four modes of operation:

1. Run—System responds automatically to events. All system features and functions are working. Single-event, on-line programming is allowed.
2. Manual—All circuit breakers are turned on, and events are not processed. All remote and network data is ignored.
3. Halt—Control signals are not processed. No status changes can occur except for manual overrides. Local programming and overrides are allowed.
4. Hold—Control signals are not processed, but events are logged. Outputs are updated when the mode of operation is returned to RUN. Overrides, diagnostics, and local programming are allowed.

Access Codes
The control module uses a four-digit access code to control program security. There are three levels of security, each level requiring its own access code. If no key is pressed for five minutes, an access code will "time out," and must be re-entered.

TABLE 5
Access Codes

Access Code	Gives Access To
Operator	Operator Level
Supervisor	Supervisor Level and Operator Level
Master	Master Level, Supervisor Level, and Operator Level

Names
For control modules programmed with a PC, an optional 12-character alpha-numeric name tag can be assigned to individual circuit breakers or zones of circuit breakers within a panelboard. Name tags will not actually appear unless a name has been entered for that item using a PC and PLK-101 software.

Priorities
In cases of conflicting commands, such as a time-based event telling a circuit breaker to turn on and an input event telling a circuit breaker to turn off, a priority scheme is used. Higher priority commands, which are represented by lower numbers on the command priority table, override lower priority commands, which are represented by higher numbers.

TABLE 6
Command Priorities

Priority	Command
1	Overrides
2	Special Dates Schedule
3	Input Program
4	Sunrise/Sunset
5	Time program

Screen Organization
The control module organizes screens under five headings: Status, Setup, Program, Override, and Diagnostic. These are listed across the top of the screen (A) on all five main screens.

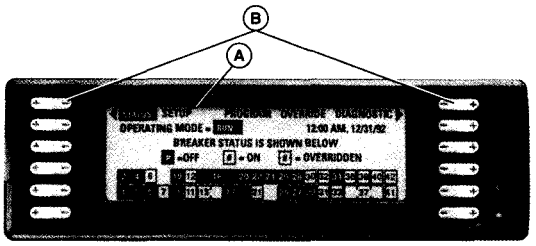


FIGURE 2 – CONTROL MODULE SCREEN ORGANIZATION

1. Status screen—shows status of all circuit breakers, indicating if the circuit breaker is on, off, or overridden. The status screen also displays present operating mode, and time-of-day and date, (Time-of-Day control module only). This is the default screen upon power-up.

2. Setup screens—used to set up the system configuration and global values. This must be completed before any programming functions can be performed.
3. Program screens—used to program the system for desired operation.
4. Override screens—used to override program values.
5. Diagnostic screens—used to evaluate system performance, and for trouble-shooting if system does not perform as expected.

Selection Keys

The selection keys (B) on either side of the LCD screen are used for entering the program choices. The keys operate only if there is an arrow next to them.

◀ ▶ Solid arrows indicate that the key will modify a choice on that screen.

◁ ▷ Hollow arrows indicate that the key will advance to a new screen.

The keys will stay in a neutral position until actuated and can be moved to a minus (-) or plus (+) position.

Access Codes Screens

The control module displays the access code screen as necessary. If a screen with restricted access is requested by a user without access authorization, the module displays the access code screen before displaying the requested screen.

Global Values

Global values are set to affect all POWERLINK AS circuit breakers and all program items.

FLASH OUTPUTS or BLINK NOTICE – sets the number of minutes prior to a change that the program will flash the lights, prior to a pending timed OFF event. Default value is 00 minutes prior to a change, (no blink notice), and blink notice may be user configured to either 05, 10, or 15 minutes.

SEQUENCE TIME – sets the time period between circuit breaker switching operations, when multiple circuit breakers are switched simultaneously with an event. Default value is 0.25 seconds, and sequence time may be user configured to either 0.25, 0.5, 1.0, 5.0, or 10.0 seconds.

DEFAULT ACTION IF NO CONTROL MODULE – defines the action by the system if control module is removed from the power interface module. Default action is all POWERLINK AS circuit breakers ON, and may be user configured to turn all POWERLINK AS circuit breakers OFF, or all POWERLINK AS circuit breakers to remain in present state – NO CHANGE.

Circuit Breaker Status

Circuit breaker status is indicated at the bottom of many screens. All circuit breakers available to the system are shown as numbers. (Refer to Figure 3.)

A white number in a black box indicates that the circuit breaker has been signalled to turn off.

A black number in a white box indicates that the circuit breaker has been signalled to turn on.

A white number in a flashing black box indicates that the circuit breaker has been overridden off.

A black number in a flashing white box indicates that the circuit breaker has been overridden on.

Multi-pole circuit breakers are indicated by connected boxes:

A two-pole circuit breaker has two boxes with one number.

A three-pole circuit breaker has three boxes with one number.

Numbers represent the pole containing the internal 24Vdc motor and the 6-pin plug-on control bus connector.

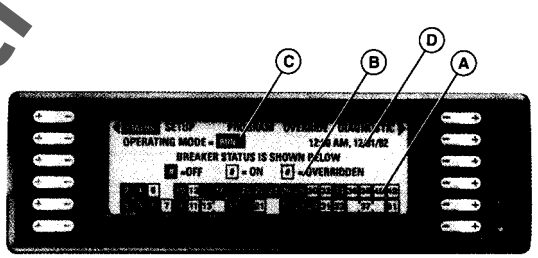


FIGURE 3 — CONTROL MODULE STATUS SCREEN

Status Screen

The status screen is the default screen, which is displayed whenever the system is active. The control module returns to the status screen after five minutes of no activity.

The status screen displays:

- Circuit breaker status (A), indicating if the circuit breaker is on, (a black number in a white box), if the circuit breaker is off, (a white number in a black box), if the circuit breaker is overridden on, (a black number in a flashing white box), or if the circuit breaker is overridden off, (a white number in a flashing black box).
- The overridden legend (B) (flashing white box) will appear only if one or more of the circuit breakers is overridden.
- The operating mode (C) of the system (run, manual, halt, or hold).
- Internal time and date (D) (appears with optional time-of-day control modules only). If time does not include AM or PM, then the internal clock is using a 24-hour display.

For additional programming information, refer to the *POWERLINK AS Control Module Programming Guide.*

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
CONTROL MODULES

CIRCUIT BREAKER COMMAND INHIBIT FLAG

The control module will issue a circuit breaker command inhibit flag, declaring a circuit breaker as non-responding, for either of two conditions.

