EcoStruxure™

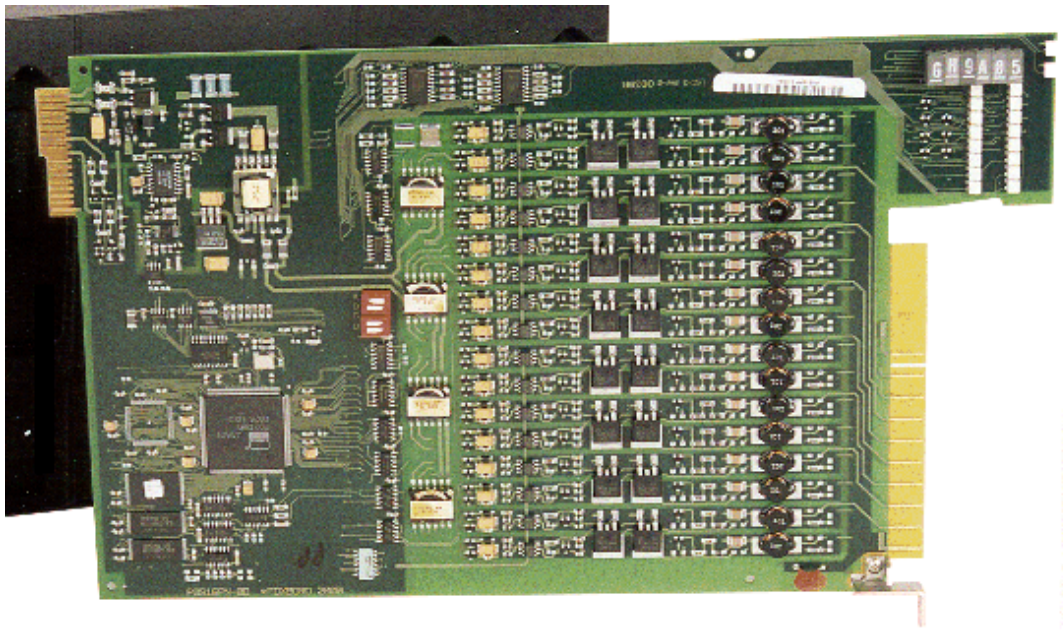
Foxboro™ DCS

Fieldbus Modules for Westinghouse® Process Control WDPF® I and II Systems

PSS 41H-3MIGWDPF

Product Specification

May 2019



Schneider Electric™

www.schneider-electric.com

Legal Information

Overview

The EcoStruxure™ Foxboro™ DCS Control Processors and Foxboro DCS Fieldbus Modules (FBMs) replace the Westinghouse WDPF® I or II Controllers and Q-Cards, respectively, and connect existing field devices to Foxboro DCS.

The Foxboro DCS FBM family provides a migration path from Westinghouse WDPF I and II System process input and output (I/O) components to Foxboro DCS display and supervisory functions. This can save significant cost over total system replacement by preserving the existing process interface and wiring and minimizing process downtime.

No additional communication devices are required. No multi-vendor communication software licensing is required. The Foxboro DCS FBM family replaces the Westinghouse WDPF I/O Q-Cards. Once integrated, the process is controlled entirely by the advanced Foxboro DCS algorithm set.

The Foxboro DCS FBMs provide access to all process signals connected to the Westinghouse system by providing the connection between the Field Termination Assemblies (FTAs) and Foxboro DCS. All process signals become fully integrated into Foxboro DCS. Process data is used for: operator display, history, alarming, control.

Operator functions and engineering configuration is accomplished by Foxboro DCS. This migration path provides plant operations with all the power and flexibility of Foxboro DCS. All process values can be used plant wide for control, display, history, alarming and information management from a single vendor source.

Features

- FBMs plug directly into an existing Q-Crate to replace process input and output modules
- Migration from proprietary DCS to a state-of-the-art open Foxboro DCS
- Advanced Foxboro DCS with a single point of configuration
- More direct control performance than any gateway device can offer
- Single vendor service and supply

Fundamental Principle

Foxboro believes that it is only acceptable to interface with competing manufacturers' operating systems in two ways:

- Through high level public gateways
- At the lowest level, directly to field devices, without communicating with proprietary buses or components

The Foxboro migration product offerings adhere to this principle.

Product Descriptions

The Foxboro DCS migration strategy replaces the WDPF Distributed Process Unit (DPU) with an Foxboro DCS control processor and provides a card-for-card replacement of I/O modules, but leaves the original process interface wiring and cabinets in place.

New Foxboro DCS FBMs plug directly into existing Q-Crates in place of Westinghouse I/O Q-Cards. Q-Cards are removed from the Q-Crate and their termination assemblies detached. Each unit is replaced by a corresponding Foxboro DCS FBM. The original I/O card termination units mounted on the front of the I/O cards are reused. The original termination assembly, including the undisturbed process wiring connections, is reattached to the new FBM. Alternately, edge connectors can be used for cables to the field terminations in a remote I/O subsystem or in an adjacent expansion cabinet. All I/O wiring connected to the I/O card termination units remains in place. This provides original I/O functionality of the process inputs and outputs.

The FBMs pass process measurement, output signals, and digital I/O signals to and from a Foxboro DCS control processor. I/O from the subsystem is connected to the control strategy using standard Foxboro DCS I/O type blocks. All process signals are fully integrated into the Foxboro DCS, allowing direct Foxboro DCS monitoring and control of the process.

Westinghouse WPDF I and II Subsystems

The DPU assembly may optionally be removed from the cabinet and replaced with a baseplate containing single or redundant FCPs. The I/O card power supplies and Q-Crates are retained in the cabinet. If installing the EcoStruxure Foxboro DCS FCP280 in the DPU cabinet, single or redundant 24 V dc power supplies must be installed in the cabinet.

The Foxboro DCS FCP280 can be located in a nearby existing enclosure or Foxboro DCS enclosure and the fieldbus extended to connect the modules to the Q-Crates.

Migration with FCP280 and FBMs

The Field Control Processor 280 (FCP280) is a distributed, field-mounted controller module that supports up to 128 FBMs (depending on selected scan periods). The FCP280 connects to the EcoStruxure™ Foxboro™ DCS Control Network via optionally redundant 100 Mbps Ethernet fiber optic cables and Ethernet fiber switches. The FCP280 is an optionally fault-tolerant controller that communicates with connected FBMs to perform data acquisition and control using Foxboro DCS control algorithms.

The FCP280 mounts in a Modular Baseplate that supports a single module or a fault-tolerant module pair. A single/redundant FCP280 requires 24 V dc power from single/redundant power supplies.

For more information on the FCP280, refer to PSS 41H-1FCP280.

Q-Card I/O

The FBMs provide advanced 200 Series FBM technology on a Q-Card form factor. Each module plugs into the slot used by the replaced Q-Card and provides a front edge connector for the field termination connector or the cable connection to the field terminations in a separate cabinet.

The following I/O card types are used in the system:

- Analog input card
- Analog output card
- Analog input and output card
- Digital input card
- Digital output card

Each card type is replaced with an equivalent Foxboro DCS FBM card. All I/O wiring connected to the I/O card termination panels remain in place. Power is derived from the original cabinet 13 V dc power supply.

