



SAFE EXHAUST VALVES WITH & WITHOUT SOFT-START
MDC SERIES

PRODUCT CATALOG



Safe Exhaust MDC Series Valves with & without Soft-Start (EEZ-ON®)

Product Overview

Safe Exhaust Safety Function

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



Illustration examples.

The MDC Series valve is designed to supply air to a zone or entire machine/system until signaled to shut off and exhaust residual downstream pneumatic energy from the machine. Thus, reducing the hazards associated with the presence of residual energy during employee access and/or minor servicing.

VALVE FEATURES

Safety Control	MDC1 Series valves without solid state pressure sensor are rated for Category 1, PL c. MDC2 Series valves with solid state pressure sensor are rated for Category 2, PL c, when used with proper safety controls. The “fail-to-safe” safety function is ensured as long as the poppet is able to go back into the start position.
External Monitoring	Monitoring the sensor on each actuation and de-actuation of the MDC2 Series valve provides a diagnostic coverage between 60% < 90%
Poppet Design	Dirt tolerant, wear compensating for quick response and high flow capacity
Soft-Start Function	On energization, the Soft-Start (EEZ-ON®) allows outlet pressure to increase at a slower rate until it reaches approximately 50% of inlet pressure, at which point the valve will then open fully to finish filling the system at full rate
Threaded and Modular Port Connection Options	Modular port connection allows modular connection to Air Entry System (Lockout Valve, FRLs)
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.

STANDARD SPECIFICATIONS

GENERAL	Function		3/2 Valve		Normally Closed	
	Construction Design		Single Poppet			
	Actuation		Electrical		Solenoid Pilot Controlled	
	Mounting	Type	Valve Body Size		1/2	Inline/Modular
		Orientation			1	Inline
	Connection		Threaded Port		NPT G	
	Monitoring		Dynamic, cyclical, external with customer supplied equipment. Monitoring should check state of the valve pressure sensor with any and all changes in state of valve control signal.			
	Minimum Operation Frequency		Once per month, to ensure proper function			
OPERATING CONDITIONS	Temperature	Ambient	40° to 120°F (4° to 50°C)			
		Media	40° to 175°F (4° to 80°C)			
	Flow Media		Compressed air according to ISO 8573-1 Class 7:4:4			
	Operating Pressure	Valve Body Size		1/2	30 to 150 psig (2 to 10.3 bar)	
				1	35 to 150 psig (2.5 to 10.3 bar)	
Pressure Sensor	PNP solid state, M12					
	Current Consumption		<4mA			
ELECTRICAL DATA	Solenoid	Current Flow	Operating Voltage	Valve Body Size	Power Consumption (each solenoid)	
		DC	24 volts	1/2	1.5 watts	
				1	15 watts	
	Rated for continuous duty					
	Design according to VDE 0580					
	Enclosure Rating		IP 65			
	Electrical Connection	Valve Body Size		1/2	DIN EN 175301-803 Form C M12	
1				DIN EN 175301-803 Form A M12		
Pressure Switch (Status Indicator) Rating		Contacts - 5 amps at 250 volts AC, or 5 amps at 30 volts DC				
CONSTRUCTION MATERIAL	Valve Body		Cast Aluminum			
	Poppet		Acetal and Stainless Steel			
	Seals		Buna-N			
SAFETY DATA	Functional Safety Data		Category	MDC 1 Series	CAT 1, PL c	
				MDC 2 Series	CAT 2, PL c	
			B _{10D}	5,000,000		
			PFH _D	pending		
			MTTF _D	pending		

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

PRODUCT CREDENTIALS

Performance Level Per ISO 13849-1:2015 	Safety Integrity Level Per IEC 2061:2001 	DGUV Pending	Declaration of Conformity 	Certificate of Compliance
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Ordering Information

