

Junction Module (JM™) Enclosure with:



FOUNDATION Fieldbus Input/Output Module (JMM93____)

These I/O Modules are designed to function as FOUNDATION Fieldbus nodes with termination points for connecting switches/sensors, as well as outputs to operate ultra low power (Piezo) devices such as solenoid valves and relays.

Inputs and Outputs

- Two (2) Discrete Inputs
- Two (2) Discrete Outputs

Features

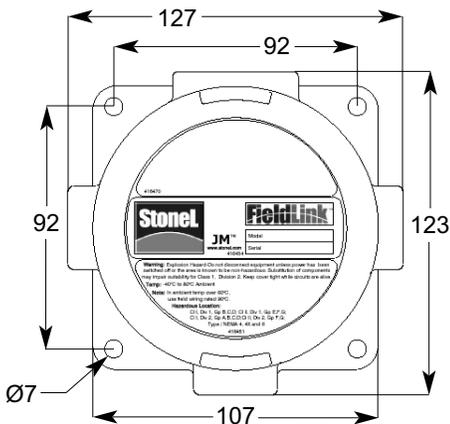
- LED input displays for Inputs 1 & 2
- Date of Last Service
- Pre-determined output Fail State



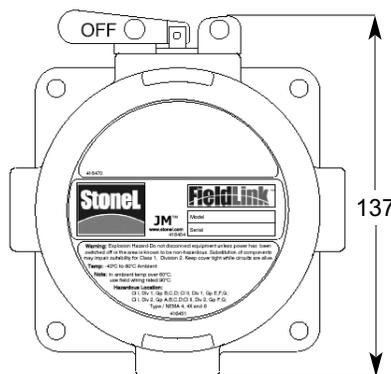
(See Page 4 detailed wiring instructions)

JM Enclosure Dimensions (in mm)

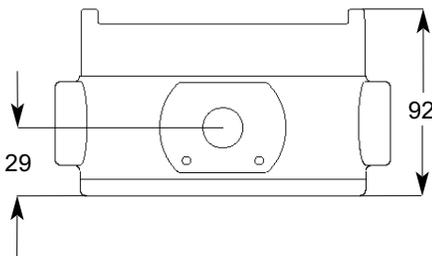
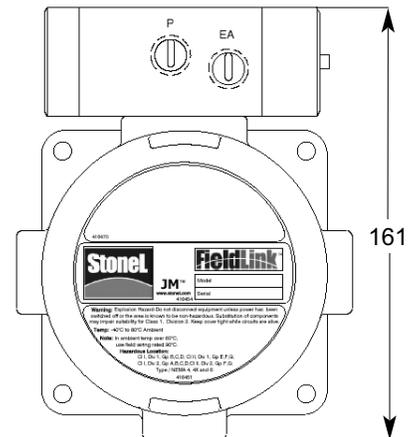
Standard Enclosure



Switched Enclosure



Enclosure w/Cyclone Valve



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Example: JMM933GE3

JM	M93	Function	Solenoid				Enclosure	Conduit Entries
		I/O Module (2 DI/2 DO), F/Fieldbus (H1) (only w/ Solenoid 11,3A,3G)	11 No Solenoid					C Clear Cover E Epoxy Coated Aluminum
			Pilot	Type	Brass	SS		
			1-Solenoid	2-Postn,5-Way	2H	2B		
			1-IS Piezo	2-Postn,5-Way	3G	3A		
			2-Solenoids	2-Postn,5-Way	2L	2E		

General Specifications

Operating Life	Unlimited	Temperature Range	-40° to +80° C (-40° to 176° F)
Materials of Construction		Enclosure Protection	NEMA 4, 4X & 6; IP67
Housing and Cover	Marine grade anodized aluminum epoxy coating	Hazardous Area Ratings	
Clear Cover	Lexan® Polycarbonate	Intrinsic Safety (FISCO)	Class I, Div. 1 and 2, Groups A,B,C,D Class II, Div. 1 and 2, Groups E,F,G
Elastomer Seals	Buna-N	Explosion Proof (Aluminum Cover)	Class I, Div. 1 and 2, Groups B,C,D Class II, Div. 1 and 2, Groups E,F,G
Fasteners	Stainless Steel	Non-incendive (Clear Cover)	Class I, Div. 2, Groups A,B,C,D Class II, Div. 2, Groups E,F,G
Warranty			(Not all units carry approvals, consult factory)
Complete Assemblies	Two Years		

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Mounting Instructions

Mounting The JM Enclosure

1. Locate the position where the JM enclosure will be mounted. Ensure that there is sufficient room to operate the disconnect switch levers and to remove the cover.
2. Attach the JM enclosure to a wall or other stationary flat surface using the mounting holes provided.
3. Secure the cover until hand tight

Attaching Conduit and Fittings

1. Conduit entries are provided for the convenient attachment of threaded conduit and threaded conduit fittings. Attach threaded fittings and conduits securely.
2. Follow all applicable NEC codes and other regulations.

