DS-TMF-SLAMf-Series-RevB-MFC-eng
August, 2017

Data Sheet

# SLAMf Series

Thermal Mass Flow


*Model SLAMf*

## Elastomer Sealed, Digital, Thermal Mass Flow Meters and Controllers

## Overview

The SLA Series mass flow meters and mass flow controllers have gained broad acceptance as the standard for accuracy, stability and reliability. These products have a wide flow measurement range and are suitable for a broad range of temperature and pressure conditions making them well suited for industrial & academic applications, such as chemical & petrochemical research, laboratory test & experimentation, analytical systems, fuel cell research & development, & life sciences process control, among others.

Highlights of the SLAMf Series mass flow product include: industry leading long term stability, accuracy backed by superior metrology systems and methods using primary calibration systems directly traceable to international standards, and a broad range of analog and digital I/O options to suite virtually any application. An independent diagnostic/service port permits users to troubleshoot or change flow conditions without removing the mass flow controller from service. The SLAMf Series products have NEMA 4X and IP66 weatherproof protection enclosures for 'Hosedown' applications such as; Food, Beverage, Pilot Plants, Pharmaceutical and Biotech.

## Product Description

The SLAMf Series provides a highly configurable platform based on a simple modular architecture. The SLAMf Series feature set was carefully selected to enable drop-in replacement and upgrade of many brands of mass flow controllers. With the wide range of options and features available, the SLAMf Series provides users with a single platform to support a broad range of applications.

## Features and Benefits

| Features | Benefits |
|---|---|
| Industry leading sensor stability | Increased system throughput and reduced cost of ownership by reducing maintenance and eliminating periodic recipe adjustments and/or device recalibrations |
| User accessible service port | Simplified installation, start-up, troubleshooting and access to diagnostics provides maximum uptime |
| Advanced diagnostics | Ensures device is operating within user specified limits for high process yield and maximum uptime |
| Superior valve technology | Minimum leak-by, maximum turndown, and fast response reduces overall gas panel cost and increases throughput |
| Adaptable mechanical configurations | Easily retrofit to existing systems |
| Primary standard calibration systems | Ensures measurement accuracy is traceable to international standards |
| Simple modular design | Easy-to-service elastomer sealed design provides for factory or field service maximizing uptime and reducing total cost of ownership |

# Product Description

### Advanced Thermal Flow Measurement Sensor

Brooks' sensor technology combines:

- Excellent signal to noise performance for improved accuracy at low setpoints
- Superior long-term stability through enhanced sensor manufacturing and burn in process
- Isothermal packaging to reduce sensitivity to external temperature changes
- Corrosion resistant sensor flow path

### Advanced Diagnostics

The mass flow controller remains the most complex and critical component in gas delivery systems. When dealing with highly toxic or corrosive gases, removing the mass flow controller to determine if it is faulty should be the last resort. In response to this, Brooks pioneered smarter mass flow controllers with embedded self test routines and introduced an independent diagnostic/service port to provide the user with a simple interface, for troubleshooting without disturbing flow controller operation.

### Wash-down Enclosure

The SLAMf Series comes equipped with an IP66 / NEMA4X rated enclosure. This makes these instruments perfect for wash-down or outdoor environments. So no matter how harsh the surroundings, the SLAMf Series keeps the process under control.

### Wide Flow Range

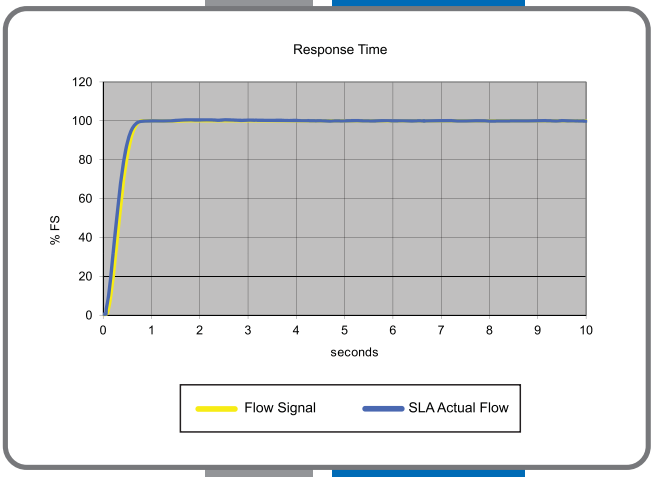
The SLAMf Series covers an extremely broad range of flow rates. Model SLAMf50 can have a full scale flow as low as 3 ccm. With a high turndown ratio of 100:1 for any full scale range from 1-50 lpm N2 equivalent and 50:1 turndown for all other flow rates, accurate gas flow can be measured or controlled down to 0.06 ccm! Model SLAMf53 can monitor or control gas flows up to 2,500 lpm. Model SLAMf64 can monitor gas flows up to 36,000 lpm.

### Fast Response Performance

The all-digital electronics and superior mechanical configuration in the SLAMf Series provide for ultra fast response characteristics.

### Broad Array of Communication Options

Brooks offers traditional 0-5 volt and 4-20mA analog options as well as RS485 digital communications ("S-protocol", based on HART). Brooks also offers control interfaces via digital network protocols like DeviceNet, a high speed (up to 500k baud) digital communication network, Profibus and EtherCAT. Brooks' communication capabilities and device-profiles have been certified by the ODVA (Open DeviceNet Vendor's Association) and the ITK (Interoperability Test Kit). Other network protocols are in development. Talk to your Brooks representative about your specific needs.


# Product Specifications

## Flow Ranges and Pressure Ratings:

| Mass Flow Controller Model | Mass Flow Meter Model | Flow Ranges N2 Eq. Ratings | | Pressure Unit psi/bar | | PED Module H Category |
|---|---|---|---|---|---|---|
| | | Min. F.S. | Max. F.S. | Standard | Optional | |
| SLAMf50 | SLAMf60 | 0.003 | 50 lpm | 1500 psi/103 bar | 4500 psi/310 bar | SEP |
| SLAMf51 | SLAMf61 | 15 | 200 lpm(1) | 1500 psi/103 bar(2) | NA(3) | SEP |
| SLAMf53 | SLAMf63 | 100 | 2500 lpm | 1000 psi/70 bar | NA | 1 for all 150 lb flanges<br>2 for all other connections |
| - | SLAMf64 | 18 | 2160 $m^3/n$ | Flow rate dependant | | 1-1/2" - 100 bar<br>2" & 3" - 85 bar<br>4" & 6" - 70 bar<br>8" - 50 bar |

(1) 600 lpm of H2 possible with decreased accuracy (2) 1000 psi/70 bar for UL Certification (3) 4500 psi/310 bar available as a special on the SLAMf61 only
> 40 psig inlet required for flows greater than 100 lpm

## Performance

| | SLAMf50/60 | SLAMF51/61 | SLAMF53/63 | SLAMf64 |
|---|---|---|---|---|
| **Flow Accuracy** | ±0.9% of S.P. (20-100% F.S.), +0.18% of F.S. (2-20% F.S., 1-20% F.S. from 1-50 lpm) | | ±0.9% of S.P. (20-100% F.S.), ±0.18% of F.S. (2-20% F.S.) up to 1100 lpm, ±1.0% of F.S. from 1100 lpm up to 2500 lpm | ±1% F.S. |
| **Control Range** | Turndown 100:1 for F.S. from 1-50 lpm (50:1 for all other F.S. flows) | | | N/A |
| **Repeatability & Reproducibility** | 0.20% S.P. | | | ±0.25% S.P. |
| **Linearity** | Included in accuracy | | | |
| **Response Time (Settling Time within ±2% F.S. for 0-100% command step)*** | < 1 second | | < 3 seconds | N/A |
| **Zero Stability** | < ± 0.2% F.S. per year | | | |
| **Temperature Coefficient** | Zero: <0.05% of F.S. per °C. Span: < 0.1% of S.P. per °C | | | |
| **Pressure Coefficient** | ±0.03% per psi (0-200 psi N2) | | | |
| **Attitude Sensitivity** | <0.2% F.S. maximum deviation from specified accuracy after re-zeroing | | | |