MODEL NUMBER CONFIGURATOR

3-Way 2-Position Valves

MDC 1 E13 1 N A E X C G A

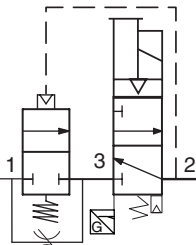
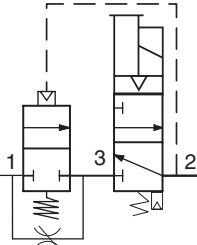
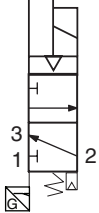
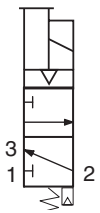
Series		MDC		
Feedback Signal		1		
Without Pressure Sensor		1		
With Solid State Pressure Sensor		2		
Soft-Start	Body Size	Port Size		
		In-Out	Exhaust	
With	1/2	3/8	1	E13
		1/2	1	E14
		3/4	1	E15
Without	1	3/4	1-1/2	X25
		1	1-1/2	X26
		1-1/4	1-1/2	X27
Exhaust Silencer		1		
With Silencer		1		
Without Silencer		X		
Port Thread		N		
NPT		N		
G		G		
Revision Level		A		
Pressure Measuring Device		G		
With Analog Gauge		G		
Digital Transducer		T		
None		X		
Solenoid Connection		C		
DIN EN 175301-803		C		
M12		M		
Communication		None		
Monitoring		External		
Voltage		24 V DC		

Model Number examples: MDC1E131NAEXCGA, MDC2E1351GAEXMTA.

Basic Size	Port Size	Flow* C _v (NI/m)		Valve with Silencer, Pressure Sensor and Analog Gauge Weight lb (kg)
		1-2	2-3	
1/2	3/8	3.1 (3100)	3.3 (3200)	2.05 (0.93)
	1/2	3.7 (3600)	4.0 (3900)	
	3/4	4.0 (3900)	4.2 (4100)	
1	3/4	14 (14000)	19 (19000)	9.35 (4.24)
	1	21 (21000)	27 (29000)	
	1-1/4	23 (23000)	30 (30000)	

* Flow test conducted without silencer at the exhaust port.

Valve Schematics

Valve with EEZ-ON® (Soft-Start)		Valve without EEZ-ON® (Soft-Start)	
With Pressure Sensor	Without Pressure Sensor	With Pressure Sensor	Without Pressure Sensor
			

Solenoid & Pressure Sensor Pinouts			
	DIN EN 175301-803 Form A	DIN EN 175301-803 Form C	M12
Solenoid	<p>1 - Positive 2 - Negative 4 - Ground</p>	<p>1 - Positive 2 - Negative 3 - Ground</p>	<p>3 - Positive 4 - Negative</p>
Pressure Sensor	<p style="text-align: center;">M12 – Solid State Pressure Sensor</p> <p>1, 2, 3, 4 - Pin PNP - Switched Positive NO - Normally Open NC - Normally Closed</p>		

Digital Pressure Transducer – Technical Data

Digital Pressure Transducer Specifications				
Pressure Range psig (bar)	Electrical Output	Electrical Connection	Pressure Port Size/Type	Weight lb (kg)
0 (0) to 145 (10)	(1) PNP with (1) 4-20ma	M8, 4 Pin	1/8 Male	0.099 (0.045)
Sensor Pinout with Analog Output				
<p>1 - Brown - 24 VDC 2 - White - 4 to 20mA 3 - Blue - 0 VDC 4 - Black - PNP Open Collector Output 1</p>				

Safety Solution Options

Safe Air Entry System Assemblies with MDC Series Valves

Air Entry System Assemblies with manual Lockout L-O-X® valve, air preparation FRL combinations, MDC Series Safe Valve with Soft-Start are available.

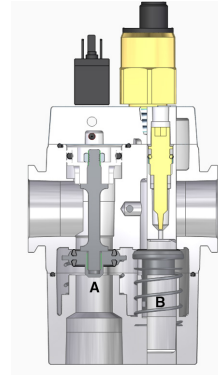


For information please visit www.rosscontrols.com.