Table 1. Optional Analog Input Modules

Part No.	Module	Description	Replaces
P0918JP	WAH01A	8 AI	QAH-G01
P0918JR	WAH01B	8 AI	QAH-G02
P0918JT	WAH01C	8 AI	QAH-G03
P0918JV	WAH01D	8 AI	QAH-G04
P0918KE	WAI01A	4 AI	QAI-G04
P0918KG	WAI01B	4 AI	QAI-G05
P0918KJ	WAI01C	4 AI	QAI-G06
P0918KM	WAI01D	4 AI	QAI-G07
P0918JY	WAI02A	4 TC or ±100 mV Inputs	QAI-G01 QAI-G02 QAI-G03 QAI-G08
P0918LP	WAV02A	6 TC or ±100 mV Inputs On-board RTD	QAV-G01 through QAV-G09
P0918LW	WAW01A	6 AI	QAW-G01
P0918LY	WAW01B	6 AI	QAW-G02
P0918MA	WAW01C	6 AI	QAW-G03
P0918MD	WAW01D	6 AI	QAW-G04
P0918MF	WAW01E	6 AI	QAW-G05
P0918MH	WAW01F	6 AI	QAW-G06
P0918MT	WAX01A	12 AI	QAX-G04
P0918MV	WAX01B	12 AI	QAX-G05
P0918MX	WAX01C	12 AI	QAX-G06

Table 1. Optional Analog Input Modules (Continued)

P0918ML	WAX02A	12 TC, or ±100 mV Inputs	QAX-G01 QAX-G02 QAX-G03
P0918TG	WRF03A	6 AI (4-wire RTD)	QRF-G01 QRF-G03
P0918TK	WRF03B	6 AI (4-wire RTD)	QRF-G02 QRF-G04
P0918TR	WRT03A	4 AI (3-wire RTD)	QRF-G01
P0918TT	WRT03B	4 AI (3-wire RTD)	QRF-G02

Table 2. Optional Analog Output Modules

Part No.	Module	Description	Replaces
P0918KX	WAO37A	4 AO	QAO-G01
P0918LA	WAO37B	4 AO	QAO-G02
P0918LC	WAO37C	4 AO	QAO-G03
P0918LE	WAO37D	4 AO	QAO-G04
P0918LG	WAO37E	4 AO	QAO-G05
P0918LJ	WAO37F	4 AO	QAO-G06 QAO-G08
P0918LL	WAO37G	4 AO	QAO-G07

Table 3. Optional Analog Input and Analog Output Modules

Part No.	Module	Description	Replaces
P0918SQ	WLJ04A	3 AI, 1 AO	QLJ-G01
P0918SS	WLJ04B	3 AI, 1 AO	QLJ-G02
P0918SU	WLJ04C	3 AI, 1 AO	QLJ-G03

Table 4. Optional Digital Input Modules

Part No.	Module	Description	Replaces
P0918PT	WCI07A	16 DI	QCI-G01 QCI-G02 QSE-G01 QSE-G02
P0918PZ	WDI07A	16 DI	QDI-G01
P0918QC	WDI07B	16 DI	QDI-G03
P0918QE	WDI07C	16 DI	QDI-G05
P0918QH	WDI07D	16 DI	QDI-G07
P0918QK	WDI07E	16 DI	QDI-G08

Table 4. Optional Digital Input Modules (Continued)

			QDI-G09
P0918NA	WID07A	16 DI	QID-G01 QBI-G01
P0918ND	WID07B	8 DI	QID-G02 QDI-G02
P0918NG	WID07C	16 DI	QID-G03 QBI-G04 QBI-G10
P0918NJ	WID07D	8 DI	QID-G04 QDI-G04
P0918NL	WID07E	16 DI	QID-G05 QBI-G05 QBI-G06
P0918NN	WID07F	8 DI	QID-G06 QDI-G06
P0918NQ	WID07G	16 DI	QID-G07 QBI-G07 QBI-G08
P0918NS	WID07H	16 DI	QID-G08 QBI-G02
P0918NU	WID07I	16 DI	QID-G09 QBI-G03 QBI-G09
P0918NX	WID07J	16 DI	QID-G10 QDI-G10
P0918NZ	WID07K	8 DI	QID-G11 QDI-G11
P0918PB	WID07L	16 DI	QBI-G11 QID-G12
P0918PE	WID07M	8 DI	QID-G13
P0918PH	WID07N	16 DI	QID-G14
P0918PK	WID07O	8 DI	QID-G15
P0918PM	WID07P	16 DI	QID-G16
P0918SX	WPA06A	4 Pulse Inputs	QPA-G04

Table 5. Optional Digital Output Modules

Part No.	Module	Description	Replaces
P0918PQ	WBO09A	16 DO	QBO-G01 QBO-G02
P0918HZ	WBO09B	16 DO	QBO-G03 QBO-G04 QBO-G05
P0918TN	WRO09A	8 DO	QRO-G01 QRO-G02
P0918RK	WRO09B	8 DO	QRO-G03 QRO-G04
P0922BQ	WRO09C	8 DO	QRO-G01
P0922DR	WRO09D	8 DO	QRO-G03
P0918UH	WTO09	8 DO	QTO-G01

WFCM10E (Communication Module) Functional Specifications

Description	The WFCM10E Fieldbus Communications Module is a communications interface which allows the FBMs to communicate with Foxboro DCS control stations through the high speed, optionally redundant Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 7 W (maximum) at 13 V dc • Heat Dissipation: 7 W (maximum) at 13 V dc
Power Monitoring	Primary and backup rack power sources are monitored and alarmed at the system level if either voltage drops below acceptable levels.
Calibration Requirements	Calibration of the module is not required.

WFCM10EF (Communication Module) Functional Specifications

Description	The WFCM10EF Fieldbus Communications Module is a fiber optic communications interface which allows the FBMs to communicate with the Foxboro DCS control station over extended distances using fiber optic cabling.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 7 W (maximum) at 13 V dc • Heat Dissipation: 7 W (maximum) at 13 V dc
Power Monitoring	Primary and backup rack power sources are monitored and alarmed at the system level if either voltage drops below acceptable levels.
Calibration Requirements	Calibration of the module is not required.

WAH01 Series (Analog Input) Functional Specifications

Description	The WAH01 Series consists of differential voltage input interface modules that contain eight group-isolated unipolar and bipolar input channels, with each channel accepting a 2-wire analog input voltage.
Input	Analog Input Accuracy • *Accuracy (includes linearity)*: ±0.03% of span • *Accuracy Temperature Coefficient*: ±50 ppm/°C
Communication	The module communicates with its associated FCM via the local Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 2.5 W (maximum) at 13 V dc • Heat Dissipation: 2.5 W (maximum) at 13 V dc
Calibration Requirements	Calibration of the module is not required.
Input Signal A/D Conversion	Multiplexer converter shared by all channels.
Input Conversion Time (Software Configurable)	Input signal conversion time specifications for the WAH01 Series modules are listed in *Table 7. WAH01 Conversion*.
Settling Time	Defined as the value settling within a 1% band of steady state for 10 to 90% input step change.
Common Mode Input Range	±5 V dc or ac peak channel-to-channel maximum.
Channel Isolation	Each channel has a differential input to allow voltage differences between channels without introducing errors. The channels are not galvanically isolated from each other, but are galvanically isolated from ground and module logic. Differential group isolated inputs use the FBM subsystem power supply for field power. The module withstands, without damage, a potential of 600 V ac applied for one minute between the differential isolated channels and ground. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** This does not imply that these channels are intended for permanent connection to hazardous voltage circuits. Connection of these channels to voltages greater than 30 V ac or 60 V dc violates electrical safety code requirements and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 6. WAH01 Modules, Signal Ranges, and Q-Card Equivalents

Module	Signal Range	Q-Card
WAH01A	-10.24 to +10.24 V dc	QAH-G01
WAH01B	-5.12 to +5.12 V dc	QAH-G02
WAH01C	0 to 10.24 V dc	QAH-G03
WAH01D	0 to 5.12 V dc	QAH-G04

Table 7. WAH01 Conversion

Conversion Time	Update Time	Settling Time	Resolution
50 ms	100 ms	50 ms	15 bits
100 ms	100 ms	125 ms	15 bits
200 ms	100 ms	200 ms	15 bits
500 ms	100 ms	500 ms	15 bits
1000 ms	100 ms	1000 ms	15 bits

