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REVISED 04/08/11

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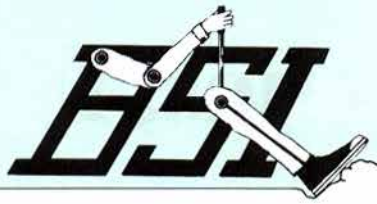

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INDEX (CONT.)

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SECTION GUIDE

SECTION	DESCRIPTION
1	CHECK VALVES
2	AIR SCALES
3	BRAKE CONTROL VALVE
4	MODULATING VALVES
5	PRESSURE HOLDING VALVES
6	PRESSURE REGULATORS
7	QUICK RELEASE VALVES
8	RELAY VALVES
9	TRANSMISSION SHIFTS
10	TREADLES
11	UNIVERSAL VALVES
12	ENGINE CONTROLS
13	ACCESSORIES & TANKS

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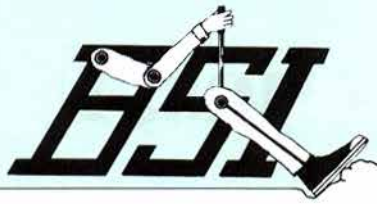

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SECTION INDEX

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SECTION 1: CHECK VALVES

WM-80

WM-83

WM-412

WM-413

WM-639

WM-774

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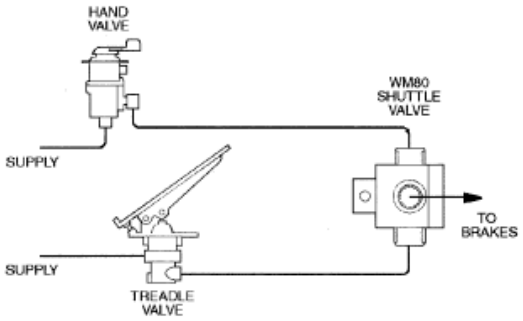
WM80 SERIES

WM80A
3/8 INCH
SHUTTLE VALVE

DESCRIPTION

The WM80 is a bracket-mounted shuttle valve engineered for applications which operate with a moderate air flow rate. It functions as a double check valve, allowing two pressure sources to independently supply a single outlet. As long as there is a pressure differential between the two inlets, the shuttle seals off the one with the least pressure. WM80 valves are available with the option of an additional port for installation of a pressure gage or switch. This shuttle valve is commonly used in air brake systems where a hand valve and a treadle are both used to control the same function.



SPECIFICATIONS

Port size	3/8-18 NPTF
Maximum supply pressure	150 PSI (1034 kPa)
Operating temperature	-20ºF to 200ºF (-29ºC to 93ºC)
Flow rating	200 SCFM @ 100 PSI (5,4 m^3/min @ 690 kPa)
Mounting	Bracket
Mounting attitude	Optional
Materials: Body castings	Iridited die cast zinc alloy
Shuttle	Brass
Shuttle chamber	Brass
O-rings	Buna N
Weight	15 oz (0,4 kg)

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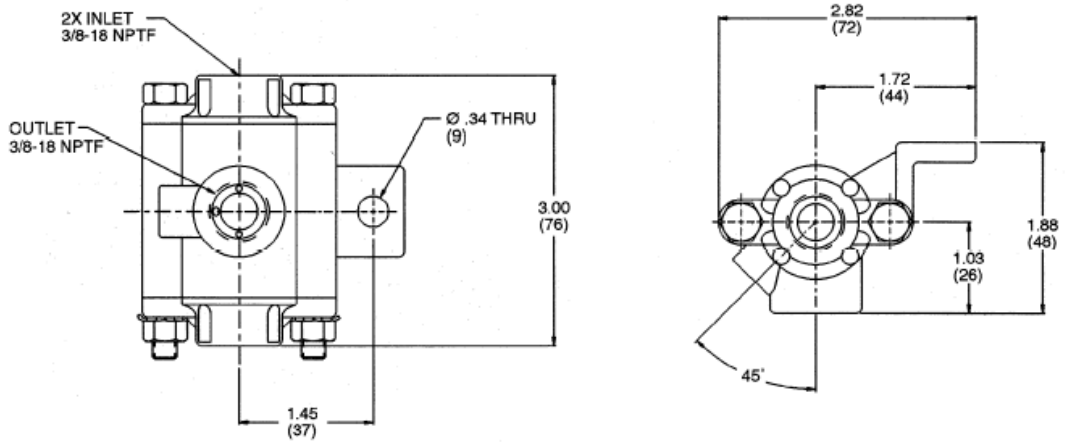
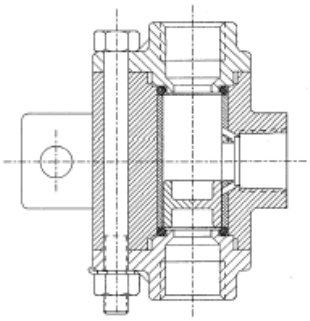
DIMENSIONAL DATA



CROSS SECTION



To order specify **WM80**__(suffix) _____(part number). Select suffix and part number below

Suffix	Part Number	Description
WM80 *	111231	Shuttle valve without auxiliary port
WM80A	111232	Shuttle valve with auxiliary port for gage or switch

*Manufactured by Williams Controls

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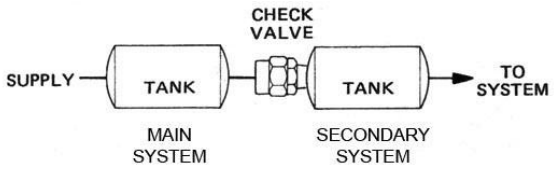
WM83 SERIES

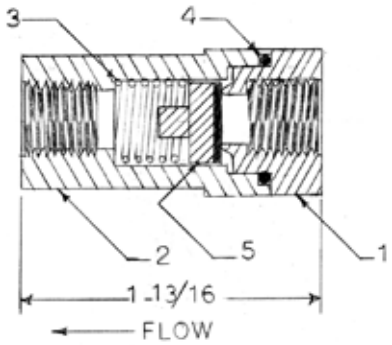
PRODUCT DESCRIPTION

This check valve series is designed for air circuits utilizing small pipe sizes, 1/8" and 1/4" NPT. Companion items include WM34, 55 Rotary, WM147 Relay, WM200 Anti Jacknife Tee, WM219 Dash Valve, WM224 Modulating Dash Control, WM331 Foot control, WM342 Pop Off, WM366 Quick Release, VM371 Lever Button, WM448 Cylinders, WM449 Cylinders, WM498 Module Dash Controls, WM637 Cylinders, etc.

CHECK VALVE

TYPICAL INSTALLATION

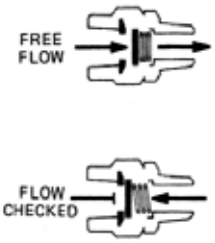




PART NO.			WM83A	WM83B
INLET N.P.T.			¼"	⅛"
OUTLET N.P.T.			¼"	⅛"
DWG. NO.	NAME	QTY.	PART NO.	PART. NO.
1	INLET BODY	1	101295	101273
2	OUTLET BODY	1	101248	101247
3	SPRING	1	101021	101021
4	O-RING	1	116443	116443
5	POPPER	1	103879	103879

Service this unit with repair kit R83.
* Asterisk designates parts included in repair kit.

FUNCTIONAL DIAGRAM



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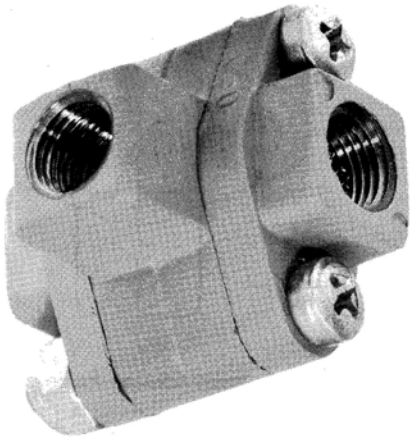
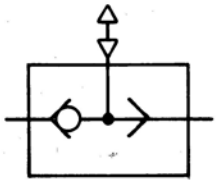
WILLIAMS CONTROLS INC.

WM412A 1/8 INCH SHUTTLE VALVE

34 SCFM @ 100 PSI

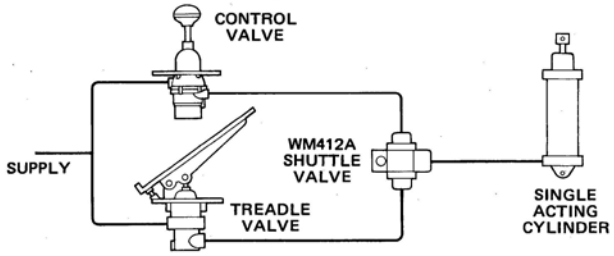


I.S.O. SYMBOL



DESCRIPTION

The WM412A is a bracket-mounted shuttle valve with a 34 SCFM flow capacity. It functions as a double check valve, allowing two pressure sources to independently supply a single outlet. The WM412A is equipped with an elastomer shuttle which moves freely back and forth in an internal chamber connecting the valve's two inlet ports. As long as there is a pressure differential between the two inlets, the shuttle seals off the one with the lesser supply pressure. This allows air flow and backflow between the inlet with the greater supply pressure and the outlet, but prevents air from flowing between the valve's two inlet ports.

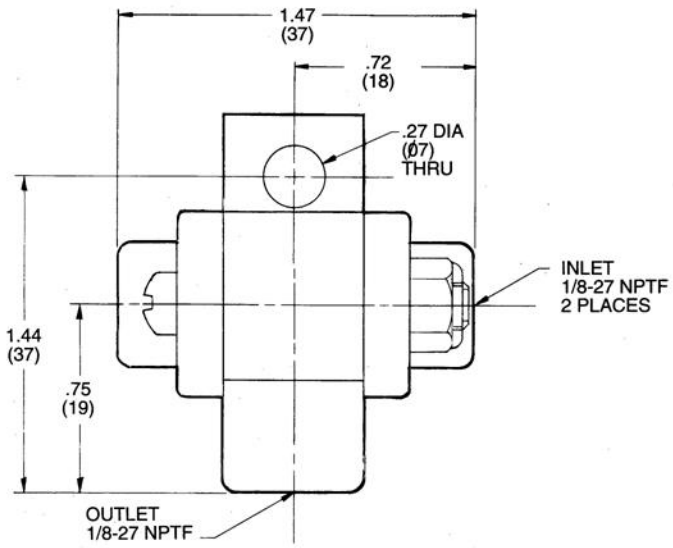


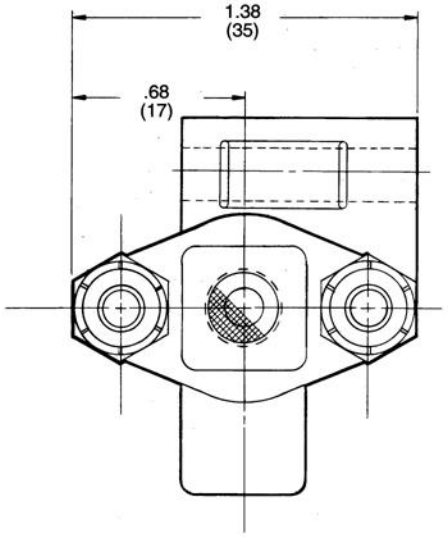
SPECIFICATIONS

PORT SIZE	1/8-27 NPTF
MAXIMUM OPERATING PRESSURE	150 PSI (1034 kPa)
FLOW RATING	34 SCFM @ 100 PSI (1 m^3/min @ 690 kPa)
OPERATING TEMPERATURE	-20°F to 200°F (-29°C to 93°C)
MOUNTING	Bracket
MOUNTING ATTITUDE	Optional
MATERIALS: Body Castings	Die Cast Zinc Alloy
Shuttle	Buna N
O-Rings	Buna N
WEIGHT	4 oz. (1,0 kg)

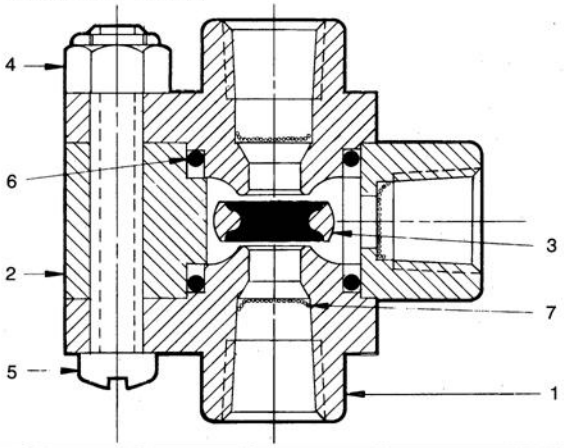
119884
REV. A 10/91

DIMENSIONAL DATA





SECTIONAL VIEW



ITEM	DESCRIPTION	PART NUMBER	QTY.
1	End Cap	102923	2
2	Bracket Body	102924	1
3	Poppet	102925	1
4	Nut	114564	2
5	Screw	114707	2
6	O-Ring	116345	2
7	Screen	116455	3

ORDERING INFORMATION

TO ORDER, SPECIFY WM412A

PART NUMBER 112841

WILLIAMS CONTROLS, INC.

14100 SW 72ND AVENUE, PORTLAND, OREGON 97224

TEL: (503) 684-8600, TELECOPIER: (503) 684-8610

WILLIAMS CONTROLS INC.

WM413 SERIES

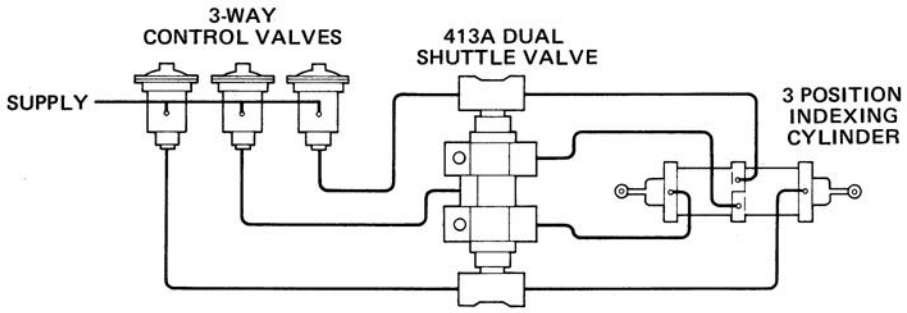
PRODUCT DESCRIPTION

DESCRIPTION The WM413A is a bracket-mounted dual shuttle valve engineered for industrial and vehicular applications which operate with a low air flow rate. WM413A valves are composed of two WM412A valves mounted on a common body with a tee on either end, giving them a total of seven ports.

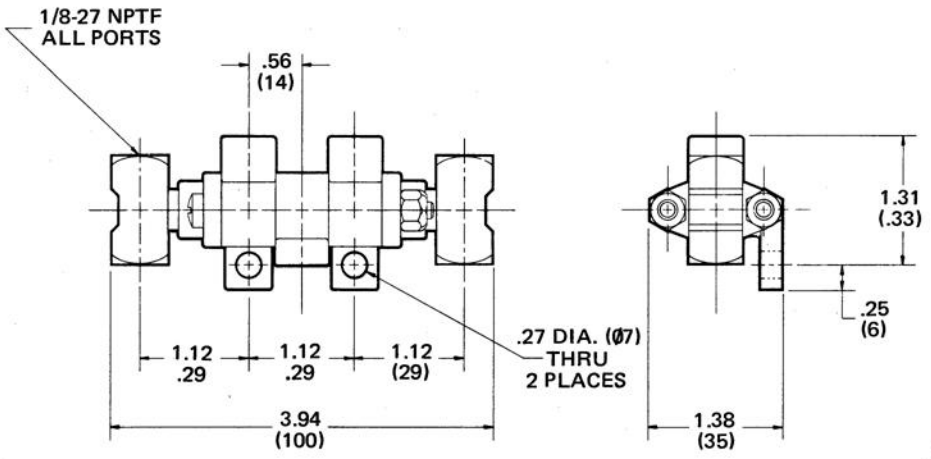
OPERATION The WM413A shuttle valve is equipped with three inlet ports and four outlets. A pressure signal introduced at one of the inlets will cause air to flow to two specific outlet ports, as illustrated in the functional diagram. Air pressure is prevented from flowing from one inlet port to another by two elastomer shuttles within the valve.

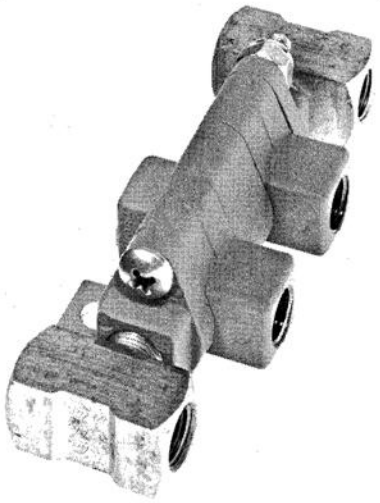
APPLICATION WM413A shuttle valves are designed for use in the control systems of indexing cylinders. The valve allows two cylinder ports to be simultaneously pressurized by a single air signal, greatly reducing the complexity of the indexing cylinder's control circuit and the number of lines required to the control valve.

TYPICAL INSTALLATION



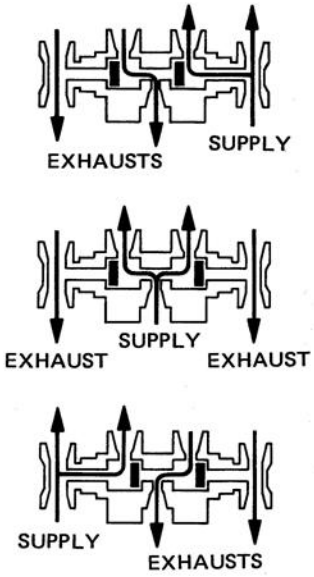
EXTERNAL CONFIGURATION



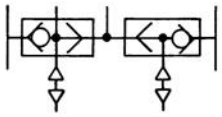


DUAL SHUTTLE VALVE

FUNCTIONAL DIAGRAM



I. S. O. SYMBOL



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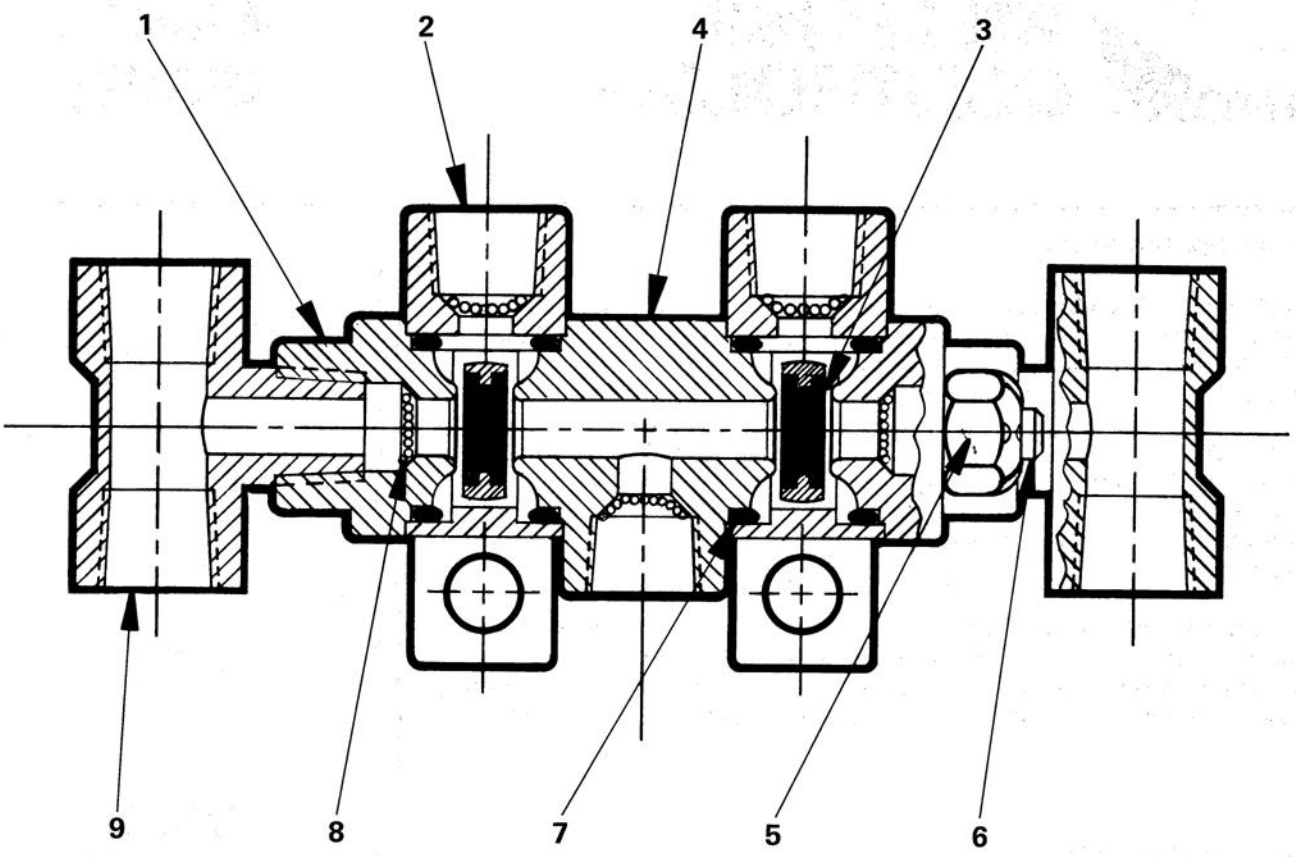
14100 SW 72ND AVENUE, PORTLAND, OREGON 97224, TEL: (503) 684-8600, TELECOPIER: (503) 684-8610

119883
REL. 9/80



PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	END CAP	2
2	BRACKET BODY	2
* 3	POPPET	2
4	CENTER BODY	1
5	NUT	2
6	SCREW	2
* 7	O-RING	4
8	SCREEN	5
9	PIPE TEE	2

Service this unit with repair kit number 114353.
*Asterisk designates items included in repair kit.

SPECIFICATIONS

PORT SIZE . . . . . 1/8-27 NPTF
MAXIMUM OPERATING PRESSURE. . . . . .150 PSI (1034, 2 kPa)
FLOW RATING. . . . . 35 scfm @ 100 PSI (0,9 m^3min @ 690 kPa)
OPERATING TEMPERATURE* . .-20°F to 200°F (-28, 9°C to 93, 3°C)
MOUNTING. . . . . Integral Bracket
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Shuttles . . . . . Buna N
O-rings . . . . . Buna N
NET WEIGHT. . . . . 9 ounces (0,3kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM413A

Model Number

PART NUMBER 112848

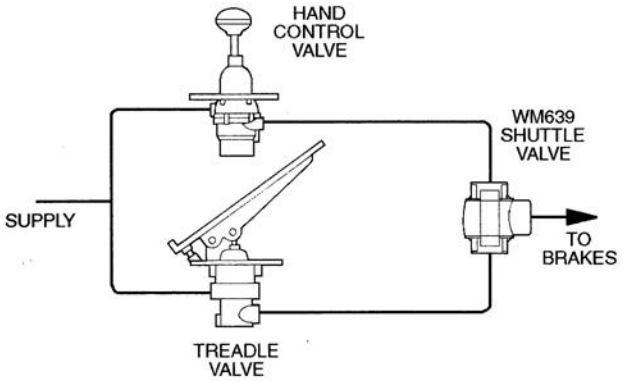
WILLIAMS CONTROLS INC.

WM639 Series 3/8 Inch Shuttle Valve

130 SCFM @ 100 PSI

DESCRIPTION

The WM639 is an in-line shuttle valve engineered for applications with a low to moderate air flow rate. It functions as a double check valve, allowing two pressure sources to independently supply a single outlet. The WM639 is equipped with a die cast zinc shuttle which moves freely back and forth in a chamber connecting the valve's two inlet ports. As long as there is a pressure differential between the inlets, the shuttle seals off the one with the least supply pressure. This valve in commonly used in air brake systems in which a hand valve and a treadle are both used to control the same function.

