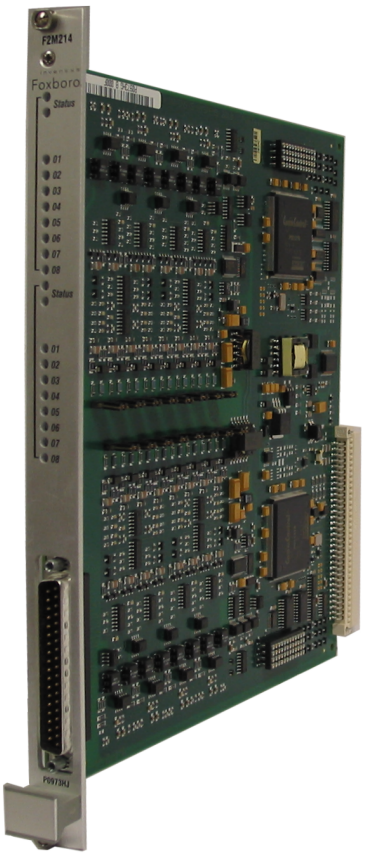
Foxboro™ DCS

Fieldbus Module for Migration of Fisher PROVOX® Systems

PSS 41H-3MIGFISH

Product Specification

May 2019



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Legal Information

Overview

EcoStruxure™ Foxboro™ DCS Fieldbus Modules (FBMs) allow migration from Fisher PROVOX® process input and output (I/O) components to a Foxboro DCS process control system.

The Foxboro DCS FBM family provides a migration path from Fisher PROVOX® process input and output components to Foxboro DCS display and supervisory functions. This can save significant cost over total system replacement by preserving 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 PROVOX Controller and/or process I/O devices. Once integrated, the process is controlled entirely by the advanced Foxboro DCS algorithm set. PROVOX DCS control devices are disconnected upon migration, so there is no undesirable interaction caused by the decommissioned system.

The Foxboro DCS FBM product includes appropriate connectors to enable integration of original process signals to the Foxboro DCS system while keeping the field interface and wiring. It provides access to all process signals connected to the PROVOX system by providing the connection between the Field Termination Assemblies (FTAs) and the Foxboro DCS system. All process signals become fully integrated into the Foxboro DCS system. Process data is used for operator display, history, alarming and control.

Operator functions and engineering configuration are accomplished by the Foxboro DCS system at any Foxboro DCS operator workstation. Because all process values become part of the Foxboro DCS system, all configuration data is maintained by the system as native Foxboro DCS configurations.

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

Features

- FBMs plug directly into an existing control I/O nest to replace process I/O module cards
- Migration from proprietary DCS to a state-of-the-art open Foxboro DCS system
- Advanced Foxboro DCS system control with single point of configuration
- More direct control performance than any gateway device offers
- Single vendor service and supply

Fundamental Principle

The Company 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 DCS migration product offerings adhere to this principle.

Product Descriptions

The PROVOX migration consists of new Foxboro DCS FBMs and new Fieldbus Isolators. This allows migration to Foxboro DCS control, display, and application products while retaining original process termination and field I/O wiring. All original process I/O capability of the PROVOX Control Units, I/O File Units, and Input/Output Units functions are replaced by FBM cards and direct Foxboro DCS control processor scanning and control.

New Foxboro DCS FBMs plug directly into existing PROVOX Control Unit Packages and I/O File Units in place of PROVOX I/O Unit cards. These FBMs pass process measurement and output signals to and from a Foxboro DCS control processor. The Foxboro DCS control processor provides control in place of the PROVOX Control Units. This saves customers significant cost over a total system replacement by preserving existing process interfaces and wiring and minimizing process downtime.

PROVOX Series 10 UOC, UOC+, IFC, MUX Subsystems

The I/O card file, used to house I/O cards, is reused to house the Foxboro DCS FBM cards. The original I/O card termination units mounted on the front of the I/O cards are reused. All I/O wiring connected to the I/O card termination units remains in place.