## Ratings

| | | | | |
|---|---|---|---|---|
| **Operating Temperature Range** | -14 to 65°C (7 to 149°F)** | | | |
| **Minimum Pressure Differential (Controllers)** | 5 psi/0.35 bar | 10 psi/0.69 bar | Min.: 11.7 psi/0.81 bar at 500 lpm<br>Min.: 14.5 psi/1.00 bar at 1000 lpm<br>Min.: 35.0 psi/2.41 bar at 2500 lpm | N/A |
| **Maximum Pressure Differential (Controllers)** | Application specific up to 1500 psi/103.4 bar | 50 psi/3.45 bar | 300 psi/20.0 bar | N/A |
| **Leak Integrity (external)** | $1x10^{-9}$ atm. cc/sec He | | | |

## Mechanical

| | | |
|---|---|---|
| **Valve Type** | Normally Closed, Normally Open, Meter | Meter |
| **Primary Wetted Materials** | 316L Stainless Steel, High Alloy Stainless Steel, Viton® fluoroelastomers, Buna-N, Kalrez®, Teflon®/Kalrez®, and EPDM | |

* Response time can be improved upon request

## Diagnostics

| | |
|---|---|
| **Status Lights** | MFC Health, Network Status |
| **Alarms*** | Sensor Output, Control Valve Output, Over Temperature, Power Surge/Sag, Network Interruption |
| **Diagnostic/Service Port** | RS485 via 2.5mm jack (Located under the top cover) |

* Alarm modes are dependent on the communications interface. These are described in the corresponding digital communication interface manual.
** Hazardous area certifications have a temperature range limitation of 0-65°C.

# Electrical Specifications

| Communication Protocol | RS485 | Profibus® | DeviceNet™ | EtherCAT® |
|---|---|---|---|---|
| **Electrical Connection** | All: PG11 Cable Gland, 1/2" NPT (F) Conduit, M20 x 1.5 Conduit<br>DeviceNet Only: 5-Pin Micro Connector | | | 5-Pin M8 Connector |
| **Analog I/O** | 0-5 V, 1-5 V, 0-10 V,<br>0-20 mA, 4-20 mA | | N/A | 0-5 V |
| **Power Max./Purge** | From +13.5 Vdc to<br>+27 Vdc | | From +11 Vdc to<br>+25 Vdc | From +13.5 Vdc to<br>+27 Vdc |
| **Power Requirements Watts, Max.** | Valve Orifice > 0.032": 8 W<br>Valve Orifice ≤ 0.032": 5 W<br>Without Valve: 2 W | | Valve Orifice > 0.032": 10 W<br>Valve Orifice ≤ 0.032": 7 W<br>Without Valve: 4 W | Valve Orifice > 0.032": 8.5 W<br>Valve Orifice ≤ 0.032": 5.5 W<br>Without Valve: 2.5 W |
| **Voltage Set Point Input Specifications** | | | | |
| **Nominal Range** | 0-5 Vdc, 1-5 Vdc or 0-10 Vdc | | N/A | N/A |
| **Full Range** | (-0.5)-11 Vdc | | N/A | N/A |
| **Absolute Max.** | 18 V (without damage) | | N/A | N/A |
| **Input Impedence** | >990 kOhms | | N/A | N/A |
| **Required Max. Sink Current** | 0.002 mA | | N/A | N/A |
| **Current Set Point Input Specifications** | | | | |
| **Nominal Range** | 4-20 mA or 0-20 mA | | N/A | N/A |
| **Full Range** | 0-22 mA | | N/A | N/A |
| **Absolute Max.** | 24 mA (without damage) | | N/A | N/A |
| **Input Impedence** | 100 Ohms | | N/A | N/A |
| **Flow Output (Voltage) Specifications** | | | | |
| **Nominal Range** | 0-5 Vdc, 1-5 Vdc or 0-10 Vdc | | N/A | N/A |
| **Full Range** | (-1)-11 Vdc | | N/A | N/A |
| **Min Load Resistance** | 2 kOhms | | N/A | N/A |
| **Flow Output (Current) Specifications** | | | | |
| **Nominal Range** | 0-20 mA or 4-20 mA | | N/A | N/A |
| **Full Range** | 0-22 mA (@ 0-20 mA); 3.8-22 mA (@ 4-20 mA) | | N/A | N/A |
| **Max. Load** | 380 Ohms (for supply voltage: < 16 Vdc) | | N/A | N/A |
| **Analog I/O Alarm Ouput*** | | | | |
| **Type** | Open Collector | | N/A | N/A |
| **Max. Closed (On) Current** | 25 mA | | N/A | N/A |
| **Max. Open (Off) Leakage** | 1µA | | N/A | N/A |
| **Max. Open (Off) Voltage** | 30 Vdc | | N/A | N/A |
| **Analog I/O Valve Override Signal Specifications**** | | | | |
| **Floating/Unconnected** | Instrument controls valve to command set point | | N/A | N/A |
| **VOR < 0.3 Vdc** | Valve Closed | | N/A | N/A |
| **1 Vdc < VOR < 4 Vdc** | Valve Normal | | N/A | N/A |
| **VOR > 4.8 Vdc** | Valve Open | | N/A | N/A |
| **Input Impedence** | 800 kOhms | | N/A | N/A |
| **Absolute Max. Input** | (-25 Vdc) < VOR < 25 Vdc (without damage) | | N/A | N/A |

*The Alarm Output is an open collector or "contact type" that is CLOSED (on) whenever an alarm is active. The Alarm Output may be set to indicate any one of various alarm conditions.

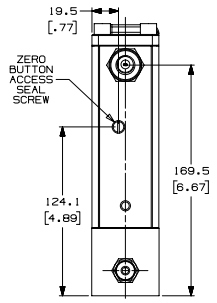
** The Valve Override Signal (VOR) is implemented as an analog input which measures the voltage at the input and controls the valve based upon the measured reading as shown in this section.

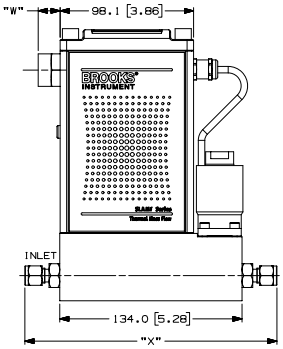
# Product Dimensions

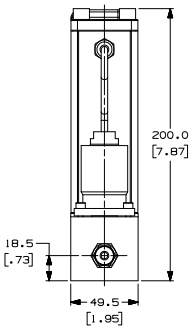
## *SLAMf50, Analog/RS485*

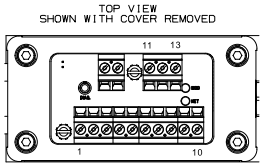
MM/[ INCH ]

| CABLE CONNECTOR | "W" DIMENSION |
|---|---|
| CABLE GLAND 0.20 [5.1] TO 0.39 [9.9] DIA. CABLE | 28.6 [1.12] |
| 1/2" NPT-F CONDUIT | 16.5 [0.65] |
| M20x1.5 (F) CONDUIT | 12.5 [0.49] |