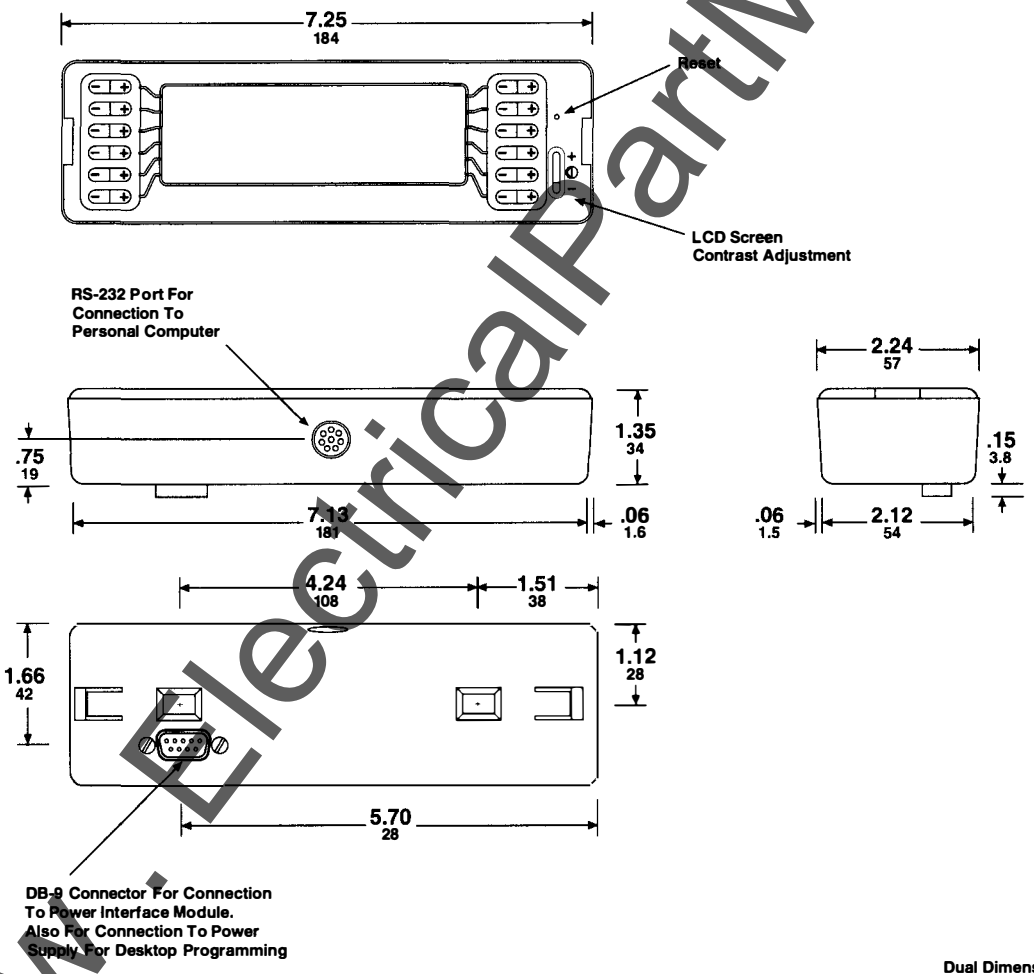
Condition 1:

If a circuit breaker is off initially, and is manually overridden on by placing the switch mode selector in manual mode and moving the circuit breaker handle to the ON position, then the control module will pulse the circuit breaker with three continuous off commands. The control module will attempt to match the previous OFF status of the circuit breaker with the new status, and if unsuccessful, the control module sets a circuit breaker command inhibit flag. This flag declares the circuit breaker as non-responding, and the control module will restrict any new commands issued to the circuit breaker to protect the circuit breaker motor. The command inhibit flag clears when the control module desired state matches the actual state of the circuit breaker, and automatic control operation resumes.

Condition 2:

If a circuit breaker is on initially, and the breaker is manually overridden off by placing the switch mode selector in the manual mode and moving the circuit breaker handle to the off position, then the control module will pulse the circuit breaker with three consecutive on commands. The control module will attempt to match the previous on status of the circuit breaker with the new status, and if unsuccessful, the control module sets a circuit breaker command inhibit flag. This flag declares the circuit breaker as non-responding, and the control module will restrict any new commands issued to the circuit breaker to protect the circuit breaker motor. The command inhibit flag clears when the circuit breaker status matches the control module desired status for the corresponding breaker, and automatic control operation resumes.

DIMENSIONS



Dual Dimensions: INCHES
Millimeters

Part 4
Software and Network Configurations

This part provides information on PC-based software and sample network configurations for POWERLINK AS panelboards. It describes the software and network options available for four types of networked systems and includes software selection data and other ordering information.

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
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SOFTWARE

This section describes the benefits and features of the optional software package developed for the POWERLINK AS system. It also includes selection data and PC minimum requirements.

BENEFITS

The optional POWERLINK AS system software provides additional capabilities to enhance system programming, monitoring, and control. During POWERLINK AS system installation, the PC-based software can be used to facilitate configuration of the system and programming of the control module. This can be performed locally (the control module has an RS-232 port for a local PC connection), remotely using a desktop PC and programming kit, or via a desktop PC communicating over an RS-485 network.

The software also simplifies system monitoring. For example, it provides remote monitoring of the system and circuit breaker status from a single remote location. Overrides and other control functions can also be initiated from a remote location. All of these operations are protected from unauthorized use by the system's access control features.

FEATURES

The POWERLINK AS software makes it possible to configure or program the system, view system status, control multiple networked panelboards, and initiate overrides at the panelboard from a remote location. It has the following features:

- The PLK101 software option is DOS-based, menu- and function key-driven.
- Up to 999 connected panelboards are supported with individual device polling/scanning.
- Software allows access to setup, program, status, and override functions:
  - Displays data for all POWERLINK AS panelboards (one at a time)
  - Works with EGA or higher graphic adapters (laptops, notebooks)
  - Works with SY/LINK® card or RS-232 serial port (requires an external RS-232/RS-485 converter)
  - Reports circuit breaker status: on, off, or overridden (not tripped)
- A user-friendly design means that no special programming skills or development tools are required for programming and use.
- Software is provided on 3.5" and 5.25" floppy disks and is packaged with an instruction manual.

SELECTION DATA

Class 3080 - POWERLINK AS Application Software ● ■ ◆

Description	Catalog Number
AS Communications Software ▲	PLK101

▲ DOS-based requires IBM® XT/AT or higher PC (100% IBM® compatible) with one 3.5" or 5.25" floppy disk, hard drive, EGA or VGA graphics terminal and DOS 3.3 or higher.

● For software upgrades, add a -U to the product Type Number. Upgrade prices are 20% of base product price. All software upgrade orders must include serial number of existing product.

■ For software service agreements, contact your local Square D sales office.

◆ Discounts for multiple copies and site licenses are available. Contact your local Square D sales office.

PLK101 AS COMMUNICATIONS SOFTWARE

PC MINIMUM REQUIREMENTS

The POWERLINK AS system software requires the following hardware and software:

- IBM XT/AT or higher (100% IBM compatible)
- 640KB RAM on main board
- One 3.5" or 5.25" floppy disk drive, high or low density (hard drive recommended)
- EGA or VGA color monitor and adapter
- DOS 3.3 or higher.

Note: The SY/LINK card occupies one full size 8/16 bit slot in IBM XT/AT compatible machines, based on the ISA or EISA internal bus structure. If using software with a SY/LINK card, the following will be required:

- One long slot available in the PC
- One SY/LINK network interface card (8010-SFI-510).

For most applications, network communication from a laptop or desktop personal computer may be directed out of a serial COM port, through an external RS-232 to RS-422/485 converter. This method does not require a SY/LINK card, and a simple setup screen in PLK101 is used to select COM port or SY/LINK communications. For users who desire a SY/LINK card installed in a personal computer, an external RS-232 to RS-422/485 converter is not required.

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NETWORK OPTIONS

This section describes network options available with the POWERLINK AS system, including sample RS-485 and SY/NET® Local Area Network configurations. For a detailed description of SY/NET, SY/MAX® PLC, and other I/O devices, refer to the Square D *Automation Products Catalog*. For a detailed description of the POWERLOGIC® Power Monitoring and Control System, refer to the *Planning and Installation Guide* (Bulletin 63210-200-01) and the *Communications Reference for POWERLOGIC Circuit Monitors* (Bulletin 63210-203-01).

BENEFITS

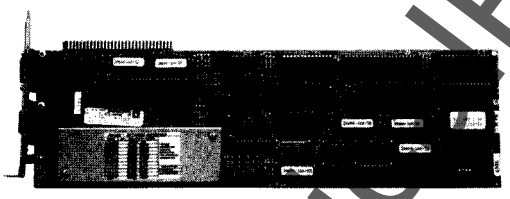
When POWERLINK AS is configured on an RS-485 network, additional remote control capabilities are available for connected panelboards. For example, authorized users can program, monitor, and control any POWERLINK AS panelboard connected to the network from a remote location. The network offers true distributed control, ensuring continued operation of individual panelboards without central control.