WAI02A (Thermocouple Input) Module Functional Specifications

Description	The WAI02A is a channel-isolated thermocouple/mV input interface that contains four isolated thermocouple input channels.
Input	Four isolated and independent thermocouple/mV input channels. Inputs are preset to read thermocouple inputs. The range of each individual channel can be re-configured to read ±100 mV.
Input Range	WAI02A input ranges are listed in *Table 8. WAI02A Input Ranges*.
Reference Junction	WAI02A uses external thermocouple temperature compensation provided by Westinghouse “B” Cabinet mounted RTDs that are connected to WRT03 Series modules. The user must determine the RTD type used in the “B” Cabinet to properly configure the WRT03 Series inputs. The WRT03 Series input is used as an external reference for the AIN blocks connected to the thermocouple input channels.
Accuracy	• *Millivolt Input:* ±0.03% of span (±27 µV) at 25°C • *Thermocouple Conformity:* ±0.25°C • *Accuracy Temperature Coefficient:* ±50 ppm/°C
Differential Input Impedance	10 MΩ
Common Mode Voltage	Up to 30 V ac or 60 V dc
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 3 W (maximum) • Heat Dissipation: 3 W (maximum)
Communication	The module communicates with its associated FCM via the local Fieldbus.
Input Conversion Time (Software Configurable)	Input signal conversion time specifications for the WAI02A Series modules are listed in *Table 9. WAI02A Conversion*.
Settling Time	Defined as the value settling within a 1% band of steady state for 10 to 90% input step change.
Input Open Circuit Voltage	2.5 V dc (mV channels)
Typical Thermocouple Types	B, E, J, K, N, R, S, T, and other millivolt signals.
Input Signal A/D Conversion	Multiplexer converter shared by all channels.

Calibration Requirements	Calibration of the module is not required.
Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground, or between a given channel and any other channel. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** This does not imply that these channels are intended for permanent connection to hazardous voltage circuits. Connection of these channels to voltages greater than 30 V ac or 60 V dc violates electrical safety code requirements and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 8. WAI02A Input Ranges

TC Full Range	–10.5 mV dc to +71.42 mV dc (0 to 65535 raw counts)
TC Normal Range	–10.5 mV dc to +69.5 mV dc (0 to 64000 raw counts)
mV Full Range	–105.12 mV dc to +105.12 mV dc (0 to 65535 raw counts)
mV Normal Range	–100 mV dc to +100 mV dc (1600 to 64000 raw counts)

Table 9. WAI02A Conversion

Conversion Time	Update Time	Settling Time	Resolution
50 ms	100 ms	50 ms	15 bits
100 ms	100 ms	125 ms	15 bits
200 ms	100 ms	200 ms	15 bits
500 ms	100 ms	500 ms	15 bits
1000 ms	100 ms	1000 ms	15 bits

WAI01 Series (Analog Input) Module Functional Specifications

Description	The channel-isolated WAI01 Series input interface modules contain four isolated input channels. Each channel accepts a 2-wire analog input voltage or 4 to 20 mA input depending upon the model type. The inputs are galvanically isolated from other channels and ground.
Input	Four individually isolated and independent channels. The WAI01 Series modules, their signal ranges and the Q-Card equivalents are listed in *Table 10. WAI01 Modules, Signal Ranges, and Q-Card Equivalents*.
Accuracy	• *Accuracy (includes linearity)*: ±0.03% of span • *Accuracy Temperature Coefficient*: ±50 ppm/°C
Communication	The module communicates with its associated FCM via the local Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 3 W (maximum) at 13 V dc • Heat Dissipation: 3 W (maximum) at 13 V dc
Calibration Requirements	Calibration of the module is not required.
Input Signal A/D Conversion	Each channel performs A/D signal conversion using an independent Sigma-Delta converter.
Input Conversion Time (Software Configurable)	Input signal conversion time specifications for the WAI01 Series modules are listed in *Table 11. WAI01 Conversion*.
Settling Time	Defined as the value settling within a 1% band of steady state for 10 to 90% input step change.
Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground, or between a given channel and any other channel. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** This does not imply that these channels are intended for permanent connection to hazardous voltage circuits. Connection of these channels to voltages greater than 30 V ac or 60 V dc violates electrical safety code requirements and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 10. WAI01 Modules, Signal Ranges, and Q-Card Equivalents

Module	Signal Range	Q-Card
WAI01A	–512 to +512 mV dc	QAI-G04
WAI01B	–1.02 to +1.02 V dc	QAI-G05
WAI01C	–10.24 to +10.24 V dc	QAI-G06
WAI01D	0 to 20.48 mA	QAI-G07

Table 11. WAI01 Conversion

Conversion Time	Update Time	Settling Time	Resolution
50 ms	100 ms	50 ms	15 bits
100 ms	100 ms	125 ms	15 bits
200 ms	100 ms	200 ms	15 bits
500 ms	100 ms	500 ms	15 bits
1000 ms	100 ms	1000 ms	15 bits

WAO37 Series (Analog Output) Module Functional Specifications

Description	The WAO37 Series are channel-isolated output interface modules with four 0 to 20 mA dc or four unipolar or bipolar analog output channels, dependent upon model type.
Output Channels	Four 20 mA dc or unipolar or bipolar analog output channels, except the WAO37F, which has only one channel. Each channel is isolated and independent. The seven modules in the series, their signal ranges, and the Q-Cards they replace are listed in *Table 12. WAO37 Modules, Signal Ranges, and Q-Card Equivalents*.
Communication	The module communicates with its associated FCM via the local Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: ◦ *WAO37A, WAO37F, WAO37G* 3.5 W (maximum) at 13 V dc ◦ *WOA37B, WAO37C, WAO37D* 7 W (maximum) at 13 V dc ◦ *WAO37E* 10 W (maximum) at 13 V dc • Heat Dissipation: 3.5 W (maximum) at 13 V dc
Calibration Requirements	Calibration of the module is not required.
Analog Accuracy	• *Accuracy (includes linearity)*: ±0.05% of span • *Accuracy Temperature Coefficient*: ±50 ppm/°C • *Output Processing Delay*: 30 ms maximum • *Resolution*: 13 bits
Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground, or between a given channel and any other channel. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** This does not imply that these channels are intended for permanent connection to hazardous voltage circuits. Connection of these channels to voltages greater than 30 V ac or 60 V dc violates electrical safety code requirements and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 12. WAO37 Modules, Signal Ranges, and Q-Card Equivalents

Module	Signal Range	Q-Card
WAO37A	0 to 20.48 mA, 0 to 1 K load, 40 V dc internal power	QAO-G01
WAO37B	0 to 10.24 V dc, 500 Ω load minimum	QAO-G02
WAO37C	–10.24 to +10.24 V dc, 500 Ω load minimum	QAO-G03
WAO37D	0 to 5.12 V dc, 500 Ω load minimum	QAO-G04
WAO37E	–5.12 to +5.12 V dc, 500 Ω load minimum	QAO-G05
WAO37F	–10.24 to +10.24 V dc, 500 Ω load minimum, single output	QAO-G06
WAO37G	0 to 20.48 mA, 0 to 1 K load, 40 V dc external power	QAO-G07

WAV02A (Thermocouple Input) Module Functional Specifications

Description	The WAV02A is a channel-isolated thermocouple/mV input interface that contains six isolated thermocouple input channels with on-card temperature compensation. Each thermocouple/mV channel accepts standard thermocouples for various temperature ranges, and provides thermocouple burnout detection (up-scale).
Input	Six isolated and independent thermocouple/mV input channels. Inputs are preset to read thermocouple inputs. The range of each individual channel can be reconfigured to read ±100 mV.
Input Range	WAV02A input ranges are listed in *Table 13. WAV02A Input Ranges*.
Reference Junction	WAV02A has an on-card thermocouple temperature compensation sensor that is mapped into channel 9 in the ECB. On-card thermocouple temperature compensation is only used when thermocouples are directly connected to the card edge termination assembly found typically in remote Q-Line termination cabinets. External thermocouple temperature compensation is provided by “B” Cabinet mounted RTDs that are connected to WRT03 Series modules (see WRT03 SERIES [RTD INPUT] MODULES FUNCTIONAL SPECIFICATIONS). You must determine the RTD type used in the “B” Cabinet to properly configure the WRT03 Series module inputs. The WRT03 Series module inputs are used as external references for the AIN blocks connected to the thermocouple input channels.
Accuracy	• *Millivolt Input:* ±0.03% of span (±27 µV) at 25°C • *Thermocouple Conformity:* ±0.25°C • *Accuracy Temperature Coefficient:* ±50 ppm/°C
Differential Input Impedance	10 MΩ
Common Mode Voltage	Up to 30 V ac or 60 V dc
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 2.5 W (maximum) at 13 V dc • Heat Dissipation: 2.5 W (maximum) at 13 V dc
Communication	The module communicates with its associated FCM via the local Fieldbus.
Input Conversion Time (Software Configurable)	Input signal conversion time specifications for the WAV02A modules are listed in *Table 14. WAV02A Conversion* .
Settling Time	Defined as the value settling within a 1% band of steady state for 10 to 90% input step change.
Input Open Circuit Voltage	2.5 V dc (mV channels)
Typical Thermocouple Types	B, E, J, K, N, R, S, T, and other millivolt signals.

