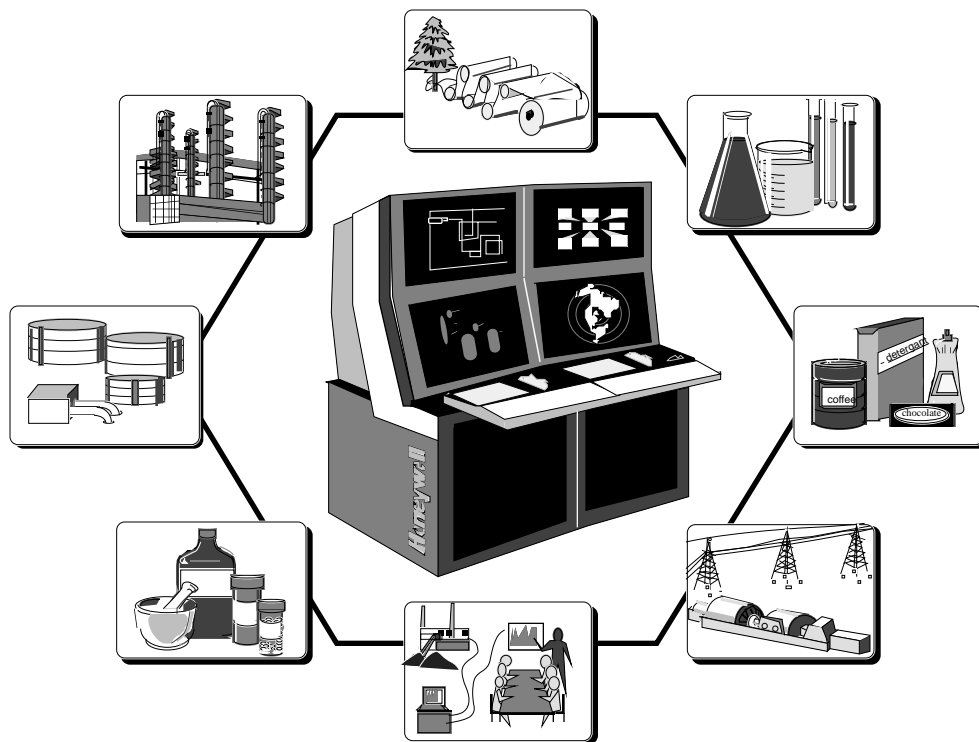


TDC 3000^X Galvanic Isolation/Intrinsic Safety Field Termination Assemblies Specification and Technical Data

GA03-100
R500
6/96



TDC 3000X

Galvanic Isolation/Intrinsic Safety Field Termination Assemblies

Specification and Technical Data

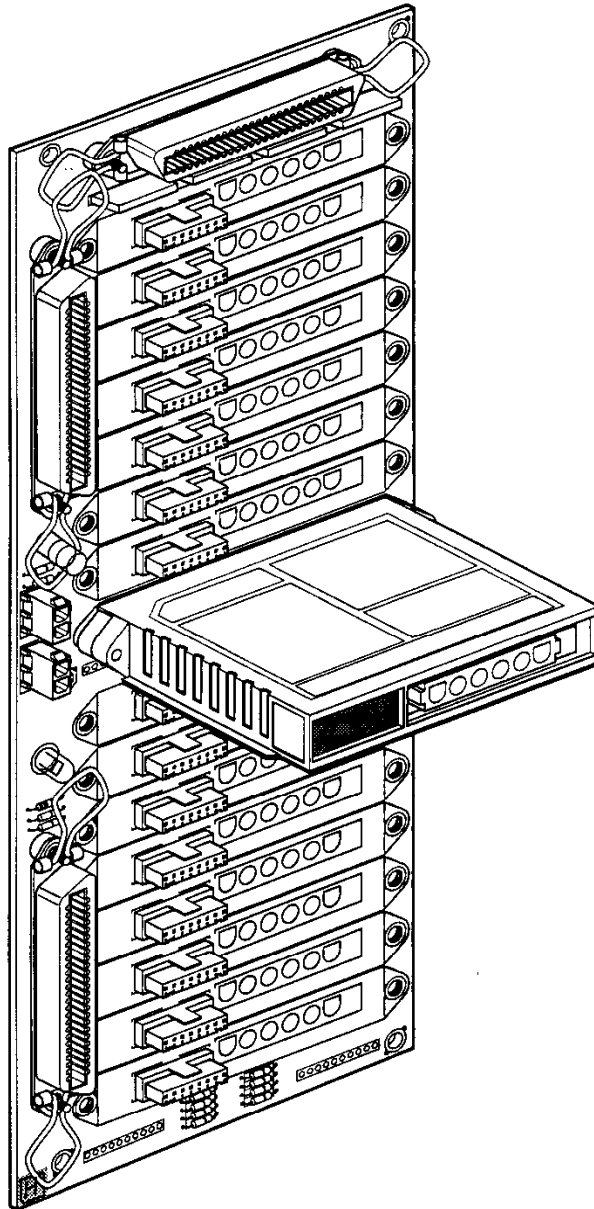
Introduction

The Galvanic Isolation/Intrinsic Safety Field Termination Assemblies (GI/IS FTAs) for the Process Manager family, including PM/APM/HPM, provide:

- An Intrinsically Safe (IS) interface directly to hazardous-area processes.
- Galvanic Isolation (GI) eliminating the high integrity ground required for Zener barriers.
- A space-efficient design.
- A reduced total installed cost compared to separate Zener barrier or isolator approaches.

Plug-in modules on the FTAs, called isolators, incorporate both the galvanic isolation and intrinsic safety functions and additionally provide:

- Single loop integrity for most devices.
- Ease of maintenance.
- Compact design for reduced cabinet space.
- Simplified wiring, because hazardous field wiring can be brought directly to the isolators on the FTAs, eliminating the need for separate IS barriers and the associated point-to-point wiring with the PM family.
- Minimum number of isolators to support major signal types; HLAI/STI, AO, DI, and DO.
- Certification for connection to equipment which is located in all hazardous areas/zones for all explosive gas classifications.



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Figure 1 — Galvanic Isolator Module Mounted on FTA

The GI/IS FTAs are always fully populated with isolators to provide a one-to-one correspondence with the respective IOP. For example, the HLAI/STI FTA has 16 HLAI/STI isolators and the AO FTA has 8 AO isolators. Figure 1 shows one isolator mounted on an FTA, for illustration purposes only, to depict the modular plug-in approach.

Features

Intrinsic Safety

Process areas typically consist of hazardous areas where flammable liquids, gases, or dusts may be present in sufficient quantity with air to produce an explosive mixture. Intrinsic safety is the technique used to limit the electrical energy entering the hazardous area to a level below which ignition of a flammable atmosphere cannot occur. Special enclosures or purging are not required with intrinsic safety because the source of ignition is eliminated.

An intrinsically safe system includes the IS interface, provided by these FTAs, plus the field wiring and the IS field device. All components of an IS system must be incapable of releasing sufficient electrical energy or thermal energy under normal or abnormal conditions to cause ignition. Specified failure conditions include accidental damage or failure to any part of the equipment or wiring insulation, electrical components, or application of over-voltage.