SELECTION DATA

Computer Hardware and Accessories

Description	Class	Catalog Number
SY/LINK® Network Interface Board for Personal Computers	8010	SFI510
Personal Computer configured as a POWERLINK AS Master Station ■	xxxx	xxxx

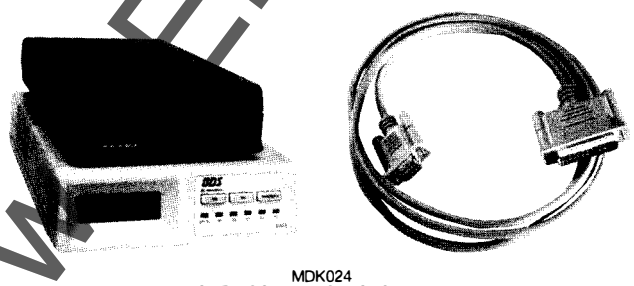
■ Consult POWERLOGIC/POWERLINK Application Engineering (PAE) in Smyrna, TN.



SFI510
SY/LINK BOARD FOR PERSONAL COMPUTERS

Modem and Converter Kits

Description	Class	Catalog Number
Modem Kit with 1200 Baud Modem and RS/232/RS-422/485 Converter	3070	MDK012
Modem Kit with 2400 Baud Modem and RS-232/RS-422/485 Converter	3070	MDK024



MDK024
MODEM COMMUNICATIONS KIT WITH
RS-232 TO RS-422/485 CONVERTER
AND INTERCONNECT CABLE

The RS-485 network options also provide connections with other control systems. POWERLINK AS is compatible with the POWERLOGIC Power Monitoring and Control System and Square D's family of SY/MAX programmable logic controllers. Both operate on the same RS-485 network.

For additional information regarding software, RS-485 communications, and SY/NET networks refer to the *POWERLINK AS System Software* instruction bulletin.

FEATURES

The network options for the POWERLINK AS system include the following features:

- An industry proven, high-speed, multi-drop SY/NET network supports communications up to 500K baud.
- POWERLINK AS panels may be daisy-chained together on an RS-485 network that supports communications up to 19.2K baud.
- As many as 32 POWERLINK AS panelboards are supported on one RS-485 network drop.
- Connections to an IBM-compatible personal computer are provided via a SY/LINK card, or via a COM port with an external RS-232/RS-422/485 converter kit.

Communications and Network Accessories

Description	Class	Catalog Number
SY/NET Local Area Network Interface Module (NIM)	8030	CRM510▲
SY/NET Multi-Media Network Interface Module (MNIM)	8030	CRM511▲
SY/NET NIM for Class 8005 Model 50 Programmable Controller	8030	CRM540▲
SY/NET Remote Network Interface Module (RNIM)	8030	CRM560▲
SY/NET Network Interface Module with Modbus Protocol	8030	CRM570▲
SY/NET POWERLOGIC/POWERLINK AS Network Interface Module (PNIM)	8030	CRM565▲
Single RS-232 to RS-422/485 Converter	3090	MCI101
Dual RS-232 to RS-422/485 Converter	8030	CRM601▲

▲ Device mounts in rack assembly register slot.

CRM565
POWERLOGIC NETWORK INTERFACE MODULE (PNIM)

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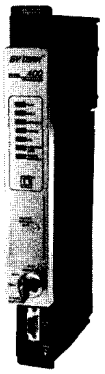
Programmable Controllers

Description	Class	Catalog Number ▲
SY/MAX® Model 400 – 4K RAM without floating point	8020	SCP401
SY/MAX Model 400 – 8K RAM with floating point	8020	SCP423
SY/MAX Model 400 – 16K RAM with floating point	8020	SCP424
SY/MAX Model 600 – 16K RAM	8020	SCP631
SY/MAX Model 650 – Ethernet Processor with 16K RAM	8055	SCP654

▲ Device mounts in rack assembly register slot.

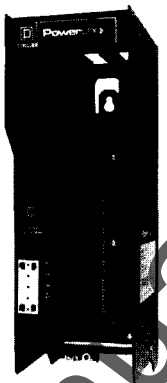


SCP423
SY/MAX MODEL 400
PROGRAMMABLE LOGIC CONTROLLER

Rack Assemblies, Power Supplies, and Accessories

Description	Class	Catalog Number
2-Slot Rack with Integral 120Vac/125Vdc Power Supply (for NIM Modules)	3090	SRK2 †
5-Slot Register Rack Assembly	8030	RRK100
9-Slot Register Rack Assembly	8030	RRK200
18-Slot Register Rack Assembly	8030	RRK300
Power Supply with 120Vac Incoming Power – 64 I/O Capacity	8030	PS11
Power Supply with 120Vac Incoming Power – 128 I/O Capacity	8030	PS21
Power Supply with 120Vac Incoming Power – 512 I/O Capacity	8030	PS31
Power Supply with 120Vdc Incoming Power – 128 I/O Capacity	8030	PS74
Power Supply Cable – 60" Long, P2 Connector	8030	CC20
Redundant Power Supply Cable	8030	CC51
Register Slot Cover Plate (for use in RRK Racks)	8030	CPB106

† 2-Slot rack does not provide battery backup or backplane communications.



SRK2
POWERLOGIC® 2-SLOT RACK
WITH INTEGRAL POWER SUPPLY

Digital and Analog I/O

Description	Class	Catalog Number ▲
120 Vac/Vdc Input Module – 16 Inputs	8030	RIM101
120 Vac Relay Output Module – 16 Outputs	8030	ROM221
240 Vac/125 Vdc Relay Output Module – 16 Outputs	8030	ROM271
Standard 4-Function Analog Input Module	8030	RIM121
Analog Input Module, 16 Inputs	8030	RIM125
Standard 4-Function Analog Output Module	8030	ROM121
Four-Channel Isolated Analog Output Module	8030	ROM122

▲ Device mounts in rack assembly register slot.

POWERLINK AS and POWERLOGIC use standard industrially proven communication architectures and protocols that are common to the Square D product family. Communication components, such as computer SY/LINK boards and POWERLOGIC Network Interface Modules (PNIMs) as well as PLCs used for automatic control are described in detail elsewhere. Literature is also available from the POWERLOGIC/POWERLINK Application Engineering Group in Smyrna, TN.

NOTE: For additional information on any of the following:

SY/MAX®	Programmable Controllers
SY/NET®	Communication Network
SY/MATE®	Software Support Products
SY/VIEW®	Operator Interface Family

Refer to the Square D Industrial Control Catalog #169, or consult your local Square D sales office.