I/O units are removed and their termination assemblies detached. Each unit is replaced by a corresponding Foxboro DCS FBM. The original termination assembly, including the undisturbed process wiring connections, is reattached to the new FBM. This provides original I/O functionality of the process inputs and outputs. The FBM is powered by the original Controller or Multiplexer Unit power bus. Fieldbus Isolators are housed in depopulated UOC, UOC+, IFC, or MUX nest assemblies. Foxboro DCS Fieldbus provides communication to Foxboro DCS control processors which take over all control and communication functions. Migration is accomplished using the UOC, UOC+, IFC Migration Kit (P0914NT), the MUX Control Nest Migration Kit (P0914NU), and the MUX Card File Migration Kit (P0914NV). The following are optional Foxboro DCS FBMs.

Model	Replaces	Termination Type	Description
F1M01A	DM6311X1-A1-B1	A	8AI 1 to 5 V dc, single-ended
	DM6321	A (C to V)	8AI 4 to 20 mA, single-ended
	DM6321	C	8AI 4 to 20 mA, single-ended (with two wire transmitter power)
F1M01E	DM6311X1-A2-B1	A	8AI 0 to 10 V dc, single-ended
F1M01C	DM6312X1-A1-B1	B	4AI 1 to 5 V dc, (isolated channels)
	DM6322X1-A1-B1	B (C to V)	DM6322X1-A1-B1 B (C to V) 4AI 4 to 20 mA, (isolated channels)
F1M01F	DM6312X1-A2-B1	B	4AI 0 to 10 V dc (isolated channels)
F1M02	DM6341	B	4AI -10 to 70 mV (isolated channels)

	DM6351	BJ	4TC Type J (isolated channels)
	DM6352	BK	4TC Type K (isolated channels)
	DM6353	BT	4TC Type T (isolated channels)
	DM6354	BE	4TC Type E (isolated channels)
	DM6355	BR	4TC Type R (isolated channels)
F1M03	DM6331	A	4RTD 0 to 320 Ω
F1M04A	DM6411	A	4AO 1 to 5 V dc
F1M04B	DM6421	A	4AO 4 to 20 mA
F1M06	DM6371	A	4PI 4 to 30 V dc, pulse input
	DM6372	D	4PI dry contact pulse input
	DM6373	F	4PI field transmitter pulse input
F1M07	DM6361	A	8DI 0 to 30 V dc
	DM6362	D	8DI dry contact
	DM6363	G	8DI 120 V ac
F1M09	DM6461	A	8DO 0 to 30 V dc at 100 mA
	DM6462	Internal Relay	8DO internal relay
	DM6463	External Relay	8DO external relay

PROVOX Regulatory Controller Units

Controller types consist of:

- Configurable
- Computing
- Interactive Two Wide
- Interactive Three Wide PIO
- Interactive Three Wide DIO
- Interactive Four Wide

Foxboro DCS FBM Migration Kits replace the indicated controller card sets and are housed in the original controller files. Original I/O wiring to the controller file terminator panels stays in place. Power is derived from the original rack power supply. Each FBM is powered by its own dc to dc converter. Fieldbus Isolators are housed in the controller file nest assemblies. Foxboro DCS Fieldbus provides communication to Foxboro DCS control processors which take over all control and communication functions. Migration is accomplished using the Regulatory Controller Migration Kit (P0915XX).