A field device mounted in the hazardous area, such as a transmitter, must be certified if it is capable of storing energy. However, if it is a “simple device” or “nonvoltage producing” device, that is, it neither generates or stores significant energy, then no certification of the field device is

Table 1 — Hazardous Substance Classifications

IEC Countries (CENELEC Stds.)	United States of America and Canada	Ease of Ignition
Group IIC Hydrogen Acetylene	Class I Group A Acetylene	Easiest
	Group B Hydrogen	-
Group IIB Ethylene	Group C Ethylene	-
	Group D Propane	-
Group IIA Ammonia Propane	Class II Group E Metal dust	-
	Group F Carbon dust	-
Group I Mining (Methane)	Group G Flour, starch, grain	-
	Class III Fibers & flyings	Hardest

Table 2 — Hazardous Area Classifications

IEC Countries (CENELEC Standards)	United States of America and Canada
Zone 0: A hazardous atmosphere is continuously present or present for long periods.	Division 1: A hazardous atmosphere is continuously, intermittently, or periodically present in normal operation.
Zone 1: A hazardous atmosphere is likely to occur in normal operation.	
Zone 2: A hazardous atmosphere is not likely to occur in normal operation and, if it occurs, it will exist only for a short time.	Division 2: A hazardous atmosphere is only likely to be present under abnormal conditions.

required. A thermocouple is an example of a “simple device.”

Field wiring has distributed capacitance and inductance capable of releasing energy. Because IS requirements are concerned with the amount of energy that can be released from circuits in a hazardous area, the stored energy in the distributed inductance and capacitance of the cable must be considered in determining the length of field wiring.

The GI/IS FTAs serve as an interface between TDC 3000^X equipment in a nonhazardous location and sensors and actuators located in a hazardous location. As an IS interface, the FTAs limit electrical energy (voltage and current) below a critical level which would result in ignition of any flammable mixture in the hazardous process area. In addition, they provide galvanic

isolation between a circuit in a hazardous area (field side of the FTA) and the corresponding circuit in the safe area (PM/APM/HPM side of the FTA), eliminating the need for a high-integrity ground required by IS Zener barrier approaches. Channel-to-channel isolation is an added benefit, due to the modular architecture of these FTAs.

Hazardous gases and substances are classified into groups according to the amount of energy required to cause ignition. The classification of these groups, detailed in Table 1, are defined differently for IEC countries (including Europe) and North America.

These hazardous areas are classified by the probability that the hazardous atmosphere will be present. In IEC/European countries, area classification is defined for three zones, and in North America area classification is

defined for two divisions (see Table 2). Note that it is the responsibility of the user to classify these areas of the process and define the line or area of demarcation.

Many of the standard PM/APM/HPM components already comply and have been certified for Class 1, Division 2 mounting or interfacing without the use of a separate IS interface. However, the requirements for Class 1, Division 1 and IEC Zone 0/Zone 1 are much more restrictive. Both Division 1 and IEC Zone 0 and Zone 1 require a separate IS interface.

Traditional control systems have accomplished this by using separate shunt-diode (Zener) barriers or isolators installed between the control system and the hazardous area, as shown in Figure 2. This traditional approach requires additional cost and space, due to the point-to-point wiring between the IS interface and the control system.

Figure 3 shows the GI/IS FTAs with the IS interface imbedded within the PM/APM/HPM. This approach eliminates additional wiring, a separate enclosure for the IS interface, and custom engineering of the separate IS interface cabinet with point-to-point wiring to the PM/APM/HPM. As a result, the installed cost and space is reduced due to the simplified wiring and cabinetry offered by the GI/IS FTAs.

Galvanic Isolation

The intrinsic safety barrier has traditionally consisted of a current limiting resistor and a Zener diode as part of the energy limiting circuit. This traditional “barrier” scheme is shown in the left-most “Energy Limiting” box of Figure 4.

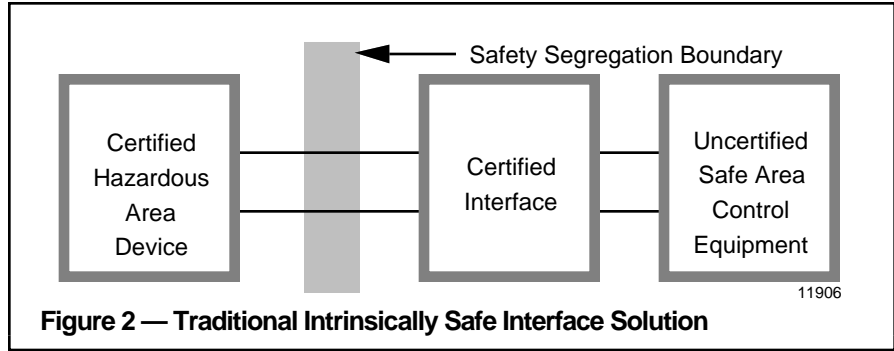


Figure 2 — Traditional Intrinsically Safe Interface Solution

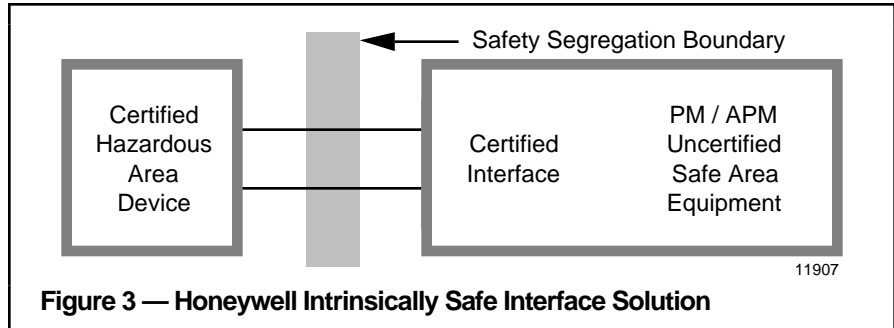


Figure 3 — Honeywell Intrinsically Safe Interface Solution

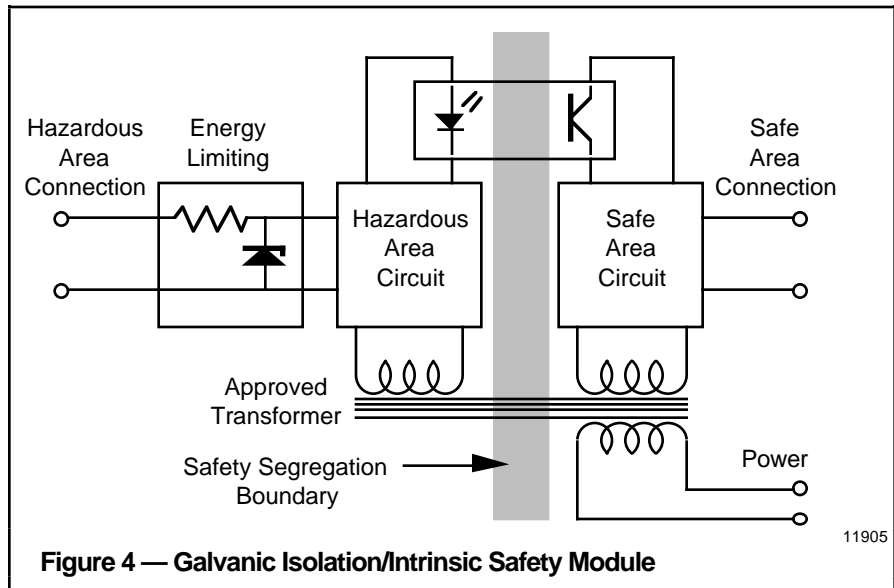


Figure 4 — Galvanic Isolation/Intrinsic Safety Module

This Zener barrier approach also requires a specially designed, low resistance, safe ground connection, which is complex to install, expensive, and can potentially induce ground loop currents into the process measurements.

The complete galvanic isolator (GI/IS), shown schematically in Figure 4, not only employs conventional energy limiting, but also fully isolates the hazardous area circuit from ground-loop problems.