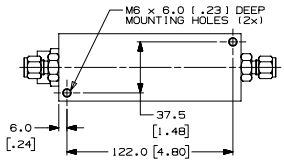



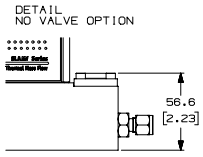




| TERMINAL | FUNCTION |
|---|---|
| 1 | SETPOINT COMMON |
| 2 | FLOW OUTPUT (0-5V, 1-5V) |
| 3 | ALARM OUT |
| 4 | FLOW OUTPUT (0-20mA, 4-20mA) |
| 5 | POWER SUPPLY (13.5-27V) |
| 6 | SETPOINT INPUT (0-20mA, 4-20mA) |
| 7 | SETPOINT INPUT (0-5V, 1-5V) |
| 8 | POWER COMMON |
| 9 | FLOW OUT COMMON |
| 10 | VALVE OVERRIDE INPUT |
| 11 | AUX INPUT (0-5V, 0-10V) |
| 12 | RS-485, B (-), INPUT/OUTPUT |
| 13 | RS-485, A (+), INPUT/OUTPUT |

| FITTING | "X" DIMENSION |
|---|---|
| 1/8" TUBE COMP. | *180.7 [7.12] |
| 1/4" TUBE COMP. | *185.3 [7.30] |
| 3/8" TUBE COMP. | *188.4 [7.42] |
| 1/2" TUBE COMP. | *192.4 [7.58] |
| 1/4" VCR | 181.8 [7.16] |
| 1/4" VCO | 173.6 [6.84] |
| 1/4" NPT-F | 176.2 [6.94] |
| 6mm TUBE COMP. | *185.4 [7.30] |
| 10mm TUBE COMP. | *188.8 [7.43] |
| 3/8"-1/2" VCR | 189.4 [7.46] |
| 3/8"-1/2" VCO | 184.8 [7.28] |
| 1/4" RC-F (BSP) | 174.2 [6.86] |

• OVERALL LENGTH FINGER TIGHT



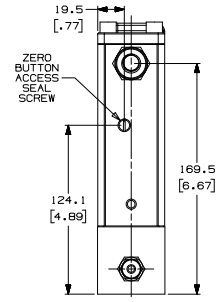



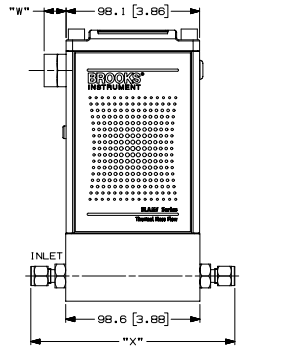

Note: Aux Input is used for Remote Transducer Pressure Controllers only.

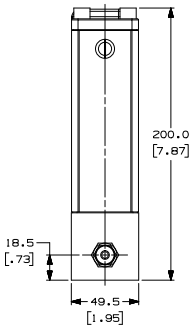
## *SLAMf60, Analog/RS485*

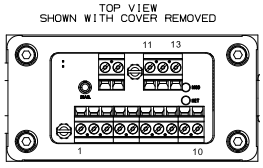
MM/[ INCH ]

| CABLE CONNECTOR | "W" DIMENSION |
|---|---|
| CABLE GLAND 0.20 [5.1] TO 0.39 [9.9] DIA. CABLE | 28.6 [1.12] |
| 1/2" NPT-F CONDUIT | 16.5 [0.65] |
| M20x1.5 (F) CONDUIT | 12.5 [0.49] |



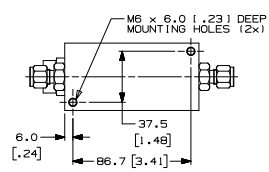




| TERMINAL | FUNCTION |
|---|---|
| 1 | SETPOINT COMMON |
| 2 | FLOW OUTPUT (0-5V, 1-5V) |
| 3 | ALARM OUT |
| 4 | FLOW OUTPUT (0-20mA, 4-20mA) |
| 5 | POWER SUPPLY (13.5-27V) |
| 6 | SETPOINT INPUT (0-20mA, 4-20mA) |
| 7 | SETPOINT INPUT (0-5V, 1-5V) |
| 8 | POWER COMMON |
| 9 | FLOW OUT COMMON |
| 10 | VALVE OVERRIDE INPUT |
| 11 | AUX INPUT (0-5V, 0-10V) |
| 12 | RS-485, B (-), INPUT/OUTPUT |
| 13 | RS-485, A (+), INPUT/OUTPUT |

| FITTING | "X" DIMENSION |
|---|---|
| 1/8" TUBE COMP. | *145,3 [5,72] |
| 1/4" TUBE COMP. | *149,9 [5,90] |
| 3/8" TUBE COMP. | *152,9 [6,02] |
| 1/2" TUBE COMP. | *157,0 [6,18] |
| 1/4" VCR | 146,3 [5,76] |
| 1/4" VCO | 138,2 [5,44] |
| 1/4" NPT-F | 140,7 [5,54] |
| 6mm TUBE COMP. | *149,9 [5,90] |
| 10mm TUBE COMP. | *153,2 [6,03] |
| 3/8"-1/2" VCR | 153,9 [6,06] |
| 3/8"-1/2" VCO | 149,4 [5,88] |
| 1/4" RC-F (BSP) | 138,8 [5,46] |

• OVERALL LENGTH FINGER TIGHT



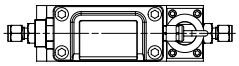

Note: Aux Input is used for Remote Transducer Pressure Controllers only.

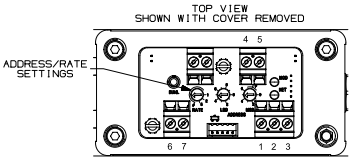
# Product Dimensions (continued)

## *SLAMf51, DeviceNet*

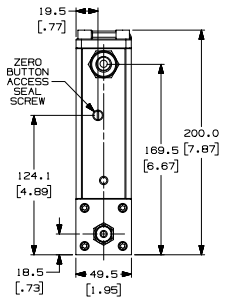
MM/[ INCH ]

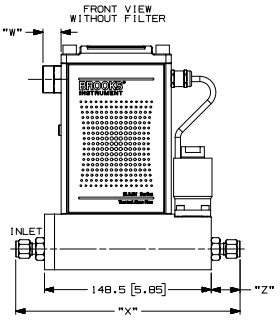
| CABLE CONNECTOR | "W" DIMENSION |
|---|---|
| CABLE GLAND 0.20 [5.1] TO 0.39 [9.9] DIA. CABLE | 28.6 [1.12] |
| 1/2" NPT-F CONDUIT | 16.5 [0.65] |
| M20x1.5 (F) CONDUIT | 12.5 [0.49] |

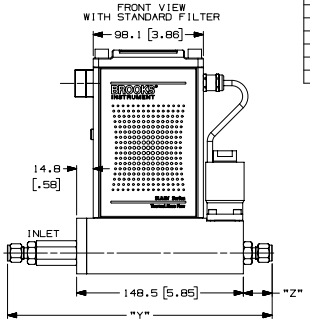


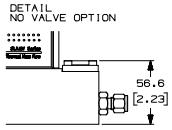



| TERMINAL | FUNCTION |
|---|---|
| 1 | DRAIN |
| 2 | POWER SUPPLY (11-25V) |
| 3 | POWER COMMON |
| 4 | CAN_H |
| 5 | CAN_L |
| 6 | AUX COMMON |
| 7 | AUX INPUT (0-5V, 0-10V) |