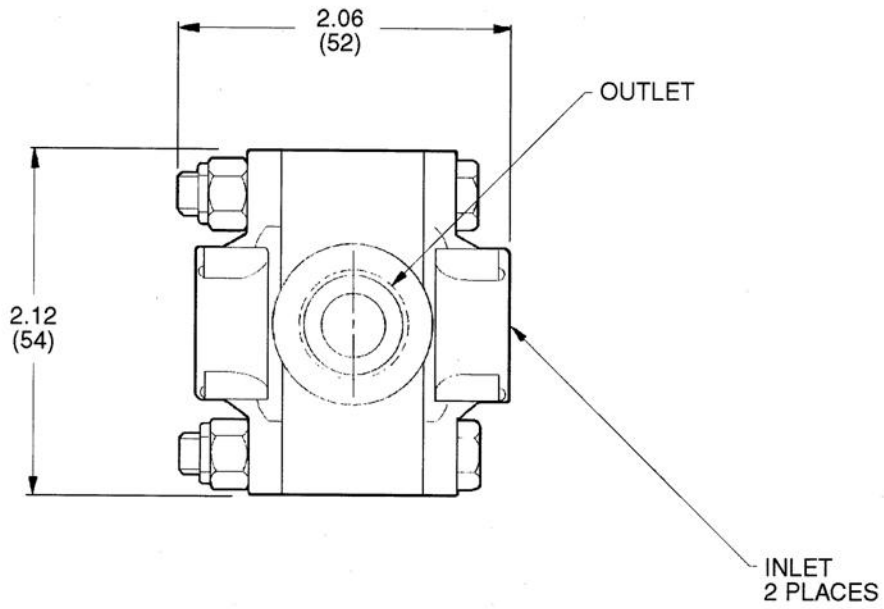


SPECIFICATIONS

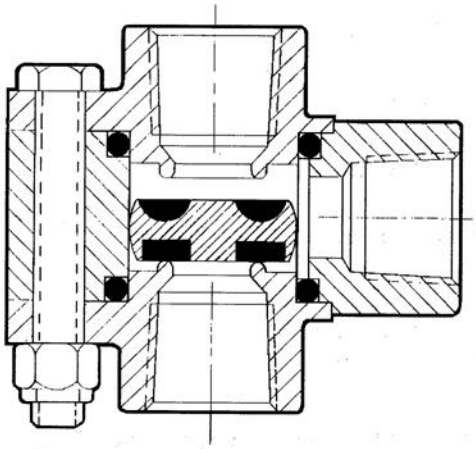
Port size	3/8-18 NPTF
Maximum supply pressure	150 PSI (1034 kPa)
Operating temperature	-20°F to 200°F (-29°C to 93°C)
Flow rating	130 SCFM @ 100 PSI (3,5 m^3/min @ 690 kPa)
Mounting	In-line
Mounting attitude	Optional
Materials: Body castings	Iridited die cast zinc alloy
Shuttle	Buna N bonded to zinc alloy
O-rings	Buna N
Weight	7 oz (0,2 kg)

Document Number 119882 Rev B. 9/96

DIMENSIONAL DATA



CROSS SECTION



ORDERING INFORMATION

To order, specify **WM639A**, part number 113934.

WILLIAMS CONTROLS INDUSTRIES, INC. 14100 SW 72nd Avenue Portland, Oregon USA 97224 (503) 684-8600 Fax (503) 684-8610

WM774 SERIES

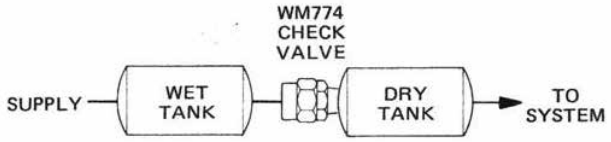
PRODUCT DESCRIPTION

DESCRIPTION The WM774A is a lightweight aluminum check valve engineered for industrial and vehicular applications which operate with a moderate air flow rate. WM774A valves can be installed directly into air reservoirs or mounted in-line.

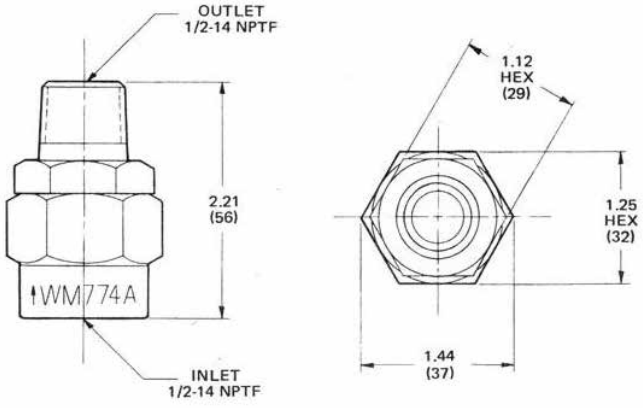
OPERATION The WM774A check valve allows air flow from the inlet to the outlet, with minimum restriction, as long as air pressure is greater at the inlet than at the outlet. When inlet pressure falls below outlet pressure, a spring-loaded stainless steel poppet seats on an elastomer-bonded metal ring to seal off the inlet port and prevent reverse flow.

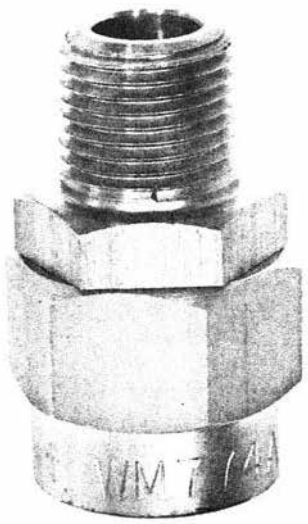
APPLICATION WM774A series check valves are used to protect downstream pneumatic circuits from pressure loss due to upstream pressure depletion. The male threading on the WM774A outlet port makes valve ideal for installation directly into air reservoir inlets to maintain pressure in the event of negative fluctuations in supply pressure. Note: A check valve should not be installed directly downstream from a compressor without the use of a pulse-isolating reservoir.

TYPICAL INSTALLATION



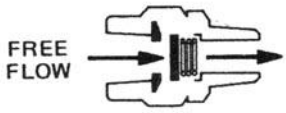
EXTERNAL CONFIGURATION

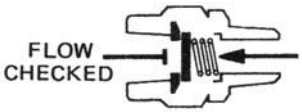




1/2 INCH CHECK VALVE

FUNCTIONAL DIAGRAM





I.S.O. SYMBOL

Available from Brake Systems Inc.

SECTION 1
13

REV. DATE: 2010.06.16

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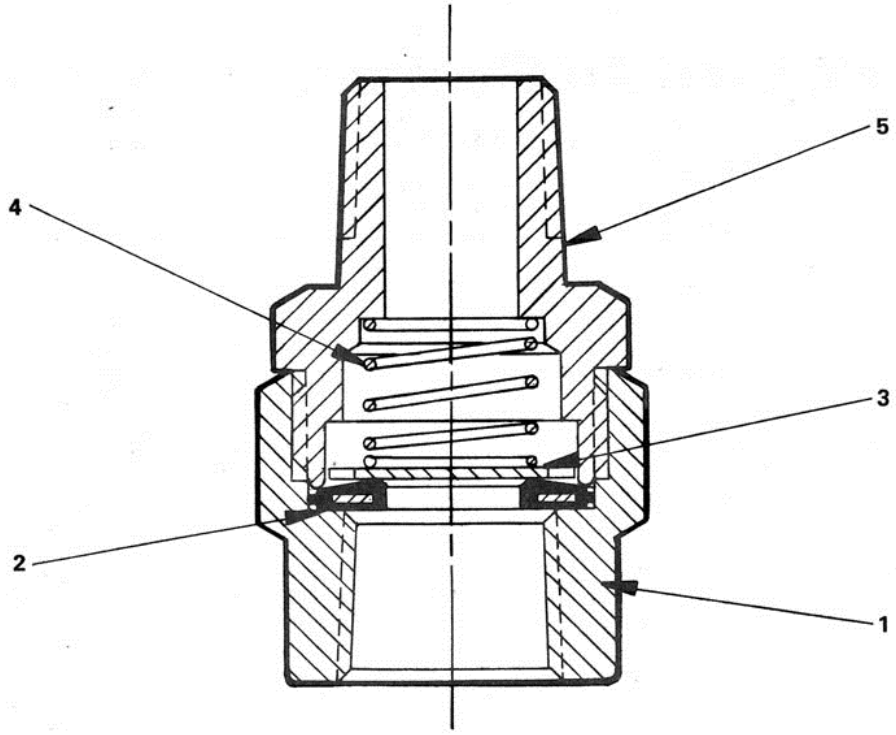

PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	INLET BODY	1
2	POPPET SEAT	1
3	POPPET	1
4	SPRING	1
5	OUTLET BODY	1
This item is classified as a non-repairable unit.		

SPECIFICATIONS

PORT SIZE: Inlet . . . . . 1/2-14 NPTF (female)
Outlet . . . . . 1/2-14 NPTF (male)
MAXIMUM OPERATING PRESSURE. . . . . 150 PSI (1034, 2 kPa)
FLOW RATING. . . . . 180 scfm @ 100 PSI (4,9 m^3min @ 690 kPa)
OPERATING TEMPERATURE. . -40°F to 250°F (-40,0°C to 121,1°C)
MOUNTING. . . . . In-line
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Valve Body . . . . . Aluminum
Poppet . . . . . Stainless Steel
Poppet Seat . . . . . Buna N Bonded To Aluminum
NET WEIGHT. . . . . 2 Ounces (0,06 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM774A
Model Number
PART NUMBER 117005

Available from Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

SECTION 2: AIR SCALES

WM-653

WM-654

BRAKE SYSTEMS, INC.
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BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WM653 SERIES

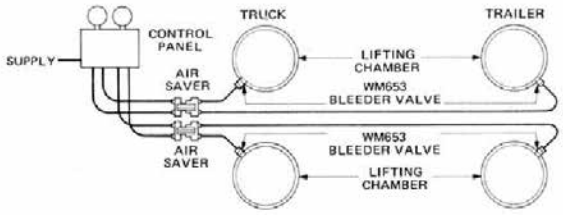
PRODUCT DESCRIPTION

DESCRIPTION WM653 bleeder valves are engineered for use in conjunction with Williams air scales. They function to control pressurization of scale lifting chambers to conform with the load which is being weighed.

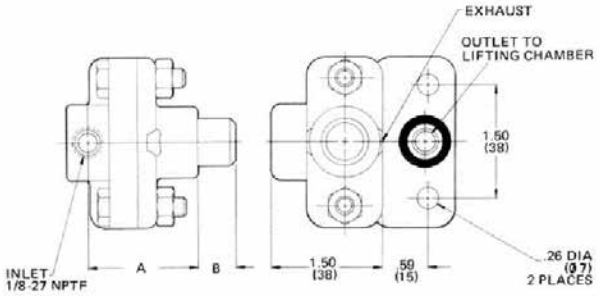
OPERATION A WM653 bleeder valve is factory installed on each air scale lifting chamber. The WM653 allows air to flow into the chamber until it is sufficiently pressurized to lift the load. When the chamber rises, the bleeder valve stem is held down by an internal spring to open the valve's exhaust port. The exhausting of supply pressure delivered to the chamber causes a gage on the air scale control panel to stabilize, indicating to the operator that the chamber has lifted the load.

APPLICATION WM653 bleeder valves are designed for use with Williams air scales. Two models are available with the two lifting chamber sizes. Appropriate bleeder valves are included with purchase of air scale kits and lifting chambers.

TYPICAL INSTALLATION

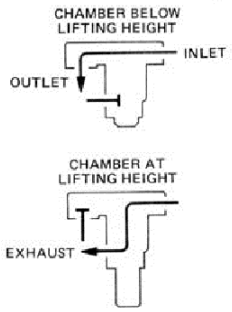


EXTERNAL CONFIGURATION

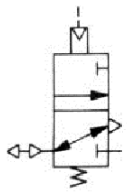


AIR SCALE BLEEDER VALVE

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2011.01.19

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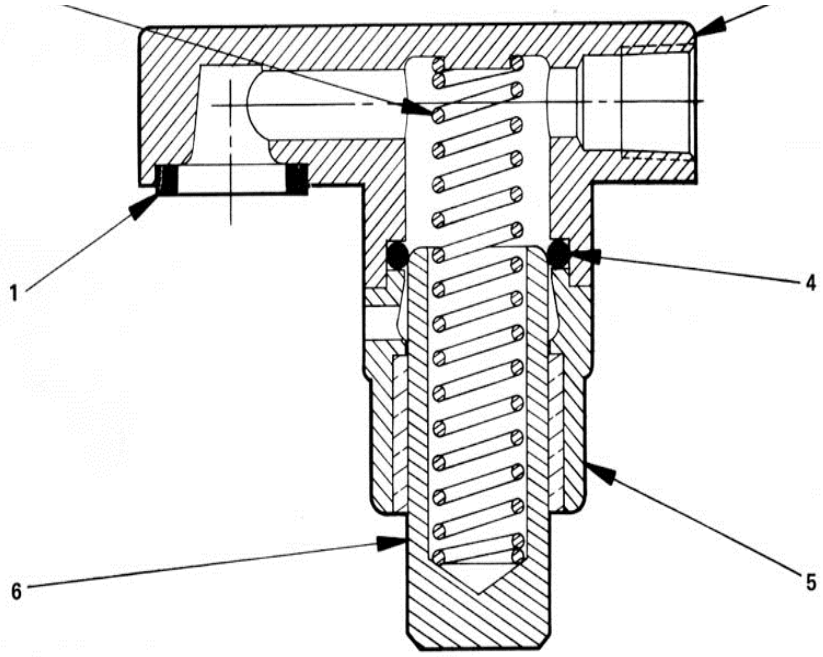
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com



PARTS IDENTIFICATIONS		
ITEM	DESCRIPTION	QTY.
* 1	SEAL	1
2	VALVE BODY	1
* 3	SPRING	1
* 4	O-RING	1
* 5	STEM	1
6	GUIDE COVER	1
N.A.	SCREW	2
N.A.	NUT	2

Service the WM653C with repair kit number 114514. Service the WM653D with repair kit number 114515.
*Asterisk indicates items included in repair kit.

SPECIFICATIONS

PORTS: Inlet . . . . . 1/8-27 NPTF
Outlet . . . . . Gasket Seal
MAXIMUM OPERATING PRESSURE . . . . . 150 PSI (1034,2 kPa)
OPERATING TEMPERATURE* . . -20°F to 200°F (-28,9°C to 93,3°C)
MOUNTING. . . . . Secured To Lifting Chamber
MOUNTING ATTITUDE . . . . . Horizontal
MATERIALS: Body Castings . . . . . Die Cast Aluminum Alloy
Valve Stem . . . . . Stainless Steel
O-Ring . . . . . Buna N
NET WEIGHT: WM653C . . . . . 7 oz. (0,2 kg)
WM653D . . . . . 8 oz. (0,2 kg)

*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM653___

Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	FOR LIFTING CHAMBER	A	B
WM653 D	113979	WM652A	1.99 in. (50,6 mm)	.74 in. (18,8 mm)

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WM654 SERIES

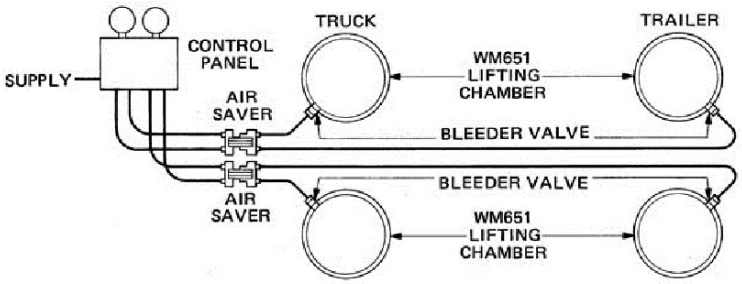
PRODUCT DESCRIPTION

DESCRIPTION TheWM654A is an air saver valve engineered for use in conjunction with Williams air scales. Air savers maintain up to 80% of the air in one of the lifting chambers while the other set is being used. This allows multiple weight checks to be made without the necessity of repeatedly recharging the chambers.

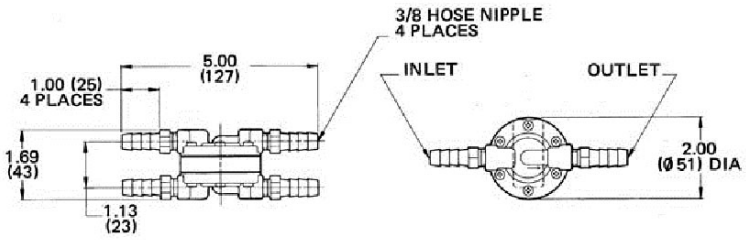
OPERATION WM654A air savers are equipped with two internal diaphragms, two inlets and two outlets. The diaphragms function to direct air flow from a pressurized inlet to the corresponding outlet, and to prevent any other flow through the valve. This allows air to be held in a lifting chamber for subsequent weight checks while another chamber is being pressurized.

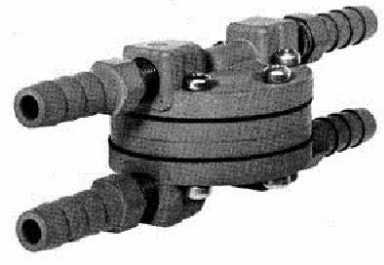
APPLICATION WM654A air saver valves are designed for use with vehicular air scales. One air saver is used for each set of lifting chambers and is installed between the air scale control panel and the first lifting chamber. WM654A valves are included with applicable Williams air scale kits.

TYPICAL APPLICATION



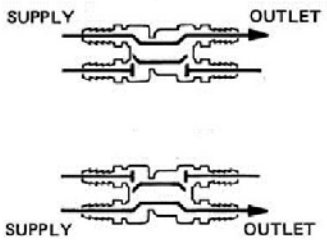
EXTERNAL CONFIGURATION



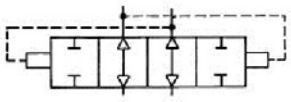


AIR SAVER VALVE

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2011.01.19

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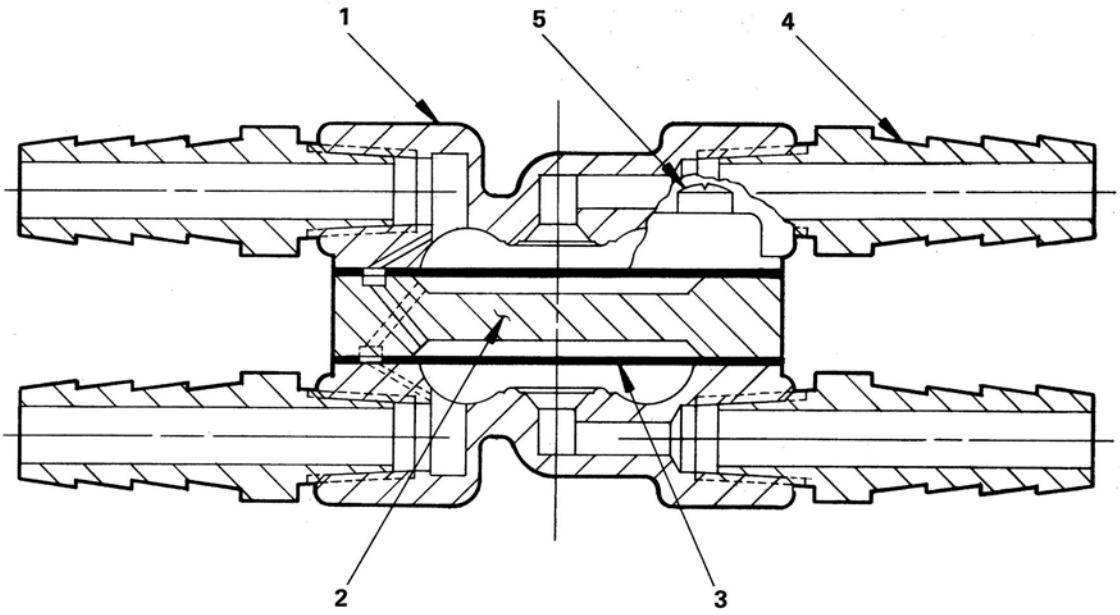
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com



PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	LOWER BODY	2
2	CENTER BODY	1
* 3	DIAPHRAGM	2
4	HOSE NIPPLE	4
5	SCREW	12

Service this unit with repair kit number 114516.
*Asterisk designates items included in repair kit.

SPECIFICATIONS

PORT SIZE . . . . . 3/8" Hose Fittings
MAXIMUM OPERATING PRESSURE . . . . . 150 PSI (1034,2 kPa)
OPERATING TEMPERATURE* . . -20°F to 200°F (-28,9°C to 93,3°C)
FLOW RATING . . . . . 20 SCFM @ 100 PSI (0,5 m^3/min @ 690 kPa)
MOUNTING . . . . . In-Line
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Diaphragms . . . . . Fabric-Reinforced Buna N
NET WEIGHT . . . . . 12 oz. (0,3 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM654A

Model Number

PART NUMBER 113981

Manufactured in the USA by Brake Systems Inc.

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2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

SECTION 3: BRAKE CONTROL VALVES

FAST BRAKE KIT

WM-81

WM-271

WM-321

WM-325

WM-385

WM-420

WM-498

WM-672

WM-674

WM-762

WM-763

WM-777

BRAKE SYSTEMS, INC.
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Brake Systems, Inc.

BRAKE SYSTEMS

FOR MULTIPLE UNIT COMBINATIONS

- Ultra Fast Application
- Anti-jackknife Timing
- Breakaway Protection
- Fast Brake Release
- Less Stopping Distance

Williams®

DEPENDABLE PERFORMANCE POWER BRAKE CONTROLS

REV. DATE: 11/11/09

Brake Systems, Inc.

The Williams *FAST BRAKE KIT* meets the demands of longer combination vehicles with the best in Air Brake Components...

Performance requirements of vehicles and their stopping machinery are in a perpetual state of evolution. Here at Williams we are constantly at work to provide Pneumatic Control Systems to meet needs of all new developments in the trucking industry.

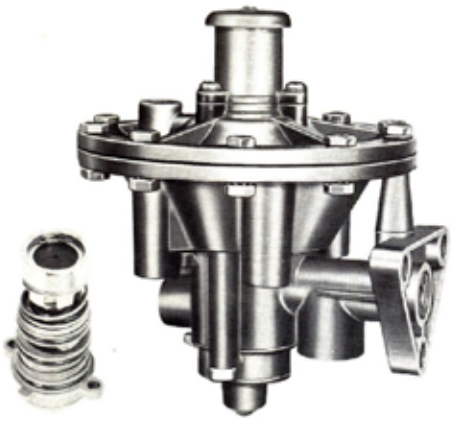
Recently many logging companies began doubling and tripling off-highway payloads under certain conditions by using up to five trailers. Obviously trains like these could not operate without a braking system that could provide ultra fast application and anti-jackknife timing.

By combining the WM-101 Relay Emergency (I.C.C.-193.43) Valve with the WM-320-A Amplifying Relay, Williams has designed an ideal fast brake kit for multiple trailer combinations shown in Figure A.

The Fast Brake System has been found to decrease trailer brake lag time by *40% over conventional systems. Think of driving a large trailer train with brakes reacting fast like those on your passenger car. This system is now available in a pre-plumbed version with all components mounted on a standard size air tank.

Installation in the field will normally require only 30 minutes: (1) Remove existing trailer or dolly tank (with relay) and substitute pre-plumbed assembly, or: (2) Add additional components to your existing equipment. Wherever you choose to install this system (on trailer or dolly) it will speed up your brakes both on the rearward vehicle as well as the forward vehicle.

*On a standard 20 MPH stop this can mean a reduced stopping distance of as much as 10 to 15 feet.



WM-101 RELAY EMERGENCY VALVE

Originally developed to meet off-highway performance requirements and I.C.C. safety regulations (I.C.C.-193.43) this valve is now being used as the basis for safety stopping systems for multiple unit combinations. The WM-101 has been refined and improved since its inception and now offers many exclusive new features including limited emergency application pressure to chambers. This reduces air consumption and eliminates high pressure strain on hoses, diaphragms, slack adjusters, shoes and drums. It will not "dynamite" into an emergency application as trailer braking effort is proportional to the drop of truck reserve pressure. Application is ultra-fast.

WM-320-A AMPLIFYING RELAY

Complementing the WM-101, this new valve reduces transmission time of the control signal from truck to trailer and from trailer to trailer . . . particularly critical in combinations with more than one trailer. By using the exclusive ejector principle a fresh application signal is sent to the next trailer in lieu of the "tired" truck signal. Fast release of trailer brakes is provided by an individual quick release port. Relay type construction dead ends the tractor application signal, providing breakaway protection for each vehicle.

"Specializing in Manufacture and Distribution of BSI Air, Electronic Throttles and Exhaust Brakes"

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

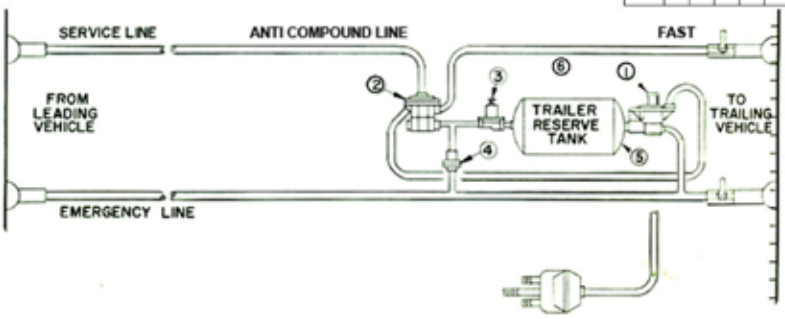
LOW MAINTENANCE COSTS

Important wearing surfaces in Williams valves are chrome plated to provide extra long life. The control diaphragm is of nylon reinforced material to provide relative insensitivity to dust. Service is simple, as the cartridge contains all working parts and may be changed in five minutes or less. There are no lines to disconnect and admit dirt.

FAST BRAKE KITS for TRAILER TRAINS (W/O SPRING BRAKES)

WM-346 A or C for two trailer trains.
WM-346 B or D for three or more trailer trains.