Valve Operation

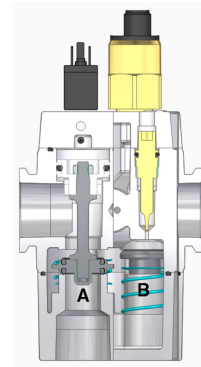
Valve De-actuated (ready-to-run) Pilot Air at Piston A

Pilot De-energized – Piston A is exhausted through the exhaust port of the pilot valve. The main exhaust port on piston A is going to open and the air above piston B and the air at the outlet port is exhausted through the exhaust of piston A.



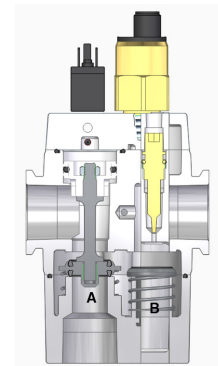
Valve Actuated

Pilot Energized – Pilot air forces piston A downward to close the exhaust port. Air flows past the adjusting needle, opens the ball check and begins slowly to pressurize the outlet line. At the same time, pressure is building up on piston B.

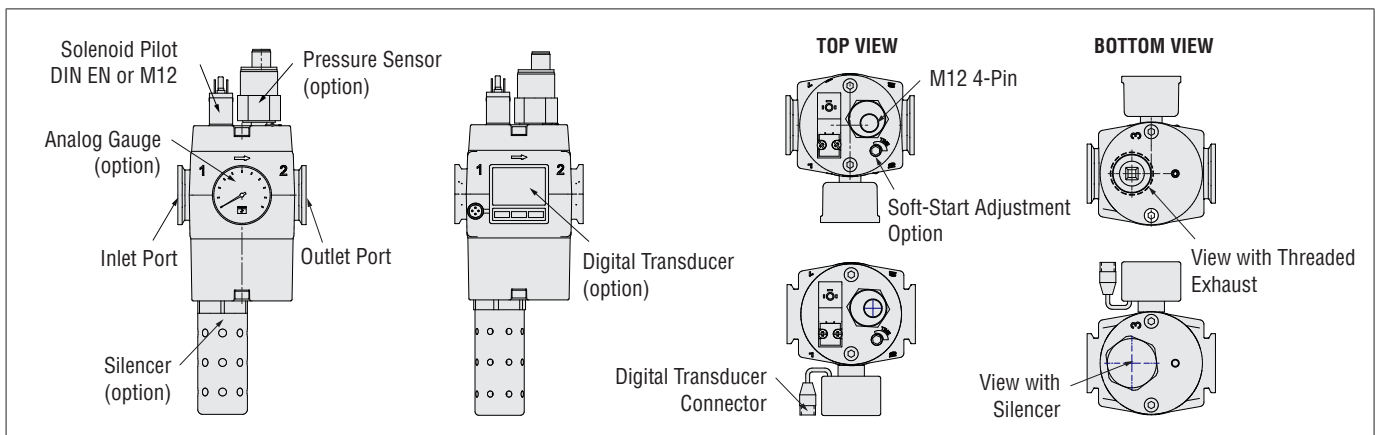


Valve Actuated Full Pressure

When the pressure on piston B reaches approximately 50 percent of inlet pressure, it is forced downward. Full inlet pressure now flows freely to the outlet port.



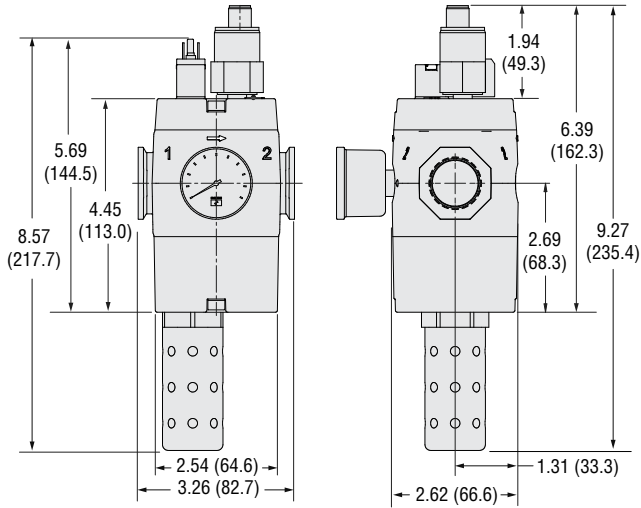
Normal operation requires energizing the solenoid for switching the MDC Series valve ON, and de-energizing the solenoid for switching the MDC Series valve OFF.