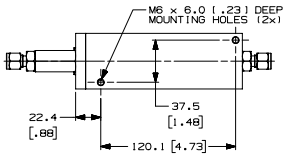




| FITTING | "X" DIMENSION (Without Standard Filter) | Y" DIMENSION (With Standard Filter) | "Z" DIMENSION |
|---|---|---|---|
| 9/16"-18 UNF | 148.5 [5.85] | 184.5 [7.26] | N/A |
| 1/4" TUBE COMP. | •199.8 [7.87] | •235.8 [9.28] | •25.7 [1.01] |
| 3/8" TUBE COMP. | •202.9 [7.99] | •238.8 [9.40] | •27.2 [1.07] |
| 1/2" TUBE COMP. | •206.9 [8.15] | •242.9 [9.56] | •29.2 [1.15] |
| 1/4" VCR | 196.3 [7.73 | 232.2 [9.14] | 23.9 [0.94] |
| 1/4" VCO | 188.1 [7.41] | 224.1 [8.82] | 19.8 [0.78] |
| 1/4" NPT | 190.7 [7.51] | 226.7 [8.92] | 21.1 [0.83] |
| 6mm TUBE COMP. | •199.9 [7.87] | •235.8 [9.28] | •25.7 [1.01] |
| 10mm TUBE COMP. | •203.3 [8.00] | •239.4 [9.42] | •27.4 [1.08] |
| 3/8"-1/2" VCR | 203.9 [8.03] | 239.9 [9.44] | 27.7 [1.09] |
| 3/8"-1/2" VCO | 199.3 [7.85] | 235.3 [9.26] | 25.4 [1.00] |
| 1/4" RC (BSP) | 188.7 [7.43] | 224.6 [8.84] | 20.1 [0.79] |

• OVERALL LENGTH FINGER TIGHT

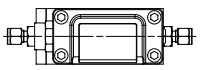


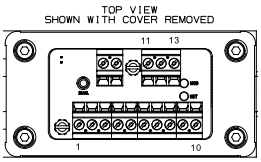

Note: Aux Input is used for Remote Transducer Pressure Controllers only.

## *SLAMf61, Analog/RS485*

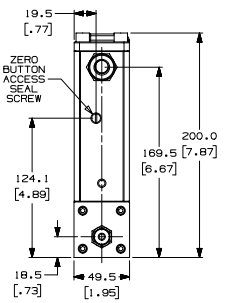
MM/[ INCH ]

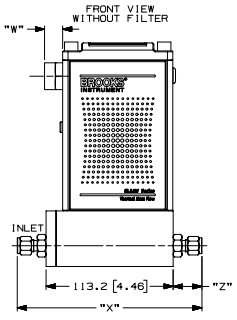
| CABLE CONNECTOR | "W" DIMENSION |
|---|---|
| CABLE GLAND 0.20 [5.1] TO 0.39 [9.9] DIA. CABLE | 28.6 [1.12] |
| 1/2" NPT-F CONDUIT | 16.5 [0.65] |
| M20x1.5 (F) CONDUIT | 12.5 [0.49] |

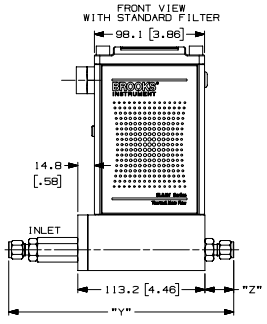





| TERMINAL | FUNCTION |
|---|---|
| 1 | SETPOINT COMMON |
| 2 | FLOW OUTPUT (0-5V, 1-5V) |
| 3 | ALARM OUT |
| 4 | FLOW OUTPUT (0-20mA, 4-20mA) |
| 5 | POWER SUPPLY (13.5-27V) |
| 6 | SETPOINT INPUT (0-20mA, 4-20mA) |
| 7 | SETPOINT INPUT (0-5V, 1-5V) |
| 8 | POWER COMMON |
| 9 | FLOW OUT COMMON |
| 10 | VALVE OVERRIDE INPUT |
| 11 | AUX INPUT (0-5V, 0-10V) |
| 12 | RS-485, B (-), INPUT/OUTPUT |
| 13 | RS-485, A (+), INPUT/OUTPUT |

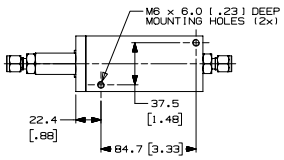



| FITTING | "X" DIMENSION (Without Standard Filter) | Y" DIMENSION (With Standard Filter) | "Z" DIMENSION |
|---|---|---|---|
| 9/16"-18 UNF | 113.2 [4.46] | 149.2 [5.87] | N/A |
| 1/4" TUBE COMP. | •164.5 [6.48] | •209.4 [8.24] | •25.7 [1.01] |
| 3/8" TUBE COMP. | •167.6 [6.60] | •212.5 [8.36] | •27.2 [1.07] |
| 1/2" TUBE COMP. | •171.6 [6.76] | •216.5 [8.52] | •29.2 [1.15] |
| 1/4" VCR | 161.0 [6.34] | 205.9 [8.10] | 23.9 [0.94] |
| 1/4" VCO | 152.9 [6.02] | 197.7 [7.78] | 19.8 [0.78] |
| 1/4" NPT | 155.4 [6.12] | 200.3 [7.89] | 21.1 [0.83] |
| 6mm TUBE COMP. | •164.6 [6.48] | •209.5 [8.25] | •25.7 [1.01] |
| 10mm TUBE COMP. | •167.9 [6.61] | •212.9 [8.38] | •27.4 [1.08] |
| 3/8"-1/2" VCR | 168.7 [6.64] | 213.5 [8.40] | 27.7 [1.09] |
| 3/8"-1/2" VCO | 164.1 [6.46] | 208.9 [8.22] | 25.4 [1.00] |
| 1/4" RC (BSP) | 153.4 [6.04] | 198.3 [7.81] | 20.1 [0.79] |