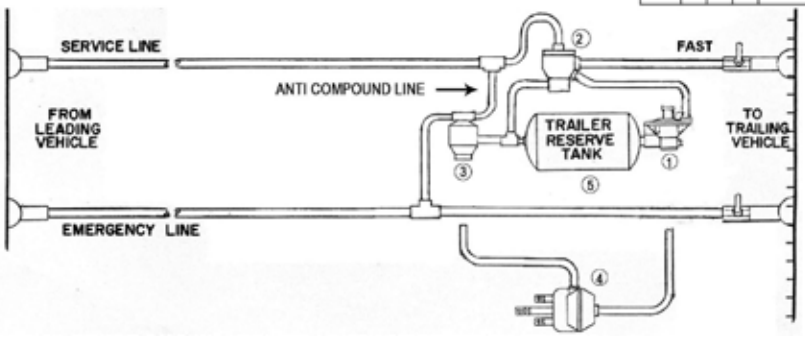
WM-346 TRAILER FAST KITS W/O SPRING BRAKES					
NO	A	B	C	D	DESCRIPTION
1	1	1	1	1	WM-101-A RELAY EMERGENCY VALVE
2	1	—	1	—	WM-320-A AMPLIFYING VALVE
2	—	1	—	1	WM318A AMPLIFYING VALVE
3	1	1	1	1	WM-87 BREAKAWAY VALVE
4	1	1	1	1	WM-97-C CHECK VALVE
5	—	—	1	1	WM-341-B AIR TANK
6	—	—	1	1	PREPLUMBED



FAST BRAKE KITS for TRAILER TRAINS (W/ SPRING BRAKES)

WM-346 E or G for two trailer trains.
WM-346 F for three or more trailer trains.

WM-346 TRAILER FAST KITS W/ SPRING BRAKES				
NO	E	F	G	DESCRIPTION
1	1	1	1	WM227F SERVICE BRAKE RELAY
2	1	—	1	WM320A AMPLIFYING RELAY
2	—	1	—	WM318A RATIO AMPLIFYING RELAY
3	1	1	1	KN26000 SPRING BRAKE RELAY
4	1	1	—	GC 3030 P40 SPRING/SERVICE CHAMBER
5	1	1	1	WM341D AIR TANK OR HALDEX 19810



Brake Systems, Inc.

ULTRA-FAST BRAKE APPLICATION • LESS STOPPING DISTANCE

With combinations of trailers measuring 98 feet in length now operating on turnpike freeways and even larger combinations on private logging roads, excessive brake lag time is a serious problem. To meet this challenge a complete Williams Systems can provide 50# of air pressure on the rearmost brake chamber in less than one-half second* after the driver steps on the brake.

ANTI-JACKKNIFE FEATURES

By applying trailer brakes in the proper sequence, Williams Systems keep jackknifing skids from developing. Brake ratio features of the WM-320A or 318-A Amplifying Valve cause rear brakes to "come on" at the same time as the front brakes.

BREAKAWAY PROTECTION

Each vehicle is provided with breakaway protection. This is not an I.C.C. requirement but is an additional safety feature proven to be desirable. If the rear vehicle breaks away, stopping ability is still maintained and controlled by the remaining combination. This feature is not found in conventional systems.

FAST BRAKE RELEASE

Fast release of trailer brakes is a result of the Quick Release Feature designed into each amplifying relay WM-320-A. Each trailer signal is exhausted "on the spot" without being required to bleed out through the exhaust port of the tractor brake valve. Three to four times faster trailer brake release is normal — no dragging brakes to wear out your lining (and $$$).

*on two-trailer combinations (98' long) with Williams WM-323 Tractor Protection Kit on the power unit and WM-346-A Brake Kit on each trailer.

DEPENDABLE PERFORMANCE **Williams** POWER BRAKE CONTROLS

BRAKE SYSTEMS INC. PHONE: 503-236-2116
2221 NE HOYT ST. TOLL: 800-452-5734
PORTLAND, OR 97232 FAX: 503-239-5005

EMAIL: BRAKESYSTEMS@BRAKESYSTEMSINC.COM
WEBSITE: WWW.BRAKESYSTEMSINC.COM

NOW MANUFACTURED BY

"Specializing in Manufacture and Distribution of Air, Electronic Throttles and Exhaust Brakes"

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

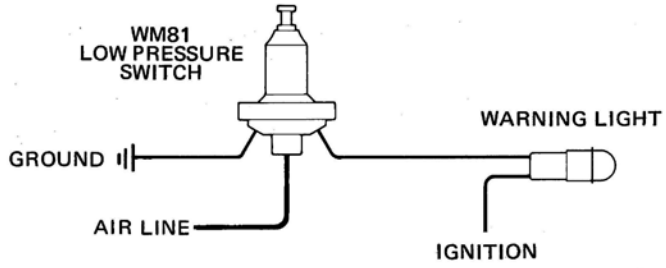
PRODUCT DESCRIPTION

DESCRIPTION The WM 81 series consists of non-grounded switches that respond to a drop of air pressure below a preset level. The WM 81 switches feature an adjustment that allows the actuation setting to be modified. The switches are shipped from the factory with this setting preadjusted to 50-60 PSI (344,7-413,7 kPa). When the pressure drops below the preset value, these switches activate a light or buzzer to indicate that a low pressure condition exists.

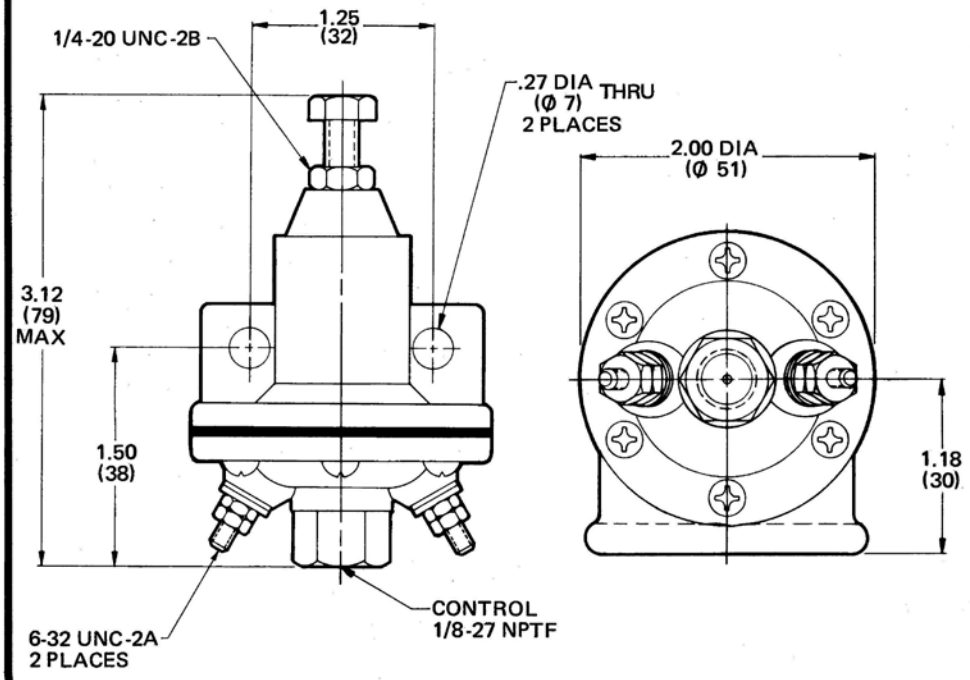
OPERATION When the control pressure exceeds the preset level, a diaphragm in the switch holds the contacts in the open position. If the pressure decreases below this level, the diaphragm is spring-returned and the contacts close. A customer-supplied light or buzzer warns the operator of the low pressure condition.

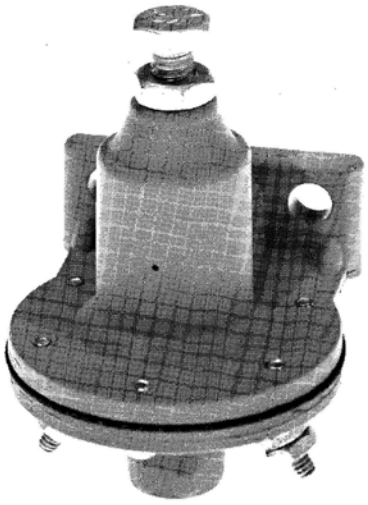
APPLICATION The WM 81 series single-pole, single-throw switches are commonly installed as signal devices in pneumatic braking systems. Designed for low voltage (6-24 VDC), low amperage applications, these switches are frequently used to activate a warning light or buzzer when a low pressure condition exists in the vehicle's air brake system. The WM 81 series is not UL approved.

TYPICAL INSTALLATION



EXTERNAL CONFIGURATION





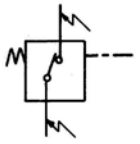
ADJUSTABLE PRESSURE SWITCH

FUNCTIONAL DIAGRAM

CONTROL PRESSURE
BELOW PREADJUSTED SETTING

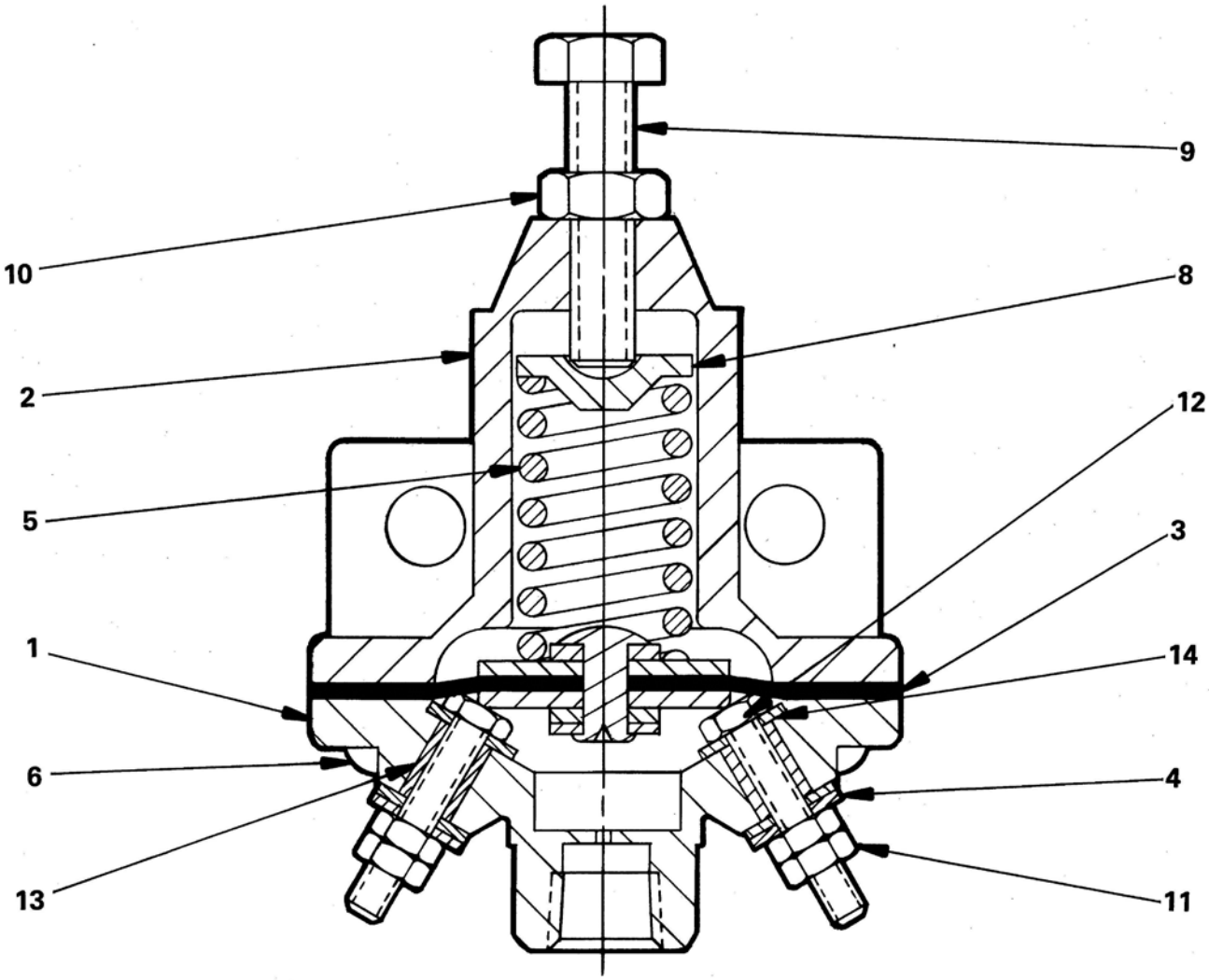
CONTROL PRESSURE
ABOVE PREADJUSTED SETTING

I.S.O. SYMBOL



WILLIAMS CONTROLS, INC.
14100 SW 72ND AVENUE, PORTLAND, OREGON 97224, TEL: (503) 684-8600, TELECOPIER: (503) 684-8610

119955
REL. 9/79



PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	BODY	1
2	COVER	1
3	DIAPHRAGM ASSEMBLY	1
4	WASHER	2
5	SPRING	1
6	SCREW	6
8	SPRING SEAT	1
9	SCREW	1
10	NUT	1
11	NUT	4
12	SCREW	2
13	SLEEVE	2
14	INSULATOR	4

This component is classified as a non-repairable item.

SPECIFICATIONS

PORT SIZE . . . . . 1/8-27 NPTF
MAXIMUM OPERATING PRESSURE . . . . . 150 PSI (1034,2 kPa)
OPERATING TEMPERATURE* . . -20°F to 200°F (-28,9°C to 93,3°C)
ADJUSTABLE PRESSURE RANGE . . . . 20-30 PSI (137,9-206,8 kPa)
to 120-130 PSI (827,4-896,3 kPa)
PRESET PRESSURE TO OPEN CONTACTS . . 50-60 PSI (344,7-413,7 kPa)
MOUNTING. . Pipe Mtg. or Bracket Secured to Frame, Bulkhead, or Bracket
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Terminals, Contacts, & Contact Plate . . Silver-Plated Brass
Diaphragm . . . . . Fabric-Reinforced Buna N
NET WEIGHT. . . . . 8.0 oz. (0,2 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM81
Model Number
PART NUMBER 111237

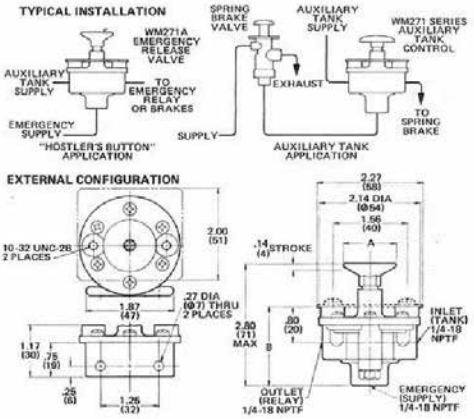
WM271 SERIES

PRODUCT DESCRIPTION

DESCRIPTION Available with various combinations of button actuators and escutcheon plates, the WM271 series valves are three-way, panel-mounted push button valves. These valves are available with or without return springs. On spring-returned models, the spring restores the valve to the normal position when the button is released. Other models must be manually returned to the normal position.

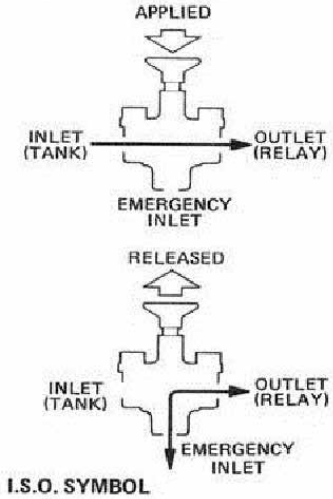
OPERATION as shown in the installation schematics below, the WM271 push button valve directs air pressure from one of two sources to a single outlet. When the button is in the normal released position, air flows between the emergency inlet port and the outlet (relay) port. Reverse flow is permitted. The operator depresses the button to close the emergency inlet and open the alternate inlet (tank) port. Pressure from the second supply source is then delivered to the outlet port. IMPORTANT: On spring-returned models, the operator must hold the button in the depressed position. On models without the return spring, the button will remain pushed in until (1) it is manually returned, or (2) the emergency inlet pressure becomes greater than the outlet pressure. When the emergency inlet pressure exceeds the downstream outlet pressure, the valve automatically returns to the normal position.

APPLICATION The diagrams below illustrate two ways that the WM271 series valves can be used in the braking system of heavy duty vehicles. When a trailer or dolly is disconnected, the WM271A is used as a "hostler's button" to control the application and release of the parking brakes. Before moving the trailer or dolly, the button is depressed to release the brake. The operator may then reapply the brakes without reconnecting any air lines. When the tractor lines are reconnected, the valve automatically returns to the normal position and the brakes are released. In the second application shown below, the WM271 valve is used to control the auxiliary air supply during an emergency release of the spring brakes. The WM271 valves can also serve as a three-way push button valves in industrial applications if the emergency inlet is used as an exhaust port.

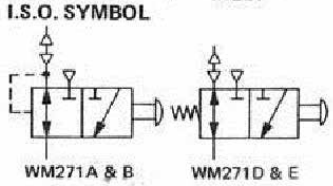


THREE-WAY PUSH BUTTON VALVE CONTROL

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2011.01.27

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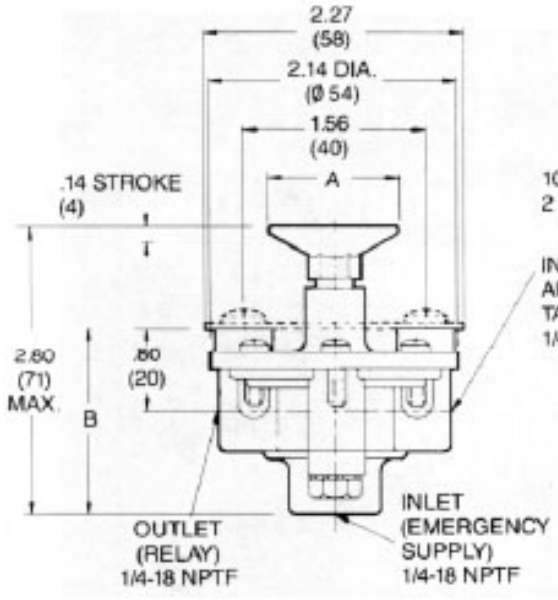
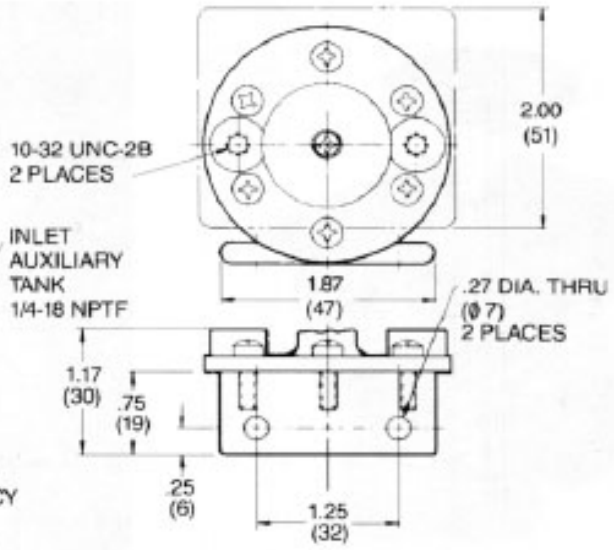
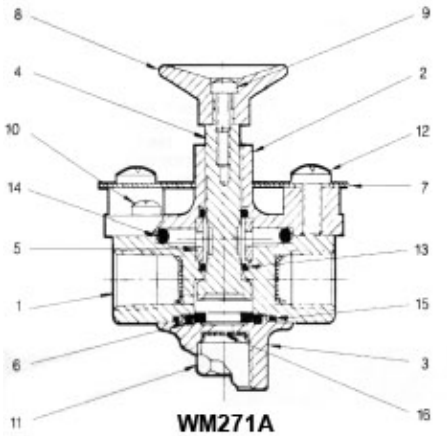
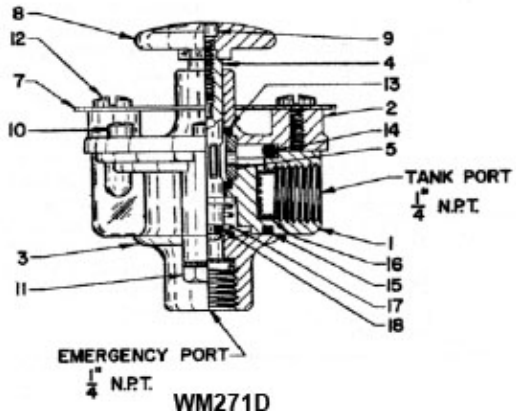






WM271A



WM271D

ITEM	DESCRIPTION	WM271A	QTY
1	Body	101905	1
2	Cover	103282	1
3	End Cap	101907	1
4	Stem	101908	1
5	Sleeve	101909	1
*6	Poppet	101910	1
7	Escutcheon Plate	103540	1
8	Button	102769	1
9	Screw	114651	1
10	Screw	119223	6
11	Screw	118899	2
12	Screw	116892	2
*13	O-Ring	116302	2
*14	O-Ring	116323	1
*15	O-Ring	116367	1
*16	Screen	116456	3

ITEM	DESCRIPTION	WM271D	QTY
1	Body	101905	1
2	Cover	103282	1
3	End Cap	103363	1
4	Stem (103364)	104580	1
5	Sleeve	101909	1
7	Escutcheon Plate	103271	1
8	Button (101173)	105373	1
9	Screw (114651)	114654	1
10	Screw (114657)	119223	6
11	Screw (114676)	118899	2
12	Screw (114803)	116892	2
*13	O-Ring (8019)	116302	2
*14	O-Ring	116323	1
*15	O-Ring (8019)	116367	2
*16	Screen	116456	2
17	Spring	103365	1
*18	O-Ring	116297	1

*Asterisk designates items included in repair kit. Service WM271A with repair kit R271AB and WM271D with repair kit R271DE.

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REV. DATE: 2011.01.27

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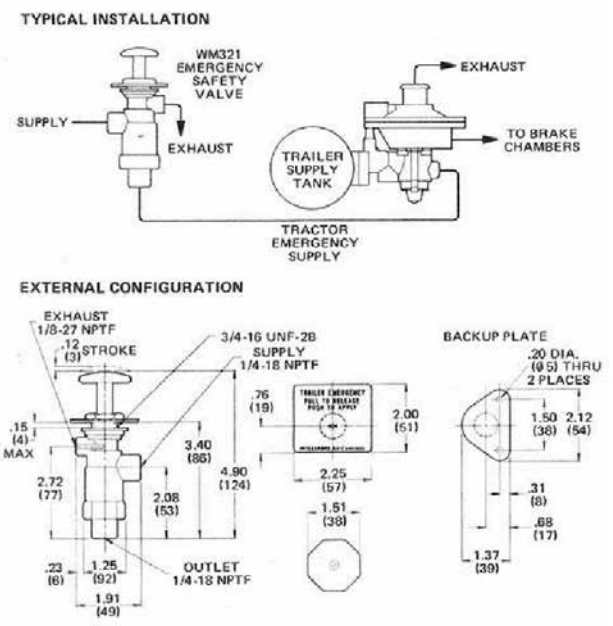
WM321 SERIES

PRODUCT DESCRIPTION

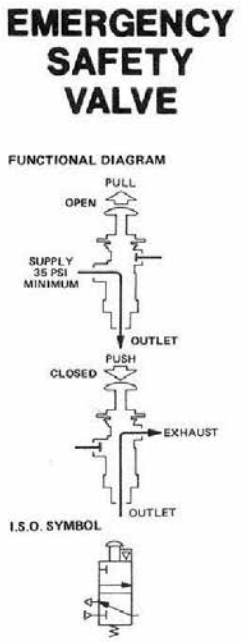
DESCRIPTION The WM321 is a panel-mounted, normally closed, three-way valve with a pull-to-open, push-to-close control knob. The WM321 requires a minimum supply pressure of 35 PSI (241,3 kPa) for operation, and automatically closes when supply pressure falls below that level.

OPERATION When adequate supply pressure is present and the WM321's control knob is pulled out, air is allowed to flow from the valve's inlet to its outlet. If the knob is pulled out when the supply pressure is below the required level of 35 PSI (241,3 kPa), the flow is blocked where the piston seats on the exhaust tube and the valve remains closed. When the knob is manually pushed in or the supply pressure depletes to the 35-45 PSI (241,3-309,3 kPa) range, the valve closes and any pressure at the outlet is released through the exhaust port.

APPLICATION The WM321 can be used in any industrial or vehicular system capable of supplying the required minimum of 35 PSI (241,3 kPa) of air pressure to the valve. The WM321 is often used to provide manual and automatic application of the trailer brakes in the vehicular air brake systems. When the WM321's control knob is pulled out, the brakes are released. If the supply pressure drops to the automatic application range or if the knob is pushed in, the brakes are applied. This is typically used with the relay emergency valve as the WM101 series where a "pull to release" function is desired.



