USER GUIDE

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MVA

Multi-Variable Analog Interface

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NRTL/C

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MODEL SELECTION

M V A - 1 x 1 - y where: **x** = number of analog outputs, **1** or **4**

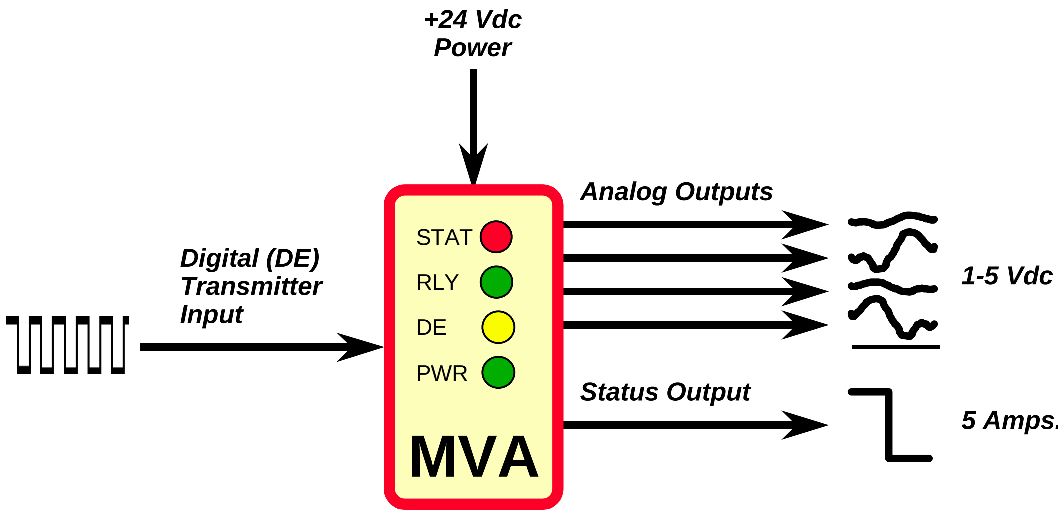
y = option selection(s), '**-E**' specifies European CE Compliance

Note: Custom factory configuration not covered in this guide is available for PV/SV SELECTION, ANALOG OUTPUT FAULT VALUE, OUTPUT MODE ACTION.

DESCRIPTION

The **Multi-Variable Analog** (**MVA**) interface provides a means to interface with analog instrumentation while utilizing the advantages of Honeywell's Digitally Enhanced (DE) communications. The **MVA** is fully compatible with all Honeywell Smartline™ transmitters, 3rd party DE transmitters and DE control system interfaces. In addition, handheld communicators may be used with **no** disturbances to the analog outputs or status.

Figure 1 - MVA Block Diagram



The **MVA** works by converting a single transmitter's digital PV or SV signals into 1-5 volt analog signals. Each module's analog output is precision factory characterized. In addition to analog outputs, a "smart status" relay output is provided that is derived from the transmitter's diagnostic status. The module is suitable for DIN rail mounting in proximity to the analog instrumentation. MVA operates from a single +24VDC source and is internally short-circuit protected.

APPLICATIONS

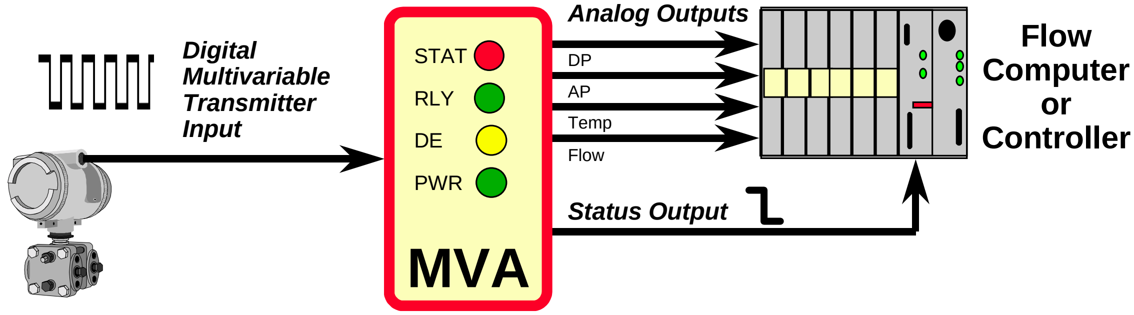
- Mix DE and Analog Input Instrumentation
- Multivariable Flow Computer Interface
- Safety System Interface
- Accuracy/Repeatability Enhancement
- Multivariable Metering

Following are a few examples of typical applications.

ACCESS MULTIPLE VARIABLES

Save wiring costs. The MVA is user configurable to simultaneously access up to four (4) transmitter variables. Each of the MVA's four (4) analog outputs is independently user configurable.

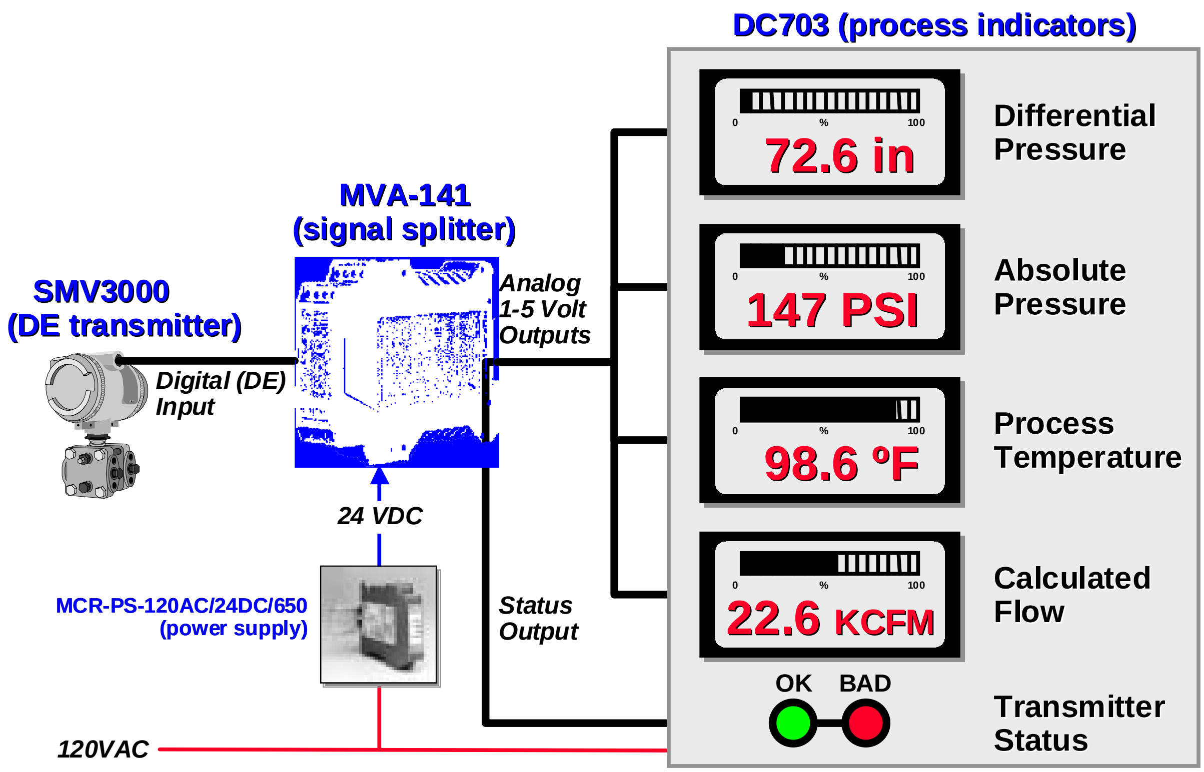
Figure 2 - Multivariable Flow Computer Interface



MULTIVARIABLE METERING

Multivariable process measurements may be displayed, in engineering units, anywhere the digital (DE) signal is accessible. Meters may display PV1 through PV4 or SV1.

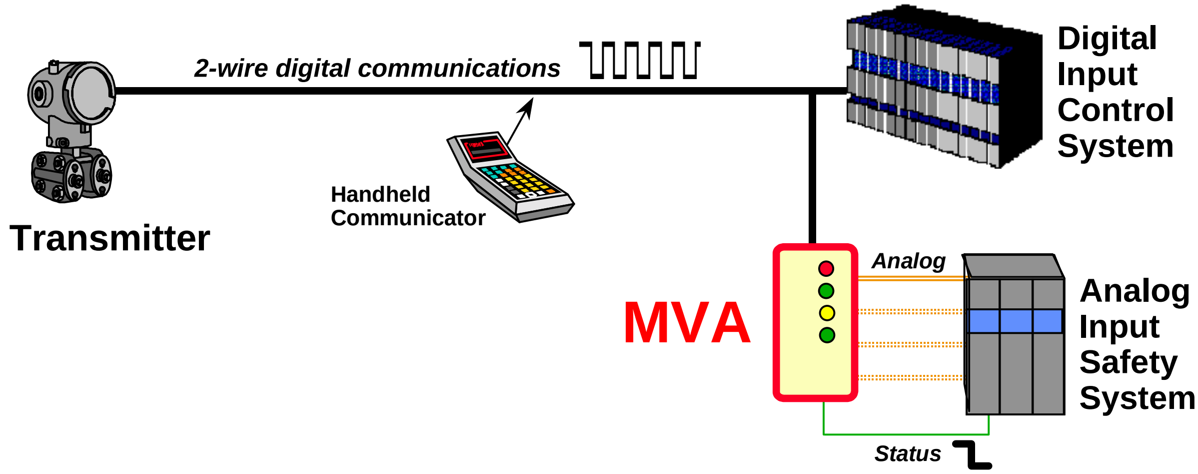
Figure 3 - Multivariable Metering Example



SAFETY SHUTDOWN APPLICATIONS

Process upsets or false shutdowns may be avoided by incorporating the transmitter status into the shutdown strategy. The independent transmitter status relay output is useful in differentiating a MAINTENANCE problem from a PROCESS problem. Alarm simplification is also possible when using the status output relay to eliminate the need for loop open/short trips. Shutdown reaction time may be improved by utilizing the status relay to validate the PV. The hold *Last Know Good* feature may be enabled to allow the operator more time to react. Bumpless communications and configurable "output mode" action enhance validation procedures. MVA has taken into consideration the emerging requirements of ISA S84 and IEC 61508.