Installing & Removing Cover

1. To insure NEMA 4, 4X, 6 and hazardous location ratings are maintained the cover **must be** completely closed and the O-Ring sealed to keep out water.

Specifications

Communication Protocol:	Foundation Fieldbus (H1)
Configuration:	(2) Discrete Inputs for low power dry contact switches capable of operating at <.045mA @ 6.5VDC or solid state PNP capable of operating at <1mA @ 6.5 VDC (2) Discrete Outputs for bus powered discrete devices that operate at ultra low power such as Piezo solenoid valves and relays. Limited to 2.0mA @ 6.5 VDC
Function Blocks	2 DI; 2 DO
Indication	Input 1 = Red LED Input 2 = Green LED
Voltage:	9-32 VDC (Bus Voltage)
Output Voltage:	6.5 VDC
Max. Output Current:	2.0mA @ 6.5 VDC
Current Draw:	16mA

Standard Channel Assignments

Channel 1 (DI1) - Discrete Input 1 (Red LED);	1 = True; 0 = False
Channel 2 (DI2) - Discrete Input 2 (Green LED);	1 = True; 0 = False
Channel 3 (DO1) - Discrete Output 1 (OUT 1);	1 = True; 0 = False
Channel 4 (DO2) - Discrete Output 2 (OUT 2);	1 = True; 0 = False

Special Channel Assignments

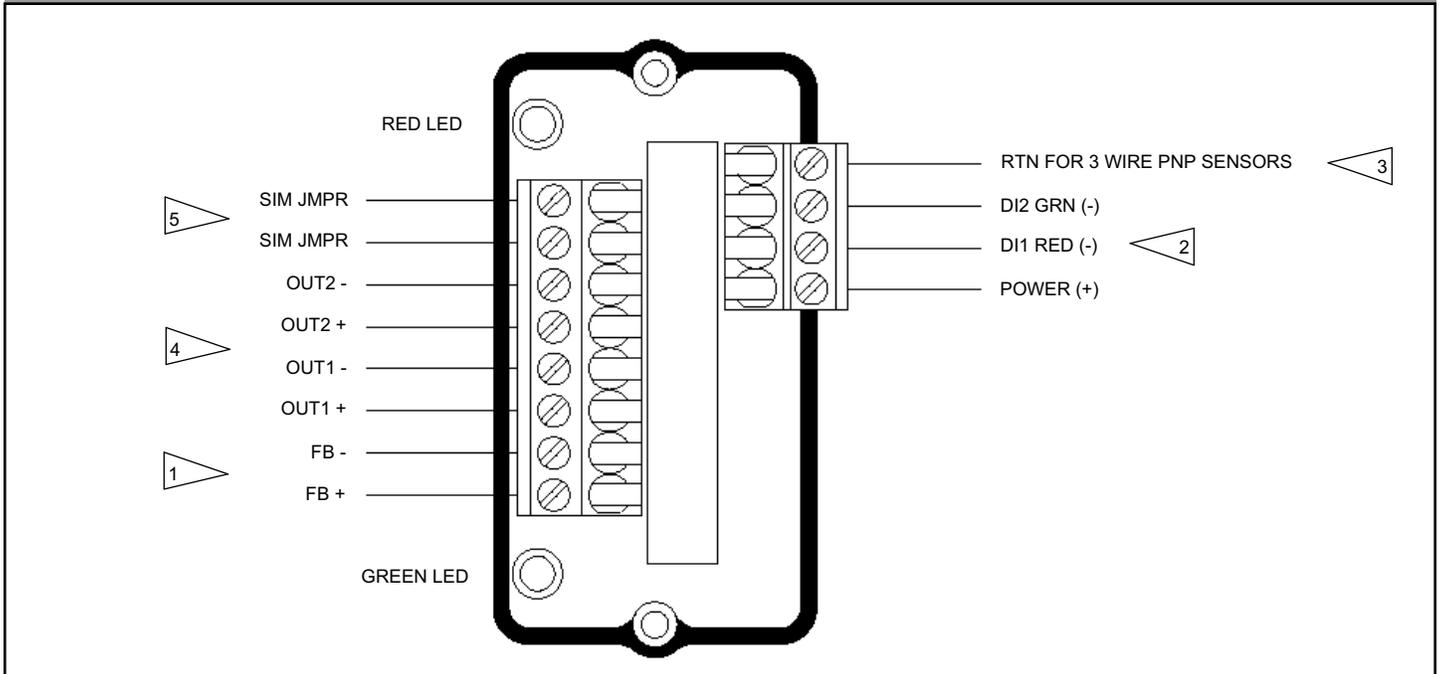
Channel 8 (DO1) - Discrete Output 1 (OUT 1) with state report from Discrete Input 1 (READBACK_D)
 Channel 9 (DO2) - Discrete Output 2 (OUT 2) with state report from Discrete Input 2 (READBACK_D)