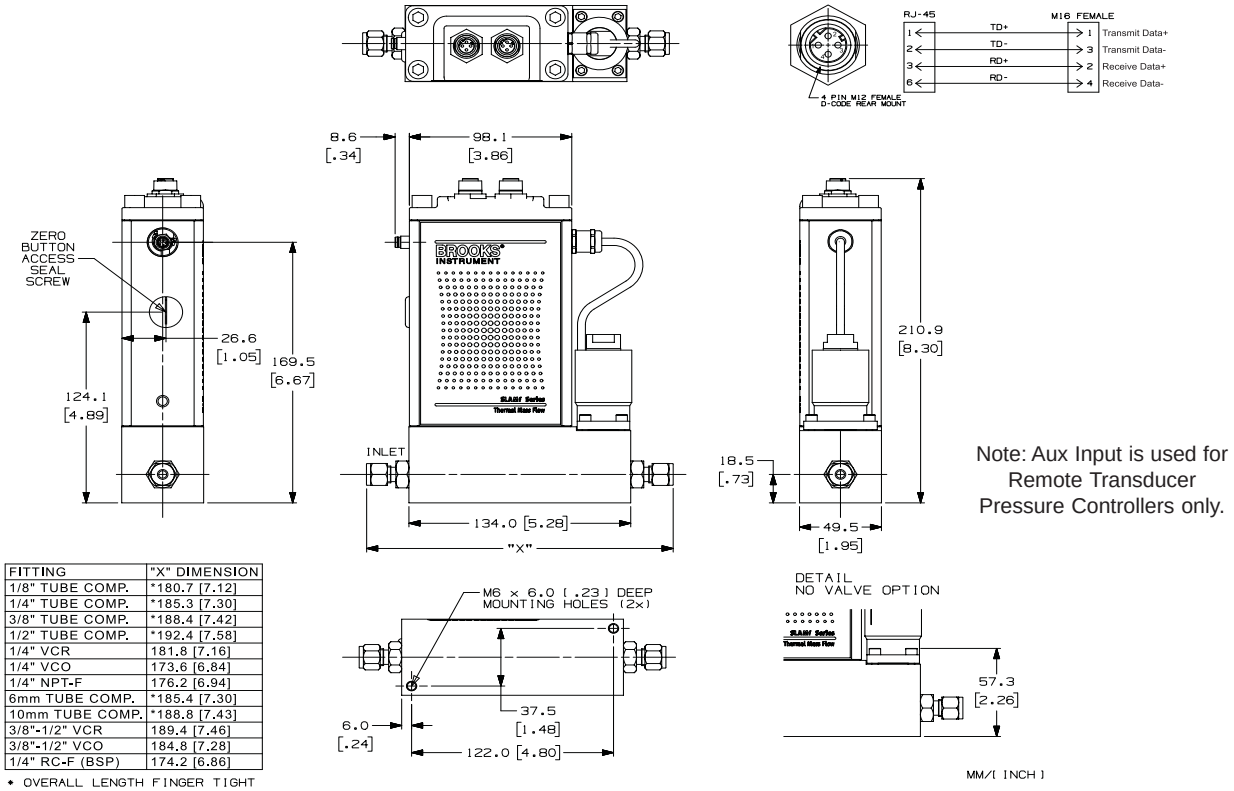
• OVERALL LENGTH FINGER TIGHT




Note: Aux Input is used for Remote Transducer Pressure Controllers only.

# Product Dimensions (continued)

## *SLAMf50 EtherCAT*




Note: Aux Input is used for Remote Transducer Pressure Controllers only.

| FITTING | "X" DIMENSION |
|---|---|
| 1/8" TUBE COMP. | *180.7 [7.12] |
| 1/4" TUBE COMP. | *185.3 [7.30] |
| 3/8" TUBE COMP. | *188.4 [7.42] |
| 1/2" TUBE COMP. | *192.4 [7.58] |
| 1/4" VCR | 181.8 [7.16] |
| 1/4" VCO | 173.6 [6.84] |
| 1/4" NPT-F | 176.2 [6.94] |
| 6mm TUBE COMP. | *185.4 [7.30] |
| 10mm TUBE COMP. | *188.8 [7.43] |
| 3/8"-1/2" VCR | 189.4 [7.46] |
| 3/8"-1/2" VCO | 184.8 [7.28] |
| 1/4" RC-F (BSP) | 174.2 [6.86] |

* OVERALL LENGTH FINGER TIGHT

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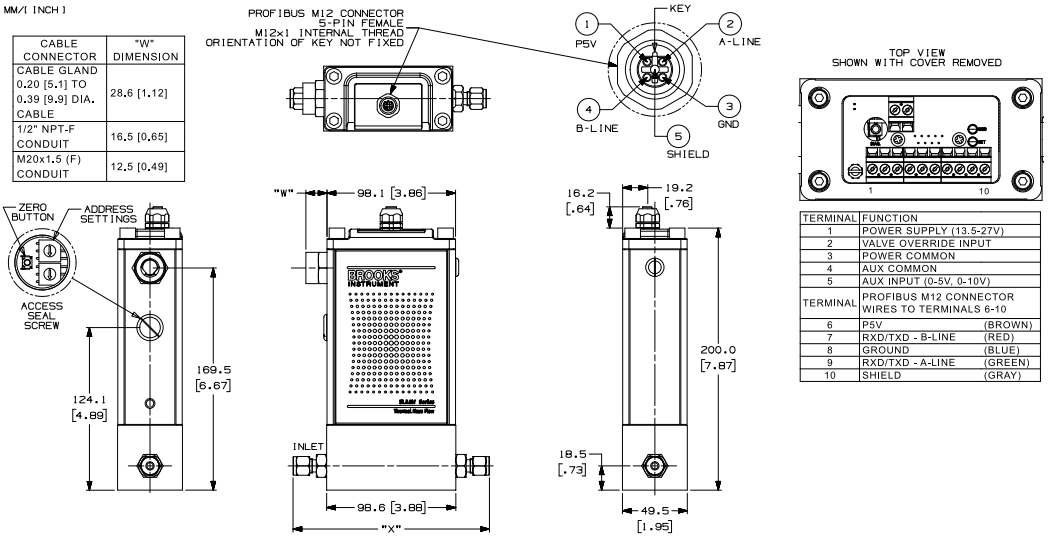
## *SLAMf60, Profibus*




| CABLE CONNECTOR | "W" DIMENSION |
|---|---|
| CABLE GLAND 0.20 [5.1] TO 0.39 [9.9] DIA. CABLE | 28.6 [1.12] |
| 1/2" NPT-F CONDUIT | 16.5 [0.65] |
| M20x1.5 (F) CONDUIT | 12.5 [0.49] |

| TERMINAL | FUNCTION | |
|---|---|---|
| 1 | POWER SUPPLY (13.5-27V) | |
| 2 | VALVE OVERRIDE INPUT | |
| 3 | POWER COMMON | |
| 4 | AUX COMMON | |
| 5 | AUX INPUT (0-5V, 0-10V) | |
| TERMINAL | PROFIBUS M12 CONNECTOR WIRES TO TERMINALS 6-10 | |
| 6 | P5V | (BROWN) |
| 7 | RXD/TXD - B-LINE | (RED) |
| 8 | GROUND | (BLUE) |
| 9 | RXD/TXD - A-LINE | (GREEN) |
| 10 | SHIELD | (GRAY) |

| FITTING | "X" DIMENSION |
|---|---|
| 1/8" TUBE COMP. | *145.3 [5.72] |
| 1/4" TUBE COMP. | *149.9 [5.90] |
| 3/8" TUBE COMP. | *152.9 [6.02] |
| 1/2" TUBE COMP. | *157.0 [6.18] |
| 1/4" VCR | 146.3 [5.76] |
| 1/4" VCO | 138.2 [5.44] |
| 1/4" NPT-F | 140.7 [5.54] |
| 6mm TUBE COMP. | *149.9 [5.90] |
| 10mm TUBE COMP. | *153.2 [6.03] |
| 3/8"-1/2" VCR | 153.9 [6.06] |
| 3/8"-1/2" VCO | 149.4 [5.88] |
| 1/4" RC-F (BSP) | 138.8 [5.46] |

* OVERALL LENGTH FINGER TIGHT

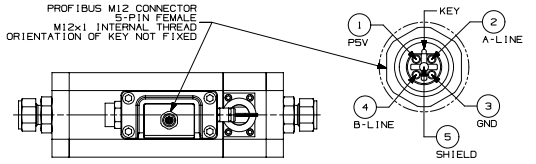
Note: Aux Input is used for Remote Transducer Pressure Controllers only.

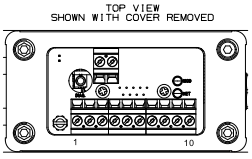
# Product Dimensions (continued)

## *SLAMf53, Profibus*

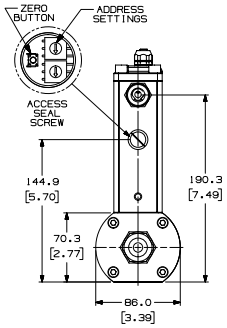
MM/[ INCH ]

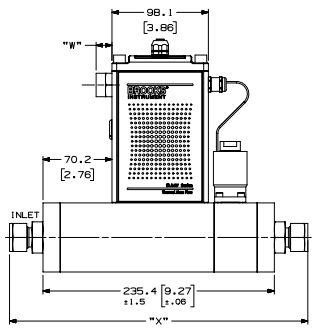
| CABLE CONNECTOR | "W" DIMENSION |
|---|---|
| CABLE GLAND 0.20 [5.1] TO 0.39 [9.9] DIA. CABLE | 28.6 [1.12] |
| 1/2" NPT-F CONDUIT | 16.5 [0.65] |
| M20x1.5 (F) CONDUIT | 12.5 [0.49] |