These are optional Foxboro DCS FBMs:

Model	Replaces	Description
FRM701	CL7001 Configurable Controller	4AI, 1AO, 2DI, 7DO
FRM711	CL7011 Computing Controller	5AI, 2AO, 4DI, 2DO
1-FRMMPU 1-FRMJMP	Two Wide Interactive Controller	10AI, 3AO, 4DI, 4DO
2-FRMMPU 1-FRMJMP	Three Wide Interactive Controller with Discrete I/O	10AI, 3AO, 4DI, 8DO
2-FRMMPU 1-FRMJMP	Three Wide Interactive Controller with Process I/O	15AI, 5AO, 4DI, 8DO
2-FRMMPU 2-FRMJMP	Four Wide Interactive Controller with Process I/O	20AI, 6AO, 8DI, 8DO

PROVOX 20 Series microPROVOX (SR90)

The PROVOX Series 20 (SR90) Controller is made up of three devices:

- Model 30 microPROVOX (MUX) Multiplexer Controller for monitoring of discrete, analog I/O and motor control through Discrete Control Devices (DCDs)
- Model 50 microPROVOX Integrated Function Controller (IFC) for continuous control applications
- Model 70 microPROVOX Unit Operations Controller (UOC) for batch applications

The above controllers are decommissioned with migration.

Controller I/O Card File

The original PROVOX 20 Series control I/O subsystem cards interface the above controllers to the various process termination panels. The I/O cards interface to the termination panels through D-shell connectors on the edge of the I/O card. The cards are installed in CP6701 I/O Card Files.

There are 14 I/O cards per card file and up to 16 card files per controller. The CP6701 I/O card files are reused to house the Foxboro DCS FBM cards. There are four I/O card types used in the original system:

- Discrete I/O Card
- Analog I/O Card
- Analog Input Card
- External Interface Card

The external interface card interfaces to serial devices such as PLCs and weight scales. In the current implementation of the PROVOX system, this function is handled by Foxboro DCS Field Device System Integrator (FDSI) modules (FBM233).

The discrete I/O, analog I/O, and analog input cards are replaced with Foxboro DCS FBM cards. All I/O wiring connected to the I/O card termination panels remain in place. Power is derived from the optionally redundant F2MDOR Diode/Jumper cards which replace the original rack power supply. Each FBM has a dc to dc converter. Original I/O card file power converters are not used. Fieldbus Isolators, mounted in a F2DFBC Dual Baud Fieldbus Isolator Carrier Board, are housed in the CP6701 I/O card file nest assemblies.

NOTE: The F2DFBI Fieldbus Isolator, F2DFBC Dual Baud Fieldbus Isolator Carrier Board (P0973HN) and the F2MDOR Diode/Jumper card are ordered together as part of the FBM subsystem migration kit (P0973KB).

The Foxboro DCS Fieldbus provides communication to the Foxboro DCS system CPs which take over all control and communications functions. Migration is accomplished using the following Foxboro DCS FBMs, and their supported hardware.

Model	Replaces	Description
F2M214	CL6821	16AI
F2M215[1]		8AO
F2M239	CL6721	16DI, 16DO, 8DI/8DO

F2M214 and F2M215 include a digital HART™ Frequency Shift Keying (FSK) modem dedicated to, respectively, each input or output channel for bidirectional digital communications with HART field devices, such as HART transmitters and other HART output devices.

F2M214 and F2M215 serve as a HART communications field device hosts, enabling the Foxboro DCS system to request and receive two digital messages per second from the field device. The message pass-through capability can be used to support HART universal, common practice, and device-specific commands, but not the burst communication mode. These commands are implemented using the Foxboro DCS Intelligent Field Device Configurator Foxcom™ and HART™ Protocols (IFDC — refer to *PSS 21S-8A3 B3* for details).

1. F2M215 must be ordered as part of kit P0973JY, as this kit includes an F2MAOA Analog Output Adapter which is installed between the analog output termination panel and its output cable to the F2M215, to provide an additional connection to the panel's Power Supply Common (PSC). F2M215 requires this connection to the PSC.