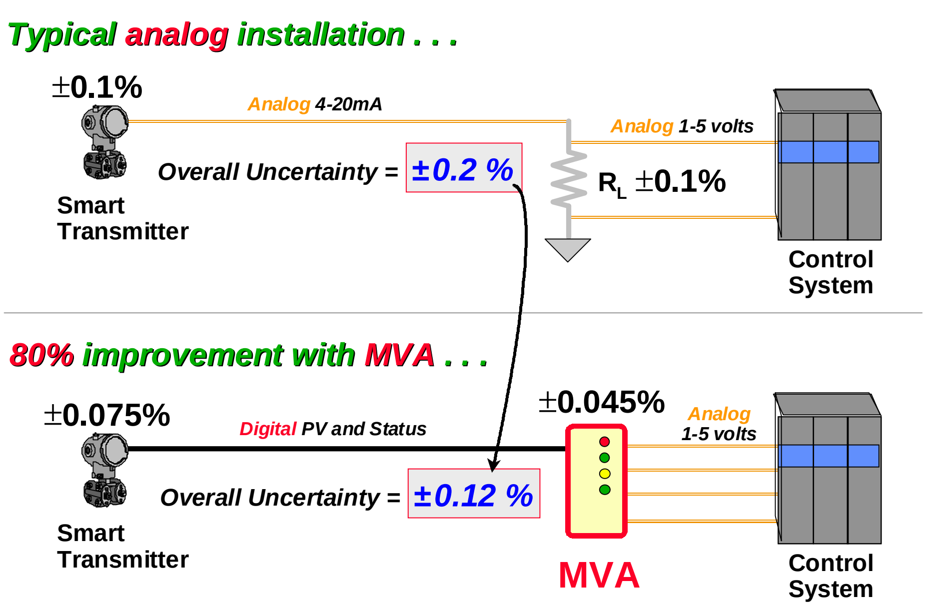
Figure 4 - Multivariable Safety Interlock



ENHANCED ANALOG ACCURACY

The MVA precision voltage outputs increase the overall analog accuracy 80% by eliminating uncertainties introduced in the transmitter's D/A and the 250 Ω loop resistor. Also see *FREQUENTLY ASKED QUESTIONS.*

Figure 5 - Increasing Accuracy



INSTALLATION

MOUNTING

The MVA mounts on any 35 mm DIN rail (top hat, EN50022). The rails may be purchased in various heights, lengths and hole configurations. The MVA will mount on either shallow or deep rail types. The MVA may be mounted in any orientation without degradation of performance. The MVA should be located such that the wire run which carries the digital DE communications signal is maximized. As a *listener* device, the MVA may be installed without disconnecting or disrupting the existing installation.

ENVIRONMENTAL

The MVA is NOT suitable for harsh environments. It is intended to be mounted in rack room or control room environments. Refer to the specification for limits.

PRECAUTIONS

This CAUTION symbol on the equipment refers the user to the User Guide for additional information. This symbol appears next to required information in this manual.

The MVA should be installed in close proximity to the instrumentation that is receiving the analog outputs.

Wire lengths to the analog instrumentation should be kept as short a possible. Wire runs as long as 50 feet may be tolerated provided the analog instrumentation has differential input capability. A separate analog signal return wire from the MVA should be provided which is not used to carry other return signals or power. Following these precautions will help maintain the rated accuracy of the MVA analog outputs. The WIRING DIAGRAMS section indicate alternative connections for improved performance in specific applications.

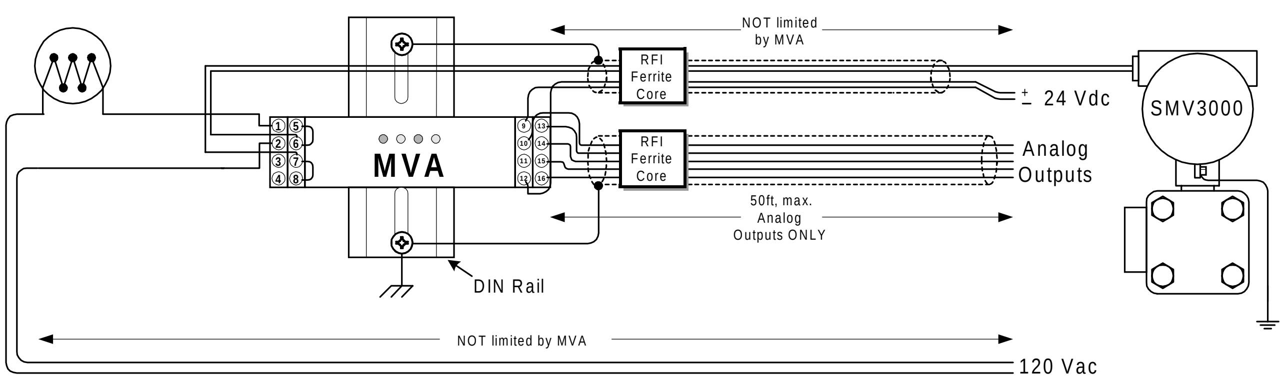
Precautions should be taken to avoid installation of the MVA in locations that may not be suitable for reliable operation. Refer to the SPECIFICATIONS section for electrical and environmental requirements.

While the MVA is NOT isolated, the DE input is capacitively coupled and is relatively insensitive to noise since the signal is digital and can tolerate up to 50 VDC of common mode. Situations with greater potentials should install a commercial isolation module between the field instrument and the MVA.

CE CONFORMITY (European Option)

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.

Figure 6 - Typical CE Mark Wiring



Ferrite suppression filter(s), Fair-Rite # 0443164151 or Honeywell # 51197612 or equivalent, are required on all signal and 24VDC power cables, mounted as close to the MVA unit as possible. Shielded twisted pair cables, Belden # 9318 or equivalent, are required for all transmitter, analog outputs, and 24VDC power. Shields shall be grounded at the MVA end only. *Figure 6 - Typical CE Mark Wiring*, depicts the recommend installation using the two supplied ferrite suppression filters. Because installations and wire type may vary, one ferrite suppression filter may be used, provided the cables are able to pass through the central core.

Deviation from the installation conditions specified in this manual may invalidate this product's conformity with the Low Voltage and EMC Directives.

CONTROL and RELAY WIRING

The insulation of wires connected to the control and relay terminals shall be rated for the highest voltage involved. Extra Low Voltage (ELV) wiring (input, output) shall be separated from HAZARDOUS LIVE (>50 Vac, or 75 Vdc) Low Voltage (LV) Relay circuits.

All connectors are <u>removable</u> and <u>keyed</u>. The MVA will accept up to 12 awg. stranded wire. When terminating multiple wires under a single screw terminal it is good practice to use an external fastener. For ease of SFC or SCT connection, it may be useful to leave 1/8" of the wire exposed for connection of the clipleads.

Refer to the detailed wiring diagram shown in the WIRING DIAGRAMS section.

Figure 7 - Terminal Numbering

*** NOTES:** 1) The STATUS output relay is normally energized for good transmitter status. Therefore, the N.O. relay contacts are CLOSED for normal operation with good transmitter status.

2) Model **MVA-111** 'Analog Output' uses terminal #13.

ALL MVA Analog Outputs are 1-5 VOLTS (not 4-20ma.). DAMAGE WILL OCCUR IF THE MVA IS CONNECTED TO A CURRENT LOOP VOLTAGE SOURCE.

STAND ALONE versus LISTENER

When used as *STAND ALONE*, the MVA provides the loop power and 250Ω loop resistor. When used as *LISTENER*, the loop power and 250Ω loop resistor are provided externally (e.g. Host DCS, PLC, etc.).

POWERING THE MVA

The MVA is intended to operate from a 24VDC bulk supply. The MVA is a thermally stabilized device that requires approximately 250 mA for 2 seconds after power-up, after which the current draw is reduced to 80 mA.

POWERING THE FIELD INSTRUMENT

The field instrument can be optionally powered by the MVA via terminal 5. Additionally, the MVA optionally provides a 250 ohm loop resistor via terminal 8. The internal loop resistor is adequate to process the digital DE signal and should not be used for any other purposes.

The transmitter supply from the MVA is short circuit protected to 300 mA. and will automatically recover a few seconds after the short is removed.

WITH SAFETY BARRIERS

Only approved safety barriers which are capable of passing the digital DE signal may be used. Refer to the Honeywell PM/APM Smartline Transmitter Integration Manual, #PM12-410, or call Honeywell for assistance.

WITH HOST (TPS/TDC, PLC, etc.)

When using the MVA with a host device, the field instrument is usually NOT powered by the MVA. The MVA behaves as a *listener* and must be wired such that the system safety barrier operation is not compromised.

