ROSS®

Flu-Tech
Fluid Control Specialists

บริษัท ฟลูเทค จำกัด
Flu-tech co.,ltd

Safe Exhaust
Double Valves DM²® Series C

Product Catalog

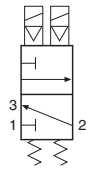
ROSS™
a global family

Safe Exhaust Control Reliable Double Valves DM²® Series C
Product Overview

Safe Exhaust Safety Function

The DM²® Series C valve safety function is to shut off supply or pneumatic energy and to exhaust any pneumatic energy from downstream of the valve.

Simplified Schematic



The DM²® Series C Safe Exhaust valves are dual valves used to block the supply and remove the downstream pressure from the circuit or machine. It is integrated into the electrical safety system to remove potentially hazardous energy in order to provide employees safe access to a machine or zone. By quickly removing the pneumatic energy with a safety valve, determined by the risk assessment, the safety system integrity is maintained allowing the employee to complete their tasks and safely and rapidly.

VALVE FEATURES	
Redundant Control	Redundant control can achieve Category 4, PL e, when used with proper safety controls
Dynamic Monitoring	Monitoring, and air flow control functions are simply integrated into two identical valve elements
Dynamic Memory	Asynchronous movement of valve elements is detected by the dynamic monitoring and the valve latches in the safe condition, resulting in a residual outlet pressure of less than 1% of supply
Valve Reset	Can only be accomplished by the integrated electrical (solenoid) reset; the valve cannot be reset by removing and re-applying supply pressure
Poppet Design	Dirt tolerant, wear compensating for quick response and high flow capacity
PTFE Backup Piston Rings	Enhances valve endurance enabling operation with or without in-line lubrication
Status Indicator	Includes a pressure switch with both normally open (NO) and normally closed (NC) contacts to provide status feedback to the control system indicating whether the valve is in the lockout or ready-to-run condition
Silencer	High flow, clog resistant silencer included
Mounting	Base mounted for ease of valve replacement, captive valve-to-base mounting screws
Flexible Piping	Inlet and outlet ports on both sides (plugs for unused ports included)
Intermediate Pilots (Basic Size 12 and 30 valves only)	Increases pilot air flow for fast valve response, making it possible to use the same size solenoids as valve sizes 2, 4 & 8, thereby reducing electrical power requirements for these larger valves
SISTEMA Library	Available for download at rosscontrols.com

These valves are not designed for controlling clutch/brake mechanisms on mechanical power presses, see DM²® Series D double valves for mechanical power press applications.

Specifications

STANDARD SPECIFICATIONS

GENERAL	Function		Safe Exhaust		
	Construction Design		3/2 Normally Closed Valve; Dual Poppet		
	Actuation		Electrical		
	Mounting	Type	Base		
		Orientation	Vertically with pilot solenoids on top		
	Connection		Threaded; G, NPT		
	Monitoring		Dynamically, cyclically, internally during each actuating and de-actuating movement Monitoring function has memory and requires an overt act to reset unit after lockout		
	Minimum Operation Frequency		Once per month, to ensure proper function		
OPERATING CONDITIONS	Temperature	Ambient	15° to 122°F (-10° to 50°C)		
		Media	40° to 175°F (4° to 80°C)		
	Flow Media		Filtered, lubricated or unlubricated (mineral oils according to DIN 51519, viscosity classes 32-46)		
	Operating Pressure		Valve Basic Size	2	45 to 150 psig (3.1 to 10.3 bar)
				4, 8, 12, 30	30 to 120 psig (2.1 to 8.3 bar)
ELECTRICAL DATA ELECTRICAL DATA	Solenoids		According to VDE 0580. Enclosure rating according to DIN 400 50 IP 65 Three solenoids, rated for continuous duty		
	Operating Voltage		24 volts DC 110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz 230 volts AC 50/60 Hz		
	Power Consumption (each solenoid)	Primary Solenoids	Valve Basic Size	2, 4, 12, 30	24 V DC, 110/120 V AC, 230 V AC – 5.8 watts nominal, 6.5 watts maximum
				8	24 V DC – 15 watts 110/120 V AC – 36 VA inrush and 24.6 VA holding 230 V AC – 32 VA inrush and 22 VA holding
		Reset Solenoids	All Valve Basic Size		24 V DC, 110/120 V AC, 230 V AC – 5.8 watts nominal, 6.5 watts maximum
	Enclosure Rating		IP65, IEC 60529		
	Electrical Connection		DIN EN 175301-803 Form A, or M12		
	Mechanical Pressure Switch (Status Indicator) Rating		NO/NC Contacts - 0.1 A, 125/250 volts AC; 0.1 A, 30 volts DC; 0.3 A, 60 volts DC		
	Solid State Pressure Sensor (Status Indicator) Rating		Supply Voltage - 8-30 volts DC Current Consumption <4mA		
CONSTRUCTION MATERIAL	Valve Body		Cast Aluminum		
	Poppet		Acetal and Stainless Steel		
	Seals		Buna-N		
SAFETY DATA	Functional Safety Data		Category	CAT 4, PL e	
			B_{10D}	20,000,000	
			PFH_D	$7.71x10^{-9}$	
			$MTTF_D$	301.9 (n_{op}: 662400)	
	Vibration/Impact Resistance		Tested to DIN EN 60068-2-6		

