## **Technical Information**

# Honeywell

## **MVX 3000 Multivariable Pressure Transducer**

## Specifications 34-SM-04-01 June 2010

## Introduction

The MVX 3000 Multivariable Pressure Transducer, based on Honeywell ST 3000 and SMV 3000 sensor technology, measures both differential pressure and static pressure (absolute or gauge) and can replace two separate transmitters or transducers integrated to flow computers today.

The MVX 3000 increases flow calculation accuracy and improves flow computer reliability. Multiple measurements, combined with proven sensor characterization, will lower your overall costs when integrating the MVX 3000 to a flow computer.

The MVX 3000 Multivariable Pressure Transducer transmits an output signal proportional to the measured variables in multiplexed pulse format for interfacing with the flow computers or RTUs.

Ranges		
Differential Pressure	0 to $\pm 400 \text{ inH}_2\text{O}$	0 to ±1,000 mbar
Absolute Pressure	0 to 750 psia 0 to 1,500 psia	0 to 52 bara 0 to 103 bara
Or Gauge Pressure	0 to 4,500 psig	0 to 310 barg

### **Proven Sensor Technology**

The MVX 3000 utilizes proven Honeywell Piezoresistive sensor technology and has an ion-implanted silicon chip hermetically sealed in its meter body. This single piezoresistive capsule actually contains three sensors in one; a differential pressure sensor, a static pressure sensor, and a meter body temperature sensor. Process pressure applied to the transmitter's diaphragm transfers through the fill fluid to the sensor. Voltage bridge (Wheatstone) circuits on the chip measure the differential and static pressures while a resistor in a voltage divider measures the temperature.



Figure 1 – MVX 3000 Multivariable Pressure Transducer

These three input signals from the sensor, coupled with the characterization data stored in the flow computer EPROM, are then used by the microprocessor to calculate highly accurate values for the differential pressure and static pressure measurements.

### **Flow Computer Benefits**

- Highly accurate piezoresistive sensor technology provides better than ±0.075% accuracy for differential pressure and static pressure, which relates directly to increased flow accuracy for flow computer manufacturers.
- Single Sensor Capsule

provides both DP and AP or GP measurements and therefore lowers the total cost of integration to flow computers.

Highly Stable Sensors

provides  $\pm 0.0625\%$  of URL per year stability for DP,  $\pm 0.008\%$  of URL per year stability for AP(MXA145) and  $\pm 0.005\%$  of URL per year stability for GP. Stable sensors improve product reliability and reduce zero drift for flow computers.

#### **MVX 3000 Integration**

To utilize the MVX 3000 Multivariable Pressure Transducer, the flow computer company must develop a circuit board to communicate with the MVX 3000. This circuit board should include a 10-pin connector and also provide all operating power to the MVX 3000. With 5 Vdc power, the MVX 3000 provides a pulse train of signals proportional to differential pressure, static pressure and meter body temperature. The flow computer circuit board must be designed to count the pulse duty cycle to interpret the signals.

#### **Features**

The MVX 3000 family of multivariable pressure transducers utilizes a single sensor capsule to measure both differential pressure and static pressure and provides the most accurate, cost-effective meter body in the industry for integration to flow computers.

#### **Operating Conditions – All Models**

Parameter	Refe Con	Reference Rated Condition		Operative Limits		Transportation and Storage			
	°C	۰F	°C	°F	ů	°F	ů	°F	
Meter Body Temperature	25±1	77±2	-40 to 110 <sup>*</sup>	-40 to 230 <sup>*</sup>	-40 to 125 <sup>*</sup>	-40 to 257 <sup>*</sup>	-55 to 125	-67 to 257	
Vacuum Region, Minimum Pressure mmHg absolute inH <sub>2</sub> O absolute	Atmospheric 25 Atmospheric 13								
Supply Voltage, Current, and Load Resistance	Voltag Currer Load F	Voltage Range: 10.8 to 42.4 Vdc at terminals Current Range: 3.0 to 20.8 mA Load Resistance: 0 to 1440 ohms							
Maximum Allowable Working Pressure (MAWP) *** (ST 3000 products are rated to Maximum Allowable Working Pressure. MAWP depends on Approval Agency)	MXA12 MXA14 MXG17 Static F Limit.	25 = 3,00 15 = 3,00 70 = 4,50 Pressure	0 psi, 210 bar 0 psi, 210 bar 00 psi, 310 bar Limit = Maxin	*** **** ••••• num Allowable	e Working Pre	ssure (MAW	/P) = Overpi	essure	

For CTFE fill fluid, the rating is -15 to 110°C (5 to 230°F)

Consult factory for MAWP of transducers that require CSA approval (CRN).