DIMENSIONS

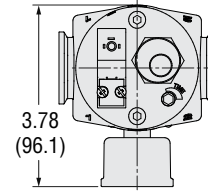
Inches (mm)

Body Size 1/2

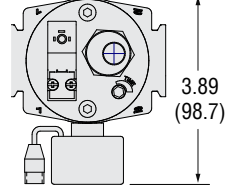


Top View

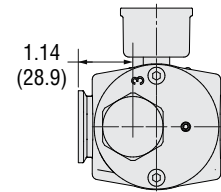
With Analog Gauge



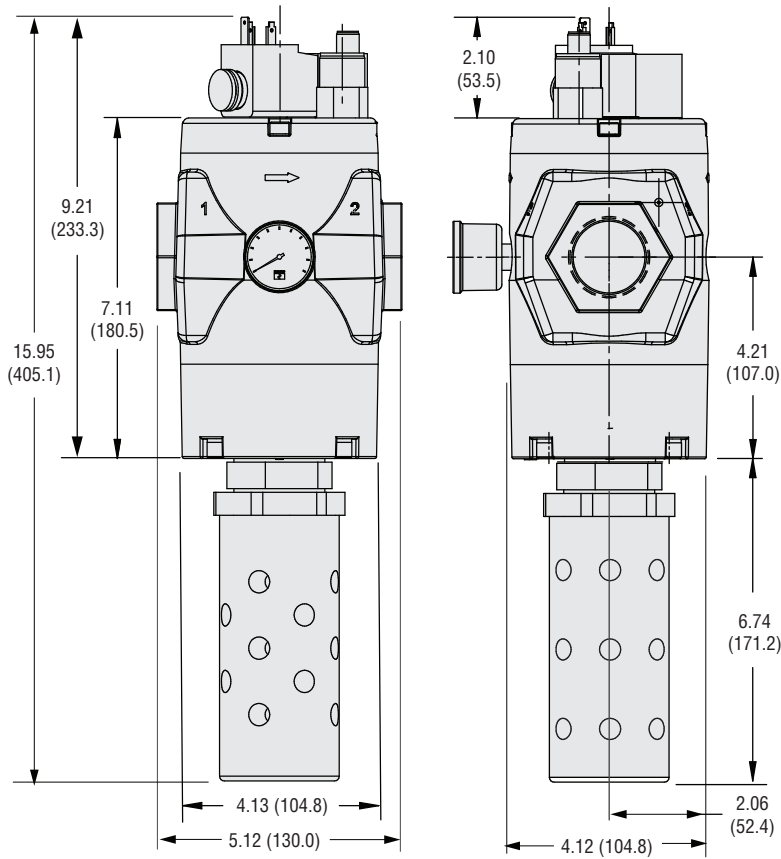
With Digital Transducer



Bottom View

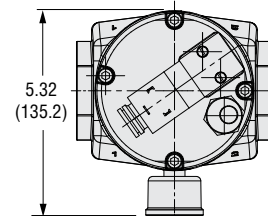


Body Size 1

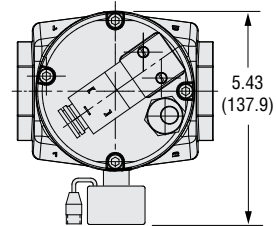


Top View

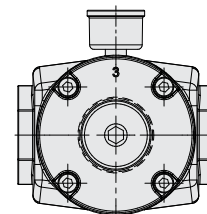
With Analog Gauge



With Digital Transducer



Bottom View



Downloadable CAD models available.

Accessories

PRESSURE GAUGE



Illustration example.

Analog Pressure Gauge	Mounting	Port Size	Thread Type	Model Number	Pressure Range psig (bar)	Case Diameter inches (mm)
	Center Back	1/4	NPT – Male	5400A2011	0-200 (0-14)	2.2 (55)

PRESSURE TRANSDUCERS



Illustration example.