Functional Specifications - Common to All FBMs

Calibration Requirements	Calibration of the FBMs is not required.
Communication	Redundant IEEE P1118 Fieldbus
Process I/O Capacity	**Field Control Processor 280 (FCP280)**: 128 FBMs maximum (depending on scan periods)

F2M214 Analog/HART Input FBM Functional Specifications

Power Requirements	• Input Voltage Range: 24 V dc ±5% maximum • Consumption: 5.4 W • Heat Dissipation: 5.4 W
Part Number	P0973HJ
Analog Input Channels	Sixteen single-ended group isolated input channels • Signal Range: 0 to 20 mA dc (0 to 64,000 counts) • Rated Mean Accuracy: ± 0.13% of full scale (module is +/- 0.03%, the sense resistor is +/- 0.1%) • Over-Range Capability: 20.4 mA dc (65,280 counts), 36 mA without damage when using external power • Temperature Coefficient: 0.005% per degree C (50 PPM/C) • Resolution: 15 bits • Update Rate: 100 msec • Integration Time: 500 msec • Input Signal A/D Conversion: A multiplexed Sigma-Delta A to D converter performs signal conversion sequentially under module software control. • Input Channel Impedance: 250 Ω (minimum) • Current Sense Resistor: 250 Ω • Communications: Non-redundant, point-to-point, master/slave, asynchronous, half-duplex at 1200 baud (each channel). • Error Checking: Refer to HART Data Link Layer Specification, HCF_SPEC-81. • Speed: 2 messages per second (each channel) • Maximum Distance (Interface to Field Device): Meets HART FSK Physical Layer Specification HCF_SPEC-54, Revision 8.1 (up to 3048 m (10000 ft))

	• Analog Input Termination Panels: Compatible with the following termination panels: ◦ CL6861 (Single) and CL6862 X1-A2 (Redundant) with analog input only ◦ CL6863 and CL6864 with analog input (no HART) ◦ CL6895-A1 and CL6896 with cubes ◦ CL6859-X1-A5 for analog input and HART **NOTE:** CL6881 and CL6882 are not compatible with the F2M214.

F2M215 Analog Output/HART FBM Functional Specifications

Power Requirements	• Input Voltage Range: 24 V dc ±5% maximum • Consumption: 7.5 W • Heat Dissipation: 3.0 W **NOTE:** The F2M215 is ordered as part of the F2M215 FBM migration kit (P0973JY), which includes the F2MAOA Analog Output Adapter cable (P0973JZ).
Part Number	P0973HK
Analog Output Channels	Eight single-ended group isolated channels • Signal Range: 0 to 20 mA dc • Over-Range Capability: 20.4 mA dc • Rated Mean Accuracy: ±0.05% of span outputs (0.1 to 20 mA) • Output Load: 750 Ω (maximum) • Temperature Coefficient: 50 PPM/C • Output Resolution: 13 bits • Output Processing Delay: 30 msec. maximum • Loop Power Supply Protection: Loop power (per channel) is galvanically isolated channel-to-channel and to logic and ground. No external power option available. • Analog Output Termination Panels: Compatible with the following termination panels: ◦ CL6871 and CL6872 with analog output and HART ◦ CL6885 and CL6886 X1-A1 with analog output and HART

F2M239 Discrete FBM I/O Functional Specifications

Power Requirements	• Input Voltage Range: 24 V dc ±5% maximum • Consumption: 2.6 W • Heat Dissipation: 3.0 W
Part Number	P0973HL

Discrete Input Channels	Zero, eight, or sixteen group isolated input channels • Applied Voltage: 24 V dc ±1% • On-State: 24 V dc ±1% maximum • Short Circuit Current: 2.5 mA maximum • Off-State Leakage: 0.1 mA maximum leakage current • Input Sample Time: 1 msec • Input Range: 0 to 30 V dc • Input Logic Thresholds: ◦ *Logic Zero (ON-State)* 0 to 5 V dc ◦ *Logic Zero (OFF-State)* 15 to 30 V dc ◦ *Current Input for Logic One* 1 mA minimum at 15 V dc, 2.3 mA maximum at 30 V dc • Input Source Resistance Limits: ◦ *ON-State* 1 kΩ (maximum) at 15 V dc ◦ *OFF-State* 100 kΩ (minimum) at 30 V dc • Discrete Input Termination Panels: Compatible with the following termination panels: CL6781, CL6783 and CL6784 I/O termination panels with plugin cubes CL6751-A7 input and CL6752-A2 output
Discrete Output Channels	Zero, eight, or sixteen single-ended group isolated channels • Applied Voltage: 24 V dc maximum • On-State Load Current: 60 mA maximum • On-State Voltage: 0.2 V dc max. at 0.25 A dc (at card cable connector) • Off-State Leakage: 0.1 mA maximum leakage current • Output Supply Voltage: 30 V dc maximum output range • Output Constant Current: 0.25 A dc maximum