Input Signal A/D Conversion	Each channel performs A/D signal conversion using an independent Sigma-Delta converter.
Calibration Requirements	Calibration of the module is not required.
Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground, or between a given channel and any other channel. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** This does not imply that these channels are intended for permanent connection to hazardous voltage circuits. Connection of these channels to voltages greater than 30 V ac or 60 V dc violates electrical safety code requirements and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 13. WAV02A Input Ranges

TC Full Range	–10.5 mV dc to +71.42 mV dc (0 to 65535 raw counts)
TC Normal Range	–10.5 mV dc to +69.5 mV dc (0 to 64000 raw counts)
mV Full Range	–105.12 mV dc to +105.12 mV dc (0 to 65535 raw counts)
mV Normal Range	–100 mV dc to +100 mV dc (1600 to 64000 raw counts)

Table 14. WAV02A Conversion

Conversion Time	Update Time	Settling Time	Resolution
50 ms	100 ms	50 ms	15 bits
100 ms	100 ms	125 ms	15 bits
200 ms	100 ms	200 ms	15 bits
500 ms	100 ms	500 ms	15 bits
1000 ms	100 ms	1000 ms	15 bits

WAW01 Series (Analog Input) Module Functional Specifications

Description	WAW01 Series voltage and current input interface modules contain six individually isolated unipolar input channels, each channel accepting a 2–wire analog input.
Input	Six individually isolated and independent channels. The modules, their signal ranges, and the Q-Cards they replace are listed in *Table 15. WAW01 Modules, Signal Ranges, and Q-Card Equivalents*.
Accuracy	• *Accuracy (includes linearity)*: ±0.03% of span • *Accuracy Temperature Coefficient*: ±50 ppm/°C
Communication	The module communicates with its associated FCM via the local Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: ◦ *WAW01A/B/C/D/F* 2.5 W (maximum) at 13 V dc ◦ *WAW01E* 7.5 W (maximum) at 13 V dc • Heat Dissipation: ◦ *WAW01A/B/C/D/F* 2.5 W (maximum) at 13 V dc ◦ *WAW01E* 7.5 W (maximum) at 13 V dc, transmitter power selected and inputs at maximum
Calibration Requirements	Calibration of the module is not required.
Input Signal A/D Conversion	Each channel performs A/D signal conversion using an independent Sigma-Delta converter.
Input Conversion Time (Software Configurable)	Input signal conversion time specifications for the WAW01 Series modules are listed in *Table 16. WAW01 Conversion*.

Settling Time	Defined as the value settling within a 1% band of steady state for 10 to 90% input step change.
Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground, or between a given channel and any other channel. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** This does not imply that these channels are intended for permanent connection to hazardous voltage circuits. Connection of these channels to voltages greater than 30 V ac or 60 V dc violates electrical safety code requirements and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 15. WAW01 Modules, Signal Ranges, and Q-Card Equivalents

Module	Signal Range	Q-Card
WAW01A	0 to 1.02 V dc, 1 K maximum source impedance	QAW-G01
WAW01B	0 to 5.12 V dc, 5 K maximum source impedance	QAW-G02
WAW01C	0 to 10.24 V dc, 10 K maximum source impedance	QAW-G03
WAW01D	0 to 20.48 mA requires external transducer power or self-powered transducer.	QAW-G04
WAW01E	0 to 20.48 mA (jumper-selectable and self-powered), 20 V dc minimum at 20 mA, current limit of 40 mA	QAW-G05
WAW01F	0 to 51.2 mA requires external transducer power or self-powered transducer.	QAW-G06

Table 16. WAW01 Conversion

Conversion Time	Update Time	Settling Time	Resolution
50 ms	100 ms	50 ms	15 bits
100 ms	100 ms	125 ms	15 bits
200 ms	100 ms	200 ms	15 bits
500 ms	100 ms	500 ms	15 bits

WAX01 Series (Analog Input) Module Functional Specifications

Description	The WAX01 Series modules are channel-isolated voltage input modules that contain 12 isolated unipolar voltage input channels. Each channel accepts a 2-wire voltage input. WAX01 Series modules have two sets of six individually isolated channels and two letterbugs.
Input	12 isolated and independent voltage input channels. The WAX01 Series modules, their signal ranges, and the Q-Cards they replace are listed in *Table 17. WAX01 Modules, Signal Ranges, and Q-Card Equivalents*.
Accuracy	• *Accuracy (includes linearity)*: ±0.03% of span • *Accuracy Temperature Coefficient*: ±50 ppm/°C
Communication	The module communicates with its associated FCM via the local Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 5 W (maximum) at 13 V dc • Heat Dissipation: 5 W (maximum) at 13 V dc
Calibration Requirements	Calibration of the module is not required.
Input Signal A/D Conversion	Each channel performs A/D signal conversion using an independent Sigma-Delta converter.
Input Conversion Time (Software Configurable)	Input signal conversion time specifications for the WAX01 Series modules are listed in *Table 18. WAX01 Conversion Table*.
Settling Time	Defined as the value settling within a 1% band of steady state for 10 to 90% input step change.
Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground, or between a given channel and any other channel. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** This does not imply that these channels are intended for permanent connection to hazardous voltage circuits. Connection of these channels to voltages greater than 30 V ac or 60 V dc violates electrical safety code requirements and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 17. WAX01 Modules, Signal Ranges, and Q-Card Equivalents

Module	Signal Range	Q-Card
WAX01A	0 to +1.02 V dc, 1 K maximum source impedance	QAX-G04
WAX01B	0 to +5.12 V dc, 5 K maximum source impedance	QAX-G05
WAX01C	0 to +10.24 V dc, 10 K maximum source impedance	QAX-G06

Table 18. WAX01 Conversion Table

Conversion Time	Update Time	Settling Time	Resolution
50 ms	100 ms	50 ms	15 bits
100 ms	100 ms	125 ms	15 bits
200 ms	100 ms	200 ms	15 bits
500 ms	100 ms	500 ms	15 bits
1000 ms	100 ms	1000 ms	15 bits