Expensive and troublesome installation of the specially designed, low resistance, safe ground is also eliminated.

Depending on the GI/IS module type, signal isolation is accomplished through either a photo-diode coupler which passes only light pulses across the safety segregation boundary or through approved signal transformers. Power required for the circuitry on the hazardous side of the interface, including power for the field device, is passed across the safety boundary by employing an approved isolation transformer.

Approval Standards

The Honeywell GI/IS FTAs contain isolator modules which are approved as a direct interface to hazardous areas. The field wiring to the hazardous area is terminated to a removable connector on top of each isolator. Each isolator plugs onto the FTA. The connection between the FTA and the isolator is a "safe" connection because the IS interface is performed within the isolator. As a result, the FTA itself does not require safety certification because no hazardous signals are routed on the FTA. However, the FTAs and the isolators have been approved by Factory Mutual (FM) for mounting within a Class 1, Division 2 area.

The isolator modules have been certified by the British Approvals Service for Electrical Equipment in Flammable Atmospheres (BASEEFA) for conformity to the CENELEC standards. In North America, the isolators have been certified by Factory Mutual (FM) and the Canadian Standards Association (CSA). See the Approvals section for the complete list of standards the isolators are certified to, what they are approved for, and reference certificate and file numbers.

Galvanic Isolation/Intrinsic Safety Features

Cost Effective

- Advantages of galvanic isolation at comparable installed costs to the Zener barrier approach.
- Eliminates point-to-point wiring of nonintegrated solutions.
- Eliminates custom engineering of nonstandard approach.

Ease of Installation

- Flexibility of grounding—eliminate costly separate ground.
- Space efficient design—20 to 50% reduction in space.
- Auxiliary access to the safe-side signal for recorders, shutdown.
- Immunity to field wiring errors.

Ease of Maintenance

- No pots or jumpers to set.
- Spare stock minimized because of few module types.
- Isolation eliminates ground fault problems.
- Analog Output readback checking.
- No exposed wires on module replacement.
- No wiring errors on module replacement.

Ease of Migration

- Compatible with existing IOPs (HLAI/STI, AO, DI, and DO).
- Upgrade to Honeywell smart transmitters through IOP replacement (no disruption of control room or field wiring).

Simplified Growth

Existing Honeywell process control equipment (Process Manager, Advanced Process Manager or High Performance Manager) can make use of the GI/IS FTAs because they are compatible with existing HLA, STI, DI, and DO IOPs.

When installing new process control equipment, valuable floor space can be conserved by eliminating the need for separate intrinsic safety cabinets.

Engineering costs are reduced by using Honeywell's integrated intrinsic safety solutions instead of relying on custom plant designs and multiple vendors.

GI/IS FTAs

The GI/IS Field Termination Assemblies (FTAs) provide a Honeywell standard solution for directly interfacing HLA, STI, AO, DI, and DO signals from hazardous locations (Division 1 or Zone 0) to the Process Manager, Advanced Process Manager or High Performance Manager (PM/APM/HPM).

Each GI/IS FTA is cable-connected to the respective PM family I/O processor (IOP).

Redundancy is supported for HLA/STI and AO FTAs.

An additional connector is provided on the AI, DI, and DO FTAs for cabling to the optional Marshalling Panel, which provides for auxiliary safe access to the field signals. Standby manual is accommodated for the AO and DO FTAs.

High Level Analog Input/STIMV

The GI/IS HLAI/STIMV Field Termination Assembly provides a fully-floating dc supply for energizing a 2-wire, 4-20 mA transmitter in a hazardous area, and repeats the process variable signal accurately to the HLAI/STIMV I/O processor and to a secondary device through an optional Marshalling Panel, both in a safe area. The auxiliary signal to the secondary device can be a 1 to 5 volt or a 4 to 20 mA signal, depending on the FTA type (MU-GAIH13/14/83/84, or MU-GAIH22/92). The floating transmitter circuit allows one of the field wires to be grounded, either intentionally or in error.

The galvanically isolated HLAI/STI Field Termination Assembly can also be used with the PM family STI I/O processor and any Honeywell Smart Transmitter. The Honeywell Smart Transmitter can be calibrated, interrogated, or tested from the TDC 3000^X Universal Station, or from a hand-held communicator.

Analog Output

The galvanically isolated AO Field Termination Assembly isolates and passes on a 4-20 mA signal from the AO I/O processor to drive a current-to-pressure (I/P) converter, a position actuator, or any other load up between 90 and 710Ω in the hazardous area. An open circuit or a short circuit (in later models using 4045B isolators) in the field wiring is detected and reported by the I/O processor.

Digital Input

Each isolator module of the DI Field Termination Assembly accommodates two channels. Each channel accepts a switch or proximity detector input from a hazardous area. The MU-GDID12/82 provides two reed-contact outputs; one contact serves the DI I/O processor and the second contact may be routed through the optional Marshalling Panel. This second output is useful for applications where the status of a switch or proximity detector must be fed to both the PM family and a secondary device, such as a shutdown system. It also has phase reversal which allows the operation of each channel to be reversed by independent switches on top of the unit.

The MU-GDID13/83 uses solid-state outputs to the IOP. It does not provide auxiliary outputs or phase reversal.

Digital Output

The GI/IS Field Termination Assembly enables any certified intrinsically safe load, such as a solenoid or alarm, to be driven by the DO IOP. Also, a non-energy-storing "simple apparatus," such as an LED in a hazardous area, can be driven by the DO IOP.

The MU-GDOD12 can also have the signal from the DO I/O processor overridden OFF by an auxiliary signal routed through the optional Marshalling Panel such as from a shutdown system. The MU-GDOL12 offers DO Line

