ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Honeywell MC-PAOX03* at our website: ***Click HERE***

Technical Information

Honeywell

TPS Process Manager I/O Specification and Technical Data



IO03-684
TPN Release R684
December 2012
Revision 2

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Revision History

Revision	Date	Description
1	2012/08/30	First Issue
2	2012/12/02	Updated

Table of Contents

1. Acronyms and Definitions 4
2. Introduction 4
3. Functional Description 5
   - 3.1. Functional Overview 5
   - 3.2. Serial Interface (SI) (APM, HPM, and EHPM only) 8
   - 3.3. Pulse Input (PI) 9
   - 3.4. Analog Output 9
   - 3.5. Digital Input 9
   - 3.6. Digital Input Sequence of Events (APM, HPM, and EHPM only) 10
   - 3.7. Digital Output 10
   - 3.8. Fieldbus IOP (Obsolete Product) 10
   - 3.9. I/O Simulation Option (APM/HPM/EHPM only) 10
   - 3.10. Card File Assemblies 11
   - 3.11. Field Termination Assemblies 12
4. Options 12
   - 4.1. I/O Redundancy 12
   - 4.2. Galvanically Isolated/ Intrinsically Safe FTAs 12
   - 4.3. Standby Manual 12
   - 4.4. Remote I/O 12
   - 4.5. Corrosion Protection Option 13
   - 4.6. Harsh Environment Option 14
5. European Community (EC) Compliance 14
6. Specifications 15
   - 6.1. I/O Link Extender (Remote I/O) 15
   - 6.2. European Community Compliance (CE-Mark) 15
   - 6.3. High Level Analog Input Processor - 16 Inputs 16
   - 6.4. High Level Analog Input Processor Redundancy Option 17
   - 6.5. Low Level Analog Input Processor - 8 Inputs 18
   - 6.6. Low Level Analog Input Multiplexer Processor - 32 Inputs 20
   - 6.7. Remote Hardened Multiplexer Processor - 32 Inputs 23
   - 6.8. Smart Transmitter Interface Processor* 25
   - 6.9. Smart Transmitter Interface Processor* Redundancy Option 26
   - 6.10. Serial Device Interface (General Specifications) 27
   - 6.11. Serial Device Interface - Toledo Weigh Cell 28
   - 6.12. Serial Device Interface - Manual/Auto Station 29
   - 6.13. Serial Device Interface - UDC 6000 Process Controller 30
   - 6.14. Serial Interface I/O Processor/FTA - Modbus 31
   - 6.15. Serial Interface I/O Processor/FTA - Allen-Bradley 32
   - 6.16. Allen-Bradley File Types 33
   - 6.17. Pulse Input Processor/FTA 34
   - 6.18. Analog Output 8-Point Processor/FTA 35
   - 6.19. Analog Output 8-Point Processor Redundancy Option 36
   - 6.20. Analog Output 16-Point Processor/FTA 37
   - 6.21. Analog Output 16-Point Processor Redundancy Option 38
   - 6.22. Digital Input Processor and Digital Input Sequence of Events Processor 39
   - 6.23. Digital Input Processor Redundancy Option 41
   - 6.24. Digital Input 24 Vdc Processor 42
   - 6.25. Digital Output 16-Point Processor 43
   - 6.26. Digital Output 32-Point Processor 47
   - 6.27. FOUNDATION Fieldbus I/O Processor/FTA (Obsolete Product) 49
   - 6.28. Analog Input IOP Comparison 50
   - 6.29. Analog Output IOP Comparison 51
   - 6.30. Digital Input IOP Comparison 52
   - 6.31. Digital Output IOP Comparison 53
   - 6.32. IOP/FTA Compatibility Matrix 54
7. Model Numbers 60

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1. Acronyms and Definitions

AI	Analog Input
APM	Advanced Process Manager
AO	Analog Output
CL	Control Language
DI	Digital Input
DISOE	Digital Input Sequence of Events
DO	Digital Output
EHPM	Enhanced High Performance Process Manager
FTA	Field Termination Assemblies
HLAI	High Level Analog Input
HPM	High performance Process Manager
IEEE	Institute of Electrical and Electronics Engineers
ISPA	Intrinsically Safe Power Adapter
IOP	Input/Output Processors
LCN	Local Control Network
LLMUX	Low Level Multiplexer
NIM	Network Interface Module
NIPA	Non-Incendive Power Adapter
OTD	Open-thermocouple detection
PM	Process Manager
PU	Process Unit
RHMUX	Remote Hardened Multiplexer
SDI	Serial Device Interface
SI	Serial Interface
STI	Smart Transmitters Interface
PI	Pulse Input
PV	Process Variable
TPN	TPS Process Network
TPS	TotalPlant Solution
UCN	Universal Control Network

2. Introduction

The Process Manager (PM), Advanced Process Manager (APM) and High Performance Process Manager (HPM) are Honeywell's leading **TotalPlant** Solution (TPS) system control and data acquisition devices for industrial process applications. They represent a powerful combination of cost-effective Honeywell controllers which can be applied to solve a broad range of industrial process control problems.

The PM, APM, HPM, and EHPM offer highly flexible I/O (input/output) functions for both data monitoring and control. One of the unique features of this family of controllers is its common set of Input/Output Processors (IOPs) and Field Termination Assemblies (FTAs). All IOPs and FTAs are usable by all three controllers (with only minor exceptions).

This specification and technical data sheet provides information on PM, APM, HPM, and EHPM IOPs and FTAs. Please refer to the following specification and technical data sheets for information about each controller:

- **PM03-400** - Process Manager Specification and Technical Data
- **AP03-500** - Advanced Process Manager Specification and Technical Data
- **HP03-500** - High Performance Process Manager Specification and Technical Data
- **EHPM03-600** - Enhanced High Performance Process Manager Specification

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3. Functional Description

3.1. Functional Overview

I/O Processors, along with Field Termination Assemblies (FTAs), perform input and output scanning and processing on all field PM/APM/HPM/EHPM I/O (Figure 2).

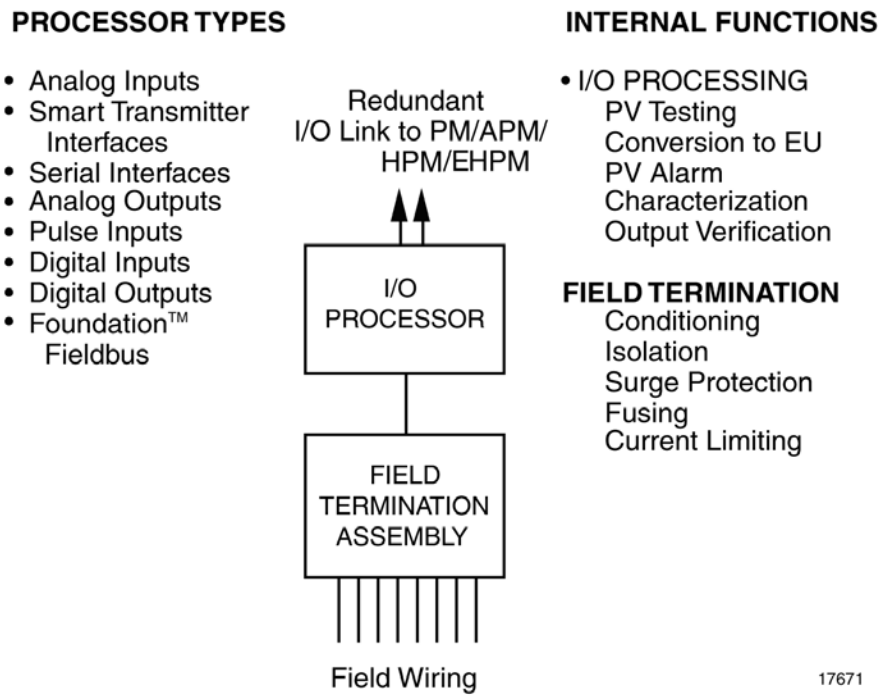


Figure 2 — PM/APM/HPM/EHPM I/O Functions

A redundant I/O Link is standard for maximum security. Optionally, High Level Analog Input, Smart Transmitter Interface, Analog Output, Digital Input and Digital Output processors can be redundant. I/O processing is performed separately from control processing functions so that I/O scan rates are completely independent of I/O quantity, controller loading, processing, and alarming. This partitioning of functions allows more efficient use of advanced Control Processor capability and provides for future I/O expansion.

A variety of I/O processors are available for the PM controllers:

- Analog Input–High Level (16 points)
- Analog Input–Low Level (8 points)
- Analog Input–Low Level Multiplexer (32 points)
- Smart Transmitter Multivariable Interface (16 points)
- Analog Output (8 points)
- Analog Output (16 points)
- Serial Device Interface (16 points—2 ports)
- Serial Interface (32 arrays, 2 ports)*
- Pulse Input (8 points)
- Digital Input (32 points)
- Digital Input 24 Vdc (32 points)
- Digital Input Sequence of Events (DISOE) (32 points)*

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Digital Output (16 points)
- Digital Output (32 points)
- Foundation Fieldbus (127 slots, 4 Fieldbus segments)**

* *APM, HPM, and EHPM only*
** *HPM and EHPM only*

Any mix of the above I/O processors can be selected for a PM/APM/HPM/EHPM controller. This can be any combination of single and/or redundant (HLAI, STI, AO, DI and DO) pairs, up to a total of 40. Even with the maximum complement of 80 physical IOPs, there is no impact on control or communication performance. In a redundant IOP configuration, control automatically transfers to the backup I/O processor during board replacement or failure.

While a separate FTA of a given type is required to handle varying field wiring signal levels, identical I/O Processors can usually be used. This I/O approach simplifies system hardware selection and minimizes spare parts requirements. For example, one Digital Input Processor can handle 24 Vdc, 120 Vac, 125 Vdc or 240 Vac, depending on the FTA selected.

Analog Input

High and **low level analog input** (HLAI + LLAI - 8) processors both perform signal conversion and conditioning functions:

- PV Source (Auto, Manual, Substituted)
- PV Clamping
- EU Conversion
- PV Value Status
- PV Filter (Single Lag)
- Bad PV
- PV Hi/Lo
- PV HiHi/LoLo
- PV Rate-of-Change +/-
- Software Calibration
- Low PV Cutoff

They perform engineering unit conversion, including fifth-order polynomial temperature input characterization, if the high level processor receives these inputs from mV/I converters. Through use of a dual processor design and custom integrated circuits, the low level analog input processor supports software configuration per channel for different thermocouples or RTD types with excellent resolution and accuracy. Open thermocouple detection is performed once per scan so that no bad data is propagated for control processing.

The **Low Level Multiplexer (LLMUX)** processor provides an economical way to bring in a large number of data acquisition signals. Each processor can handle 32 points, using two 16-point FTAs. Every point is scanned once per second with a one second scan delay for processing. Open thermocouple detection is performed every 30 seconds for all points. Options for either local or remote cold junction reference are available.

The **Remote Hardened Multiplexer (RHMUX)** processor provides functionality similar to that of the LLMUX, but the two 16-input FTAs may be mounted up to 2 km away from the xPM cabinet. Each FTA is mounted in its own NEMA-4 or -4X enclosure, providing protection against precipitation, hosedown, and windblown dust. The FTA itself is conformally coated, and is capable of operation in a GX “Severe” corrosive environment and in the presence of condensing humidity.

Power for the RHMUX’s remote FTAs is provided by one of two power adapters, which provide power limiting, serial data interfaces, and galvanic isolation. The power adapter mounts in the FTA tray in the xPM cabinet, and provides the interface between the IOP and the two remote FTAs. The Intrinsically Safe Power Adapter (ISPA) allows the FTAs to be placed in Division 1 or Zone 0 environments. The Non-Incendive

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Power Adapter (NIPA) provides an economical means to allow the remote FTAs to be placed in Division 2 or Zone 1 environments.

Every point is scanned once per 4 seconds. Data is made available at the end of each scan; there is no additional processing latency. Open-thermocouple detection (OTD) is optionally performed on every measurement. If enabled, the OTD test is performed immediately after the A/D conversion. If the test indicates an open thermocouple, data from the just-completed conversion will not be propagated.

To prevent spurious ground paths from affecting readings, ground-fault detection is performed.
All RHMUX remote FTAs are equipped with a local cold junction reference
The RHMUX IOP is configured into the TPS PM system as a standard LLMUX. This permits using the RHMUX in Release 300 and greater systems.

Smart Transmitter Multi-Variable Interface (STI-MV)

The Smart Transmitter Multivariable processor is the PM/APM/HPM/EHPM's digital interface to Honeywell's advanced series of smart transmitters.

Each STI-MV processor can communicate bi-directionally with up to 16 smart transmitters, including:

- ST3000 Pressure Transmitters
- STT3000 Temperature Transmitters
- MagneW 3000 Magnetic Flowmeters

These transmitters are used for pressure, temperature, and flow measurement

Each STI-MV processor also has the ability to accept up to four PVs each from the following multivariable transmitters:

- SCM 3000 Coriolis flowmeter
- Drexelbrook SLT level transmitter
- SMV3000 Multivariable Pressure Transmitter
- SGC3000 Gas Chromatograph

Multivariable transmitters provide the high accuracy of a digital interface while reducing wiring costs because multiple PVs are available over a single pair of wires.

Each IOP can accommodate DE inputs to a maximum of

- 16 single PV inputs from Smartline transmitters
- Four multivariable field devices with up to four PVs each, or
- A mix of single and multivariable field devices that equals up to 16 inputs per IOP (some restrictions apply)

The STI-MV Interface supports the functions for PV processing, EU conversion, and alarming supported by the other analog input processors (see above). It also provides Bad PV and Bad Database protection for added security.

All communications from the STI-MV processors to the Smart Transmitter are bit-serial, bi-directional, using the Honeywell DE (digital enhanced) protocol.

An individual at a Universal Station can perform any of the following functions

- Display primary and secondary Process Variables
- Display/Modify/Configure the transmitter database
- Re-range the transmitter
- Save/Restore the database
- Support calibration commands
- Display detailed transmitter status information
- Display the transmitter scratch pad, serial number, and revision level.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Enhanced digital accuracy is provided for all signals, resulting in accuracy that typically is three times better than that of analog.

Serial Device Interface (SDI)

The Serial Device Interface processor provides connection to field devices that use serial communications (EIA-232 or EIA-485). Inputs from these devices are mapped into the I/O database and can be used directly for calculations and control. Since communication is bi-directional, information such as target value or damping factors can be written to or read from the field device. Specific serial devices are supported by custom programmable modules.
One such device is the UDC 6000 Process Controller, which provides single-loop remote display and control capability. Operating as a subsystem of the PM/APM/HPM/EHPM controller, the UDC 6000 displays PV, SP, and OP on front panel bar graphs. When digitally integrated with the PM/APM/HPM/EHPM, the UDC Controller can be configured for the following modes:

- Manual/Auto (M/A) Station where all control resides in the PM, APM, HPM, or EHPM.
- M/A Station with emergency backup control.
- Stand-alone control with the PM/APM/HPM/EHPM as supervisor.
- Stand-alone control with remote SP from the PM, APM, HPM, or EHPM.

Another device is the Toledo Weigh Cell (T8142), providing weight, setpoint control of feed (fast cutoff) and rate of change alarming.

3.2. Serial Interface (SI) (APM, HPM, and EHPM only)

The **Serial Interface** IOP provides a communications interface to Modbus or Allen-Bradley compatible subsystems (see Figure 3). Each serial interface IOP, by way of a Power Adapter, supports any combination of up to two FTAs. Note that the SI IOP is supported by the APM, HPM, and EHPM *only.* Each FTA supports one port and up to 16 array points.