The MAWP is intended as a pressure safety limit. Honeywell does not recommend use above the PV 2 Upper Range Limit. MAWP applies for temperature range –40 to 125°C. However, Static Pressure Limit is de-rated to 3000 psi from –26°C. to –40°C.

#### **Physical Bodies**

Parameter	Description
Process Interface Material	Process Barrier Diaphragms: 316L SS, Hastelloy <sup>®</sup> C-276 <sup>2</sup>
	<b>Process Head:</b> 316 SS <sup>4</sup> , Carbon Steel (Zinc-plated) <sup>5</sup>
	<b>Head Gaskets:</b> Glass Reinforced Teflon <sup>®1</sup> or Viton <sup>®</sup> is optional
	Bolting: Carbon Steel (Zinc-plated) <sup>5</sup> , A286 SS (NACE) and 316 SS <sup>4</sup> optional
Vent/Drain Valves & Plugs <sup>1</sup>	316 SS, Hastelloy <sup>®</sup> C-276 <sup>2</sup> , Monel 400 <sup>®</sup> 8
Fill Fluid	Silicone DC <sup>®</sup> 200 oil
Process Connections	1/4-inch NPT

<sup>1</sup> Vent /Drains are sealed with Teflon<sup>®</sup> or PTFE

<sup>2</sup> Hastelloy<sup>®</sup> C-276 or UNS N10276

<sup>4</sup> Supplied as 316 SS or as Grade CF8M, the casting equivalent of 316 SS.

<sup>5</sup> Carbon Steel heads are zinc-plated and not recommended for water service due to hydrogen migration. For that service, use 316 stainless steel wetted

Process Heads.