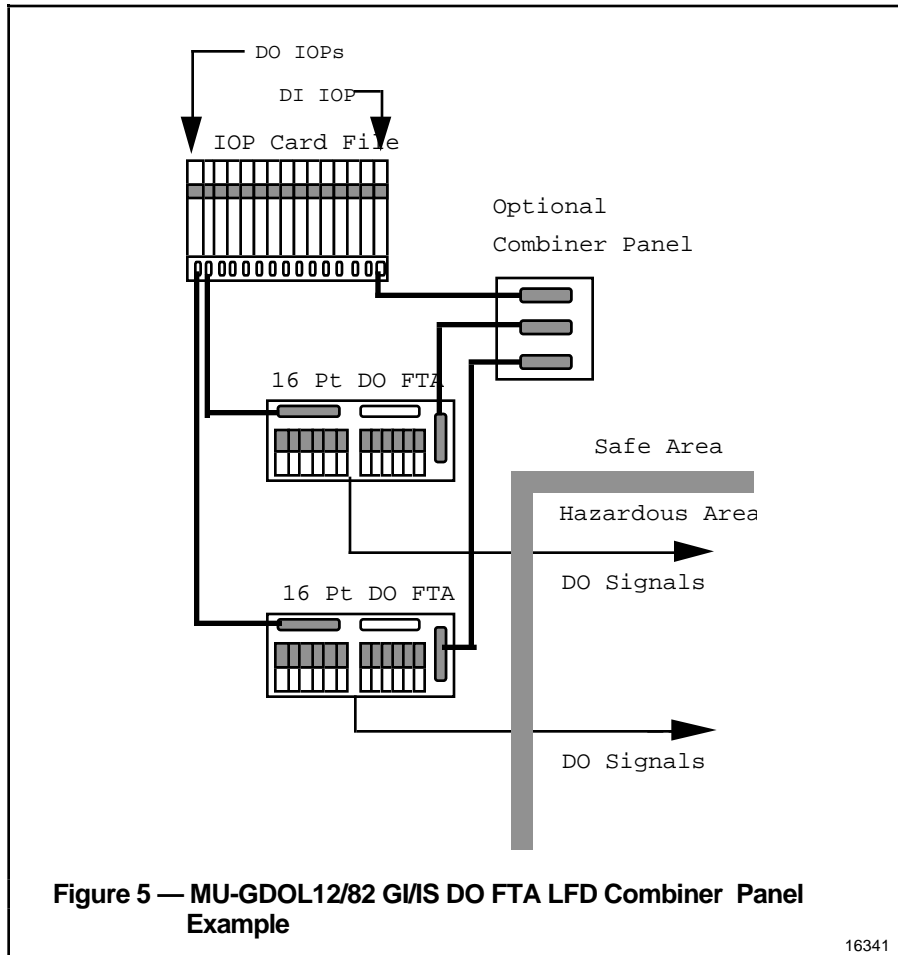


Figure 5 — MU-GDOL12/82 GI/IS DO FTA LFD Combiner Panel Example

Fault Detection (LFD) in combination with the LFD combiner panel and a DI IOP as shown in Figure 5. Shorted or open DO field wiring is reported back to TDC as a digital input. Up to two 16 point DO FTAs can be connected to one 32 point DI IOP via the combiner panel. This FTA is not available with auxiliary signal override.

Physical Layout

Galvanic Isolation/Intrinsically Safe FTAs System Layout

Figure 6 is an example of the GI/IS FTAs and accessory equipment connected to a Process Manager family.

Each GI/IS FTA is cable connected to its respective PM/APM/HPM I/O processor.

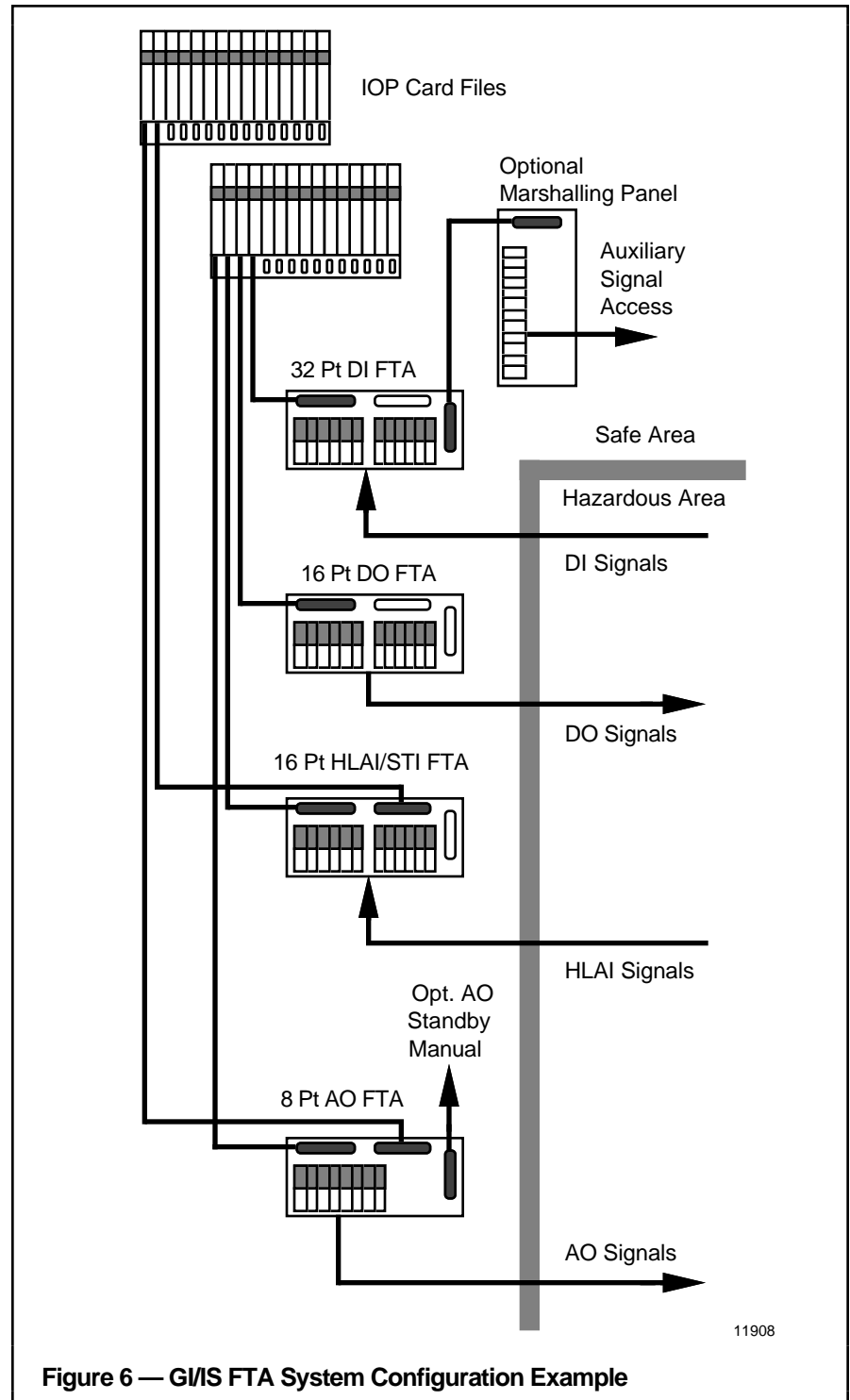
In the illustration, the FTAs are, from top to bottom:

- Digital Input
- Digital Output
- HLAI/STI in a redundant configuration
- Analog Output in a redundant configuration.

The optional Marshalling Panel is shown connected through the auxiliary connector on the DI GI/IS FTA providing auxiliary access to the field signals on the safe side. The AO GI/IS FTA is shown connected to an AO Standby Manual unit through the auxiliary connector.

GI/IS FTA Cabinet Layout

The GI/IS FTAs are mounted horizontally in the PM/APM/HPM cabinet, as illustrated in Figure 6. This mounting scheme assures maintaining adequate wire separation between safe and hazardous wiring.



A single cabinet side can accommodate up to 8 horizontal FTA mounting trays, each capable of holding two GI/IS FTAs for a cabinet density of 16 GI/IS FTAs per cabinet side or 14 GI/IS FTAs

with the eighth tray used to hold the Power Distribution Assemblies (two mounting trays are shown in Figure 7).

Power to Galvanic Isolators

Figure 8 is an example of the power distribution scheme used with the FTAs shown in Figure 6. The power distribution scheme shown is the redundant power option.

Based upon your power supply options, either nonredundant or redundant 24 Vdc power can be supplied.

Each Power Distribution Panel has eight 2-pin connectors and eight fuses. Each FTA has two 2-pin connectors, allowing prefabricated power cables to be easily connected between the distribution panels and the FTAs.

Additional Power Requirements

Additional PM/APM/HPM Power Subsystems may be required for use with the GI/IS FTAs because the power subsystem provides power for both the GI/IS modules on the FTAs and the field devices. To properly allocate sufficient power supplies, consult individual FTA specification sheets for current consumption.

European Community (EC) Compliance

All GI/IS FTAs comply with European Community (EC) directive requirements, denoted by the "CE mark" (Conformite Europeene). Non-compliant models are not available. As of January 1, 1996, all goods imported into the European community or moving between member countries must be compliant with the new EC directives.