USING MULTIPLE MVAs

Several MVA modules may be used to *listen* to a single field instrument since the MVA input impedance is 10Kohm. This may be advantageous if the distances between the analog instrumentation are large.

USE WITH MTS, SFC, SCT, METERS, STDC, STI-MV, ETC.

The MVA is compatible with all other DE devices. Up to ten (10) devices may be simultaneously connected to the digital DE loop at any point.

CONFIGURATION

Model **MVA-111** has NO user configuration switches. Configuration is factory preset to PV1, FAIL-SAFE LOW AND OUTPUT MODE PASS THROUGH AS VALID PV. Custom factory configurations are available.

All **MVA-141** configuration is accomplished via two(2) rows of internal DIP switches. The switches are accessed by slightly depressing the two(2) tabs on each side of the module while gently sliding the module top upwards until both rows of DIP switches are visible. See *Figure 8 - Configuration Switch Location*.

Using a small tool, slide the appropriate switch to the desired position. Refer to *Figure 9 - Configuration DIP Switch Layout* and *Table 1 - Configuration switch descriptions.* When all configuration is completed, slide the module top back down into the lower housing until both side tabs are engaged.

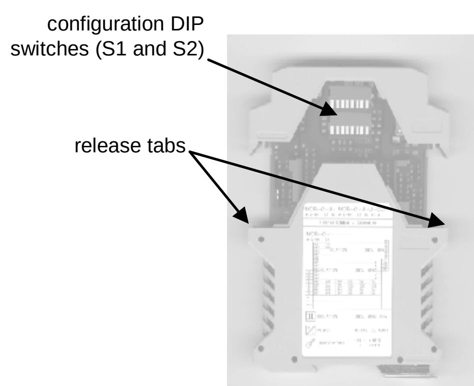


Figure 8 - Configuration Switch Location

Although it is recommended that the MVA be configured with all power off or connectors removed, the MVA may be configured “hot”. In which case there may be a delay of up to 60 seconds for new configuration information to be acquired from the transmitter.

CONFIGURATION SWITCHES

Figure 9 - Configuration DIP Switch Layout

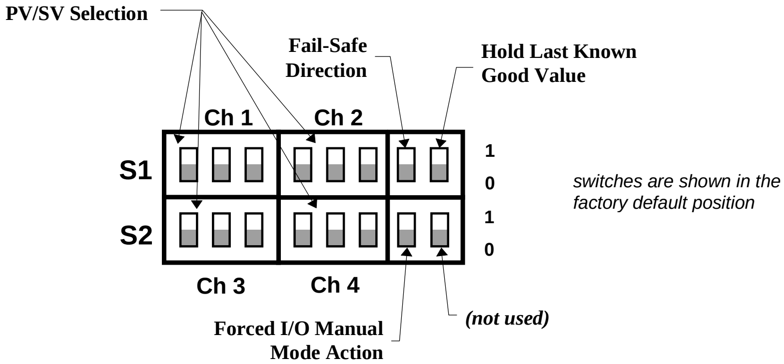


Table 1 - Configuration switch descriptions

FUNCTION	POSITION	ACTION	
PV/SV SELECTION	000	PV1 *	0% - 100%
(per channel)	001	PV2	0% - 100%
	010	PV3	0% - 100%
	011	PV4	0% - 100%
	100	SV1 - Full	-40ºC to +110ºC
	101	SV1 - Narrow	0ºC to +100ºC
	110	*(unused)*	
	111	*(unused)*	
FAIL-SAFE	0	LOW *	(< 0.6 VDC, < -10%)
DIRECTION	1	HIGH	(> 5.4 VDC, > 110%)
HOLD LAST KNOWN	0	DISABLE *	(use Fail-Safe)
GOOD VALUE	1	ENABLE	
FORCED I/O	0	TRIP *	(de-energized)
MANUAL ACTION	1	NOT TRIP	(energized)

* Indicates the **MVA-141** factory default setting. Model **MVA-111** is factory pre-configured to PV1, Fail-Safe Low, NOT trip on Forced I/O.

PV/SV SELECTION

PVs and SVs: All PVs (PV1, PV2, PV3, PV4) are available to the MVA provided they are enabled in the transmitter. Only TEMPERATURE SVs that are cyclically broadcasted are available to the MVA provided they are enabled in the transmitter. SVs that are part of the transmitter database are NOT available to the MVA. Therefore, only SV1 is available from selected transmitters.

SPAN/RANGES: All analog outputs configured for PV1 through PV4 track the transmitter's PV value, nominally 0-100%, with 1-5volts. There is a ±10% over/under-range provided.

All analog outputs configured for SV1 follow the transmitter's SV value but normalized to either the FULL range, -40ºC to +110ºC or NARROW range, 0ºC to +100ºC, depending on the internal MVA configuration switch setting. There is also a ±10% over/under-range provided.

Refer to *Table 2 - Multi-Variable Transmitter PVs and SVs* and *Table 3 - Single-Variable Transmitter PVs and SVs* for a specific list of which measured variables are available to the MVA for each specific transmitter type.

Table 2 - Multi-Variable Transmitter PVs and SVs

	MAG or SMT	SGC	SLT	SMV
PV1	Volumetric Flow	Gas Component	Level	DP
PV2	Temperature	Gas Component	Level | Mass | Volume[1]	AP
PV3	Calculated Mass Flow	Gas Component	n/a	Temperature
PV4	n/a	Gas Component	n/a	Compensated Flow
SV1	Totalized Flow[2]	T_{oven} | $P_{Carrier\ Gas}$[2] | P_{Atmos}[2]	n/a	Sensor Temperature
SV2	Compensated Density[2]	n/a	n/a	n/a
SV3	Totalized Mass[2]	n/a	n/a	CJT[2]

[1] = choice of one [2] = not available for MVA

Table 3 - Single-Variable Transmitter PVs and SVs

	ST	STT	MagneW
PV1	Pressure	Temperature	Volumetric Flow
SV1	Sensor Temperature	Cold Junction Temperature	Totalized Flow[2]

[2] = not available for MVA

FAIL-SAFE DIRECTION and HOLD LKG VALUE

<u>ANALOG OUTPUT FAULT VALUE</u>: The MVA analog outputs may be configured to take 1 of 3 possible actions should a PV or SV go BAD (e.g. missing, dropout or bad transmitter status):

Fail-Safe High = > 5.4 Volts
Fail-Safe Low = < 0.6 Volts
Hold Last Known Good (LKG) Value

FORCED I/O MANUAL ACTION

The MVA may be configured to indicate either GOOD or BAD status when the transmitter's *input* or *output* is in a forced manual mode (e.g. Output Mode).

Normally it is desirable to allow the MVA to "trip" the ***STATUS RELAY*** when this condition is detected. This prevents inadvertently leaving a transmitter in a forced manual state. In other applications where the MVA is within a loop that requires periodic validation, it is recommended that configuration be set to "not trip" the ***STATUS RELAY***. For either configuration, the MVA will allow the forced value of the PV or SV to pass through to the analog outputs.

"SMART" STATUS

The MVA takes full advantage of DE transmitter diagnostic capabilities and MVA self-diagnostics by providing a single combined "SMART" STATUS indication. The "SMART" STATUS will take into consideration -

- Transmitter status (critical, non-critical, bad PV)
- Forced I/O manual mode (response action is user configurable)
- DE signal integrity (no DE, missing PV/SV)
- MVA test mode or module diagnostic fault

"SMART" STATUS will go BAD if ANY one of the above conditions are BAD. The **STATUS LED** provides a visual indication and the **STATUS RELAY** provides a contact output. See *Table 4 - "STATUS" LED Description*.

INDICATORS

Four (4) LED indicators are located on the top face of the MVA module which provide concise indication of all activity and status. The top label also contains a legend table for the STATUS LED.

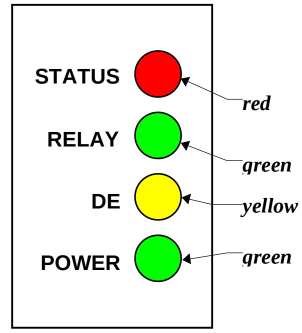


Figure 10 - LEDs

POWER

The green "***POWER***" LED is ON when +24VDC power is present.

DE

The yellow "***DE***" *L*ED is ON when a valid DE signal broadcast by the transmitter is received by the MVA.

RELAY

The green "***RELAY***" LED is ON when the STATUS RELAY is energized, the "not tripped" state. This LED is electrically in series with the relay coil and serves as an indication of current flow through the relay coil.

STATUS

The red "***STATUS***" LED has several modes of indication; ON, Blink - *slow*, Blink - *fast*, Blink - *double* and OFF. Refer to *Table 4 - "STATUS" LED Description.*

Table 4 - "STATUS" LED Description

LED STATE	**DESCRIPTION**	**RATE** (approx.)
OFF	Normal	-
BLINK - *slow*	Bad Transmitter Status, Missing PV or SV Forced I/O Manual Mode	short blink, 1/sec long blink, 1/sec
- *fast*	MVA Test Mode	6/sec
- *double*	Analog Output Fault	2 blinks, 1/sec
ON	MVA Module Fault	-

OPERATION

POWER-UP

The MVA has been designed to power up before the transmitters are ready. As such, the MVA will acquire the first available DE signal, Status and PV/SV. The green ***"POWER"*** LED will light first. After a valid DE signal is recognized, the yellow "***DE***" LED will also light.

NORMAL

The MVA will NOT indicate GOOD status until ALL information required via the internal user selectable switches has been acquired free of error. Under normal conditions this will typically be less than 5 seconds. However, some transmitter types may take as long as 60 seconds to broadcast all required information.