EMERGENCY SAFETY VALVE



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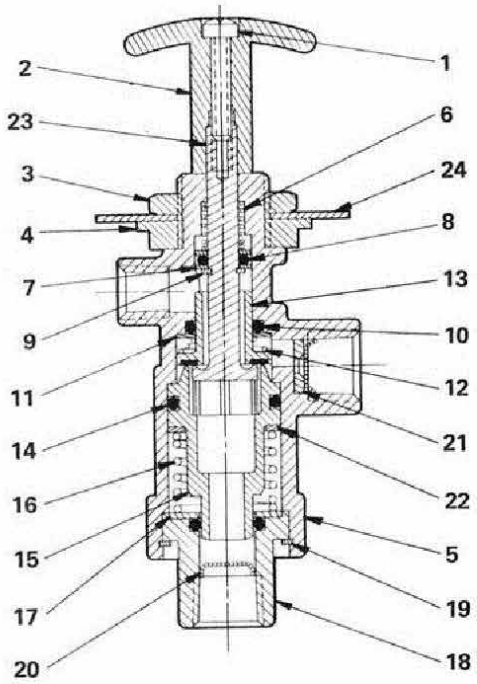

PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	SCREW (114989)	1
2	KNOB (105374)	1
3	NUT (114589)	1
4	MOUNTING COLLAR	1
5	BODY	1
6	SPRING	1
7	WASHER	2
* 8	O-RING	1
9	RETAINING RING	1
* 10	O-RING	2
11	WASHER	1
12	SPRING	1
* 13	EXHAUST SEAT TUBE	1
* 14	O-RING	1
15	PISTON	1
16	SPRING	1
17	WASHER	1
18	END CAP	1
19	RETAINING RING	1
* 20	SCREEN	2
21	RESTRICTOR	1
22	SHIM	1
23	STEM	1
24	ESCUTCHEON PLATE (103270)	1

Service this unit with repair kit number 114266.
*Asterisk designates items included in repair kit.

SPECIFICATIONS

PORT SIZES: Inlet & Outlet . . . . . 1/4-18 NPTF
Exhaust . . . . . 1/8-27 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:
Inlet to Outlet . . . . 20 SCFM @ 100 PSI (0,6 m^3/min @ 690 kPa)
Outlet to Exhaust . . 25 SCFM @ 100 PSI (0,7 m^3/min @ 690 kPa)
AUTO. APPLICATION PRESSURE . . . 35-45 PSI (241,3-309,3 kPa)
MOUNTING. . . .Secured to Panel w/ Mounting Nut or Two Fasteners
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
O-Rings. . . . . Buna N
Knob . . . . . Red Plastic
NET WEIGHT. . . . . 12 oz. (0,3 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM321
Model Number
PART NUMBER 112215

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WILLIAMS CONTROLS INC.

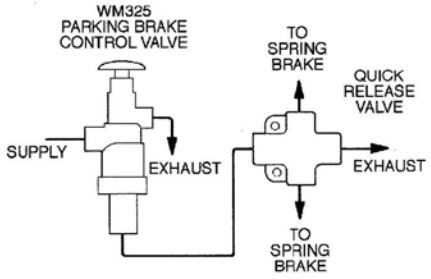
WM325 Series Parking Brake Control Valve

PULL TO RELEASE
PUSH TO APPLY
PRE-FMVSS-121 APPLICATIONS

DESCRIPTION

WM325 panel mounted valves are used as parking brake controls in pre-FMVSS-121 air brake systems in both on and off highway applications. They are normally closed, three-way valves with pull-to-open, push-to-close knob action.

A minimum supply pressure of 35 PSI is required before the WM325 can be manually operated. As long as pressure at the WM325's inlet exceeds 35 PSI and the valve is actuated, an integral check valve maintains outlet pressure at peak supply level. If inlet pressure falls below 35 PSI, the WM325 automatically deactivates and exhausts downstream pressure to apply the spring brakes.



SPECIFICATIONS

Port sizes:	Inlet and outlet	1/4-18 NPTF
	Exhaust	1/8-27 NPTF
Maximum supply pressure		150 PSI (1034 kPa)
Operating temperature		-20°F to 150°F (-29°C to 66°C)
Flow rating:	Inlet to outlet	20SCFM @ 100 PSI (0,6 m^3/min @ 690 kPa)
	Outlet to exhaust	25 SCFM @ 100 PSI (0,7 m^3/min @ 690 kPa)
Automatic application pressure		25-40 PSI (172-275 kPa)
Mounting		Panel mounted
Mounting attitude		Optional
Materials:	Body castings	Iridited die cast zinc alloy
	O-rings	Buna N
	Knob: WM325	Yellow plastic
	WM325D	Red plastic
Weight		12 oz (340 grams)

Document Number 119927 Rev B. 8/96

WM385 COMPLETE VACUUM KITS

WM385D
Vacuum/Hydraulic Control Kit

A trailer control kit for trucks with vacuum boosted hydraulic brakes pulling trailers with vacuum/hydraulic brake boosters and hydraulic foundation brakes. There are many variations of this basic diagram. Please contact the BSI engineering department for details.

WM420 COMPLETE AIR KITS

WM420E
Air Brake Kit, Hand Control

Adds a trailer control to trucks destined to pull air brake trailers. This kit is designed as an aftermarket addition to Non/Pre FMVSS121 air brake trucks with dual foot valves and twin air tanks (primary and secondary).

For trucks with other brake systems, contact BSI engineering for suggestions. WM606C1 is the standard hand control with gage that produces up to 120 PSI with full handle movement. It is also available in variations, 0–30, 0–60, 0–85 and *0–180.

*Usually for off highway operations such as logging machinery

Available from Brake Systems Inc.

REV. DATE: 2010.06.16

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WM385D Trailer Hand Control Kit*

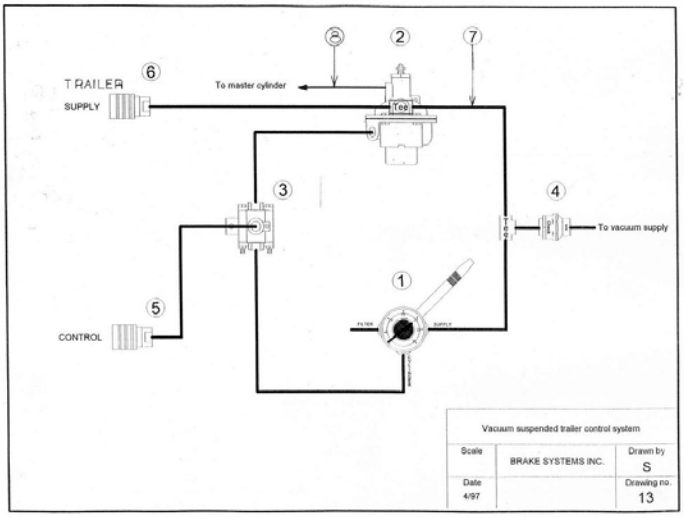
Vacuum/Hydraulic Trailer Brakes

Bill of Materials

Item	Quantity	Part Number	Description
1	1	WM37	Hand Control
2	1	WM573A	Synch Valve
3	1	WM80	Shuttle Valve
4	1	C11475	Check Valve
5	1	175002	Coupler, Vac
6	1	175002	Coupler, Vac
7	10'	NT10008BK	Nylon Tubing 1/2"
8	2	175006	Plug, Vac
9	1	3600x8	Tee
10	5	1868x8x8	1/2 Union - 1/2"
11	3	1868x8	1/2 Union - 1/2"
12	1	B412	Hyd. Line
13	2	1873x8x8	Bulkhead
14	2	3325x8	Nipple, Mtg.
15	1	7905**	Service Tee

*Use piping diagram dwg 13

**Choose adapter to fit customer's master cylinder



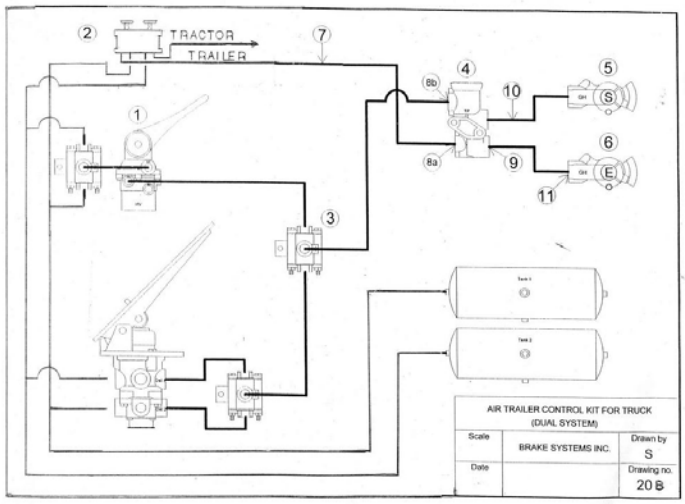
WM420E Air Trailer Hand Control Kit*

Typical Dual System Truck Plumbing

Bill of Materials

Item	Quantity	Part Number	Description
1	1	WM606C1	Hand Valve
2	1	800516	Dash Control
3	3	WM80	Shuttle Valve
4	1	279000	Tractor Protection
5	1	11461	Gladhand-S
6	1	11462	Gladhand-E
7	30'	NT10006BK	Nylon Tubing 3/8"
8	1	1868x6x6	Adapter, Half Union
9	1	1868x6	Adapter, Half Union
10	4	33806B-Y38	Hose End
11	20'	11001	Hose, Rubber 3/8"
12	2	11403	Terminal Bolt
13	2	11601	Spring

*Use piping diagram dwg 20B



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WM498 SERIES

PRODUCT DESCRIPTION

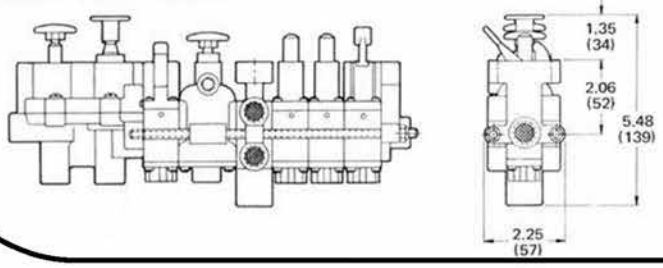
The WM498 series comprise a variety of push button, rocker, toggle, and knob-actuated valves. With end caps, spacing blocks, and supply manifolds, the WM498 series valves are grouped together in multiple valve manifold panel assemblies.

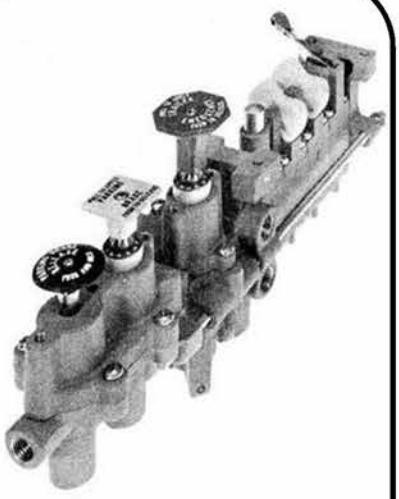
Each manifold assembly required a WM498 assembly kit to unite the assembly components. The WM 498 valves have integral aligning pins on mating surfaces and are held together by two tie bolts that run the full length of the assembly. The tie bolts, O-ring seals, and extra aligning pins are supplied in the WM498 assembly kits.

With the exception of the end-mounting units, all of the WM498 series valves have "straight-through" supply passages that allow the panel assembly to be fed by a single supply source. To seal the supply passage between two components, the WM498 series is designed with O-ring grooves on supply passage interfaces.

Air pressure is supplied to the assembly through a WM498A and cap or a WM498D supply manifold. To mount the WM498A end cap on the assembly, extra aligning pins are required in certain installations. Supplied in the assembly kits, these pins are used to connect the end cap's female mounting surface to another female surface. In this type of installation, two O-rings must be used. The WM498D supply manifold is available either as a series-mounting unit (WM498D) or as an end-mounting unit (WM498D1).

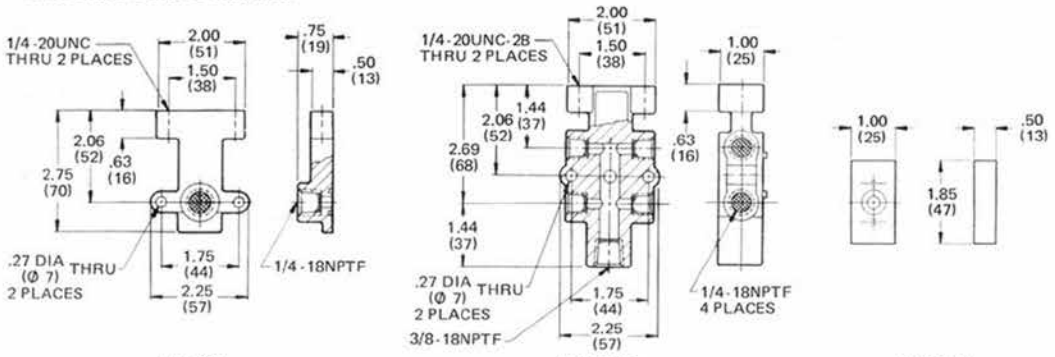
TYPICAL INSTALLATION





MULTIPLE VALVE MANIFOLD PANEL ASSEMBLY

EXTERNAL CONFIGURATION



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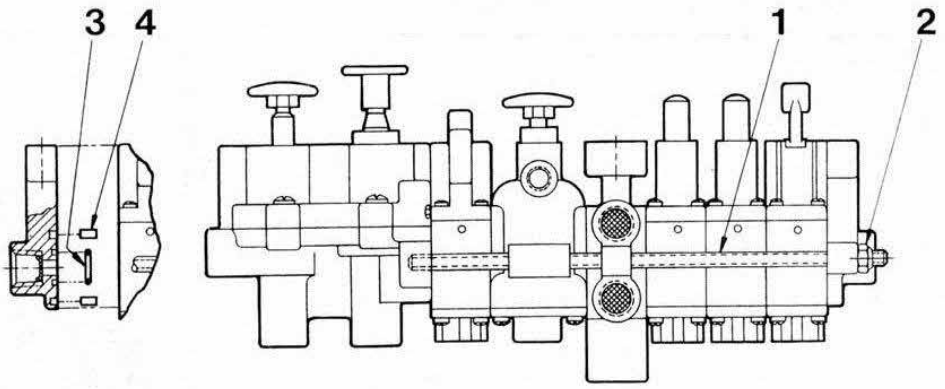


PARTS IDENTIFICATION				
ITEM	WM498K1		WM498K2	
	DESCRIPTION	QTY.	DESCRIPTION	QTY.
1	9 INCH TIE BOLT	2	18 INCH TIE BOLT	2
2	LOCKNUT	2	LOCKNUT	2
3	O-RING	6	O-RING	12
4	PIN	2	PIN	2

HOW TO ORDER

Review the information on the WM498 series to determine which valves and assembly components will best satisfy your requirements.

Two WM498A end caps are usually required for each manifold panel assembly. However, use of an end-mounting component eliminates the need for one of these end caps.

Depending on how many components you have selected, including end caps, spacing blocks, and supply manifolds, order either the WM498K1 or the WM498K2 assembly kit. The WM498K1 is used for manifold panels of up to 6 components, and the WM498K2 is used for assemblies of 7 to 12 components. Order one assembly kit for each manifold assembly.

In addition to the valve components and assembly kits, some factory pre-assembled control panels are available. Check the current Williams Air Controls price list for available configurations.

TO ORDER, SPECIFY

WM498 ____

Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	DESCRIPTION
WM498 A	104075	END CAP
WM498 D	104067	SUPPLY MANIFOLD (Series-Mounting)
WM498 D1	104480	SUPPLY MANIFOLD (End-Mounting)
WM498 X	106554	½ INCH SPACING BLOCK
WM498 K1	117930	ASSEMBLY KIT (For up to 6 Components)
WM498 K2	117931	ASSEMBLY KIT (For 7 to 12 Components)

Manufactured in the USA by Brake Systems Inc.

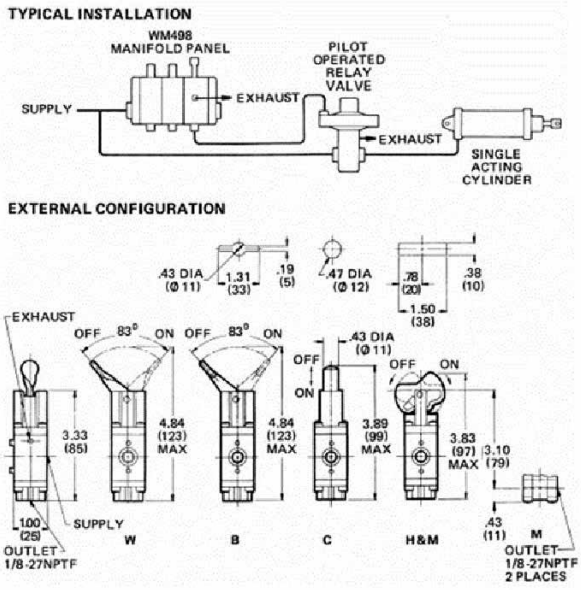
WM498 B,C,H,M&W

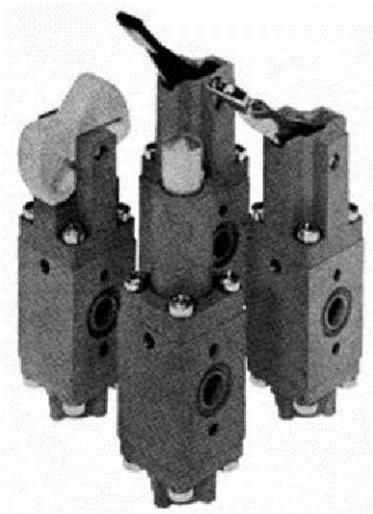
PRODUCT DESCRIPTION

DESCRIPTION The WM498B,C,H,M, and W are components of the WM498 series control panel assemblies. They are gang mounted, sheer action valves available with either toggle, rocker, or push button actuators. The toggle and rocker actuated units are two-position, manually operated, three-way valves. The push button version is a spring returned, normally closed, three-way valve. Retained by the tie rods and locknuts supplied in the assembly kits, these valves are mounted in manifold assemblies.

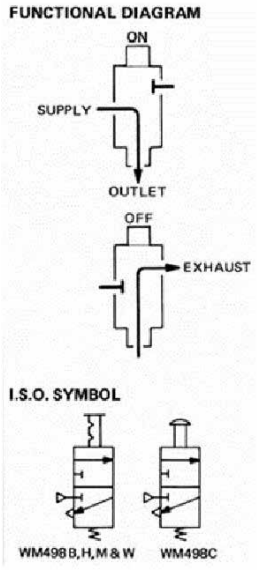
OPERATION The operation of these valves depends on two internal working parts. These are the poppet, which opens or closed the exhaust port, and the stem, which opens or closes the supply port. Flipping the toggle or rocker to the "on" position or depressing the push button causes the poppet to seat on the stem. This closes the exhaust port and moves the stem downward to open the supply port. When the toggle or rocker is flipped to the "off" position or the push button is released, the stem is returned by an internal spring to close the supply port. At the same time, the poppet is lifted off the stem and spring-returned, which opens the exhaust port.

APPLICATION The WM4988,C,H,M and W are universal application valves designed for controlling small air cylinders, relay valves, or air-operated accessories in industrial or vehicular pneumatic systems.





THREE-WAY ACCESSORY VALVE



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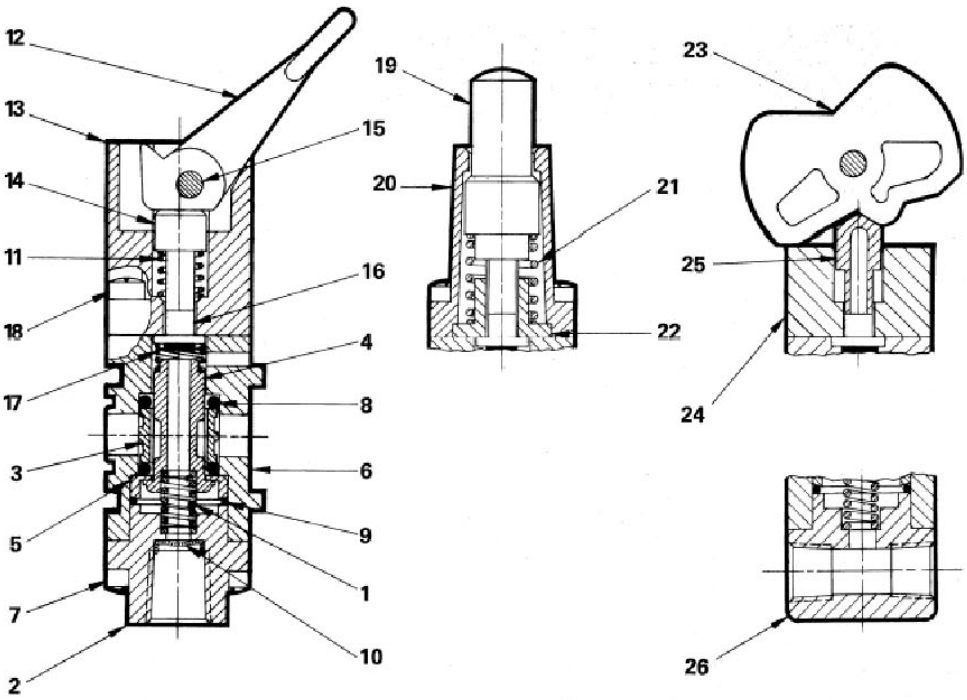

PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	SPRING	1
2	OUTLET BODY	1
3	SPOOL	1
* 4	STEM	1
* 5	SEAL RETAINER	1
6	MAIN BODY	1
* 7	SCREW	4
* 8	O-RING	2
* 9	O-RING	1
10	SCREEN	1
11	SPRING	1
12	LEVER (WM498B & W)	1
13	UPPER BODY	1
14	PUSH ROD	1
15	PIN	1
* 16	POPPET	1
* 17	EXHAUST SPRING	1
18	SCREW	4
19	PUSH BUTTON (WM498C)	1
20	UPPER BODY	1
21	SPRING	1
22	POPPET GUIDE	1
23	ROCKER (WM498H & M)	1
24	UPPER BODY	1
25	PUSH ROD	1
26	OUTLET BODY (WM498M)	1

Service this unit with repair kit number 100980.
*Asterisk designates parts included in repair kit.

SPECIFICATIONS

PORT SIZE . . . . . 1/8-27 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. . . . . 15 SCFM @ 100 PSI (0,4 m^3/min @ 690 kPa)
MOUNTING. . .Between Two Components in Control Panel Assembly
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body . . . . . Die Cast Aluminum Alloy
O-Rings and Poppet. . . . . Buna N
NET WEIGHT. . . . . .5.5 oz. (0,2 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM498___
Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	DESCRIPTION
WM498 B	104474	TOGGLE VALVE (Plastic Lever)
WM498 C	104475	PUSH BUTTON VALVE
WM498 H	104621	ROCKER VALVE (Single Outlet)
WM498 M	105142	ROCKER VALVE (Dual Outlet)
WM498 W	117683	TOGGLE VALVE (Steel Lever)

Manufactured in the USA by Brake Systems Inc.

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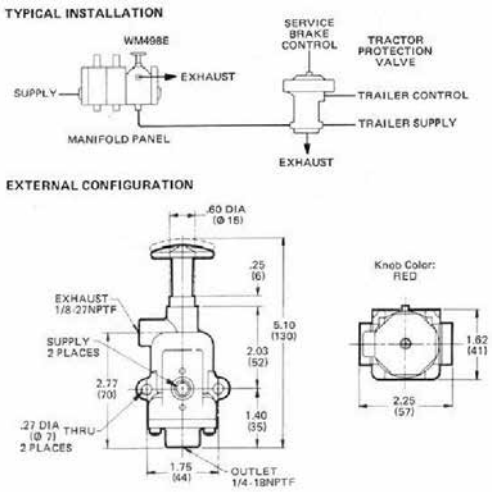
WM498E

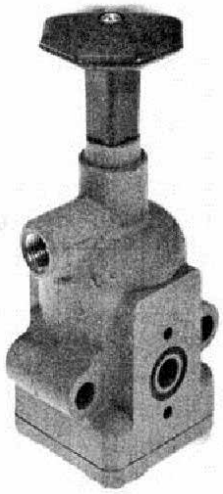
PRODUCT DESCRIPTION

DESCRIPTION The WM498E is a component of the WM498 series manifold panel assemblies. The WM498E is a gang-mounted, three-way valve with pull-to-open, push-to-close action. When the supply pressure exceeds a nominal 35PSI (241,3 kPa), the valve may be manually opened or closed; when the supply pressure drops below 35-45 PSI (241,3-310,3 kPa), the valve will automatically close.