For APM and HPM systems, customers must choose whether or not CE compliance is needed. HPMMs, APMs, IOPs, and power supplies are only available CE-compliant. For cardfiles and some other FTAs, both compliant and non-compliant versions are

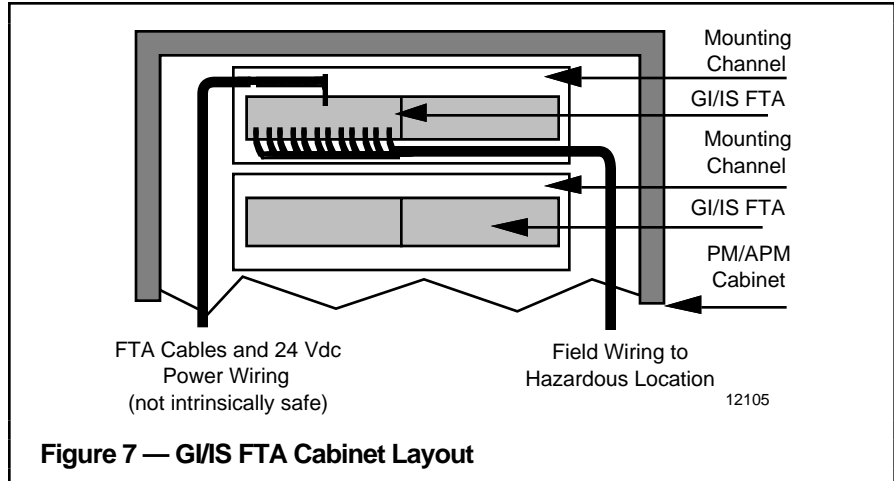


Figure 7 — GI/IS FTA Cabinet Layout

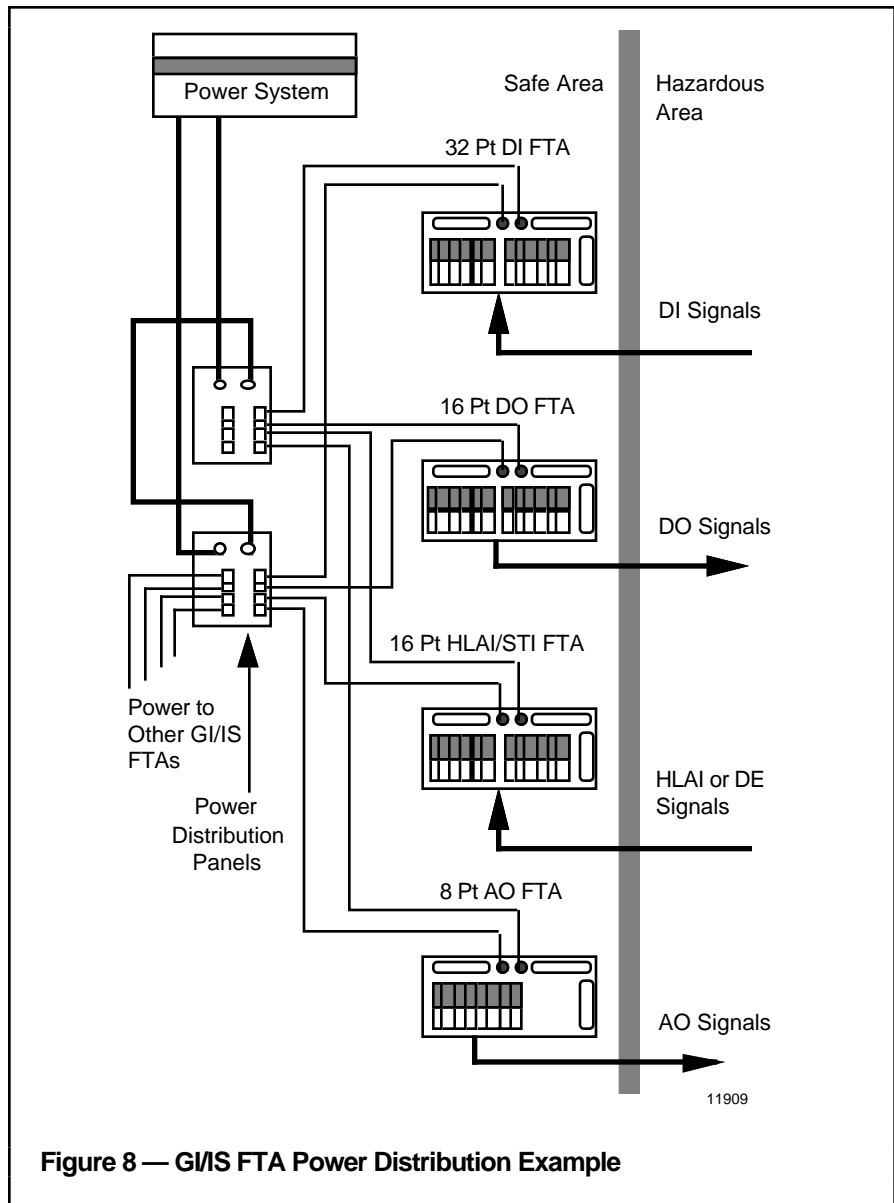


Figure 8 — GI/IS FTA Power Distribution Example

available. Only Rittal cabinets are CE-compliant. Please refer to **IO03-500, Process Manager I/O Specification and Technical Data**, for more IOP/FTA details.

Accessories

Field Terminals

The GI/IS FTAs are provided with two field termination options as illustrated in Figure 9:

- A crimp terminal which provides a secure crimp connection for #14-20 AWG (≈ 0.5-2 mm²) wires, and
- A compression terminal which provides top wire and screw clamp access and accepts 12 to 22 AWG (≈ 0.35-3 mm²) wire.

Both connectors provide a locking mechanism for securing the connector to the GI/IS module and are polarized to ensure proper orientation on the GI/IS module.

Field wires are connected to the compression terminals by using a small screwdriver as illustrated. The crimp connector terminals use a GI/IS FTA Crimp Connector Tool Kit which contains a crimping tool and an extractor tool.

All field terminals are provided with the GI/IS FTA and do not need to be ordered separately.

Marshalling Panel

An optional Marshalling Panel is available for auxiliary safe access of the field signals from the HLAI/STI, DI, and DO GI/IS FTAs.