BAD STATUS or FAULT

ANY bad "Smart Status" or module fault will be indicated by the red ***"STATUS"*** LED via one of the *BLINK* or *ON* states shown in *Table 4 - "STATUS" LED Description* accompanied by the "***STATUS"*** RELAY de-energized and the green ***"RELAY"*** LED turning OFF.

TROUBLESHOOTING

The MVA has internal power-up diagnostics, run-time diagnostics, watch dog timer and analog output fault detection. Follow these troubleshooting steps to determine the problem source:

Step 1: *CHECK FOR POWER*

The green "***POWER***" LED should be ON when the MVA is connected to a +24VDC power supply. Voltage may be checked at MVA terminals 12 & 10.

If the MVA "***POWER***" LED is OFF, the MVA power output may be overloaded. That voltage may be checked at MVA terminals 5 & 10. The MVA will automatically restore the power output within 60 seconds after the short is removed. If this does not occur, the MVA module has failed.

Step 2: *CHECK FOR DE*

The yellow "***DE***" LED is ON when a DE signal is broadcast by the transmitter. If this LED is OFF, check that the transmitter is wired correctly, powered and NOT in ANALOG MODE. The MVA is a passive device. As such, the transmitter must be placed in DE MODE from a handheld communicator (e.g. SFC or SCT).

Step 3: *CHECK FOR OUTPUT SHORTS (CROSSWIRING)*

The red "***STATUS***" LED will double blink ON to indicate that an MVA analog output has been wired incorrectly, is shorted or overloaded. Check all analog output wiring with the WIRING DIAGRAMS section.

Step 4: *BAD "SMART" STATUS*

First check for the presence of a DE signal. The yellow "***DE***" LED must be ON.

The red "***STATUS***" LED will be ON or BLINK to indicate the specific bad status. Most commonly the PV/SV configuration of the transmitter and MVA do not agree and the MVA has not received a required value from the transmitter. Also, check that the transmitter has not been left in a forced input or output manual mode, e.g. OUTPUT MODE. Refer to *Table 4 - "STATUS" LED Description* to isolate the problem.

Step 5: *RELAY ACTION BACKWARDS*

The STATUS output relay is normally energized for good transmitter status. Therefore, the N.O. relay contacts are CLOSED for normal operation with good transmitter status.

Step 6: *CHECK GROUNDS*

Check that all wiring is in accordance with the recommended wiring diagrams. Note that additional wires may be required in noisey environments. Check that the analog ground has NOT been incorrectly wired to another ground. The MVA chassis is electrically isolated from the DIN rail.

Step 7: *CHECK FOR MVA FAILURE*

If the red "***STATUS***" LED is ON steady, the MVA module has failed and should be replaced.

Step 8: *TEST MODE*

To test the operation of the MVA, ground TEST terminal 11 to POWER GROUND terminal 10. The "***STATUS***" relay will de-energize and the green "***RELAY***" LED will go OFF. The red "***STATUS***" LED will FAST blink. All analog outputs will go to 3.00 volts, 50%. When the jumper is removed normal operation will resume.

SPECIFICATIONS

# Input Channels:	1
Connectors:	Screw type, compression, removable, keyed, corrosion resistant
Input Type:	Honeywell DE, 4 or 6 byte, multivariable broadcast formats A thru F [*listen* only]
Input (Loop) Loading:	10 Kohms, min.
Input Common Mode:	50 VDC, max.
Analog Outputs:	1 or 4 @ 1-5 volts, nom. ±10% over/under-range, min.
Analog Output Accuracy:	Reference: ± 0.045% F.S., into 10 Kohms, min. @ 25°C Standard: ± 0.2% F.S., into 10 Kohms, min. @ 0°C to 60°C
Analog Output Resolution:	12 bits
Analog Out Update Rate: (PV) (PV) (SV)	3.6/sec. @ 4 byte mode[1] 2.7/sec. @ 6 byte mode[1] Temperature ONLY. Rate varies with field device, refer to field device specification.
Analog Out Throughput Delay:	50 msec., max. to 99% of new PV/SV value
Fault States: * (Analog) (Status)	Fail-Safe HI/LO or Last Known Good value (switch configurable) STATUS relay de-energized = status bad
PV/SV Selection: *	PV1, PV2, PV3, PV4 or SV1 (switch configurable)
"Smart Status":	Transmitter status, forced I/O manual mode[3], DE signal integrity, MVA test mode and MVA module fault.
Status Output Relay: (Type) (Action)	1 Form A and 1 Form B, 5A @ 30VDC, 250VAC, 0.1HP, 100K actuations, min. [4] Energized when "Smart Status" = good. De-energized when "Smart Status" = bad.
Status Throughput Delay:	5 msec., max.
LED Indicators (4): POWER RELAY DE STATUS	Green: ON when +24Volt power is present. Green: ON when NOT *tripped* (relay energized) and "Smart Status" = good. Yellow: ON when DE signal is present. Red: BLINKS when "Smart Status" = bad (relay de-energized, *tripped*). ON steady for MVA fault. OFF when "Smart Status" = good (NOT *tripped*).
Transmitter Forced I/O Action: *	MVA switch selection configures STATUS relay trip action
Test Mode:	Trips STATUS relay (de-energized), LEDs indicate BAD status, all analog outputs forced to 3.00 volts
Field Communicator Interaction:	No impact to PV/SV accuracy or status state. Value may be delayed due to interleaved communications.
Channel-Channel Isolation:	None
Power Consumption:	80 mA., typ. @ +24VDC (excluding field device)
Power Supply:	+18VDC to +30VDC, +24VDC nom.
Safety Barrier Compatibility:	Compatible with commercially available "smart" safety barriers [2]
Size:	4.51"(H) x 0.89"(W) x 3.9"(D)
Operating Temperature:	0°C to 60°C, ambient
Storage Temperature:	-55°C to +125°C, ambient
Operating Humidity:	10-95% RH, max. non-condensing
Enclosure/Mounting:	IP 20 / 35 mm DIN Rail (EN 50022) mounted equipment

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.
Product Classification:	Class I: Fixed, Permanently Connected, Equipment. (EN 61010-1)
Installation Category (Overvoltage Category):	Category II: Energy-consuming equipment supplied from the fixed installation. Local level appliances, and Industrial Control Equipment. (EN 61010-1)
Pollution Degree:	Pollution Degree 2: Normally non-conductive pollution with occasional conductivity caused by condensation. (ref. IEC 664-1)
EMC Classification:	Group 1, Class A, Industrial Control Equipment (EN 55011, emissions) Generic Immunity, Industrial (EN 50082-2, immunity)
CSA Certification (Canada)	CSA C22.2 No. 205M – Signal Equipment
UL Standard (USA)	CSA NRTL/C, UL 1635 – Digital Alarm Communicator System Unit

* Model **MVA-111** has NO user configuration switches. Configuration is factory preset to PV1, FAIL-SAFE LOW AND NOT trip on Forced I/O. Custom factory configurations are available.

[1] The actual rate depends on the broadcast format configured in the field instrument.

[2] Refer to the Honeywell PM/APM Smartline Transmitter Integration Manual, PM12-410.

[3] Transmitter forced I/O manual mode response action is user configurable on the MVA.

[4] CSA relay rating is at 25°C, 50%RH.

Figure 11 - Functional Diagram

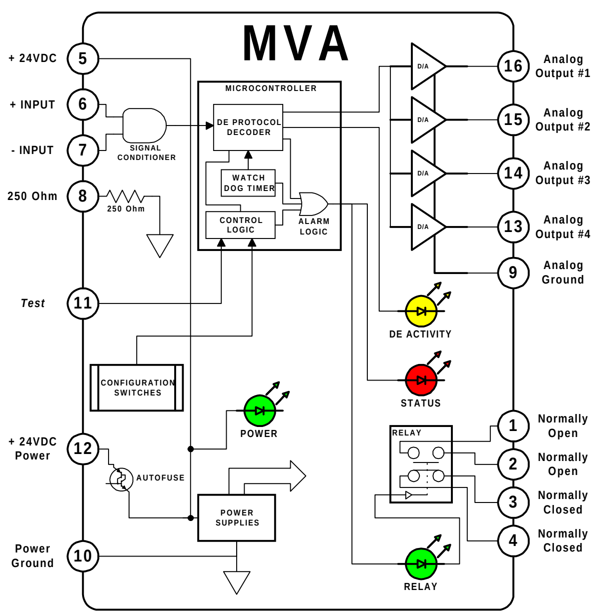
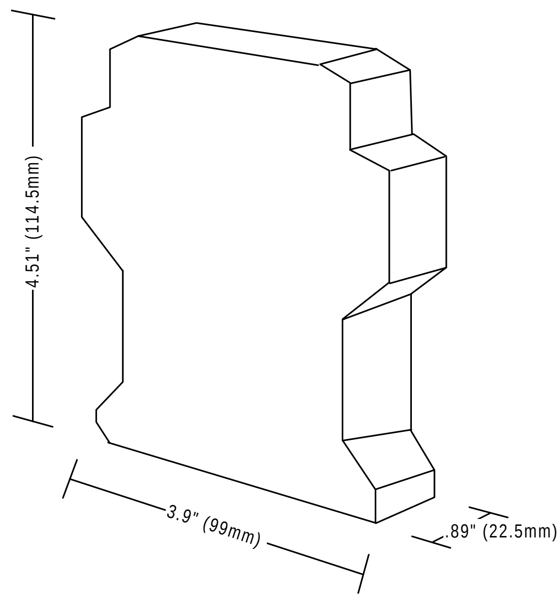