 $^{8}\,$  Monel 400  $^{\circ}$  or UNS N04400  $\,$ 

Parameter	Description		
Models	MXA125	MXA145	MXG170
Upper Range Limit inH <sub>2</sub> O	±400	±400	±400
mbar	1,000	1,000	1,000
	at 39.2°F (4°C) standard	at 39.2°F (4°C) standard	at 39.2°F (4°C) standard
	reference temperature.	reference temperature.	reference temperature.
Reference Pressure			
Accuracy . Temperature & Pressure :	$25 \text{ inH}_2\text{O} (187.5 \text{ mbar})$	75 inH <sub>2</sub> O (187.5 mbar)	50 inH <sub>2</sub> O (187.5 mbar)
	50 inH <sub>2</sub> O (187.5 mbar)	100 inH <sub>2</sub> O (187.5 mbar)	100 inH <sub>2</sub> O (187.5 mbar)
	±400 to 1	±400 to 1	±400 to 1
Minimum Span InH <sub>2</sub> O	±1	±1	±1
Reference Accuracy (Includes	2.3	2.3	Z.J Rottor thon 10.075% of
<ul> <li>combined effects of linearity, hysteresis, and repeatability)</li> <li>Applies for model with stainless steel barrier diaphragm.</li> <li>Accuracy includes residual error after averaging successive readings.</li> </ul>	±0.075% of calibrated span of upper range value (URV), whichever is greater. For URV below reference point (25 inH₂O), accuracy equals: 0.0125% ±0.0625% (25/span)	$\pm 0.075\%$ of calibrated span of upper range value (URV), whichever is greater. For URV below reference point (25 inH <sub>2</sub> O), accuracy equals: 0.0125% $\pm 0.0625\%$ (75/span)	calibrated span or upper range value (URV), whichever is greater. For URV below reference point (50 inH <sub>2</sub> O), accuracy equals: 0.0125% ±0.0625% (50/span)
Zero Temperature Effect per 28°C (50°F) Applies for model with stainless	±0.1% of calibrated span or upper range value (URV), whichever is greater.	±0.1% of calibrated span or upper range value (URV), whichever is greater.	±0.125% of calibrated span or upper range value (URV), whichever is greater.
steel barrier diaphragm	For URV below reference point (50 inH <sub>2</sub> O), Zero Temperature Effect equals: ±0.10(50/span) in % of span	For URV below reference point (100 inH <sub>2</sub> O), Zero Temperature Effect equals: $\pm 0.10(100/\text{span})$ in % of span	For URV below reference point (100 inH <sub>2</sub> O), Zero Temperature Effect equals: $\pm 0.125(100/span)$ in % of span
Combined Zero and Span Temperature Effect per 28°C (50°F)	±0.225% of calibrated span or upper range value (URV), whichever is greater.	±0.225% of calibrated span or upper range value (URV), whichever is greater.	±0.225% of calibrated span or upper range value (URV), whichever is greater.
Applies for model with stainless steel barrier diaphragm	For URV below reference point (50 inH <sub>2</sub> O), Zero Temperature Effect equals: $\pm 0.125 \pm 0.10(50/\text{span})$ in % of span	For URV below reference point (100 inH <sub>2</sub> O), Zero Temperature Effect equals: $\pm 0.125 \pm 0.10(100/\text{span})$ in % of span	For URV below reference point (50 inH <sub>2</sub> O), Zero Temperature Effect equals: $\pm 0.125 \pm 0.10(100/\text{span})$ in % of span
Zero Pressure Effect per 1,000 psi (70 bar)	±0.24% of calibrated span or upper range value (URV), whichever is greater.	±0.12% of calibrated span or upper range value (URV), whichever is greater.	±0.15% of calibrated span or upper range value (URV), whichever is greater.
steel barrier diaphragm	For URV below reference point (50 inH <sub>2</sub> O), Zero Static Pressure Effect equals: $\pm 0.05 \pm 0.19$ (50/span) in % of span	For URV below reference point (100 inH <sub>2</sub> O), Zero Static Pressure Effect equals: $\pm 0.025 \pm 0.095$ (100/span) in % of span	For URV below reference point (100 inH <sub>2</sub> O), Zero Static Pressure Effect equals: $\pm 0.025 \pm 0.125$ (100/span) in % of span
Combined Zero and Span Pressure Effect per 1000 psi (70 bar)	±1.04% of calibrated span or upper range value (URV), whichever is greater.	±0.52% of calibrated span or upper range value (URV), whichever is greater.	±0.35% of calibrated span or upper range value (URV), whichever is greater.
Applies for model with stainless steel barrier diaphragm	For URV below reference point (50 inH <sub>2</sub> O), Zero + Span Static Pressure Effect equals: $\pm 0.85 \pm 0.19$ (50/span) in % of span	For URV below reference point (100 inH <sub>2</sub> O), Zero + Span Static Pressure Effect equals: $\pm 0.425 \pm 0.095$ (100/span) in % of span	For URV below reference point (100 inH <sub>2</sub> O), Zero + Span Static Pressure Effect equals: $\pm 0.225 \pm 0.125$ (100/span) in % of span
Stability*	$\pm 0.0625\%$ of URL per year ( $\pm 0.25$ inH <sub>2</sub> O per year)	$\pm 0.0625\%$ of URL per year ( $\pm 0.25$ inH <sub>2</sub> O per year)	$\pm 0.0625\%$ of URL per year ( $\pm 0.25$ inH <sub>2</sub> O per year)

\* All Stability specifications are based on the Honeywell Smart Multivariable Transmitters.

Parameter	Description
Upper Range Limit psia bara	750 52
Reference Pressure	
Accuracy :	20 psia (1.4 bara)
Temperature & Pressure :	50 psia (3.5 bara)
Turndown Ratio	150 to 1
Minimum Span psia bara	5 0.35
Zero Suppression	No limit (except minimum span) from absolute zero to 100% URL. Specifications valid over this range.
<ul> <li>Reference Accuracy (Includes combined effects of linearity, hysteresis, and repeatability)</li> <li>Applies for model with stainless steel barrier diaphragm.</li> </ul>	$\pm 0.075\%$ of calibrated span or upper range value (URV), whichever is greater - Terminal based. For URV below reference point (20 psi), Reference Accuracy equals: $\pm 0.0125 \pm 0.0625$ (20/span) in % of span.
<ul> <li>Accuracy includes residual error after averaging successive readings.</li> </ul>	
Zero Temperature Effect per 28°C (50°F)	$\pm 0.10$ % of calibrated span or upper range value (URV), whichever is greater.
Applies for model with stainless steel barrier diaphragm	For URV below reference point (50 psi), Zero Temperature Effect equals: $\pm 0.10$ (50/span) in % of span
Combined Zero and Span Temperature Effect per 28°C (50°F) Applies for model with stainless steel barrier diaphragm	±0.225 % of calibrated span or upper range value (URV), whichever is greater. For URV below reference point (50 psi), Combined Zero + Span Temperature Effect equals: ±0.125 ±0.10(50/span) in % of span
Stability	±0.016% of URL per year (±0.12 psi per year).