Digital Pressure Transducers	Monitoring Type	Electrical Connection	Electrical Output	Model Number		Pressure Port Size	Pressure Range psig (bar)	Weight lb (kg)
				NPT Thread	G Thread			
	Electrical	M8, 4 Pin	(1) PNP with (1) 4-20ma	760B94	D760B94	1/8	0 to 145 (0 to 10)	0.099 (0.045)
For Digital Pressure Readout, Analog 4-20mA Output, and Transistor Switching Output.								

Pinout	
Sensor Pinout with Analog Output	
	<p>1 - Brown - 24 VDC</p> <p>2 - White - 4 to 20mA</p> <p>3 - Blue - 0 VDC</p> <p>4 - Black - PNP Open Collector Output 1</p>

ENERGY RELEASE VERIFICATION



Illustration example.

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

ELECTRICAL STATUS INDICATION

Pressure Sensor	Indicator Type	Connector Type	Model Number	Port Thread	Factory Preset psi (bar)
	Solid State Pressure Sensor	M12	1335B30W	M10x1	17 (1.2) falling



Illustration example.

Pinouts	
<p>DIN EN 175301-803 Form A</p> <p>1 - Common 2 - Normally Closed 3 - Normally Open 4 - Ground (Not Used)</p>	<p>M12 – Solid State Pressure Sensor</p> <p>1 – 8-30 VDC 2 – Output 3 – Ground 4 – Output PNP – Switched Positive NO – Normally Open NC – Normally Closed</p>

Accessories

PREWIRED ELECTRICAL CONNECTORS

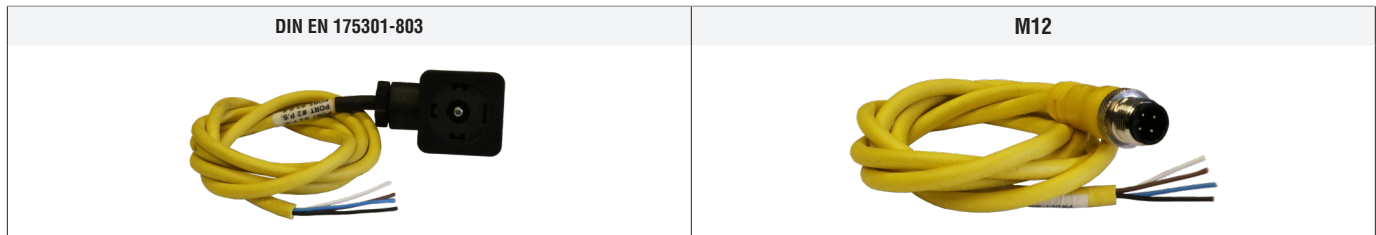


Illustration examples.

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
	DIN EN 175301-803 Form A	Flying leads	Solenoid	1	2 (6.5)	6	721K77	720K77-W
1				2 (6.5)	10	371K77	383K77-W	
DIN EN 175301-803 Form C	Flying leads	Solenoid	1	3 (10)	8	2449K77	2450K77-W	
M12 5-pin, Female	Flying leads	Solenoid	1	5 (16.4)	–	2241H77	–	
			1	10 (32.8)	–	2242H77	–	

ELECTRICAL CONNECTORS

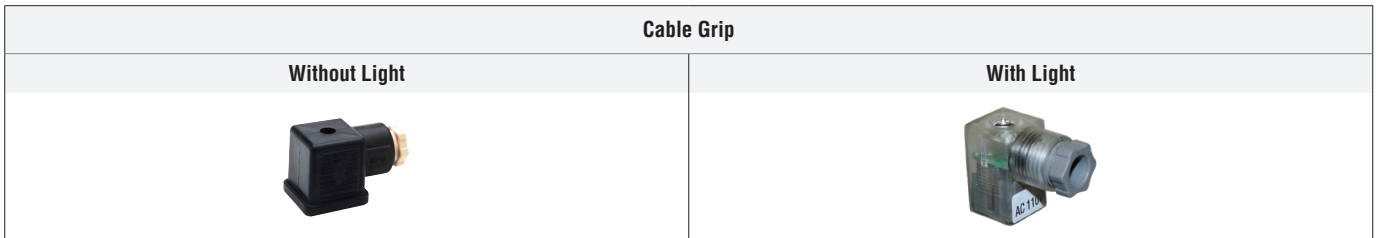
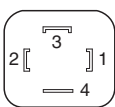
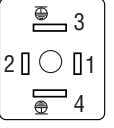
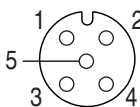