WAX02A (Thermocouple Input) Module Functional Specifications

Description	The WAX02A Series modules are channel-isolated voltage input modules that contain 12 isolated unipolar voltage input channels. Each channel accepts a two-wire voltage input. WAX02A Series modules have two sets of six individually isolated channels and two letterbugs.
Input	12 isolated and independent thermocouple/mV input channels. Inputs are preset to read thermocouple inputs. The range of each individual channel can be configured to read TC or ±100 mV.
Input Range	WAX02A input ranges are listed in *Table 19. WAX02A Input Ranges*.
Reference Junction	When the WAX02A is used to read thermocouples, channel 12 (channel 6 of the second set) is used to read the QAXT Terminal Block Temperature Sensor connected to point 12 on the input termination assembly. The input is read by using an AIN block connected to channel 12 and used as an external reference for the AIN blocks connected to the other 11 thermocouple input channels. In this configuration, the WAX02A card provides the QAXT card with 12 V dc power via the channel 12 shield. Supplying power to the QAXT is a jumper-selectable option. When the jumper is installed on WAX02A, a yellow LED on the WAX02A card edge indicates when power is being supplied to the terminal sensor. A replaceable fuse on the WAX02A helps protect the connection. The ground return is via the “B” Cabinet to “A” Cabinet ground connection. See *Table 20. WAX02A Channel 12 Input Ranges* for the range of the channel 12 input which is based on the Westinghouse card group being replaced.
Accuracy	• *Millivolt Input:* ±0.03% of span (±27 µV) at 25°C • *Thermocouple Conformity:* ±0.25°C • *Accuracy Temperature Coefficient:* ±50 ppm/°C
Differential Input Impedance	10 MΩ
Common Mode Voltage	Up to 30 V ac or 60 V dc
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 5 W (maximum) • Heat Dissipation: 5 W (maximum)
Communication	The module communicates with its associated FCM via the local Fieldbus.
Input Conversion Time (Software Configurable)	Input signal conversion time specifications for the WAX02A modules are listed in *Table 21. WAX02A Conversion*.
Settling Time	Defined as the value settling within a 1% band of steady state for 10 to 90% input step change.

Input Open Circuit Voltage	2.5 V dc (mV channels)
Typical Thermocouple Types	B, E, J, K, N, R, S, T, and other millivolt signals.
Input Signal A/D Conversion	Each channel performs A/D signal conversion using an independent Sigma-Delta converter.
Calibration Requirements	Calibration of the module is not required.
Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground, or between a given channel and any other channel. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** This does not imply that these channels are intended for permanent connection to hazardous voltage circuits. Connection of these channels to voltages greater than 30 V ac or 60 V dc violates electrical safety code requirements and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 19. WAX02A Input Ranges

TC Full Range	–10.5 mV dc to +71.42 mV dc (0 to 65535 raw counts)
TC Normal Range	–10.5 mV dc to +69.5 mV dc (0 to 64000 raw counts)
mV Full Range	–105.12 mV dc to +105.12 mV dc (0 to 65535 raw counts)
mV Normal Range	–100 mV dc to +100 mV dc (1600 to 64000 raw counts)

Table 20. WAX02A Channel 12 Input Ranges

G01	Scales to 0.2 mV/C for QAX-G01 cards, Standard half-shells. 0 mV at 0°C, 20 mV at 100°C
G02	Scales to 0.5 mV/C for QAX-G02 cards, Standard half-shells. 0 mV at 0°C, 50 mV at 100°C
G03	Scales to 1.0 mV/C for QAX-G03 cards, Standard half-shells. 0 mV at 0°C, 100 mV at 100°C

Table 21. WAX02A Conversion

Conversion Time	Update Time	Settling Time	Resolution
50 ms	100 ms	50 ms	15 bits
100 ms	100 ms	125 ms	15 bits
200 ms	100 ms	200 ms	15 bits
500 ms	100 ms	500 ms	15 bits
1000 ms	100 ms	1000 ms	15 bits

WBO09 Series (Discrete Output) Module Functional Specifications

Description	The WBO09 Series consists of channel-isolated discrete output interface modules that contain 16 discrete output channels which are sourced externally. The WBO09 Series modules include an output LED flash option. A 4-position rocker switch selects the rate and duty cycle at which the corresponding output LEDs on the front of the card flash.
Output Channels	16 isolated channels. The WBO09 Series modules, their signal ranges, and the Q-Cards they replace are listed in *Table 22. WBO09 Modules, Signal Ranges, and Q-Card Equivalents*.
Communication	The module communicates with its associated FCM via the local Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: ◦ *WBO09A* 3 W (maximum) at 13 V dc ◦ *WBO09B* 3 W (maximum) at 13 V dc • Heat Dissipation: ◦ *WBO09A* 14 W (maximum) at 13 V dc, all outputs on at maximum load current ◦ *WBO09B* 3 W (maximum) at 13 V dc, all outputs on at maximum load current
Calibration Requirements	Calibration of the module is not required.
Applied Voltage	• *WBO09A* 60 V dc (maximum) at 300 mA maximum load current • *WBO09B* 20 V dc (maximum) at 16 mA maximum load current
On-State Voltage Drop	• *WBO09A* 2 V (maximum) at 300 mA • *WBO09B* 0.5 V (maximum) at 16 mA
Off-State Leakage Current	• *WBO09A* 0.5 mA (maximum) • *WBO09B* 0.1 mA (maximum)

Inductive Loads	WBO09A module can handle inductive loads.
Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground, or between a given channel and any other channel. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** This does not imply that these channels are intended for permanent connection to hazardous voltage circuits. Connection of these channels to voltages greater than 30 V ac or 60 V dc violates electrical safety code requirements and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 22. WBO09 Modules, Signal Ranges, and Q-Card Equivalents

Module	Signal Range	Q-Cards
WBO09A	60 V dc maximum at 300 mA maximum	QBO-G01 and QBO-G02
WBO09B	20 V dc maximum at 16 mA maximum	QBO-G03, QBO-G04, and QBO-G05

WCI07A (Contact Input) Module Functional Specifications

Description	The WCI07A is a channel-isolated contact sense input interface module that functions as a 16-channel contact sensor. Each channel accepts a 2–wire input from a pair of contacts or solid-state switches. The 16 single-ended contact sensor inputs share a common 48 V dc on-board power supply and a common return line. The WCI07A is designed to replace the following Q-Cards: QCI-G01, QCI-G02, QSE-G01, and QSE-G02.
Input	16 single-ended independent contact input channels.
Communication	The module communicates with its associated FCM via the local Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 3.5 W (maximum) at 13 V dc • Heat Dissipation: 5 W (maximum) at 13 V dc all channels on at maximum load
Calibration Requirements	Calibration of the module is not required.
Filter/Debounce Time	Configurable (4, 8, 16, or 32 ms).
Loop Power Supply Protection	On-card 48 V dc power supply is current limited at each channel to 2.5 mA maximum.
Contact Sensor Function	• *Input Range (Each Channel)* Contact open (off) or closed (on) • *Open-Circuit Voltage* 48 V dc ±15% • *Short-Circuit Current* 2.5 mA (maximum) • *On-State Resistance* 1.0 kΩ (maximum) • *Off-State Resistance* 100 kΩ (minimum)
Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** The channel isolation statement does not imply that these channels are intended for permanent connection to voltages of these levels. Exceeding the limits for input voltages, as stated elsewhere in this specification, violates electrical safety codes and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

WDI07 Series (Digital Input) Module with External Supply Functional Specifications

Description	The WDI07 Series of channel-isolated input interface modules provide 16 channels of contact sensor input. Each channel accepts a 2-wire input from a pair of contacts or solid-state switches. Inputs include 5, 12, 24, 48, or 120 Volts.
Input	The WDI07 Series consists of seven 16-channel digital input interface cards that replace selected QDI Series digital input modules, as listed in *Table 23. WD107 Modules, Signal Ranges, and Q-Card Equivalents*.
Communication	The module communicates with its associated FCM via the local Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 2 W (maximum) at 13 V dc • Heat Dissipation: 2 W (maximum) at 13 V dc plus power dissipated at inputs. Refer to *Table 24. WDI07 Series Contact Sensor Function Specifications*.
Calibration Requirements	Calibration of the module is not required.
Filter/Debounce Time	Configurable (4, 8, 16, or 32 ms)
Loop Power Supply Protection	On-card 1.0 A replaceable fuse and an external 1.0 A fuse located between terminal block (“A”) and the half-shell extension (“B”) block.
Contact Sensor Function	*Table 24. WDI07 Series Contact Sensor Function Specifications* lists the specifications for the contact sensor functions of each model. • Field input voltages equal to or less than the maximum Off Input Voltage or current equal to or less than the maximum Off Input Current help guarantee input OFF state. • Field input voltages within the range of the On Input Voltage helps guarantee input ON state. • On Input Current gives the range of the input current for the specified On Input Voltage. Minimum On Input Current does not guarantee input ON state. • Contact open is OFF; contact closed is ON. • Power in front end is typical with all inputs on.
Channel Isolation	Each channel is optically isolated from ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** The channel isolation statement does not imply that these channels are intended for permanent connection to voltages of these levels. Exceeding the limits for input voltages, as stated elsewhere in this specification, violates electrical safety codes and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 23. WD107 Modules, Signal Ranges, and Q-Card Equivalents

