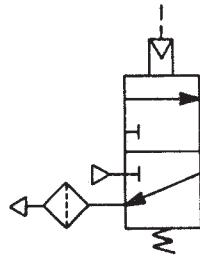


I.S.O. SYMBOL

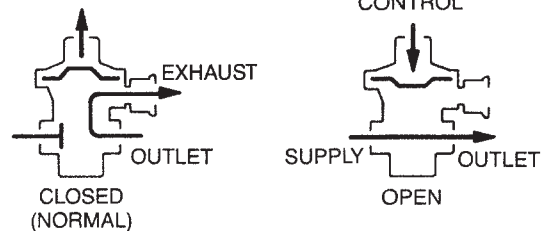


**WM147BC
NORMALLY CLOSED
HIGH PILOT PRESSURE
RELAY VALVE**

**35 SCFM
65-85 PSI TO OPEN**

DESCRIPTION

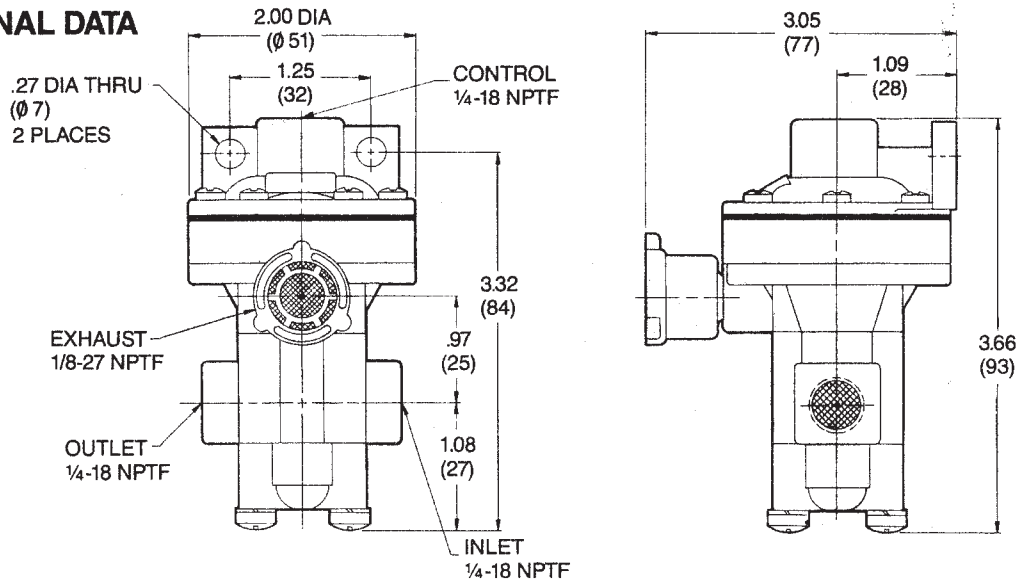
WM147BC is a normally closed, three-way directional relay valve. A pilot pressure of 65-85 PSI must be applied to the WM147BC's control port before the valve will open to allow supply pressure to flow to its outlet. The WM147BC will close and exhaust downstream pressure to atmosphere when pressure at its control port descends to 65-50 PSI.



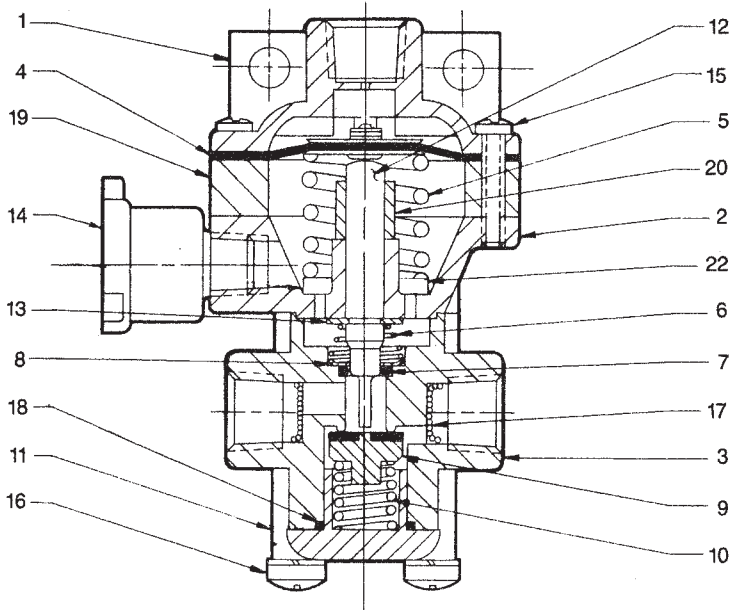
SPECIFICATIONS

PORT SIZES: Inlet, Outlet & Control	1/4-18 NPTF
Exhaust	1/8-27 NPTF
MAXIMUM SUPPLY PRESSURE	150 PSI (1034 kPa)
CONTROL PRESSURE (ASCENDING) TO OPEN	65-85 PSI (448-586 kPa)
CONTROL PRESSURE (DESCENDING) TO RECLOSE	65-50 PSI (448-345 kPa)
OPERATING TEMPERATURE	-20°F to 200°F (-29°C to 93°C)
FLOW RATING	35 SCFM @ 100 PSI (1,0 m ³ /min @ 690 kPa)
MOUNTING	Integral Bracket and Two 1/4" Fasteners
MOUNTING ATTITUDE	Optional
MATERIALS: Body Castings	Die Cast Zinc Alloy
Stem	Aluminum
Diaphragm	Fabric-Reinforced Buna N
Poppet	Buna N with Aluminum Backing
O-Rings	Buna N
WEIGHT	15 oz. (0,4 kg)

DIMENSIONAL DATA



SECTIONAL VIEW



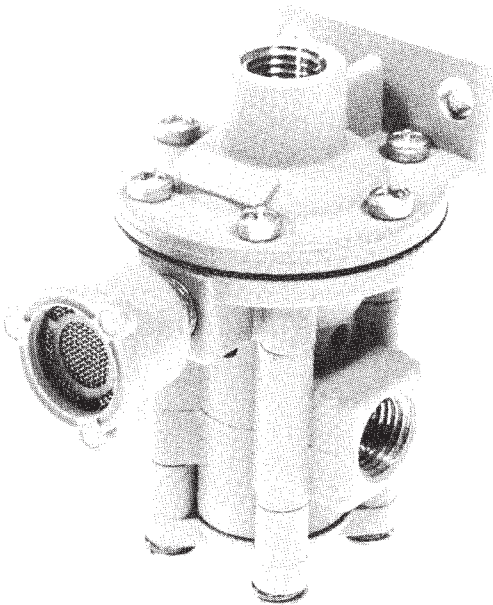
ITEM	DESCRIPTION	PART NUMBER	QTY
1	Inlet Body	103119	1
2	Center Body	103242	1
3	Lower Body	103121	1
4	Diaphragm Assembly	119479	1
5	Spring	101631	1
6	Spring	101629	1
* 7	O-Ring	116299	1
* 8	Retaining Ring	116189	1
* 9	Poppet	103879	1
10	Spring	101021	1
11	End Cap	118132	1
12	Stem	101632	1
13	Retaining Ring	116183	1
14	WM111B	111412	1
15	Screw	119225	6
16	Screw	118770	4
17	Screen	116456	2
* 18	O-Ring	116380	1
19	Spacer	101633	1
20	Support Tube	101634	1
22	Washer	115093	1

Service these units with repair kit 119480.
*Item is included in repair kit.