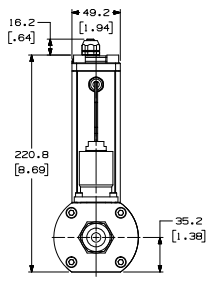



| TERMINAL | FUNCTION | |
|---|---|---|
| 1 | POWER SUPPLY (13.5-27V) | |
| 2 | VALVE OVERRIDE INPUT | |
| 3 | POWER COMMON | |
| 4 | AUX COMMON | |
| 5 | AUX INPUT (0-5V, 0-10V) | |
| TERMINAL | PROFIBUS M12 CONNECTOR WIRES TO TERMINALS 6-10 | |
| 6 | P5V | (BROWN) |
| 7 | RXD/TXD - B-LINE | (RED) |
| 8 | GROUND | (BLUE) |
| 9 | RXD/TXD - A-LINE | (GREEN) |
| 10 | SHIELD | (GRAY) |

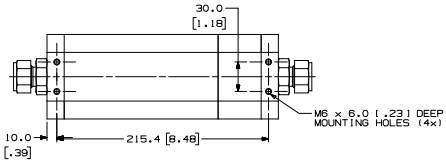



| FITTINGS | "X" DIMENSION |
|---|---|
| 9/16" - 18 UNF | 235.4 [9.27] |
| 1-1/16" - 12 UN | 235.4 [9.27] |
| 1 -5/16 - 12 UN | 235.4 [9.27] |
| 1/2" NPT | 235.4 [9.27] |
| 1" NPT | 235.4 [9.27] |
| 1-1/2" NPT | 235.4 [9.27] |
| 1/2" RC (BSP) | 235.4 [9.27] |
| 1" RC (BSP | 235.4 [9.27] |
| 3/8" TUBE COMP. | •290 [11.42] |
| 1/2" TUBE COMP. | •304 [11.97] |
| 3/4" TUBE COMP. | •304 [11.97] |
| 1" TUBE COMP. | •311.7 [12.27] |
| 1/2" VCO | 286.3 [11.27] |
| 3/4" VCO | 293.9 [11.57] |
| 1" VCO | 296.4 [11.67] |
| 1/2" VCR | 293.9 [11.57] |
| 3/4" VCR | 316.7 [12.47] |

• OVERALL LENGTH FINGER TIGHT

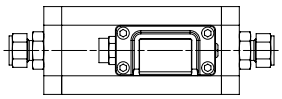


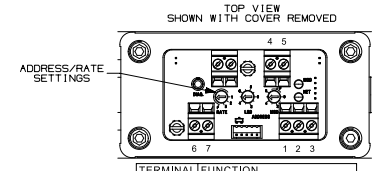

Note: Aux Input is used for Remote Transducer Pressure Controllers only.

## *SLAMf63, DeviceNet*

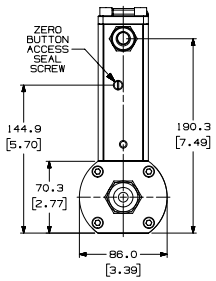
MM/[ INCH ]

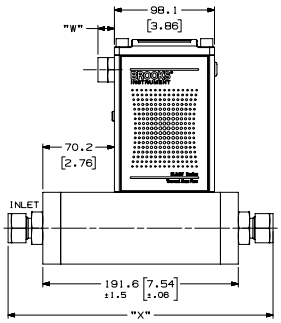
| CABLE CONNECTOR | "W" DIMENSION |
|---|---|
| CABLE GLAND 0.20 [5.1] TO 0.39 [9.9] DIA. CABLE | 28.6 [1.12] |
| 1/2" NPT-F CONDUIT | 16.5 [0.65] |
| M20x1.5 (F) CONDUIT | 12.5 [0.49] |

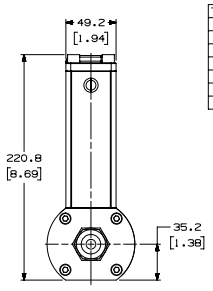





| TERMINAL | FUNCTION |
|---|---|
| 1 | DRAIN |
| 2 | POWER SUPPLY (11-25V) |
| 3 | POWER COMMON |
| 4 | CAN_H |
| 5 | CAN_L |
| 6 | AUX COMMON |
| 7 | AUX INPUT (0-5V, 0-10V) |

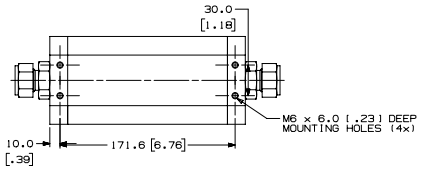



| FITTINGS | "X" DIMENSION |
|---|---|
| 9/16" - 18 UNF | 191.6 [7.54] |
| 1-1/16" - 12 UN | 191.6 [7.54] |
| 1 -5/16 - 12 UN | 191.6 [7.54] |
| 1/2" NPT | 191.6 [7.54] |
| 1" NPT | 191.6 [7.54] |
| 1-1/2" NPT | 191.6 [7.54] |
| 1/2" RC (BSP) | 191.6 [7.54] |
| 1" RC (BSP | 191.6 [7.54] |
| 3/8" TUBE COMP. | •246.0 [9.69] |
| 1/2" TUBE COMP. | •260.4 [10.25] |
| 3/4" TUBE COMP. | •260.4 [10.25] |
| 1" TUBE COMP. | •268.0 [10.55] |
| 1/2" VCO | 242.6 [9.55] |
| 3/4" VCO | 250.2 [9.85] |
| 1" VCO | 252.7 [9.95] |
| 1/2" VCR | 250.2 [9.85] |
| 3/4" VCR | 273.1 [10.75] |

• OVERALL LENGTH FINGER TIGHT

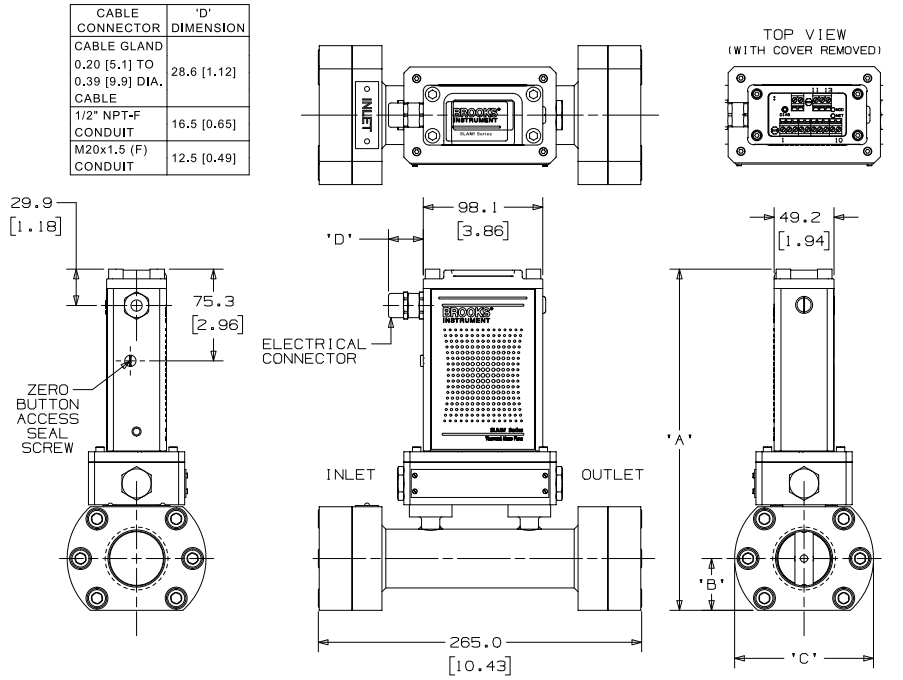



Note: Aux Input is used for Remote Transducer Pressure Controllers only.

