SMART

PowerLine Coordinator™ v2

The PowerLine Coordinator™ v2 is a rugged and reliable communication device that serves as an intermediary between the SmartValve™ v1.04 devices and the PowerLine Gateway™. It is responsible for managing the fiber-optic link and communication with the PowerLine Gateway for control and status reporting. The communication with PowerLine Gateway is via a proprietary and secure authenticated protocol. The PowerLine Coordinator v2 is a robust and reliable communication device that acts on behalf of PowerLine Gateway to:

- Establish a proprietary/authenticated communication link with the SmartValves
- Commission the SmartValves
- Aggregate data and control of multiple SmartValves
- Cache and reliably transfer a firmware image to the SmartValves as part of the Smart Wires' proprietary firmware upgrade protocol

The PowerLine Coordinator v2 is an important component of the Smart Wires End-to-End (E2E) Communication and Control System that enables the utility to seamlessly commission, observe, control, and maintain the overall SmartValve System.



Front and Rear View of the PowerLine Coordinator v2

POWERLINE COORDINATOR 1 -PWLC1

PowerLine Coordinator v2

Dimensions





Features

General

- Compliant with applicable FCC and RED requirements for the North American, European, and Australian markets
- Support of multiple fiber optic types for short-range and long-range transmission
- Redundant set fibers
- SFP-based Ethernet redundant uplinks/downlinks to PowerLine Gateway and SmartValves
- Remote firmware upload support via PowerLine Gateway and SmartInterface™

Reliability

- Rugged hardware for substation environment
- No fans or other moving parts
- Supports device and communication redundancy
- Power supply redundancy
- Redundant Ethernet ports

Scalability and Upgradability

- Accommodates a range of DC voltage inputs
- Supports field-deployment of new features via firmware updates

Security

- Packet authentication using HMAC-SHA256 message authentication code
- Supports security on both upstream and downstream communication links
- Authentication process with the PowerLine Gateway based on IEEE 802.11 four-way handshake
- Entire network is time-synchronized with the PowerLine Gateway. The PowerLine Gateway can be synced to a utility time server if needed.

Location

The figure below shows the location of the PowerLine Coordinator v2 relative to the other components of the SmartValve System. The PowerLine Coordinator v2 is typically installed in a substation control house with a fiber-optic channel to communicate with the SmartValves.



Layout of the Components of the SmartValve System

Technical Specifications

Configuration and Management			
Commissioning User Interface	Configuration via the SmartInterface utility via direct connection or over a secure network	Maintenance	SmartInterface through the PowerLine Gateway
Security and Redundancy			
Communication Security	Multilevel protocol optimized for fast telemetry. Protocol uses keyed SHA 256 HMACs to ensure cryptographic integrity of all messages while supporting full observability by utility firewalls	Internal Redundancy	Redundancy on communication ports including redundant fibers and Ethernet ports
Device Security	Tamper detection switch with alarms	System Redundancy	Redundant PowerLine Coordinator v2 supported
Certifications & Approvals			
Emissions (EMC)	Compliant to relevant FCC and RED standards	Material Compliance	RoHS2
ESD	Covered under RED testing		
Input Power ⁽¹⁾⁽²⁾⁽³⁾⁽⁴⁾			
DC Variant (P115442)	40 - 160 VDC	Input Power Requirement	25 W
Communication Interfaces			
Ethernet	6x 1000 Mbps electrical/optical Ethernet ports (selectable by SFP module) with auto MDIX capability	Serial	2x RS232 ports with hardware flow control 2x RS485 full-duplex ports
Connection between PowerLine Coordinators	Single connection over fiber or copper SFP to complete the ring communication with SmartValves. Communication done over 1000BASE-SX gigabit Ethernet standard.	Fiber Connection to the SmartValves	Three fiber connections to the SmartValves, one per phase

Connection between PowerLine Coordinator and PowerLine Gateway	Single connection over fiber or copper SFP. Communication done over 1000BASE-SX gigabit Ethernet standard.		
Physical			
Cooling	Rugged fan-less design	Mounting	Standard 19-inch rack-mount (2U)
Mass	13.5 lbs. (6.15 kg)	Dimensions	18.94 in. x 3.47 in. x 13.98 in. (481 mm x 88.1 mm x 355 mm) See above drawing
LED Status Indications – Front Panel	Power x2; Comms. x1; Time Sync. x1; System Health x1		
Communication Link Details			
Communication Connections	Three LC connectors for communi- cation with SmartValves. Communi- cation with other PowerLine Coordi- nator and PowerLine Gateway maybe over fiber or copper Ethernet.	Fiber Optic Details	LC connectors with 50/125 µm multi-mode fiber at 800 nm wavelength (770- 860). Communication over 1000BASE-SX gigabit Ether- net standard.
Environmental			
Storage Temperature	0 °F to +185 °F (-17.7 °C to +85 °C)	Operating Temperature	0 °F to +122 °F (-17.7 °C to +50 °C)
Relative Humidity	5 % to 95 % RH, non-condensing	Altitude	Up to 6,561 ft. (2,000 m)
Diagnostic Monitoring	On-board sensors for board temperature and humidity		
SmartValve Compatibility			
Capacity	Communicates with up to 50 SmartValve v1.04 devices of any type		

Notes:

1. Specified at the time of order.

2. All PowerLine Coordinators have redundant power supplies.

3. The PowerLine Coordinator uses screw terminals for DC power connections.

4. Other input types and voltage ranges can be developed upon request.



About Smart Wires

Smart Wires is the world's leading grid enhancing technology and services provider. We quickly solve bottlenecks and grid issues to create extra capacity and provide advice on solutions critical to creating the digital grid. Headquartered in Research Triangle Park, North Carolina, Smart Wires has a global workforce of visionary, tenacious, industry-leading experts spread across four continents. Together we are paving the way to energy certainty on a global scale. Working with our customers, industry partners, policymakers, and regulators, we are transforming the grid to economically deliver net zero.

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