Figure 12 - Package Outline

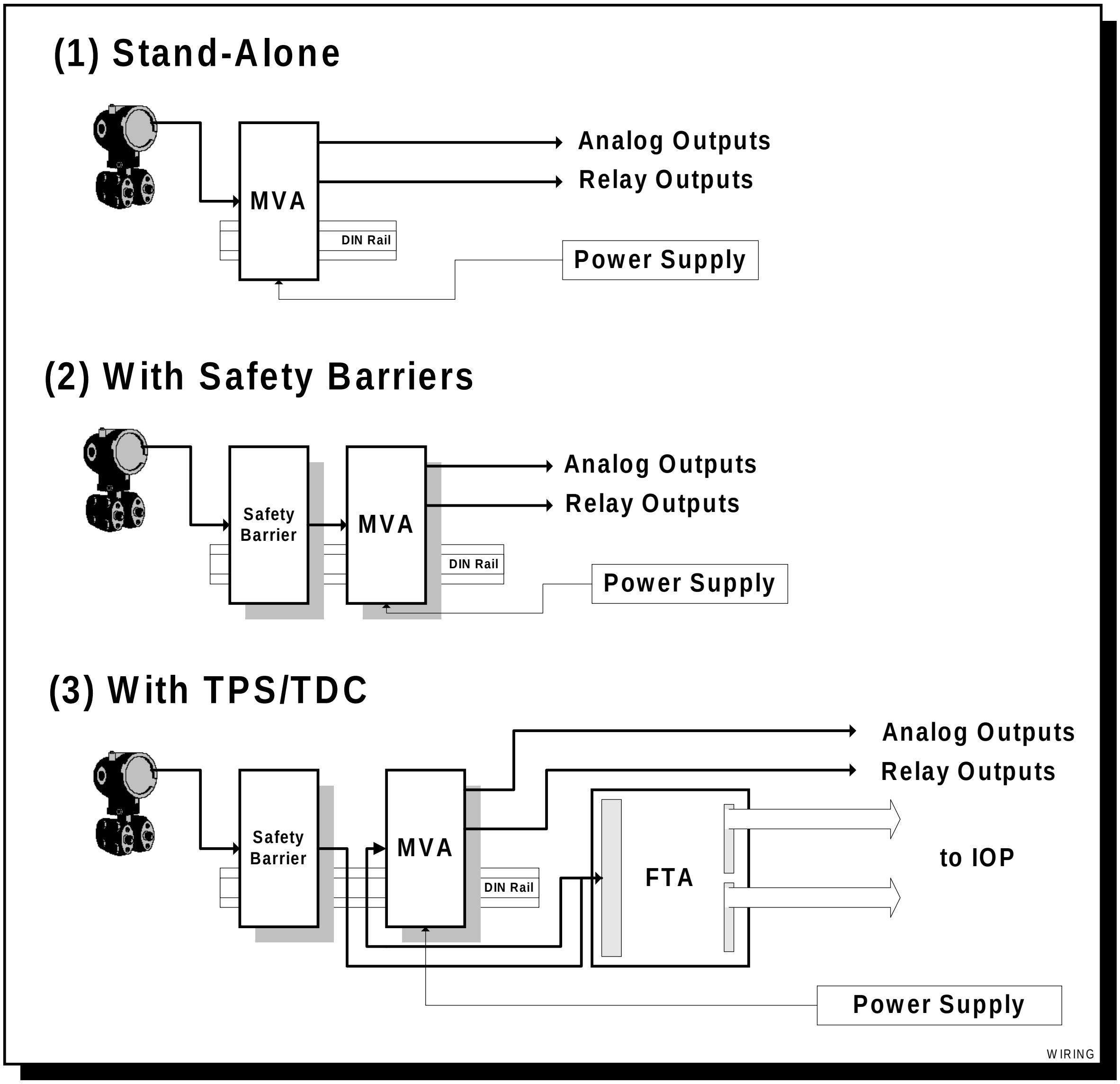


NOTE: Model **MVA-111** ‘Analog Output’ uses terminal #13.

WIRING DIAGRAMS

The *Figure 13* shows basic usage scenarios of the MVA. Detailed wiring diagrams are shown in the following figures. *Figure 14* illustrates how to provide MVA power from a Honeywell system. *Figure 15* and *Figure 16* show the most common wiring for MVA. *Figure 17* shows an alternate means of connecting to a Honeywell system. *Figure 18* through *Figure 21* show how to wire using safety barriers. *Figure 22* discusses wiring into safety systems. *Figure 23* shows wiring details for the analog outputs.

Figure 13 - Basic MVA Wiring Scenarios



NOTE 1. ALL Analog Outputs are 1-5 volts (not 4-20ma.). DAMAGE WILL OCCUR TO THE MVA IF CONNECTED TO A CURRENT LOOP VOLTAGE SOURCE.

NOTE 2. Model **MVA-111** 'Analog Output' uses terminal #13.

NOTE 3. The insulation of wires connected to the Control and Relay terminals shall be rated for the highest voltage involved. Extra Low Voltage (ELV) wiring (input, output) shall be separated from HAZARDOUS LIVE (>50 Vac, or 75 Vdc) Low Voltage (LV) Relay circuits.

Detailed Honeywell transmitter and I.S. barrier wiring diagrams can be found in Honeywell document # 30753667.

POWER

The +24VDC power for the MVA should be supplied from a bulk power supply since most supply connections to the field instruments are current limited. If different power sources are used, they are permitted to have a ground potential difference of up to 50VDC. Transmitter loop power from the MVA is short circuit protected to 300 mA.

Where the bulk 24VDC power supply is not readily accessible, the MVA may be powered from 120VAC using a DIN rail power supply with the same form factor, like the Phoenix Contact MCR-PS-120AC/24DC/650.

To power the MVA from a Honeywell host system 24VDC bulk power supply, connection to a *Power Distribution Assembly* similar to model # MU-TDPR01 is recommended, where terminal TB1 is GND and TB2 is +24VDC.

Figure 14 – Honeywell TPS 24VDC Power Distribution Assembly

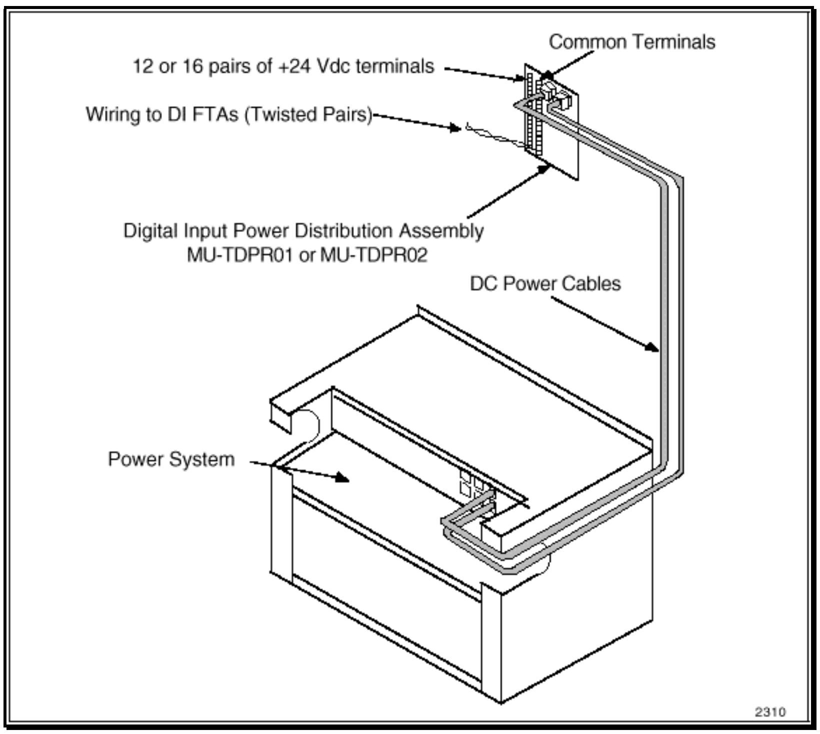


Figure 15 - Stand Alone or with Analog Input Host

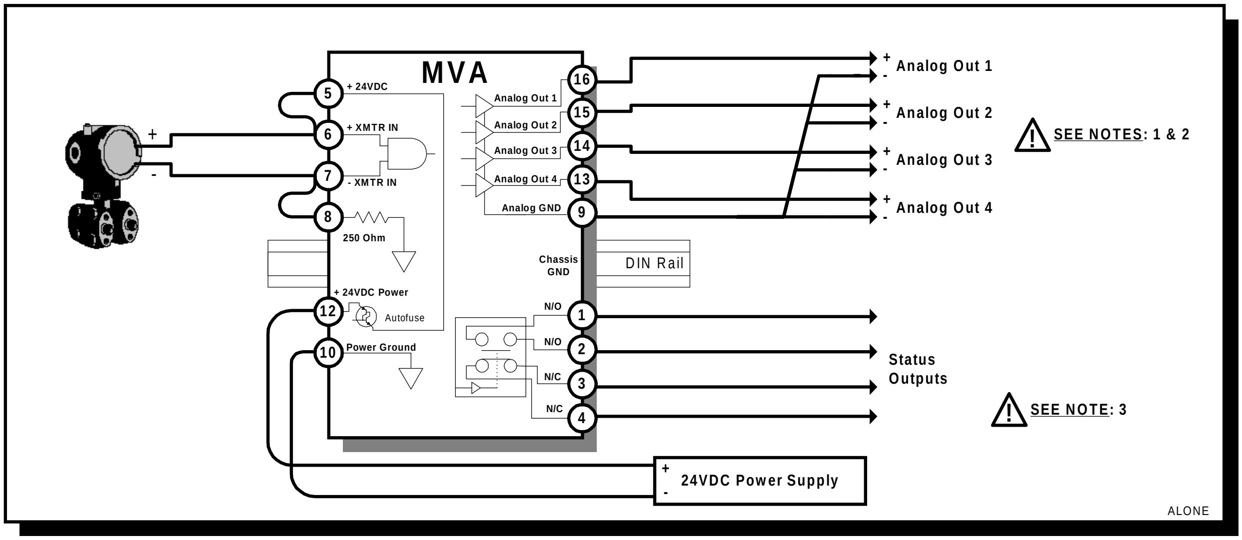


Figure 16 - DE Input Host (TPS, TDC2000, TDC3000, AB PLC)

If host system does NOT accept DE, wire as shown in *Figure 15 - Stand Alone or with Analog Input Host*.