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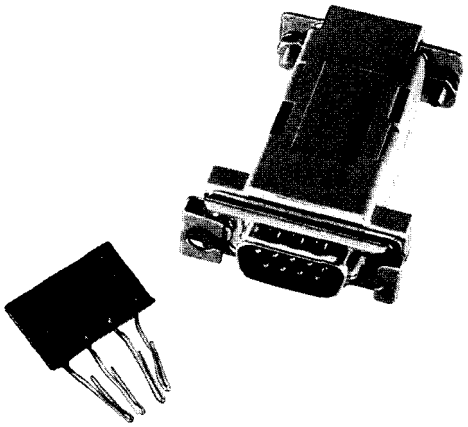
Communications Cables and Other System Accessories

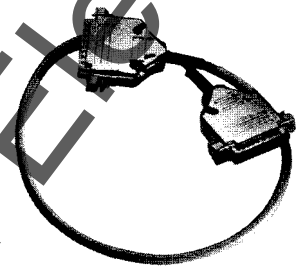
Description	Class	Catalog Number
10 Ft. 9-Pin Differential Cable	8010	CC100
30 Ft. 9-Pin Differential Cable	8010	CC101
2 Ft. 9-Pin Differential Cable	8010	CC102
Differential Cable Kit for Building Custom Length Cable	8010	CCK102
Communication Cable for Model 600/650 Processors – 1/2 Meter	8030	CC601
Communication Cable End Kit for Model 600/650 Processors	8030	CCK611
Communication Cable T-Connector for Model 600/650 Processors	8030	CCK612
Communication Cable Terminator for Model 600/650 Processors	8030	CCK613
SY/NET® Network Cable with Connectors – 2 Ft.	8030	CC201
SY/NET Network Cable with Connectors – 10 Ft.	8030	CC202
SY/NET Network Cable End (for Belden 9463 Cable)	8030	CCK211
SY/NET Network Tee Connector	8030	CCK212
SY/NET Network Terminator (set of two)	8030	CCK213
SY/NET Network Cable Extension (male to male)	8030	CCK214
Interconnect Cable – CRM601 to Modem	3090	CAB102
Interconnect Cable – RS-232 to RS-422/485 Converter to Modem	3090	CAB104
Interconnect Cable – 10 Ft. 9-Pin Differential with Loopbacks to Spade Lugs	3090	CAB107
Interconnect Cable – 2 Ft. 9-Pin female Differential with Loopbacks to Spade Lugs	3090	CAB108
POWERLINK AS Multipoint Communications Adapter	3090	MCA485
POWERLINK AS Multipoint Communications Terminator	3090	MCTAS485

CC202 SY/NET NETWORK CABLE, CCK212 TEE CONNECTOR, AND CCK214 CABLE EXTENSION

CAB-107 INTERCONNECT CABLE



MCA485 POWERLINK AS MULTIPOINT COMMUNICATIONS ADAPTER AND MCTAS485 TERMINATOR



CAB-104 INTERCONNECT CABLE

POWERLINK® AS
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COMMUNICATION RULES

In addition to proper installation, there are some general rules to follow to ensure efficient communication between POWERLINK AS panelboards and the host device (the device to which one or more POWERLINK AS panelboards are connected). These rules are listed below:

GENERAL RULES

1. The host device may communicate to *only one* POWERLINK AS panelboard at a time. For example, if POWERLINK AS panelboards are connected directly to a SY/MAX® processor, only one communication rung from the SY/MAX processor to a POWERLINK AS panelboard may be activated at a time. This rung should maintain continuity until the communication is completed. When POWERLINK AS panelboards are connected to a PNIM, the PNIM manages communications allowing only one message to be sent at a time.
2. The POWERLINK AS panelboard supports priority and non-priority READs, priority and non-priority WRITES, and Random Access READs only. (A random access READ is a non-priority operation which allows you to read non-contiguous groups of registers). In most cases, non-priority READs and WRITEs should be used.
3. The POWERLINK AS panel will only *respond* to communications from the host. It can not *initiate* any communications.
4. A POWERLINK AS multipoint communications terminator (3090 MCTAS485) must be placed on the last POWERLINK AS panel on a chain. The MCTAS485 is also required when a single AS panel is connected to a communications channel.
5. A POWERLOGIC® multipoint communications adapter (3090 MCA485) must be attached to the host device to which POWERLINK AS panelboards are connected.
6. When multiple POWERLINK AS panels are connected to a single communications channel, each panel must have a unique address in the range 01..32.
7. When POWERLINK AS panels are connected to a PNIM, the PNIM *cannot* have the same address as any POWERLINK AS panel. For example, a PNIM addressed as 20 may not have a POWERLINK AS panel connected to it whose address is 20.
8. There must be one (and only one) POWERLINK AS panel whose device address is set to 01. This should be the last panel on the link.
9. When a single POWERLINK AS panel is connected to a communication channel, its device address should be set to 01. The MCA485 must be used.
10. Up to 32 POWERLINK AS panels can be daisy-chained to a single communications port. (See Appendix A for distance limitations).
11. For additional information, on network communications, refer to the Communications Reference for POWERLOGIC Circuit Monitors, Bulletin 63210-203-01.

TERMINATION AND BIAS OF COMMUNICATION LINES

To ensure accurate communications, steps must be taken to properly terminate and bias the RS-485 communication lines. The following paragraphs detail the necessary steps.

Termination of the RS-485 communication lines is achieved with the use of the POWERLINK AS multipoint communications terminator (Catalog No. 3090 MCTAS485). The terminator has four "flying leads" which are connected to the IN+, IN-, OUT+, and OUT- communication terminals on the RS-485 COMMS port on the power interface module. See Figure 4.

IMPORTANT: *The last POWERLINK AS panel in a communications link must be terminated.* For example, if a link contains only a single POWERLINK AS panelboard, that panel must have a terminator. If multiple POWERLINK AS panelboards are daisy-chained together, only the *last* POWERLINK AS panelboard in the link should be terminated. Figure 4 illustrates the proper placement of the terminator.

The RS-485 communication lines are biased with the use of the POWERLOGIC multipoint communications adapter (Catalog No. 3090 MCA485). The 9-pin, male to female adapter is attached to the host device to which POWERLINK AS panelboards are daisy-chained. Possible connection points include: the RS-422 port of a SY/LINK® card, the top RS-422 communications port of a POWERLOGIC network interface module (PNIM), and connection to an RS-232 to RS-422/RS-485 converter as described in Section 3.3 of Bulletin 63210-200-01, POWERLOGIC Planning and Installation Guide. Figure 5 illustrates the adapter connected to a communications port of a SY/LINK board.

IMPORTANT: The communications terminator, and the communications adapter are required even when only one POWERLINK AS panelboard is on a link, to properly bias the communication line.

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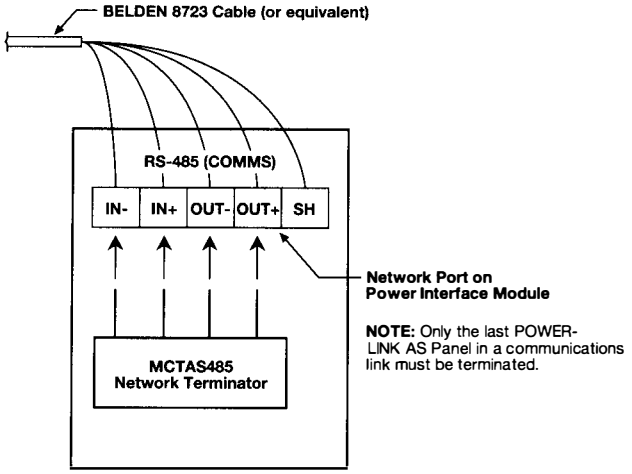
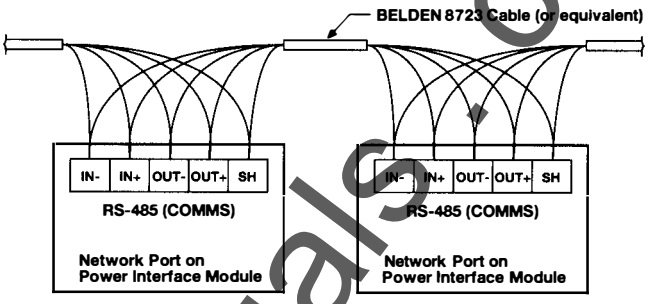


NOTE: Only the last POWERLINK AS Panel in a communications link must be terminated.

FIGURE 4-MULTIPOINT COMMUNICATIONS TERMINATOR



IMPORTANT: The communications shield is terminated at *each* POWERLINK AS Panel.