Illustration examples.

Connectors	Connector					Model Number	
	Type	Connection	Fitting Connection	Quantity Included	Cord Diameter mm	Without Light	Lighted Connector
							24 V DC
	DIN EN 175301-803 Form A	Solenoid	Cable grip	1	8 to 10	937K87	936K87-W
1/2" NPT conduit				1	–	723K77	724K77-W
DIN EN 175301-803 Form C	Solenoid	1/2" NPT conduit	1	–	2452K77	2453K77-W	

Connector Pinouts		
DIN EN 175301-803 Form A	DIN EN 175301-803 Form C	M12
 <ul style="list-style-type: none"> 1 - Black 2 - Black 4 - Green/Yellow (Ground) 	 <ul style="list-style-type: none"> 1 - Brown 2 - Blue 3 - Green/Yellow (Ground) 4 - Green/Yellow (Ground) 	 <ul style="list-style-type: none"> 3 - Blue 4 - Black

* Lights in connectors with a translucent housing can be used as indicator lights to show when solenoids are energized.

EXHAUST SILENCERS

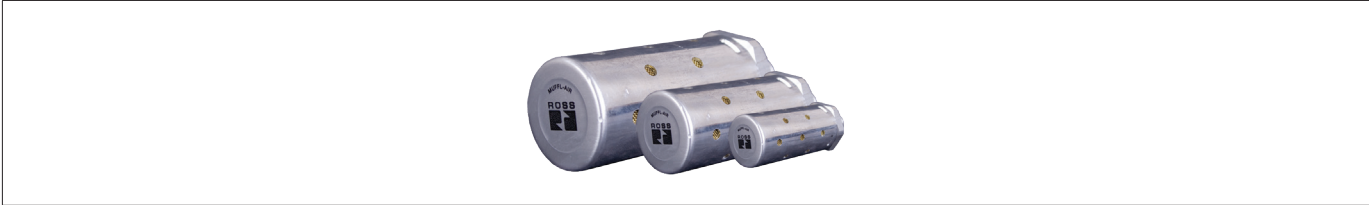


Illustration example.

Silencers	SPECIFICATIONS		Silencer Material	Pressure Range psig (bar)	Schematic			
			Aluminum	0-290 (0-20) maximum				
	Port Size	Thread Type	Flow C _v (NI/min)	Model Number		Dimensions inches (mm)		Weight lb (kg)
				NPT Thread	R/Rp Thread	Length	Hex Size (D)	
	1	Male	18 (18000)	5500A6003	D5500A6003	5.4 (14)	2.0 (51)	0.9 (0.4)
	1-1/2	Female	39 (38000)	5500A8001	D5500A8001	5.7 (14)	2.5 (64)	1.3 (0.6)

FEMALE SILENCER CONNECTORS

Hex Nipples	Material	Fitting Pipe Size	Thread Type	Model Number		
				NPT Thread	BSPT Thread	
	Steel	1-1/2	Male - Male	488J27	122J39	

Accessories

MODULAR CONNECTION

MDC Series valves have both modular receptacles for piping and female threaded ports inside receptacles, which allows either modular connection or direct piping. Mounting accessories listed below are used for modular connection to ROSS MD Series filter-regulator units.






Clamp		Bracket, Screw, and Clamp	
			
Extra Port Blocks	Female End Ports		Male End Ports
			

Illustration examples.