IMPORTANT NOTE: Please read carefully and thoroughly all of the CAUTIONS, WARNINGS on the inside back cover.

PRODUCT CREDENTIALS

Safety Category	DGUV (German Social Accident Insurance)	CE Conformity Declaration	EAC Conformity Declaration	ISO Standard	CSA Certificate of Compliance	CRN Certification
Cat. 4 PL e / SIL 3 Functional Safety	HSM 06008 Sicherheit geprüft tested safety	CE	EAC	ISO 13849-1:2015	C SP US	Available for appropriately tested valves

Ordering Information

MODEL NUMBER CONFIGURATOR

3-Way 2-Position Valves

DM2C	D	B21	A	2	1	
Series	Thread			Reset Type		

Thread

G	D
NPT	N

Reset Type

Solenoid

Basic Size	Port Size			
	Inlet	Outlet	Exhaust	
2	1/4	1/4	3/4	B20
	3/8	3/8	3/4	B21
4	1/2	1/2	1	B42
8	3/4	3/4	1	A54
	1	1	1	A55
12	1	1	1-1/2	A66
30	1-1/2	2	2-1/2	A88

Voltage*

24 volts DC	A
110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz	B
230 volts AC, 50/60 Hz	C**

* For other voltages consult ROSS.
** 230 V AC not available in the U.S. (OSHA regulations limit control voltage to no more than 120 volts AC).

Other Options*

Connector	Description		
DIN EN 175301-803 Form A	Solenoids	Connector not included	Leave Blank
	Solenoid Reset		
	Mechanical Pressure Switch**	DIN EN Connector included	
M12 (24 V DC only)	Solid State Pressure Sensor**	M12 Built-in Connector included	
M12 (24 V DC only)	Solenoids	Adapter DIN EN to M12 Connector included	005
	Solenoid Reset		
	Mechanical Pressure Switch**		
	Solid State Pressure Sensor**	M12 Built-in Connector included	

*See options for connectors or wiring kits.
**If the specific status indicator option is selected.

Status Indicator

Mechanical Pressure Switch, DIN EN 175301-803 Form A	1
Solid State Pressure Sensor, M12	2
None	X

Basic Size	Port Size			Flow C_v		Weight# lb (Kg)
	1	2	3	1-2	2-3	
2	1/4	1/4	3/4	1.7	2.6	5.3 (2.4)
	3/8	3/8	3/4	2.2	3.6	
4	1/2	1/2	1	3.0	6.5	5.9 (2.6)
8	3/4	3/4	1	4.2	9.4	8.4 (3.7)
	1	1	1	4.3	9.4	
12	1	1	1-1/2	8.7	17	15.3 (3.7)
30	1-1/2	2	2-1/2	20	55	34.7 (15.1)

Valve and base assembly with status indicator.

Safety Solutions Options

Safe Air Entry System Assemblies with DM²® Series C Double Valves

Air Entry System Assemblies with manual Lockout L-O-X® valve, air preparation FRL combinations, and Safe Exhaust Double Valves are available.