Module	Signal Range	Q-Card
WDI07A	5 V dc	QDI-G01
WDI07B	24 V ac/dc	QDI-G03
WDI07C	48 V ac/dc	QDI-G05
WDI07D	120 V ac/dc	QDI-G07
WDI07E	12 V dc, logic oriented	QDI-G08

Table 24. WDI07 Series Contact Sensor Function Specifications

FBM	On/Off Voltage (V dc or V ac RMS)			On/Off Current (mA)		Front End Power (All Inputs On)
	Max. On	Min. On	Max. Off	Max. On	Min. On	
WDI07A	4 V dc	6 V dc	0.9 V dc	10 mA	15 mA	1.75 W
WDI07B	20 V ac/dc	30 V ac/dc	3 V ac/dc	10 mA	15 mA	2.75 W
WDI07C	40 V ac/dc	60 V ac/dc	9 V ac/dc	10 mA	15 mA	5.50 W
WDI07D	100 V ac/dc	150 V ac/dc	6 V ac/dc	10 mA	15 mA	23.00 W
WDI07E	10 V dc	15 V dc	2 V dc	10 mA	15 mA	2.00 W

WID07 Series (Digital Input) Module Functional Specifications

Description	The WID07 Series are channel-isolated contact input modules with an external supply. Each module functions as an 8-channel or 16-channel contact sensor. Each channel accepts a 2-wire input from a pair of contacts or solid-state switches. Eight-input modules are 2-wire differential. 16-input modules are single ended inputs which share a common return line. Inputs include 5, 12, 24, 48, 120, or 220 Volts.
Input	The WID07 Series includes sixteen 8-channel (differential 2-wire) and 16–channel (single-ended) digital input modules designed to replace selected QID, QDI, and QBI Series cards, as listed in *Table 25. WID07 Modules, Signal Formats, and Q-Card Equivalents*.
Communication	The module communicates with its associated FCM via the local Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 2 W (maximum) at 13 V dc • Heat Dissipation: 2 W (maximum) at 13 V dc plus power dissipated at inputs. Refer to *Table 26. WID07 Series Contact Sensor Function Specifications*.
Calibration Requirements	Calibration of the module is not required.
Filter/Debounce Time	Configurable (4, 8, 16, or 32 ms)
Loop Power Supply Protection	• 16 Channel Modules: On-card 1.0 A replaceable fuse and an external 1.0 A fuse located between terminal block (“A”) and the half-shell extension (“B”) block. The oncard and external fuse is 2.0 A for WID07N and WID07P. • 8 Channel Modules: An external 1.0 A fuse is required for contact wetting supply.

Contact Sensor Function	*Table 26. WID07 Series Contact Sensor Function Specifications* lists the specifications for the contact sensor functions of each model. • Field input voltages equal to or less than the maximum Off Input Voltage or current equal to or less than the maximum Off Input Current helps guarantee input OFF state. • Field input voltages within the range of the On Input Voltage helps guarantee input ON state. • ON Input Current gives the range of the input current for the specified ON Input Voltage. Minimum On Input Current does not guarantee input on state. • Contact open is OFF; contact closed is ON. • Power in front end is typical with all inputs on.
Channel Isolation	Each channel is optically isolated from ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** The channel isolation statement does not imply that these channels are intended for permanent connection to voltages of these levels. Exceeding the limits for input voltages, as stated elsewhere in this specification, violates electrical safety codes and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 25. WID07 Modules, Signal Formats, and Q-Card Equivalents

Module	Channel	Signal Format	Q-Cards
WID07A	16	5 V ac/dc	QID-G01, QBI-G01
WID07B	8	24 V ac/dc	QID-G02, QBI-G02
WID07C	16	24 V ac/dc	QID-G03, QBI-G04, QBI-G10
WID07D	8	48 V ac/dc	QID-G04, QDI-G04
WID07E	16	48 V ac/dc	QID-G05, QBI-G05, QBI-G06
WID07F	8	120 V ac/dc	QID-G06, QDI-G06
WID07G	16	120 V ac/dc	QID-G07, QBI-G07, QBI-G08
WID07H	16	12 V dc, logic oriented	QID-G08, QBI-G02
WID07I	16	12 V ac/dc	QID-G09, QBI-G03, QBI-G09
WID07J	16	48 V dc, pulse	QID-G10
WID07K	8	120 V ac, high threshold	QID-G11, QDI-G11

Table 25. WID07 Modules, Signal Formats, and Q-Card Equivalents (Continued)

WID07L	16	120 V ac, high threshold	QID-G12, QBI-G11
WID07M	8	220 V ac	QID-G13
WID07N	16	220 V ac	QID-G14
WID07O	8	220 V dc	QID-G15
WID07P	16	220 V ac, high threshold	QID-G16

Table 26. WID07 Series Contact Sensor Function Specifications

FBM	On/Off Voltage (V dc or V ac RMS)			On/Off Current (mA)			Front End Power (All Inputs On)
	Max. On	Min. On	Max. Off	Max. On	Min. On	Off	
WID07A	2.4 V dc	7 V dc	0.9 V dc	2 mA	10 mA	0.5 mA	0.75 W
WID07B	20 V ac/ dc	30 V	7 V	2 mA	10 mA	3.0 mA	1.50 W
WID07-C	20 V ac/ dc	30 V	7 V	5 mA	10 mA	3.0 mA	2.75 W
WID07-D	40 V ac/ dc	60 V	17 V	7 mA	12 mA	5.0 mA	2.75 W
WID07E	40 V ac/ dc	40 V ac/ dc	17 V ac/ dc	7 mA	12 mA	5.0 mA	5.50 W
WID07F	100 V ac/dc	150 V ac/dc	40 V ac/ dc	6 mA	10 mA	3.8 mA	7.25 W
WID07-G	100 V ac/dc	150 V ac/dc	40 V ac/ dc	6 mA	10 mA	3.8 mA	14.25 W
WID07-H	10 V dc	15 V dc	3 V dc	5 mA	10 mA	2.0 mA	1.75 W
WID07I	10 V ac/ dc	15 V ac/ dc	3 V ac/ dc	5 mA	10 mA	2.0 mA	1.75 W
WID07J	40 V dc	60 V dc	24 V dc	7mA	12 mA	5.0 mA	5.50 W
WID07K	95 V ac	150 V ac	60 V ac	16 mA	27 mA	8.4 mA	11.75 W
WID07L	95 V ac	150 V ac	60 V ac	6 mA	27 mA	8.4 mA	23.50 W
WID07-M	190 V ac	264 V ac	120V ac	30 mA	43 mA	11.4 mA	23.75 W
WID07-N	190 V ac	264 V ac	120 V ac	30 mA	43 mA	11.4 mA	47.25 W
WI-D07O	180 V dc	264V dc	110 V dc	6 mA	10 mA	3.8 mA	12.50 W
WID07P	180 V dc	264 V dc	110 V dc	6 mA	10 mA	3.8 mA	23.55 W