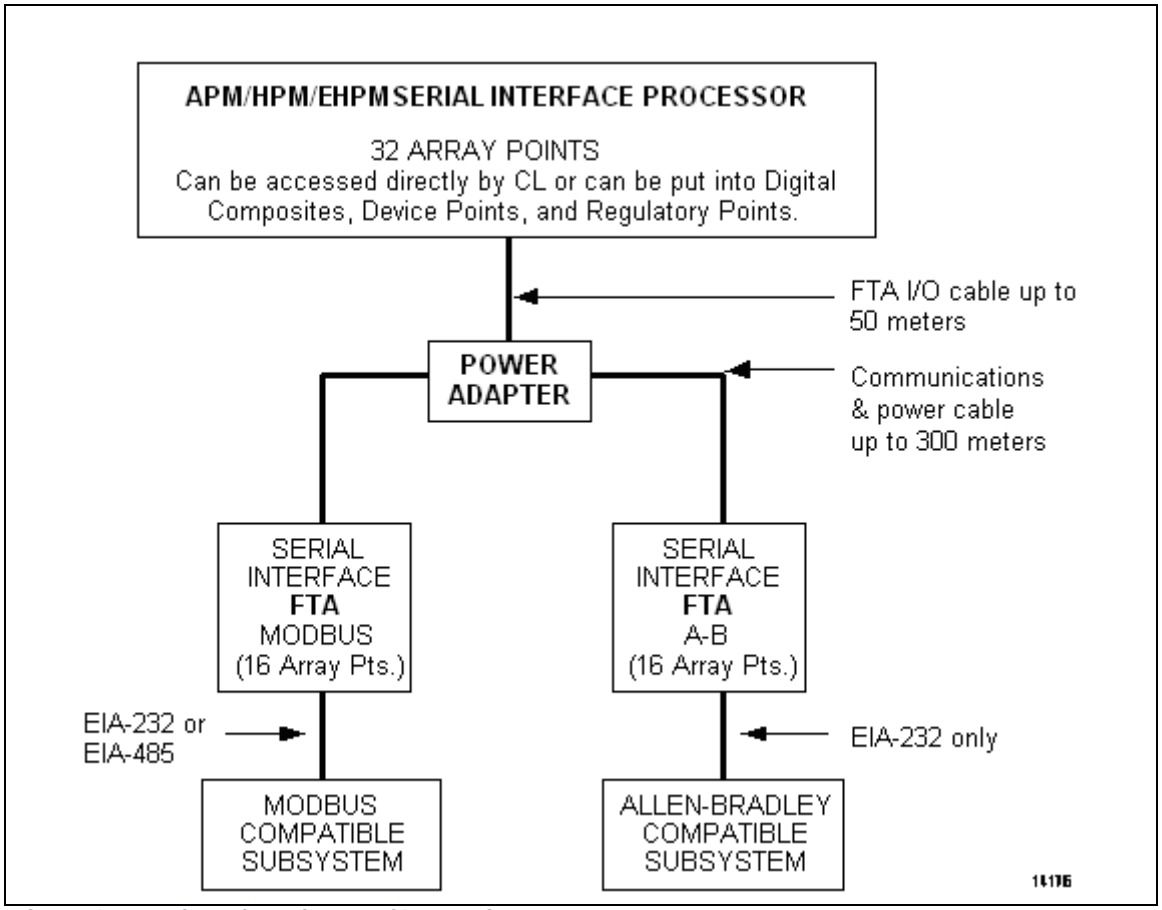


Figure 3 — PM/APM/HPM/EHPM I/O Functions

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The Modbus SI FTA supports Modbus RTU protocol and uses either EIA-232 or EIA-422/485 communications, including multidrop configurations. The Allen-Bradley FTA supports DF-1 protocol and uses only EIA-232 communication.

The serial interface supports direct digital communications to any qualified, compatible subsystem. Using this scheme, serial data is then made available for all APM, HPM, and EHPM data acquisition and control strategies. Using the 16 available array points, an SI FTA has a nominal capacity of up to:

- 8192 Flags (Boolean) or
- 256 Reals (Floating Point) or
- 512 Integers or
- 1024 Characters.

The array point values can be displayed at the Universal Station or used as part of advanced control strategies. These values can be configured into APM, HPM, and EHPM control strategies using Digital Composites, Device Points, and Regulatory Points as well as CL programs. Both reads and writes of subsystem data are supported.

To assure smooth field integration of a variety of subsystems, subsystem devices with the serial interface are qualified as part of Honeywell's Multi-Vendor Interface Program.

In addition, custom interfaces can be designed to met your specific interfacing requirements. Contact your account manager for more information.

3.3. Pulse Input (PI)

Precise control using high-accuracy pulsing-type sensing devices is possible with the Pulse Input processor. The result is improved product quality and reduced material waste. Pulse rates up to 20 kHz can be handled. Conversion to engineering units is performed, along with alarm checking, filtering, and data validity checking. 24 Vdc transmitter power is provided.

3.4. Analog Output

Two versions of the Analog Output IOP are available: one with 8 outputs and one with 16 outputs.

Both processors provide the following functions

- Readback check of actual output current
- Output characterization (5 segment)
- Output default action on failure (hold or unpowered)
- Modes and associated functions to support Manual loader and DDC control
- Software calibration

The 8-pt. analog output processor provides separate D/A converters and power regulator per channel for maximum output security. As an option, one-on-one Analog Output processor redundancy (available for both versions) provides even higher control strategy integrity.
The 16-pt analog output processor may be used with HART® field devices if the Model MU-THAO11 or MU-GHAO11 FTA is selected. These FTAs provide a connector for an external HART subsystem, and incorporate filters to prevent interference between the HART® signals and the TPS system.

3.5. Digital Input

Two Digital Input IOP models are available, both with 32 inputs. The Digital Input Processor provides the following functions:

- Event counting (accumulation) (maximum pulse rate = 15 Hz)
- Push-button and status type inputs (minimum on-time = 40 ms)
- Time deadband on alarms for status inputs

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Input direct/reverse
- PV source selection
- State or change of state alarming for status inputs
- Sequence of events resolution of 20 ms

Several voltage types are handled through a selection of FTAs. As an option, one-on-one Digital Input processor redundancy is available.

3.6. Digital Input Sequence of Events (APM, HPM, and EHPM only)

This specialized digital input processor (DISOE) provides all the functions of the conventional Digital Input except accumulation. Inputs from the board can be used for control strategies just like any other digital input. Note that the DISOE IOP is supported by the APM, HPM, and EHPM *only.*

In addition, this DISOE processor provides high-resolution sequence of events monitoring. Using the DISOE processor, SOE time stamp resolution within 1 ms is assured.

The DISOE processor provides optimum resolution when used with the standard 24 Vdc Digital Input FTA.

Optional one-on-one redundancy is available for higher availability

3.7. Digital Output

Two versions of the Digital Output IOP are available: one with 16 outputs and one with 32 outputs. Both processors provide the following functions:

- Output types (configurable per output)
  - Latched
  - Pulsed
  - Pulse-width modulated
- Output default action on failure (hold or unpowered)
- Output readback checking

The 16-point digital output processor provides separate output latches with redundant power regulators for added output security. As an option, one-on-one Digital Output processor redundancy is available for the 32-output IOP.

3.8. Fieldbus IOP (Obsolete Product)

The Fieldbus IOP and its associated Field Termination Assemblies (FTAs) as well as any power supplies or isolator modules used for Fieldbus applications have been discontinued. . For Full Fieldbus capability please refer to the Field Device Manager (FDM) product line.

3.9. I/O Simulation Option (APM/HPM/EHPM only)

The optional I/O Simulator package simulates the functions of the IOPs for the APM, HPM, and EHPM. It is a low cost, high fidelity simulation approach for control strategy checkout or for operator training support. A unique feature of this optional package is complete database transportability between the Simulation personality and the APM, HPM, or EHPM On-Process (normal operating) personality. This is especially useful for configuring the system before the physical I/O is available or connected. Features of the package include:

- “Bumpless” pause/resume interruption/restart
- Physical IOPs, FTAs and field wiring not required
- Simulation status indicated and journaled
- Database (checkpoint) transportable to target system
- Simulation rerun from saved data base using PV data

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Full peer-to-peer capability
- I/O functions simulated by Communications processor
- Almost any I/O configuration can be simulated
- Simulation load and status supported on system network
- Fault response testing and I/O redundancy simulation

The benefits of this package include

- The ability to perform high fidelity simulation
- Control strategy checkout
- Operator training
- Project cost savings

The HPM/EHPM I/O simulator package does not support the Fieldbus IOP

3.10. Card File Assemblies

A maximum of 40 logical IOPs can be configured per PM, APM, HPM, and EHPM. A “logical” IOP consists of either a single IOP or a redundant IOP pair). Typical PM, APM, HPM, and EHPM configurations may vary, but they generally consist of up to three cardfiles plus a power supply system. Each cardfile row may contain up to 15 module slots. (Refer to Figure 4.)

When options such as I/O redundancy and/or remote I/O are used, configurations with up to 8 “logical” card files can be provided.

One or two card files contain the PM, APM, HPM, or EPM Module(s). All remaining card file slots can be filled with any combination of I/O Processors. Note that 7-slot files which are used for the HPM/EHPM (i.e., not for PM or APM) *can* also be filled with IOPs. This "IOP only" configuration can be used to provide I/O for PMs and APMs as well.

With 7-slot HPM/EHPM files, a single cabinet side can hold up to 40 I/O Processors along with redundant High-Performance Process Manager Modules or redundant Ethernet High-Performance Process Manager Modules. Figure 4 shows typical cabinet layouts with redundant EHPMs/HPMs, APMs, and PMs.

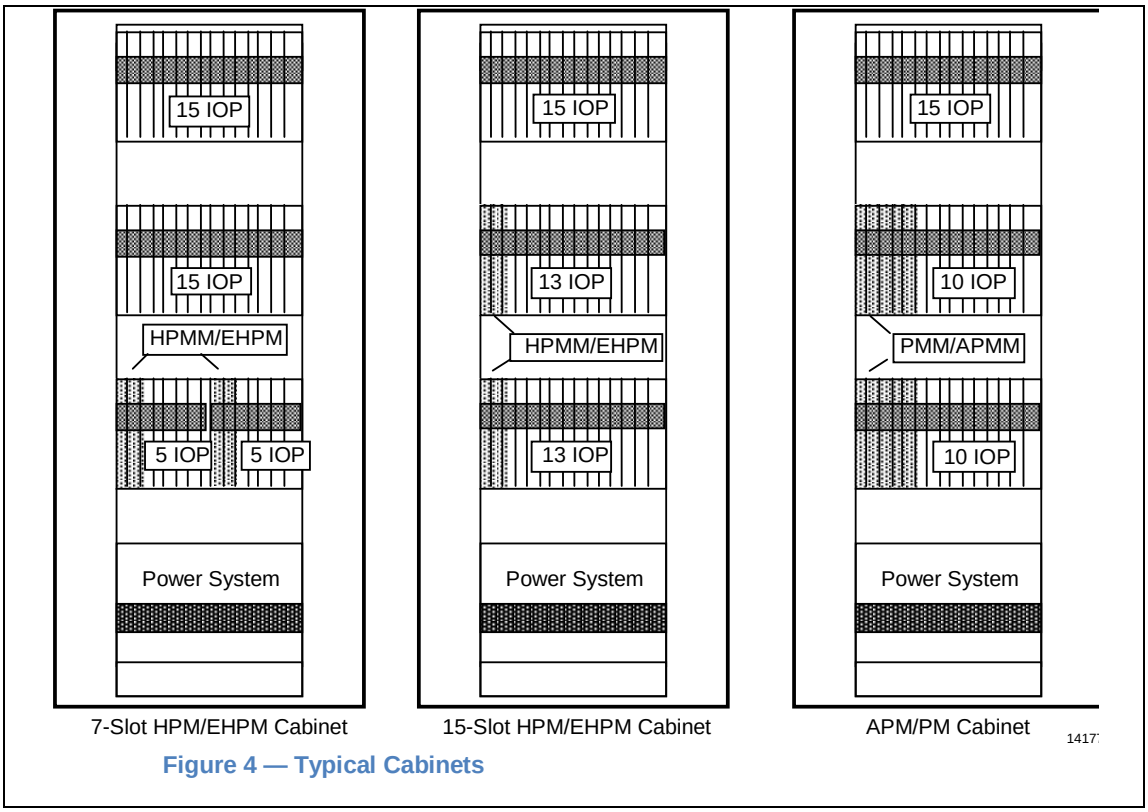


Figure 4 — Typical Cabinets

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3.11. Field Termination Assemblies

All connections to and from the process are made to Field Termination Assemblies (FTAs). Compression-type termination blocks (that can accept wire sizes as large as 14 AWG or ~1.6 mm) are available for all FTAs. Screw-type termination's can also be provided for most FTAs as shown in Table 1 in the "Specifications" section. The FTAs are connected to the I/O processors by cables that can be up to 50 meters in length. Three sizes of FTAs are used as shown in this table. Twenty-four Vdc transmitter and digital inputs sense power connections are provided through the standard FTA cable.

4. Options

4.1. I/O Redundancy

A one-on-one I/O redundancy option is also available for critical high level analog inputs, smart transmitter interface connections, analog outputs, digital inputs and digital outputs. This option offers significantly increased availability of automatic control by providing continuous operation through failure and replacement of I/O Processors, FTA cables, backplanes, and AO switching hardware. Up to 40 I/O Processors can be supported in a redundant or non-redundant PM, APM, HPM, or EHPM, and the user can selectively apply redundancy to some or all IOPs, for a maximum of 40 IOP pairs. The one-on-one design approach offers maximum coverage and fast switchover times. Integrity of the backup database and of the switching functions is provided through the extensive diagnostic coverage made possible by the processing capability of the smart I/O Processors.

4.2. Galvanically Isolated/ Intrinsically Safe FTAs

These FTAs are available for applications requiring a direct interface to either FM or CSA Class 1, Div 1, or CENELEC Zone 0 hazardous areas. Wiring and installation are simplified because integral galvanically isolated intrinsic safety isolators are part of the FTA. See GA03-100, Galvanic Isolation/ Intrinsic Safety Specification and Technical Data for further information.

4.3. Standby Manual

The 16-point digital output FTA and both analog output FTAs (8-point and 16-point) support connection to a standby manual unit. This option allows outputs to be maintained during I/O Processor replacement. Note that MU/MC-GHAO11 does not include standby manual connectors.

4.4. Remote I/O

Remote I/O options are available to enable IOPs and FTAs to be distributed at up to six remote sites (see Figure 5). Using redundant fiber-optic cables to extend the I/O Link, remote I/O installation benefits from inherent immunity against ground potential differences and EMI/RFI. In addition, remote installation of IOPs and FTAs can significantly reduce signal wire runs.

Two options are available. The Remote I/O option supports remote sites up to 1 kilometer from the main PM/APM/HPM/EHPM electronics, while the Long Distance I/O option provides for separation of up to 8 kilometers. Either option requires an I/O link Extender pair (IOLE) at both ends. The 1-km option supports up to three remote sites for each IOLE, while the 8-km option requires one IOLE per remote site.