Valve Control Single Block Mode

Channel 10 (DO1) - Discrete Output 1 (OUT 1) with state report Discrete Inputs 1&2 (READBACK_D):

READBACK_D Values:

- 0 = None
- 1 = Discrete Input 1 is True
- 2 = Discrete Input 2 is True
- 3 = Both Discrete Inputs 1&2 are True



WIRING NOTES:

- 1. FOUNDATION Fieldbus bus communications connection points.
 - 2. Bus powered Discrete Input connection points for low power dry contacts capable of operating at <math><.045\text{mA}</math> @ 6.5VDC or solid state PNP sensors capable of operating at <math><1\text{mA}</math> and 6.5VDC. Red LED is local indication of discrete input DI1 RED on/off status and the Green LED for DI2 GRN on/off status.
- NOTE: The Discrete Inputs (DI) are not galvanically isolated from the FOUNDATION signal wires. Therefore, the DI connections should not be attached to ground. If the cable runs to the DI's are long or can be exposed to electrical noise, external Opto-isolators on the DI wires may be needed to provide isolation.**
- 3. Connection point for the "return" of 3 wire PNP sensors. (See Note 2)
 - 4. Bus powered discrete outputs to operate ultra low power (Piezo) devices such solenoid valves and relays. Limited to 2.0mA @ 6.5 VDC. For models with single coil pneumatic valves, coil is pre-wired to Output 1 (Channel 3). For models with dual coil pneumatic valves, coil one is pre-wired to Output 1 (Channel 3) and coil two is pre-wired to Output 2 (Channel 4).
 - 5. These connection points not used by the consumer.

(See pages 6&7 for Intrinsically Safe (FISCO) installations)

The Cyclone Pneumatic Valve is a pilot operated 5-way spring return which may be used for single and double-acting actuators. It features a direct-acting solenoid with manual override for the pilot. The porting is sized to tolerate contaminant's up to 40 microns in size which may be found in conventional pneumatic systems.

The Cyclone Pneumatic Valve is O-ring sealed on the Junction Module (JM) enclosure to maintain it's temporary submergibility rating.

24 VDC Pilot

Power	1.8 Watts
Current draw	75 mA @24VDC
Temperature	-18°C to +50°C
Filtration Requirements	40 Microns
Pressure Range	25 to 120 PSI
Cv	0.75 (10.7 Kv)

Piezo Pilot

Current draw	2mA @6.5VDC
Temperature	-10°C to +60°C
Filtration Requirements	30 Microns
Pressure Range	25 to 120 PSI
Cv	0.75 (10.7 Kv)

Porting	1/4" NPT
Valve Body Material	360 brass or 303 Stainless
Operating Life	1 million cycles

Manual Overrides:

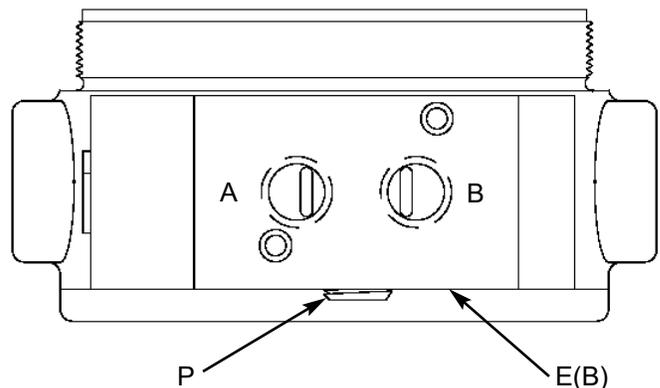
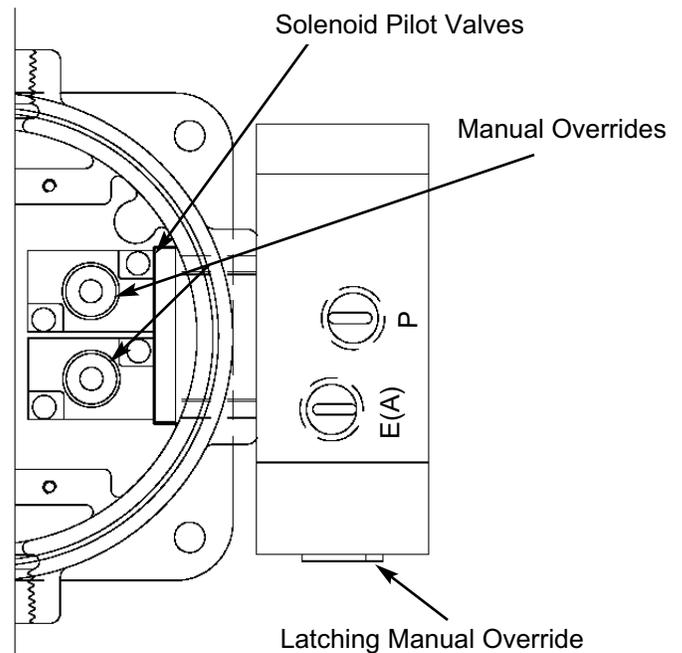
One internal momentary and One external locking.