	• Output Inrush Current: 1.0 A dc max. for 20 msec • Discrete Output Termination Panels: Compatible with the following termination panels: CL6781, CL6783 and CL6784 I/O termination panels with plugin cubes CL6751-A7 input and CL6752-A2 output

F2DFBI (Fieldbus Isolator) Functional Specifications

Maximum Number of FBMs Driven	14
Maximum Length of Fieldbus from Control Processor	305 m (1000 feet) (galvanically isolated) using twinaxial cable
Maximum Input Power Voltage	24 V dc +/-5%
Power Consumption	3.0 W (typical)
Power Dissipation	3.0 W (typical)
Data Rate	268 Kbps and 2 Mbps - Combines 268 Kbps and 2 Mbps data from I/O cards for transmission to control processor
Part Number	P0973HM

NOTE: The F2DFBI is ordered as part of the FBM subsystem migration kit (P0973KB), which includes the F2DFBC Dual Baud Fieldbus Isolator Carrier Board (P0973HN) and the F2MDOR Diode/Jumper Card (P0973HP). No I/O cards (such as the F2M214, F2M215 and F2M239) are included in this kit. They must be ordered separately.

F1M01A, E, C, F (Analog Input) Functional Specifications

Power Requirements	• Input Voltage Range: 21.0 to 29.0 V dc • Consumption: 7.7 W • Heat Dissipation: 7.7 W
Input Channels	• FBM Model: ◦ *F1M01A* When used with PROVOX termination type A; 4 to 20 mA, when used with PROVOX termination type A (C-V); 4 to 20 mA, with two wire transmitter power when used with PROVOX termination type C ◦ *F1M01E* Eight channels, single-ended; 0 to 10 V dc, when used with PROVOX termination type A ◦ *F1M01C* Four channels, isolated; 1 to 5 V dc, when used with PROVOX termination type B; 4 to 20 mA, when used with PROVOX termination type B (C-V) ◦ *F1M01F* Four channels, isolated; 0 to 10 V dc, when used with PROVOX termination type B • Rated Mean Accuracy: ±0.05% of span • Resolution: 12 to 15 bits, programmable

F1M02 (Analog Input) Functional Specifications

Power Requirements	• Input Voltage Range: 21.0 to 29.0 V dc • Consumption: 7.7 W • Heat Dissipation: 7.7 W
Input Channels	• Applied Voltage: −10 to 71.419 mV dc, when used with PROVOX termination type B ◦ *Thermocouples* E, J, K, T, R; when used with PROVOX termination panels BE, BJ, BT, BR, respectively • Rated Mean Accuracy: ±0.05% of span • Resolution: 12 to 15 bits, programmable • Isolation: The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and earth, 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.**

F1M03 (Analog Input, 4 RTD) Functional Specifications

Power Requirements	• Input Voltage Range: 21.0 to 29.0 V dc • Consumption: 7.5 W • Heat Dissipation: 7.5 W
Input Channels	• Applied Resistance: 0 to 320 Ω, when used with PROVOX termination panel type A • Rated Mean Accuracy: ±0.05% of span • Resolution: 12 to 15 bits, programmable • Isolation: The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and earth, 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.**