## Product Dimensions (continued)

*SLAMf64, 1-1/2" or 2" FNPT, RS485*

| CABLE CONNECTOR | 'D' DIMENSION |
|---|---|
| CABLE GLAND 0.20 [5.1] TO 0.39 [9.9] DIA. CABLE | 28.6 [1.12] |
| 1/2" NPT-F CONDUIT | 16.5 [0.65] |
| M20x1.5 (F) CONDUIT | 12.5 [0.49] |




| TERMINAL | FUNCTION |
|---|---|
| 1 | SETPOINT COMMON |
| 2 | FLOW OUTPUT (0-5V, 1-5V) |
| 3 | ALARM OUT |
| 4 | FLOW OUTPUT (0-20mA, 4-20mA) |
| 5 | POWER SUPPLY (13.5-27V) |
| 6 | SETPOINT INPUT (0-20mA, 4-20mA) |
| 7 | SETPOINT INPUT (0-5V, 1-5V) |
| 8 | POWER COMMON |
| 9 | FLOW OUT COMMON |
| 10 | VALVE OVERRIDE INPUT |
| 11 | AUX INPUT (0-5V, 0-10V) |
| 12 | RS-485, B (-), INPUT/OUTPUT |
| 13 | RS-485, A (+), INPUT/OUTPUT |

| MECHANICAL CONN. | 'A' DIMENSION | 'B' DIMENSION | 'C' DIMENSION |
|---|---|---|---|
| 1-1/2" FNPT | 280 [11.02] | 42.5 [1.67] | 114.0 [4.49] |
| 2" FNPT | 290 [11.42] | 47.5 [1.87] | 124.0 [4.88] |

MM
[ INCH ]

Note: Aux Input is used for Remote Transducer Pressure Controllers only.

See Instruction Manual for additional configurations.

## Certifications

| Mark | Agency | Certification | Applicable Standard | Details |
|---|---|---|---|---|
| c UL us | UL (Recogonized) | Class I, Div 2, Group A, B, C, D<br>Class I, Zone 2, IIC T4<br>Class II, Zone 22 IP66 | UL & CSA Standards | E73889 Vol 3, Sec 4 |
| c UL us | UL (Listed) | Class I, Div 2, Group A, B, C, D<br>Class I, Zone 2, IIC T4<br>Class II, Zone 22 IP66 | UL & CSA Standards | E73889 Vol 1, Sec 25 |
| Ex | ATEX | II 3 G Ex nA IIC T4 Gc<br>II 3 D Ex tc IIIC T 85 °C Dc<br>IP66 | EN 60079-0 : 2012 + A11 : 2013<br>EN 60079-15 : 2010<br>EN 60079-31 : 2014 | KEMA 04ATEX1290 X |
| | IECEx* | Ex nA IIC T4 Gc<br>Ex tc IIIC T 85 °C Dc<br>IP66 | IEC 60079-0 : 2011 + Corr. 2012 + Cor. 2013<br>IEC 60079-15 : 2010<br>IEC 60079-31 : 2013 | IEC KEM 07.0043X |
| KCs | KOSHA* | Ex nA IIC T4<br>Ex tD A22 IP66 T85°C | The Ministry of Employment and Labor Notice No. 2013-34 Article 34 of the Industrial Safety and Health | 15-AV4BO-0638<br>15-AV4BO-0639<br>16-AV4BO-0328X<br>16-AV4BO-0327X |
| CE | CE | EMC Directive 2014/30/EU<br>Directive 2011/65/EU | EN:61326-1:2013 | EMC<br>RoHS |

*Not available on SLAMf64

# Model Code

| Code | Description | Code Option | Option Description |
|---|---|---|---|
| **I.** | Base Model Numbers | **SLA** | |
| **II.** | Package / Finish Specifications | **MF** | Standard Elastomer Series |
| **III.** | Function | **5** | Mass Flow Controller |
| | | **6** | Mass Flow Meter |
| **IV.** | Body Size | **0** | 3 ccm - 50 lpm $N_2$ Equivalent |
| | | **1** | 20 - 100 lpm $N_2$ Equivalent |
| | | **3** | 100 - 2500 lpm $N_2$ Equivalent |
| | | **4** | 300 - 36000 lpm $N_2$ Equivalent |
| **V.** | Digital I/O Communication | **A** | None (select applicable analog I/O) |
| | | **D** | DeviceNet I/O (with 5-pin micro connector) |
| | | **E** | EtherCAT |
| | | **J** | DeviceNet I/O (with PG11 cable gland) |
| | | **K** | DeviceNet I/O (with M20x1.5 conduit) |
| | | **L** | DeviceNet I/O (with 1/2" NPT (F) conduit) |
| | | **P** | Profibus (5-pin female M12, M20x1.5 conduit) |
| | | **R** | Profibus (5-pin female M12, PG11 cable gland) |
| | | **T** | Profibus (5-pin female M12, 1/2" NPT (F) conduit) |
| | | **S** | RS485 (select applicable analog I/O) |
| **VI.** | Mechanical Connection (Body size 0 & 1 only) | **1A** | Without adapters, 9/16" - 18 UNF |
| | | **1B** | 1/4" tube compression |
| | | **1C** | 1/8" tube compression |
| | | **1D** | 3/8" tube compression |
| | | **1E** | 1/4" VCR |
| | | **1F** | 1/4" VCO |
| | | **1G** | 1/4" NPT |
| | | **1H** | 6mm tube compression |
| | | **1J** | 10mm tube compression |
| | | **1L** | 3/8"-1/2" VCR |
| | | **1M** | 3/8"-1/2" VCO |
| | | **1P** | 1/2" tube compression |
| | | **1T** | 1/4" RC (BSP) |
| | | **1Y** | 3mm tube compression |
| | | **B1** | 1/4" tube compression w/Filter |
| | | **C1** | 1/8" tube compression w/Filter |
| | | **D1** | 3/8" tube compression w/Filter |
| | | **E1** | 1/4" VCR w/Filter |
| | | **F1** | 1/4" VCO w/Filter |
| | | **G1** | 1/4" NPT w/Filter |
| | | **H1** | 6mm tube compression w/Filter |
| | | **J1** | 10mm tube compression w/Filter |
| | | **L1** | 3/8"-1/2" VCR w/Filter |
| | | **M1** | 3/8"-1/2" VCO w/Filter |
| | | **P1** | 1/2" tube compression w/Filter |
| | | **T1** | 1/4" RC (BSP) w/Filter |
| | | **Y1** | 3mm tube compression w/Filter |
| **VI.** | Mechanical Connection (Body size 3 unless noted Size 4 only. Size 4 noted) | **2A** | Without adapters, 9/16" - 18 UNF |
| | | **2B** | 1-1/16"-12 SAE/MS |
| | | **2C** | 3/8" tube compression |
| | | **2D** | 1/2" tube compression |
| | | **2E** | 3/4" tube compression |
| | | **2F** | 1" tube compression |
| | | **2G** | 1/2" NPT (F) |
| | | **2H** | 1" NPT (F) |
| | | **2J** | 1-1/2" NPT (F) (Size 3 & 4) |
| | | **2K** | 1/2" VCO |
| | | **2L** | 3/4" VCO |
| | | **2M** | 1/2" VCR |
| | | **2N** | 1/2" RC (BSP) |
| | | **2P** | 1" RC (BSP) |
| | | **2R** | 1-5/16"-12 SAE/MS |
| | | **2S** | 1" VCO |
| | | **2T** | 3/4" VCR |
| | | **2U** | 1" VCR |
| | | **2W** | 2" NPT Size 4 only |
| | | **2X** | 12 mm tube compression |