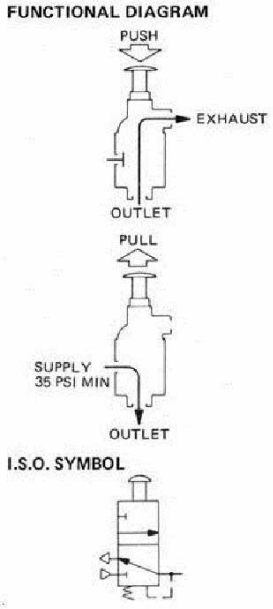
OPERATION the WM498E is a spring-returned, normally closed valve that requires a minimum supply pressure of 35 PSI (241,3 kPa) before the valve can be manually opened. When adequate pressure is present and the valve knob is pulled, air flows from the supply port to the outlet port. If the knob is pulled when the supply pressure is below the minimum, the flow of the air is blocked by the piston seated on the exhaust tube. When the supply pressure decays below the minimum holding pressure, or the button is manually pushed in, the supply port closes. Any pressure at the outlet port is released through the exhaust port

APPLICATION as a part of a WM498 manifold panel, the WM498E can be used in most industrial or vehicular pneumatic brake systems. The WM498E is commonly used as a trailer emergency valve in air brake systems of heavy duty vehicles. In these applications, the button is pushed to exhaust air pressure to the emergency line supplying the trailer(s). The WM498E must not be used in FMVSS-121 applications.





EMERGENCY SAFETY VALVE

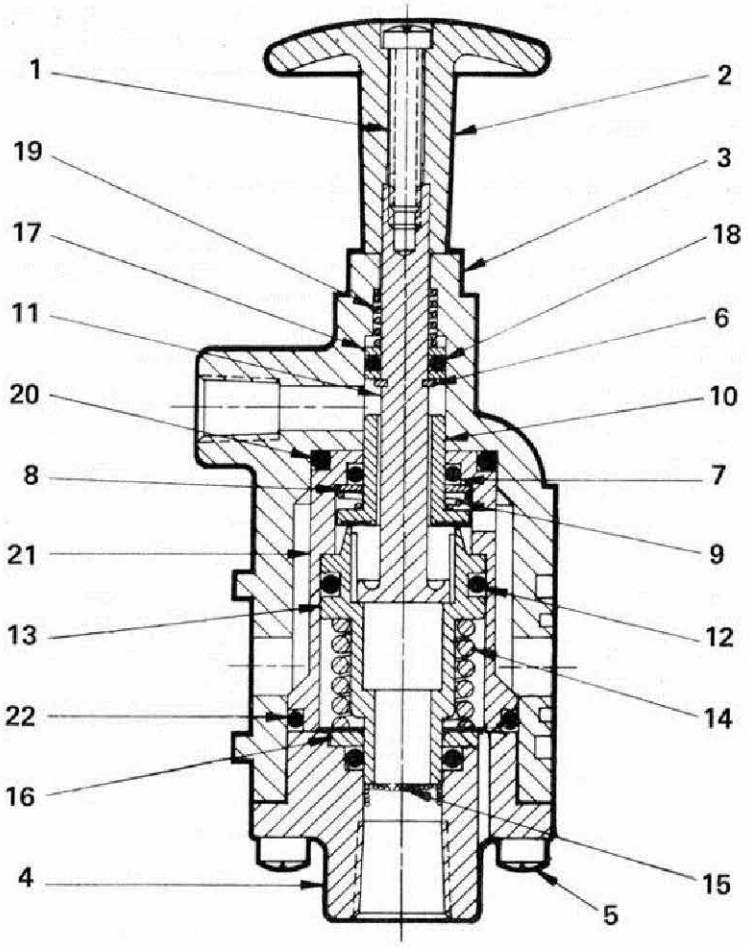


Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	SCREW	1
2	KNOB	1
3	MAIN BODY	1
4	END CAP	1
5	SCREW	4
6	RETAINING RING	1
* 7	O-RING	2
8	WASHER	1
9	SPRING	1
10	EXHAUST SEAT TUBE	1
11	STEM	1
* 12	O-RING	1
13	PISTON	1
14	SPRING	1
15	SCREEN	1
16	WASHER	1
17	WASHER	2
* 18	O-RING	1
19	SPRING	1
* 20	O-RING	1
21	BYPASS INSERT	1
* 22	O-RING	1

Service this unit with repair kit number 114375.
*Asterisk designates parts included in repair kit.



SPECIFICATIONS

PORT SIZES: Inlet/Outlet . . . . . 1/4-18 NPTF
Exhaust . . . . . 1/8-27 NPTF
MAXIMUM OPERATING PRESSURE. . . . . 150 PSI (1034,2 kPa)
OPERATING TEMPERATURE* . . -20°F to 150°F (-28,9°C to 65,6°C)
FLOW RATING:
Supply-to-Outlet . . 20 SCFM @ 100 PSI (0,6 m^3/min @ 690 kPa)
Outlet-to-Exhaust. . 25 SCFM @ 100 PSI (0,7 m^3/min @ 690 kPa)
MOUNTING. . . . . As Part of WM498 Panel Assembly
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body . . . . . Die Cast Aluminum Alloy
O-Rings and Seals. . . . . Buna N
NET WEIGHT. . . . . 12 oz. (0,3 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM498E
Model Number
PART NUMBER 104917

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

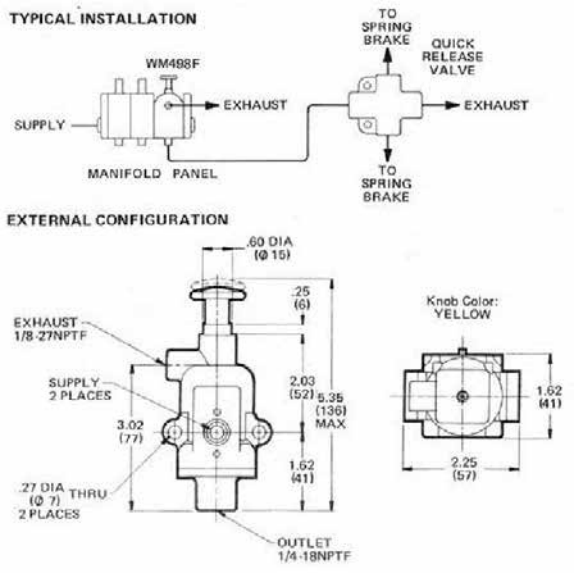
WM498F

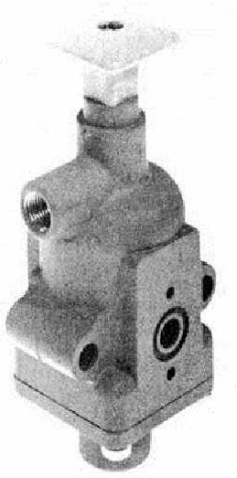
PRODUCT DESCRIPTION

DESCRIPTION The WM498F is a component of the WM498 series manifold panel assemblies. The WM498F is a gang-mounted, three-way valve with pull-to-open, push-to close action. When the supply pressure exceeds a nominal PSI (241,3 kPa), the valve may be manually opened or closed; if the supply pressure drops below25-35 PSI (172,4-241,3 kPa), the valve will automatically close. As long as the valve is open, an internal check valve maintains the outlet pressure at peak supply.

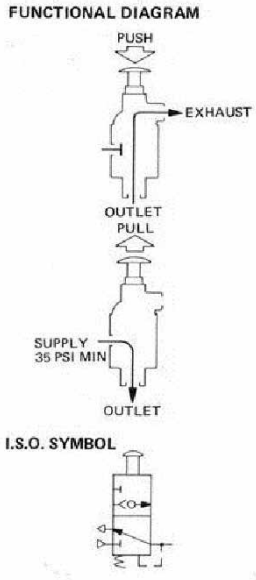
OPERATION The WM498F is a spring-returned, normally closed valve that requires a minimum supply pressure of 35 PSI (241,3 kPa) before the valve can be manually opened. When adequate pressure is present and the valve knob is pulled, air flows from the supply port through the check valve to the port. The built-in check valve allows the highest system pressure to be delivered. This prevents the brake chamber from being affected by supply pressure fluctuations, and thereby eliminates brake "drag". When the supply pressure decays below a nominal 25 PSI (172,4 kPa), the valve will close even if the knob is held in the open position. When the valve is closed, the flow of air is blocked by the piston seated on the exhaust tube. Any pressure at the outlet port is released through the exhaust port when the knob is pushed in.

APPLICATION As a part of a WM498 manifold panel, the WM498F can be used in most industrial or vehicular pneumatic brake systems. The WM498F is used primarily to control the application of spring brakes in heavy duty vehicles. This valve must not be in FMVSS-121 applications.





PRESSURE HOLDING VALVE



Manufactured in the USA by Brake Systems Inc.

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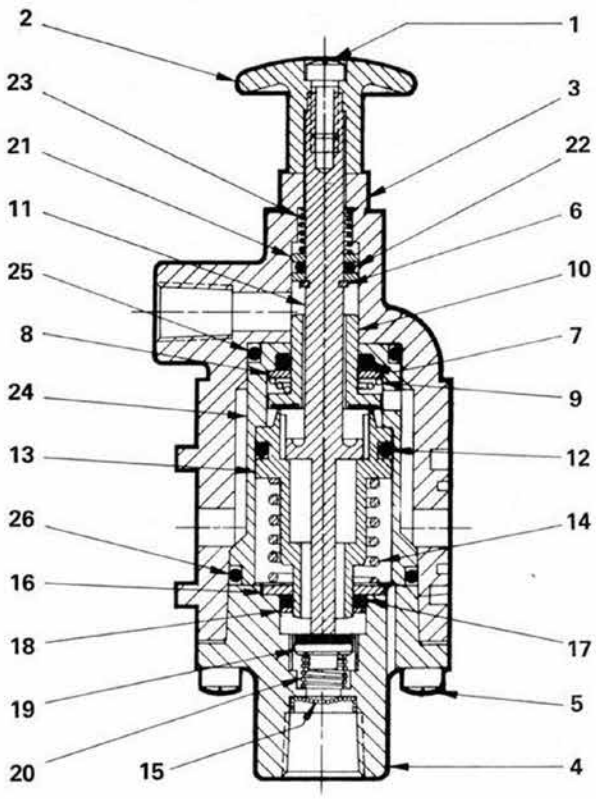
PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	SCREW	1
2	KNOB	1
3	MAIN BODY	1
4	OUTLET BODY	1
5	SCREW	4
6	RETAINING RING	1
* 7	O-RING	1
8	WASHER	1
9	SPRING	1
10	EXHAUST SEAT TUBE	1
11	STEM	1
* 12	O-RING	1
13	PISTON	1
14	SPRING	1
15	SCREEN	1
16	WASHER	1
* 17	O-RING	1
18	WASHER	1
* 19	POPPET	1
20	SPRING	1
21	WASHER	2
* 22	O-RING	1
23	SPRING	1
24	BYPASS INSERT	1
* 25	O-RING	1
* 26	O-RING	1

Service this unit with repair kit number **R498EF.**
*Asterisk designates parts included in repair kit.



SPECIFICATIONS

PORT SIZES: Outlet . . . . . 1/4-18 NPTF
Exhaust . . . . . 1/8-27 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:
Supply-to-Outlet . . 20 SCFM @ 100 PSI (0,6 m^3/min @ 690 kPa)
Outlet-to-Exhaust. . 25 SCFM @ 100 PSI (0,7 m^3/min @ 690 kPa)
MOUNTING. . . . . As Part of Control Panel Assembly
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Aluminum Alloy
O-Rings and Seals . . . . . Buna N
NET WEIGHT. . . . . 12 oz. (0,3 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM498F
Model Number
PART NUMBER 104517

Manufactured in the USA by Brake Systems Inc.

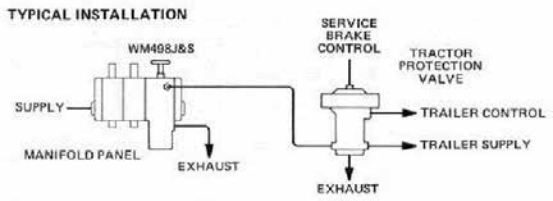
WM498J&S

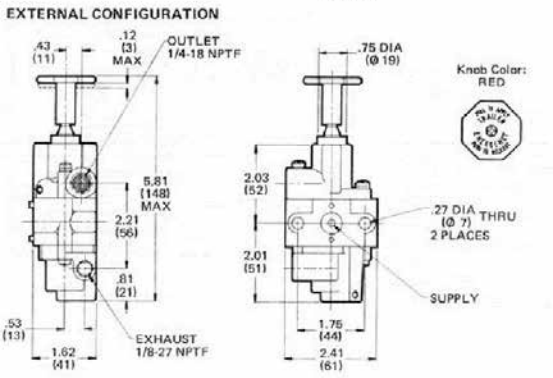
PRODUCT DESCRIPTION

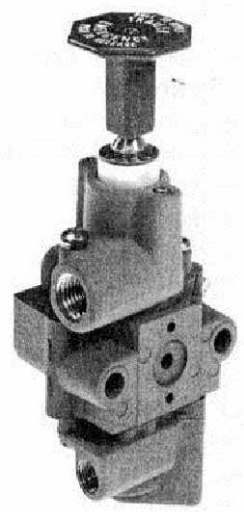
DESCRIPTION The WM498J and WM498S are components of the WM498 series manifold panel assemblies. The WM498J and WM498S are gang-mounted, three-way control valves that require actuation both manually and by supply pressure. The WM498S is designed to be mounted at one end of the manifold panel, while the WM498J is installed between two other components in the panel assembly .Functionally, the WM498J and the WM498S are identical. Each consists of a manually-actuated, three-way valve stacked in series with a pressure-actuated two-way valve that provides a non-override safety feature.

OPERATION The WM498J and WM498S are spring-returned, normally closed valves that require a minimum supply pressure of 35-45 PSI (241,3-310,3 kPa), to facilitate delivery after manual actuation. The manually-actuated portion of each valve controls the outlet port, and the pressure-actuated portion controls the supply and exhaust ports. When the supply pressure exceeds 35-45 PSI (241,3-310,3 kPa), the supply port opens, simultaneously closing the exhaust port. When this occurs, the manual portion of the valve can be operated to deliver pressure to the outlet port. If the supply pressure should drop below 35-45 PSI (241,3-310,3 kPa), the supply port automatically closes, and the exhaust port opens to release any pressure at the outlet port. The manual control cannot override this automatic safety function.

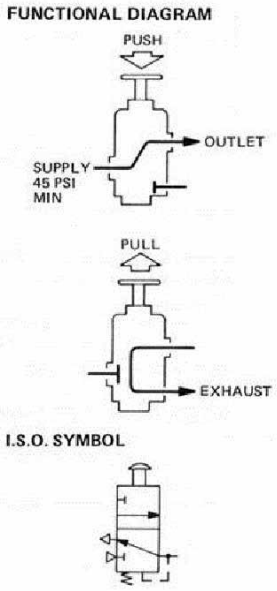
APPLICATION the WM498J and WM498S are engineered to control pressure delivery to industrial or vehicular pneumatic brake systems. These valves are often used in air brake systems of tractor-trailer combinations to control the trailer air supply.







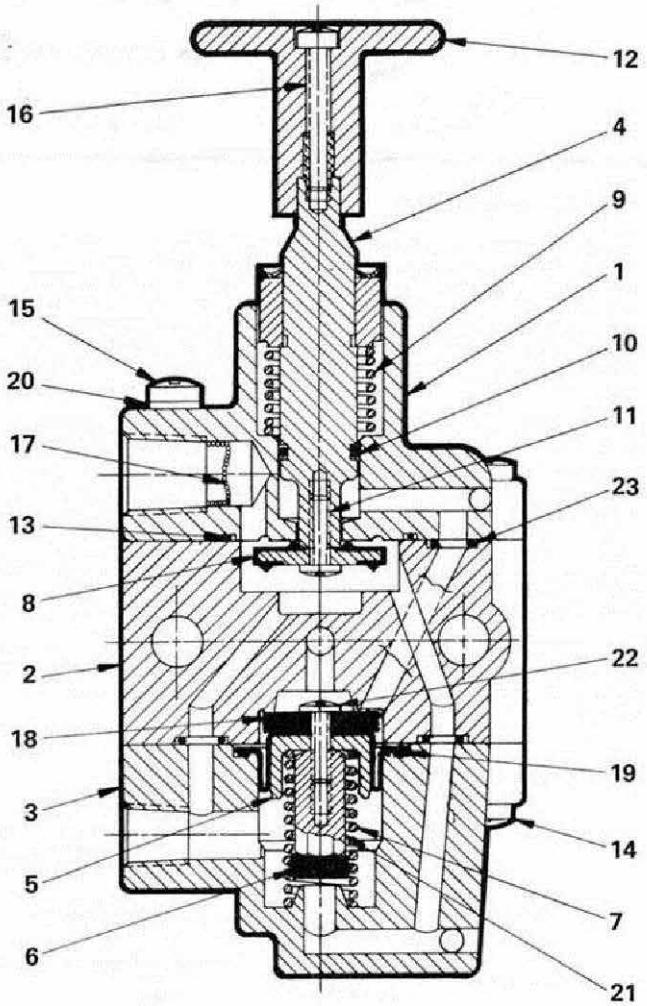
THREE-WAY NON-OVERRIDE VALVE



Manufactured in the USA by Brake Systems Inc.

PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	STEM BODY	1
2	CENTER BODY	1
3	END BODY	1
* 4	STEM ASSEMBLY	1
* 5	DIAPHRAGM PISTON	1
* 6	POPPET	1
7	SPRING	1
* 8	POPPET	1
9	SPRING	1
* 10	O-RING	1
11	SCREW	1
12	BUTTON	1
* 13	O-RING	1
14	SCREW	3
15	SCREW	1
16	SCREW	1
17	SCREEN	1
* 18	POPPET	1
* 19	DIAPHRAGM	1
20	LOCKWASHER	1
* 21	SPACER	1
* 22	SCREW	1
* 23	O-RING	3

Service this unit with repair kit number 100160.
*Asterisk designates parts included in repair kit.



SPECIFICATIONS

PORT SIZES: Outlet . . . . . 1/4-18 NPTF
Exhaust . . . . . 1/8-27 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:
Supply-to-Outlet . . 15 SCFM @ 100 PSI (0,4 m^3/min @ 690 kPa)
Outlet-to-Exhaust. . 25 SCFM @ 100 PSI (0,7 m^3/min @ 690 kPa)
AUTO. APPLICATION PRES. . . . . 35-45 PSI (241,3-310,3 kPa)
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Valve Body Castings . . . . . Aluminum
Diaphragm. . . . . Fabric-Reinforced Buna N
O-Rings and Seals. . . . . Buna N
NET WEIGHT. . . . . 12.5 oz. (0,4 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM498J&S___
Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	DESCRIPTION
WM498 J	106839	NON-OVERRIDE VALVE (Series-Mounting)
WM498 S	106840	NON-OVERRIDE VALVE (End-Mounting)

Manufactured in the USA by Brake Systems Inc.

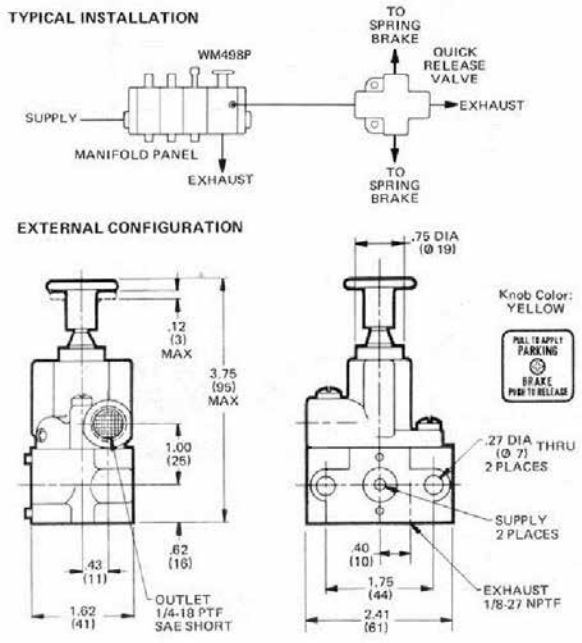
WM498P

PRODUCT DESCRIPTION

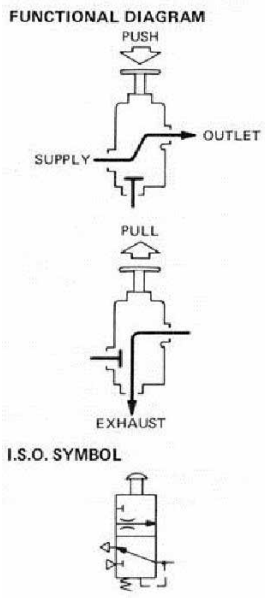
DESCRIPTION The WM498P is a component of the WM498 series manifold panel assemblies. It is a gang-mounted, three-way valve with push-to-open, pull-to-close action. The valve may be opened or closed manually, but will close automatically if supply pressure drops below the minimum holding pressure.

OPERATION The Wm498P is a spring-returned , normally closed valve that requires a minimum supply pressure of 45 PSI (310,3 kPa) to keep the valve open after manual operation. When the knob is pushed in, air flows from the port to the outlet port. When the knob is manually pulled out, or when the supply pressure drops to the 20-45 PSI (137,9-310,3 kPa) range, the supply port closes, and any pressure at the outlet port is released through the exhaust port.

APPLICATION As a part of WM498 manifold panel, the WM498P can be used in most industrial or vehicular pneumatic systems where a three-way valve is required. It is commonly used in the air brake systems of heavy duty vehicles to control the manual or automatic application of the spring brakes.



THREE-WAY PUSH/PULL VALVE



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2011.01.19

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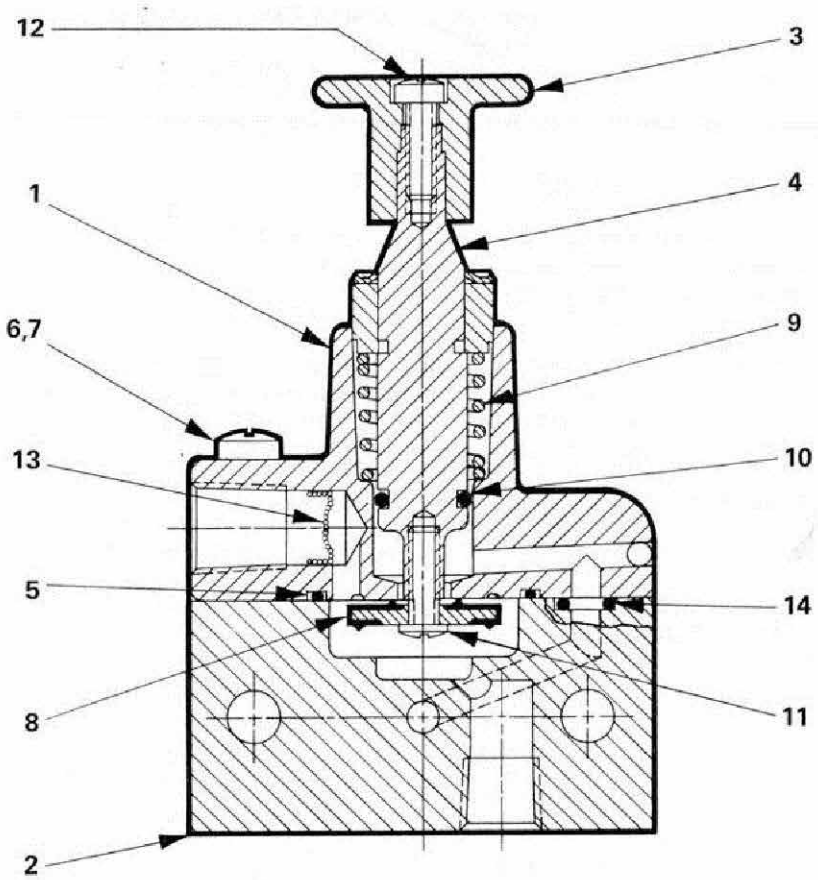


PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	STEM BODY ASSEMBLY	1
2	END COVER ASSEMBLY	1
3	BUTTON	1
* 4	STEM ASSEMBLY	1
* 5	O-RING	1
6	SCREW	1
7	SCREW	1
* 8	POPPET	1
9	SPRING	1
* 10	O-RING	1
11	SCREW	1
12	SCREW	1
13	SCREEN	1
14	O-RING	1

Service this unit with repair kit number 100162.
*Asterisk designates parts included in repair kit.