Variable Speed Adjustment: Each cylinder port is internally ported to a unique exhaust port (EA for exhaust of port A and EB for exhaust of port B). To vary actuator speed flow restrictors may be added to EA or EB to reduce exhaust flow and actuator speed in either direction.

Single-Acting Vent to Atmosphere or Refresh:

Exhaust (EA or EB) and secondary ports (A or B) may be blocked for single-acting operation with the actuator venting directly to atmosphere. Alternatively, the secondary port may be plumbed to the actuator supplying air to the spring side of the actuator and preventing it from ingesting atmospheric contaminant's.

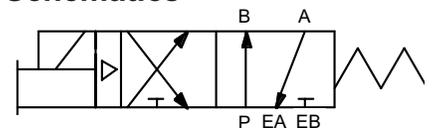
Pneumatic Porting



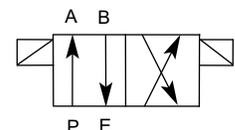
- P - Pressure Port (1/4 " NPT)
- A - Cylinder Port (1/4" NPT)
- B - Cylinder Port (1/4" NPT)
- E(A) - Exhaust for Cylinder Port A (1/4" NPT)
- E(B) - Exhaust for Cylinder Port B (1/4" NPT)

Schematics

Single Coil: 5 way with Pneumatic pilot



Dual Coil: Shuttle Piston with 2 Pneumatic pilots (2 Position Valve with position detente)



FISCO Concept

The FISCO Concept allows the interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criterion for such interconnection is that voltage (V_{max}), the current (I_{max}), and the power (P_i), which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal to or greater than the voltage (U_o , V_{oc} , V_t), the current (I_o , I_{sc} , I_t), and the power (P_o) which can be provided by the associated apparatus (supply unit). In addition, the maximum unprotected residual capacitance (C_i) and inductance (L_i) of each apparatus (other than the terminators) connected to the Fieldbus must be less than or equal to 5nF and 10 μ H respectively.

In each I.S. Fieldbus segment only one active source, normally the associated apparatus, is allowed to provide the necessary power for the Fieldbus system. The allowed voltage (U_o , V_{oc} , V_t) of the associated apparatus used to supply the bus must be limited to the range of 14V d.c. to 24V d.c. All other equipment connected to the bus cable has to be passive, meaning that the apparatus is not allowed to provide energy to the system, except to a leakage current of 50 μ A for each connected device. Separately powered equipment needs a galvanic isolation to insure that the intrinsically safe Fieldbus circuit remains passive.

The cable used to interconnect the devices must comply with the following parameters:

Loop resistance R' : 15 - 150 ohm/KM

Inductance per unit length L' : 0.4 - 1mH/KM

Capacitance per unit length C' : 80 - 200nF/KM

$C' = C'$ line to line + $\frac{1}{2} C'$ line to shield, if both lines are floating with respect to shield