F1M04A, B (Analog Output) Functional Specifications

Power Requirements	• Input Voltage Range: 21.0 to 29.0 V dc • Consumption: 7.7 W • Heat Dissipation: 7.7 W
Output Channels	• FBM Model: ◦ *F1M04A* Four channels, single-ended, 1 to 5 V dc, when used with PROVOX termination panel type A ◦ *F1M04B* Four channels, single-ended, 4 to 20.4 mA, when used with PROVOX termination panel type A • Rated Mean Accuracy: ±0.05% of span • Linearity Error: ±0.025% of span • Resolution: 12 bits • Output Load: ◦ *F1M04A* 750 Ω maximum ◦ *F1M04B* 1000 Ω minimum • Compliance Voltage: 18.6 V dc nominal at I/O field terminals • Settling Time: 100 ms to settle within a 1% band of steady state for a 10 to 90% output step change

F1M06 (Pulse Input) Functional Specifications

Power Requirements	• Input Voltage Range: 21.0 to 29.0 V dc • Consumption: 4.4 W • Heat Dissipation: 4.4 W
Input Channels	Four channels, optically isolated • On Pulse: 3.5 to 30 V dc or contact closed • Off Pulse: 0.0 to 1.6 V dc or contact open Compatible with PROVOX termination types: A, 0 to 30 V dc; D, dry contacts; F, field transmitter input • On-State Resistance: 1.0 KΩ (maximum) • Off-State Resistance: 100 KΩ (minimum) • Counter Range: 0 to 12.5 K counts per second • Isolation: The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and earth, 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.**

F1M07 (Discrete Input) Functional Specifications

Power Requirements	• Input Voltage Range: 21.0 to 29.0 V dc • Consumption: 4.4 W • Heat Dissipation: 4.4 W
Input Channels	Eight channels, optically isolated • 0 TO 30 V dc, When Used with PROVOX Termination Type A: ◦ *Logic High* 3.5 to 30 V dc ◦ *Logic Low* 0 to 1.6 V dc • Dry Contact, When Used with PROVOX Termination Type D: ◦ *Contact Range* Open (off) Closed (on) ◦ *On-State Resistance* 1.0 KΩ (maximum) ◦ *Off-State Resistance* 100 KΩ (minimum) • 120 V ac, When Used with PROVOX Termination Type G: ◦ *Logic High* 50 to 150 V ac ◦ *Logic Low* 0 to 10 V ac • Isolation: The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and earth, 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.**

F1M09 (Digital Output) Functional Specifications

Power Requirements	• Input Voltage Range: 21.0 to 29.0 V dc • Consumption: 4.4 W • Heat Dissipation: 4.4 W
Output Channels	• Eight Independent Channels: Compatible with PROVOX types A, internal relay and external relay termination panels. Specifications below are when used with type A termination panel. • Applied Voltage 30 V dc (maximum) at type A termination panel • Load Current 100 mA, steady state with type A termination panel • Off-State Leakage Current 0.25 mA (maximum) with type A termination panel • Isolation: The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and earth, 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.**

F1SFIA/F1SFIB (Fieldbus Isolator) Functional Specifications

Maximum Number of FBMs Driven	40
Maximum Length of Local Bus	9 m (30 ft)
Maximum Input Power Voltage	30 V dc
Maximum Power Dissipation	2.75 W
Minimum Isolation Voltage	2500 V rms

FRM711 Computing Controller FBM Functional Specifications

Power Requirements	• Input Voltage Range: 21.0 to 29.0 V dc • Consumption: 3.8 W • Heat Dissipation: 3.8 W
Analog Input Channels	Five single-ended input channels • Signal Range: 1 to 5 V dc, 4 to 20 mA • Rated Mean Accuracy: ±0.05% of span • Resolution: 12 bits
Discrete Input Channels	Four channels, optically isolated • Applied Voltage: 24 V dc nominal • On-State: 24 V dc nominal • On-State Resistance: 1.0 KΩ (maximum) • Off-State Resistance: 100 KΩ (minimum)