## Performance Under Rated Conditions - Absolute Pressure Measurement (MXA125)

Denemeter	Description			
Parameter	Description			
Upper Range Limit (URL) psia	1,500			
bara	104			
Reference Pressure				
Accuracy :	250 psia (17.2 bara)			
Temperature & Pressure :	250 psia (17.2 bara)			
Turndown Ratio	15 to 1			
Minimum Span psia	100			
bara	10.4			
Zero Suppression	No limit (except minimum span) from absolute zero to 100% URL. Specifications valid over this range.			
<b>Reference Accuracy</b> (Includes combined effects of linearity, hysteresis, and repeatability)	$\pm 0.075\%$ of calibrated span or upper range value (URV), whichever is greater - Terminal based.			
Applies for model with stainless steel barrier diaphragm.	For URV below reference point (250 psi), Reference Accuracy equals: 0.0125 ± 0.0625 (250/span) in % of span			
<ul> <li>Accuracy includes residual error after averaging successive readings.</li> </ul>				
Zero Temperature Effect per 28°C (50°F)	±0.10 % of calibrated span or upper range value (URV), whichever is greater.			
Applies for model with stainless steel barrier diaphragm	For URV below reference point (250 psi), Zero Temperature Effect equals: ±0.10(250/span) in % of span			
Combined Zero and Span Temperature Effect per 28°C (50°F)	±0.225 % of calibrated span or upper range value (URV), whichever is greater. For URV below reference point (250 psi), Combined Zero + Span Temperature Effect			
Applies for model with stainless steel barrier diaphragm	equals: ±0.125 ±0.10(250/span) in % of span			
Stability	±0.008% of URL per year (±0.12 psi per year).			

## Performance Under Rated Conditions - Absolute Pressure Measurement (MXA145)

Parameter	Description				
Upper Range Limit (URL) psig barg	4,500 310				
Reference Pressure					
Accuracy :	300 psig (20.8 barg)				
Temperature & Pressure :	300 psig (20.8 barg)				
Turndown Ratio	150 to 1				
Minimum Span psig barg	60 4.1				
Zero Suppression	No limit (except minimum span) from absolute zero to 100% URL. Specifications valid over this range.				
<b>Reference Accuracy</b> (Includes combined effects of linearity, hysteresis, and repeatability)	$\pm$ 0.075% of calibrated span or upper range value (URV), whichever is greater - Terminal based.				
<ul> <li>Applies for model with stainless steel barrier diaphragm.</li> </ul>	For URV below reference point (250 psi), Reference Accuracy equals:				
<ul> <li>Accuracy includes residual error after averaging successive readings.</li> </ul>	±0.0125 ± 0.0625 (300/span) in % of span				
Zero Temperature Effect per 28°C (50°F)	$\pm$ 0.10 % of calibrated span or upper range value (URV), whichever is greater.				
Applies for model with stainless steel barrier diaphragm	For URV below reference point (300 psi), Zero Temperature Effect equals: $\pm 0.10(300/span)$ in % of span				
Combined Zero and Span Temperature Effect per 28°C (50°F)	±0.225 % of calibrated span or upper range value (URV), whichever is greater.				
Applies for model with stainless steel barrier diaphragm	equals: ±0.125 ±0.10(300/span) in % of span				
Stability	±0.016% of URL per year (±0.75 psi per year).				

## Performance Under Rated Conditions - Gauge Pressure Measurement (MXG170)

Hastelloy<sup>®</sup> C-276 is a registered trademark of Haynes International. ST 3000<sup>®</sup> and Experion<sup>®</sup> are registered trademarks of Honeywell International Inc. Viton<sup>®</sup> is a registered trademark of DuPont Teflon<sup>®</sup> is a registered trademark of DuPont. DC<sup>®</sup> 200 is a registered trademark of Dow Corning.

#### Mounting

### MVX2000 & MVX3000 with standard process heads

Reference Dimensions  $\frac{\text{millimeters}}{\text{inches}}$ 



Typical mounting dimensions for reference only

#### Mounting

MVX2000 & MVX3000 with rotated (vertical) process heads

Reference Dimensions  $\frac{\text{millimeters}}{\text{inches}}$ 



Typical mounting dimensions for reference only

#### **Ordering information**

For application assistance, current specifications, pricing, or name of the nearest Authorized Distributor, contact one of the offices below. Or, visit Honeywell on the World Wide Web at: http://www.honeywell.com.