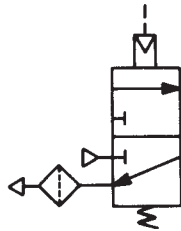
ORDERING INFORMATION

TO ORDER, SPECIFY **WM147BC**

PART NUMBER 111526



I.S.O. SYMBOL

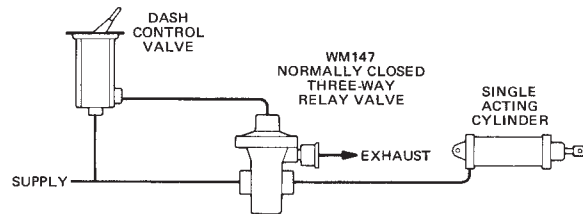


**WM147C
NORMALLY CLOSED
RELAY VALVE**

**15-30 PSI
TO OPEN**

DESCRIPTION

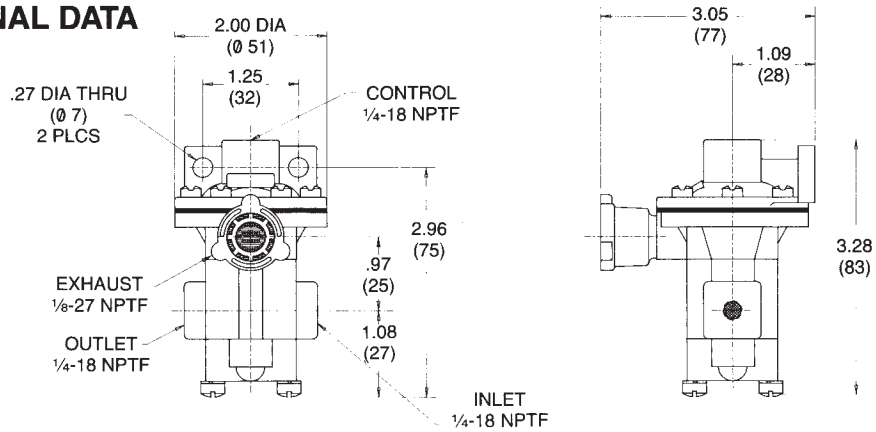
The WM147C is a normally closed 3-way non-compensating relay valve, equipped with a WM111B breather. Pilot control pressure is used to open the normally closed valve. When sufficient control pressure is applied (15-30 PSI, 103-207 kPa), an internal diaphragm expands and unseats the poppet. Air flows from the supply port to the outlet port. The valve will exhaust pressure, when the control pressure drops below the required level, at the outlet through the exhaust breather.



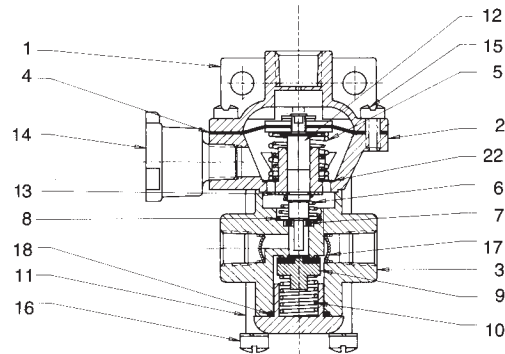
SPECIFICATIONS

PORT SIZES: INLET, OUTLET & CONTROL	1/4-18 NPTF
EXHAUST	1/8-27 NPTF Equipped w/WM111B Breather
MAXIMUM OPERATING PRESSURE	150 PSI (1034 kPa)
OPERATING TEMPERATURE	-20° F to 200° F (-29° C to 93° C)
FLOW RATING	35 SCFM @ 100 PSI (1 m ³ /min @ 690 kPa)
MOUNTING	Integral Bracket on Cover and Two 1/4" Fasteners
MOUNTING ATTITUDE	Optional
MATERIALS: BODY	Die Cast Zinc Alloy
STEM	Aluminum
DIAPHRAGM	Fabric-Reinforced Buna N
POPPET	Buna N with Aluminum Backing
O-RINGS	Buna N
WEIGHT	13 oz. (0,4 kg)

DIMENSIONAL DATA



SECTIONAL VIEW

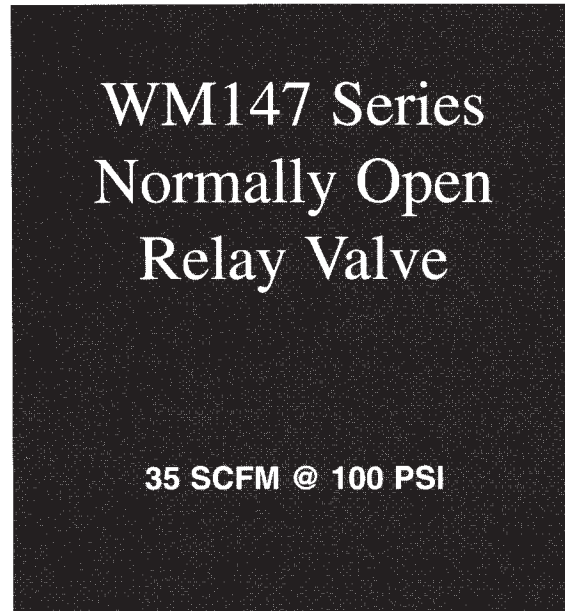
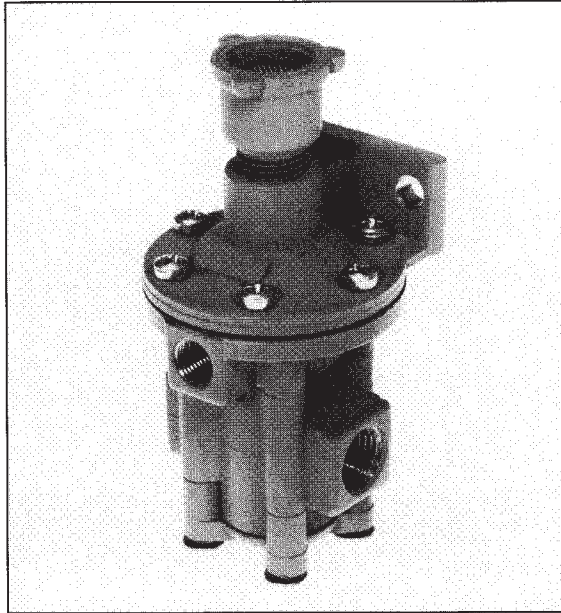