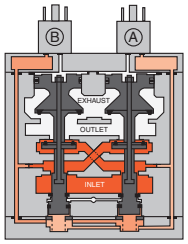
For information please visit www.rosscontrols.com.

These valves are not designed for controlling clutch/brake mechanisms on mechanical power presses, see DM²® Series D double valves for mechanical power press applications.

Valve Operation

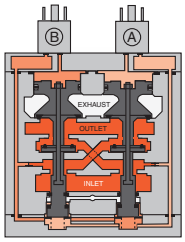
Valve De-actuated (ready-to-run)

The flow of inlet air pressure into the crossover passages is restricted by the size of the passage between the stem and the valve body opening. Flow is sufficient to quickly pressurize pilot supply/timing chambers A and B. The inlet poppets prevent air flow from crossover passages into the outlet chamber. Air pressure acting on the inlet poppets and return pistons securely hold the valve elements in the closed position. (Air passages shown out of position and reset adapter omitted for clarity.)



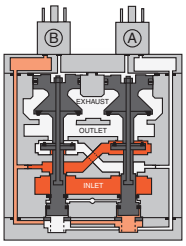
Valve Actuated

Energizing the pilot valves simultaneously applies pressure to both pistons, forcing the internal parts to move to their actuated (open) position, where inlet air flow to crossover passages is fully open, inlet poppets are fully open and exhaust poppets are fully closed. The outlet is then quickly pressurized, and pressure in the inlet, crossovers, outlet, and timing chambers are quickly equalized. De-energizing the pilots quickly causes the valve elements to return to the ready-to-run position.



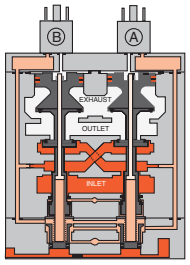
Valve Locked-out

Whenever the valve elements operate in a sufficiently asynchronous manner, either on actuation or de-actuation, the valve will move to a locked-out position. In the locked-out position, one crossover and its related timing chamber will be exhausted, and the other crossover and its related timing chamber will be fully pressurized.
The valve element (side B) that is partially actuated has pilot air available to fully actuate it, but no air pressure on the return piston to fully de-actuate the valve element. Air pressure in the crossover acts on the differential of side B stem diameters creating a latching force. Side A is in a fully closed position, and has no pilot air available to actuate, but has full pressure on the inlet poppet and return piston to hold the element in the fully closed position. Inlet air flow on side A into its crossover is restricted, and flows through the open inlet poppet on side B, through the outlet into the exhaust port, and from the exhaust port to atmosphere. Residual pressure in the outlet is less than 1% of inlet pressure. The return springs are limited in travel, and can only return the valve elements to the intermediate (locked-out) position. Sufficient air pressure acting on the return pistons is needed to return the valve elements to a fully closed position.



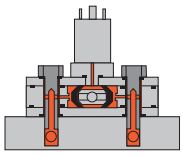
Resetting the Valve

The valve will remain in the locked-out position, even if the inlet air supply is removed and re-applied.
A remote reset signal must be applied to reset the valve. Reset is accomplished by momentarily pressurizing the reset port. Actuation of the reset piston physically pushes the main valve elements to their closed position. Inlet air fully pressurizes the crossovers and holds the inlet poppets on seat. Actuation of the reset piston opens the reset poppet, thereby, immediately exhausting pilot supply air, thus, preventing valve operation during reset (Reset adapter added to illustration.). De-actuation of reset pistons causes the reset poppets to close and pilot supply to fully pressurize. Reset pressure can be applied by a remote 3/2 normally closed valve, or from an optional 3/2 normally closed solenoid mounted on the reset adapter. De-actuation of reset pistons causes the reset poppets to close and pilot supply to fully pressurize. Reset air pressure can be applied by a remote 3/2 normally closed valve, or from an optional 3/2 normally closed solenoid, or a manual push button mounted on the reset adapter.



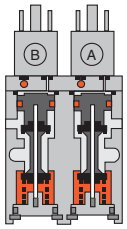
Status Indicator

The status indicator pressure switch will actuate when the main valve is operating normally, and will de-actuate when the main valve is in the locked-out position or inlet pressure is removed. This device is not part of the valve lockout function, but, rather, only reports the status of the main valve.