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Model Selection Guides are subject to change and are inserted into the specifications as guidance only. Prior to specifying or ordering a model check for the latest revision Model Selection Guides which are published at: <a href="http://hpsweb.honeywell.com/Cultures/en-US/Products/Instrumentation/ProductModelSelectionGuides/default.htm">http://hpsweb.honeywell.com/Cultures/en-US/Products/Instrumentation/ProductModelSelectionGuides/default.htm</a>

#### Model Selection Guide (34-ST-16-50)

# MVX 3000 Multivariable Pressure Transducer Differential Pressure -Static Pressure

Model Selection Guide 34-ST-16-50 Issue 11

#### Instructions

- Select the desired Key Number. The arrow to the right marks the selection available.
- Make one selection from each table, I and II, using the column below the proper arrow.
- Select as many Table III options as desired (if no options are desired, specify 00).
- A dot (•) denotes unrestricted availability. A letter denotes restricted availability.
- Restrictions follow Table IV.

Key Number		E		П		III (Optional)		IV
	- [		- [		] - [	!	+	XXXX

#### KEY NUMBER

Differential Pressure Range	Absolute Pressure Range	Selection	1	Avai	I
0 to ±400" H <sub>2</sub> O (0 to ±1,000 mbar)	0-750 psia (52.5 bara)	MXA125	¥	9000 G	
0 to ±400" H <sub>2</sub> O (0 to ±1,000 mbar)	0-1,500 psia (103 bara)	MXA145		$\mathbf{V}$	
0 to ±400" H <sub>2</sub> O (0 to ±1,000 mbar)	0-4,500 psig (310 barg)	MXG170			$\mathbf{V}$

#### TABLE I - METER BODY

	Process Heads	Vent/Drain Valves and Plugs <sup>2</sup>	Barrier Diaphragms	Selection			
	Carbon Steel 1	316 SS	316L SS	Α	•	•	•
Materials of	Carbon Steel 1	316 SS	Hastelloy® C-276 <sup>4</sup>	B	•	•	•
Construction	316 SS <sup>3</sup>	316 SS	316L SS	E	•	•	•
	316 SS <sup>3</sup>	316 SS	Hastelloy® C-276 <sup>4</sup>	F	•	•	•
Fill Fluid		_1_	•	•	•		
Process Head		A	•	•	•		
Configuration	Rotated (Ver	R	•	٠	•		

No Selection	00000	•	•	•
	00000		-	-

<sup>1</sup> Carbon Steel heads are zinc-plated and not recommended for water service due to hydrogen migration. For that service, use 316 stainless steel wetted Process Heads.

<sup>2</sup> Vent/Drains are sealed with Teflon<sup>®</sup> or PTFE.

<sup>4</sup> Hastelloy<sup>®</sup> C-276 or UNS N10276

<sup>&</sup>lt;sup>8</sup> Supplied as 316 SS or as Grade CF8M, the casting equivalent of 316 SS.

	Availability					
	MXA145 MX					
	MXA125					
TABLE III - OPTIONS	Selection	$\downarrow$	$\downarrow$	$ \downarrow $		
None	00	٠	•	•		
Viton <sup>®</sup> Process Head Gaskets	VT	•	٠	•		
316 SS Bolts and Nuts	SS	٠	•	•	_	
A286 SS (NACE) Bolts and 304 SS (NACE) Nuts for Heads	CR	•	•	•	D	
Compound Characterized	CM			•	200	
NACE Certificate (Process-Wetted only) (FC33338)	F7	•	•	•		
SS Center Vent Drain and Bushing	CV	•	•	•		
Characterization data provided by electronic mail	CD	•	•	•		

## TABLE IV

Factory Identification	XXXX	•	•	•

## RESTRICTIONS

Restriction	Ava	ilable Only With	Not	Not Available With		
Letter	Table	Selection	Table	Selection		
b		Choos	e only one option			

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## Ordering Example: MXA125-A1A-00000-00+XXXX

#### For More Information

Learn more about how Honeywell's ST 3000 Smart Pressure Transmitters can increase performance, reduce downtime and decrease configuration costs, visit our website www.honeywell.com/ps or contact your Honeywell account manager.

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