ITEM	DESCRIPTION	PART NUMBER	QTY.	ITEM	DESCRIPTION	PART NUMBER	QTY.
1	Inlet Body	103119	1	11	End Cap	118132	1
2	Center Body	103242	1	12	Stem	101630	1
3	Lower Body	103121	1	13	Snap Ring	116183	1
*4	Diaphragm Assembly	119479	1	14	WM111B Breather	111412	1
5	Spring	103597	1	15	Screw	119223	6
6	Spring	101629	1	16	Screw	118770	4
*7	O-Ring	116299	1	17	Screen	116456	2
*8	Snap Ring	116189	1	18	O-Ring	116380	1
*9	Poppet	103879	1	22	Washer	115093	1
10	Spring	101021	1				

Service these units with repair kit R147BC, C, part number 119480.
*Item is included in repair kit.

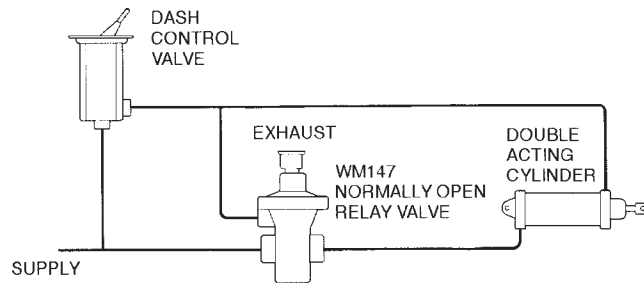
ORDERING INFORMATION

TO ORDER, SPECIFY WM147C
PART NUMBER 111527



DESCRIPTION

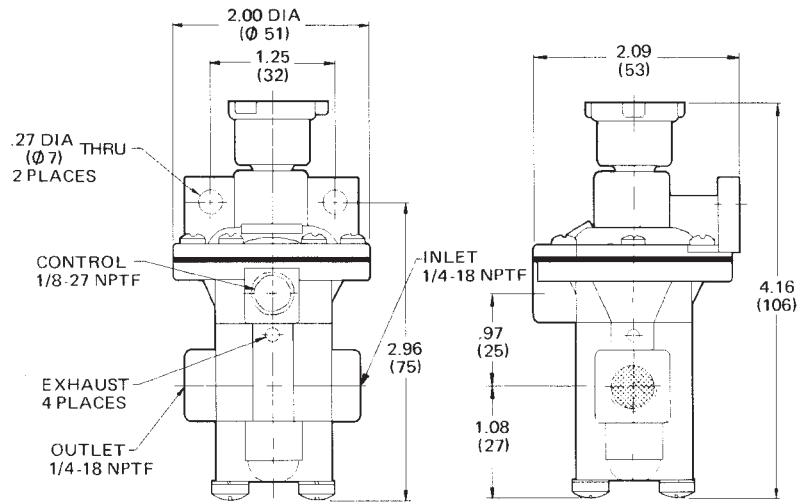
A variety of normally open, non-compensating relay valves are available in the WM147 series. Control pressure is used to close these normally open valves; the required control pressure signal differs with each model. These relays are available either as a two-way valve without an exhaust mode or as a three-way valve if the exhaust mode is desired. As shown in the installation drawing, these models are used with a two-position control valve in applications where a four-way function is desired.



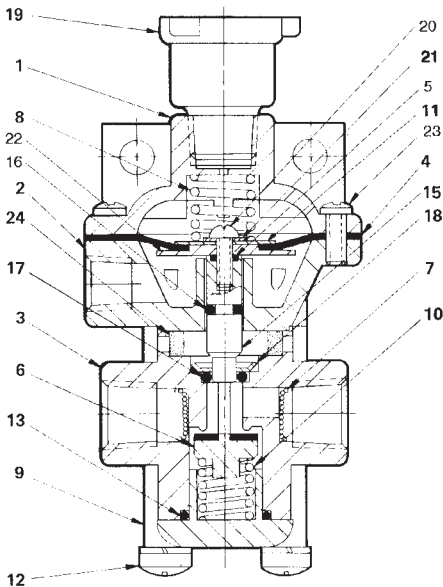
SPECIFICATIONS

Port sizes:	Inlet and outlet.....	1/4-18 NPTF
	Control.....	1/8-27 NPTF
	Exhaust.....	Unthreaded
Maximum supply pressure.....		150 PSI (1034 kPa)
Operating temperature.....		-20°F to 200°F (-29°C to 93°C)
Flow rating.....		35 SCFM @ 100 PSI (1,0 m ³ /min @ 690 kPa)
Mounting.....		Integral bracket on cover and two 1/4" fasteners
Mounting attitude.....		Optional
Materials:	Body castings.....	Iridited die cast zinc alloy
	Stem.....	Aluminum
	Diaphragm.....	Fabric-reinforced buna N
	Poppet.....	Buna N with aluminum backing
	O-rings.....	Buna N
Weight.....		15 oz (0,4 kg)

DIMENSIONAL DATA



CROSS SECTION & PARTS INFORMATION



ITEM	DESCRIPTION	WM147F	WM147P	QTY
1	Inlet Body	103119	103119	1
2	Center Body	103243	103243	1
3	Lower Body	103290	103290	1
*4	Diaphragm/Assy.	101292	101292	1
*5	O-Ring	116442	116442	1
*6	Poppet	103879	103879	1
7	Screen	116456	116456	2
8	Spring	103292	101685	1
9	End Cap	118132	118132	1
10	Spring	101021	101021	1
*11	Washer	115048	115048	1
12	Screw	118770	118770	4
*13	O-Ring	116380	116380	1
*15	Stem	103361	103361	1
*16	O-Ring	110495	110495	1
*17	O-Ring	116299	116299	1
*18	Snap Ring	116189	116189	1
19	WM111A Breather	111411	111411	1
*20	Screw	114723	114723	1
*21	Washer	115132	115132	1
*22	Diaphragm Plate	104254	104254	1
23	Screw	119223	119223	6
24	Filter	104077	104077	1

*Item is included in repair kit. Service these units with repair kit 114161. Highlighted items may be purchased separately.