Mounting Brackets & Clamp for Module Connections	Options		Model Number	
	Clamp only		R-A118-105	
	Bracket, Screw, and Clamp		R-A118-105M	
Port Block and End Ports	Options	Port Size	Model Number	
			NPTF Thread	G Thread
	Extra Port Blocks	1/2	R-118-106-4	R-118-106-4W
		3/4	R-118-106-6	R-118-106-6W
	Female End Ports	1/2	R-118-100-4	R-118-100-4W
		3/4	R-118-100-6	R-118-100-6W
Male End Ports	1/2	R-118-109-4F	R-118-109-4FW	
	3/4	R-118-109-6F	R-118-109-6FW	

CAUTIONS, WARNINGS And STANDARD WARRANTY



ROSS OPERATING VALVE, ROSS CONTROLS®, ROSS DECCO®, and AUTOMATIC VALVE INDUSTRIAL, collectively the “ROSS Group”.

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure all sources of energy are turned off, the entire pneumatic system is shut down and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).
2. All ROSS Group Products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any product can be tampered with and/or need servicing after installation, persons responsible for the safety of others or the care of equipment must check ROSS Group Products on a regular basis and perform all necessary maintenance to ensure safe operating conditions.
3. All applicable instructions should be read and complied with before using any fluid power system to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use. If you have any questions, call your nearest ROSS Group location.
4. Each ROSS Group Product should be used within its specification limits. In addition, use only ROSS Group components to repair ROSS Group Products.

WARNINGS:

Failure to follow these instructions can result in personal injury and/or property damage.

FILTRATION and LUBRICATION

1. Dirt, scale, moisture, etc., are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. The ROSS Group recommends a filter with a 5-micron rating for normal applications.
2. All standard ROSS Group filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition and hazardous leakage. Immediately replace crazed, cracked, or deteriorated bowls.
3. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with

phosphate type additives which can harm polyurethane components, potentially leading to valve failure which risks personal injury, and/or damage to property.

WARNINGS:

Failure to follow these instructions can result in personal injury and/or property damage.

AVOID INTAKE/EXHAUST RESTRICTION

1. Do not restrict air flow in the supply line. To do so could reduce the pressure of the supply air below minimum requirements for the valve and thereby causing erratic action.
2. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and must have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

WARNINGS: *Failure to follow these instructions can result in personal injury and/or property damage.*

SAFETY APPLICATIONS

1. Mechanical Power Presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.
2. Safe Exhaust (dump) valves without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All Safe Exhaust valve installations should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.
3. Per specifications and regulations, the ROSS L-O-X® and L-O-X® with EEZ-ON®, N06 and N16 Series operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARNINGS:

Failure to follow these instructions can result in personal injury and/or property damage.

STANDARD WARRANTY

All products sold by the ROSS Group are warranted for a one-year period [with the exception of Filters, Regulators and Lubricators (“FRLs”) which are warranted for a period of seven (7) years] from the date of purchase. All products are, during their respective warranty periods, warranted to be free of defects in material and workmanship. The ROSS Group's obligation under this warranty is limited to repair, replacement or refund of the purchase price paid for products which the ROSS Group has determined, in its sole discretion, are defective. All warranties become void if a product has been subject to misuse, misapplication, improper maintenance, modification or tampering. Products for which warranty protection is sought must be returned to the ROSS Group freight prepaid.

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	ROSS ASIA K.K.	Japan	Tel: +81-42-778-7251	www.rossasia.co.jp
	AUTOMATIC VALVE INDUSTRIAL LLC	USA	Tel: +1-248-474-6700	www.automaticvalve.com
	ROSS DECCO COMPANY	USA	Tel: +1-248-764-1800	www.rossdecco.com
	ROSS PNEUMATROL Ltd.	United Kingdom	Tel: +44 (0)1254 872277	www.pneumatrol.com
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There are ROSS Distributors Throughout the World

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Other literature is available for engineering, maintenance, and service requirements.

If you need products or specifications not shown in this catalog, please visit ROSS' website, contact ROSS or your ROSS distributor. The ROSS Support Team will be happy to assist you in selecting the best product for your application.