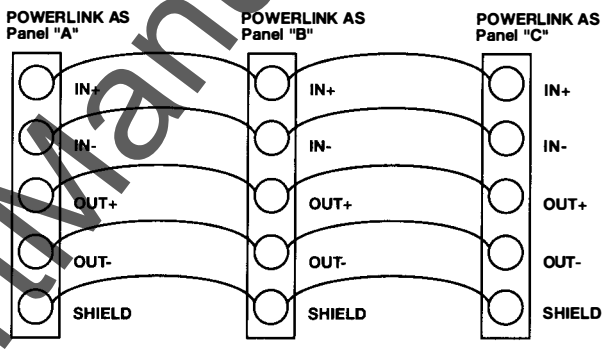
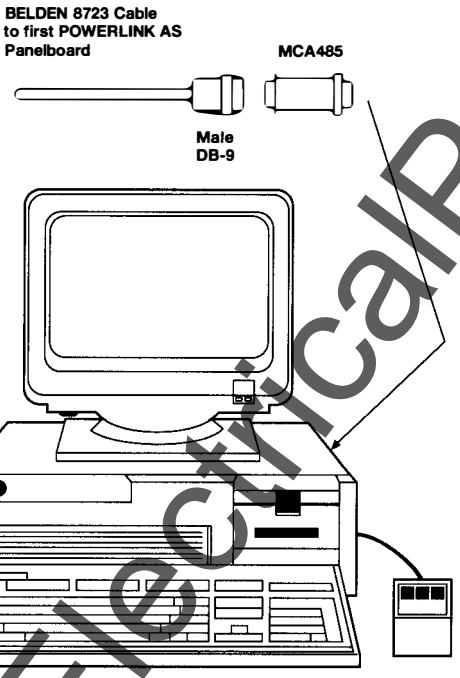


FIGURE 6-CORRECT POWERLINK AS PANEL COMMUNICATIONS WIRING



Connect MCA485 to the 1) RS-422 port of a SY/LINK board in PC
or 2) RS-422 port of a PNIM
or 3) RS-422 port of a RS-232/ RS-485 converter

NOTE: The Multipoint Communications Adapter must be attached to the host device to which POWERLINK AS Panelboards are connected.

FIGURE 5-MULTIPOINT COMMUNICATIONS ADAPTER

COMMUNICATION WIRING

POWERLINK AS panels require a communication cable containing two twisted pairs with shield, (Belden 8723, or equivalent). Communications wires are daisy-chained from one POWERLINK AS panel to the next, IN+ being wired to IN+, OUT- to OUT-, Shield to Shield, and etc. Figure 6 illustrates *correct* communications wiring. Figure 7 shows an *incorrect* wiring method, and POWERLINK AS panels should never be wired in this manner. Doing so will cause unbalanced impedance in the communications lines resulting in corruption of data.

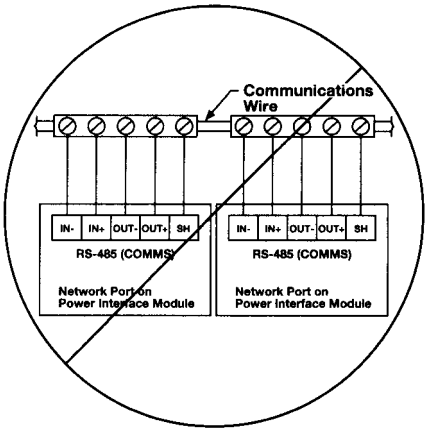


FIGURE 7-INCORRECT COMMUNICATIONS WIRING

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
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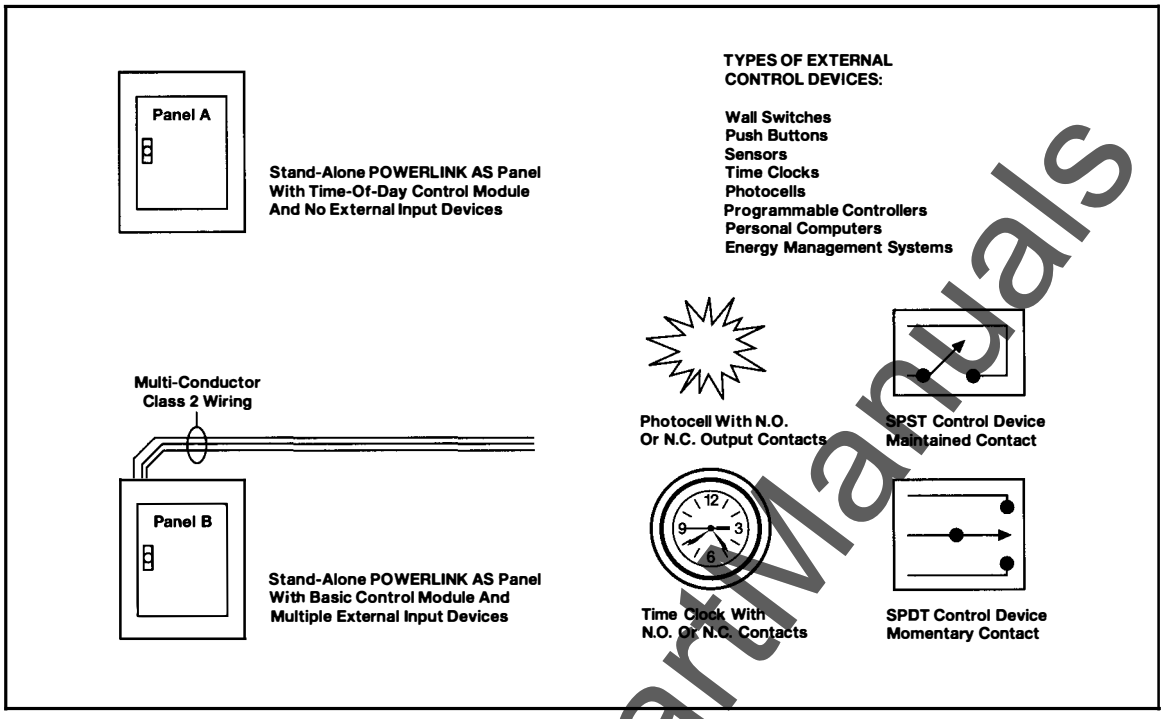
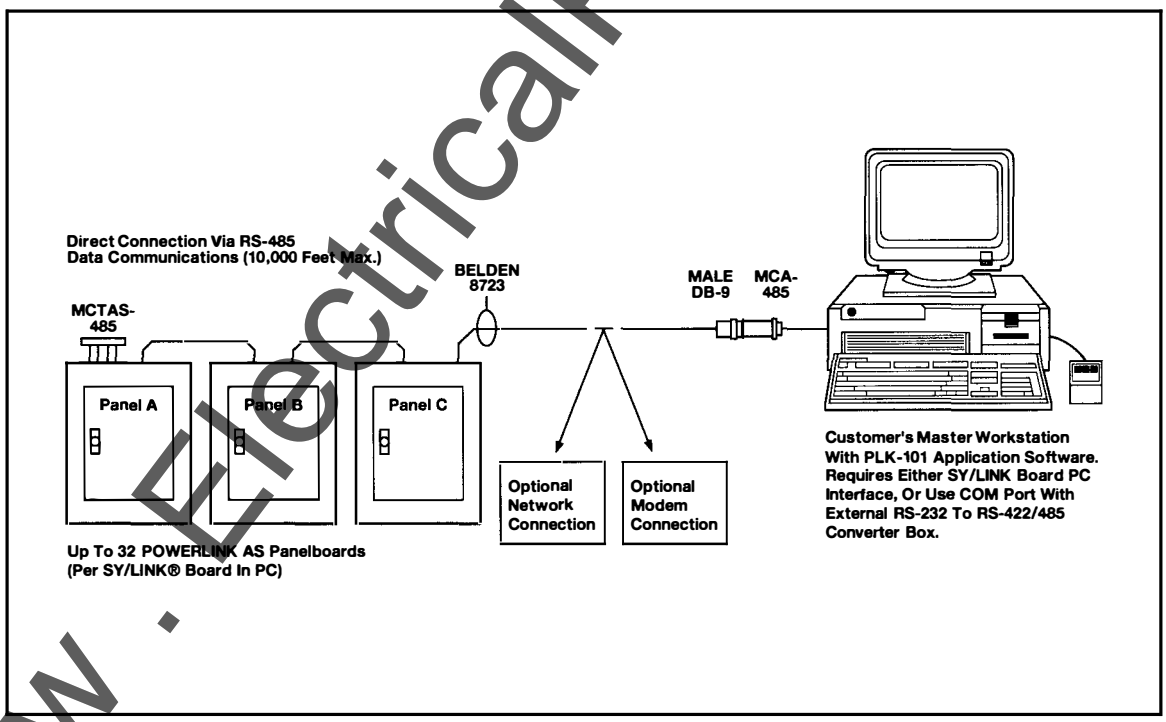