ORDERING INFORMATION

To order, specify **WM147** _____ (suffix) _____ (part number). Select suffix and part number below.

Suffix	Part Number	Model	Control Pressure	
			To Close	To Open
WM147 F	111531	3 way	30-50 PSI (207-345 kPa)	15-30 PSI (103-207 kPa)
WM147 P	111542	3 way	10-30 PSI (69-207 kPa)	5-10 PSI (35-69 kPa)

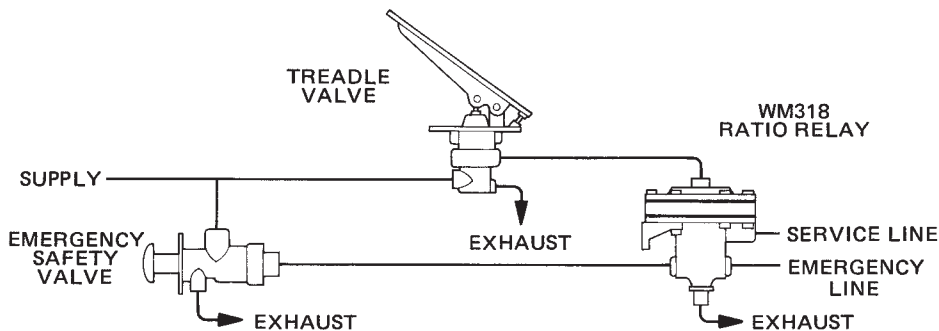
PRODUCT DESCRIPTION

DESCRIPTION Used primarily in vehicular air brake systems, the WM318 series valves are three-way, compensating, pilot pressure-operated relay valves. These valves deliver an output pressure that is proportional to the amount of control pressure applied. Some models in the WM318 series feature an adjustment which allows the output/control pressure ratio to be changed. On other models, this ratio is fixed.

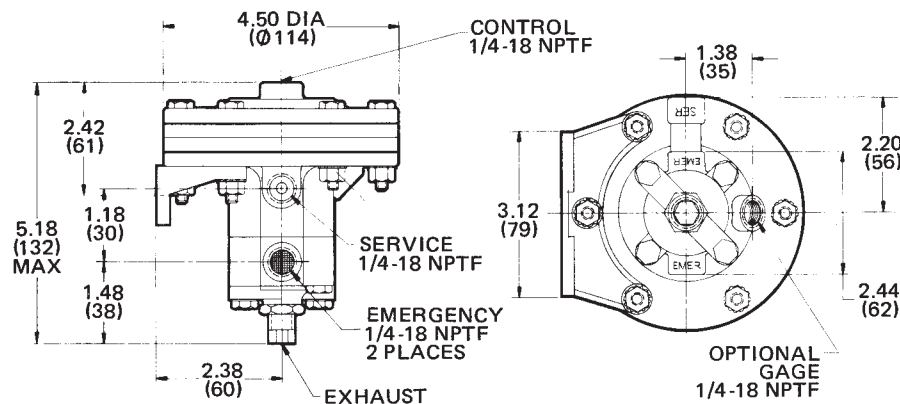
OPERATION To actuate a WM318 series relay valve, a maximum control pressure of 1.5 PSI (10,3 kPa) is required against a 100 PSI (690 kPa) supply. When control pressure is applied, two internal diaphragms expand, closing the exhaust port and opening the outlet port. Air flows from the supply port to the outlet port. As service line pressure increases and the trailer brakes are applied, pressure builds on one side of each diaphragm until a balanced condition is achieved. When this condition occurs, the supply port closes. With no control pressure applied, the valve releases any pressure at the outlet port through the exhaust.

APPLICATION The WM318 relay valves are commonly used as tractor protection valves in tractor-trailer braking systems. These relays protect brake system pressure because the control signal is exhausted through the service treadle and cannot escape downstream through an open service line. When models with the adjustable output/control pressure ratio are installed on trucks or tractors, the trailer brake pressure may be balanced with the tractor brake pressure. Other WM318 models are used in applications where a nonadjustable, factory-preset output/control pressure ratio is desired. The WM318 relays are also used in WM346 fast brake kits to activate the trailer brakes.

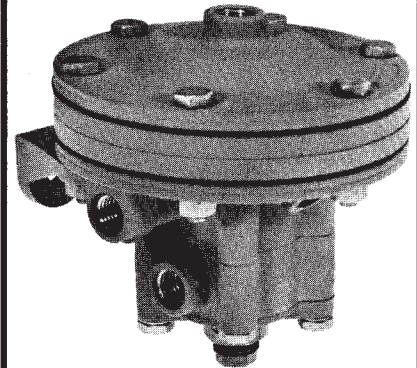
TYPICAL INSTALLATION



EXTERNAL CONFIGURATION

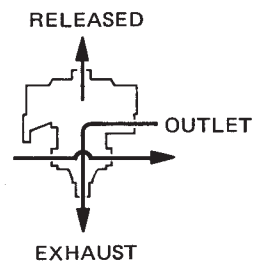
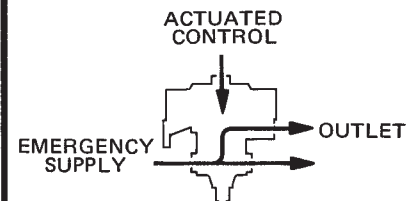