SPECIFICATIONS

PORT SIZES: Outlet . . . . . 1/4-18 NPTF
Exhaust . . . . . 1/8-27 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:
Supply-to-Outlet . . 20 SCFM @ 100 PSI (0,6 m^3/min @ 690 kPa)
Outlet-to-Exhaust . . 25 SCFM @ 100 PSI (0,7 m^3/min @ 690 kPa)
MINIMUM HOLDING PRESSURE. . . . 35-45 PSI (241,3-310,3 kPa)
AUTO. APPLICATION PRES. . . . 20 to 45 PSI (137,9 to 310,3 kPa)
MATERIALS: Valve Body Castings . . . . . Aluminum
Hardware. . . . . Cadmium-Plated Steel
O-Rings and Seals. . . . . Buna N
NET WEIGHT. . . . . 10 oz. (0,3 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM498P
Model Number
PART NUMBER 106849

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

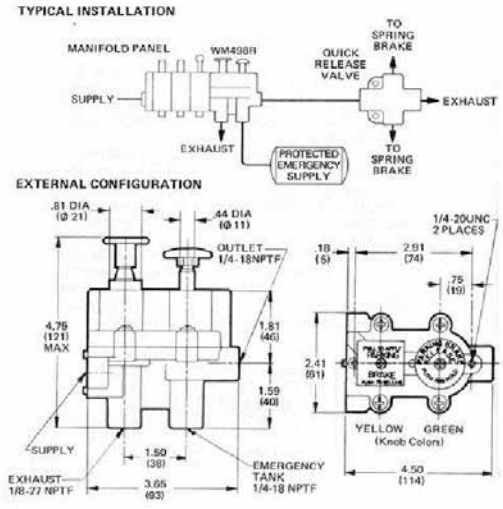
WM498R

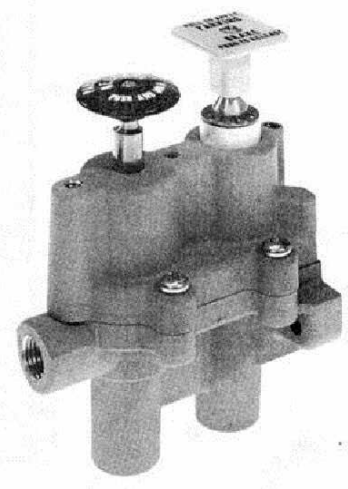
PRODUCT DESCRIPTION

DESCRIPTION The WM498R is a component of the WM498 series manifold panel assemblies. A dual function, gang-mounted air control valve, the WM498R has a built-in provision for an emergency supply reservoir. The unit consists of two manually-operated three-way valves housed in an integral casting.

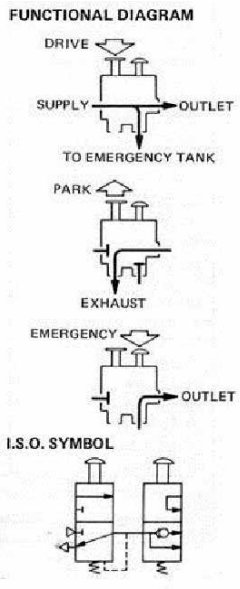
OPERATION In the WM498 R dual function control valve, one valve assembly controls the supply and exhaust ports, while the other controls the outlet and emergency ports. When pressure at the supply port exceeds 45 PSI (310,3 kPa), the first valve can be manually opened or closed. From the first valve, air flows into the second valve, which is spring-loaded to allow air to pass directly to the outlet and emergency ports. If the supply pressure drops to the 35-45 PSI (241,3-310,3 kPa) range, the first valve automatically closes the supply port. Any pressure at the outlet port is released through the exhaust. A built-in check valve in the emergency port protects the emergency air supply. When the normal air supply is shut off, the second valve may be manually actuated to close the exhaust port and open the emergency port. The emergency reservoir then supplies air to the outlet port. Since the second valve's function is intended for temporary, emergency use, this valve's control must be held manually. As soon as this control is released, pressure at the outlet port is discharged through the exhaust.

APPLICATION The WM498R dual function control valve is often used in heavy duty vehicular air brake systems to control the spring brakes in normal and emergency conditions. This valve is also suitable for industrial applications that require both normal and emergency supply controls.





DUAL FUNCTION CONTROL VALVE



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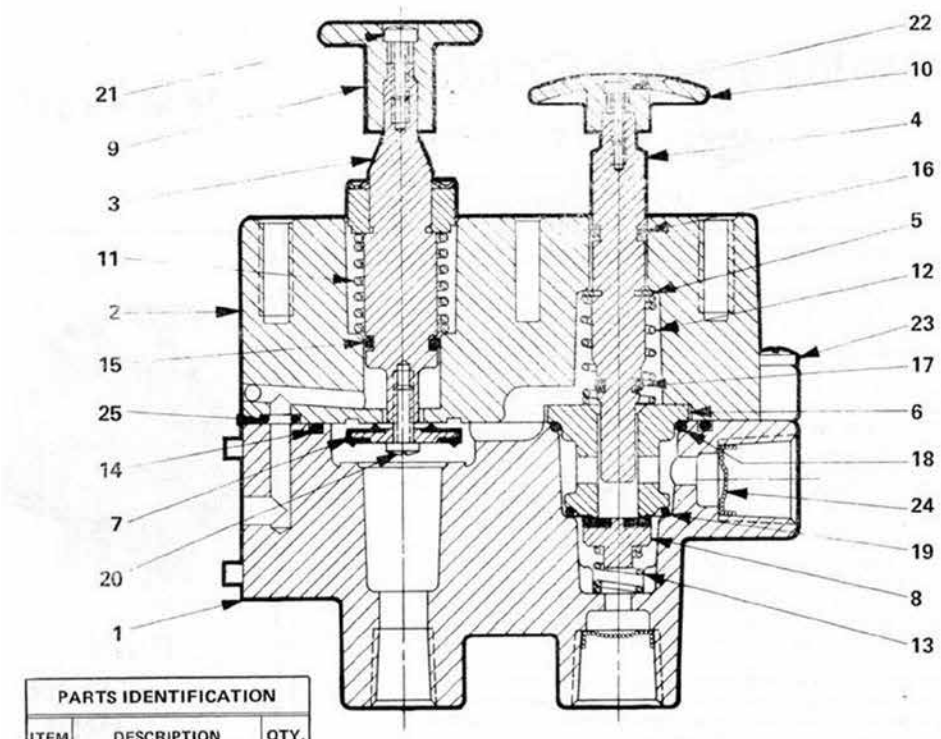


PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY.
1	END COVER	1
2	STEM BODY ASSEMBLY	1
* 3	STEM ASSEMBLY	1
4	STEM	1
5	RETAINING RING	1
6	SPOOL	1
* 7	POPPET	1
* 8	POPPET	1
9	SQUARE BUTTON	1
10	ROUND BUTTON	1
11	SPRING	1
12	SPRING	1
13	SPRING	1
* 14	O-RING	1
* 15	O-RING	1
* 16	O-RING	1
* 17	O-RING	2
* 18	O-RING	1
* 19	O-RING	1
20	SCREW	1
21	SCREW	1
22	SCREW	1
23	SCREW	4
24	SCREEN	2
25	O-RING	1

Service this unit with repair kit number RK98R1674.
*Asterisk designates parts included in repair kit.

SPECIFICATIONS

PORT SIZES: Outlet & Emergency . . . . . 1/4-18 NPTF
Exhaust . . . . . 1/8-27 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:
Supply-to-Outlet . . 20 SCFM @ 100 PSI (0,6 m^3/min @ 690 kPa)
Outlet-to-Exhaust. . 25 SCFM @ 100 PSI (0,7 m^3/min @ 690 kPa)
Emergency-to-Outlet . 35 SCFM @ 100 PSI (1,0 m^3/min @ 690 kPa)
AUTO. APPLICATION PRES. . 35 to 45 PSI (241, 3 to 310, 3 kPa)
MOUNTING. . . . . End of Control Panel Assembly
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Aluminum Alloy
Hardware. . . . . Cadmium-Plated Steel
O-Rings and Seals . . . . . Buna N
NET WEIGHT. . . . . 17 oz. (0,5 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM498R
Model Number
PART NUMBER 106848

Manufactured in the USA by Brake Systems Inc.

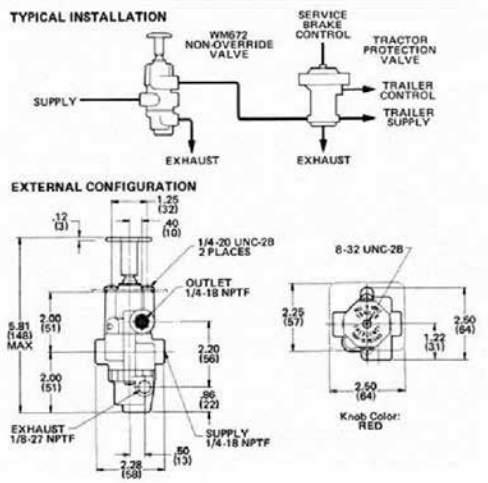
WM672 SERIES

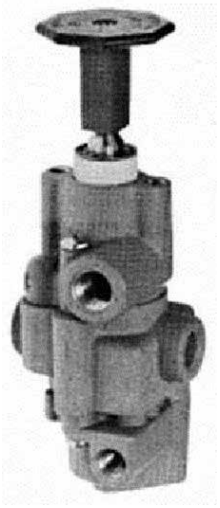
PRODUCT DESCRIPTION

DESCRIPTION The WM672 series valves are panel-mounted three-way control valves that are actuated manually and by supply pressure. Each unit consists of a manually-actuated three-way valve stacked in series with a pressure-actuated two-way valve. The two-way valve provides a non-override safety feature.

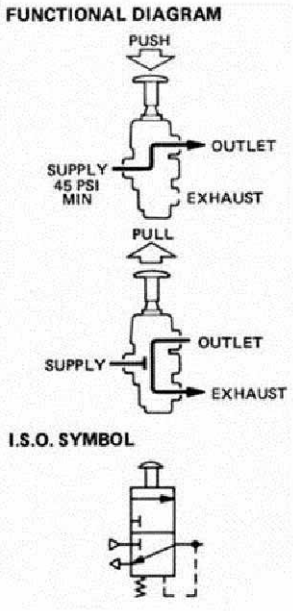
OPERATION The WM672 series valves are spring-returned, normally closed valves that require a minimum supply pressure of 45 PSI (310,3kPa) to hold the open position after manual actuation. Since the pressure actuated portion of the valve controls the supply and exhaust ports, the supply port remains closed with insufficient supply pressure, and any outlet pressure is released through the exhaust port. When the supply pressure exceeds 45 PSI (310,3kPa), the supply port opens and the exhaust port closes. The manually-actuated portion of the WM672 valve controls the outlet port: with adequate supply pressure, this part of the valve can be operated to direct pressure to the outlet port. If the supply pressure drops to the 65-45 PSI (241,3-310,3kPa) range, the supply port closes. Outlet pressure is exhausted and the trailer emergency brakes are applied automatically. The control cannot override the automatic safety function.

APPLICATION Designed for industrial and vehicular applications, the WM672 series valves are used to deliver pressure to pneumatic systems that must not be operated with less than 45 PSI (310,3kPa). In air brake systems of tractor-trailer combinations, the WM672 valve controls the application and the trailer emergency brakes. If the supply pressure drops below the necessary level, then the WM672 valve applies the trailer emergency brakes automatically. This valve is not recommended for FMVSS-121 trailer applications.





THREE-WAY NON-OVERRIDE VALVE



Manufactured in the USA by Brake Systems Inc.

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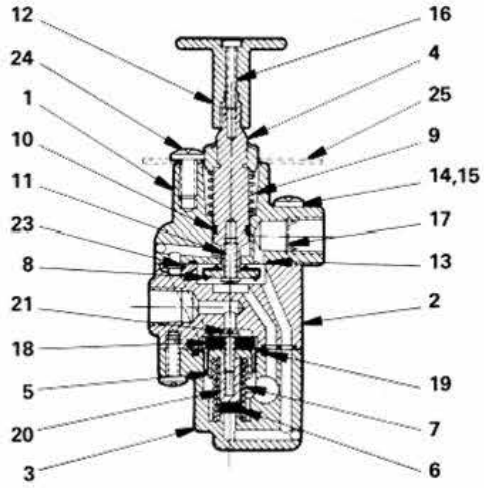
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com



PARTS IDENTIFICATION

ITEM	DESCRIPTION	QUANTITY		
		NO SUFFIX	A & E	D
1	STEM BODY	1	1	1
2	CENTER BODY	1	1	1
3	END BODY	1	1	1
* 4	STEM ASSEMBLY	1	1	1
* 5	DIAPHRAGM PISTON	1	1	1
* 6	POPPET	1	1	1
7	SPRING	1	1	1
* 8	POPPET	1	1	1
9	SPRING	1	1	1
* 10	O-RING	1	1	1
11	SCREW	1	1	1
12	BUTTON		1	1
* 13	O-RING	1	1	1
14	SCREW	3	3	3
15	SCREW	1	1	1
16	SCREW (114989)		1	1
17	SCREEN (116456)	1	1	1
* 18	POPPET	1	1	1
* 19	DIAPHRAGM	1	1	1
* 20	SPACER	1	1	1
* 21	SCREW	1	1	1
* 23	O-RING	3	3	3
24	SCREW		2	2
25	ESCUTCH. PLATE (110136)			1

Service this unit with repair kit number 100160. To replace only the button on the WM672A, order part number 110061. To replace only the button on the WM672D or E, order part number 105374. Other replaceable items are followed by part numbers.
*Asterisk designates parts included in repair kit 100160.

SPECIFICATIONS

PORT SIZES: Supply & Outlet . . . . . 1/4-18 NPTF
Exhaust . . . . . 1/8-27 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:
Supply-to-Outlet . . 15 SCFM @ 100 PSI (0,4 m^3/min @ 690 kPa)
Outlet-to-Exhaust . . 25 SCFM @ 100 PSI (0,7 m^3/min @ 690 kPa)
AUTO. APPLICATION PRESSURE . . . . 35-45 PSI (241,3-310,3 kPa)
MOUNTING . . . . Using Two 1/4-20 Fasteners (Included w/ Some Models)
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Aluminum
Diaphragm . . . . . Fabric-Reinforced Buna N
Knob . . . . . Flame-Retardant ABS Plastic
O-Rings & Seals . . . . . Buna N
NET WEIGHT . . . . . 12.5 oz. (0,4 kg)
*For continuous operation beyond this range, contact factory.

SPANISH ESCUTCHEON PLATE
P/N 110136
(INCLUDED ON WM672D)

TO ORDER, SPECIFY

WM672___
Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	KNOB IDENTIFICATION	ESCUTCHEON PLATE
WM672 NO SUFFIX	100252	Valve Furnished Without Knob	Not Included
WM672 A	106850	Knob Lettered per D.O.T. & R.C.C.C.	Not Included
WM672 D	110245	Knob Without Lettering	Spanish Plate Included
WM672 E	117111	Knob Without Lettering	Not Included

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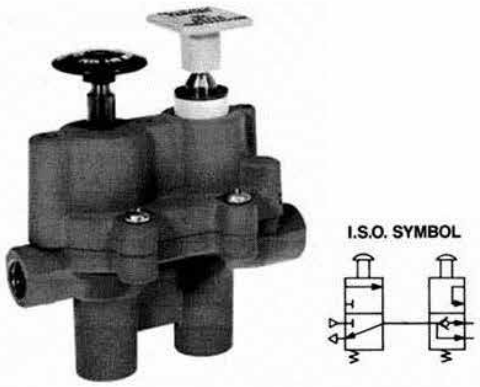
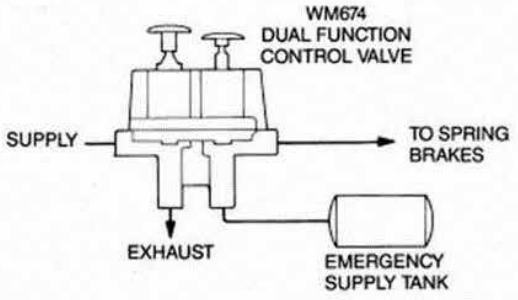
WM674 SERIES

DUAL FUNCTION PARKING BRAKE CONTROL



DESCRIPTION

The WM674 is a dual function valve used to control spring brakes under normal and emergency conditions. Each WM674 unit consists of two manually operated three-way valves housed in a common body. When pressure at its inlet exceeds 45 PSI (310 kPa), the first valve (square button) can be manually operated to control the parking brakes. From the first valve, air flows to the second valve (round button) which is spring-loaded so supply pressure can flow through it to release the spring brakes and charge the emergency supply tank. If supply pressure falls between 20-35 PSI, the first valve automatically closes and exhausts downstream pressure to cause emergency application of the spring brakes. An integral check valve in the second valve protects pressure in the emergency supply tank. The second valve can be applied to allow air to flow from the tank so the spring brakes so the vehicle can be moved. Since the second valve's function is for temporary emergency use, the round button must be manually held down. As soon as the button is released, pressure at the outlet is exhausted to atmosphere and the spring brakes are reapplied.



SPECIFICATIONS

PORT SIZES: Inlets and Outlet	1/4-18 NPTF
Exhaust	1/8-27 NPTF
MAXIMUM SUPPLY PRESSURE	150 PSI (1034 kPa)
OPERATING TEMPERATURE	-20°F to 150°F (-29°C to 66°C)
FLOW RATING: Inlet to Outlet	20 SCFM @ 100 PSI (0,6 m^3/min @ 690 kPa)
Outlet to Exhaust	25 SCFM @ 100 PSI (0,7 m^3/min @ 690 kPa)
Tank to Outlet	35 SCFM @ 100 PSI (1,0 m^3/min @ 690 kPa)
AUTOMATIC APPLICATION PRESSURE	20-35 PSI (138-241 kPa)
MOUNTING	Panel Mounted
MOUNTING ATTITUDE	Optional
MATERIALS: Body Castings	Die Cast Aluminum Alloy
Hardware	Cadmium Plated Steel
Seals & O-Rings	Buna N
WEIGHT	17 oz. (0,5 kg)

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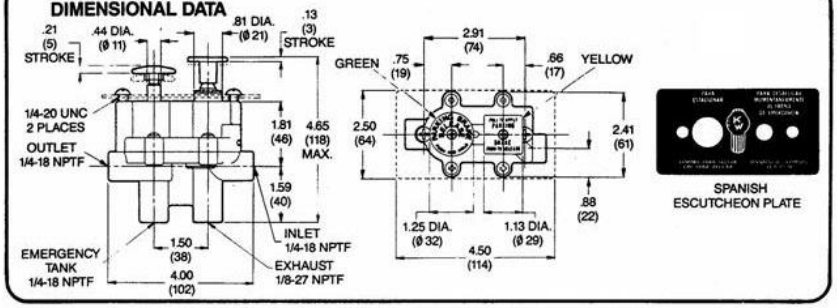
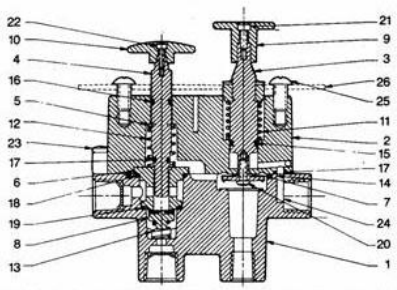
DIMENSIONAL DATA



SECTIONAL VIEW



ITEM	DESCRIPTION	WM674A	WM674E	QTY
1	End Cover	106745	106745	1
2	Body Assembly	106837	106837	1
* 3	Stem Assembly	117255	117255	1
4	Stem	106620	106620	1
5	Retaining Ring	116183	116183	1
6	Spool	106601	106601	1
* 7	Poppet	106585	106585	1
* 8	Poppet	103879	103879	1
9	Square Button	110062	105375	1
10	Round Button	110060	105373	1
11	Spring	106607	106607	1
12	Spring	106672	106672	1
13	Spring	101526	101526	1
*14	O-Ring	106589	106589	1
*15	O-Ring	116303	116303	1
*16	O-Ring	116300	116300	1
*17	O-Ring	116297	116297	2
*18	O-Ring	116367	116367	1
*19	O-Ring	116346	116346	1
20	Screw	100404	100404	1
21	Screw	114988	114988	1
22	Screw	114987	114987	1
23	Screw	118768	118768	4
24	Screen	116456	116456	3
25	Screw	114848	114848	2
26	Escutcheon Plate	—	110067	1

Service these units with repair kit 100161.
*Item is included in repair kit.

ORDERING INFORMATION

TO ORDER, SPECIFY
WM674 _____
Model Number Suffix
PART NUMBER _____
SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	KNOB IDENTIFICATION	ESCUTCHEON PLATE
WM674 A	106841	Knobs Lettered Per D.O.T. & R.C.C.C.	Not Included
WM674 E	110070	Knobs Without Lettering	Spanish Plate Included

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WILLIAMS CONTROLS INC.

WM762 SERIES

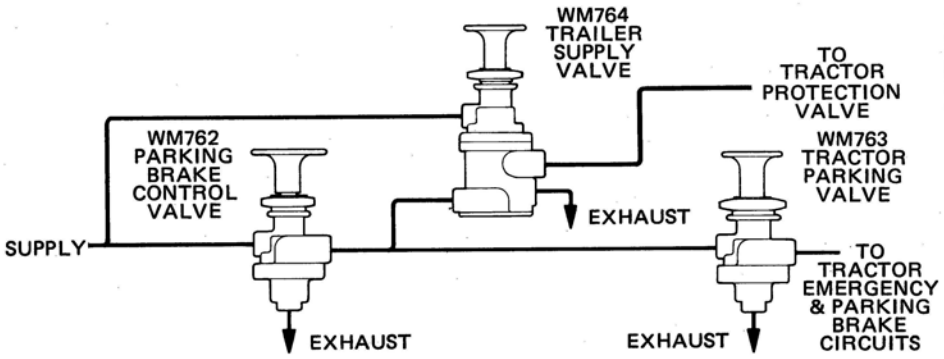
PRODUCT DESCRIPTION

DESCRIPTION The WM762 is a panel-mounted three-way control valve with push-to-open, pull-to-exhaust action. The valve may be opened or closed manually, but it will exhaust automatically if the supply pressure drops below the minimum holding pressure. A black band on the knob indicates whether valve is actuated.

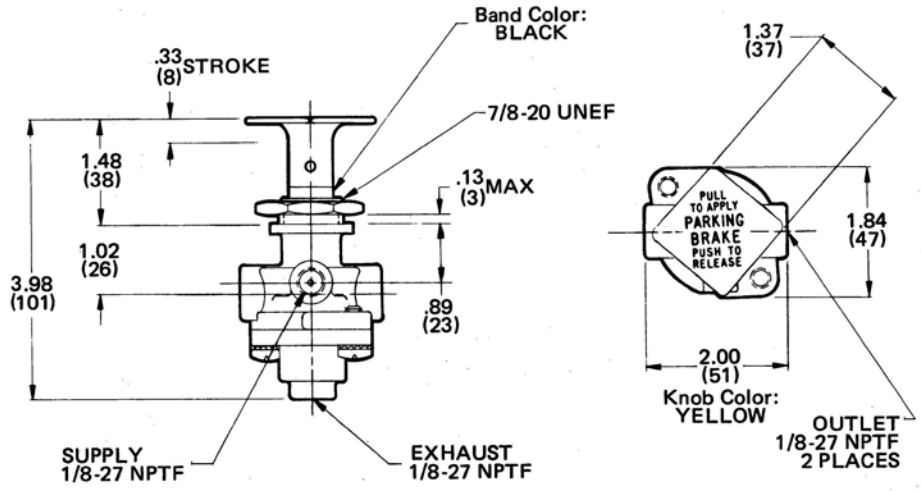
OPERATION A normally closed, spring-returned valve, the WM762 requires a minimum supply pressure of 35-45 PSI (241,3-310,3 kPa) to remain in the open position after manual actuation. When the knob is pushed in, air flows from the supply port to the outlet port. When the knob is manually pulled out or the supply pressure drops below 35-45 PSI (241,3-310,3 kPa), the supply port closes, and any pressure at the outlet port is released through the exhaust port. Thus, when the supply pressure drops below the necessary level, the valve exhausts and the spring brakes are applied automatically.

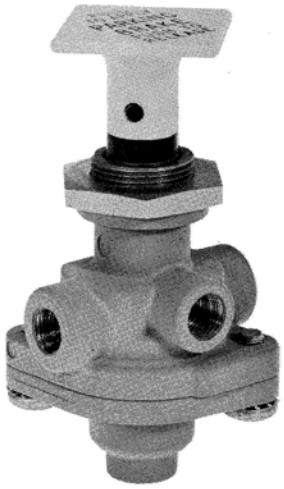
APPLICATIONS The WM762 parking brake control valve is engineered for air brake systems of heavy duty truck and tractor-trailer combinations. The valve is used to control the parking and automatic emergency functions of the spring brakes. The WM762 control valve complies with FMVSS-121.