WLJ04 Series (Analog I/O) Module Functional Specifications

Description	The WLJ04 Series Modules contains three analog inputs (channels 1 through 3) for field signals, one analog input (channel 4) for output readback and one analog output (channel 5). Each field input channel accepts an analog sensor input such as a 4 to 20 mA transmitter, a self-powered 20 mA transmitter or voltage source. The readback input channel 4 reads the output value to enable the user to validate the desired output. The output channel drives an external load and produces a 0 to 20 mA output or a 0 to 10 V dc output.
External Power Requirements	WLJ04 Series cards may require an external 24 V dc power supply to the card edge I/O connector to power input transmitters if so configured. The Q-Crate delivers 13 V dc at the rear edge pin connectors to power the on-card processor and communications.
I/O Channel Configurations	The WLJ04 Series offers three combination cards to replace the QLJ Series. Each FBM provides three analog inputs and one analog output with readback. Table 27 lists the modules in the series, their signal ranges and the Q-Cards they replace.
Analog Input Accuracy	• Accuracy (Includes Linearity): ±0.03% of span (all four input channels) • Accuracy Temperature Coefficient: ±50 ppm/°C
Input Conversion Time (Software Configurable)	Input signal conversion time specifications for the WLJ04 Series are listed in *Table 28. WLJ04 Conversion*.
Settling Time	Defined as the value settling within a 1% band of steady state for 10 to 90% input step change.
Analog Output Accuracy	• Accuracy (Includes Linearity): ±0.05% of span • Accuracy Temperature Coefficient: ±50 ppm/°C
Analog Output Processing Delay	30 ms maximum
Analog Output Resolution	13 bits
Communication	The module communicates with its associated FCM via the local Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 5 W (maximum) at 13 V dc • Heat Dissipation: 5 W (maximum) at 13 V dc

Calibration Requirements	Calibration of the module is not required.
Channel Isolation	Each field connected analog channel is galvanically isolated from ground and the other field connected channels. The output read-back channel is not isolated from the output channel. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** The channel isolation statement does not imply that these channels are intended for permanent connection to voltages of these levels. Exceeding the limits for input voltages, as stated elsewhere in this specification, violates electrical safety codes and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 27. WLJ04 Modules, Signal Ranges and Q-Card Equivalents

Module	Input and Readback Signal	Output Signal	Q-Card
WLJ04A	0 to 10.24 V dc, 10 K maximum source impedance	0 to 10.24 V dc, 500 W load minimum	QLJ-G01
WLJ04B	0 to 5.12 V dc, 5 K maximum source impedance	0 to 10.24 V dc, 500 W load minimum	QLJ-G02
WLJ04C	0 to 20.48 mA externally powered	4 to 20.48 mA, 0 to 850 W load maximum, self-powered	QLJ-G03

Table 28. WLJ04 Conversion

Conversion Time	Update Time	Settling Time	Resolution
50 ms	100 ms	50 ms	15 bits
100 ms	100 ms	125 ms	15 bits
200 ms	100 ms	200 ms	15 bits
500 ms	100 ms	500 ms	15 bits
1000 ms	100 ms	1000 ms	15 bits

WPA06A (Pulse Accumulator) Module Functional Specifications

Description	The WPA06A channel-isolated pulse input interface module contains four configurable channels that accept a pulse input with a maximum rate of 25 kHz. Input devices include vortex and turbine meters, solid state or electromechanical contacts and other sensors with similar pulse outputs. The WPA06A FBM replaces the QPA-G04 card.
Input	WLJ04 Series cards may require an external 24 V dc power supply to the card edge I/O connector to power input transmitters if so configured. The Q-Crate delivers 13 V dc at the rear edge pin connectors to power the on-card processor and communications.
Accuracy	Pulse Count: No missing pulses
Pulse Rate	0.01% of reading, independent of rate
Input Pulse Characteristics	Pulse Input Ranges (Each Channel): • Minimum On Voltage: 40 V dc • Maximum On Voltage: 60 V dc • Maximum Off Voltage: 2 V dc • Maximum Off Current: 0.35 mA • Nominal On Current: 3.35 mA at 48 V dc, 0.35 mA at 60 V dc **Notes**: • Field input voltages equal to or less than the maximum Off Input Voltage or current equal to or less than the maximum Off Input Current helps guarantee input OFF state. Field input voltages within the range of the On Input Voltage help guarantee input ON state. • On Input Current gives the range of the input current for the specified on Input Voltage. Minimum On Input Current does not guarantee input ON state. • Contact open is Off; contact closed is On.
Input Duty Cycle (Each Channel)	• Duty Cycle: 10 to 90% • Minimum Pulse Width ON/OFF: 4 µs • Input Resistance: 10 kΩ
Communication	The module communicates with its associated FCM via the local Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 3 W (maximum) at 13 V dc • Heat Dissipation: 3 W (maximum) at 13 V dc
Calibration Requirements	The module is self-calibrating.
Loop Power Supply Protection	The channel is channel-to-logic and channel-to-channel galvanically isolated, current limited, and voltage regulated.

Field Device Cabling Distance	Maximum distance of the field device from the FBM is a function of compliance voltage, wire gauge, and voltage drop at the field device.
Channel Isolation	Each channel is optically isolated from logic. The module withstands, without damage, a potential of 600 V ac applied for one minute between channel and ground. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** The channel isolation statement does not imply that these channels are intended for permanent connection to voltages of these levels. Exceeding the limits for input voltages, as stated elsewhere in this specification, violates electrical safety codes and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

WRF03 Series (RTD Input) Module Functional Specifications

Description	The WRF03 Series modules are channel-isolated platinum/nickel RTD input interfaces that contain six resistance temperature detector input channels. Each channel accepts a 4-wire RTD sensor input, within a 0 to 200 Ω resistance range or 0 to 100 Ω resistance range dependent upon module type. The WRF03A is a 0 to 640 Ω input module that replaces the QRF-G01 and G03 Series RTD input cards. The WRF03B is a 0 to 320 Ω input module that replaces the QRF-G02 and G04 Series RTD input cards.
Input	4 isolated and independent channels.
Input Range (Each Channel)	• WRF03A: 200 Platinum, 0 to 640 Ω, 0°C to 370°C • WRF03B: 100 Platinum, 0 to 320 Ω, 0°C to 290°C
Sensor Current	• WRF03A: 0.098 mA dc • WRF03B: 0.197 mA dc
Input Accuracy	• Accuracy (Includes Linearity): ±0.03% of span • Accuracy Temperature Coefficient: ±50 ppm/°C
Communication	The module communicates with its associated FCM via the local Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 3 W (maximum) at 13 V dc • Heat Dissipation: 3 W (maximum) at 13 V dc
Calibration Requirements	Calibration of the module is not required.
Input Signal A/D Conversion	Each channel performs A/D signal conversion using an independent Sigma-Delta converter.
Input Conversion Time (Software Configurable)	Input signal conversion time specifications for the WRF03 Series are listed in *Table 29. WRF03 Conversion*.
Settling Time	Defined as the value settling within a 1% band of steady state for 10 to 90% input step change.
Typical Resistance Temperature Sensors	• WRF03A: 200 Platinum, 0°C to 370° C • WRF03B: 100 Platinum, 0°C to 290° C

Input Signal	Supports 4-wire variable resistance temperature sensors.
Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground, or between a given channel and any other channel. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** The channel isolation statement does not imply that these channels are intended for permanent connection to voltages of these levels. Exceeding the limits for input voltages, as stated elsewhere in this specification, violates electrical safety codes and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 29. WRF03 Conversion

Conversion Time	Update Time	Settling Time	Resolution
50 ms	100 ms	50 ms	15 bits
100 ms	100 ms	125 ms	15 bits
200 ms	100 ms	200 ms	15 bits
500 ms	100 ms	500 ms	15 bits
1000 ms	100 ms	1000 ms	15 bits