The optional Marshalling Panel is easily cable connected to the

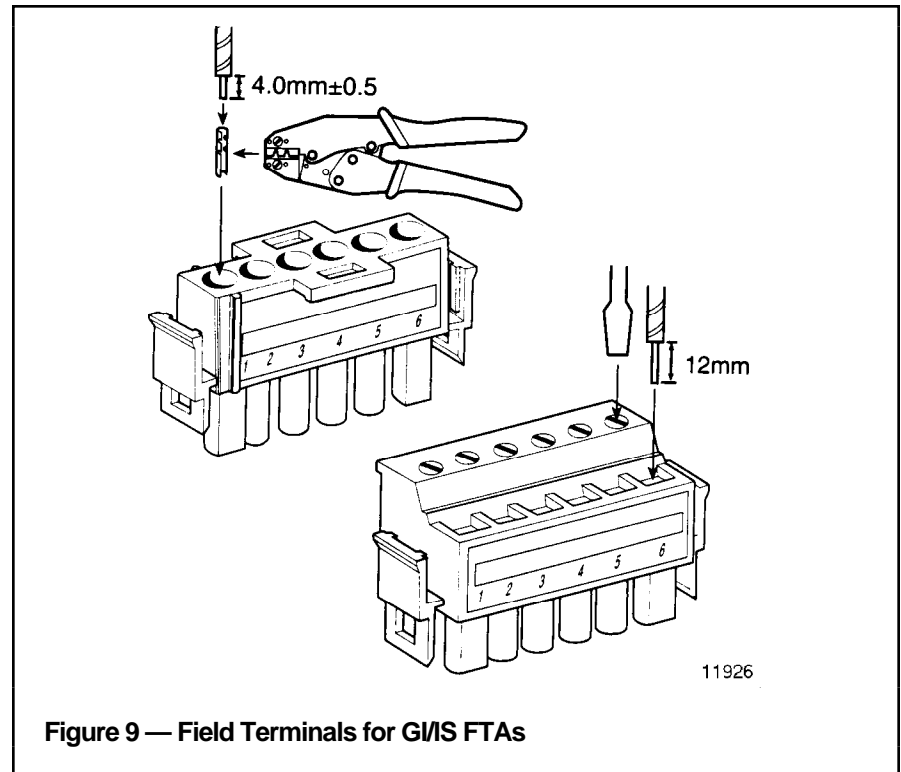


Figure 9 — Field Terminals for GI/IS FTAs

referenced GI/IS FTAs by use of a standard FTA cable to the auxiliary connector provided on the safe side of the GI/IS FTAs.

Auxiliary safe access to the field signals through the optional marshalling panel is a convenient method for interfacing to such items as a recorder for a separate hard copy of HLAI signals, or for interfacing to a safety interlock system through DIs and DOs.

Standby Manual

Both the AO and DO GI/IS FTAs support the use of standby manual.

The auxiliary connector on the AO GI/IS FTA provides safe access for an AO Standby Manual unit. Similarly, the unused second IOP connector on the DO GI/IS FTA

provides safe access for a DO Standby Manual unit.

HLAI GI/IS FTA Calibration Tool

A special calibration tool is used with the HLAI GI/IS FTA to periodically recalibrate the HLAI IOP.

This tool plugs into the auxiliary connector on the HLAI/STI GI/IS FTA, and provides a point for connecting a precision voltage calibration source.

The HLAI IOP has an auto-calibration system; therefore, no trim pots are involved in the calibration process.

SPECIFICATIONS

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. <i>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.</i>
Product Classification	Class I: Permanently mounted, permanently connected Industrial Control Equipment with protective earthing (grounding). (EN 61010-1-1993)
Enclosure Rating	The APM and HPM is sold to users in a lockable cabinet which prevents OPERATOR access to live parts, thereby providing protection against shock hazard. If a user installs parts of a Process Manager outside of the standard cabinet, they must be in an equivalent enclosure.
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)

Intrinsic Safety Approval Standards

These standards apply to assemblies and isolation modules mounted in a standard PM/APM /HPM cabinet.

Maximum Cable and Load Parameters

G/IS FTA	BASEEFA				FM		
	Gas Group	μF	mH	$\mu\text{H}/\Omega$	Gas Group	μF	mH
Digital Input	IIC	2.4	165	825	A & B	2.4	165
	IIB	7.2	495	2475	C	7.2	495
	IIA	19.2	1320	6600	D	19.2	1320
Digital Output	IIC	0.17	3	51	A & B	0.17	3
	IIB	0.51	9	153	C	0.51	9
	IIA	1.36	24	408	D	1.36	24
Analog/Smart Transmitter	IIC	0.13	4.2	55	A & B	0.13	4.2
	IIB	0.39	12.6	165	C	0.39	12.6
	IIA	1.04	33.6	440	D	1.04	33.6
Analog Output	IIC	0.13	4.2	55	A & B	0.13	4.2
	IIB	0.39	12.6	165	C	0.39	12.6
	IIA	1.04	33.6	440	D	1.04	33.6

SPECIFICATIONS (continued)

Approvals

Region (Authority)	Canada (CSA)	(CENELEC)		USA (FM)
		UK (BASEEFA) Apparatus	UK (BASEEFA) System	
Standard	C22.2 No. 157 and 142 (1)	EN50 014 & 20 BS5501: Pts. 1 & 7, 1977	EN50 039 BS5501: Pt. 9, 1982	3610 Entity
Approved for	Class I, II, III, Division 1, Groups A - G	[EEx ia] IIC	EEx ia IIC T4 or T6 (2)	Class I, II, III, Division 1, 2, Groups A - G IS circuits. Mounting in Class I, II, III, Division 2.
Model Number (3)	(Certificate/File Number)			
4013 (DI) 4016 (DI) 4021 (DO) 4023 (DO) 4041B (HLAI/STIMV) 4041P (HLAI/STIMV) 4045B (AO)	LR36637-63 LR36637-49 LR36637-49 LR36637-91 LR36637-68 LR36637-77 LR36637-91	Ex92C2322 Ex91C2450 Ex91C2001 Ex93C2499 Ex92C2003 Ex92C2003 Ex93C2478	Ex92C2323 Ex91C2451 Ex91C2002 Ex93C2500 Ex92C2004 Ex92C2004 Ex93C2479	J.I.5W3A4.AX J.I.0W2A6.AX J.I.0W2A6.AX J.I.4Y5A6.AX J.I.1X6A4.AX J.I.4X5A3.AX J.I.4Y5A7.AX
<p>(1) The isolators are also approved by CSA under the same file number (LR36637-49) as process control equipment comply with the CSA Std. No. 142 for connection to equipment in non-hazardous locations.</p> <p>(2) T6 for switches or if hazardous area device is suitably certified.</p> <p>(3) Modules from Measurement Technology Ltd. (MTL) are used on the GI/IS FTAs to provide intrinsic safety and are certified by the noted authorities to the indicated standards. Certification has been obtained by MTL. The listed model numbers are the corresponding MTL model numbers under which the modules have been certified.</p>				

Galvanic Isolation/Intrinsic Safety Field Termination Assemblies — Specifications

All specifications apply to GI/IS FTAs and isolation modules mounted in a standard PM/APM /HPM cabinet. These specifications are specific to GI/IS FTAs. Additional specifications which apply to all FTAs can be found in the *Specification and Technical Data* documents for the Process Manager and Advanced Process Manager.

GI/IS High Level Analog Input /Smart Transmitter Interface Multi-Variable (GI/IS HLAI/STIMV) FTAs-16 Inputs

Models MU-GAIH13/83 & MU-GAIH22/92 using module 4041B, and model MU-GAIH14/84 using module 4041P