POWERLINK AS SYSTEM 1
BASIC REMOTE CONTROL



POWERLINK AS SYSTEM 2
BASIC AND NETWORK REMOTE CONTROL

POWERLINK® AS
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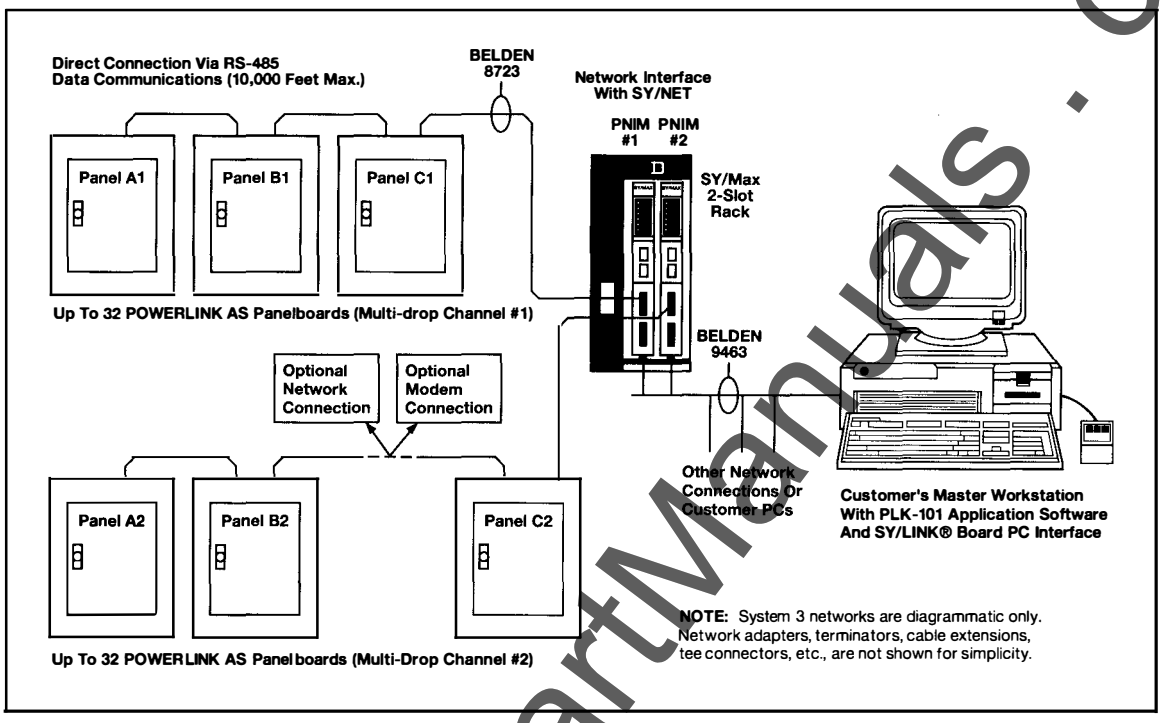
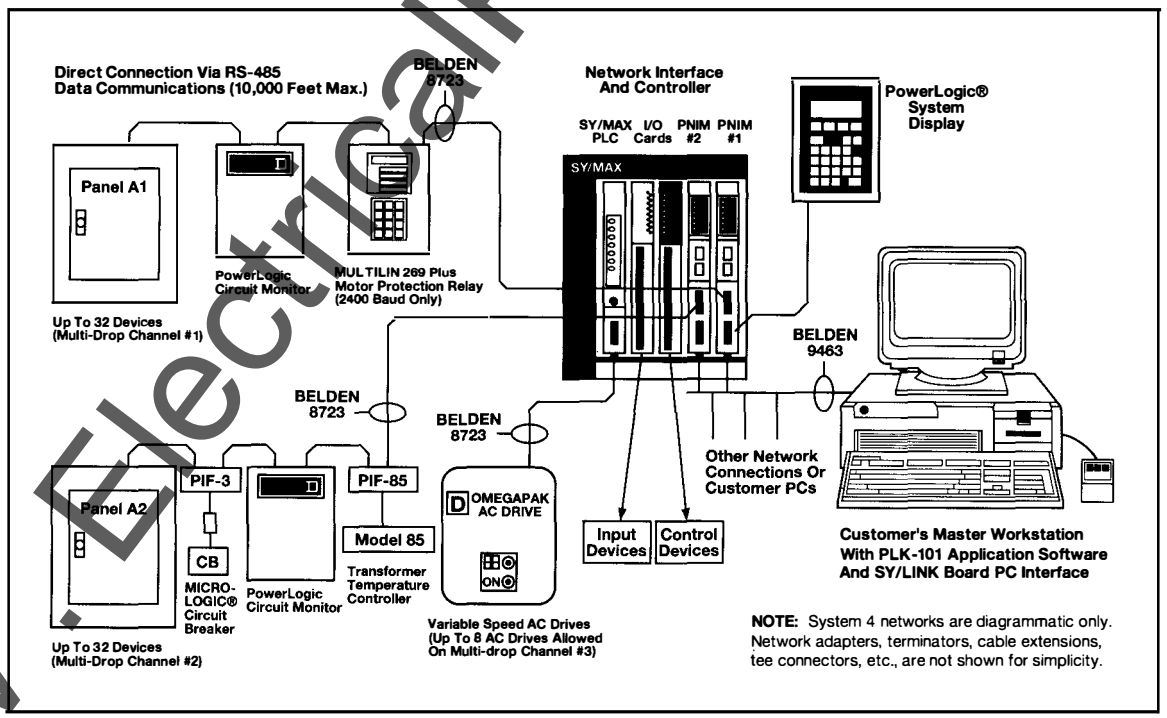


POWERLINK AS SYSTEM 3
LOCAL AREA NETWORK REMOTE CONTROL



POWERLINK AS/POWERLOGIC SYSTEM 4
AUTOMATED REMOTE MONITORING AND CONTROL

POWERLINK® AS
REMOTE POWER SWITCHING SYSTEM
SOFTWARE AND NETWORK CONFIGURATIONS

COM PORT APPLICATION ISSUES

When PLK101 is configured to communicate through a serial communications port (COM port), there are several application issues that must be addressed. This section covers the issues involved in COM port communications.

Use of SY/MAX® Protocol

When configured for the COM port mode, PLK101 communicates via the SY/MAX protocol. This affects the configuration in the following ways:

1. If the personal computer is connected to an NIM or PNIM, the NIM or PNIM port to which the computer is connected must be configured for the SY/MAX mode. If the personal computer is connected to a PNIM, it must be connected to the PNIM's *bottom* RS-422 port (port 1). The PNIM's *top* RS-422 port cannot be configured for the SY/MAX mode. Figure 8 illustrates these points.
2. If the personal computer is connected to a NIM or PNIM via a modem connection, the NIM or PNIM port must still be configured for the SY/MAX mode. Figure 9 illustrates this point.