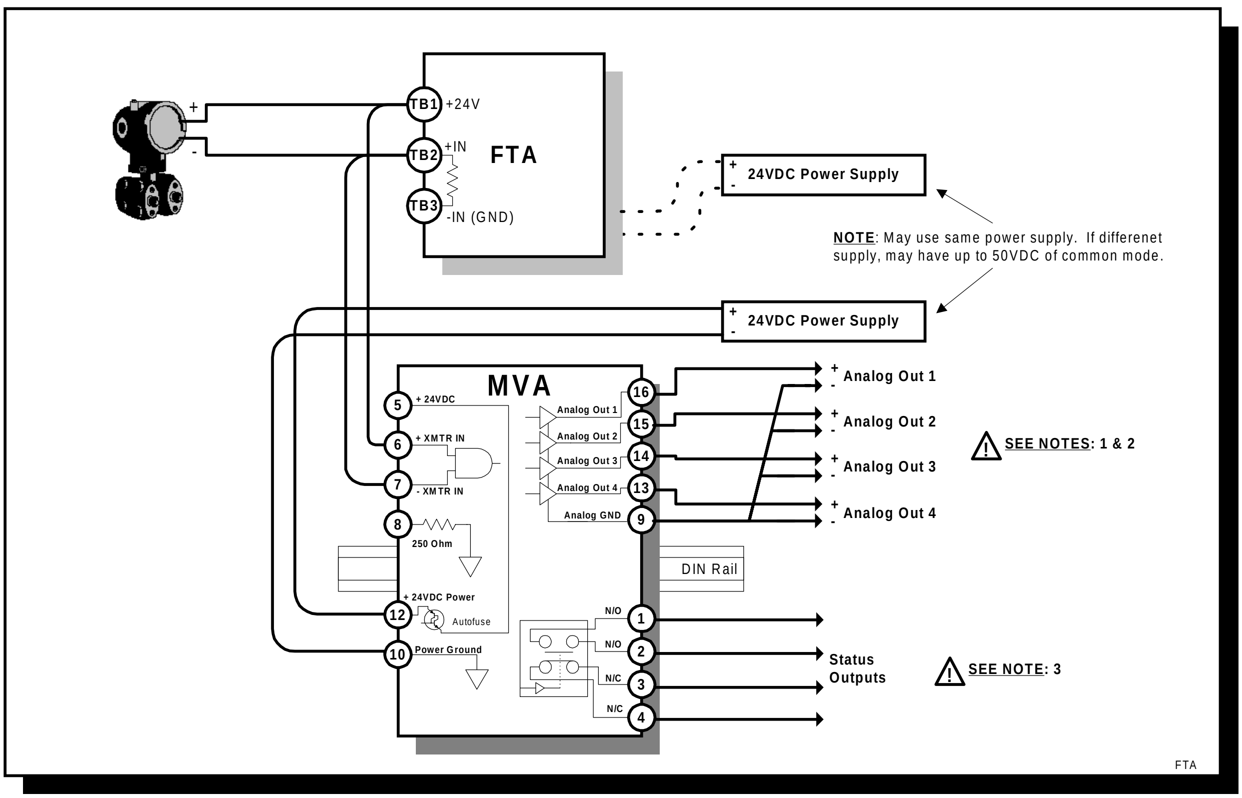


Figure 17 - TPS/TDC3000 STI-MV

This wiring diagram is an alternate to that shown in *Figure 16 - DE Input Host (TPS, TDC2000, TDC3000, AB PLC)*.

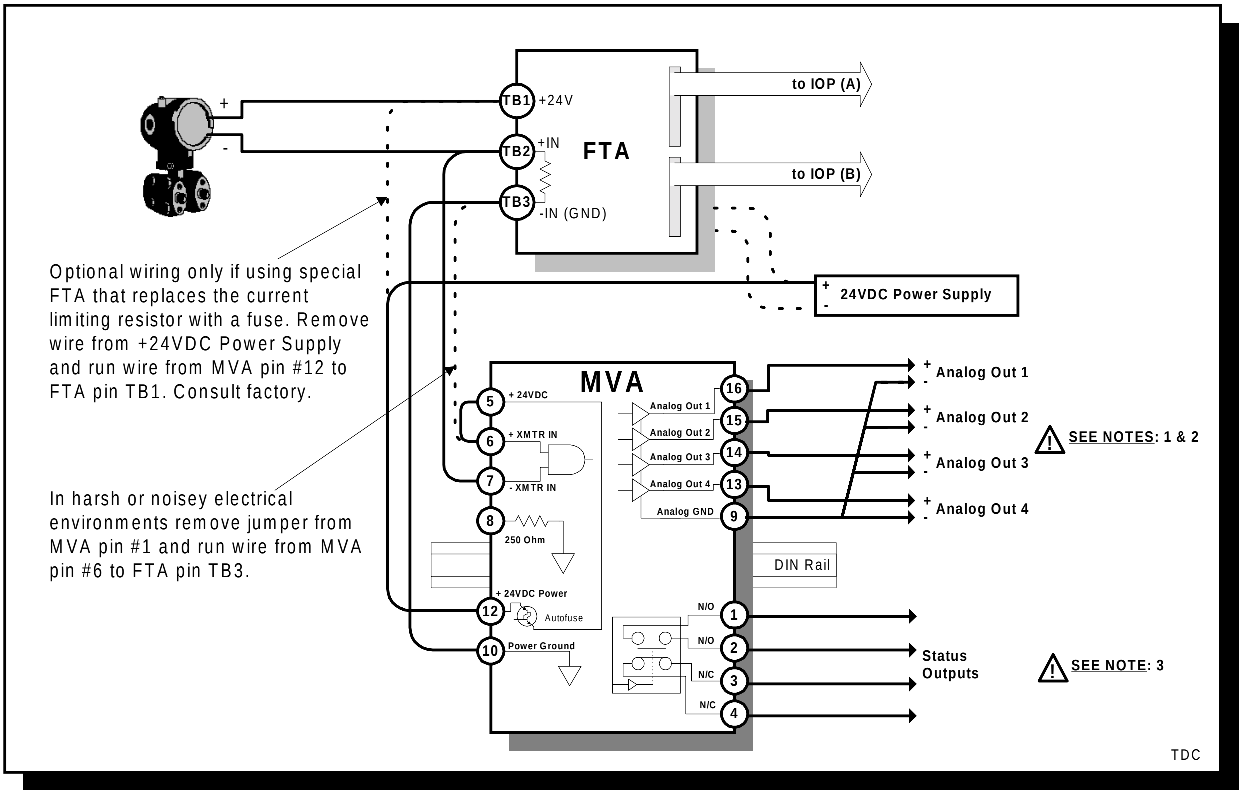


Figure 18 - TPS/TDC with Galvanically Isolated FTA

(NOT shown.) When using the MVA with the galvanically isolated FTA a separate marshaling panel needs to be installed. Refer to Honeywell document PM20-520, Process Manager I/O Installation Guide. The MVA should be wired to TB1 on the marshaling panel similar to that shown in *Figure 17 - TPS/TDC3000 STI-MV*.