FTAs at the remote site may be located an additional 50 meters from the I/O Processors. LLAI Mux, Serial Device, or Serial Interface FTAs may be located an additional 300 meters away. The RHMUX FTA may be located an additional 2 km away.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

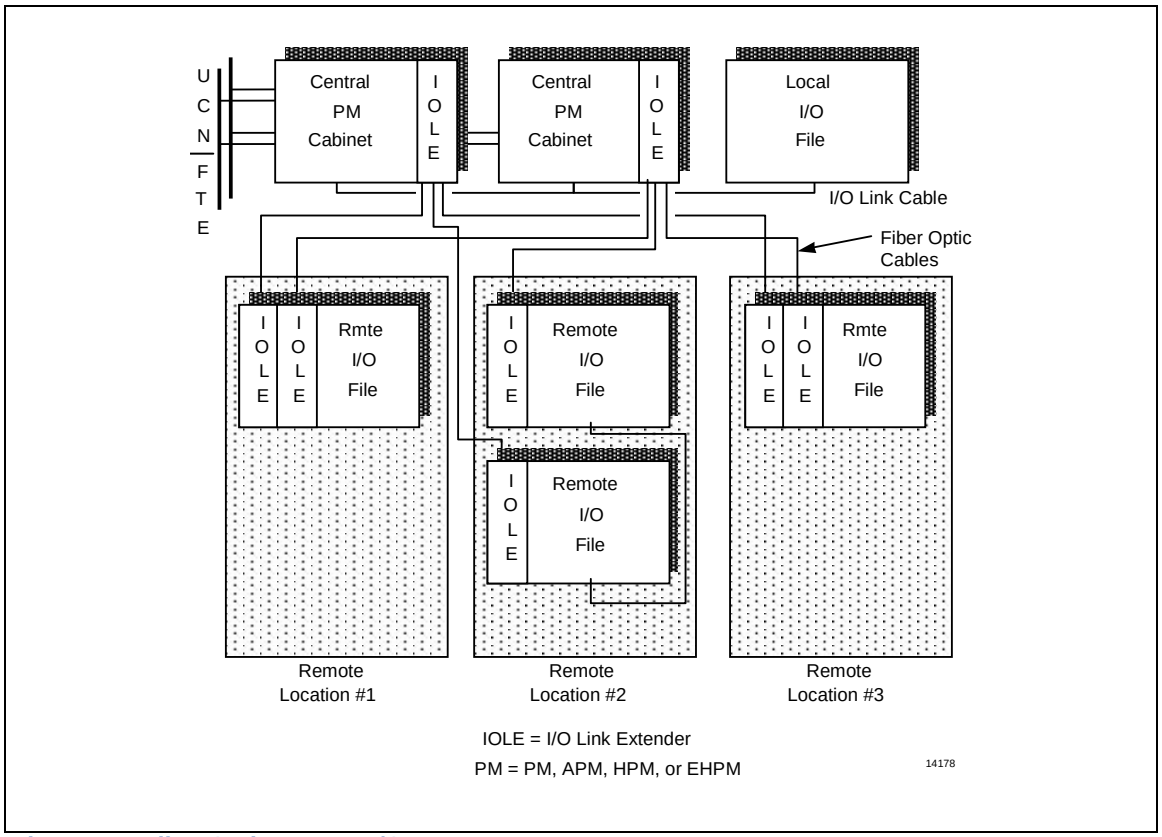


Figure 5 — Fiber Optic Remote I/O

4.5. Corrosion Protection Option

As electronic board layouts have become more compact, sensitivity to corrosion has increased. In addition, a trend toward locating I/Os closer to the process to save installation costs has generated a requirement for environmentally hardened products. To provide extra corrosion protection when PM/APM/HPM/EHPM equipment cannot be located in a mild (G1) environment, board sets are conformally coated as a standard feature. These boards are completely covered with a thin plastic film resistant to the corrosive effects of humidity and certain gases, and are thus suitable for placement in a harsh (G3) atmosphere. Coating is optional for most PM/APM/HPM/EHPM system components, such as IOPs, FTAs, power supplies and backplanes. Many components are coated as a standard, such as the HLAI IOP, AO IOP, and HPM/EHPM controller board set.

All coated products are denoted by a "C" in the second character of their model number. Uncoated boards maintain the standard MU-xxxxxx style numbers; therefore, all products for which conformal coating is available have two model numbers. For example, the uncoated DI IOP model number is MU-PDIX02, and the coated version is MC-PDIX02. In order to easily identify coated IOPs in the field, they are labeled with a distinctive symbol located on their faceplate (see Figure 6). The "C" surrounded by a solid diamond (the universal symbol of hardness) represents the protection this conformal coating process provides.

Note: Boards installed and maintained in a G1 (mild) control room environment (defined by the ISA Environmental Severity Classification) do not need this added protection.

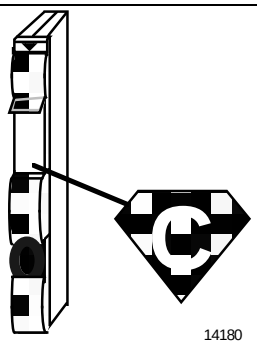


Figure 6 — IOP Conformal Coating Symbol Location

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4.6. Harsh Environment Option

To help reduce wiring and installation costs, as well as free up valuable control room space, a Remote Hardened I/O (RHIO) NEMA4X sealed cabinet option is available for remotely mounting PM/APM/HPM/EHPM I/O (see Figure 7). Backplanes and power supplies included with RHIO are conformally coated. When populated with conformally coated IOPs, FTAs, and Fiber Optic Extenders, the RHIO option provides a GX “Severe” environment product rating against corrosion due to humidity and corrosive gases in remote locations.
The IOP cabinet accommodates a 7-slot file and a redundant 8-amp power supply and is available as a standard product; the FTA cabinet must be custom ordered due to the many variations of FTA sizes and layouts.

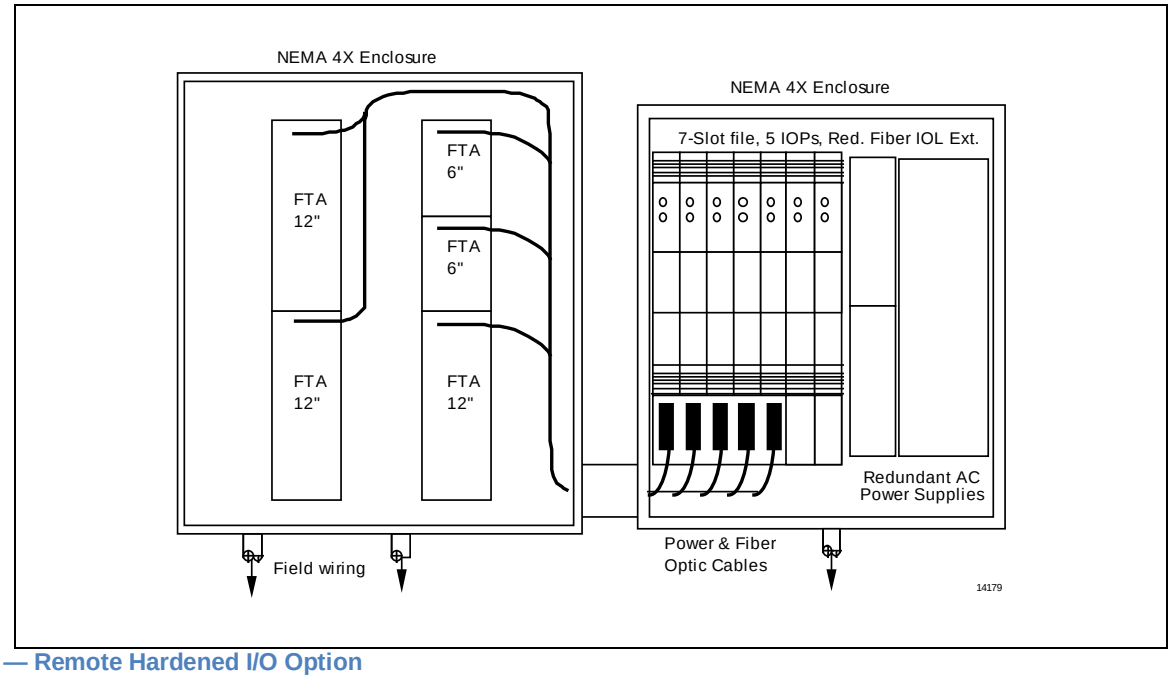


Figure 7 — Remote Hardened I/O Option

5. European Community (EC) Compliance

The APM, HPM, and EHPM are available in compliance with European Community (EC) directive requirements, denoted by the "CE mark" (Communauté Européenne). The PM is not covered. This compliance extends to the APMM/HPMM/EHPM, cardfiles, power supplies, IOPs and FTAs, as well as to Rittal cabinets. Since January 1, 1996, all goods imported into the European community or moving between member countries must be compliant with the new EC directives.
For APMM/HPMM/EHPM, customers must indicate whether or not CE compliance is required. APMMs, HPMMs, EHPMs, IOPs, and power supplies are only available CE-compliant. For cardfiles and some FTAs, both compliant and non-compliant versions are available. Only Rittal cabinets are CE-compliant. Please refer to Table 1 for IOP/FTA more information. Note that the system must be mounted in a standard Rittal cabinet per Honeywell specifications, use only standard Honeywell/Rittal mounting hardware, and be installed according to Honeywell instructions.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6. Specifications

Specifications apply to the PM/APM/HPM/EHPM I/O modules mounted in a standard cabinets. See PM/APM/HPM/EHPM Specification and Data Sheets for more information.

6.1. I/O Link Extender (Remote I/O)

Parameter	Specification	
	Remote I/O Link Extender	**Long Distance I/O Link Extender**
Fiber Link Length	1.2 km	8 km
Fiber Size	62.5/125 µm	62.5/125 µm
Wave Length	820 nanometers	1300 nanometers
Fiber Power Budget Over-Temperature Range	5.5 dB	10.0 dB
Note: Fiber optic cables are supplied by outside vendors in accordance with Honeywell specifications. For additional information, see the *PM/APM Process Manager Planning* manual, PM02-501, Section 9.		

6.2. European Community Compliance (CE-Mark)

CE Conformity (Europe)	This product is in conformity with the protection requirements of the following European Council Directives: 73/23/EEC, the Low Voltage Directive, and 89/336/EEC, the EMC Directive. Conformity of this product with any other "CE Mark" Directive(s) shall not be assumed. *Deviation from the prescribed procedures and conditions specified in the installation manuals may invalidate this product's conformity with the Low Voltage and EMC Directives.* See Table 1 for IOP and FTA model information.
Product Classification	Class I: Permanently mounted, permanently connected Industrial Control Equipment with protective earthing (grounding). (EN 61010-1-1993)
Installation Category	Category II: Energy-consuming equipment supplied from the fixed installation. Local Level Appliances and Industrial Control Equipment. (EN 61010-1-1993)
Pollution Degree	Pollution Degree 2: Normally non-conductive pollution with occasional conductivity caused by condensation. (IEC 664-1-1992)
EMC Classification	Group 1, Class A, Industrial, Scientific and Medical (ISM) Equipment. (EN55011-1991; Emissions)
Method of Assessment	EMC: Technical Construction File (TCF) LVD: Technical File (TF)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.3. High Level Analog Input Processor - 16 Inputs

MC-PAIH03

Parameter	Specification
FTA Models	MU-TAIH02, TAIH12, TAIH52, TAIH03, TAIH13, TAIH23, TAIH53, TAIH22, TAIH62
Input Type	Voltage, current (2-wire or self-powered transmitters)
Input Channels	16 differential input channels
Common Mode Rejection Ratio, dc to 60 Hz (500 Ω source imbalance)	70 dB
Common Mode Voltage, dc to 60 Hz(1)	-6 to +5 V peak
A/D Converter Resolution	16 bits (14 bits used)
Input Range	0 to 5 V 1 to 5 V 0.4 to 2 V 4-20 mA (through 250 □)
Normal Mode Rejection Ratio, at 60 Hz	32 dB
Normal Mode Filter Response	Single-pole RC, -3 dB @ 1 Hz
Maximum Normal Mode Input (differential inputs, no damage)	□ 30 Volts
Crosstalk, dc to 60 Hz (channel-to-channel)	60 dB
Input Impedance (Voltage Inputs)	> 10 M□ powered
Maximum Input Voltage (any input referenced to common, no damage)	□ 30 Volts
Input Scan Rate	4 samples per second per channel. All channels sampled within a 250 ms window.
Hardware Accuracy (@ CMV = 0 V)	□ 0.075% full-scale (23.5°□ 2°C) □ 0.15% full-scale (0 to 50°C)
Transmitter Power Conditioning MU-TAIH02, TAIH52, TAIH12, TAIH03, TAIH13, TAIH53 MU-TAIH22, TAIH23, & TAIH62	 Resistor Current Limited, 145 □ (not fused) for Class 1, Div 2 interfacing Individually Protected Current Limiting Circuits for Class 1, Div 2 interfacing Maximum current: 30 ma Minimum voltage 23 V
Surge withstand capability (Common mode)	ANSI/IEEE C37.90.1-1978
(1) The low-side input connection is normally connected to system common by a wire jumper on the FTA. This can be removed by the user, subject to operating within the CMV specification.	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.4. High Level Analog Input Processor Redundancy Option

MU-TAIH12, TAIH52, TAIH13, TAIH53, TAIH22, TAIH23, TAIH62

Parameter	Specification
Input Scan Cycles Missed or Delayed During Swap or Failover	No cycles missed or delayed
Hardware Accuracy Effect of Failure	No effect nominally □ 2% of FS maximum (at 0 V Common Mode)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.5. Low Level Analog Input Processor - 8 Inputs

MU-PAIL02

Data Conversion Performance	
Parameter	**Specification**
FTA Model	**MU-TAIL02, TAIL03**
Input Type	Thermocouple, RTD, Voltage, & Current (2-wire transmitters require separate power source)
Input Channels	8 galvanically isolated
A/D Converter Resolution	15 bits
Input Range	See table on following page
CMV, dc to 60 Hz	250 Vac rms or ±250 Vdc
Dielectric Strength	1500 Vac rms or ±1500 Vdc Channel-to-channel, and channel-to-PM/APM/HPM/EHPM common
CMRR, dc to 60 Hz	120 dB min. w/1k lead imbalance
NMRR, at line frequency	60 dB min.
Normal Mode Filter Response	-3 dB point: Typical 10.6 Hz; min. 9.6 Hz; max. 11.9 Hz
Crosstalk, dc to 60 Hz	120 dB
Input Impedance	5 k□ min. @ 0-5 Vdc (unpowered)
Input Impedance	10 M□ min. @ 0-5 Vdc (powered)
Maximum Normal Mode Input (no damage)	-20 mV to 5.5 Volt
Input Scan Rate	8 samples per second per channel. All channels sample simultaneously. 4 samples per second per channel for thermocouple input if open thermocouple detection enabled.
Line Frequency Synchronization Type Frequency Range	 Running Average 50/60 Hz +3%, -6%
Hardware (only) Accuracy (0-100 mV, 0-5 V)	±0.05% of full scale, or ± 0.075% of reading at 23.5□ ±2□C (whichever is larger)
Software (only) Accuracy (1)	±0.1□C typical, ±0.5□C maximum at 23.5□ ±2□C
Hardware Reference Junction Accuracy	±0.9□C maximum at 23.5□ ±2□C (in cabinet)
Temperature Stability Voltage Input, current input, thermocouple input (except reference junction) RTD Input	 45 ppm/□C RSS 70 ppm/□C maximum 50 ppm□C RSS 85 ppm/□C maximum
Surge withstand capability (common mode)	ANSI/IEEE C37.90.1-1978

(1) Software EU conversion error including software reference junction compensation. The temperature conversion by software meets or exceeds the accuracy tolerances for fifth order polynomials as specified in the National Institute of Standards and Technology (NIST) Monograph 125 (IPTS-68).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Signal Types and Ranges		
Signal Type	**Normal Signal Range**	**Extended Signal Range**
ANSI J	-100 to 750 C	-200 to 1200 C
ANSI K	0 to 1100 C	-200 to 1370°C
ANSI E	-150 to 500 C	-200 to 1000°C
ANSI T	-200 to 300 C	-230 to 400°C
ANSI B	+600 to 1650 C	+100 to 1820°C
ANSI S	+550 to 1500 C	0 to 1700°C
ANSI R	+550 to 1500 C	0 to 1700°C
JAPAN Type R	+550 to 1500 C	0 to 1700°C
RTD (3 Wire)		
Pt: 100 DIN (4376)	-200 to 850°C	N/A
Pt: 100 JIS (C-1604)	-200 to 650°C	N/A
Ni: 120 Ed #7	-45 to 315°C	N/A
Cu: 10	-20 to 250°C	N/A
Voltage Input		
	0-100 mV	N/A
	0-5 V	N/A

6.6. Low Level Analog Input Multiplexer Processor - 32 Inputs

MU-PLAM02

Data Conversion Performance (General Specifications)	
Parameter	**Specification**
FTA Models	**MU-TAMR03, TAMT03, TAMT13**
Input Type	Thermocouple, RTD, and linear millivolts
Input Channels	32 galvanically isolated
A/D Converter Resolution	14 bits TC types J, K, E, T, B, S, R, RP: 10 µV per bit 100 □ and 120 □ RTDs: 64 m□ per bit 10 □ RTD: 8 m□ per bit Linear mV sensors: 20 µV per bit
CMV, dc to 60 Hz	250 Vac Peak or ±250 Vdc
Dielectric Strength	1500 Vac rms or ±1500 Vdc channel-to-channel (operating), and channel-to-PM/APM/HPM/EHPM common (not operating)
Crosstalk, dc to 60 Hz	120 dB
Input Impedance	2 M□ min. @ 100 mV
Maximum Normal Mode Continuous Input (No damage)	-1 V to 10 V
Input Scan Rate	32 samples per second (each channel once per second)
Line Frequency Synchronization	Configurable to 50 or 60 Hz
Hardware (only) Accuracy	±40 µV, or ± 160 m □ 23.5□ ±2□C
Software (only) Accuracy(1)	±0.1□C typical, ±0.5□C maximum at 23.5□ ±2□C
Surge withstand capability (common mode)	ANSI/IEEE C37.90.1-1978
(1) Software EU conversion error including software reference junction compensation, at reference temperature. The temperature conversion by software meets or exceeds the accuracy tolerances for fifth order polynomials as specified in the National Institute of Standards and Technology (NIST) Monograph 125 (IPTS-68).	
NOTE: Mercury-Wetted Relays are used in this product.	

(Continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Low Level Analog Input Multiplexer Processor - **32 Inputs** (continued) **MU-PLAM02**

Data Conversion Performance --Thermocouple (TC) and Voltage Input		
Parameter	**Specification**	
Thermocouple Device Range	Normal Signal Range	Extended Signal Range
ANSI J ANSI K ANSI E ANSI T ANSI B ANSI S ANSI R JAPAN Type R	-100 to 750□ C 0 to 1100□ C -150 to 500□ C -200 to 300□ C +600 to 1650□ C +550 to 1500□ C +550 to 1500□ C +550 to 1500□ C	-200 to 1200□ C -200 to 1370□ C -200 to 1000□ C -230 to 400□ C +100 to 1820□ C 0 to 1700□ C 0 to 1700□ C 0 to 1700□ C
Voltage Input Signal Range	0 to 100 mV	
CMRR, dc to 60 Hz (0-100 mV)	120 dB min. with 500 □ lead imbalance	
NMRR, at line frequency (50 or 60 Hz)	60 dB min.	
NMRR, at other than line frequency (1-15 mV)	NMRR = -20 □$\log_{10}\left(\frac{\sin(\pi^{x}f^{x}t)}{(\pi^{x}f^{x}t)}\right)$ -20 □ $\log_{10}\left(\frac{1}{K^{x}f}\right)$ Where: □= 3.14159 f= Noise Frequency t= Integration Time (20 ms @ 50 Hz, 16.66ms @ 60 Hz) K= 0.20878 (a constant)	
Normal Mode Filter Response (TC & mV)	-3 dB point: Typical 5.1 Hz; min. 4.3 Hz; max. 6.4 Hz	
Hardware Reference Junction Accuracy	±1.0□C maximum at 23.5□ ±2□C (in cabinet)	
Temperature Stability Voltage Input, current input, thermocouple input (except reference junction)	 20 ppm/□C RSS 30 ppm/□C maximum	
TC Max Length, 250 V Peak/dc Common Mode 16 Gauge TC Wire 18 Gauge TC Wire 20 Gauge TC Wire	 3,500 ft. 2,250 ft. 1,250 ft.	
CMRR = Common Mode Rejection Ratio. NMRR = Normal Mode Rejection Ratio.		

(Continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Low Level Analog Input Multiplexer Processor - **32 Inputs** (continued) **MU-PLAM02**

Data Conversion Performance--Resistive Temperature Device (RTD)	
Parameter	**Specification**
RTD (3 Wire) Input Signal Range Pt: 100 □ DIN (4376) Pt: 100 □ JIS (C-1604) Ni: 120 □ Ed #7 Cu: 10 □	 -200 to 850°C -200 to 650°C -45 to 315°C -20 to 250°C
CMRR, dc to 60 Hz (0-100 mV)	10□ RTD: 120 dB min. 100□ RTD: 110 dB min.
NMRR, at line frequency (50 or 60 Hz)	10□ RTD: 60 dB min. (for 50/60 Hz noise of 0-15 mV) 100□ RTD: 60 dB min. (for 50/60 Hz noise of 0-75 mV)
NMRR, at other than line frequency 10□ RTD: (0-15 mV) 100□ RTD: (0-75 mV)	NMRR = -20 □$\log_{10}\left(\frac{\sin(\pi^{x} f^{x} t)}{(\pi^{x} f^{x} t)}\right)$ Where: □= 3.14159 f= Noise Frequency t= Integration Time (20 ms @ 50 Hz, 16.66ms @ 60 Hz)
Hardware Reference Junction Accuracy	±1.0□C maximum at 23.5□ ±2□C (in cabinet)
Temperature Stability RTD Input	 30 ppm/□C RSS 40 ppm/□C maximum
RTD Max Lead Resistance	15 □
CMRR = Common Mode Rejection Ratio. NMRR = Normal Mode Rejection Ratio.	

6.7. Remote Hardened Multiplexer Processor - 32 Inputs

MU-PRHM01

Data Conversion Performance (General Specifications)	
Parameter	**Specification**
FTA Model	**MC-GRMT01**
Input Type	Thermocouple and linear millivolts
Input Channels	32 galvanically isolated (16 per remote FTA)
A/D Converter resolution	15 bits 100 mV range: LSB = 8 μV Type J, K, or E thermocouples: LSB = 8 μV Type T, B, S, R, or R' thermocouples: LSB = 2μV
Common Mode Voltage, dc to 60 Hz	±30 VRMS Continuous (max, no damage) ±200 V Intermittent (max, no damage)
Crosstalk, dc to 60 Hz	120 dB min
Input Impedance	10 Megohms Min
Maximum Normal Mode Continuous Input (no damage)	±30 VRMS Continuous, one channel at a time
Input Scan Rate	Each channel once per 4 seconds
Line Frequency Noise Cancellation	Configurable to 50 or 60 Hz
Hardware (only) accuracy	0.075% of Full Scale (mV or T/C range)
Software (only) accuracy (1)	0.1°C typical, 0.5°C maximum at 20°C
Surge withstand capability	ANSI/IEEE C37.90.1-1978
Data Conversion Performance (Thermocouple and Voltage Input)	
Parameter	**Specification**
Thermocouple Device Range ANSI J ANSI K ANSI E ANSI T ANSI B ANSI S ANSI R Japan Type R	 -200 to + 1200°C -100 to + 1370°C -200 to + 1000°C -230 to + 400°C +100 to + 1820°C 0 to + 1700°C 0 to + 1700°C 0 to + 1700°C

(Continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Remote Hardened Multiplexer Processor - 32 Inputs (continued) **MU-PRHM01**

Data Conversion Performance (Thermocouple and Voltage Input)	
Parameter	**Specification**
Voltage Input Signal Range	0 to 100 mV
CMRR(2), dc to 60 Hz	90 dB min, 1000Ω lead resistance, DC or line frequency 120 dB min, 0Ω lead resistance, DC or line frequency
Hardware Reference Junction Accuracy	±1°C max error in 20 to 25°C static environment
Calibration Stability: Voltage input or thermocouple input (except reference junction)	±50 ppm per °C max
Open Thermocouple Detection	Performed on every conversion ≤1000Ω good, ≥1200Ω PV = NAN
T/C Max loop resistance	1000Ω total loop resistance
Environmental Specifications	
Parameter	**Specification**
Operating Temperature	-40 to +85°C at Remote FTA 0 to +50°C cabinet ambient for IOP and power adapters
Operating Humidity	10 to 100% condensing, Remote FTA 10 to 90% non-condensing, IOP and power adapters
Corrosives	Gx, Remote FTA G1 or G3 for IOP and power adapters, depending on corrosion option

Notes:

(1) Software EU conversion error including software reference junction compensation, at reference temperature. The temperature conversion by software meets or exceeds the accuracy tolerances for fifth-order polynomials as specified in the National Institute of Standards and Technology (NIST) monograph 125 (IPTS-68).

(2) CMRR = Common Mode Rejection Ratio

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.8. Smart Transmitter Interface Processor*

MU-PSTX03

Parameter	Specification
FTA Models	**MU-TAIH02, TAIH12, TAIH22, TAIH52, TAIH62, TSTX03, TSTX13, TSTX53**
Input Type	Honeywell DE (digital enhanced) protocol (bidirectional)
Input Channels	16 digital input channel PVs
Resolution	The resolution of the connected field instrument is passed through without degradation.
Maximum Input Voltage (any input referenced to common, no damage)	-10 V to +30 V
Transmitter broadcast frequency (PV)	2.4-3.6 PVs per second per channel (configuration dependent).
Accuracy	The accuracy of the connected field instrument is passed through without degradation.
Surge withstand capability (Common mode)	ANSI/IEEE C37.90.1-1978
Transmitter Power Conditioning MU-TAIH02, MU-TAIH52, MU-TAIH12, MU-TSTX03, MU-TSTX13, MU-TSTX53 MU-TAIH22 & TAIH62	 Resistor Current Limited, 145 □ (not fused) for Class 1, Div 2 interfacing Individual Protected Current Limiting Circuits for Class 1, Div 2 interfacing Maximum current: 30 ma Minimum voltage 23 V

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.9. Smart Transmitter Interface Processor* Redundancy Option

MU-TAIH12, TAIH52, TSTX13, TSTX53

Parameter	Specification
Input Scan Cycles Missed or Delayed During Swap or Failover	No cycles missed or delayed
Hardware Accuracy Effect of Failure	No effect nominally. The resolution of the connected field instrument is passed through without degradation.

* Smart Transmitter Interface Processor (MU-PSTX03) supports both single and multivariable transmitter types.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.10. Serial Device Interface (General Specifications)

MU-PSDX02

Parameter	Specification
FTA Models	**MU-TSDM02, TSDT02, TSDU02**
Input Channels	1 galvanically isolated serial channel per FTA
Interface Type	EIA-232, EIA-422 or EIA-485
Points per FTA (Maximum of two FTAs per IOP)	1-8
Points per IOP	1-16
Common Mode Voltage, dc to 60 Hz	250 Vac rms or ±250 Vdc
Dielectric Strength	1500 Vac rms or ±1500 Vdc (channel to PM/APM/HPM/EHPM)
Surge withstand capability	ANSI/IEEE C37.90.1-1978

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.11. Serial Device Interface - Toledo Weigh Cell

MU -TSDT02

Parameter	Specification
Physical Interface	EIA-232 using DB-25 female connector
Device Supported	Toledo Weigh Cell Model Number 8142-2089
Lines Supported (EIA-232)	Transmit Data, Receive Data, Request To Send, Clear To Send, Data Set Ready, Data Terminal Ready, Data Carrier Detect, Logic Ground, Protective Ground
Full Modem Support	No
Distance, Power Adapter to FTA	Internal cable within PM/APM/HPM/EHPM cabinet or External cable 300 m (1000 ft.) maximum
EIA-232 Cable Length, FTA to Device	15 m (2500 pF cable capacity maximum)*
Surge withstand capability	ANSI/IEEE C37.90.1-1978
ESD Protection	IEC 801.2
Number of Toledo Weigh Cells	2 FTAs per SDI IOP 1 Toledo Weigh Cell per FTA
Baud Rate	9600 bps fixed rate
Data Transfer	Bidirectional, Half-Duplex
Message Validity	Single-bit character parity Message block checksum

* Consult factory for longer lengths.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.12. Serial Device Interface - Manual/Auto Station

MU-TSDM02

Parameter	Specification
Physical Interface	EIA-485 Multidrop using 5-terminal compression connector
Device Supported	Honeywell Manual/Auto Station
Lines Supported (EIA-485)	R (Data+), Data+, Shield, Data-, R (Data-)
Full Modem Support	No, Multidrop is not a modem interface
Distance, Power Adapter to FTA	Internal cable within PM/APM/HPM/EHPM cabinet or External cable 300 m (1000 ft.) maximum
EIA-485 Cable Length, FTA to Device	1.2 km (4000 ft.) with appropriate cable*
Surge withstand capability	ANSI/IEEE C37.90.1-1978
ESD Protection	IEC 801.2
Number of Manual/Auto Stations	2 FTAs per SDI IOP 4 Manual/Auto Stations per FTA
Baud Rate	19.2 Kbps
Transmission Mode	Asynchronous, Bit Serial
Data Transfer	Bidirectional, Half-Duplex
Message Validity	Single-bit character parity Message block checksum
Tag ID Downloaded	8 Characters
PV Range	EUHI and EULO downloaded
Input Scan Rate	Four updates per second per point

* Refer to PM I/O Installation manual (PM20-520).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.13. Serial Device Interface - UDC 6000 Process Controller

MU-TSDU02

Parameter	Specification
Physical Interface	EIA-485 Multidrop using 5-terminal compression connector
Device Supported	Honeywell UDC 6000 with Modbus Communication Option
Lines Supported (EIA-485)	R (Data+), Data+, Shield, Data-, R (Data-)
Full Modem Support	No–Multidrop is not a modem interface
Distance, Power Adapter to FTA	□Internal cable within APM cabinet or □External cable 300 m (1000 ft.) maximum
EIA-485 Cable Length, FTA to Device	1.2 km (4000 ft.) with appropriate cable*
Surge withstand capability	ANSI/IEEE C37.90.1-1978
ESD Protection	IEC 801.2
Number of UDC 6000s	□2 FTAs per SDI IOP □4 UDC 6000s per FTA
Baud Rate	19.2 Kbps
Transmission Mode	Asynchronous, Bit Serial
Data Transfer	Bidirectional, Half-Duplex
Communication Protocol	Modbus Remote Terminal Unit (RTU) protocol
Message Validity	□Single-bit character parity □Message block checksum

* Refer to PM I/O Installation manual (PM20-520).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.14. Serial Interface I/O Processor/FTA - Modbus

MU-TSIM12

Parameters	Specification
Physical Interface	EIA-232 or EIA-485
Devices Supported	Multivendor Qualified Modbus Compatible Devices
Distance, Power Adapter to FTA	Internal cable within APM/HPM/EHPM cabinet or External cable 300 m (1000 ft.) maximum
Surge withstand capability	ANSI/IEEE C37.90.1-1978
ESD Protection	IEC 801.2
Number of Devices per SI	2 FTAs per SI Up to 15 devices per FTA
Data Quantity per IOP	16 Points per serial channel (organized as Arrays in the APMM/HPMM/EHPM) Each point can access *one* of the following: 512 Booleans into FLAGS 16 Reals or 32 Integers into NUMERICS 64 NUMERICS (Diagnostic Counter Data Only) 1 STRING of 64 Characters 2 STRINGS of 32 Characters 4 STRINGS of 16 Characters 8 STRINGS of 8 Characters
Serial Data Format	8 data bits with programmable 9th bit
EIA RS232 Support Transmission Mode: Lines Supported: Distance, FTA to Device:	 Serial asynchronous, bidirectional TXD, RXD, RTS, CTS, DSR, DTR, DCD, Logic GND, Protective GND 15 m (2500 pf cable capacity maximum)
EIA-RS485 Support Transmission Mode: Lines Supported: Common Mode Operation: Number of drops: Distance, FTA to Device:	 Serial asynchronous, bidirectional, half duplex only Two wire, differential pair: Data+(B), Data-(A), Protective GND (shield) 250 Vac rms (continuous) 15 drops maximum 1.2 Km (4000 ft.) maximum
Modbus Interface Specification Protocol: Serial Line Mode: Selectable Baud Rates: Selectable Parity: Number of Stop Bits: Modem Control Support: Keep Alive Cell Write Message Response Timeout: Exception Errors Reported: Data Formats Supported: Intermessage stall time: Function Codes Supported:	(Default parameters are shown in **bold**.) Modbus, Remote Terminal Unit (RTU) **RS232** or RS485 1200, 2400, 4800, 9600, **19200** bps None, **odd**, or even 1 Selectable ON/**OFF** Configurable address/**NONE** Configurable timeout/**1.5 seconds** All Boolean, Real, ASCII Strings, Signed Integers 3.5 character time minimum 01, 02, 03, 04, 05, 06, 08, 16