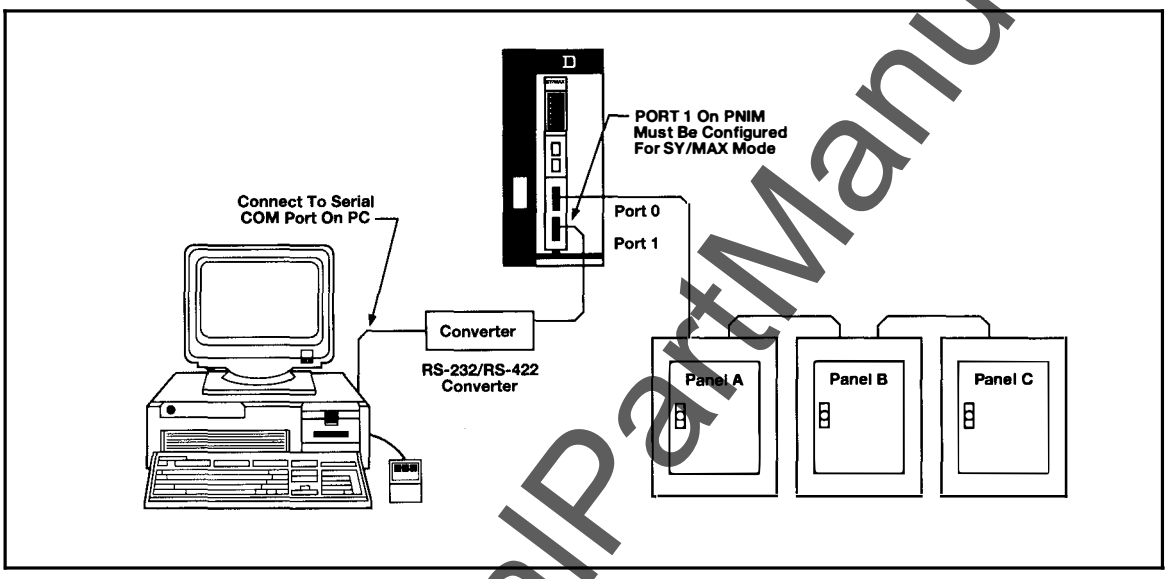


FIGURE 8 – PNIM CONFIGURATION WITH RS-232/RS-422 CONVERTER

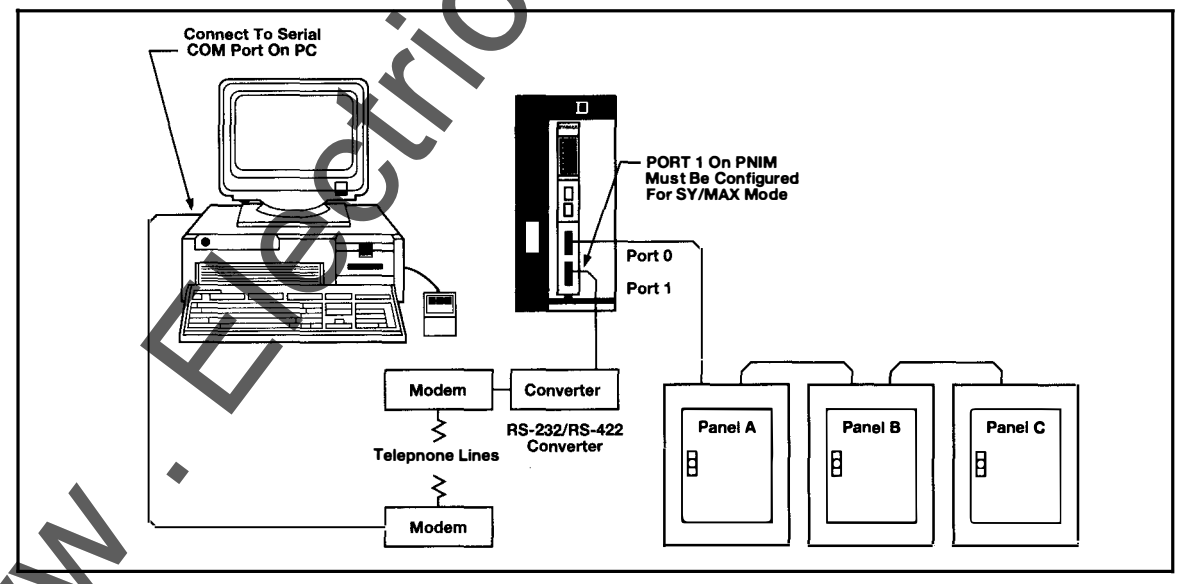


FIGURE 9 – PNIM CONFIGURATION WITH RS-232/RS-422 CONVERTER AND TELEPHONE MODEM

Requirements for Using COM3 or COM4 Parts

If possible, PLK101 should be configured to COM1 or COM2. If COM1 and COM2 are unavailable, PLK101 can be configured to use COM3 or COM4. The sections below describe special requirements for using COM3 and COM4.

Interrupt Requirements

If PLK101 is installed on an IBM® Micro Channel computer, there are no special interrupt requirements and this section does not apply. If PLK101 is installed on any other computer and COM3 or COM4 ports must be used, then the following guidelines apply.

COM3 and COM4 must be set up to use the following interrupts:

- COM3, IRQ = 4
- COM4, IRQ = 3

If COM3 is not set up to use IRQ4, PLK101 will not recognize COM3. Likewise, if COM4 is not set up to use IRQ3, PLK101 will not recognize COM4.

Since COM1 and COM3 both use the interrupt IRQ4, COM1 and COM3 cannot be used at the same time. For example, PLK101 will not run if a mouse is on COM1 and PLK101 is on COM3. However, a modem can be on COM2 with PLK101 on COM4 as long as the modem is not used while PLK101 is running. Also, a serial printer can be on COM1 with PLK101 on COM3 and logging to the printer will still be possible since printing and communications don't occur at the same exact time.

Changing the COM port I/O Address

If PLK101 is installed on an IBM Micro Channel computer, the COM port I/O does not need to be changed and this section does not apply. If PLK101 is installed on any other computer and the I/O address for COM3 or COM4 ports must be changed, then the following guidelines apply.

PLK101 uses the following default I/O addresses for COM3 and COM4:

- COM3, I/O Address = 3E8 (hexadecimal)
- COM4, I/O Address = 2E8 (hexadecimal)

These are standard, hexadecimal I/O addresses for COM3 and COM4. If the COM3 or COM4 hardware uses a different I/O address, the I/O address used by PLK101 must be changed. To change the I/O address that PLK101 uses for COM3 or COM4, the following steps must be completed:

1. Using a text editor, open the PLK101.CFG file. (The PLK101.CFG file is a file created by PLK101. It contains important setup data and is stored in the same directory as the PLK101 program.)
2. To change the I/O address for COM3, find the line "COM3 = 3E8". Change the hexadecimal value 3E8 to match the COM3 I/O address.
3. To change the I/O address for COM4, find the line "COM4 = 2E8". Change the hexadecimal value 2E8 to match the COM4 I/O address.
4. Save the changes made to the PLK101.CFG file. When PLK101 is started, it will now use the new addresses specified in the PLK101.CFG file.

Special Address Requirements

When PLK101 is set up for the COM port mode, and the COM port is connected to a NIM or PNIM, the personal computer address must match the Nim or PNIM address. For example, if the COM port is connected to a NIM whose address is 20, then the personal computer address must be set to 20. Refer to the *POWERLINK AS System Software* instruction bulletin for additional information.