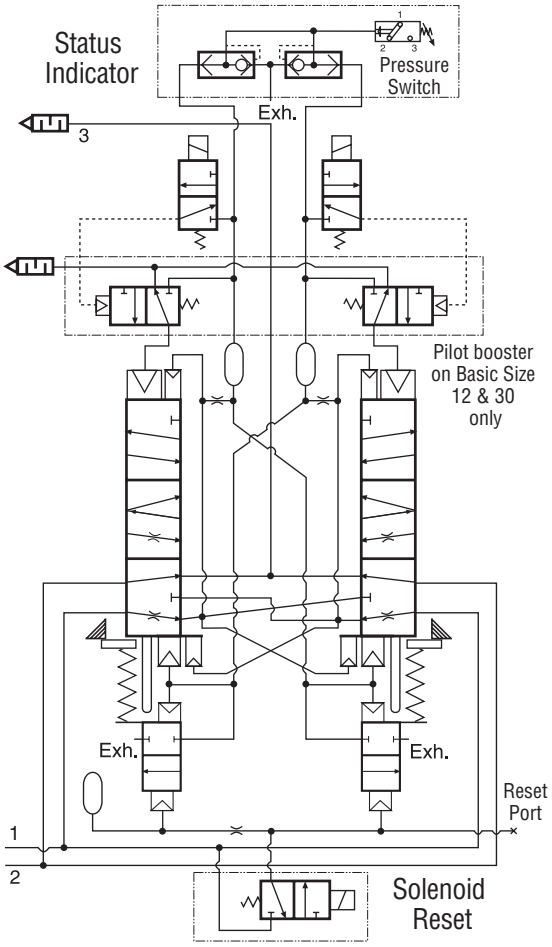
Status Indicator in normal ready-to-run position

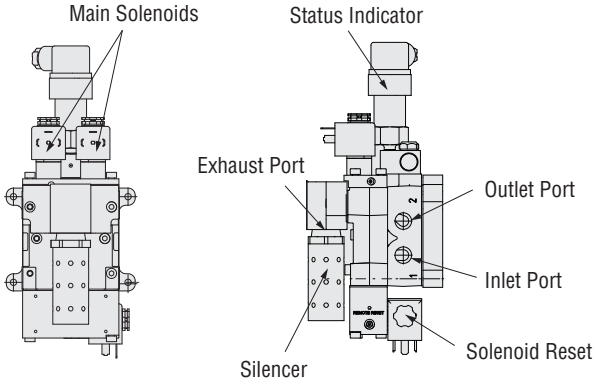
Basic Size 12 and 30 valves require relatively large pilots to actuate and de-actuate the main valve elements. In order to achieve extremely quick valve response for such large pilots, a 2-stage solenoid pilot system is incorporated into the design. This keeps the required electrical current to operate the pilots to a minimum.



Valve Basic Size 12 & 30 Pilots

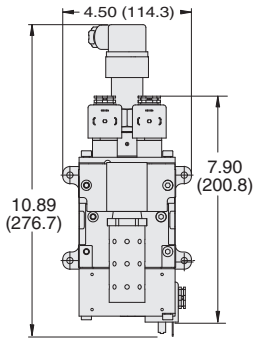
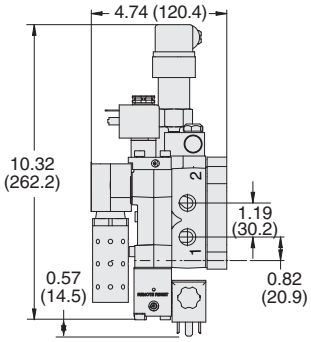
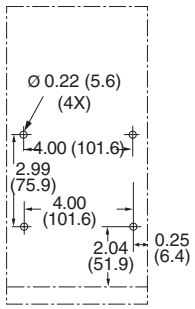
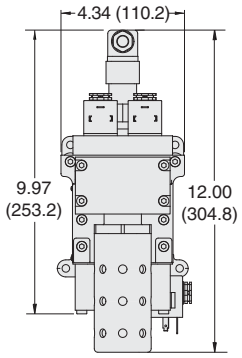
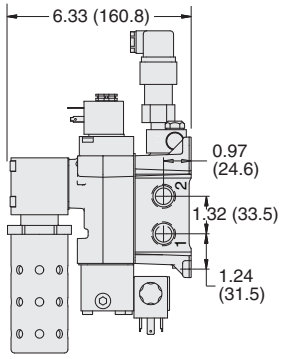
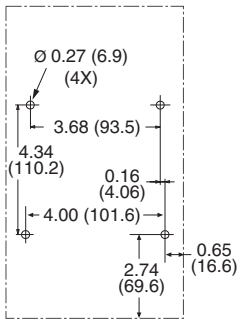
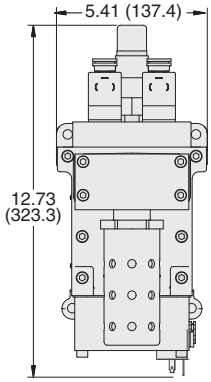
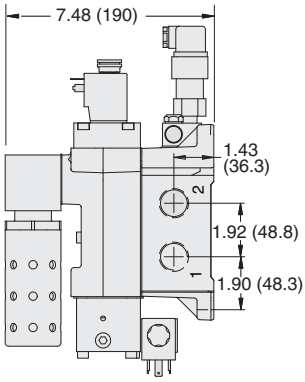
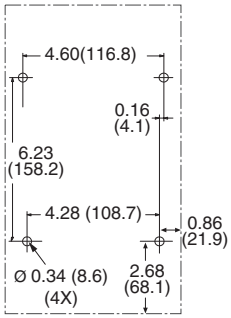
Valve Schematic





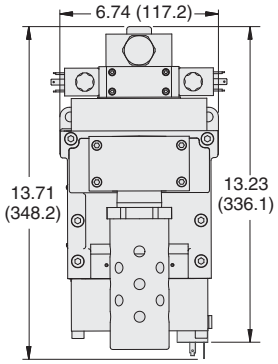
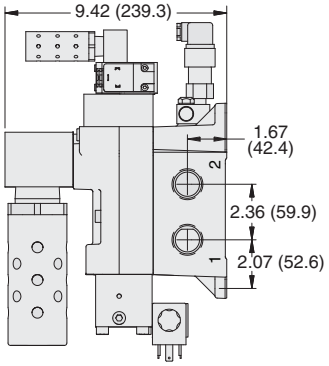
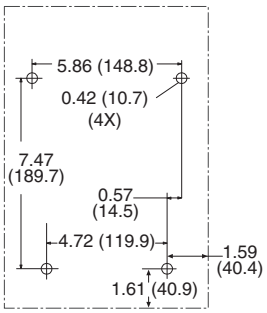
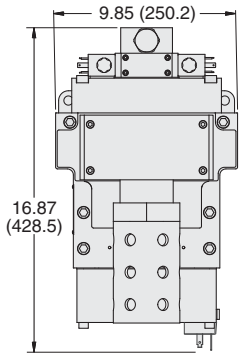
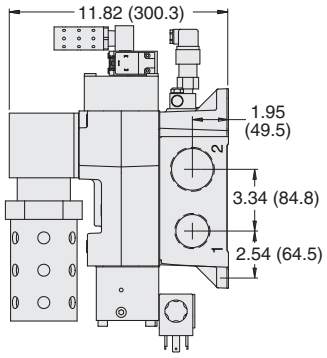
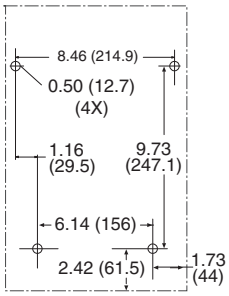
DIMENSIONS

Inches (mm)

Basic Size	Port Size			View X (base mounting hole pattern)
2	1/4 3/8			
4	1/2			
8	3/4 1			

For additional information, and to assist you with piping and connectivity designs, our products are available in downloadable 2D drawings and 3D CAD models in a wide range of options including native formats, visit www.rosscontrols.com.

Valve Technical Data

DIMENSIONS				Inches (mm)
Basic Size	**Port Size**			**View X (base mounting hole pattern)**
12	**1**			
30	**2**			

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PRESSURE STATUS INDICATION

Pressure Switches for Status Indicator

Indicator Type	Connector Type	Model Number	Port Thread	Factory Preset psi (bar)
Mechanical Pressure Switch	DIN EN 175301-803 Form A	1104A30	M10x1	22 (1.5) falling
	M12	1153A30		
Solid State Pressure Sensor	M12	1335B30W	M10x1	17 (1.2) falling

Status Indicator Assemblies

Indicator Type	Connector Type	Model Number	Factory Preset psi (bar)
Mechanical Pressure Switch	DIN EN 175301-803 Form A	Y670B94	22 (1.5) falling
Solid State Pressure Sensor	M12	Y766B94#	17 (1.2) falling

Not compatible with Size 4 valves manufactured before 3/2021, e.g., DM2CDA4***or DM2CNA4***. For Size 4 valves manufactured before 3/2021, use part number Y670B94.

ENERGY RELEASE VERIFICATION

Pressure Switches

Verification Type	Installation Location	Connector Type	Model Number	Factory Preset psi (bar)	Port Thread
Electrical	Downstream	DIN EN 175301-803 Form A	586A86	5 (0.3) falling	1/8 NPT

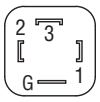
Redundant Pressure Switch Assembly

Verification Type	Installation Location	Connector Type	Model Number	Factory Preset psi (bar)	Port Size
Electrical (Dual)	Downstream	DIN EN 175301-803 Form A	RC026-13	5 (0.3) falling	3/8 NPT

Connectors Pinout

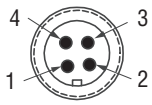
Mechanical Pressure Switch

DIN EN 175301-803 Form A



1 - Common
2 - Normally Closed
3 - Normally Open
G - Ground

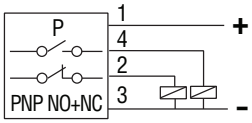
M12



1 - Common
2 - Normally Closed
3 - Not Used
4 - Normally Open

Solid State Pressure Sensor

M12



1, 2, 3, 4 - Pin
PNP - Switched Positive
NO - Normally Open
NC - Normally Closed

Accessories & Options

ELECTRICAL CONNECTORS

Pre-wired Connector Kits

Connection Type	Connector Type	Cable		Length meters (feet)	Quantity	Kit Number			
		End 1	End 2			Without Light	Lighted Connector		
							24 V DC	120 V AC	230 V AC
Solenoid and Status Indicator	DIN EN 175301-803 Form A	Connector	Flying leads	5 (16.4)	4	2283H77	2532H77-W	2532H77-Z	2532H77-Y
				10 (32.8)	4	2284H77	2533H77-W	2533H77-Z	2533H77-Y
	M12 5-pin, Female	Connector	Flying leads	5 (16.4)	4	2288H77	–	–	–
				10 (32.8)	4	2289H77	–	–	–

Pre-wired Connectors

Connection Type	Connector Type	Cable		Length meters (feet)	Quantity	Cable Diameter	Model Number			
		End 1	End 2				Without Light	Lighted Connector		
								24 V DC	120 V AC	230 V AC
Solenoid	DIN EN 175301-803 Form A	Connector	Flying leads	2 (6.5)	1	6-mm	721K77	720K77-W	720K77-Z	720K77-Y
					1	10-mm	371K77	383K77-W	383K77-Z	383K77-Y
Status Indicator	M12 5-pin, Female	Connector	Flying leads	5 (16.4)	1	6-mm	2241H77	–	–	–
				10 (32.8)	1	6-mm	2242H77	–	–	–

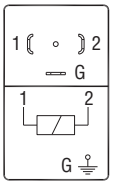
Connectors (no cable)

Connection Type	Connector Type	Fitting Connection	Quantity	Model Number			
				Without Light	Lighted Connector		
					24 V DC	120 V AC	230 V AC
Solenoid	DIN EN 175301-803 Form A	Cable grip	1	937K87	936K87-W	936K87-Z	936K87-Y
		1/2" NPT conduit	1	723K77	724K77-W	724K77-Z	724K77-Y

Connectors Pinout

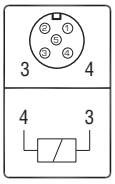
Solenoid

DIN EN 175301-803 Form A



1 - Black
2 - Black
G - Green/Yellow (Ground)

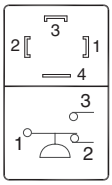
M12



3 - Blue
4 - Black

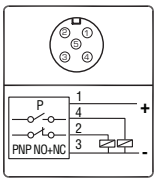
Status Indicator

DIN EN 175301-803 Form A



1 - Brown
2 - Grey
3 - Black
4 - Green/Yellow (Ground)

M12



1, 2, 3, 4 - Pin
PNP - Switched Positive
NO - Normally Open
NC - Normally Closed

JUNCTION BOX OPTIONS

Wiring Kits with J-Box

J-Box			Cable Connector Type		Length meters (feet)	Cable Quantity	Kit Number
Connection Type		J-Box Quantity					
Control System	Solenoids / Status Indicator		End 1	End 2			
10-pin Mini	M12 (5-pin)	1	M12	DIN EN 175301-803 Form A	1.0 (3.3)	4	2249H77
		1	M12	M12	1.0 (3.3)	4	2250H77

10-Pin MINI Cables

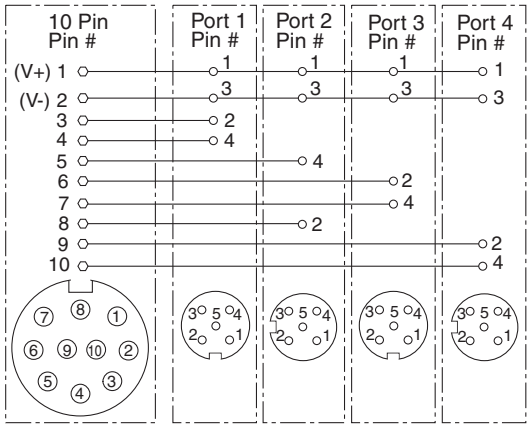
Connection Type	Cable Connector Type			Length meters (feet)	Cable Quantity	Kit Number
	End 1	End 2	Cable Conductors			
J-Box to Control System	10-pin Mini	Flying leads	18-gauge wire	3.7 (12)	1	2253H77
				6.1 (20)	1	2254H77
				9.1 (30)	1	2255H77
				15.2 (50)	1	2256H77

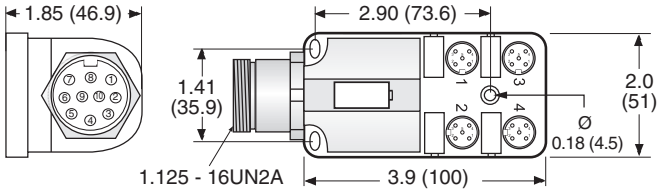
Outlet Port Pressure Monitoring Wiring Kit

Port Splitter			Cable Connector Type		Length meters (feet)	Cable Quantity	Kit Number
Port Connectors	Number of Ports	Splitter Quantity	End 1	End 2			
M12	3	1	M12	DIN EN 175301-803 Form A	1.0 (3.3)	1	2251H77

Connectors Pinout and Wiring Diagram

J-Box Wiring

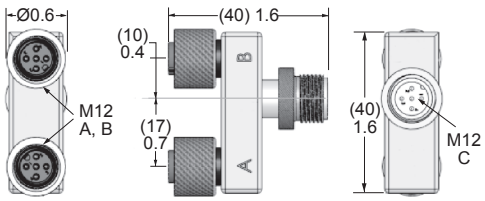


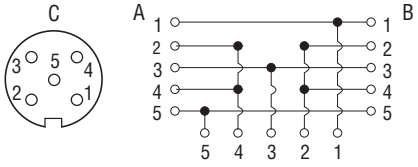


10-Pin MINI Cable

PIN #	Wire Colors	PIN #	Wire Colors
1 +24 V DC	Orange	6 -	Orange w/Black
2 Common V DC	Blue	7 Remote Reset	Red
3 -	White w/Black	8 -	Green/Yellow
4 Solenoid A	Red w/Black	9 Remote Valve Fault Light	Black
5 Solenoid B	Green w/Black	10 Remote System OK Light	White

Outlet Port Pressure Monitoring – Port Splitter





A & B Female
C Male

Options

NOISE REDUCTION SILENCERS

High Flow Noise Reduction Silencer Kits

Valve Basic Size	Kit Number*	
	R/Rp Thread	NPT Thread
2	2328H77	2323H77
4	2329H77	2324H77
8	2329H77	2325H77
12	2330H77	2326H77
30	2331H77	2327H77

* Kits include all plumbing required for installation.

Reduces the Exponentially Perceived Noise (EPNdB), Impact noise reduction in the 35–40 dB range.
Recommended for air exhaust applications for pressures up to 125 psig (8.6 bar).
Pressure Range – 125 psig (8.6 bar) maximum.

Valve Basic Size	Flow scfm (L/s)	Dimensions** inches (mm)				Pressure Range psig (bar)
		Width	Height (R/Rp)	Height (NPT)	Depth	
2	800 (378)	4.96 (126.1)	16.05 (407.7)	14.24 (361.7)	5.73 (145.5)	
4	800 (378)	4.34 (110.2)	21.40 (543.6)	19.06 (484.1)	7.27 (184.7)	0-125 (0-8.6) maximum
8	800 (378)	5.41 (137.4)	23.52 (597.4)	21.18 (538.0)	8.41 (213.6)	
12	2080 (982)	6.74 (117.2)	28.20 (716.3)	25.85 (656.6)	10.66 (270.8)	
30	7200 (3398)	9.85 (250.2)	41.55 (1055.4)	41.55 (1055.4)	13.47 (342.1)	

** Dimensions reflect valve with installed silencer.

REPLACEMENT VALVES (VALVE ONLY NO BASE)

MODEL NUMBER CONFIGURATOR

3-Way 2-Position Valves

DM2C	D	B2X	A	2	X	
Series				Reset Type		
				Solenoid		

Thread

G	D
NPT	N

Basic Size	Port Size			
	Inlet	Outlet	Exhaust	
2	1/4	1/4	3/4	B2X
	3/8	3/8	3/4	
4	1/2	1/2	1	B4X
8	3/4	3/4	1	A5X
	1	1	1	
12	1	1	1-1/2	A6X
30	1-1/2	2	2-1/2	A8X

Other Options*

Connector	Description		
DIN EN 175301-803 Form A	Solenoids	Connector not included	Leave Blank
	Solenoid Reset		
M12 (24 V DC only)	Solenoids	Adapter DIN EN to M12 Connector included	005
	Solenoid Reset		

*See options for connectors or wiring kits.

Status Indicator

None

Voltage*

24 volts DC	A
110 volts AC, 50 Hz; 120 volts AC, 50/60 Hz	B
230 volts AC, 50/60 Hz	C**

* For other voltages consult ROSS.
** 230 V AC not available in the U.S. (OSHA regulations limit control voltage to no more than 120 volts AC).

REPLACEMENT SUB-BASES

Valve Basic Size	Port Size			Status Indicator	Sub-Base Model Number		Weight lb (kg)
	Inlet	Outlet	Exhaust		G Thread	NPT Thread	
2	1/4	1/4	3/4	No	YD1872C91	Y1872C91	1.7 (0.8)
				Yes	YD1873C91	Y1873C91	2.1 (1.0)
	3/8	3/8	3/4	No	YD1874C91	Y1874C91	1.7 (0.8)
				Yes	YD1875C91	Y1875C91	2.1 (1.0)
4	1/2	1/2	1	No	YD1697C91	Y1697C91	1.7 (0.8)
				Yes	YD1698C91	Y1698C91	2.3 (1.1)
8	3/4	3/4	1	No	YD1701C91	Y1701C91	3.6 (1.6)
				Yes	YD1702C91	Y1702C91	4.2 (1.9)
	1	1	1	No	YD1703C91	Y1703C91	3.6 (1.6)
				Yes	YD1704C91	Y1704C91	4.2 (1.9)
12	1	1	1-1/2	No	YD1705C91	Y1705C91	6.2 (2.8)
				Yes	YD1706C91	Y1706C91	6.8 (3.1)
30	1-1/2	2	2-1/2	No	YD1709C91	Y1709C91	12.0 (5.4)
				Yes	YD1710C91	Y1710C91	12.6 (5.7)

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