WRO09 Series (Relay Output) Module Functional Specifications

Description	The channel-isolated WRO09 Series relay output interface module contains eight discrete output channels, which are sourced externally. Each output is fully isolated from other channels and ground. Each mercury-wetted relay output card type may be jumper selectable for normally open or normally closed. The solid-state switch type card is normally opened only. The module interfaces electrical output signals from a control processor to the field devices.
Output Channels	8 isolated channels. The modules in the series, their function, and the Q-Cards they replace are listed in *Table 30. WRO09 Modules, Function and Q-Card Equivalents, page 42*.
Communication	The module communicates with its associated FCM via the local Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: ◦ *WRO09A and WRO09B* 5 W (maximum) at 13 V dc ◦ *WRO09C and WRO09D* 4 W (maximum) at 13 V dc • Heat Dissipation: ◦ *WRO09A and WRO09B* 13 W (maximum) at 13 V dc, all outputs ON at maximum load current ◦ *WRO09C and WRO09D* 12 W (maximum) at 13 V dc, all outputs ON at maximum load current
Calibration Requirements	Calibration of the module is not required.
Applied Voltage	• *WRO09A* 330 V dc/250 V ac (maximum) at 0.5 A, switches inductive loads • *WRO09B* 330 V dc/250 V ac (maximum) at 0.5 A, non-inductive resistive loads only • *WRO09C* 330 V dc/250 V ac (maximum) at 0.5 A, switches inductive loads • *WRO09D* 330 V dc/250 V ac (maximum) at 0.5 A, non-inductive resistive loads only
Power	100 VA (maximum) dc at peak ac
Speed	2 ms typical (operate) 10 ms typical (release)
Contact Resistance	WRO09A AND WRO09B: Closed 2 Ω maximum
Impedance	• *WRO09A* Open 25 KΩ (minimum)

	• *WRO09B* Open 300 KΩ (minimum)
On-State Voltage Drop	• *WRO09C* 2.0 V (maximum) at 0.5 A • *WRO09D* 2.0 V (maximum) at 0.5 A
Off-State Leakage Current	• *WRO09C* 0.01 mA (maximum) at 330 V dc/250 V ac • *WRO09D* 0.01 mA (maximum) at 330 V dc/250 V ac
Duty Cycle	The output should not open more than once every 10 ms (at rated voltage).
Inductive Loads	WRO09A and WRO09C are equipped to handle inductive loads.
Channel Isolation	Each channel is optically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground, or between a given channel and any other channel. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** The channel isolation statement does not imply that these channels are intended for permanent connection to voltages of these levels. Exceeding the limits for input voltages, as stated elsewhere in this specification, violates electrical safety codes and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 30. WRO09 Modules, Function and Q-Card Equivalents

Module	Function	Q-Cards
WRO09A	Switches inductive loads with mercury-wetted relay output devices. Jumper-selectable normally open or normally closed.	QRO-G01 QRO-G02
WRO09B	Switches non-inductive resistive loads with mercury-wetted relay output devices. Jumper-selectable normally open or normally closed.	QRO-G03 QRO-G04
WRO09C	Switches inductive loads, normally opened only, with solid-state relay output devices.	QRO-G01
WRO09D	Switches non-inductive resistive loads, normally opened only, with solid-state relay output devices.	QRO-G03

WRT03 Series (RTD Input) Module Functional Specifications

Description	The WRT03 Series modules are channel-isolated platinum/nickel RTD input interfaces that contain four resistance temperature detector (RTD) input channels. Each channel accepts a 3-wire RTD sensor input, within a 0 to 320 Ω resistance range or 0 to 30 Ω resistance range dependent upon module type. The WRT03A module replaces the QRT-G01 and provides four 0 to 30 Ω inputs. The WRT03B module replaces the QRT-G02 and provides four 0 to 320 Ω inputs.
Input	4 isolated and independent channels.
Input Range (Each Channel)	• WRT03A: 0 to 30 Ω • WRT03B: 0 to 320 Ω
Sensor Current	• WRT03A: 0.539 mA dc • WRT03B: 0.197 mA dc
Input Accuracy	• Accuracy (Includes Linearity): ◦ *WRT03A* ±0.15% of span ◦ *WRT03B* ±0.03% of span • Accuracy Temperature Coefficient: ±50 ppm/°C
Communication	The module communicates with its associated FCM via the local Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 2 W (maximum) at 13 V dc • Heat Dissipation: 2 W (maximum) at 13 V dc
Calibration Requirements	Calibration of the module is not required.
Input Signal A/D Conversion	Each channel performs A/D signal conversion using an independent Sigma-Delta converter.
Input Conversion Time (Software Configurable)	Input signal conversion time specifications for the WRT03 Series are listed in *Table 31. WRT03 Conversion*.
Settling Time	Defined as the value settling within a 1% band of steady state for 10 to 90% input step change.
Typical Resistance Temperature Sensors	• WRT03A: Copper • WRT03B: Platinum (DIN), Platinum (SAMA), Platinum (IEC), or Nickel

Input Signal	Supports 2-wire or 3-wire variable-resistance temperature sensors.
Channel Isolation	Each channel is galvanically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground, or between a given channel and any other channel. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** The channel isolation statement does not imply that these channels are intended for permanent connection to voltages of these levels. Exceeding the limits for input voltages, as stated elsewhere in this specification, violates electrical safety codes and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 31. WRT03 Conversion

Conversion Time	Update Time	Settling Time	Resolution
50 ms	100 ms	50 ms	15 bits
100 ms	100 ms	125 ms	15 bits
200 ms	100 ms	200 ms	15 bits
500 ms	100 ms	500 ms	15 bits
1000 ms	100 ms	1000 ms	15 bits

WTO09 TRIAC Output Module Functional Specifications

Description	The WTO09A is an externally sourced TRIAC digital output module designed to replace the 8-channel QTO-G01. This channel-isolated interface contains eight discrete output channels. Each output is fully isolated from other channels and ground. The module interfaces electrical output signals from a control processor to the field devices.
Output Channels	Eight isolated channels
Communication	The module communicates with its associated FCM via the local Fieldbus.
Power Requirements	• Input Voltage Range (Redundant): 13 V dc nominal (12.4 V dc minimum, 13.1 V dc maximum) • Consumption: 2 W (maximum) at 13 V dc • Heat Dissipation: 20 W (maximum) at 13 V dc, with all outputs on at maximum load current
Calibration Requirements	Calibration of the module is not required.
Output Capabilities	*Table 32. WTO09 Output Capabilities* describes the output capabilities of the WTO09. The load current must be above 75 mA to trigger the TRIAC.
Channel Isolation	Each channel is optically isolated from all other channels and ground. The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground, or between a given channel and any other channel. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** The channel isolation statement does not imply that these channels are intended for permanent connection to voltages of these levels. Exceeding the limits for input voltages, as stated elsewhere in this specification, violates electrical safety codes and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**

Table 32. WTO09 Output Capabilities

Characteristic	Minimum	Typical	Maximum
Voltage (RMS)	80	115	140 V ac
Current (On)	0.075	——	1.8 RMS (continuous) 10 A RMS (T < 5 cycles)
Frequency	47	——	63 Hz
Common Mode Voltage	——	——	500 V dc (peak) 300 V ac (RMS, line frequency)
Current (Off)	——	——	8 mA (RMS)

Related Product Specification Sheets

Refer to this list for Product Specification Sheets (PSS documents) for additional hardware and software elements in the 200 Series subsystem. The FCP 280 is mounted in 1x8 Mounting Structure, but is listed herein for its relationship to the migration components.

PSS Number	PSS Title
PSS 31H-2FPS400	Standard 200 Series Power Supply -FPS400-24 (Supersedes: PSS 31H-2W3)
PSS 31H-2SBASPLT	Standard 200 Series Baseplates
PSS 41H-1FCP280	Field Control Processor 280 (FCP280)

Migration Kits and Components

Migration kits and components for Westinghouse® Process Control WDPF I and II Systems are listed in *DCS Fieldbus Modules for Westinghouse WDPF® Systems User's Guide* (B0400BA).

WARNING: This product can expose you to chemicals including lead and lead compounds, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.p65warnings.ca.gov/.

Schneider Electric Systems USA, Inc.
38 Neponset Avenue
Foxborough, Massachusetts 02035–2037
United States of America

Global Customer Support: https://pasupport.schneider-electric.com

As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

PSS 41H-3MIGWDPF, Rev A