Figure 19 - TPS/TDC and MTL3046B Safety Barriers

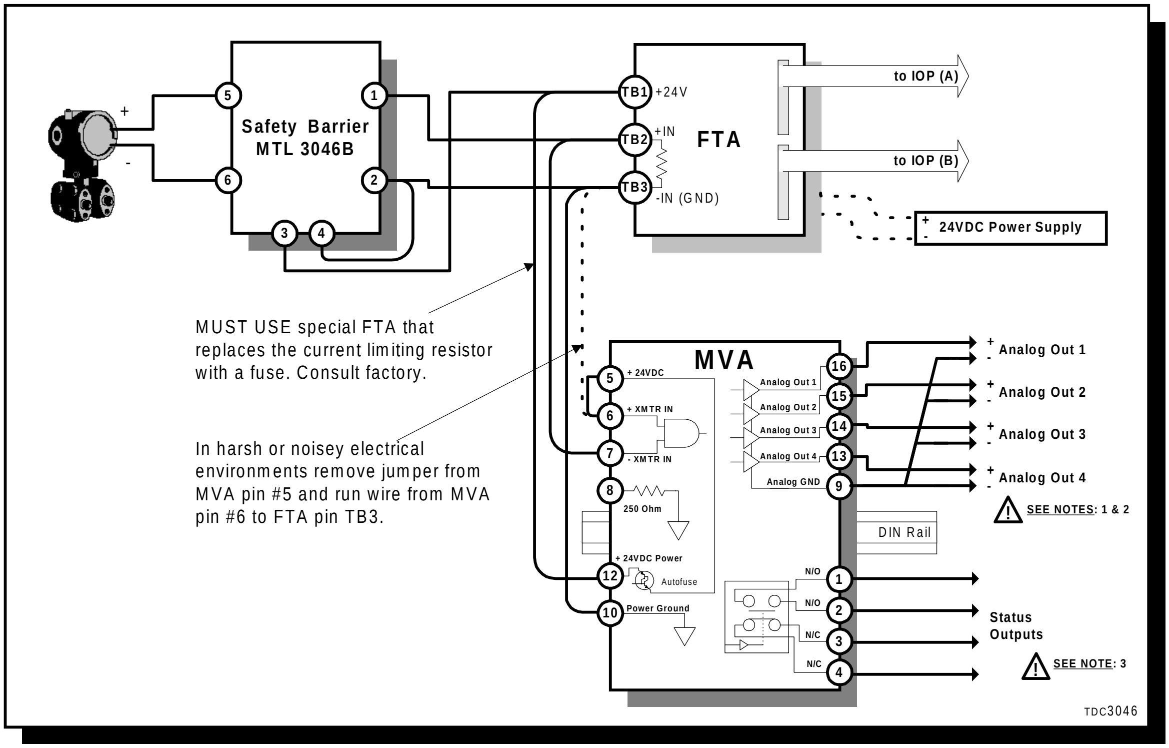


Figure 20 - TPS/TDC and MTL706 Safety Barriers

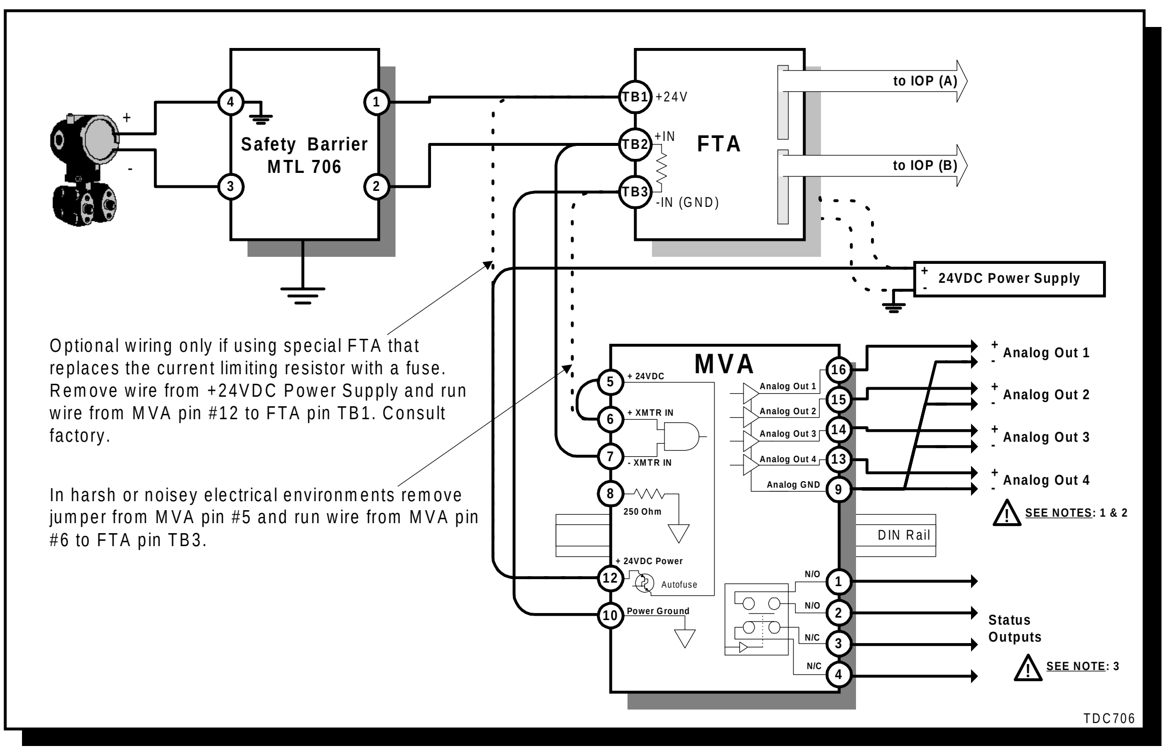


Figure 21 - Stand Alone with Safety Barriers

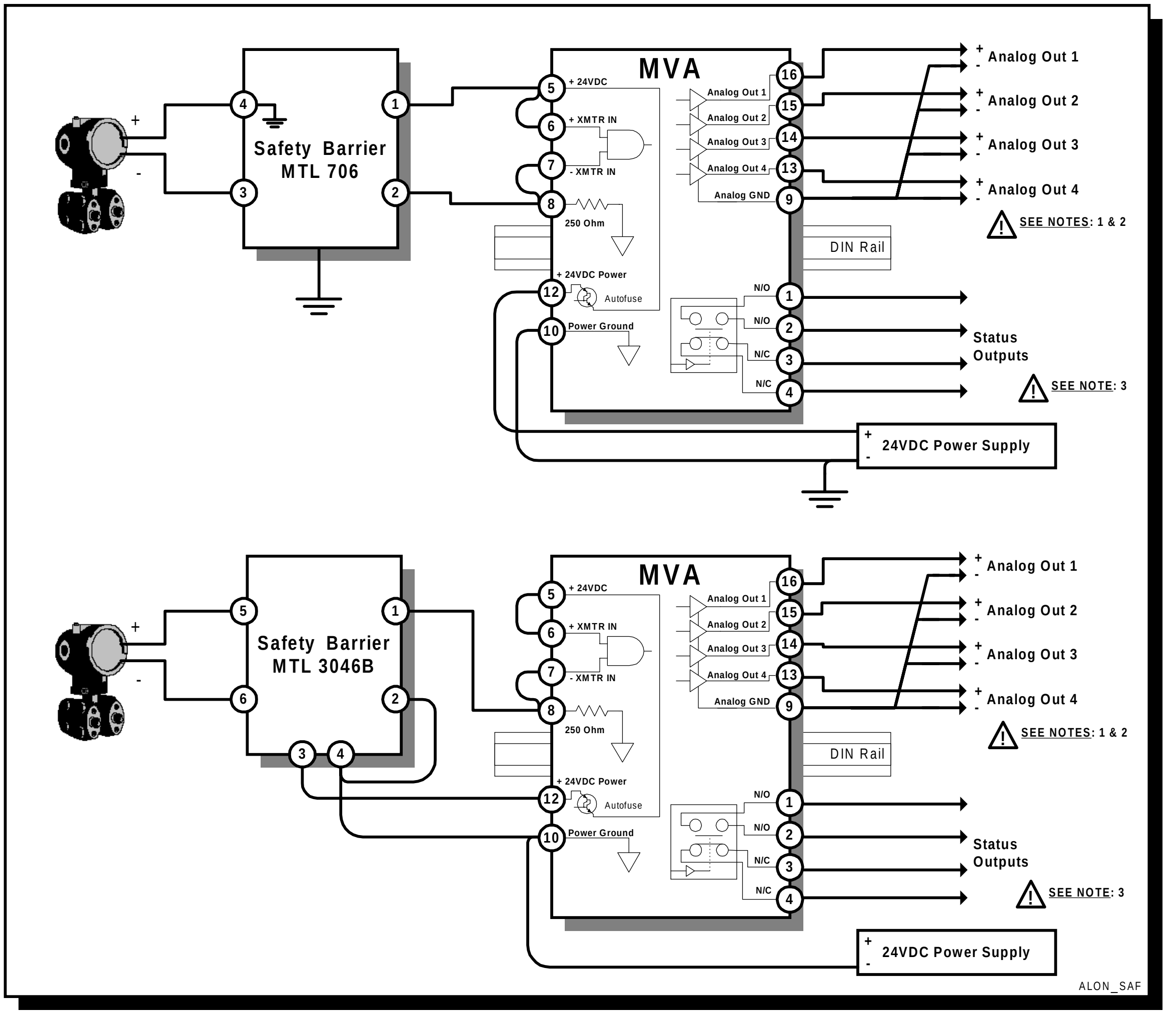


Figure 22 - Safety Shutdown Systems

(Figure NOT Shown.)

All **Triconex** safety shutdown system Analog Input modules accept the MVA *analog outputs* as a voltage input. The correct Input Termination Assembly is #2700-1 for “voltage in” or the equivalent FTA. Use the “-” and “+” terminals. Do NOT use Termination Assembly #2700-2 or -4 as they are designed for 4-20mA. and have an internal loop resistor which will introduce errors.