APPENDIX A

MAXIMUM DISTANCES FOR POWERLINK AS PANELBOARD COMMUNICATIONS

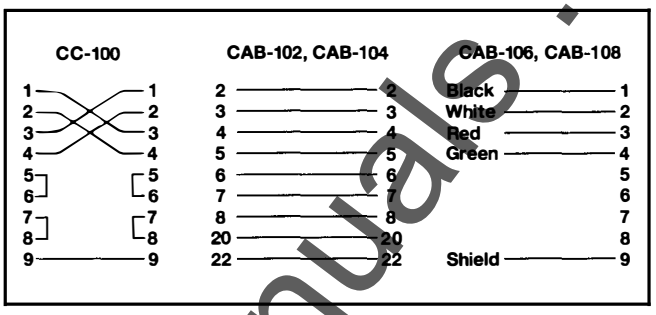
The POWERLINK AS Panel's RS-485 communications allow a maximum of 32 POWERLINK AS panels to be connected to a host communication port. For example, up to 32 POWERLINK AS panels may be connected to the top RS-422 communications port of a POWERLOGIC Network Interface Module (PNIM). When 1 to 16 panels are connected to a single communications port, the entire length of the communications link (i.e. the distance from the COM port to the last POWERLINK AS panel in the chain) may be up to 10,000 feet. When more than 16 panels are connected to a single communications port, the maximum length of the communications link becomes shorter. This is necessary to ensure accurate communications at high rates of speed (up to 19,200 baud). Table 7 shows the maximum distances recommended at varying baud rates.

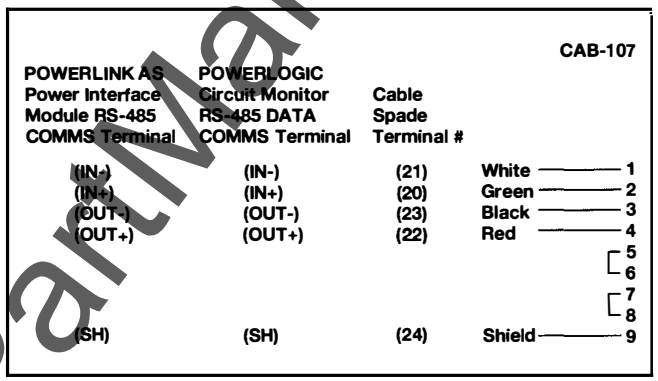
TABLE 7
Distance Limitations for
POWERLINK AS RS-485 Communications

Baud Rate	Maximum Distances	
	Number of Panelboards	
	16	17-32
1200	10,000	10,000
2400	10,000	5,000
4800	10,000	5,000
9600	10,000	4,000
19200	10,000	2,500

APPENDIX B

COMMUNICATION CABLE PINOUTS





APPENDIX C

This section contains various guide-form schedules for design, layout, and programming of POWERLINK AS panelboards. These schedules make reference to all necessary information required for panelboard configuration and programming.

POWERLINK® AS Global Setup

_____ (panel number)

_____ (network address)

System Response		Selection	Default
Interface Location		1-49 (odd numbers only)	1
Flash Outputs		0-15 minutes	0
Sequence Delay		0.25, 0.5, 1, 5, 15, 30, 60 seconds	0.25
No controller present		ALL ON, NO CHANGE, ALL OFF	ALL ON
Communications			
Front Panel Baud Rate		1200, 2400, 4800, 9600, 19200	9600
Network Baud Rate		1200, 2400, 4800, 9600, 19200	9600
Network Address		0 to 32 (0 = point to point)	1
Sunrise/Sunset			
Sunrise Time (today)		Hours, Minutes	6:00am
Latitude		0 to 90 degrees (+/-)	40
Sunrise Offset		0 to 60 minutes (+/-)	0
Sunset Offset		0 to 60 minutes (+/-)	0
Circuit Breakers		1 to 42	

POWERLINK® AS Panel Wiring Schedule (3-Phase)

Panelboard _____ Voltage _____ Phase 3 Wire ____ Network Address _____

Panel Type _____ Mains _____ Mains Rating _____ AIC Rating _____

NEMA Type Enclosure _____ Mounting _____ Options _____ Interface Module Location _____

Ckt. No.	Zone	Load Description	Brkr. Size ▲	Breaker Options	Conduit Wire	kW	Phase	kW	Conduit Wire	Breaker Options	Brkr. Size ▲	Load Description	Zone	Ckt. No.
1							A							2■
3							B							4■
5							C							6■
7							A							8
9							B							10
11							C							12
13							A							14
15							B							16
17							C							18
19							A							20
21							B							22
23							C							24
25							A							26
27							B							28
29							C							30
31							A							32
33							B							34
35							C							36
37							A							38
39							B							40
41							C							42
43							A							44
45							B							46
47							C							48
49		Not Available				—	A	—				Not Available		50
51		Not Available				—	B	—				Not Available		52
53		Not Available				—	C	—				Not Available		54

Notes

■ Power interface module occupies 6 pole spaces.

▲ All circuit breakers to be 20-Amp, 1-Pole unless otherwise noted.

Totals: ∅A ____kw ∅B ____kw ◆ ∅C ____kw Total ____kw

Breaker Options:

AS - POWERLINK AS Breaker
ST - Shunt Trip Type
AUX - Auxiliary Contacts
LO - Handle lock-off device
PA - Handle Padlock Attachment
GFCI - Ground Fault Circuit Interrupter

POWERLINK® AS Panel Wiring Schedule (1-Phase)

Panelboard _____ Voltage _____ Phase 1 Wire _____ Network Address _____

Panel Type _____ Mains _____ Mains Rating _____ AIC Rating _____

NEMA Type Enclosure _____ Mounting _____ Options _____ Interface Module Location _____

Ckt. No.	Zone	Load Description	Brkr. Size ▲	Breaker Options	Conduit Wire	kW	Phase	kW	Conduit Wire	Breaker Options	Brkr. Size ▲	Load Description	Zone	Ckt. No.
1							A							2■
3							B							4■
5							A							6■
7							B							8
9							A							10
11							B							12
13							A							14
15							B							16
17							A							18
19							B							20
21							A							22
23							B							24
25							A							26
27							B							28
29							A							30
31							B							32
33							A							34
35							B							36
37							A							38
39							B							40
41							A							42
43							B							44
45							A							46
47							B							48
49		Not Available				—	A	—				Not Available		50
51		Not Available				—	B	—				Not Available		52
53		Not Available				—	A	—				Not Available		54

Notes

■ Power interface module occupies 6 pole spaces.

▲ All circuit breakers to be 20-Amp, 1-Pole unless otherwise noted.

Totals: ØA _____ kw ØB _____ kw Total _____ kw

Breaker Options:

AS - POWERLINK AS Breaker
ST - Shunt Trip Type
AUX - Auxiliary Contacts
LO - Handle lock-off device
PA - Handle Padlock Attachment
GFCI - Ground Fault Circuit Interrupter

POWERLINK® AS Time Schedule

_____
(panel number)

_____
(network address)

Time Program	Description	Days/ Holidays	Time of Event	Open/ Close	Zone(s)	Circuit(s)	Flash Notice

Notes

Refer to Holiday schedule for holiday/special period schedules.
Flash notice applies only to a scheduled "OFF" event

POWERLINK® AS Input Schedule

____
(panel number)

____
(network address)

Input Number	Input Type	Input Description	Open/ Close	Zone(s)	Circuit(s)	Time Override	Flash Notice

Notes

Flash notice applies only to inputs with timed overrides

POWERLINK® AS Holiday/Special Event Schedule

_____
(panel number)

_____
(network address)

Holiday Period	Starting Date	Ending Date
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
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