or

$C' = C'$ line to line + C' line to shield, if one line is connected to shield

Trunk Length: \leq 1000 meters

Spur Length: \leq 30 meters

Splice Length: \leq 1 meters

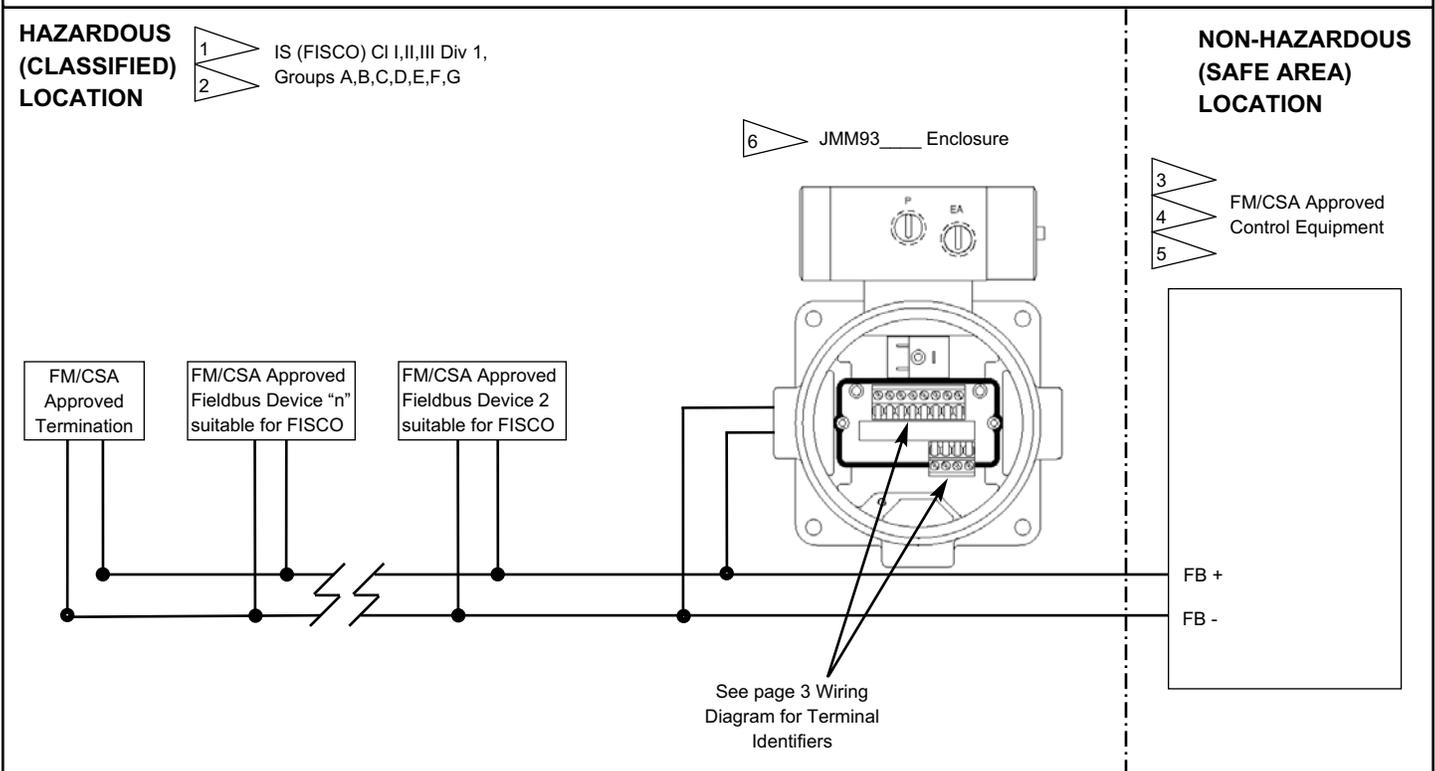
FM Approved line terminators must be used on each end of the trunk cable that have the following parameters:

$R = 90 - 100$ ohms

$C = 0.0 - 2.2\mu$ F

(See Page 7 for Installation Diagram and Notes)

JMM93___ Intrinsically Safe (FISCO) installation:



INSTALLATION NOTES:

JMM93___ Entity Parameters (FISCO):

U_i (V_{max}) = 30 Vdc; I_i (I_{max}) = 380 mA ; C_i = 0.0 nF; L_i = 0.0 mH; P_i = 5.32 W

1. Installation shall be in accordance with ANSI/ISA RPA12.6.01, ANSI/NFPA 70, and the National Electrical Code or in accordance with the Canadian Electric Code.
2. Dust-tight conduit seal must be used when installed in Class II and Class III environments or where Ingress Protection of IP67 is required.
3. Control equipment must be FM or CSA Approved Associated Apparatus suitable for FISCO.
4. Control equipment connected to FISCO barrier must not use or generate more than 250Vrms or Vdc.
5. Resistance between FISCO Intrinsically Safe Ground and earth ground must be less than 1.0 Ohm.
6. Devices connected to the Discrete Inputs and Discrete Outputs must be suitable for FISCO. (Optional solenoid valve with piezo electric coil is suitable for FISCO).
7. Substitution of components may impair hazardous location safety.
8. Approval Agency controlled Installation Diagram. No revision to diagram allowed without prior Factory Mutual or Approval Agency authority.