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.15. Serial Interface I/O Processor/FTA - Allen-Bradley

MU-TSIA12

Parameters	Specification
General	
Interface Type:	EIA-RS232
Number of Channels per IOP:	2
Distance, Power Adapter to FTA:	300 m (1000 ft.)
Baud Rate:	19.2 k bps
Serial Data Format with parity bit:	8 data bits
Common Mode Operation:	250 V rms (continuous)
EIA-RS232 Support	
Interface Type:	Serial asynchronous
Lines Supported:	TXD, RXD, Logic GND, Protective GND
Distance, FTA to Device:	15 meters (cable cap. = 2500 pF max.)
SI A-B Specific Interface Specifications	
Protocol:	Full Duplex Allen-Bradley DF1 with embedded responses
Transmission Mode:	Character oriented
Serial Line Mode:	RS232
Parity:	even
No. Stop Bits:	1
Modem Control Support:	Off
ACK Timeout:	3.2 sec.
FTA Message Response Timeout:	4.0 sec.
Data Formats Supported:	Booleans, Reals, Signed/Unsigned Integers, ASCII Strings
CIM Communication Options:	Pass-through diagnostic Accept duplicate message BCC error check
Allen-Bradley Family Types Supported:	PLC-2 PLC-3 (Native Mode and PLC-2 Mode) PLC-5, except PLC-5/250 (Native Mode and PLC-2 Mode)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.16. Allen-Bradley File Types

APM/HPM Array Point Types	PLC-5 File Types	PLC-3 Files Types
Flag	Output (O), Input (I), Status (S)	Output (O), Input (I), Status (S)
Flag	Bit (B)	Binary (B)
Numeric (16-bit Signed Integer)	Integer (N)	Integer (N)
Numeric (IEEE Single Precision)	Float (F) (IEEE Format)	Float (F) (VAX F Format)
Numeric (16-bit Unsigned Integer)	Timer (T), Counter (C) (READ ONLY)	
String	ASCII (A)	ASCII (A)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.17. Pulse Input Processor/FTA

MU-PPIX02

Parameters	Specification
FTA Models	**MU-TPIX12, TPIX52**
Sensor Inputs	Self-powered 2-wire PM/APM/HPM/EHPM-powered (with automatic current limiting) 3-wire Pulse voltage or contact input
Input Type	Rectangular or sine waves
Input Channels	8
Input Impedance	10 k□ minimum
Input Frequency (1) 50% Duty Cycle Square Wave Sine Waves	 1 Hz to 20 kHz (all channels same amplitude) 1 Hz to 20 kHz
Pulse Levels Low High	 -0.5 V to +1.9 V +3.5 V to +24 V (Hysteresis prevents change between 1.9 V and 3.5 V)
Pulse Width (On/Off Dwell) High and Low	 25 µs minimum at 20 kHz (with IOP filter jumper in storage position) 50 µs minimum at 10 kHz (with IOP filter jumper in H position) 500 µs minimum at 1 kHz (with IOP filter jumper in L position)
Contact Current Low (0, Field contact closed) High (1, Field contact open)	 23 mA maximum (with FTA Pullup) (2) 20 mA maximum (with FTA Pullup) (2)
Contact Resistance Low (0, Field contact closed) High (1, Field contact open)	 82 □ maximum (with FTA Pullup) (2) 175 □ minimum (with FTA Pullup) (2)
Field Input Scan Rate	20 ms
AV Update Rate (Used for Totalizer Algorithm)	20 ms
PV Update Rate	500 ms for 8 channels
Rate Accuracy	±0.01% of input frequency, ±0.4 Hz (whichever is larger)
Rate Resolution	±0.4 Hz
Input Range (No Damage)	±30 V maximum
Transmitter Power Conditioning (for 3-wire connection) Open Circuit Voltage Full Load Short Circuit Current	 23-25 Vdc 21 V @ 115 mA 150 mA maximum

(1) Sine waves must not be intermixed with square waves or contacts on the same FTA.
50 M FTA cables with mixed signal amplitudes: frequency is 9 kHz maximum (55 µs minimum pulse width)
30 M FTA cables: frequency is 13 kHz maximum (38 µs minimum pulse width)
20 M FTA cables: frequency is 15 kHz maximum (33 µs minimum pulse width)
10 M FTA cables: frequency is 18 kHz maximum (28 µs minimum pulse width)
5 M FTA cables: frequency is 20 kHz maximum (25 µs minimum pulse width)

(2) 1 k□ to 24 Vdc.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.18. Analog Output 8-Point Processor/FTA

MC-PAOX03

Parameter	Specification
FTA Models	**MU-TAOX02, TAOX12, TAOX52**
Output Type	4-20 mA
Output Channels	8
Output Ripple	100 mV peak-to-peak at power line frequency, across 250 □ load
Output Temperature Stability	0.02% Full Scale/□C
Resolution	± 0.05%
Calibrated Accuracy	± 0.35% (25□C) including linearity
Output Readback Checking Accuracy	±4%
Humidity	10 - 90% non-condensing
Directly Accessible Output Current Range	0.1-21.4 mA
Maximum Current Output	26 mA
Maximum Resistive Load	750 □ @ 22 mA
Output Settling Time (digital input code to 98% of final output value)	4 ms
Surge withstand capability	ANSI/IEEE C37.90.1-1978

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.19. Analog Output 8-Point Processor Redundancy Option

MU-TAOX12, TAOX52

Parameter	Specification
Output Signal Perturbation During Swap	1 ms nominal 4 ms maximum
Output Signal Perturbation During Failover	30 ms nominal 125 ms maximum
FTA Switching Hardware Diagnostic Frequency	Once per minute

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.20. Analog Output 16-Point Processor/FTA

MU-PAOY22

Parameter	Specification
FTA Models	**MU-TAOY22, TAOY52, THAO11, GHAO11**
Output Type	4-20 mA
Output Channels	16
Output Ripple	100 mV peak-to-peak at power line frequency, across 250 □ load
Output Temperature Stability	±0.02% Full Scale/□C (all except MU-GHAO11) ±0.025% Full Scale/□C (MU-GHAO11)
Output Readback Accuracy	±4%
Humidity	□0.1% full scale (50% RH □40% RH)
Output Current Linearity	± 0.05% nominal
Resolution	± 0.05%
Calibrated Accuracy	± 0.35% (25□C) including linearity (all except MU-GHAO11) ± 0.45% (25□C) including linearity (MU-GHAO11)
Directly Settable Output Current Range	0 mA, 2.9 mA to 21.1 mA
Absolute Max Current Output for AO Value Digital Input Code	24 mA
Maximum Resistive Load (24 V supply = 20 V)	750 □ @ 20 mA (MU-TAOY22, TAOY52) 720 □ @ 20 mA (MU-THAO11) 870 □ @ 20 mA (MU-GHAO11)
Maximum Output Compliant Voltage (24 V supply = 20 V)	15 V (MU-TAOY22, TAOY52) 14.4 V (MU-THAO11) 17.4 V (MU-GHAO11)
Output Settling Time (digital input code to 98% of final output value)	4 ms
Surge Withstand Capability	ANSI/IEEE C37.90.1-1978

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.21. Analog Output 16-Point Processor Redundancy Option

MU-TAOY22, TAOY52, THAO11, GHAO11

Parameter	Specification
Gap (0 mA) of Output to Field on Failover	20 ms maximum
Switching Hardware Diagnostic Frequency	Once per minute

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.22. Digital Input Processor and Digital Input Sequence of Events Processor

MU-PDIX02/MU-PDIS12

FTAs with Removable Plug-In Isolators			
Parameter	**Specification**		
	24 Vdc FTA	**120 Vac FTA 125 Vdc FTA**	**240 Vac FTA**
FTA Models	**MU-TDID12, TDID52**	**MU-TDIA12, TDIA52**	**MU-TDIA22, TDIA62**
Input Channels	32	32	32
Accumulated Input Frequency	dc - 15 Hz	NA	NA
Galvanic Isolation (field to PM/APM/HPM/EHPM)	1500 Vac rms or ±1500 Vdc(2)	1500 Vac rms or ±1500 Vdc	1500 Vac rms or ±1500 Vdc
Isolation Technique	Optical	Optical	Optical
Digital Input Pwr. Range(1)	20-30 Vdc	90-132 Vac rms	180-264 Vac rms
Sense Current (ON condition)	4.5 mA minimum	3.5 mA minimum	2.2 mA minimum
Sense Current (OFF condition)	2.8 mA maximum	1.5 mA maximum	1.0 mA maximum
Pick Up Voltage (ON condition)	20 Vdc minimum(3)	90 Vac rms minimum(4)	180 Vac rms minimum(4)
Drop Out Voltage (OFF condition)	10 Vdc maximum(3)	25 Vac rms maximum(4)	50 Vac rms maximum(4)
Absolute Delay Across Input Filter and Isolation (Bounceless Input to PM/APM/HPM/EHPM logic level change)	2.0 ms maximum	25 ms maximum	25 ms maximum
Frequency Range	dc	47-63 Hz	47-63 Hz
Surge withstand capability	ANSI/IEEE C37.90.1-1978	ANSI/IEEE C37.90.1-1978	ANSI/IEEE C37.90.1-1978

(1) These dc voltage limits include an ac component that has a peak value of 5% of the nominal dc range value.
(2) Not applicable if system power is used to power field inputs.
(3) This voltage present from '-' terminal to ground.
(4) The voltage present across input terminals.

(Continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Digital Input Processor and Digital Input SOE Processor (continued) **MU-PDIX02/ MU-PDIS12**

Packaged FTAs without Plug-In Isolators		
Parameter	**Specification**	
	24 Vdc FTA	**120 Vac FTA**
FTA Model Numbers	**MU-TDID72**	**MU-TDIA72**
Input Channels	32	32
Accumulated Input Frequency	dc - 15 Hz	NA
Galvanic Isolation (field to APM)	1500 Vac rms or ±1500 Vdc(5)	1500 Vac rms or ±1500 Vdc
Isolation Technique	Optical	Optical
Digital Input Pwr. Range(1)	18-30 Vdc	90-132 Vac rms
Sense Current (ON condition)	12 mA minimum	5.2 mA minimum
Sense Current (OFF condition)	4.3 mA maximum	1.47 mA maximum
Absolute Delay Across Input Filter and Isolation (Bounceless Input to PM/APM/HPM/EHPM logic level change)	3.6 ms maximum	25 ms maximum
Field Resistance for Guaranteed ON condition(2, 3)	100 □ maximum	100 □ maximum
Field Resistance for Guaranteed OFF condition(2, 3)	45 k□ minimum(4)	71 k□ minimum
Frequency Range	dc	47-63 Hz
Surge withstand capability	ANSI/IEEE C37.90.1-1978	ANSI/IEEE C37.90.1-1978

(1) These dc voltage limits include an ac component that has a peak value of 5% of the nominal dc range value.
(2) This resistance is present between the two legs of a DI current sense circuit.
(3) For field wiring distance guidelines, see the appropriate *Site Planning* manual.
(4) Reduce to 37.4 k□ if digital input power range is limited to 18-25 Vdc.
(5) Not applicable if system power is used to power field inputs.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.23. Digital Input Processor Redundancy Option

(MU-PDIS12 Only)

Parameter	Specification
Input Scan Cycles Missed or Delayed During Swap or Failover	No cycles missed or delayed (all FTA types)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.24. Digital Input 24 Vdc Processor

MU-PDIY22

Parameter	Specification
FTA Models	**MU-TDIY22, MU-TDIY62**
No. Points per IOP/FTA	32
Galvanic Isolation (any input terminal voltage referenced to common)	30 Vac, □42.4 Vdc (max)
Isolation Technique	Optical (in IOP)
DI Power Voltage Range	15 to 30 Vdc
Input Signal Direction	Source/Sink
ON Sense Voltage/Current OFF Sense Voltage/Current	13 Vdc (min) or 3 mA (min) 5 Vdc (max) or 1.2 mA (max)
Input Impedance	4.2 K□
Absolute Delay Across Input Filter and Isolation	5 ms □ 20%
Field Resistance for Guaranteed ON Condition	300 Ω max @ 15 Vdc
Field Resistance for Guaranteed OFF Condition	30 KΩ min @ 30 Vdc
Surge Withstand Capability	ANSI/IEEE C37.90.1-1978

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.25. Digital Output 16-Point Processor

MU-PDOX02

Solid State			
Parameter	**Specification**		
	3-30 Vdc FTA	**120/240 Vac FTA**	**31-200 Vdc FTA**
FTA Model Numbers	**MU-TDOD13, 53, 14, 54**	**MU-TDOA13, MU-TDOA53**	**MU-TDOD23, MU-TDOD63**
Output Channels	16 (Outputs are independent from each other and can use independent load power supplies.)	16 (Outputs are independent from each other and can use independent load power supplies.)	16 (Outputs are independent from each other and can use independent load power supplies.)
Output Type	Normally open power transistor switch per output (emitter and collector terminals are both available to the user.)	Normally open triac switch per output (both triac terminals are available to the user)	Normally open power transistor switch per output (emitter and collector terminals are both available to the user.)
Load Voltage Range	13, 53 3-30 Vdc 14, 54 5-30 Vdc	120/240 Vac	31-200 Vdc
FTA Max Continuous Load Current	1.25 Adc per output(2)	1.25 Adc per output(2)	0.5 Adc per output(2)
Load Fuse Rating(5)	2.5 A 125 V slow blow (5x20 mm) fuse per output (readily replaceable in fuseholders)	2.5 A 125 V slow blow (5x20 mm) fuse per output (readily replaceable in fuseholders)	1 A 125 V slow blow (5x20 mm) fuse per output (readily replaceable in fuseholders)
Fuse Type (BUSS)	GDC-2.5 A	GDC-2.5 A	GDC-1 A
Load Power Factor	N/A	Must be 0.5 or greater(1)	N/A
Min. Load Current(3)	10 mAdc	50 mA (rms)	10 mAdc
Isolation	1500 V (rms) (field terminals to system power supply common)	1500 V (rms) (field terminals to system power supply common)	1500 V (rms) (field terminals to system power supply common)
On-State Voltage Drop	(@ max. load current) 13, 53 1.6 V max. 14, 54 3.0 V max .	1.6 V max. (@ max. load current)	3.0 V max. (@ max. load current)
Off-State Leakage Max.	13, 53 10 µAdc max. 14, 54 100 µAdc max.	5 mA rms	100 µAdc max.
Turn-on/Turn-off Time	1 ms max.	Next zero voltage/next zero current(4)	1 ms max.
Contact Suppression (Shunt)	Diode clamp	Resistor/capacitor snubber plus varistor per output	Diode clamp
Surge withstand capability	ANSI/IEEE C37.90.1-1978	ANSI/IEEE C37.90.1-1978	ANSI/IEEE C37.90.1-1978

(1) Load power factors less than 0.5 can damage the triac switches. Additional resistor/capacitor snubbing must be added across the triac as discussed in the appropriate *Installation* manual for load power factors less than 0.5; otherwise a load with power factor 0.5, or greater, must be used.
(2) Individual output rated at maximum 2 Adc, provided that total current for two adjacent channels does not exceed 2.5 amps.
(3) Surge current rating of solid-state switch at 20 □C non-repeating.
(4) As much as 0.5 line cycle (8.33 ms for 60 Hz line) for power factor <1.0.
(5) Actual fuse rating is slightly greater than the maximum FTA output allowed. “Use the FTA Max Continuous Load Current” section for maximum FTA output rating.

(Continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Digital Output 16-Point Processor (continued) **MU-PDOX02**

Solid State (continued)	
Parameter	**Specification**
	24 Vdc Nonisolated FTA
FTA Models	**MU-TDON12, MU-TDON52**
Output Channels	16 (outputs referenced to power supply common)
Output Type	Open-collector (current-sinking) NPN transistors
Output Volt. States(1)	ON-state: 0-2 Vdc (maximum) OFF-state: "Ref +" terminal voltage (24 Vdc nominal)
Maximum Load Current	100 mA per output(2)
Minimum Load Current	1 mA per output
Output Isolation	None (any screw terminal to common)
On-State Voltage Drop	2 V max. @ max. load current
Off-State Leak. Current	100 µA max. @ max. output voltage
Turn-on/Turn-off Time	10 µs
Contact Suppression (Shunt)	Diode per output to “Ref +” terminal(3)
Output Transient Protection	(See Contact Suppression)

(1) Because of the open-collector transistor configuration of the outputs, the nominal off-state output voltage is the load power supply (“Ref +”) voltage, nominally +24 Vdc, minus any voltage across the load caused by off-state leakage current.

(2) All outputs ON (100% duty cycle) at maximum operating temperature.

(3) User must diode-suppress any inductive loads (such as relay coils) as close as possible to the load.

(Continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Digital Output 16-Point Processor (continued) **MU-PDOX02**

Electro-Mechanical Relay--120 Vac FTA, 125 Vdc FTA	
Parameter	**Specification**
FTA Models	**MU-TDOR12, MU-TDOR52**
Outputs	16 isolated Form A (SPST/NO) or Form B (SPST/NC) contacts (jumper selectable per output)
Contact Type	Silver alloy
Maximum Load Voltage	140 Vac (rms)/140 Vdc
Maximum Steady-State Load Current	5 A rms @ 120 Vac (resistive) per output 2 A @ 30 Vdc (resistive) per output 0.5 A @ 125 Vdc (resistive) per output 1/8 horsepower per output
Minimum Load Current(1)	100 mA
Load Surge Current(2)	Overload and Endurance per UL 508
Isolation	1500 Vac rms or ±1500 Vdc Channel-to-channel, and channel-to-PM/APM/HPM common
Turn-on Time	10 ms typical, 15 ms maximum
Turn-off Time	10 ms typical, 15 ms maximum
Maximum Repetition Rate	360 cycles per hour at rated load
Contact Life(3)	Operations / % of Max. Load 350,000 100 450,000 80 750,000 60 1,000,000 40 1,300,000 20 20,000,000 0 (Mechanical Life)
Contact Suppression (Shunt)	22 □/0.1 µF resistor/capacitor snubber across each contact
Load Fusing on Termination Assembly	6 A 125 V slow-blow (5x20 mm) fuse per output
Surge withstand capability	ANSI/IEEE C37.90.1-1978

(1) The power contacts in these relays are not suitable for load currents less than 100 mA.

(2) Contact surge rating is limited by fuse opening time. Fuse opening time is 0.5 sec @ 18 A, 1 sec. @ 15 A, 5 sec @ 10 A

(3) For resistive loads (power factor = 1.0); derate linearly by 5% at 0.9 load power factor to 50% at 0.1 load power factor.

(Continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Digital Output 16-Point Processor (continued) **MU-PDOX02**

Electro-Mechanical Relay--240 Vac FTA, 125 Vdc FTA	
Parameter	**Specification**
FTA Models	**MU-TDOR22, MU-TDOR62**
Outputs	16 isolated Form A (SPST/NO) or Form B (SPST/NC) contacts (jumper selectable per output)
Contact Type	Silver alloy
Maximum Load Voltage	265 Vac (rms)/140 Vdc
Maximum Steady-State Load Current	2.5 A (rms) @ 240 Vac (resistive) per output 2 A @ 30 Vdc (resistive) per output 0.5 A @ 125 Vdc (resistive) per output 1/8 horsepower per output
Minimum Load Current(1)	100 mA
Load Surge Current(2)	Overload and Endurance per UL 508
Isolation	1500 Vac rms or ±1500 Vdc Channel-to-channel, and channel-to-PM/APM/HPM common
Turn-on Time	10 ms typical, 15 ms maximum
Turn-off Time	10 ms typical, 15 ms maximum
Maximum Repetition Rate	360 cycles per hour at rated load
Contact Life(3)	Operations % of Max. Load 350,000 100 450,000 80 750,000 60 1,000,000 40 1,300,000 20 20,000,000 0 (Mechanical Life)
Contact Suppression (Shunt)	51 □/0.022 µF resistor/capacitor snubber across each contact
Load Fusing on Termination Assembly	3 A 250 V slow-blow (5x20 mm) fuse per output
Surge withstand capability	ANSI/IEEE C37.90.1-1978

(1) The power contacts in these relays are not suitable for load currents less than 100 mA.
(2) Contact surge rating is limited by fuse opening time. Fuse opening time is 0.5 sec @ 10 A, 1 sec. @ 8 A, 5 sec @ 6 A.
(3) For resistive loads (power factor = 1.0); derate linearly by 5% at 0.9 load power factor to 50% at 0.1 load power factor.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.26. Digital Output 32-Point Processor

MU-PDOY22

24 Vdc FTA	
Parameter	**Specification**
FTA Model Numbers	**MU-TDOY22, MU-TDOY62**
Output Channels	32
Output Type	Open-collector (current sinking) NPN transistors
Load Voltage Range	15-30 Vdc
Load Current	MU-TDOY22 0.5 A (max) per pts. 1.0 A (max) per 2 pts. 5 A (max) per 32 pts. MU-TDOY62 0.5 A (max) per pts. 1.2 A (max) per 8 pts. 5 A (max) per 32 pts.
Isolation	Galvanic Isolation (photo coupler) 30 Vac, 42.4 Vdc max. (Any output voltage referenced to common)
On-State Voltage	0.5 V (max), load current @ 0.5A
Off-State Voltage	30 Vdc (max)
Off-State Leak Current	0.5 A (max)
Turn-On/Turn-Off Time	200 msec (max)
Surge withstand capability	ANSI/IEEE C37.90.1-1978
Load Fuse Rating	MU-TDOY22 -- 1 fuse/2 pts. (compression)* MU-TDOY62 -- 1 fuse/8 pts. (screw terminal)* * Fuse - 1.6 A 125 V (5.5 x 17.2 MM)

(Continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Digital Output 32-Point Processor (continued) **MU-PDOY22**

120/240 Vac Relay FTA	
Parameter	**Specification**
FTA Model Numbers	**MU-TDOY23, MU-TDOY63**
Output Channels	32 (16 per FTA) 16 isolated Form A (SPST/NO) or Form B (SPST/NC) contacts (jumper selectable per output)
Contact Type	Gold-clad silver nickel
Maximum Load Voltage	250 Vac (RMS)/125 Vdc
Maximum Steady State Load Current per Output	Current Voltage 3 A 250 Vac(resistive) 3 A 125 Vac (resistive) 3 A 30 Vdc (resistive) 1 A 48 Vdc (resistive) 0.4 A 125 Vdc (resistive) 2 A 250 Vac (inductive = 0.4 power factor) 2 A 125 Vac (inductive = 0.4 power factor) 1 A 30 Vac (inductive L/R = 100 ms) 0.3 A 48 Vac (inductive L/R = 100 ms) 0.1 A 125 Vac (inductive L/R = 100 ms)
Minimum Load Voltage	5 Vdc
Minimum Load Current	10 mA
Isolation	1500 Vac rms or ±1500 Vdc Channel-to-channel, and channel-to-PM/APM/HPM common
Turn-On Time	10 ms maximum
Turn-Off Time	10 ms maximum
Maximum Repetition Rate	
Contact Life	Operations % of Max Load 10,000,000 0 (Mechanical Life) 200,000 @ 3 A (100%)
FTA +24 Vdc Current	12.5 mA for each energized relay (coil resistance = 2 K□)
Surge Absorber for Coil	120□ + 0.03 □F for each channel
Serviceability	No fuse for FTA
Surge withstand capability	ANSI/IEEE C37.90.1-1978
NOTE: One FTA supports up to 16 circuits. When 17-32 circuits are used, 2 FTAs are required. Bridge cable MU-KBFT01 or MU-KBFT02 is required to connect the two FTAs.	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.27. FOUNDATION Fieldbus I/O Processor/FTA (Obsolete Product)

The EHPM/HPM based Fieldbus products (MU-PFBS01, MC-PFBS01, MU-TFBS01, MC-TFBS01, MU-TFBS11, MC-TFBS11, MU-GFBS01, MC-GFBS01, MU-GFBS71 and MC-GFBS71) have been discontinued. For Full Fieldbus capability please refer to the Field Device Manager (FDM) product line.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.28. Analog Input IOP Comparison

Product	LLAI 8	LLMUX	RHMUX
IOP Configuration(1)	LLAI	LLMUX	LLMUX
Channels	8	32	32
T/C inputs	Yes	Yes (MU-TAMT03/13)	Yes
RTD inputs	Yes	Yes (MU-TAMR03)	No
Linear Voltage	0 - 100 mV 0 - 5 V	0 - 100 mV	0 - 100 mV
CJR	Local	Local (MU-TAMT03) Remote (MU-TAMT13)	Local (on mux FTA)
A/D Converter Resolution	15 bits	14 bits	15 bits
Max distance	50 meters	300 meters	2000 meters
Scans/Second	8 (without OTD) 4 (with OTD)	1	0.25(2)
OTD Detection	Every Sample	Every 30 Seconds	Every Sample
Ground Fault Detect	No	No	Yes
Multiplexer Switch Type	N/A	Mercury-Wetted Relays	Solid-State Relays
Temperature Range	0 to 50°C	0 to 50°C	-40 to +85°C (FTA only)
Humidity Range	10-90% noncondensing	10-90% noncondensing	10-100% condensing (FTA only)
Mounting	FTA Tray	FTA Tray	Remote Enclosure(3)
Corrosion Resistance	G1 or G3(4)	G1 or G3(4)	GX

(1) The RHMUX is configured into the TPS PM system as a standard LLMUX, and may be used in systems with Release 300 or greater.
(2) The IOP scans one or both remote FTAs every 4 seconds.
(3) The RHMUX remote multiplexer FTA is designed to mount in a NEMA-4 or NEMA-4X enclosure to withstand harsh environmental conditions.
(4) Depending on corrosion option.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.29. Analog Output IOP Comparison

Function **IOP Models**	**AO (8 points** **MC-PAOX03**	**AO (16 points)** **MU-PAOY22**
IOP Configuration	AO	AO_16
Number of Channels	8	16
Smallest ORU(1)	IOP	IOP
Redundancy(2)	Yes	Yes
Redundancy Method	Outputs Electrically Isolated via Field Replaceable Relay Switch Module on FTA	Parallel Outputs -- Solid-State Switch in IOPs
Redundancy Bias(3)	Yes	No
Output Condition on IOP failure(4)	Configurable	Unpowered
Output Condition on PMM failure(5)	Configurable	Configurable
Single Channel Failure Robustness(6)	High	Medium
External Connection Check(7)	Yes	Yes
Standby Manual(8)	Yes	Yes
Supports Direct Landing of HART Signals	No	Yes

(1) The Optimal Replaceable Unit (ORU) is the object that can be replaced on a failure that minimally impacts the operation of the system. The ORU is generally an item that can be replaced in the field using a minimum number of tools. In many cases the item is plug replaceable such as the IOP.

(2) Failure detection coverage for the redundancy option is equivalent.

(3) In a redundant configuration, the primary is a "preferred" primary. System availability is slightly increased when the primary IOP is the “preferred” Primary. Servicing of the FTA switching module can be performed without disturbing the process when the IOP is the “preferred” primary.

(4) The output state upon failure of the AO8 IOP is configurable to either ***Hold*** or ***Unpower*** the output. AO16 outputs are always set to ***Unpowered*** upon failure of the IOP.

(5) The output state upon failure of the PMM for both AO8 and AO16 IOPs is configurable to either ***Hold*** or ***Unpower*** the output.

(6) Channel robustness is different in the two module types. The AO8 provides individual channel output circuitry including individual output power systems and individual DAC output circuits. The AO16 provides one power supply and one DAC per IOP. Individual AO16 outputs are controlled using sample and hold circuitry.

(7) Point level failures are detected by both AO8 and AO16 IOPs. Both IOPs can detect if the output is being correctly propagated to the field (i.e., wires are connected).

(8) The Standby Manual is an optional unit which handles 8 outputs. The AO16 provides a Standby manual function by using two AO8 standby manual units connected into the AO16 FTA.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.30. Digital Input IOP Comparison

Function IOP Models	DI (32 points) MU-PDIX02	DI (32 points) MU-PDIY22	DI SOE (32 points) MU-PDIS12
Number of Channels	32	32	32
IOP Configuration(1)	DI	DI	DISOE
Maximum Input Voltage @ FTA	250 V ac/dc	30 Vdc	250 V ac/dc
Smallest ORU(2)	2 Channels	IOP	2 Channels
Redundancy	No	Yes	Yes

(1) The DI24V is configured into the TPS PM system as a standard DI IOP. This permits using the DI24 V IOP in systems on releases prior to R500. Any PM system requiring only 24 Volt Digital Inputs can use the DI24 V IOP.

(2) The Optimal Replaceable Unit (ORU) is the object that can be replaced on a failure that minimally impacts the operation of the system. The ORU is generally an item that can be replaced in the field using a minimum number of tools. In many cases the item is plug replaceable such as the IOP.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.31. Digital Output IOP Comparison

Function IOP Models	DO (16 points) MU-PDOX02	DO (32 points) MU-PDOY22
IOP Configuration	DO	DO_32
Number of Channels	16	32
Smallest ORU(1)	1 Channel	IOP
Redundancy(2)	No	Yes
Redundancy Method	Solid-state switch in IOP	Solid-state switch in IOP
Relay Minimum Load current Relay FTA)	100 ma	10 ma
Standby Manual Supported	Yes	No
Output Overload Protection(3)	Fuses on FTA per channel	• Fuses on 24 Vdc FTA • No fuse on relay FTA
Contact Bounce Suppression-Relay FTA	Always Installed	Configurable via Jumper
Galvanic Output Isolation - Relay FTA(4)	per Channel	per Channel
Galvanic Output Isolation - SS FTA(4)	per Channel	no per channel isolation
Galvanic Output Isolation(4)	per Channel	per 16 Channels
Output Condition on IOP Failure(5)	Configurable	Unpowered
Output Condition on PMM Failure(6)	Configurable	Configurable
Output Readback Check(7)	Yes	Yes
Number of FTAs Supported(8)	5 (See Below)	2 (Direct & Relay)

(1) The Optimal Replaceable Unit (ORU) is the object that can be replaced on a failure that minimally impacts the operation of the system. The ORU is generally an item that can be replaced in the field using a minimum number of tools. In many cases the item is plug replaceable such as the IOP.
(2) Readback check coverage for the redundancy option is not equivalent. See Output Readback Check.
(3) Compression-type relay FTA for DO-32 has 1 fuse per 2 points. Screw-type relay FTA for DO-32 has 1 fuse per 8 points. Current overload protection for the DO16 is provided on a per channel basis based on the particular FTA used.
(4) All Outputs are galvanically isolated from system common.
(5) The output state upon failure of both the DO16 and DO32 IOP is configurable to either ***Hold*** or ***Unpower*** the output. The DO32 outputs are set to ***Unpowered*** when the on-board power regulator (5 V) has failed.
(6) The output state upon failure of the PMM (or APMM or HPMM or EHPM) for both DO16 and DO32 IOPs is configurable to either ***Hold*** or ***Unpower*** the output.
(7) The DO32 performs register readback check on the IOP. The DO16 performs actual output readback check including the FTA and FTA cable.
(8) DO16 FTA types are: 120 Vac Electro-Mechanical Relay; 240 Vac Electro-Mechanical Relay; 24 Vdc @100 ma Non-Isolated; 20-200 Vdc Solid State; 3-30 Vdc Solid State; 120/240 Vac Solid State; 31-200 Vdc Solid State.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6.32. IOP/FTA Compatibility Matrix