**WM318
SERIES**

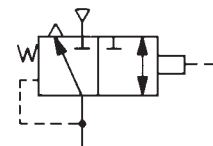


**RATIO RELAY
VALVES**

FUNCTIONAL DIAGRAM

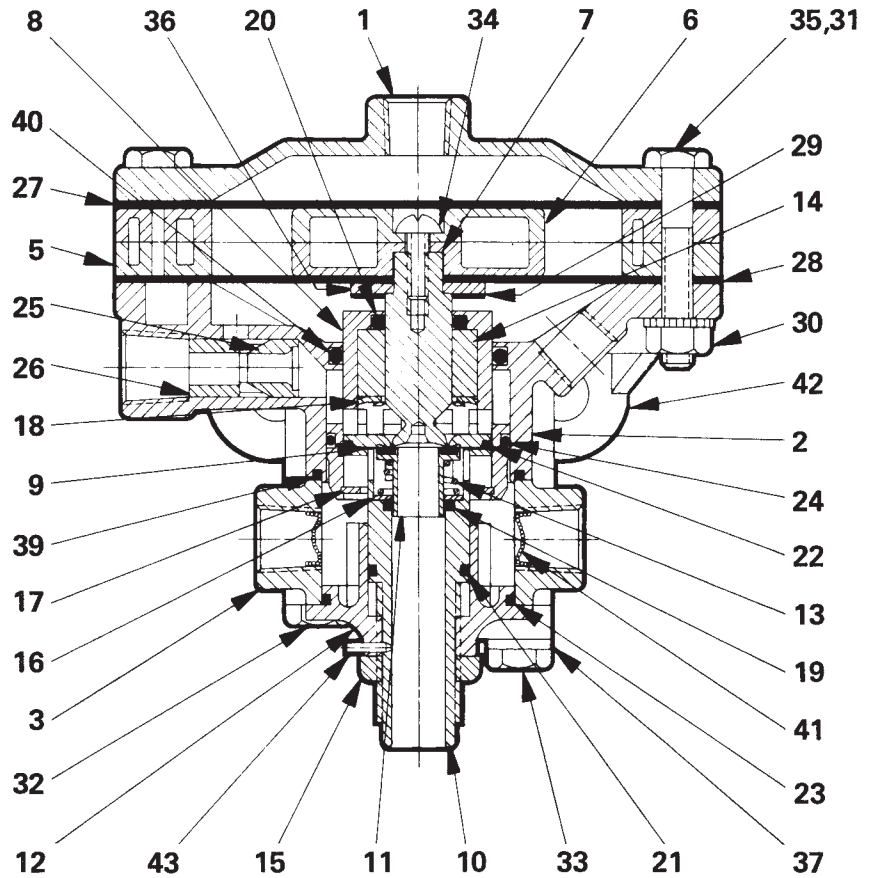


I.S.O. SYMBOL



PARTS IDENTIFICATION			
ITEM	DESCRIPTION	QUANTITY	
		A	B
1	COVER	1	1
2	BODY	1	1
3	EMERGENCY BODY	1	1
5	DIAPHRAGM SPACER	2	2
6	DIAPHRAGM PLATE	2	2
7	EXHAUST STEM	1	1
8	INLET CAGE	1	1
9	INLET SEAT	1	1
10	STEM	1	1
*11	POPPET	1	1
12	CARTRIDGE BODY	1	1
13	SPRING	1	1
14	STEM GUIDE	1	1
15	NUT (114590)	1	1
16	WASHER	1	1
17	RETAINING RING	1	1
*18	RETAINING RING	1	1
*19	O-RING (116303)	1	1
*20	O-RING	1	1
*21	O-RING	1	1
*22	O-RING	1	1
*23	O-RING	1	1
*24	O-RING	1	1
25	ORIFICE	1	1
26	EXPANSION TUBE	1	1
*27	UPPER DIAPHRAGM	1	1
*28	DIAPHRAGM	1	1
*29	BUMPER	1	1
30	LOCKNUT	6	6
31	SCREW	3	3
32	SCREW	2	2
33	SCREW	2	2
34	SCREW	1	1
35	SCREW	3	3
36	WASHER	1	1
37	LOCKWASHER	2	2
*39	O-RING	1	1
*40	O-RING	1	1
41	SCREEN (116456)	2	2
42	BRACKET (105182)	1	1
43	ROLL PIN	1	1

Service this unit with repair kit number 114262. Repair kit includes parts to service the cartridge assembly. To replace the cartridge assembly in the WM318A, order part number 102047. To replace the cartridge assembly in the WM318B, order part number 105343. Other replaceable items are followed by part numbers.
*Asterisk designates parts included in repair kit 114262.



SPECIFICATIONS

PORT SIZE 1/4-18 NPTF
 MAXIMUM OPERATING PRESSURE 150 PSI (1034, 2 kPa)
 OPERATING TEMPERATURE -20°F (-28,9°C) to 200°F (93,3°C)
 FLOW RATING 50 SCFM @ 100 PSI (1, 0 m³/min @ 690 kPa)
 CRACKING PRESSURE ...1.5 PSI (10,3 kPa) w/100 PSI (690 kPa) Supply
 OUTPUT ADJUSTABILITY 20% less than control pressure
 to 30% greater than control pressure

MATERIALS: Body Castings Iridated Die Cast Aluminum
 Diaphragms Fabric-Reinforced Buna N
 Poppet Chrome-Plated Brass w/ Buna N Insert
 Bumper & O-Rings Buna N

NET WEIGHT 4 lb. (1,8 kg)
 *For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM318
 Model Number Suffix

PART NUMBER _____
 SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	OUTPUT/CONTROL PRESSURE RATIO	GAGE PORT
WM318 A	112201	Adjustable	1/4-18 NPTF

WM338 SERIES

PRODUCT DESCRIPTION

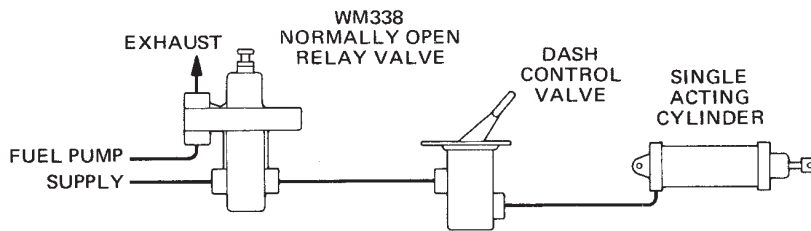
DESCRIPTION The WM338 series valves are normally open, three-way relay valves that close and exhaust with sufficient control pressure. The WM338 series includes non-compensating relay valves and compensating pressure-limiting valves. The compensating models deliver an output pressure proportional to the control signal received.

The control pressure required to close the WM338 valves varies with the different models in the series. Some models are equipped with an adjustment that changes the control pressure at which the valve closes; these models are factory pre-adjusted to close at a specific value. The non-adjustable models will close at a fixed control pressure.