Analog Output Channels	Two channels • Range: 0 to 20.4 mA (one channel) 1 to 5 V dc (one channel) • Rated Mean Accuracy: ±0.05% of span • Resolution: 12 bits • Output Load: ◦ *Current* 735 Ω (maximum) ◦ *Voltage* 3 KΩ(minimum) • Compliance Voltage: 18.6 V dc nominal at 20 mA at FTA terminals • Settling Time: 100 ms to settle within a 1% band of steady state for a 10 to 90% input step change
Discrete Output Channels	Two channels, optically isolated • Applied Voltage Range: 21 to 29 V dc, 24 V dc nominal • On-State Load Current: 60 mA maximum • Off-State Leakage: 0.25 mA maximum

FRM701 Configurable Controller FBM Functional Specifications

Power Requirements	• Input Voltage Range: 21.0 to 29.0 V dc • Consumption: 3.8 W • Heat Dissipation: 3.8 W
Analog Input Channels	Four single-ended input channels • Signal Range: 1 to 5 V dc, 4 to 20 mA • Rated Mean Accuracy: ±0.05% of span • Resolution: 12 bits
Discrete Input Channels	0, 1, or 2 Channels, optically isolated, configured by on-board jumpers • Applied Voltage: 24 V dc nominal • On-State: 24 V dc nominal • On-State Resistance: 1.0 KΩ (maximum) • Off-State Resistance: 100 KΩ (minimum)

Analog Output Channels	One channel • Range: 0 to 20.4 mA (one channel) • Rated Mean Accuracy: ±0.05% of span • Resolution: 12 bits • Output Load: Current 735 Ω (maximum) • Compliance Voltage: 18.6 V dc nominal at 20 mA at FTA terminals • Settling Time: 100 ms to settle within a 1% band of steady state for a 10 to 90% input step change
Discrete Output Channels	Three to seven channels, optically isolated, configured by on-board jumpers • Applied Voltage Range: 21 to 29 V dc, 24 V dc nominal • On-State Load Current: 60 mA maximum • Off-State Leakage: 0.25 mA maximum

FRMMPU Functional Specifications

Power Requirements	• Input Voltage Range: 21.0 to 29.0 V dc • Consumption: 3.8 W • Heat Dissipation: 3.8 W
Analog Input Channels	Ten single-ended input channels • Signal Range: 1 to 5 V dc, 4 to 20 mA • Rated Mean Accuracy: ±0.05% of span • Resolution: 12 bits
Discrete Input Channels	Four channels, optically isolated • Applied Voltage: 24 V dc nominal • On-State: 24 V dc nominal • On-State Resistance: 1.0 KΩ (maximum) • Off-State Resistance: 100 KΩ (minimum)

Analog Output Channels	Three channels • Range: 4 to 20.4 mA (two channel) 1 to 5 V dc (one channel) • Rated Mean Accuracy: ±0.05% of span • Resolution: 12 bits • Output Load: ◦ *Current* 735 Ω (maximum) ◦ *Voltage* 3 KΩ (maximum) • Compliance Voltage: 18.6 V dc nominal at 20 mA at FTA terminals • Settling Time: 100 ms to settle within a 1% band of steady state
Discrete Output Channels	Four channels, optically isolated • Applied Voltage Range: 21 to 29 V dc, 24 V dc nominal • On-State Load Current: 60 mA maximum • Off-State Leakage: 100 µA maximum leakage current

FRSFBI (Fieldbus Isolator) Functional Specifications

Maximum Number of FBMs Driven	40
Maximum Length of Local Bus	9 m (30 ft)
Maximum Input Power Voltage	30 V dc
Maximum Power Dissipation	2.75 W
Minimum Isolation Voltage	2500 V rms

Environmental Specifications

Operating Temperature	0 to 60°C
Operating Relative Humidity	5 to 95% non-condensing
Storage Temperature	−40 το 70°C
Storage Relative Humidity	5 to 95% non-condensing

NOTE: These specifications are for all PROVOX FBM migration products.

⚠ **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/.

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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.

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