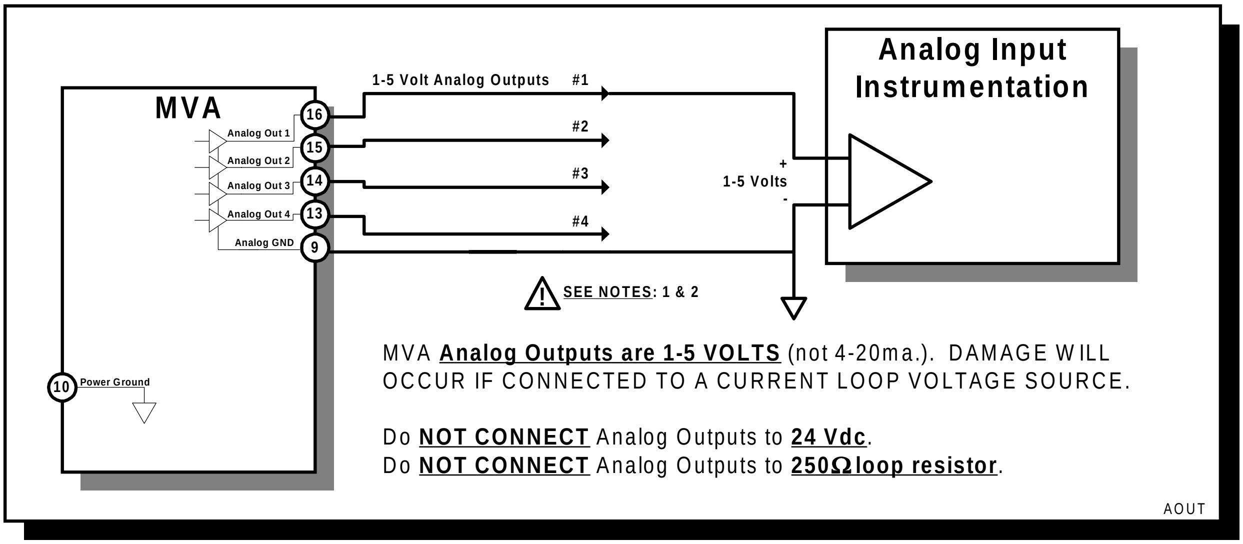
The Honeywell **Safety Manager** (formerly **FSC**) Analog Input modules 10102/1/1 or 10102/1/2 accept the MVA *analog outputs* as a voltage input. Wire as a “passive” device. Use the “0 v” and “volt” terminals on the /1 model and the “0 V” and “IN” terminals on the /2 model.

ANALOG OUTPUTS

Figure 23 shows how to wire the MVA 1-5 volt analog outputs. The MVA should be installed in close proximity to the instrumentation that is receiving the analog outputs. Wire lengths to the analog instrumentation should be kept as short a possible. Analog output wire runs as long as 50 feet may be tolerated provided the analog instrumentation has differential input capability. A separate analog signal return wire from the MVA should be provided which is not used to carry other return signals or power. Following these precautions will help maintain the rated accuracy of the MVA analog outputs.

NOTE: The MVA Analog Output is 1-5 volts (NOT 4-20ma.). DAMAGE will occur to the MVA if connected to a current loop voltage source.

Figure 23 – 1-5 Volt Analog Outputs



FREQUENTLY ASKED QUESTIONS

1. What field instruments can be used?

Every Honeywell field instrument currently being shipped is capable of communication using the DE Protocol. The only exception is some early model ST3000 Pressure Transmitters. All ST3000 R100 transmitters from software version 6.2 and beyond are DE capable. (Versions 6.1 and 9.1 are analog only.) All ST3000 R600 transmitters from software version 2.3 and beyond are DE capable. All other ST3000 models are DE capable. All other transmitter types are also all DE capable. A communicator, SFC or SCT, may be used to read the transmitter software revision number.

2. Why is the MVA analog output not 4-20mA. and what is its effect on accuracy?

4-20mA. signals are primarily used for long wire runs to/from the field. As such, the MVA is most effective when the long wire run from the field is the robust 4-20mA. digital DE signal into the MVA. By providing a 1-5volt analog output, the MVA eliminates the error that would be introduced via the 250 Ohm loop resistor (typically 0.1%) when converting the signal back to voltage for the instrumentation. As such, the overall accuracy is improved by eliminating the loop resistor error.

3. How does the MVA increase analog accuracy by 80% ?

With the *Analog Repeat* output option, the precision voltage output increases the overall analog accuracy 80% by eliminating errors introduced in the transmitter's D/A and the 250 Ohm loop resistor. For a typical analog transmitter accuracy of 0.1% and 0.1% loop resistor, the worst case error is **0.2%**. The MVA *Analog Repeat* output is a 0.045% precision voltage output which eliminates the loop resistor and its associated error. The transmitter's digital output accuracy is 0.075%. This produces an overall worst case error of only **0.12%** which is an 80% improvement.

4. What PV and/or SV values can be used?

The MVA is capable of monitoring and outputting an analog signal for PV1 thru PV4 or SV1. See PV/SV application *Table 2* and *Table 3* for details.

5. What are the restrictions on the SV and how is it processed?

The MVA is ONLY capable of outputting an analog signal for SVs that are TEMPERATURE. Additionally, the temperature must be within -40ºC to +110ºC. Transmitters capable of outputting a wider temperature range may still be used as long as the range of interest falls within either the FULL or NARROW range of the MVA (e.g. SGC). The FULL range setting scales the temperature span of -40ºC to +110ºC into 1-5 volts. The NARROW range setting scales the temperature span of 0ºC to +100ºC into 1-5 volts.

6. Can the MVA be used in conjunction with a TPS or TDC system?

Yes. See wiring diagrams for details.

7. Can the MVA be used with 3rd party DE instrumentation (PLCs, RTUs, etc.)?

Yes. Interfacing into other devices is similar to that of TPS/TDC. See wiring diagrams for connection to TPS/TDC system for details.

8. Can the MVA be used in conjunction with safety barriers?

Yes. See wiring diagrams for details.

9. How should the MVA be mounted?

The MVA mounts in any orientation on standard 35mm DIN rail.

10. Are there any environmental restrictions for the MVA?

The MVA is NOT suitable for harsh environments. See specification sheet for limitations.

11. Where should the MVA be located relative to the analog instrumentation?

To avoid common mode problems and noise pickup on the analog outputs, the MVA should be located in close proximity to the analog instrumentation.

12. Does the MVA need to be located in the control or safety shutdown cabinet?

The MVA may be located wherever is convenient, provided its environmental limits are not exceeded.

13. How can the STATUS relay outputs be best utilized?

For safety shutdown systems and interlocks, the positive contact Status output may have a speed advantage over analog interfaces that have delays due to damping or filtering. For transmitter or MVA Status annunciation using a host instrument's DI (digital input), you may prefer to connect several MVAs' status outputs serially into a single DI. For rapid pinpointing of a problem device they should be wired separately.

14. Do I need access to view the LEDs?

Although it is not required, you may want to view the MVA's LEDs during installation, routine maintenance and validation. Consider the mounting location and its accessibility.

15. Can current limiting of the MVA power source inhibit operation?

It could. Most supplies to field instruments are current limited. Refer to the specification sheets to be assured that adequate voltage and current is available for the MVA.

16. How much power is required for the MVA?

At power-up the MVA draws approximately 250mA. for 2 seconds, after which it draws 80mA., excluding the transmitter power.

17. Does the MVA need to be fused?

No. The MVA has an internal self-resetting electronic fuse that should provide sufficient protection from short circuits and/or failures. If it is felt that a fuse is needed, a 250mA. slow-blo is recommended.

18. Must the MVA power the field instrument?

No. Field instruments may be either powered externally or from the MVA. When the MVA is used to provide power, the internal self-resetting electronic fuse protects the field wiring from short circuits. See wiring diagrams for details.

19. Must I use the MVA's internal loop resistor?

No, only if needed for the application. See wiring diagrams for details.

20. Can more than one MVA be used in the same application?

Yes. There is no practical limit.

21. How can the MVA assist with field validation?

The MVA has user configurable "forced input/output manual mode" action. By configuring the MVA action to "not trip" the STATUS relay, the user is permitted to (via a SFC) force a field instrument's input or output to a known value to validate the host system's action, without having the MVA's status relay indicate BAD. The forced PV/SV value also appears on the MVA analog output. (Note: That configuration setting is NOT the factory default.)

22. How can I maximize the advantages of bumpless SFC communications?

The MVA should be located such that the maximum wire run is from the transmitter to the MVA.

23. Could the MVA impact the process startup sequence?

This should not be a problem because the MVA was designed to power-up before the field instrument.

24. How can I connect a SFC?

The SFC or SCT may be connected at any point along the DE signal. It may be convenient when wiring the MVA to strip back the wires to the transmitter just enough to allow the clip leads access.

25. Everything seems to be wired correctly but the yellow *"DE"* LED is OFF or the red *"STATUS"* LED is ON?

The transmitter may be in analog mode. Using a SFC or SCT change the transmitter communications mode to DE. Also check the transmitter broadcast configuration to be sure the PV or SV variables needed by the MVA are configured correctly in the transmitter.

26. Can I change the MVA configuration switches with power on?

Yes. The MVA will automatically accept the new configuration. Depending on the particular field instrument type, the MVA may take as long as 60 seconds to acquire the new configuration information.

27. How fast does the MVA status respond?

Bad transmitter status is annunciated almost instantaneously. (See "Status Throughput Delay" specification.) A missing PV signal annunciation is primarily a function of the transmitter broadcast format and always occurs within 15 seconds. A missing SV signal annunciation is also primarily a function of the transmitter broadcast format and always occurs within 60 seconds.

28. What are the advantages of using the DE Protocol and MVA?

There are distinct advantages:

- Allows mixing of DE and ANALOG instrumentation:
- Safety Systems, Controllers , Recorders , Trip Switches, Indicators, etc.
- Increases Overall Accuracy by 80%
- Full Digital, Non-Bumping Communications
- Expand Functionality and Maintain Digital Integration
- Wiring Savings
- Independent Transmitter Status
- Economically Access PVs and SVs
- Enables Stand-Alone Digital Operation

You may wish to refer to MVA sales literature and related articles. It may also be helpful to be familiar with other literature on Honeywell Digital Integration and the DE Protocol.