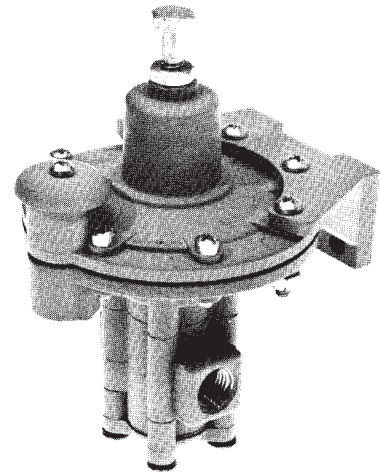
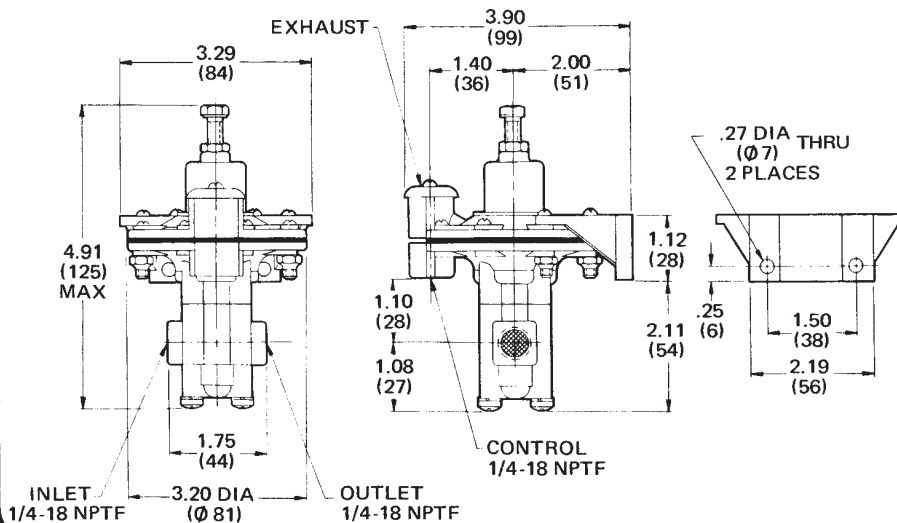
OPERATION When the WM338 valve is in the normally open position, air flows from the supply port to the outlet port. In response to a sufficient control signal, the supply poppet seats and the valve closes. Pressure at the outlet port is exhausted to the atmosphere. The valve reopens when the control pressure drops below the necessary level. If the valve is a compensating model, its output will increase in proportion to the decreasing control pressure.

APPLICATION Commonly used in industrial and vehicular applications, these normally open inversion valves close with sufficient hydraulic or pneumatic control pressure. The WM338 relay and pressure-limiting valves are often used because they feature adjustable and preset control pressures.

TYPICAL INSTALLATION

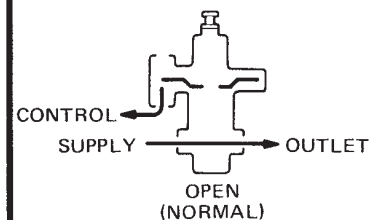
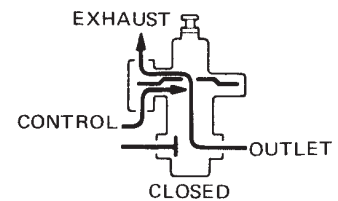


EXTERNAL CONFIGURATION

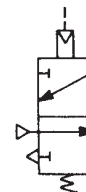


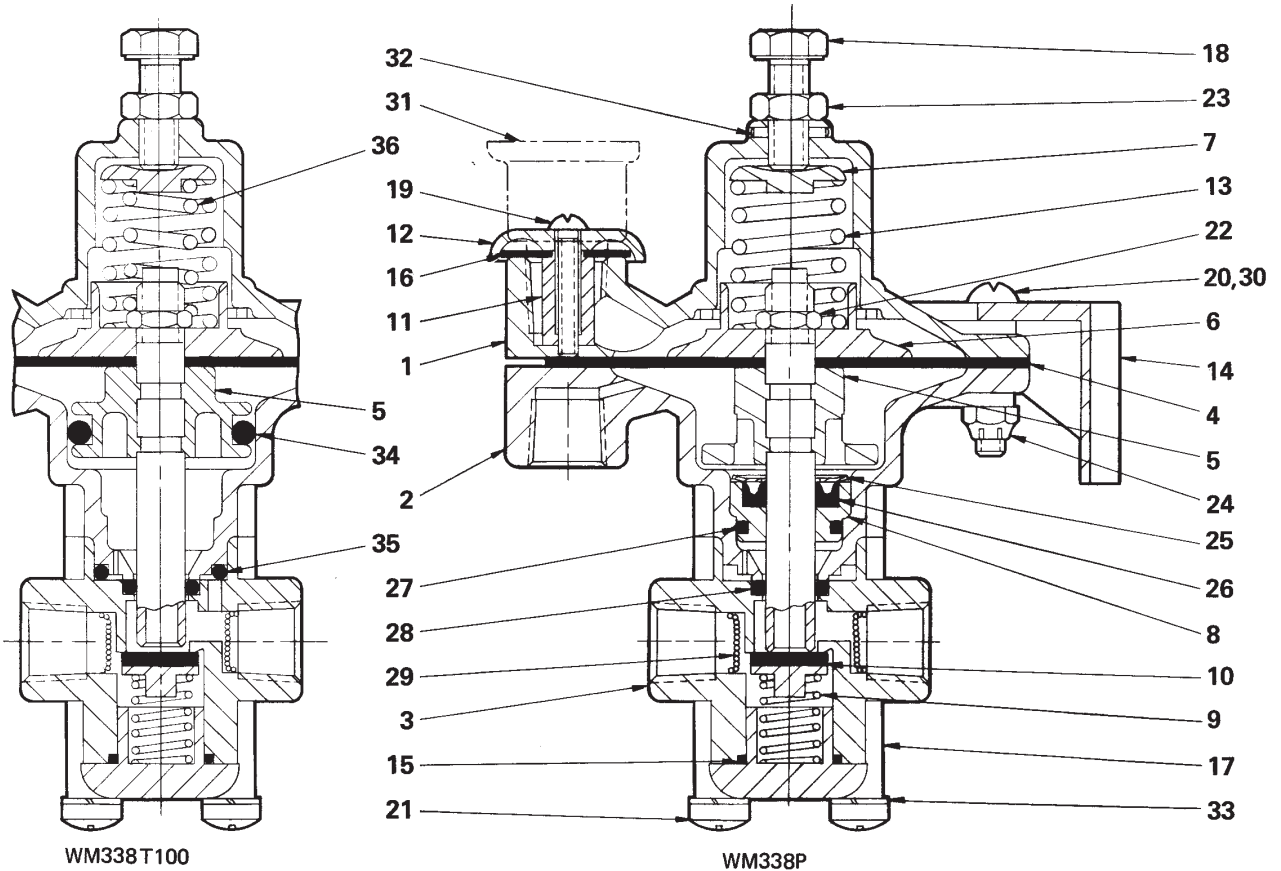
NORMALLY OPEN RELAY VALVE

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL





WM338T100

WM338P

SPECIFICATIONS

PORT SIZES:

Inlet, Outlet, & Control 1/4-18 NPTF
Exhaust: WM338P ,T100 Equipped with Cap and Check Disc

MAXIMUM OPERATING PRESSURE 150 PSI (1034,2 kPa)
OPERATING TEMPERATURE* . . . -20°F to 200°F (-28,9°C to 93,3°C)
FLOW RATING 60 SCFM @ 100 PSI (1,7 m³/min @ 690 kPa)
CONTROL PRESSURE TO CLOSE:

WM338P ,T100 Adjusts from 2 to 120 PSI (13,8 to 827,4 kPa)

CONTROL PRESSURE MEDIA Hydraulic or Pneumatic
MOUNTING Bracket Secured to Frame, Bulkhead, or Bracket
MOUNTING ATTITUDE Adjusting Screw Up Recommended
MATERIALS: Body Castings Die Cast Zinc Alloy
Diaphragm Fabric-Reinforced Buna N
Poppet EPT Rubber w/ Aluminum Backing
O-Rings Buna N

NET WEIGHT 1 lb.8 oz. (0,7 kg)

*For continuous operation beyond this range, contact factory.

PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY.		ITEM	DESCRIPTION	QTY.	
		P	T100			P	T100
1	UPPER BODY	1	1	19	SCREW	1	1
2	CONTROL BODY	1	1	20	SCREW	4	4
3	LOWER BODY	1	1	21	SCREW	4	4
* 4 †	DIAPHRAGM	1	1	22	NUT	1	1
5	PISTON ASSEMBLY	1	1	23	NUT	1	1
6	DIAPHRAGM PLATE	1	1	24	LOCKNUT	4	4
7	SPRING CAP	1	1	*25	RETAINING RING	1	1
8	BUSHING	1	1	*26	U-CUP	1	1
9	SPRING	1	1	*27	O-RING	1	1
* 10 †	POPPET	1	1	*28 †	O-RING	1	1
11	EXHAUST SPACER	1	1	29	SCREEN	2	2
12	EXHAUST CAP	1	1	30	SCREW	4	4
13	SPRING	1	1	31	BREATHER		
14	BRACKET	1	1	32	ROLL PIN		
* 15 †	O-RING	1	1	33	LOCKWASHER	4	4
* 16 †	EXHAUST CHECK	1	1	34 †	O-RING		1
17	END CAP	1	1	35 †	O-RING		1
18	SCREW	1	1	36	SPRING		

Service the WM338P with repair kit number 114293. Service the WM338T100 with repair kit 114289.
To replace the WM111A exhaust breather (Item 31), order part number 111411.
*Asterisk designates parts included in repair kit 114293. †Dagger designates parts included in repair kit 114289.

TO ORDER, SPECIFY **WM338** _____ PART NUMBER _____ SELECT SUFFIX & PART NUMBER BELOW

Model Number Suffix

SUFFIX	PART NUMBER	DESCRIPTION	CONTROL PRESSURE TO REOPEN
WM338 P	112371	Normally Open, Non-Compensating, Adjustable Relay Valve	Preset @ 20/25 PSI (138/172 kPa) w/ 55/65 PSI (379/448 kPa) Supplv.
WM338 T100	112381	Normally Open, Compensating, Adjustable Pressure-Limiting Valve	Preset @ 50/60 PSI (345/414 kPa) w/ 110/130 PSI (758/896 kPa) Supply

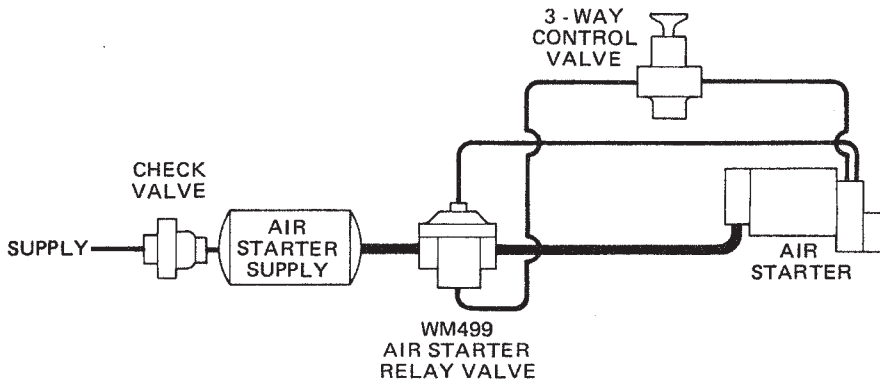
PRODUCT DESCRIPTION

DESCRIPTION The WM499 air starter relay valves are normally closed, non-compensating, two-way relay valves engineered specifically for use with air starters. Suitable for large tubing, the WM499 relay valves are capable of high air flow capacity.

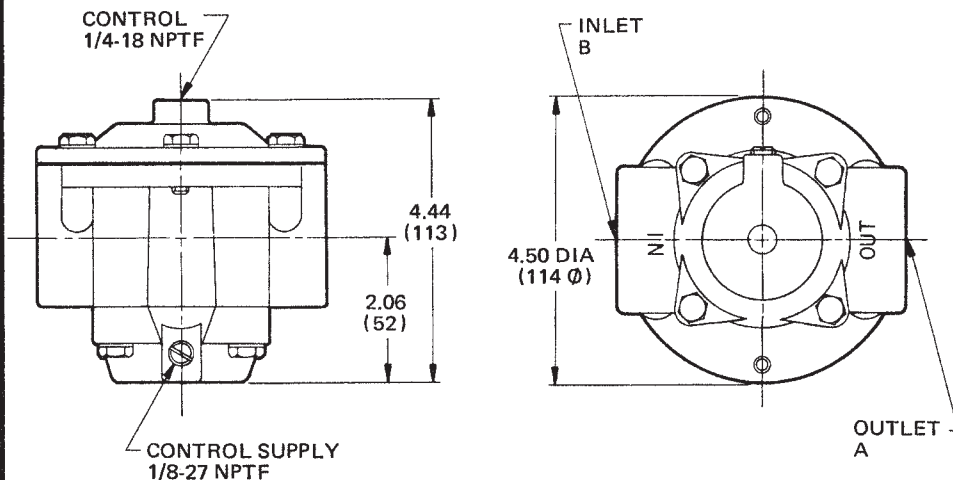
OPERATION To open the valve and allow delivery, the WM499 relay valve is actuated by pressure from a control. With a control pressure of only 30%-35% of the supply pressure, the WM499 valve will open to permit large capacity delivery. A control pressure of approximately 30 PSI (207 kPa), for example, will open the valve against a supply of 100 PSI (690 kPa). When open, the relay valve allows a maximum output pressure equal to the supply pressure. When the control pressure is removed, an internal spring causes the valve to return to its normally closed position.