Parameter	Specification
Number of Channels	One per Isolator Module, 16 Isolator Modules per FTA
Location of Transmitter	Class I, II, III, Division 1, Group A - G or IEC Zone 0, IIC, T4-6 Hazardous area if suitably certified
Location of FTA	Unclassified or FM Division 2
Voltage available for transmitter	MU-GAIH13/83 & 22/92: 15 Vdc Minimum at 20 mA MU-GAIH14/84: 16.3 Vdc minimum at 20 mA (Maximum open-circuit voltage is 28 Vdc for all HLAI models)
Auxiliary Output	MU-GAIH13/83 & 14/84: 1 - 5 Vdc MU-GAIH22/92: 4 - 20 mA (max input impedance of auxiliary device = 275W)
Signal Range	2.9 to 21.1 mA
Hardware Accuracy	System: $\pm 0.2\%$ (at 20 ∞ C), $\pm 0.47\%$ (at 0-50 ∞ C)
Temperature Drift	< 0.009% per degree C
Power Requirement (FTA)	1.21 A (29.06 watts), with a 20 mA signal per channel
Power Dissipation (FTA)	22.8 watts, with a 20 mA signal per channel
Isolation	250 Vac between safe and hazardous area circuits
Safety Description	MU-GAIH13/83 & 22/92: Voc = 28 V, Rs = 300 W, Isc = 93 mA. Um. = 250 V rms or dc MU-GAIH14/84: Voc = 28 V, Rs = 240 W, Isc = 116.6 mA, Um. = 250 V rms or dc Voc = Maximum Open Circuit Voltage Rs = Minimum Source Resistance Isc = Maximum Short Circuit Current Um = Maximum applied voltage without invalidating intrinsic safety
FM Entity Parameters	MU-GAIH13/83 & 22/92: Voc = 28 Vdc, Isc = 93 mA, Ca = 0.13 μ F, La = 4.2 mH MU-GAIH14/84: Voc = 28 Vdc, Isc = 112 mA, Ca = 0.16 mF, La = 2.86 mH Voc = Maximum Open Circuit Voltage Isc = Maximum Short Circuit Current Ca = Maximum Capacitance of Field Cable and Load La = Maximum Inductance of Field Cable and Load
Environmental Conditions	Same as PM family
Electromagnetic Interference	15 V/m (External to the standard PM/APM/HPM cabinet with doors closed.)
Surge Protection	IEEE SWC 472-1974
CE Conformity (Europe)	89/336/EEC, Electromagnetic Compatibility (EMC) Directive
LED Indicators	16 (one per isolator) indicates power to isolator (green) 1 per FTA shows primary IOP in control (green)
Major Dimensions (FTA)	4.9" W x 12.1" L (B-size)
Compatible with all Honeywell Smart Transmitters	

GI/IS Analog Output (GI/IS AO) FTAs-8 Outputs
Models MU-GAOX02/72 and MU-GAOX12/82 using module 4045B

Parameter	Specification
Number of Channels	One per Isolator Module, 8 Isolator Modules per FTA
Location of I/P Converter	Class I, II, III, Division 1, Group A - G or IEC Zone 0, IIC, T4-6 Hazardous area if suitably certified
Location of FTA	Unclassified or FM Division 2
Signal Range	2.9 to 21.1 mA
Load Resistance	90 Ω minimum to 710 Ω maximum
Output Dynamic Impedance	>1 M Ω
Input and Output Circuit Ripple	<40 μ A peak-to-peak (<0.25%)
Hardware Accuracy	System: \pm 0.625% (at 20°C), \pm 1.41% (at 0-50°C)
Temperature Drift	< 0.026% per degree C
Response Time	Settles within 1.25% of final value within 100 ms
Power Requirement (FTA)	0.45 A (10.7 watts), with a 20 mA signal per output
Power Dissipation (FTA)	9.6 watts, with a 20 mA signal per output
Isolation	250 Vac between safe and hazardous area circuits
Safety Description	Voc = 28 V, Rs = 300 Ω , Isc = 93 mA. Um. = 250 V rms or dc Voc = Maximum Open Circuit Voltage Rs = Minimum Source Resistance Isc = Maximum Short Circuit Current Um = Maximum applied voltage without invalidating intrinsic safety
FM Entity Parameters	Voc = 28 Vdc, Isc = 93 mA, Ca = 0.13 μ F, La = 4.2 mH Voc = Maximum Open Circuit Voltage Isc = Maximum Short Circuit Current Ca = Maximum Capacitance of Field Cable and Load La = Maximum Inductance of Field Cable and Load
Environmental Conditions	Same as PM family
Electromagnetic Interference	15 V/m (External to the standard PM/APM/HPM cabinet with doors closed.)
Surge Protection	IEEE SWC 472-1974
CE Conformity (Europe)	89/336/EEC, Electromagnetic Compatibility (EMC) Directive
LED Indicators	8 (1 per isolator) indicates power to isolator (green) 1 per FTA shows primary IOP is in control (green)
Major Dimensions (FTA)	4.9" W x 12.1" L (B-size)

GI/S Digital Input (GI/S DI) FTAs –32 Inputs

Models MU-GDID12/82 using module 4016 and model MU-GDID13/83 using module 4013

Parameter	Specification
Number of Channels	Two per Isolator Module, 16 Isolator Modules per FTA
Location of Switch	Class I, II, III, Division 1, Group A - G or IEC Zone 0, IIC, T6 Hazardous area if suitably certified
Location of Proximity Detector	Class I, II, III, Division 1, Group A - G or IEC Zone 0, IIC, T4-6 Hazardous area if suitably certified
Location of FTA	Unclassified or FM Division 2
Voltage Applied to Sensor	7.7 to 9.0 Vdc from 1 K Ω
Input/Output Characteristics	Model MU-GDID12/82: Outputs closed if >2.1 mA* (<2 K Ω) in sensor circuit Outputs open if <1.2 mA* (>10 K Ω) in sensor circuit Hysteresis: 200 μ A (650 Ω) nominal Model MU-GDID13/83: Output on if >2.1 mA* (<2 K Ω) in sensor circuit Output off if <1.2 mA* (>10 K Ω) in sensor circuit Hysteresis: 200 μ A (650 Ω) nominal
Phase Reversal MU-GDID12/82 only	Model The operation of each channel may be reversed by independent switches on top of each isolator module.
Response Time	2 ms maximum
Power Requirement (FTA)	0.72 A (18 watts)
Power Dissipation (FTA)	16 watts
Safety Description	Voc = 10.5 V, Rs = 800 Ω , Isc = 14 mA, Um. = 250 V rms or dc Voc = Maximum Open Circuit Voltage Rs = Minimum Source Resistance Isc = Maximum Short Circuit Current Um = Maximum applied voltage without invalidating intrinsic safety
FM Entity Parameters	Voc = 10.5 Vdc, Isc = 14 mA, Ca = 2.4 μ F, La = 165 mH Voc = Maximum Open Circuit Voltage Isc = Maximum Short Circuit Current Ca = Maximum Capacitance of Field Cable and Load La = Maximum Inductance of Field Cable and Load
Isolation	Model MU-GDID12/82: 250 Vac between each of the following circuits: Input ₁ , Input ₂ , Relay Output _A , Relay Output _B , Power Supply Model MU-GDID13/83: 250 Vac between each of the following circuits: Input ₁ , Input ₂ , and safe-area circuits
Environmental Conditions	Same as PM family
Electromagnetic Interference	15 V/m (External to the standard PM/APM/HPM cabinet with doors closed.)
Surge Protection	IEEE SWC 472-1974
CE Conformity (Europe)	89/336/EEC, Electromagnetic Compatibility (EMC) Directive
LED Indicators	32 (two per isolator) indicates output to PM/APM /HPM is ON (amber) 16 (one per isolator) indicates power to isolator (green)
Major Dimensions (FTA)	4.9" W x 12.1" L (B-size)
* NAMUR and DIN 19234 standards for proximity detectors.	