IOP Model Number	FTA Model Number	Description	Red	CE Mark	Term Type(6)	Circuits	Size(1)
MC-PAIH03		**High Level Analog Input**	√	□		16	
	MU-TAIH02	HLAI/STI			C	16	A
	MU-TAIH12	HLAI /STI Redundant	□		C	16	B
	MU-TAIH52	HLAI/STI Redundant	□		S	16	B
	MU-TAIH03	HLAI		□	C	16	A
	MU-TAIH13	HLAI Redundant	□	□	C	16	B
	MU-TAIH53	HLAI Redundant	□	□	S	16	B
	MU-TAIH22	Enhanced Power HLAI /STI	□		C	16	B
	MU-TAIH23	Enhanced Power HLAI	□	□	C	16	B
	MU-TAIH62	Enhanced Power HLAI /STI	□		S	16	B
	MU-GAIH13	GI/IS - Aux. Out (4041B)	□	□	C(3)	16	B
	MU-GAIH83	GI/IS - Aux. Out (4041B)	□	□	CP(3)	16	B
	MU-GAIH14	GI/IS - Aux. & Hi V Out (4041P)	□	□	C(3)	16	B
	MU-GAIH84	GI/IS - Aux. & Hi V Out (4041P)	□	□	CP(3)	16	B
	MU-GAIH22	GI/IS - Aux. Current Out (4041B)	□	□	C(3)	16	B
	MU-GAIH92	GI/IS - Aux. Current Out (4041B)	□	□	CP(3)	16	B
MU-PSTX03		**Smart Xmtr Int. - Multi-Var.**	□	□		16	
	MU-TAIH02	HLAI /STI			C	16	A
	MU-TAIH12	HLAI/STI Redundant	□		C	16	B
	MU-TAIH52	HLAI/STI Redundant	□		S	16	B
	MU-TAIH22	Enhanced Power HLAI/STI	□		C	16	B
	MU-TAIH62	Enhanced Power HLAI/STI	□		S	16	B
	MU-TSTX03	STI		□	C	16	A
	MU-TSTX13	STI Redundant	□	□	C	16	B
	MU-TSTX53	STI Redundant	□	□	S	16	B
	MU-GAIH13	GI/IS - Aux. Out (4041B)	□	□	C(3)	16	B

NOTE: The footnotes are located at the end of the table. (Continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

IOP / FTA Compatibility Matrix (continued)

IOP Model Number	FTA Model Number	Description	Red	CE Mark	Term Type(6)	Circuits	Size(1)
MU-PSTX03 (cont'd)	MU-GAIH83	GI/IS - Aux. Out (4041B)	□	□	CP(3)	16	B
	MU-GAIH14	GI/IS - Aux. & Hi V Out (4041P)	□	□	C(3)	16	B
	MU-GAIH84	GI/IS - Aux. & Hi V Out (4041P)	□	□	CP(3)	16	B
	MU-GAIH22	GI/IS - Aux. Current Out (4041B)	□	□	C(3)	16	B
	MU-GAIH92	GI/IS - Aux. Current Out (4041B)	□	□	CP(3)	16	B
MU-PAIL02		**Low Level Analog Input**		□		8	
	MU-TAIL02	Low Level Analog Input			C	8	B
	MU-TAIL03	Low Level Analog Input		□	C	8	B
MU-PLAM02		**Low Level Analog Input Mux.**		. □		32	
	MU-TAMR03	LLMUX FTA RTD(2)		□	C	16	B
	MU-TAMT03	LLMUX FTA RTD(2)		□	C	16	B
	MU-TAMT13	LLMUX FTA TC w/ Remote CJR(2)		□	C	16	B
MU-PRHM01		**Remote Hardened Mux.**		. □		32	
	MU-GRPA01	Intrinsically Safe Power Adapter(7)		□	C(3)	16	A
	MU-TRPA01	Non-Incendive Power Adapter(7)		□	C	16	B
	MC-GRMT01	Remote FTA (7)		□	C	16	12.5 x 12.5 in.
MU-PSDX02		**Serial Device Interface**		□		16 (5)	
	MU-TSDM02	SDI - Manual / Auto Station IF (2)		□	C	1	A
	MU-TSDT02	SDI - Toledo Weigh Cell IF (2)		□	DB25	1	A
	MU-TSDU02	SDI - UDC6000 IF (2)		□	C	1	A

(Continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

IOP / FTA Compatibility Matrix (continued)

IOP Model Number	FTA Model Number	Description	Red	CE Mark	Term Type(6)	Circuits	Size(1)
MU-PSIM11		**Serial Interface**		□		32(5)	
	MU-TSIA12	SI - Allen Bradley PLC-2/3/5 IF(2)		□	DB25	1	A
	MU-TSIM12	SI - Modbus IF(2)		□	DB25 or C	1	A
MC-PAOX03		**Analog Output (8 Outputs)**	□	□		8	
	MU-TAOX02	AO		□	C	8	A
	MU-TAOX12	AO Redundant	□	□	C	8	B
	MU-TAOX52	AO Redundant	□	□	S	8	B
	MU-GAOX02	GI/IS - AO (4045C)		□	C(3)	8	B
	MU-GAOX72	GI/IS - AO (4045C)		□	CP(3)	8	B
	MU-GAOX12	GI/IS - AO Redundant (4045C)	□	□	C(3)	8	B
	MU-GAOX82	GI/IS - AO Redundant (4045C)	□	□	CP(3)	8	B
MU-PAOY22		**Analog Output (16 Outputs)**	□	□		16	
	MU-TAOY22	AO16 Redundant w/ Stby Man.	□	□	C	16	B
	MU-TAOY52	AO16 Redundant w/ Stby Man.	□	□	S	16	B
	MU-THAO11	AO16 Redundant w/ Stby Man. and HART®	□	□	C	16	B
	MU-GHAO11	GI/IS – AO16 Redundant (4046P) w/ HART®, w/o Stby Man.	□	□	C	16	B

(Continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

IOP / FTA Compatibility Matrix (continued)

IOP Model Number	FTA Model Number	Description	Red	CE Mark	Term Type(6)	Circuits	Size(1)
MU-PDIX02		**Digital Input**		□		32	
MU-PDIS12		**Digital Input SOE**	□	□		32	
	MU-TDID12	DI 24 Vdc	□	□	C	32	C
	MU-TDID52	DI 24 Vdc	□	□	S	32	C
	MU-TDID72	DI Packaged 24 Vdc			RS	32	C
	MU-TDIA12	DI Isolated 120 Vac	□	□	C	32	C
	MU-TDIA52	DI Isolated 120 Vac	□	□	S	32	C
	MU-TDIA72	DI Pckgd. Isolated 120 Vac			RS	32	C
	MU-TDIA22	DI 240 Vac	□	□	C	32	C
	MU-TDIA62	DI 240 Vac	□	□	S	32	C
MU-PDIS12 (cont'd)	MU-GDID12	GI/IS - DI (4016)	□	□	C(3)	32	B
	MU-GDID82	GI/IS - DI (4016)	□	□	CP(3)	32	B
	MU-GDID13	GI/IS - DI Solid-State Relays (4013)	□	□	C(3)	32	B
	MU-GDID83	GI/IS - DI Solid-State Relays (4013)	□	□	CP(3)	32	B

(Continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

IOP / FTA Compatibility Matrix (continued)

IOP Model Number	FTA Model Number	Description	Red	CE Mark	Term Type(6)	Circuits	Size(1)
MU-PDIY22		**Digital Input 24 V Only**	□	□		32	
	MU-TDIY22	DI 24 Vdc Only	□	□	C	32	B
	MU-TDIY62	DI 24 Vdc Only	□	□	S	32	B
MU-PPIX02		**Pulse Input**		□		8	
	MU-TPIX12	Pulse Input		□	C	8	B
	MU-TPIX52	Pulse Input		□	S	8	B
MU-PDOX02		**Digital Output (16 Outputs)**		□		16	
	MU-TDON12	DO 24 Vdc, Nonisolated			C	16	B
	MU-TDON52	DO 24 Vdc, Nonisolated			S	16	B
	MU-TDOD13	DO 3-30 Vdc, Solid State			C	16	B
	MU-TDOD53	DO 3-30 Vdc, Solid State		□	S	16	B
	MU-TDOD14	DO 3-30 Vdc, Solid State		□	C	16	B
	MU-TDOD54	DO 3-30 Vdc, Solid State		□	S	16	B
	MU-TDOD23	DO 31-200 Vdc, Solid State		□	C	16	B
	MU-TDOD63	DO 31-200 Vdc, Solid State		□	S	16	B
	MU-TDOA13	DO 120/240 Vac, Solid State		□	C	16	B
	MU-TDOA53	DO 120/240 Vac, Solid State		□	S	16	B
	MU-TDOR12	DO120 Vac/125 Vdc Relay		□	C	16	B
	MU-TDOR52	DO120 Vac/125 Vdc Relay		□	S	16	B
	MU-TDOR22	DO 240 Vac/125 Vdc Relay		□	C	16	B
	MU-TDOR62	DO 240 Vac/125 Vdc Relay		□	S	16	B

(Continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

IOP / FTA Compatibility Matrix (continued)

IOP Model Number	FTA Model Number	Description	Red	CE Mark	Term Type(6)	Circuits	Size(1)
MU-PDOX02 (cont'd)	MU-GDOL12	GI/IS - DO w/ line fault dect.(4023)		□	C(3)	16	B
	MU-GDOL82	GI/IS - DO w/ line fault dect.(4023)		□	CP(3)	16	B
	MU-GDOD12	GI/IS - DO (4021)		□	C(3)	16	B
	MU-GDOD82	GI/IS - DO (4021)		□	CP(3)	16	B
	MU-GLFD02	GI/IS DO Combiner Panel		□	N/A	32	A
MU-PDOY22		**Digital Output (32 Outputs)**	□	□		32	
	MU-TDOY22	Digital Output 32, 24 Vdc	□	□	C	32	B
	MU-TDOY62	Digital Output 32, 24 Vdc	□	□	S	32	B
	MU-TDOY23	Digital Output 32, Relay(4)	□	□	C	16	B
	MU-TDOY63	Digital Output 32, Relay(4)	□	□	S	16	B
		Misc. / Multiple Use FTAs					
	MU-TLPA02	LLMUX, SI, SDI Power Adapter		□	C	2	A
	MU-TDPR02	DI Power Distribution FTA		□	S	12	A
	MU-GPRD02	GI/IS Power Distribution FTA		□	N/A	12	A
	MU-GMAR52	GI/IS — Marshalling Panel		□	S	16	B

(1) Length: A = 15.24 cm/6.0 in.
B = 30.73 cm/12.1 in.
C = 46.228 cm/18.2 in.

(1) Width: All FTAs except GI/IS FTAs = 12.065 cm/4.75 in.
All GI/IS FTAs = 12.446 cm/4.90 in.
MU/MC-TAIL03 = 13.335 cm/5.25 in.

(2) Requires Power Adapter FTA.

(3) Terminals are on top of the GI/IS modules.

(4) One FTA supports up to 16 circuits. When 17-32 circuits are used, 2 FTAs are required. Bridge cable MU-KBFT01 or MU-KBFT02 is required to connect the two FTAs.

(5) Number of Circuits denotes number of logical connections.

(6) For nongalvanically isolated FTAs, the terminal connector types are compression (C), nonremovable screw (S), and removable screw (RS). For galvanic isolation type FTAs, the terminal connector types are compression (C), and crimp pin (CP). The Marshalling Panel has nonremovable screw (S) terminals.

(7) The MC-GRMT01 is a remotely mountable Field Termination for Thermocouple inputs. Two of these FTAs can be connected to a single Power Adapter (MU-GRPA01 or MU-TRPA01) depending on the hazardous environment. The Power Adapter is, in turn, connected to the IOP (MU-PRHM01).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

7. Model Numbers

Description	Uncoated Model Number	Coated Model Number (see note)
I/O Processors		
High Level Analog Input Processor (16 Inputs)	n/a	MC-PAIH03
Smart Transmitter Interface (Multivariable) Processor (16 Inputs)	MU-PSTX03	MC-PSTX03
Serial Device Interface Processor (16 Points/Port)	MU-PSDX02	MC-PSDX02
Serial Interface Processor (16 Points/Port)	MU-PSIM11	MC-PSIM11
Low Level Analog Input Processor (8 Inputs)	MU-PAIL02	MC-PAIL02
Low Level Analog Input Multiplexer Processor (32 Inputs)	MU-PLAM02	MC-PLAM02
Remote Hardened Multiplexer IOP (32-Points)	MU-PRHM01	MC-PRHM01
Pulse Input Processor (8 Inputs)	MU-PPIX02	MC-PPIX02
Analog Output Processor (8 Outputs)	n/a	MC-PAOX03
Analog Output 16 Processor (16 Outputs)	n/a	MC-PAOY22
Digital Input Processor (32 Inputs)	MU-PDIX02	MC-PDIX02
Digital Input Processor for Sequence of Events (32 Inputs)	MU-PDIS12	MC-PDIS12
Digital Input 24 Vdc Processor (32 Inputs)	MU-PDIY22	MC-PDIY22
Digital Output Processor (16 Outputs)	MU-PDOX02	MC-PDOX02
Digital Output 32 Processor (32 Outputs)	MU-PDOY22	MC-PDOY22
Blank Filler Plate for I/O Slot	MU-PFPX01	n/a
I/O Link Extender Pair̃Main Location	MU-IOLM02	MC-IOLM02
I/O Link Extender Pair̃Remote Location	MU-IOLX02	MC-IOLX02
Long Distance I/O Link Extender Pair	MU-ILDX03	MC-ILDX03
I/O Link Extender Shroud (EC)	MU-ILES01	n/a
NOTE: MC model numbers indicate conformally coated boards. All IOPs are available conformally coated (MC models).		

(Continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Model Numbers (continued)

FTA I/O Cables (Telephone Connector* Version)		
FTA I/O Cable (5 m)		MU-KFTA05
FTA I/O Cable (10 m)		MU-KFTA10
FTA I/O Cable (15 m)		MU-KFTA15
FTA I/O Cable (20 m)		MU-KFTA20
FTA I/O Cable (25 m)		MU-KFTA25
FTA I/O Cable (30 m)		MU-KFTA30
FTA I/O Cable (35 m)		MU-KFTA35
FTA I/O Cable (40 m)		MU-KFTA40
FTA I/O Cable (45 m)		MU-KFTA45
FTA I/O Cable (50 m)		MU-KFTA50
Shielded FTA I/O Cables (lengths, xx, same as MU-KFTAxx)		MU-KFTSxx
FTA I/O Bridge Cable, 0.5 meter	To combine two 16 pt. MU-TDOY63 relay	MU-KBFT01
FTA I/O Bridge Cable, 2.0 meter	FTAs for 32-pt. MU-PDOY22 DO IOP	MU-KBFT02
LLAI MUX, Serial Device Interface, or Serial I/F Twisted Pair Cables		
Twisted Pair Cable with Shield (Local Cabinet Use)		MU-KLAM00
Four-Conductor Cable with Shield - 18 gauge (76 m/250 ft.)		MU-KLX076
Four-Conductor Cable with Shield- 18 gauge (152 m/500 ft.)		MU-KLX152
Four-Conductor Cable with Shield - 18 gauge (305 m/1000 ft.)		MU-KLX305
Four-Conductor Outdoor Cable with Armor and Shield - 12 gauge (305 m/1000 ft.)		MU-KLO305
LLMUX (TC) Remote CJR Cable (45 m/150 ft.)		MU-KRCJ00

* For DIN-style FTAs, Cables, and File Options, see the *Site Planning* manual.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Model Numbers (continued)

Description	Uncoated Model Number	Coated Model Number
Field Termination Assemblies (Phone Connector Style* - Compression Terminals)		
High Level Analog Input/STI FTA (16 Inputs)	MU-TAIH02	MC-TAIH02
High Level Analog Input/STI FTA for Redundancy (16 Inputs) **	MU-TAIH12	MC-TAIH12
High Level Analog Input FTA (16 Inputs) (CE Mark)	MU-TAIH03	MC-TAIH03
High Level Analog Input FTA for Redundancy (16 Inputs) (CE Mark) **	MU-TAIH13	MC-TAIH13
Smart Transmitter Interface FTA (16 Inputs) (CE Mark)	MU-TSTX03	MC-TSTX03
Smart Transmitter Interface FTA for Redundancy (16 Inputs) (CE Mark) **	MU-TSTX13	MC-TSTX13
Enhanced Power High Level /STI Analog Input FTA (16 Inputs) **	MU-TAIH22	MC-TAIH22
Enhanced Power High Level Analog Input FTA (16 Inputs) (CE Mark)**	MU-TAIH23	MC-TAIH23
Low Level Analog Input FTA (8 Inputs)	MU-TAIL02	MC-TAIL02
Low Level Analog Input FTA (8 Inputs) (CE Mark)	MU-TAIL03	MC-TAIL03
Low Level Analog Input Multiplexer RTD FTA (16 Inputs)	MU-TAMR03	MC-TAMR03
Low Level Analog Input Multiplexer TC FTA (16 Inputs)	MU-TAMT03	MC-TAMT03
Low Level Analog Input Multiplexer TC FTA with Remote CJR (16 Inputs)	MU-TAMT13	MC-TAMT13
RHMUX Remote FTA		MC-GRMT01
RHMUX GI/IS Power Adapter	MU-GRPA01	MC-GRPA01
RHMUX GI/NI Power Adapter	MU-TRPA01	MC-TRPA01
RHMUX NEMA 4 Enclosure (Painted Carbon Steel)	MU-CMSC03	
RHMUX NEMA 4X Enclosure (Stainless Steel)	MU-CMSS03	
LLMUX, SDI, SI Power Adapter	MU-TLPA02	MC-TLPA02
Pulse Input FTA (8 Inputs)	MU-TPIX12	MC-TPIX12
Analog Output FTA (8 Outputs)	MU-TAOX02	MC-TAOX02
Analog Output FTA for Redundancy (8 Outputs) **	MU-TAOX12	MC-TAOX12
Analog Output 16 FTA (16 Outputs), w/StbyMan (use ONLY w/ MU-PAOY22)**	MU-TAOY22	MC-TAOY22
Analog Output 16 FTA (16 Outputs), w/StbyMan and HART® connector (use ONLY w/ MU-PAOY22)**	MU-THAO11	MC-THAO11
GI/IS Analog Output 16 FTA (16 Outputs), w/o StbyMan, w/HART® connector (use ONLY w/ MU-PAOY22)**	MU-GHAO11	MC-GHAO11
Digital Input Isolated 120 Vac FTA (32 Inputs)	MU-TDIA12	MC-TDIA12
Digital Input Isolated 240 Vac FTA (32 Inputs)	MU-TDIA22	MC-TDIA22
Digital Input 24 Vdc FTA (32 Inputs)	MU-TDID12	MC-TDID12
Digital Input 24 Vdc FTA (32 Inputs) (use ONLY w/ MU-PDIY22)**	MU-TDIY22	MC-TDIY22
Digital Output 120/240 Vac Solid-State FTA (16 Outputs)	MU-TDOA13	MC-TDOA13
Digital Output 3-30 Vdc Solid-State FTA (16 Outputs)	MU-TDOD13	MC-TDOD13
Digital Output 3-30 Vdc Solid-State FTA (16 Outputs) (CE Mark)	MU-TDOD14	MC-TDOD14
Digital Output 31-200 Vdc Solid-State (16 Outputs)	MU-TDOD23	MC-TDOD23
Digital Output 24 Vdc, 100 ma Nonisolated FTA (16 Outputs)	MU-TDON12	MC-TDON12
Digital Output 120 Vac/125 Vdc Relay FTA (16 Outputs)	MU-TDOR12	MC-TDOR12
Digital Output 240 Vac/125 Vdc Relay FTA (16 Outputs)	MU-TDOR22	MC-TDOR22
Digital Output 24 Vdc FTA (32 Outputs) (use ONLY w/ MU-PDOY22)**	MU-TDOY22	MC-TDOY22
Digital Output Relay FTA (16 Outputs) (use two w/ MU-PDOY22)**	MU-TDOY23	MC-TDOY23

* For DIN-style FTAs, Cables and File Options, See the *Site Planning* manual.
** These FTAs can be used for single or redundant applications.
All FTAs are available conformally coated (MC-models).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Model Numbers (continued)

Description	Uncoated Model Number	Coated Model Number
Field Termination Assemblies (Phone Connector* Style with Screw Terminals)		
High Level Analog Input/STI FTA (16 Inputs)**	MU-TAIH52	MC-TAIH52
High Level Analog Input FTA (16 Inputs) (CE Mark)**	MU-TAIH53	MC-TAIH53
Smart Transmitter Interface FTA for Redundancy (16 Inputs) (CE Mark)**	MU-TSTX53	MC-TSTX53
Enhanced Power High Level Analog Input/STI FTA (16 Inputs)**	MU-TAIH62	MC-TAIH62
Pulse Input FTA (8 Inputs)	MU-TPIX52	MC-TPIX52
Analog Output FTA (8 Outputs)**	MU-TAOX52	MC-TAOX52
Analog Output 16 FTA (16 Outputs), w/StbyMan (use ONLY w/ MU-PAOY22)**	MU-TAOY52	MC-TAOY52
Digital Input Isolated 120 Vac FTA (32 Inputs)	MU-TDIA52	MC-TDIA52
Digital Input Isolated 120 Vac FTA -Packaged (32 Inputs)	MU-TDIA72	MC-TDIA72
Digital Input Isolated 240 Vac FTA (32 Inputs)	MU-TDIA62	MC-TDIA62
Digital Input 24 Vdc FTA (32 Inputs)	MU-TDID52	MC-TDID52
Digital Input 24 Vdc FTA -Packaged, without plug-in isolators (32 Inputs)	MU-TDID72	MC-TDID72
Digital Input 24 Vdc FTA (32 Inputs) (use ONLY w/ MU-PDIY22)**	MU-TDIY62	MC-TDIY62
Digital Output 120/240 Vac Solid-State FTA (16 Outputs)	MU-TDOA53	MC-TDOA53
Digital Output 3-30 Vdc Solid-State FTA (16 Outputs)	MU-TDOD53	MC-TDOD53
Digital Output 3-30 Vdc Solid-State FTA (16 Outputs) (CE Mark)	MU-TDOD54	MC-TDOD54
Digital Output 31-200 Vdc Solid-State (16 Outputs)	MU-TDOD63	MC-TDOD63
Digital Output 5-200 Vdc Solid State (16 Outputs)	MU-TDOD62	MC-TDOD62
Digital Output 24 Vdc, 100 ma Nonisolated FTA (16 Outputs)	MU-TDON52	MC-TDON52
Digital Output 120 Vac/125 Vdc Relay FTA (16 Outputs)	MU-TDOR52	MC-TDOR52
Digital Output 240 Vac/125 Vdc Relay FTA (16 Outputs)	MU-TDOR62	MC-TDOR62
Digital Output 24 Vdc FTA (32 Outputs) (use ONLY w/ MU-PDOY22)**	MU-TDOY62	MC-TDOY62
Digital Output Relay FTA (16 Outputs) (use two w/ MU-PDOY22)**	MU-TDOY63	MC-TDOY63
Field Termination Assemblies for Serial Device Interface and Serial Interface		
Serial Device Interface FTA for Toledo Scale (8142)	MU-TSDT02	MC-TSDT02
Serial Device Interface FTA for Manual/Auto Station	MU-TSDM02	MC-TSDM02

* For DIN-style FTAs, Cables and File Options, See the *Site Planning* manual.
** These FTAs can be used for single or redundant applications.
All FTAs are available conformally coated (MC- models).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Model Numbers (continued)

Description	Model Number	
Serial Device Interface FTA for UDC 6000	MU-TSDU02	MC-TSDU02
Serial Interface FTA for Modbus	MU-TSIM12	MC-TSIM12
Serial Interface FTA for Allen-Bradley	MU-TSIA12	MC-TSIA12
Display Units		
Manual/Auto Station	MU-MASX02	
EIA - 485 Cables		
SDI/SI FTA EIA - 485 Cable (30.5 m/100 ft.)	MU-KSX030	
SDI/SI FTA EIA - 485 Cable (152.4 m/500 ft.)	MU-KSX152	
SDI/SI FTA EIA - 485 Cable (304.8 m/1000 ft.)	MU-KSX305	
Standby Manual Units (Phone Connector* Style)		
Analog Output Standby Manual (8 Outputs) with Case and 3 Meter Cable	MU-SMAC02	
Digital Output Standby Manual (16 Outputs) with Case and 3 Meter Cable	MU-SMDC02	
Digital Output Standby Manual (16 Outputs - mounts similar to FTA) with Cable	MU-SMDX02	
Cabinets and Cabinet Components (Markhon Style)		
Cabinet - Dual Access (.8 W x .8 D x 2.1 H [meters])	MU-CBDM01	
Cabinet - Single Access (.8 W x 5.5 D x 2.1 H [meters])	MU-CBSM01	
Cabinet Lifting Eyebolts (4)	MU-CLBM01	
Cabinet (Dual Access) Forklift Base	MU-CFDM01	
Cabinet (Single Access) Forklift Base	MU-CFSM01	
Cabinet Trim File Filler Panel	MU-CTFP11	
Vertical Trim Panel Set - Full Height	MU-CTVF11	
Vertical Trim Panel Set - Half Height	MU-CTVH11	
FTA Mounting Channel - Narrow	MU-TMCN11	
FTA Mounting Channel with Shield Ground Bar - Narrow	MU-TMCN12	
FTA Mounting Channel - Wide	MU-TMCW11	
FTA Mounting Channel with Shield Ground Bar - Wide	MU-TMCW12	
Cabinets and Cabinet Components (Rittal Style)		
Cabinet - Dual Access (.8 W x .8 D x 2 H [meters])	MU-CBDX01	
Cabinet - Single Access (.8 W x .5 D x 2 H [meters])	MU-CBSX01	
Cabinet Trim File Filler Panel	MU-CTFP01	
Vertical Trim Panel Set - Full Height	MU-CTVF01	
Vertical Trim Panel Set - Half Height	MU-CTVH01	
FTA Mounting Channel - Narrow	MU-TMCN01	
FTA Mounting Channel with Shield Ground Bar - Narrow	MU-TMCN02	
FTA Mounting Channel - Wide	MU-TMCW01	
FTA Mounting Channel with Shield Ground Bar - Wide	MU-TMCW02	

Cabinet Fan Assemblies (All Styles)	**Uncoated Model Numbers**	**Coated Model Numbers**
Cabinet Fan Assembly (240 Vac-50/60 Hz)	MU-FAN501	n/a
Cabinet Fan Assembly with Alarm (240 Vac-50/60 Hz)	MU-FAN511	MC-FAN511
Cabinet Fan Assembly (120 Vac-50/60 Hz)	MU-FAN601	n/a
Cabinet Fan Assembly with Alarm (120 Vac-50/60 Hz)	MU-FAN611	MC-FAN611

* For DIN-style FTAs, Cables and File Options, See the *Site Planning* manual.
** These FTAs can be used for single or redundant applications.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Model Numbers (continued)

Description	Uncoated Model Numbers	Coated Model Number
Power Systems Including, or Upgradeable to, System Battery Backup		
Redundant Power System with Mounting (20 A)	MU-PSRX04	MC-PSRX04
Single Power System with Mounting (20 A)	MU-PSSX04	MC-PSSX04
Redundant Power System with System Battery Backup Mounting (20 A)	MU-PSRB04	MC-PSRB04
HPM Power System (20 A) Upgrade Kit (upgrade from MU/MC-PSxx03 only)	MU-ZPSR04	MC-ZPSR04
Harsh Environment Option		
Remote Hardened I/O Encl, 110 Vac, Left (1-7) (1)	MU-CBSS01	
Remote Hardened I/O Encl, 110 Vac, Right (9-15) (1)	MU-CBSS02	
Remote Hardened I/O Encl, Left (1-7), No Power Supply	MU-CBSS11	
Remote Hardened I/O Encl, Right (9-15), No Power Supply	MU-CBSS12	
Remote Hardened I/O Encl, 220 Vac, Left (1-7)(1)	MU-CBSS21	
Remote Hardened I/O Encl, 220 Vac, Right (9-15)(1)	MU-CBSS22	
AC-Only Power Systems		
AC-Only Redundant Power Supply 120 Vac (8 A)	MU-PAR111	
AC-Only Redundant Power Supply 240 Vac (8 A)	MU-PAR211	
AC-Only Single Power Supply 120 Vac (8 A)	MU-PAS111	
AC-Only Single Power Supply 240 Vac (8 A)	MU-PAS211	
AC-Only Redundant Power Supply 120 Vac (16 A)	MU-PAR121	
AC-Only Redundant Power Supply 240 Vac (16 A)	MU-PAR221	
AC-Only Single Power Supply 120 Vac (16 A)	MU-PAS121	
AC-Only Single Power Supply 240 Vac (16 A)	MU-PAS221	
AC-Only Power System Cover Plate	MU-PACP01	
24 Vdc Power Distribution		
Power Distribution FTA (24 Vdc)	MU-TDPR02	MC-TDPR02
(1) Includes enclosure, power distribution panel, backplane, and 8 A, redundant power supplies.		

Digital Sense Power Cables	Model Number
Power Distribution (24 Vdc) (5 m)	MU-KDPR05
Power Distribution (24 Vdc) (10 m)	MU-KDPR10
Power Distribution (24 Vdc) (15 m)	MU-KDPR15
Power Distribution (24 Vdc) (20 m)	MU-KDPR20
Power Distribution (24 Vdc) (25 m)	MU-KDPR25
Power Distribution (24 Vdc) (30 m)	MU-KDPR30
Power Distribution (24 Vdc) (35 m)	MU-KDPR35
Power Distribution (24 Vdc) (40 m)	MU-KDPR40
Power Distribution (24 Vdc) (50 m)	MU-KDPR50
CE-Mark Power Distribution (24 Vdc) (lengths, xx, same as MU-KDPRxx)	MU-KSPRxx

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

For More Information

To learn more about Honeywell's products or solutions visit our website www.honeywell.com/ps or contact your Honeywell account manager.

Automation & Control Solutions

Honeywell Process Solutions

1860 W. Rose Garden Lane
Phoenix, AZ 85027
Tel: 800-822-7673

www.honeywell.com/ps

IO03-684
December 2012

© 2012 Honeywell International Inc.

Experion™ and Honeywell Enhanced Universal Control Network™ are trademarks of Honeywell International Inc..
All other products and brand names shown are trademarks of their respective owners.
This document contains Honeywell proprietary information. It is published for the sole usage of Honeywell Process Solutions' customers and prospective customers worldwide. Information contained herein is to be used solely for the purpose submitted, and no part of this document or its contents shall be reproduced, published, or disclosed to a third party without the express permission of Honeywell International Inc..
While this information is presented in good faith and believed to be accurate, Honeywell disclaims the implied warranties of merchantability and fitness for a particular purpose and makes no express warranties except as may be stated in its written agreement with and for its customer.
In no event is Honeywell liable to anyone for any indirect, special or consequential damages. The information and specifications in this document are subject to change without notice.

Honeywell

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP