ROSS®

Flu-Tech
Fluid Control Specialists

บริษัท ฟลูเทค จำกัด
Flu-tech co.,ltd
Authorized Distributor in Thailand

Safe Exhaust Double Valves

DM²® Series C

Product Catalog

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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.

Size 2	Basic Size 4 & 8	Basic Size 12 & 30
		

Illustration examples.

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 & 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

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.

PRODUCT CREDENTIALS

Performance Level	Safety Integrity Level	DGUV	Declaration of Conformity			Certificate of Compliance
Per ISO 13849-1:2015	Per IEC 61:2001					
Cat. 4 PL e	SIL 3 Functional Safety	DGUV Test HSM 06008 Sicherheit geprüft tested safety	CE	UKCA	EAC	CSA C US

Specifications

STANDARD SPECIFICATIONS

GENERAL	Function		3/2 Normally Closed Valve			
	Construction Design		Dual Poppet			
	Actuation		Electrical	Solenoid Pilot Controlled		
	Mounting	Type	Base			
		Orientation	Vertically with pilot solenoids on top			
	Connection		Threaded	NPT, G		
	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	Solenoids		Current Flow	Operating Voltage	Valve Basic Size	Power Consumption (each solenoid)
	Primary Solenoids		DC	24 volts	2, 4, 12, 30	5.8 watts nominal, 6.5 watts maximum
					8	15 watts
			AC	110 volts, 50 Hz; 120 volts, 50/60 Hz	2, 4, 12, 30	5.8 watts nominal, 6.5 watts maximum
					8	36 VA inrush and 24.6 VA holding
				230 volts AC, 50/60 Hz	2, 4, 12, 30	5.8 watts nominal, 6.5 watts maximum
					8	32 VA inrush and 22 VA holding
			Rated for continuous duty			
			Design according to VDE 0580			
	Reset Solenoids		Current Flow	Operating Voltage	Valve Basic Size	Power Consumption (each solenoid)
			DC	24 volts	2, 4, 8, 12, 30	5.8 watts nominal, 6.5 watts maximum
			AC	110 volts, 50 Hz; 120 volts, 50/60 Hz		
				230 volts, 50/60 Hz		
			Rated for continuous duty			
			Design according to VDE 0580			
	Enclosure Rating		DIN 40050, 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.

Ordering Information

MODEL NUMBER CONFIGURATOR

3-Way 2-Position Valves

DM2C	D	B21	A	2	1	

Series

Port Thread	
NPT	N
G	D

Basic Size	Port Size			
	In	Out	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

Current	Voltage*	
DC	24 V	A
AC	110 V, 50 Hz 120 V, 50/60 Hz	B
	230 V, 50/60 Hz	C

* For other voltages consult ROSS.

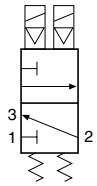
Connection Type *	Description	Voltage	
DIN EN 175301-803 Form A Leave Blank	Solenoids (connectors sold separately)	AC or DC	
M12 Adapter DIN EN to M12	Solenoids (connectors included)	24 V DC only	005
	Mechanical Pressure Switch when selected (connector included)		

* See options for connectors or wiring kits.

Status Indicator Type	Connection	
Mechanical Pressure Switch (connector included)	DIN EN 175301-803 Form A	1
Solid State Pressure Sensor (built-in connector)	M12	2
None		X

Reset Type
Solenoid

Model Number examples: DM2CDB20A21005, DM2CDB21A21005,

Size				Flow Cv (NI/min)		Weight# lb (kg)	Simplified Schematic
Basic	Port 1	Port 2	Port 3	1-2	2-3		
2	1/4	1/4	3/4	1.7 (1700)	2.6 (2600)	5.3 (2.4)	
	3/8	3/8	3/4	2.2 (2200)	3.6 (3500)		
4	1/2	1/2	1	3.0 (3000)	6.5 (6400)	5.9 (2.6)	
8	3/4	3/4	1	4.2 (4100)	9.4 (9300)	8.4 (3.7)	
	1	1	1	4.3 (4200)	9.4 (9300)		
12	1	1	1-1/2	9.0 (8900)	17 (17000)	15.3 (3.7)	
30	1-1/2	2	2-1/2	20 (20000)	55 (54000)	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

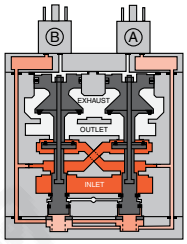
Air Entry System Assemblies with manual Lockout L-O-X® valve, air preparation FRL combinations, and Safe Exhaust Double Valves are available.

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

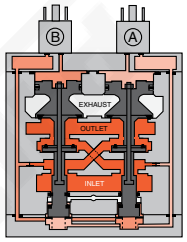
Valve De-actuated (ready-to-run)

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.)



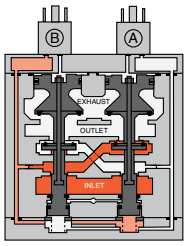
Valve Actuated

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.



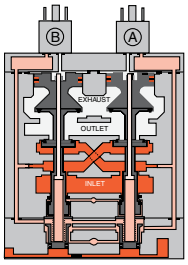
Valve Locked-out

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.



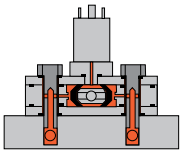
Resetting the Valve

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.



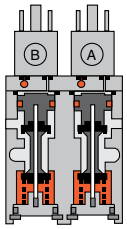
Status Indicator

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

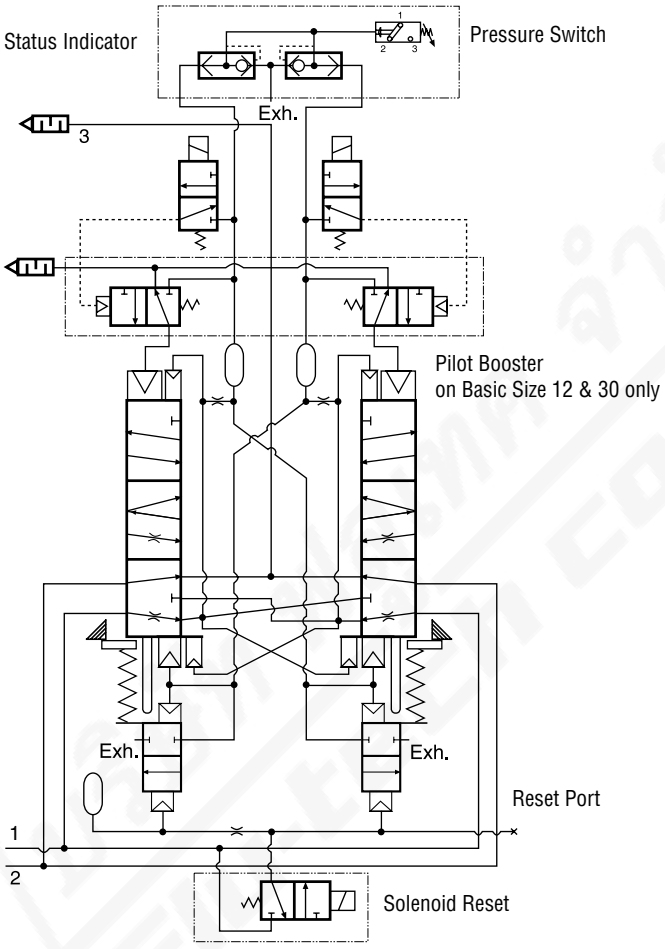
Basic Size 12 and 30 valves require relatively large pilots to actuate and de-actuate the main valve elements. In order to achieve extremely quick valve response for such large pilots, a 2-stage solenoid pilot system is incorporated into the design. This keeps the required electrical current to operate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



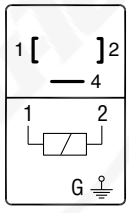
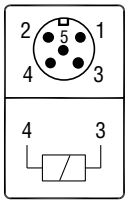
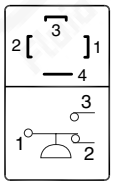
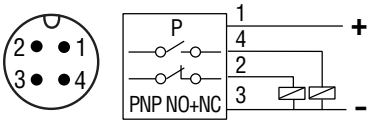
Valve Basic Size 12 & 30 Pilots

Valve Technical Data

Valve Schematic

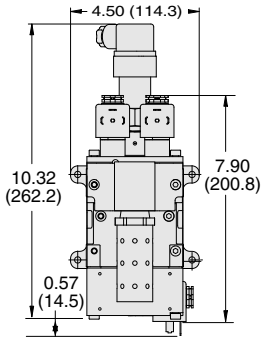
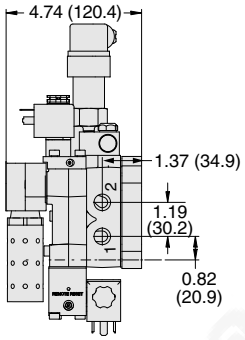
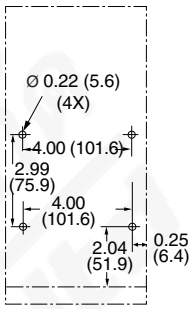
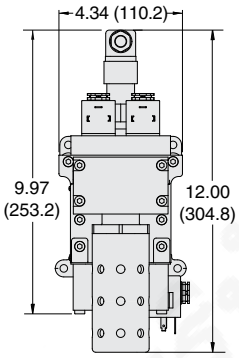
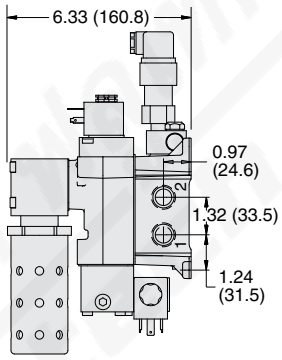
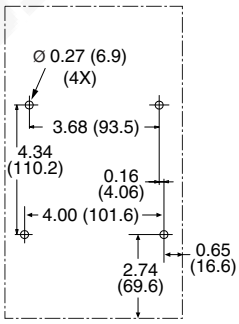
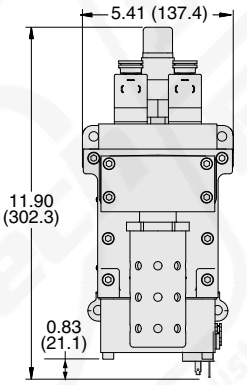
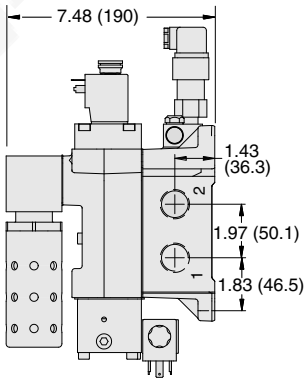
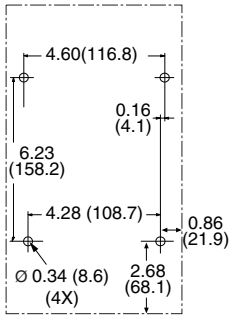


Solenoid & Pressure Switch Pinouts

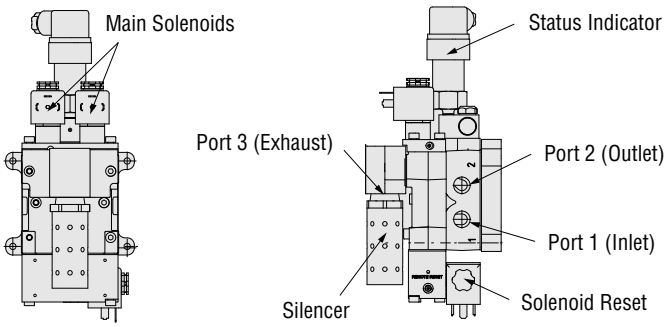
	DIN EN 175301-803 Form A	M12
Solenoid	 1 - Positive 2 - Negative 4 - Ground	 3 - Positive 4 - Negative
Pressure Switch	 1 - Common 2 - Normally Closed 3 - Normally Open 4 - Ground (Not Used)	 1, 2, 3, 4 - Pin PNP - Switched Positive NO - Normally Open NC - Normally Closed

DIMENSIONS

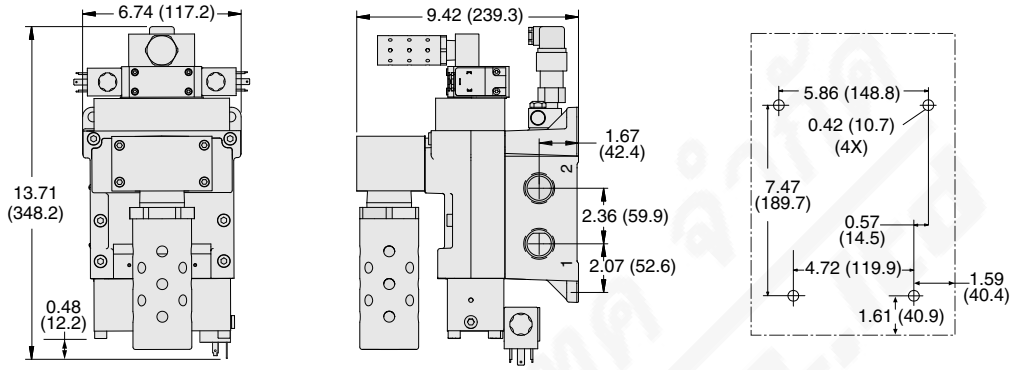
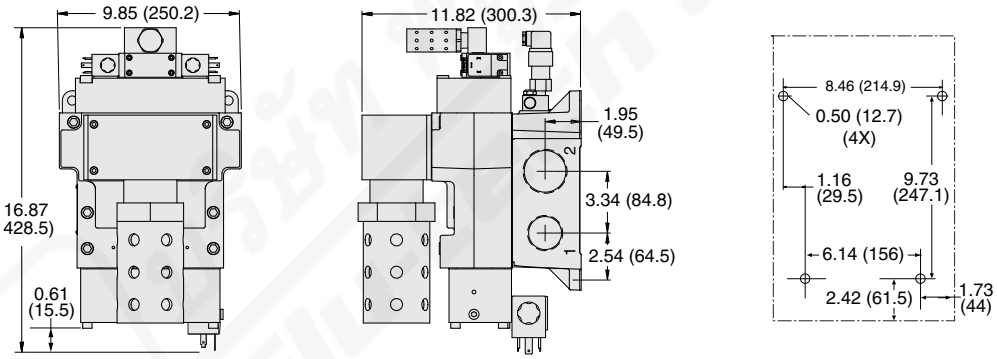
Inches (mm)

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

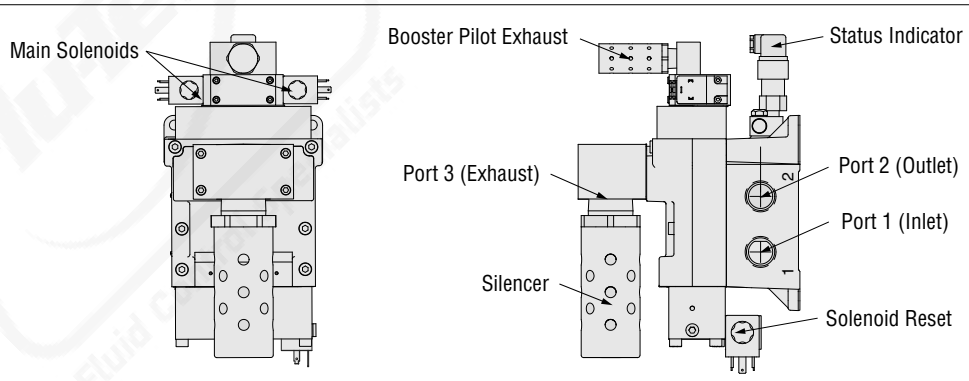
Downloadable CAD models available.



Valve Technical Data

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

Downloadable CAD models available.



ELECTRICAL STATUS INDICATION

Pressure Switch

Illustration example.

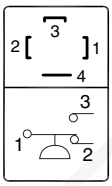
	Indicator Type	Connector Type	Model Number	Port Thread	Factory Preset psi (bar)
Pressure Switches for Status Indicator	Mechanical Pressure Switch	DIN EN 175301-803 Form A	1104A30	M10x1	22 (1.5) falling
		M12	1153A30		
	Solid State Pressure Sensor	M12	1335B30W	M10x1	17 (1.2) falling

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

Pinouts

Mechanical Pressure Switch

DIN EN 175301-803



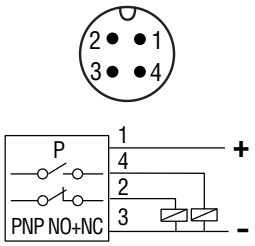
1 - Common
2 - Normally Closed
3 - Normally Open
4 - Ground (Not Used)

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

ENERGY RELEASE VERIFICATION

Pressure Switch	Redundant Pressure Switch Assembly
	

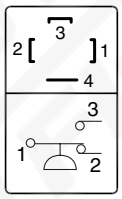
Illustration examples.

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

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

Pinout

DIN EN 175301-803



1 - Common
2 - Normally Closed
3 - Normally Open
4 - Ground (Not Used)

PREWIRED ELECTRICAL CONNECTORS

DIN EN 175301-803	M12
	

Illustration examples.

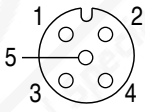
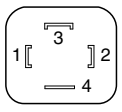
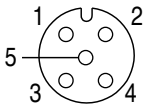
Prewired Connector Kits

Cable						Kit Number			
End 1	End 2	Length meters (feet)	Connection	Quantity Included	Cord Diameter mm	Without Light	Lighted Connector		
Connector	Cord						24 V DC	120 V AC	230 V AC
DIN EN 175301-803 Form A	Flying leads	5 (16.4)	Solenoid	3	6	2283H77	2532H77-W	2532H77-Z	2532H77-Y
			Status Indicator	1					
		10 (32.8)	Solenoid	3	6	2284H77	2533H77-W	2533H77-Z	2533H77-Y
			Status Indicator	1					
M12 5-pin, Female	Flying leads	5 (16.4)	Solenoid	3	6	2288H77	–	–	–
			Status Indicator	1					
		10 (32.8)	Solenoid	3	6	2289H77	–	–	–
			Status Indicator	1					

Prewired Connectors

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

Connector Pinouts

Solenoid		Status Indicator	
DIN EN 175301-803	M12	DIN EN 175301-803	M12
 1 - Black 2 - Black 4 - Green/Yellow (Ground)	 3 - Blue 4 - Black	 1 - Brown 2 - Grey 3 - Black 4 - Green/Yellow (Ground)	 1 - Brown 2 - White 3 - Blue 4 - Black 5 - Grey

Accessories

ELECTRICAL CONNECTORS

Cable Grip	
Without Light	**With Light**
	

Illustration examples.

Connectors	Connector					Model Number			
	Type	Connection	Fitting Connection	Quantity Included	Cord Diameter mm	Without Light	Lighted Connector		
							24 V DC	120 V AC	230 V AC
	DIN EN 175301-803 Form A	Solenoid	Cable grip	1	8 to 10	937K87	936K87-W	936K87-Z	936K87-Y
			1/2" NPT conduit	1	–	723K77	724K77-W	724K77-Z	724K77-Y

Connector Pinout
DIN EN 175301-803

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

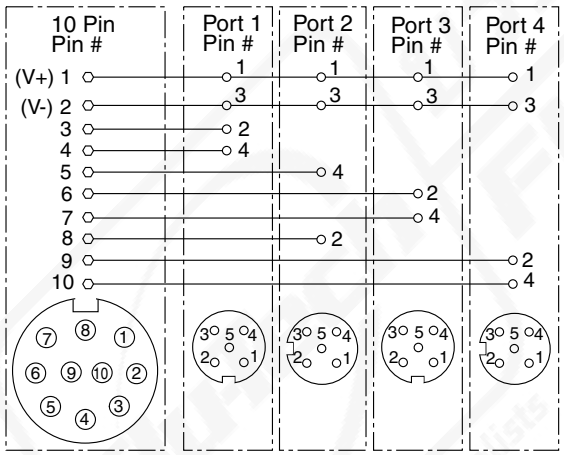
JUNCTION BOX OPTIONS

Illustration example.

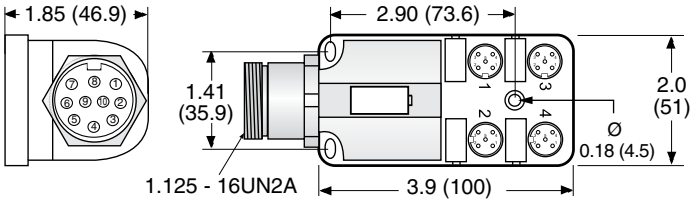
Wiring Kits with J-Box	J-Box			Cable				Kit Number
	Connection		J-Box Quantity	Connector Type		Quantity Included	Length feet (meters)	
	Control System	Solenoids / Status Indicator		End 1	End 2			
	10-pin Mini	M12 (5-pin)	1	M12	DIN EN 175301-803 Form A	4	3.3 (1)	2249H77
			1	M12	M12	4	3.3 (1)	2250H77

Connectors Pinout and Wiring Diagram

J-Box Wiring



Dimmensions: Inches (mm)



Accessories

JUNCTION BOX OPTIONS

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

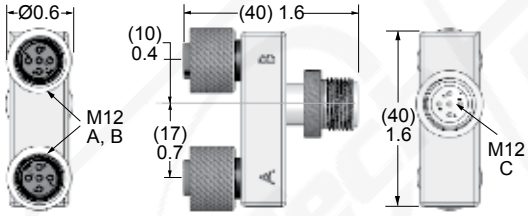
	Port Splitter			Cable				Kit Number
	Port Connectors	Number of Ports	Splitter Quantity	End 1 Connector	End 2 Connector	Quantity Included	Length feet (meters)	
Outlet Port Pressure Monitoring Wiring Kit	M12	3	1	M12	DIN EN 175301-803 Form A	1	3.3 (1)	2251H77

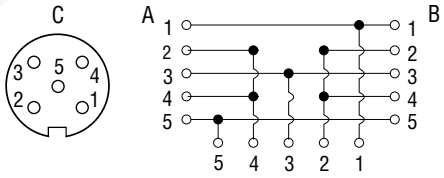
10-Pin MINI Cable

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

Dimmensions: Inches (mm)





A & B Female
C Male

HIGH FLOW NOISE REDUCTION SILENCER KITS

Silencers	Pressure Range psig (bar)
	0-125 (0-8.6) maximum

Reduces the Exponentially Perceived Noise (EPNdB), Impact noise reduction in the 17–25 dB range.
Kits include all plumbing required for installation.

DM Valve Basic Size	Model Number		Flow scfm (NL/s)	Dimensions inches (mm)			
	NPT Thread	R/Rp Thread		Width	Height (NPT)	Height (R/Rp)	Depth
2	2323H77	2328H77	800 (380)	4.96 (126.1)	14.24 (361.7)	16.05 (407.7)	5.73 (145.5)
4	2324H77	2329H77	800 (380)	4.34 (110.2)	19.06 (484.1)	21.40 (543.6)	7.27 (184.7)
8	2325H77	2329H77	800 (380)	5.41 (137.4)	21.18 (538.0)	23.52 (597.4)	8.41 (213.6)
12	2326H77	2330H77	2100 (980)	6.74 (117.2)	25.85 (656.6)	28.20 (716.3)	10.66 (270.8)
30	2327H77	2331H77	7200 (3400)	9.85 (250.2)	41.55 (1055.4)	41.55 (1055.4)	13.47 (342.1)