GI/IS Digital Output (GI/IS DO) FTA—16 Outputs

Parameter	Specification
Number of Channels	One per Isolator Module, 16 Isolator Modules per FTA
Location of Load	Class I, II, III, Division 1, Group A - G or IEC Zone 0, IIC, T4-6 hazardous area if suitably certified
Location of FTA	Unclassified or FM Division 2
Override Input	An open collector transistor or a switch (at the marshalling panel) can be used to turn the output off, regardless of the state of the control input.
Minimum Output Voltage For MU-GDOD12/82 For MU-GDOL12/82	<p>The first graph for MU-GDOD12/82 shows a linear decrease in output voltage from 22 V at 0 mA to 10 V at 50 mA. The second graph for MU-GDOL12/82 shows a linear decrease from 22 V at 0 mA to 14 V at 45 mA.</p>
Maximum Output Voltage	MU-GDOD12/82: 25.5 Vdc from 232 Ω MU-GDOL12/82: 25 Vdc from 170 Ω
Output Ripple	<0.5% of maximum output, peak-to-peak
Response Time	Output within 10% of final value after 100 ms
Power Requirement (FTA)	1.10 A (22.5 watts) with a 350 Ω load per channel and all outputs on
Power Dissipation (FTA)	19.2 watts with a 350 Ω load per channel and all outputs on
Isolation	250 Vac between safe and hazardous area circuits
Safety Description MU-GDOD12/82: MU-GDOL12/82:	<p>Voc = 25.5 V, Rs = 232 Ω, Isc = 110 mA. Um. = 250 V rms or dc</p> <p>Voc = 25 V, Rs = 170 Ω, Isc = 147 mA. Um. = 250 V rms or dc</p> <p>Voc = Maximum Open Circuit Voltage Rs = Minimum Source Resistance Isc = Maximum Short Circuit Current Um = Maximum applied voltage without invalidating intrinsic safety</p>
Line Fault MU-GDOL12/82 only	Line fault is detected if the load is < 50 Ω or > 7 K Ω which causes a contact closure via the marshalling panel or combiner panel.

<p>FM Entity Parameters</p> <p>MU-GDOD12/82:</p> <p>MU-GDOL12/82:</p>	<p>Voc = 25.5 Vdc, Isc = 110 mA, Ca = 0.17 μF, La = 3 mH Voc = Maximum Open Circuit Voltage Isc = Maximum Short Circuit Current Ca = Maximum Capacitance of Field Cable and Load La = Maximum Inductance of Field Cable and Load</p> <p>Voc = 25 Vdc, Isc = 147 mA, Ca = 0.17 μF, La = 1.6 mH Voc = Maximum Open Circuit Voltage Isc = Maximum Short Circuit Current Ca = Maximum Capacitance of Field Cable and Load La = Maximum Inductance of Field Cable and Load</p>
<p>Environmental Conditions</p>	<p>Same as PM family</p>
<p>Electromagnetic Interference</p>	<p>15 V/m (External to the standard PM/APM/HPM cabinet with doors closed.)</p>
<p>Surge Protection</p>	<p>IEEE SWC 472-1974</p>
<p>CE Conformity (Europe)</p>	<p>89/336/EED, Electromagnetic Compatibility (EMC) Directive</p>
<p>LED Indicators</p> <p>MU-GDOD12/82:</p> <p>MU-GDOL12/82:</p>	<p>16 (one per isolator) indicates output is ON (amber) 16 (one per isolator) indicates power to isolator (green)</p> <p>16 (one per isolator) indicates line fault is detected (red) 16 (one per isolator) indicates output is ON (amber) 16 (one per isolator) indicates power to isolator (green)</p>
<p>Major Dimensions (FTA)</p>	<p>4.9" W x 12.1" L (B-size)</p>

Marshalling Panel

When Used With	Parameter	Specification
	Number of Terminations	Signal 32 Common 4 Unused <u> 2</u> Total 38
	Location of Marshalling Panel	Unclassified or FM Division 2
MU-GAIH13, 14, 83, or 84	Process Variable Signal Output to aux device	1 to 5 Vdc
MU-GAIH22 or 92	Process Variable signal output to aux device	4 to 20 mA dc
MU-GAIH13, 14, 83, or 84	GI/IS HLAI FTA Input Impedance of Auxiliary Device	1 M Ω minimum Note: An auxiliary device with a lower input impedance may affect the accuracy of the PM/APM/HPM HLAI. 1 M Ω input impedance affects HLAI accuracy by 0.025%
MU-GAIH22 or 92	GI/IS HLAI FTA Input Impedance of Auxiliary Device	275 ohms maximum
MU-GDID12 or 82	Process contact state signal Output to aux device	Relay Contact
MU-GDOD12 or 82	Override signal from Auxiliary Device	Relay or Solid State Contact: closure will override IOP output, deenergize load.
MU-GDOL12 or 82	Line Fault Detection signal to Aux Device	Solid state contact output. Closes when line fault detected.
	Environmental Conditions	Same as PM family
	Electromagnetic Interference	15 V/m (External to the standard PM/APM /HPM cabinet with doors closed.)
	Surge Protection	IEEE SWC 472-1974
	LED Indicators	None
	Major Dimensions (FTA)	4.75" W x 12" L (B-size)

Model Numbers

Description	Model Number
GI/IS Field Termination Assemblies (Compression Terminals)	
High Level Analog Input/STIMV FTA, 16 Inputs with aux voltage output (4041B)	MU-GAIH13*
High Level Analog Input/STIMV FTA, 16 inputs, with aux volt out & high voltage (4041P)	MU-GAIH14*
High Level Analog Input/STIMV FTA, 16 Inputs, with aux current output (4041B)	MU-GAIH22*
Analog Output FTA, 8 Outputs (4045B)	MU-GAOX02
Analog Output FTA for Redundancy, 8 Outputs (4045B)	MU-GAOX12*
Digital Input dc FTA, 32 Inputs (4016)	MU-GDID12
Digital Input dc FTA, 32 Inputs, with solid state relays (4013)	MU-GDID13**
Digital Output dc FTA, 16 Outputs, with line fault detection (4023)	MU-GDOL12
Digital Output dc FTA, 16 Outputs with override inputs (4021)	MU-GDOD12
GI/IS Field Termination Assemblies (Crimp Terminals)	
High Level Analog Input/STIMV FTA, 16 Inputs with aux voltage output (4041B)	MU-GAIH83*
High Level Analog Input/STIMV FTA, 16 inputs, with aux volt out & high voltage (4041P)	MU-GAIH84*
High Level Analog Input/STIMV FTA, 16 inputs, with current output (4041B)	MU-GAIH92*
Analog Output FTA, 8 Outputs (4045B)	MU-GAOX72
Analog Output FTA for Redundancy, 8 Outputs (4045B)	MU-GAOX82*
Digital Input dc FTA, 32 Inputs (4016)	MU-GDID82
Digital Input dc FTA, 32 Inputs, with solid state relays (4013)	MU-GDID83**
Digital Output dc FTA, 16 Outputs, with line fault detection (4023)	MU-GDOL82
Digital Output dc FTA, 16 Outputs with override inputs (4021)	MU-GDOD82
GI/IS Power Assembly (Located in FTA Mounting Channels)	
Power Distribution Panel	MU-GPRD02
Power Cable (Local Cabinet Use)	MU-KGPR00
Power Cable (5M)	MU-KGPR05
Power Cable (10M)	MU-KGPR10
GI/IS Field Wiring Terminals	
Compression Terminal (for Field Wiring)	51191738-100
Crimp Terminal (for Field Wiring)	51191737-100
GI/IS Marshalling Assembly (Located in FTA Mounting Channels)	
Marshalling Panel	MU-GMAR52
FTA I/O Cable (for auxiliary connection to marshalling panel)	MU-KFTAxx****
GI/IS Accessories	
Crimp Connector Tool Kit	MU-GCTK01
HLAI Calibration Tool	MU-GACT02
Combiner Panel for Digital Output Line Fault Detection	MU-GLFD02****
Horizontal FTA Mounting Channel	MU-TMHN01
Horizontal FTA Mounting Channel with Shield Ground Bar	MU-TMHN02
<p>* These FTAs can be used for either single or redundant applications. ** MU-GDID13/83 has no auxiliary outputs or phase reversal *** xx = 00 for local cabinet use; xx in 5M lengths to 50M for external use. **** Used only with MU-GDOL12/82 DO FTA</p>	

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