*Model Code continued on next page.*

# Model Code (continued)

| Code Description | Code Option | Option Description | | |
|---|---|---|---|---|
| **VI.** Mechanical Connection (cont.) (Body size 3 unless noted Size 4 only. Size 4 noted) | **3A** | DIN DN15 PN40 Flange | | |
| | **3B** | DIN DN25 PN40 Flange | | |
| | **3C** | DIN DN40 PN40 Flange | | |
| | **3D** | DIN DN15 PN40 Flange | | |
| | **3E** | ANSI 1/2" 150# RF Flange | | |
| | **3F** | ANSI 1/2" 300# RF Flange | | |
| | **3G** | ANSI 1" 150# RF Flange | | |
| | **3H** | ANSI 1" 300# RF Flange | | |
| | **3J** | ANSI 1-1/2" 150# RF Flange (Size 3 & 4) | | |
| | **3K** | ANSI 1-1/2" 300# RF Flange | | |
| | **3L** | ANSI 2" 150# RF Flange (Size 4 only) | | |
| | **3N** | ANSI 3" 150# RF Flange (Size 4 only) | | |
| | **3P** | ANSI 3-1/2" 300# RF Flange (Size 4 only) | | |
| | **3Q** | ANSI 3" 600# RF Flange (Size 4 only) | | |
| | **3R** | DIN DN80 PN40 Flange (Size 4 only) | | |
| | **3S** | DIN DN80 PN64 Flange (Size 4 only) | | |
| | **3T** | DIN DN80 PN100 Flange (Size 4 only) | | |
| | **4A** | ANSI 4" 150# RF Flange (Size 4 only) | | |
| | **4B** | ANSI 4" 300# RF Flange (Size 4 only) | | |
| | **4C** | ANSI 4" 600# RF Flange (Size 4 only) | | |
| | **4D** | DIN DN100 PN16 Flange (Size 4 only) | | |
| | **4E** | DIN DN100 PN40 Flange (Size 4 only) | | |
| | **4F** | DIN DN100 PN64 Flange (Size 4 only) | | |
| | **6A** | ANSI 6" 150# RF Flange (Size 4 only) | | |
| | **6B** | ANSI 6" 300# RF Flange (Size 4 only) | | |
| | **6C** | ANSI 6" 600# RF Flange (Size 4 only) | | |
| | **6D** | DIN DN150 PN16 Flange (Size 4 only) | | |
| | **6E** | DIN DN150 PN40 Flange (Size 4 only) | | |
| | **6F** | DIN DN150 PN64 Flange (Size 4 only) | | |
| | **8A** | ANSI 8" 150# RF Flange (Size 4 only) | | |
| | **8B** | ANSI 8" 300# RF Flange (Size 4 only) | | |
| | **8C** | DIN DN200 PN10 Flange (Size 4 only) | | |
| | **8D** | DIN DN200 PN16 Flange (Size 4 only) | | |
| | **8E** | DIN DN200 PN25 Flange (Size 4 only) | | |
| | **8F** | DIN DN200 PN64 Flange (Size 4 only) | | |
| **VII.** O-ring Material | **A** | Viton | | |
| | **B** | Buna | | |
| | **C** | PTFE | | |
| | **D** | Kalrez | | |
| | **E** | EPDM (Not available in Size 4) | | |
| | **J** | FDA/USP Class VI - Viton (Not available in Size 4) | | |
| | **L** | FDA/USP Class VI - EPDM (Not available in Size 4) | | |
| **VIII.** Valve Seat | **A** | None (Sensor only) | | |
| | **B** | Viton (for body size 3, diaphragm material = PTFE) | | |
| | **C** | Buna (for body size 3, diaphragm material = PTFE) | | |
| | **D** | Kalrez (for body size 3, diaphragm material = PTFE) | | |
| | **E** | EPDM (for body size 3, diaphragm material = PTFE) (Not available in Size 4) | | |
| | **F** | PTFE | | |
| **IX.** Valve Type | **0** | None (Sensor only) | | |
| | **1** | Normally closed | | |
| | **2** | Normally closed (Pressure diff. >30 psig (2 bar)) | | |
| | **3** | Normally closed (Pressure diff.<30 psig (2 bar)) | | |
| | **4** | Normally closed - high pressure | | |
| | **5** | Normally open | | |
| **X.** Analog I/O Communications | **A** | None - Digital Communications only | | |
| | **E** | 4-20 mA | 0-5 Volt | PG11 Cable Gland |
| | **F** | 0-5 Volt | 0-5 Volt | PG11 Cable Gland |
| | **G** | 4-20 mA | 4-20 mA | PG11 Cable Gland |
| | **H** | 0-5 Volt | 4-20 mA | PG11 Cable Gland |
| | **I** | 0-5 Volt | 0-20 mA | PG11 Cable Gland |
| | **J** | 0-5 Volt | 0-5 Volt | 1/2" NPT (F) Conduit |
| | **K** | 4-20 mA | 4-20 mA | 1/2" NPT (F) Conduit |
| | **N** | 0-5 Volt | 4-20 mA | M20x1.5 Conduit |
| | **O** | 0-5 Volt | 0-20 mA | M20x1.5 Conduit |
| | **P** | 4-20 mA | 0-5 Volt | M20x1.5 Conduit |
| | **Q** | 0-20 mA | 0-5 Volt | M20x1.5 Conduit |

*Model Code continued on next page.*

## Model Code (continued)

| Code | Description | Code | Option | Option | Description |
|---|---|---|---|---|---|
| X. | Analog I/O Communications (cont.) | R | 1-5 Volt | 1-5 Volt | PG11 Cable Gland |
| | | S | 0-20 mA | 0-20 mA | PG11 Cable Gland |
| | | T | 1-5 Volt | 1-5 Volt | 1/2" NPT (F) Conduit |
| | | U | 0-20 mA | 0-20 mA | 1/2" NPT (F) Conduit |
| | | V | 0-5 Volt | 0-5 Volt | M20x1.5 Conduit |
| | | W | 1-5 Volt | 1-5 Volt | M20x1.5 Conduit |
| | | X | 0-20 mA | 0-20 mA | M20x1.5 Conduit |
| | | Y | 4-20 mA | 4-20 mA | M20x1.5 Conduit |
| | | Z | 0-20 mA | 0-5 Volt | PG11 Cable Gland |
| | | 5 | 0-5 Volt | 4-20 mA | 1/2" NPT (F) Conduit |
| | | 6 | 0-5 Volt | 0-20 mA | 1/2" NPT (F) Conduit |
| | | 7 | 4-20 mA | 0-5 Volt | 1/2" NPT (F) Conduit |
| | | 8 | 0-20 mA | 0-5 Volt | 1/2" NPT (F) Conduit |
| XI. | Power Supply Inputs | 1 | ±15 Vdc | | |
| | | 2 | 24 Vdc | | |
| XII. | Output Enhancements | A | Standard response | | |
| XIII. | Certification | 1 | Safe Area | | |
| | | 2 | For Zone 2 Atex | | |
| | | 3 | Div. 2 / Zone 2 UL Listed | | |
| | | 4 | Div. 2 / Zone 2 UL Recognized | | |
| | | 5 | Zone 2 IECEx | | |
| | | 6 | KOSHA | | |

**Sample Standard Model Code**

| I | II | III | IV | V | VI | VII | VIII | IX | X | XI | XII | XIII |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SLA | MF | 4 | 0 | S | 1A | A | B | 1 | E | 1 | A | 1 |

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### START-UP SERVICE AND IN-SITU CALIBRATION

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