APPLICATION WM499 relay valves are engineered for use with air starters in industrial and vehicular applications. WM499 air starter relay valves are especially suited for other applications requiring high flow capacity. **MARINE APPLICATIONS:** This device meets the pressure test requirements specified in "Marine Engineering Regulations" (CG-115). Documentation is available upon request.

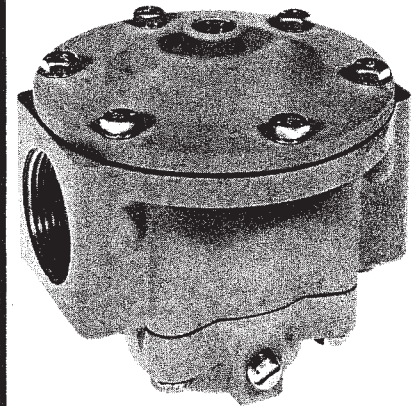
TYPICAL INSTALLATION



EXTERNAL CONFIGURATION

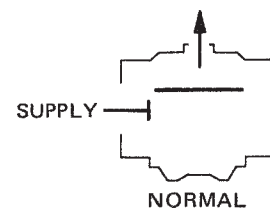
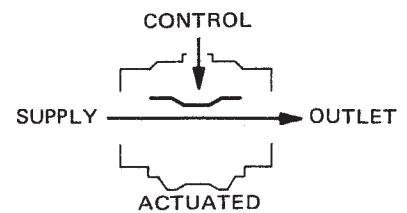


**WM 499
SERIES**

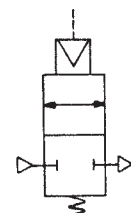


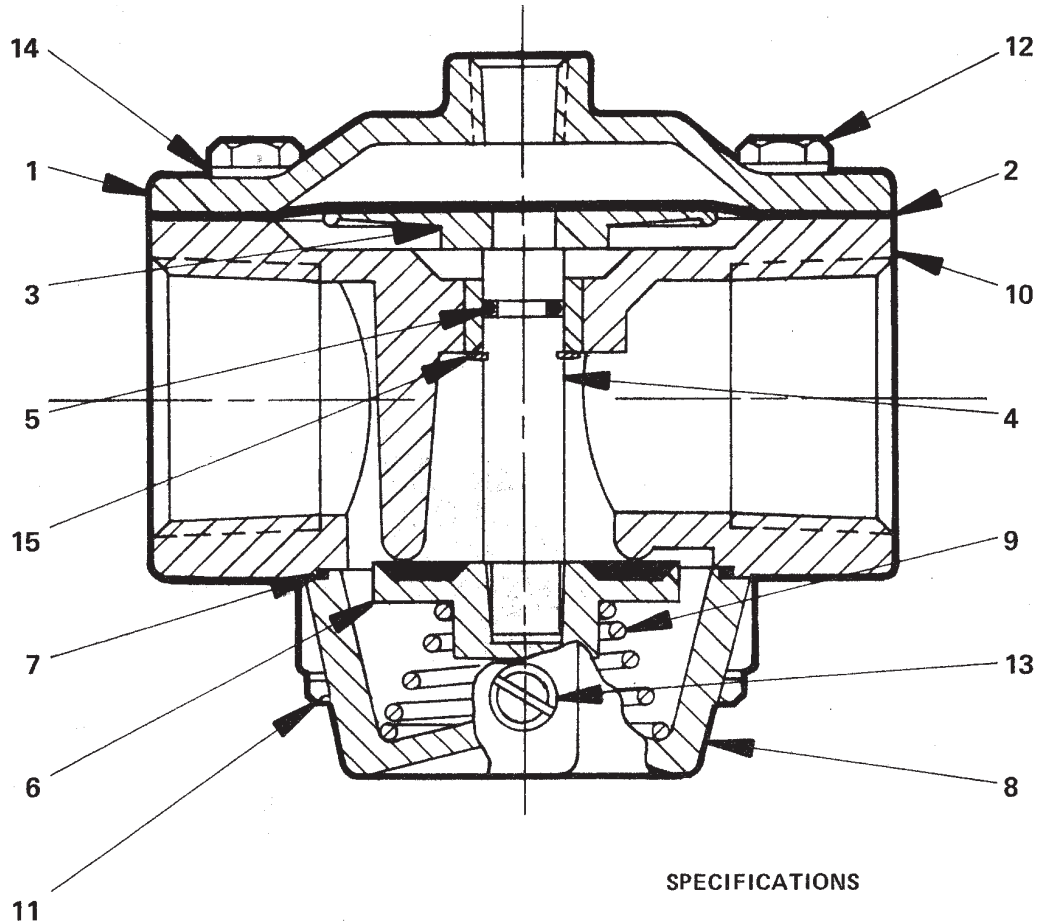
**AIR
STARTER
RELAY**

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL





SPECIFICATIONS

PORT SIZES: Inlet and Outlet: WM499C. 1-1/4" NPTF

Control. 1/4" NPTF

Control Supply 1/8" NPTF

MAXIMUM OPERATING PRESSURE. 150 PSI (1034,2 kPa)

OPERATING TEMPERATURE* -20°F to 200°F (-28,9°C to 93,3°C)

FLOW RATING. . . . 1400 SCFM @ 100 PSI (39,7 m³/min @ 690 kPa)

PRESSURE REQUIRED TO OPEN VALVE 30%-35% of Supply

MOUNTING. By Inlet and/or Outlet Ports

MOUNTING ATTITUDE Control Port Up Recommended

MATERIALS: Body Castings Die Cast Aluminum Alloy

Diaphragm. Fabric-Reinforced Buna N

O-Rings. Buna N

Poppet Molded Buna N with Aluminum Backing

NET WEIGHT. 3 lbs. 5 oz. (1,5 kg)

*For continuous operation beyond this range, contact factory.

PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY
1	COVER (102064)	1
* 2	DIAPHRAGM	1
3	DIA. PLATE (102066)	1
4	SHAFT	1
* 5	O-RING	1
* 6	POPPET	1
* 7	O-RING	1
8	COVER	1
9	SPRING	1
10	BODY	1
11	SCREW	4
12	SCREW	6
13	FITTING	1
14	WASHER	10
* 15	RETAINING RING	1

Service this unit with repair kit number 114461.
*Asterisk designates parts included in repair kit.

TO ORDER, SPECIFY

WM499 _____
Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	PORT SIZE	
		OUTLET A	INLET B
WM499 C	113470	1½" NPTF	1¼" NPTF