TYPICAL INSTALLATION



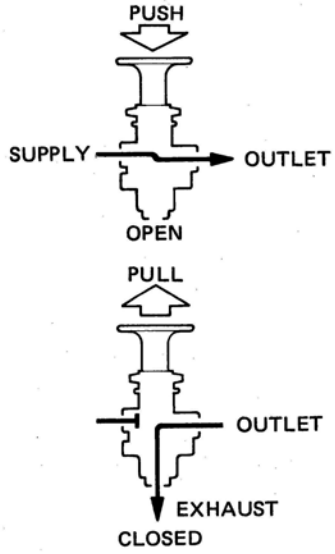
EXTERNAL CONFIGURATION



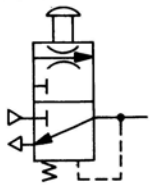


THREE-WAY CONTROL VALVE

FUNCTIONAL DIAGRAM

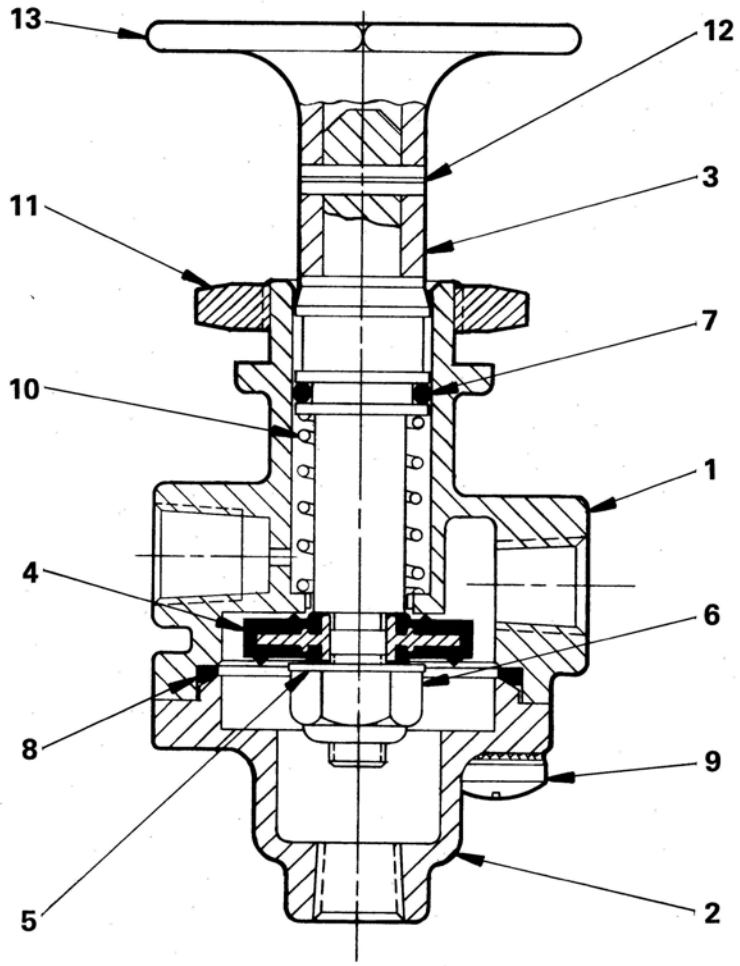


I.S.O. SYMBOL



WILLIAMS CONTROLS, INC.
14100 SW 72ND AVENUE, PORTLAND, OREGON 97224, TEL: (503) 684-8600, TELECOPIER: (503) 684-8610

119929
REL. 12/79



PARTS IDENTIFICATION			
ITEM	DESCRIPTION	QTY. A1A	QTY. A2A
1	BODY	1	1
2	END CAP	1	1
3	STEM	1	1
* 4	POPPET	1	1
5	WASHER	1	1
* 6	LOCKNUT (114592)	1	1
* 7	O-RING	1	1
* 8	RECTANGULAR SEAL	1	1
9	SCREW	2	2
10	SPRING	1	1
11	NUT (117057)	1	1
12	SPRING PIN (117071)		1
13	BUTTON (117127)		1

Service this unit with repair kit number 117659. Replaceable items are followed by part numbers. *Asterisk designates parts included in repair kit 117659.

SPECIFICATIONS

PORT SIZE . . . . . 1/8-27 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 . . . . . 20 SCFM @ 100 PSI (0,6 m^3/min @ 690 kPa)
AUTO. APPLICATION PRES. . . Below 35-45 PSI (241,3-310,3 kPa)
MOUNTING . . . . . 0.88 in. (22 mm) Hole in Control Panel
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Hardware . . . . . Plated Steel
Seals & O-Rings . . . . . Buna N
NET WEIGHT . . . . . 9.5 oz. (0,3 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM762 ____

Model Number Suffix

PART NUMBER ————

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	KNOB IDENTIFICATION
WM762 A1A	117451	Valve Furnished Without Knob
WM762 A2A	117069	Knob Lettered Per D.O.T. & R.C.C.C.

WILLIAMS CONTROLS INC.

WM763 SERIES

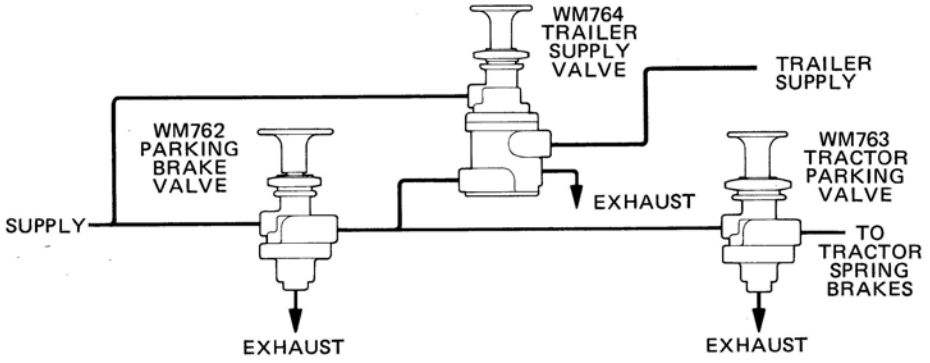
PRODUCT DESCRIPTION

DESCRIPTION The WM763 is a panel-mounted three-way control valve with push-to-exhaust action. The valve does not incorporate an internal spring and must be returned manually to the exhaust position. The WM763 control valve is available with a blue or black plastic knob, and each knob is inscribed with a functional description (shown in the external configuration below). All knobs feature a white band that indicates whether the valve is in the applied or released position.

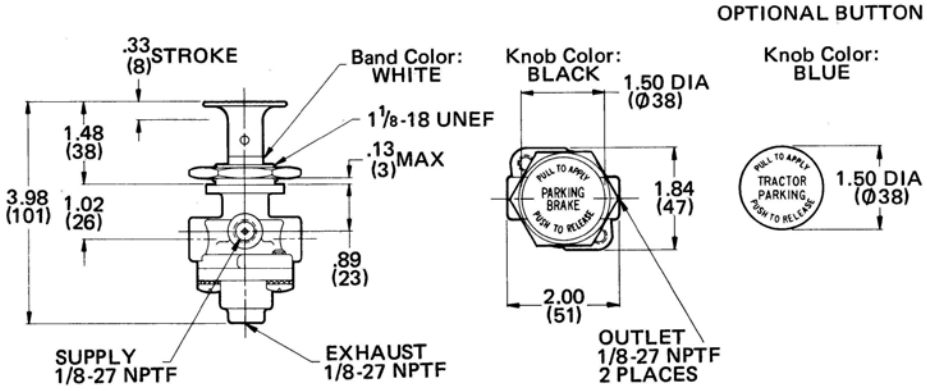
OPERATION The valve does not require a minimum supply pressure for operation. When the knob is pushed in, the supply port opens to allow delivery to the outlet port. Since this valve is not automatically returned by a spring, it must be manually deactivated. When the knob is pulled out, the supply port closes, and any pressure at the outlet port is discharged through the exhaust port.

APPLICATION The WM763 control valve can be used in any pneumatic circuit where a manual on-off valve is required. In air brake systems of heavy duty tractor-trailer combinations, this valve is often used with the WM762 parking brake valve as an optional manual control for the tractor spring brakes. To distinguish the WM763 from the WM762, the WM763 has a $1\frac{1}{8}$-18 UNEF threaded mounting nut. The WM763 control valve complies with the provisions of FMVSS-121.

TYPICAL INSTALLATION

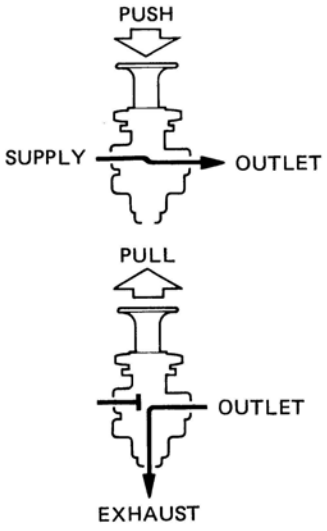


EXTERNAL CONFIGURATION

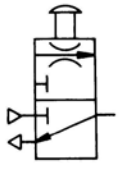


TRACTOR PARKING VALVE

FUNCTIONAL DIAGRAM

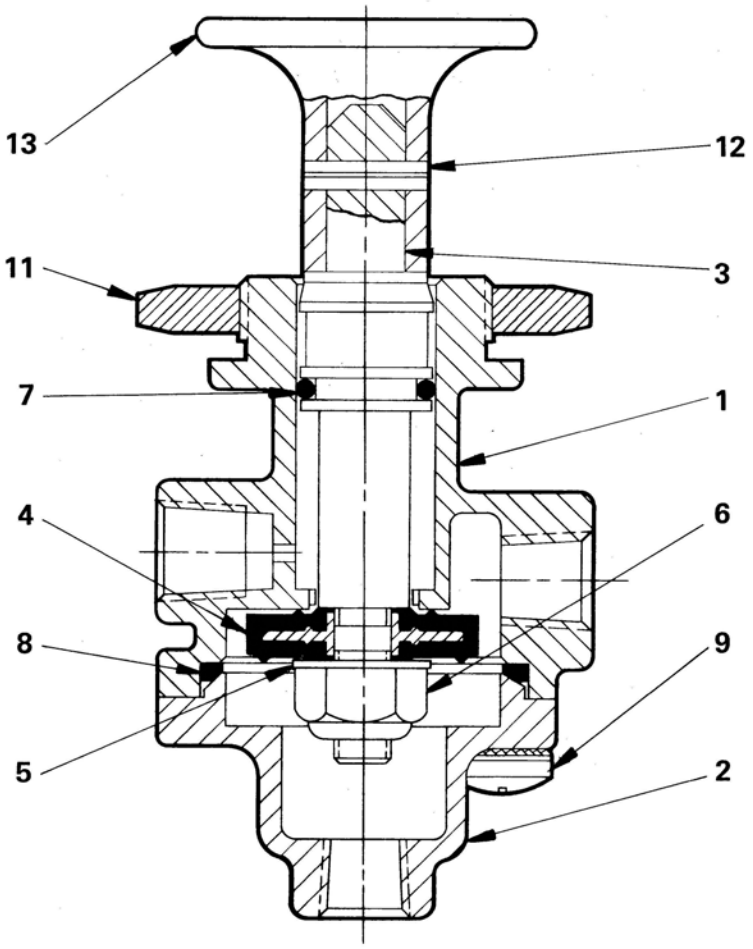


I.S.O. SYMBOL



WILLIAMS CONTROLS, INC.
14100 SW 72ND AVENUE, PORTLAND, OREGON 97224, TEL: (503) 684-8600, TELECOPIER: (503) 684-8610, TELEX: 15-1145

119926
REL. 1/80



PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	BODY	1
2	END CAP	1
3	STEM	1
* 4	POPPET	1
5	WASHER	1
6	LOCKNUT (114592)	1
* 7	O-RING	1
* 8	SQUARE SEAL	1
9	SCREW	2
11	NUT	1
12	SPRING PIN (117071)	1
13	BUTTON	1

Service this unit with repair kit number 117659. To replace the button on the WM763A4A or A8A, refer to the ordering information block. Other replaceable items are followed by part numbers.
*Asterisk designates parts included in repair kit 117659.

SPECIFICATIONS

PORT SIZE . . . . . 1/8-27 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 . . . . . 24 SCFM @ 100 PSI (0,7 m^3/min @ 690 kPa)
MOUNTING. . . . . 1.14 in. (29 mm) Diameter Hole in Control Panel
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Hardware. . . . . Cadmium-Plated Steel
Knob . . . . . Flame-Retardant ABS Plastic
O-Rings & Seals . . . . . Buna N
NET WEIGHT. . . . . 9.5 oz. (0,3 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM763 ____

Model Number Suffix

PART NUMBER ————

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	KNOB IDENTIFICATION
WM763 **A4A**	117068	Blue Knob (P/N 117126) Lettered per D.O.T. & R.C.C.C.
WM763 **A8A**	118051	Black Knob (P/N 118050) Lettered per D.O.T. & R.C.C.C.

WILLIAMS CONTROLS INC.

WM 777 SERIES

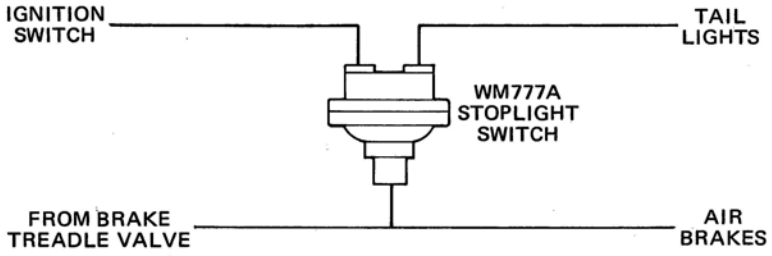
PRODUCT DESCRIPTION

DESCRIPTION Engineered for industrial or vehicle applications, the WM777A is a normally open, air pressure-actuated, electrical stoplight switch. The unit is mounted by the ¼-18 NPTF male inlet port.

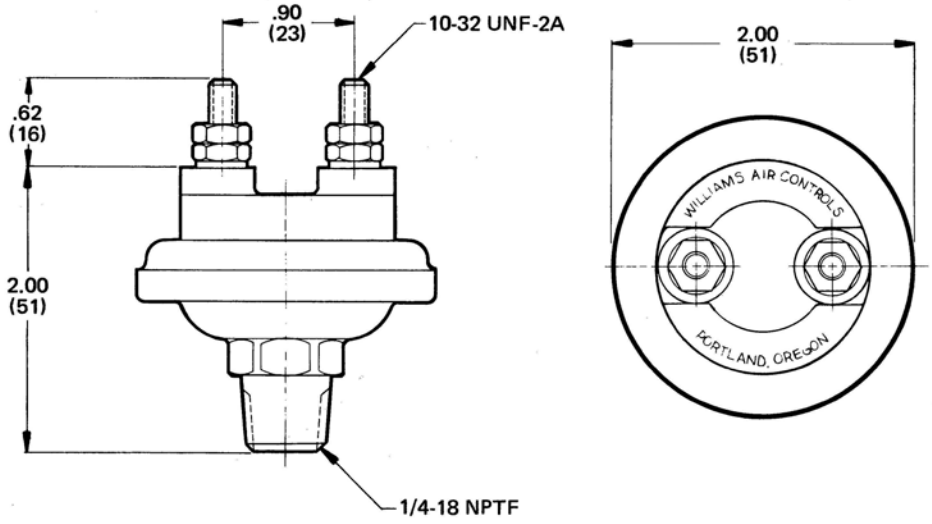
OPERATION An internal spring holds the contacts in the normal, open position. The WM777A stoplight switch is actuated by 2-6 PSI (13,8-41,4 kPa) of air pressure. When actuated, an internal diaphragm expands, closing the contacts.

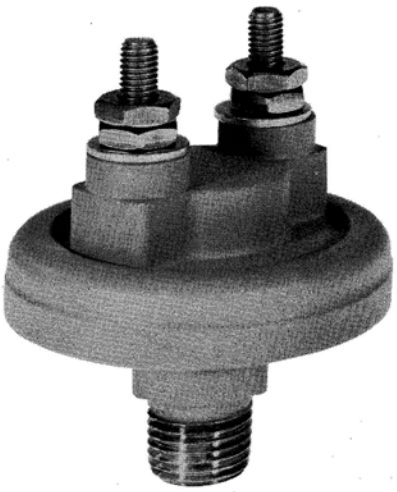
APPLICATION Designed primarily for vehicular stoplight applications, the WM777A can be used in any air pressure-activated installation. A tee-fitting can be used to mount the switch to any air line. Wiring can be connected to either terminal. The WM777A stoplight switch can be used in FMVSS 121 applications.

TYPICAL INSTALLATION



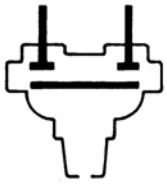
EXTERNAL CONFIGURATION

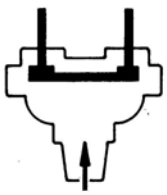




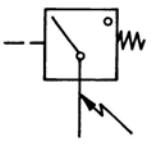
STOPLIGHT SWITCH

FUNCTIONAL DIAGRAM

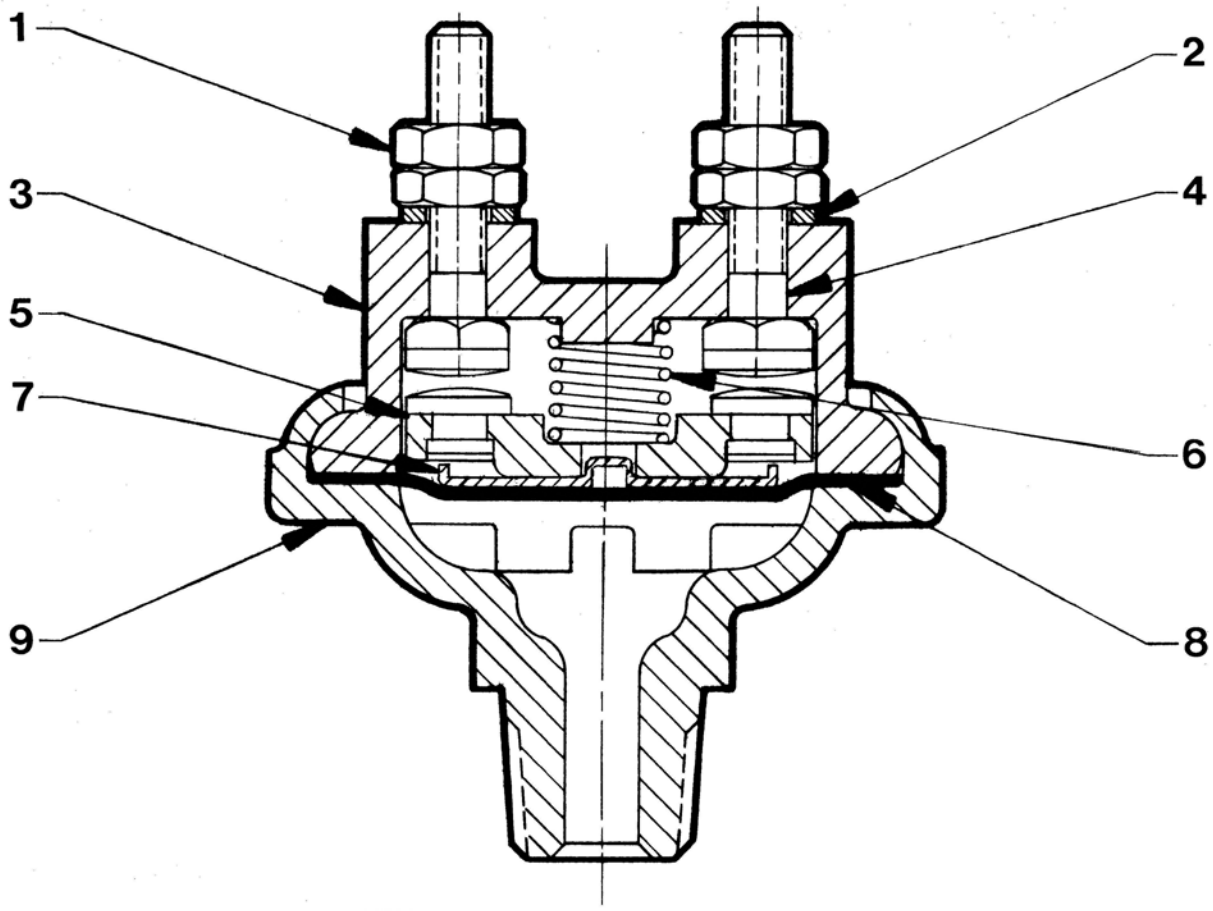

NORMAL


ACTUATED

I.S.O. SYMBOL



WILLIAMS CONTROLS, INC.
14100 SW 72ND AVENUE, PORTLAND, OREGON 97224, TEL: (503) 684-8600, TELECOPIER: (503) 684-8610



PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	NUT	4
2	WASHER	2
3	BODY	1
4	TERMINAL	2
5	CONTACT	1
6	SPRING	1
7	DIAPHRAGM PLATE	1
8	DIAPHRAGM	1
9	COVER	1

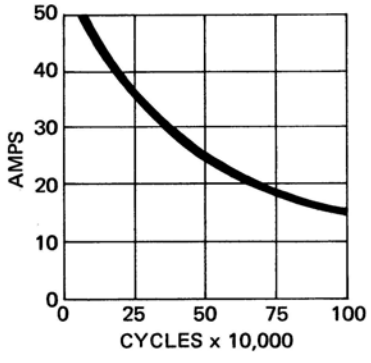
This component is classified as a non-repairable item.

SPECIFICATIONS

PORT SIZE . . . . . ¼-18 NPTF
MAXIMUM OPERATING PRESSURE. . . . . 150 PSI (1034,2 kPa)
OPERATING TEMPERATURE. . . . -40°F to 200°F (-40°C to 93,3°C)
PRESSURE REQUIRED TO ACTUATE . . . . 2-6 PSI (13,8-41,4 kPa)
CURRENT RATING. . . . . See Graph of Current Rating vs. Usage
MOUNTING. . . . . Female Valve Port or Line Fitting
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body . . . . . Glass-Filled Gray Noryl
Cover . . . . . Die Cast Zinc Alloy
Terminals . . . . . Brass
Contacts . . . . . Cadmium-Silver Alloy
Contact Plate . . . . . Die Cast Aluminum Alloy
Diaphragm . . . . . Fabric-Reinforced Buna N
NET WEIGHT. . . . . 3 oz. (0,1 kg)

TO ORDER, SPECIFY

WM777A
Model Number
PART NUMBER 118150



SECTION 4: MODULATING VALVES

WM-90

WM-106

WM-224

WM-317

WM-333

WM-352

WM-606

WM-607

WM-786

WM-787

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WM90 SERIES

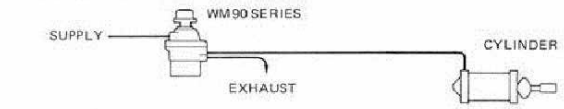
PRODUCT DESCRIPTION

DESCRIPTION The WM 90 valves are a variety of push rod-actuated, self-relieving pressure modulators. Several models are available with different pressure ranges and modulating characteristics. All valves in the WM 90 series have a threaded stud at the push rod neck for mounting. Each valve is furnished with a hex nut requiring a 1.5 inch wrench. The WM 90 valves can be in a .103 inch (26 mm) diameter hole through material up to 0.25 inch (6 mm) thick.

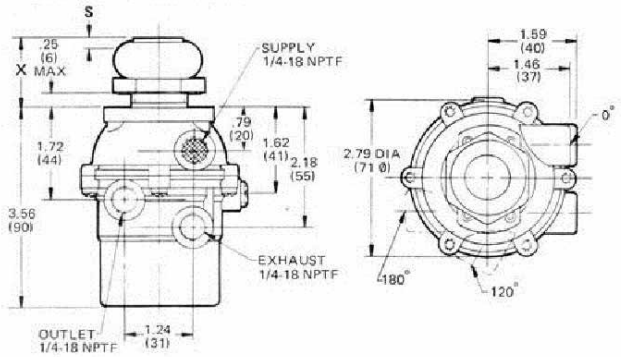
OPERATION When the valve is in the deactuated position, the pressure at the outlet port equals atmospheric pressure. Depressing the push rod closes the exhaust poppet. Additional movement of the push rod unseats the poppet. The out-put pressure rises to balance against an internal spring under the main piston. The main piston closes the inlet port to maintain the balanced condition. Further movement of the rod establishes a new balance point. As the push rod is released, the exhaust port opens to decrease the outlet pressure. When the push rod is fully released, the valve exhausts and returns to the deactuated position.

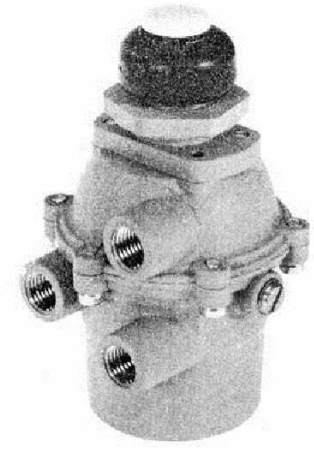
APPLICATION The WM 90 series pressure modulating valves serve as subassemblies in many Williams Air Controls products. In most instances, the actuating force is applied to the push rod through a lever-action mechanism that multiplies the push rod stroke and reduces the effort required for actuation. As a result, the actuation effort is relatively constant throughout the modulation range, making the WM 90 valves ideal for throttle control applications.
IMPORTANT: For safety-related applications, use the WM 90 series valves which are designed with special fail-safe features and are approved for FMVSS-124 application.

TYPICAL INSTALLATION



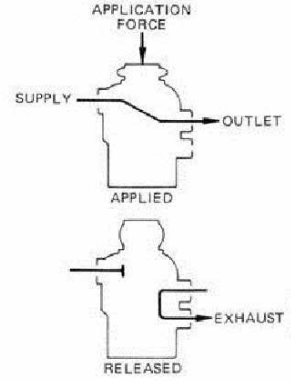
EXTERNAL CONFIGURATION



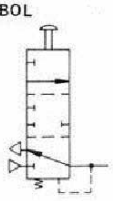


PRESSURE MODULATING VALVE

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
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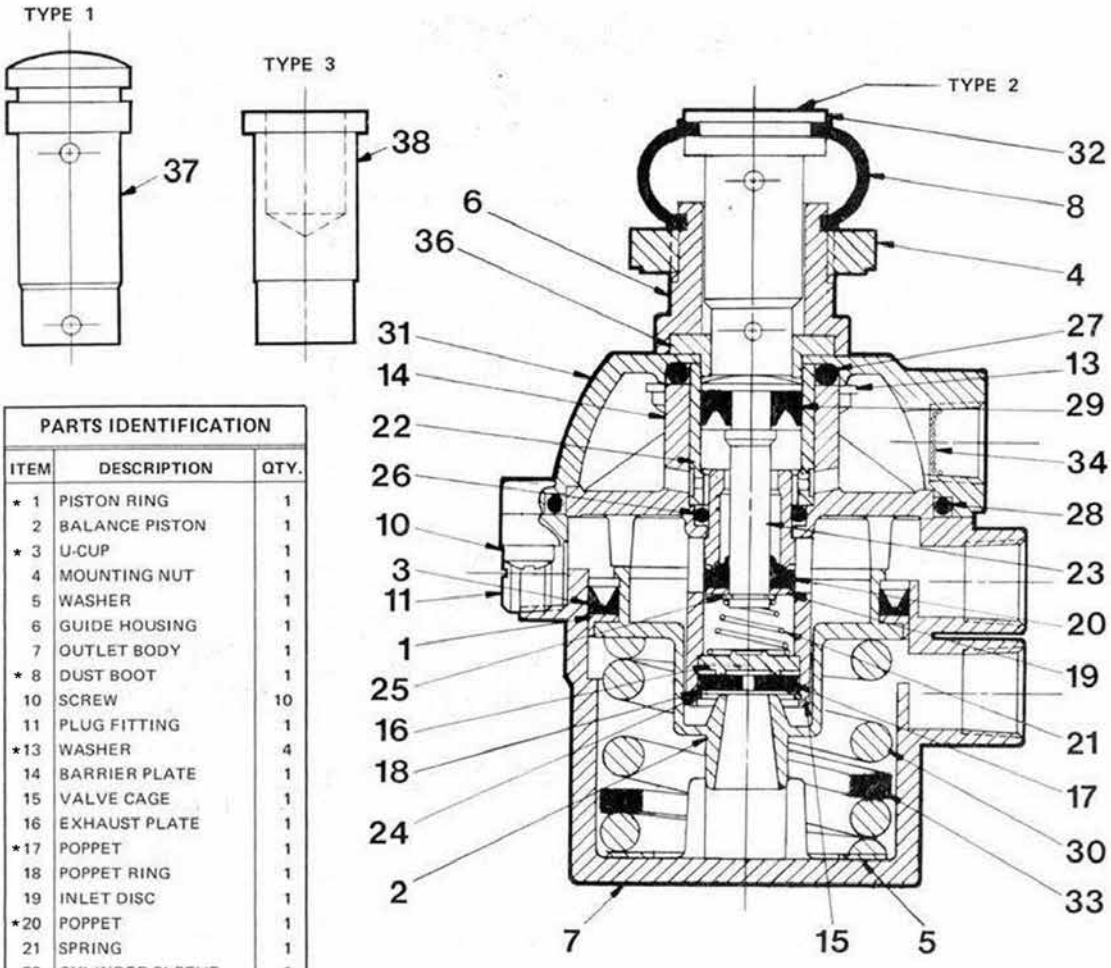

PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
* 1	PISTON RING	1
2	BALANCE PISTON	1
* 3	U-CUP	1
4	MOUNTING NUT	1
5	WASHER	1
6	GUIDE HOUSING	1
7	OUTLET BODY	1
* 8	DUST BOOT	1
10	SCREW	10
11	PLUG FITTING	1
*13	WASHER	4
14	BARRIER PLATE	1
15	VALVE CAGE	1
16	EXHAUST PLATE	1
*17	POPPET	1
18	POPPET RING	1
19	INLET DISC	1
*20	POPPET	1
21	SPRING	1
22	CYLINDER SLEEVE	1
23	PISTON	1
*24	RETAINING RING	1
*25	RETAINING RING	1
*26	O-RING	1
*27	O-RING	1
*28	O-RING	1
*29	U-CUP	1
30	SPRING	1
31	INLET BODY	1
32	PUSH ROD	1
*33	BOOSTER SPRING †	1
34	SCREEN	1
36	PUSH ROD STOP	1
37	PUSH ROD	1
38	PUSH ROD	1

Service this unit with repair kit **R90**

To replace the cartridge (barrier plate) assembly, order part number **132846**
*Asterisk designates parts included in repair kit.
†Part used only on units with 0-180 PSI output range.

SPECIFICATIONS

PORT SIZES: Supply ("A" suffix valves) . . . . 7/16 Dia. Unthreaded
Supply (all other suffixes) . . . . . 1/4-18 NPTF
Outlet . . . . . 1/4-18 NPTF
Exhaust . . . . . 1/4-18 NPTF
MAXIMUM OPERATING PRESSURE. . . . . 200 PSI (1379,0 kPa)
OPERATING TEMPERATURE* . . . -20°F to 200°F (-28,9°C to 93,3°C)
FLOW RATING. . . . . 35 SCFM @ 100 PSI (1,0 m^3/min @ 690 kPa)
ACTUATION FORCE:
Min. Opening . . . . 12 lbs. (53,4 N) @ 100 PSI (690 kPa) Supply
100 PSI Output . . 35 lbs. (155,7 N) @ 100 PSI (690 kPa) Supply
200 PSI Output . . 75 lbs. (333,6 N) @ 200 PSI (1379 kPa) Supply
MOUNTING. . . . . 1.03 in. (2,6 cm) Diameter Hole
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Zinc Alloy
O-Rings & U-Cup Seals . . . . . Buna N
Poppets. . . . . Buna N
NET WEIGHT. . . . . 2 lbs. 2 oz. (1,0 kg)
*For continuous operation beyond this range, contact factory.

Manufactured in the USA by Brake Systems Inc.

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TO ORDER, SPECIFY

WM90____

Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	MODULATING PRESSURE RANGE	MAXIMUM OUTPUT	STROKE S	HEIGHT X	INLET PORT ORIENTATION	PUSH ROD DESCRIPTION		BALANCE SPRING REPLACEMENT KIT
							DESIGN	MATERIAL	
WM90 A	111276	0-120 PSI (0-827 kPa)	Tank	0.38 in. (10 mm)	1.38 in. (35 mm)	120°*	TYPE 1	Acetal Resin	118035
WM90 AE	111277	0-60 PSI (0-414 kPa)	60 PSI (414 kPa)	0.34 in. (9 mm)	1.38 in. (35 mm)	120°*	TYPE 1	Acetal Resin	118044
WM90 AM	111280	0-130 PSI (0-896 kPa)	130 PSI (896 kPa)	0.34 in. (9 mm)	1.38 in. (35 mm)	120°*	TYPE 1	Acetal Resin	118035
WM90 AR	100418	0-90 PSI (0-621 kPa)	90 PSI (621 kPa)	0.34 in. (9 mm)	1.38 in. (35 mm)	120°*	TYPE 1	Stainless Steel	118035
WM90 AT	111282	0-90 PSI (0-621 kPa)	90 PSI (621 kPa)	0.34 in. (9 mm)	1.38 in. (35 mm)	120°*	TYPE 1	Acetal Resin	118036
WM90 AW	111284	0-180 PSI (0-1241 kPa)	Tank	0.38 in. (10 mm)	1.38 in. (35 mm)	120°*	TYPE 1	Acetal Resin	118035
WM90 B	111285	0-120 PSI (0-827 kPa)	Tank	0.38 in. (10 mm)	1.38 in. (35 mm)	180°	TYPE 1	Acetal Resin	118035
WM90 BE	111288	0-60 PSI (0-414 kPa)	60 PSI (414 kPa)	0.34 in. (9 mm)	1.38 in. (35 mm)	180°	TYPE 1	Acetal Resin	118044
WM90 BM	111292	0-130 PSI (0-896 kPa)	130 PSI (896 kPa)	0.34 in. (9 mm)	1.38 in. (35 mm)	180°	TYPE 1	Acetal Resin	118035
WM90 BR	111293	24-94 PSI (165-648 kPa)	94 PSI (648 kPa)	0.13 in. (3 mm)	1.38 in. (35 mm)	180°	TYPE 1	Stainless Steel	118035
WM90 BT	111294	0-90 PSI (0-621 kPa)	90 PSI (621 kPa)	0.34 in. (9 mm)	1.38 in. (35 mm)	180°	TYPE 1	Acetal Resin	118036
WM90 BW	111297	0-180 PSI (0-1241 kPa)	Tank	0.38 in. (10 mm)	1.38 in. (35 mm)	180°	TYPE 1	Acetal Resin	118035
WM90 D	111300	0-60 PSI (0-414 kPa)	60 PSI (414 kPa)	0.34 in. (9 mm)	1.19 in. (30 mm)	0°	TYPE 2	Acetal Resin w/ Brass Cap	118044
WM90 DA	111301	0-120 PSI (0-827 kPa)	Tank	0.38 in. (10 mm)	1.38 in. (35 mm)	0°	TYPE 2	Brass	118035
WM90 DB	111302	0-80 PSI (0-552 kPa)	80 PSI (552 kPa)	0.34 in. (9 mm)	1.25 in. (32 mm)	0°	TYPE 3	Stainless Steel	118036
WM90 DM	111303	0-130 PSI (0-896 kPa)	130 PSI (896 kPa)	0.34 in. (9 mm)	1.19 in. (30 mm)	0°	TYPE 2	Acetal Resin w/ Brass Cap	118035
WM90 DM2**	110402	0-130 PSI (0-896 kPa)	130 PSI (896 kPa)	0.34 in. (9 mm)	1.19 in. (30 mm)	0°	TYPE 2	Acetal Resin w/ Brass Cap	118035
WM90 DN	110504	0-60 PSI (0-414 kPa)	60 PSI (414 kPa)	0.34 in. (9 mm)	1.25 in. (32 mm)	0°	TYPE 3	Stainless Steel	118044
WM90 DT	111304	0-90 PSI (0-621 kPa)	90 PSI (621 kPa)	0.34 in. (9 mm)	1.19 in. (30 mm)	0°	TYPE 2	Acetal Resin w/ Brass Cap	118036
WM90 DW	111305	0-180 PSI (0-1241 kPa)	Tank	0.34 in. (9 mm)	1.19 in. (30 mm)	0°	TYPE 2	Brass	118035

NOTES: *Inlet port is not threaded.
**Enlarged outlet port.

Manufactured in the USA by Brake Systems Inc.

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Williams Air Controls

DANA CORPORATION

14100 S. W. 72nd Avenue
Phone # 503-639-3151
Portland, Oregon 97223
Telex # 15-1145

WM90DX

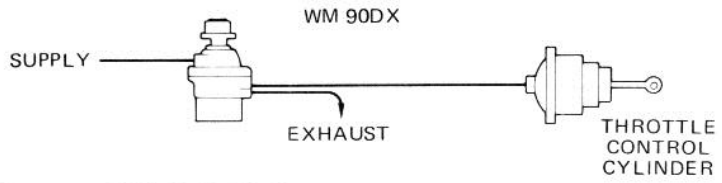
PRODUCT DESCRIPTION

DESCRIPTION The WM 90DX valves are push rod-actuated, self-relieving pressure modulators. Several models are available with a variety of pressure ranges. All valves in the WM 90DX series have a threaded stud at the neck for mounting and are equipped with a hex nut that requires a 1.5 inch wrench. Mounted in a 1.03 inch (26 mm) diameter hole, the WM 90DX valves can be installed in material up to 0.25 inch (6 mm) thick. The WM 90DX valves differ from the WM 90 series in that these valves are designed with special safety features for use in FMVSS-124 systems. If an internal mechanical failure occurs in the WM 90DX valve, the outlet pressure is immediately released to the atmosphere.

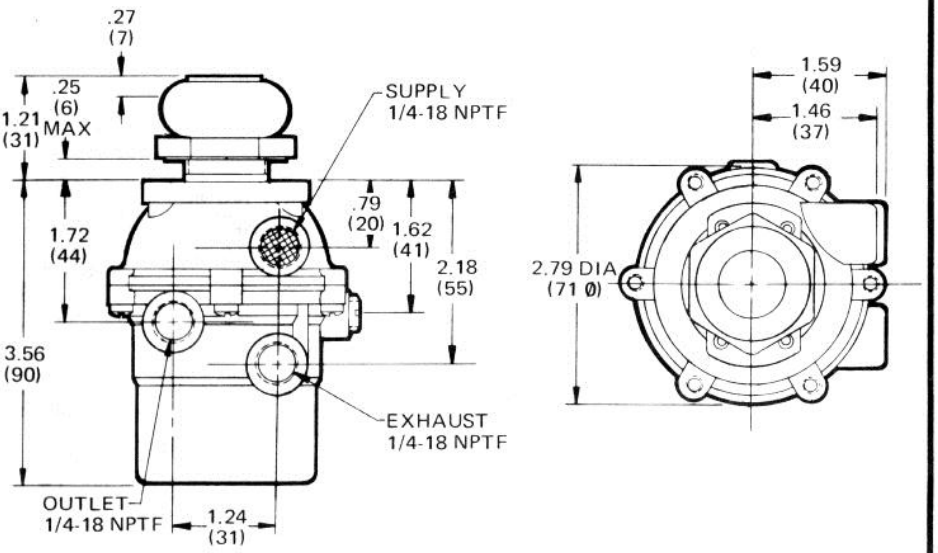
OPERATION When the WM 90DX valve is in the deactuated position, the outlet pressure equals atmospheric pressure. Depressing the push rod closes the exhaust poppet and additional movement against the push rod unseats the inlet poppet. The output pressure rises to balance against an internal spring under the main piston. The main piston closes the inlet port to maintain the balanced condition. If the push rod is moved, a new balance point is established. As the push rod is released, the exhaust port opens to decrease the outlet pressure. When the push rod is fully released, the valve exhausts and returns to the rest position.

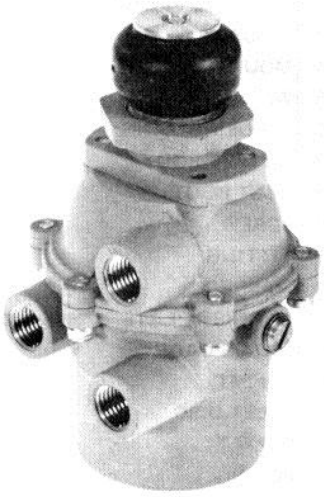
APPLICATION The WM 90DX series pressure modulating valves are used in several Williams Air Controls air throttle valve assemblies. The WM 90DX valves are certified for throttle applications requiring compliance with FMVSS-124 when installed according to Williams Air Controls requirements.

TYPICAL INSTALLATION



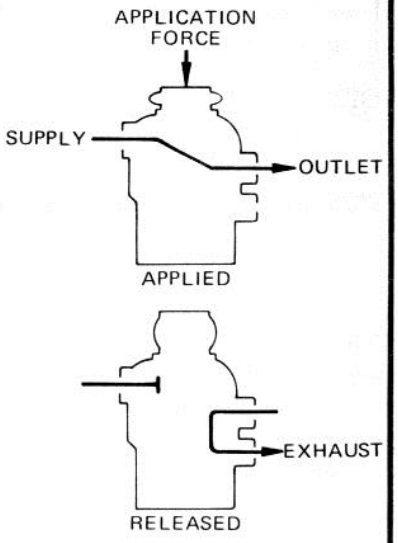
EXTERNAL CONFIGURATION



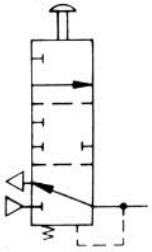


FAIL-SAFE PRESSURE MODULATING VALVE

FUNCTIONAL DIAGRAM



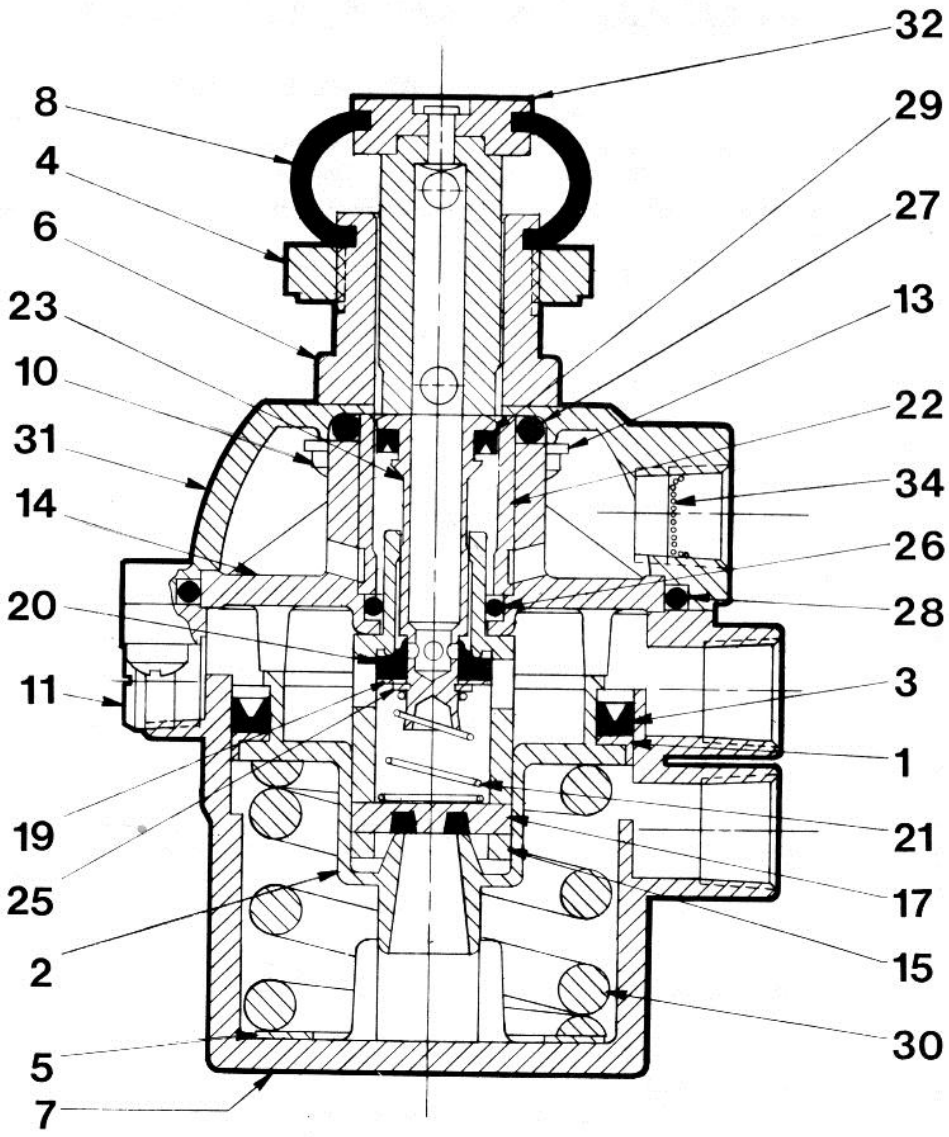
I.S.O. SYMBOL



PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY.
* 1	PISTON RING	1
2	BALANCE PISTON	1
* 3	U-CUP	1
4	MOUNTING NUT	1
5	WASHER	1
6	GUIDE HOUSING	1
7	OUTLET BODY	1
* 8	DUST BOOT	1
* 10	SCREW	10
11	FITTING	1
13	WASHER	4
* 14	BARRIER PLATE	1
* 15	VALVE CAGE	1
* 17	POPPET	1
* 19	INLET DISC	1
* 20	POPPET	1
* 21	SPRING	1
* 22	CYLINDER SLEEVE	1
* 23	PISTON	1
* 25	RETAINING RING	1
* 26	O-RING	1
* 27	O-RING	1
* 28	O-RING	1
* 29	U-CUP	1
30	SPRING	1
31	INLET BODY	1
* 32	PUSH ROD ASSEMBLY	1
34	SCREEN	1

Service this unit with repair kit number 117103.
To replace cartridge (barrier plate) assembly, order part number 116953.
*Asterisk designates parts included in repair kit.



SPECIFICATIONS

PORT SIZE . . . . . 1/4-18 NPTF
MAXIMUM OPERATING PRESSURE. . . . . 150 PSI (1034,2 kPa)
OPERATING TEMPERATURE . . . . .-40°F to 200°F (-40°C to 93,3°C)
FLOW RATING. . . . . 35 SCFM @ 100 PSI (1,0 m^3/min @ 690 kPa)
ACTUATION FORCE:
Min. to Open . . . 12 lbs. (53,4 N) @ 100 PSI (690 kPa) Supply
Max. Output. . . .38 lbs. (169,0 N) @ 100 PSI (690 kPa) Supply
MOUNTING. . . . . .1.03 in. (26 mm) Diameter Hole
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Zinc Alloy
Poppets. . . . . Buna N
O-Rings & U-Cups. . . . . Buna N
NET WEIGHT. . . . . 2 lbs. 2 oz. (1,0 kg)

TO ORDER, SPECIFY

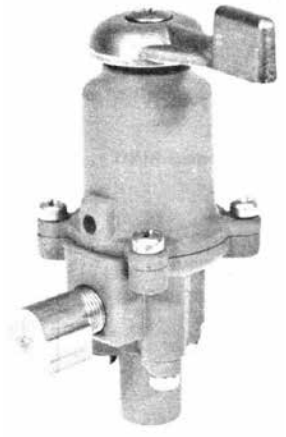
WM90DX ____
Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	PRESSURE MODULATION RANGE	MAXIMUM OUTLET PRESSURE
WM90 **DX**	116697	0-55/65 PSI (0-379/448 kPa)	65 PSI (448 kPa)
WM90 **DX1**	117262	10-55/65 PSI (69-379/448 kPa)	65 PSI (448 kPa)
WM90 **DX2**	117269	0-85/95 PSI (0-586/655 kPa)	95 PSI (655 kPa)
WM90 **DX3**	117535	0-70/80 PSI (0-483/552 kPa)	80 PSI (552 kPa)

WM106A COMPENSATING VALVE

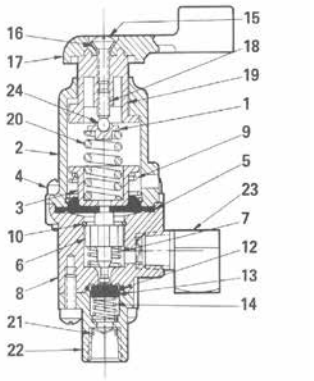


Available with different actuators, the WM106A hand valve is a lightweight, compact, three-way pressure modulator. Equipped with a handle that stops in four distinct positions, the WM106A provides a compensating four-stage output.
The WM106N is similar to the WM106A, but from the OFF position, the WM106N handle moves through an infinite number of positions before locking in the ON position. (The WM106N handle locks only in the ON and OFF positions.) Both the WM106A and WM106N have an adjustment that limits the maximum output to a preset level.
The WM106F, designed with a push pin actuator, has an unthreaded inlet.

The WM106U is also actuated by a push pin, but this valve has a threaded inlet port. The WM106F and WM106U are usually combined with a lever-action mechanism that multiplies the force applied to the push pin.
When the actuator is applied, an internal diaphragm expands, closing the exhaust port and unseating the supply poppet. The outlet pressure increases to balance against an internal spring. To maintain this balanced condition, the supply poppet seats. A new balance point is established if the downstream pressure changes or if the operator repositions the handle or push pin. A second internal spring returns the valve to the rest position when the operator releases the handle or push pin. Pressure at the outlet port escapes through the exhaust vent.
IMPORTANT: When the handle on the WM106A or WM106N models is locked in a delivery position, the operator must manually return the handle in order to exhaust the valve.

ITEM	QUANTITY	PART NUMBER	DESCRIPTION
17	1	101458	Handle

VALVE	REFERENCE NUMBER	ACTUATOR DESCRIPTION	MAX. HANDLE MOBILITY	COMPENSATING RANGE	MAXIMUM OUTPUT
WM106A	111360	Handle Actuator Four Positions	92 degrees	Ps.1 0 PSI (0 kPa) Ps.2 20/30 PSI (138/207 kPa) Ps.3 35/45 PSI (241/310 kPa) Ps.4 60/70 PSI (414/483 kPa)	Preset at 60 to 70 PSI (414/483 kPa)

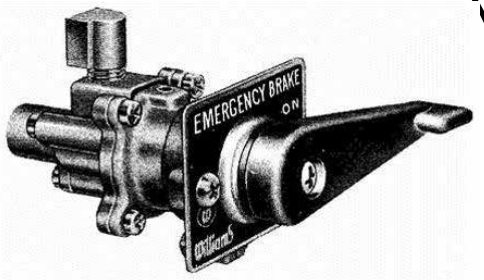


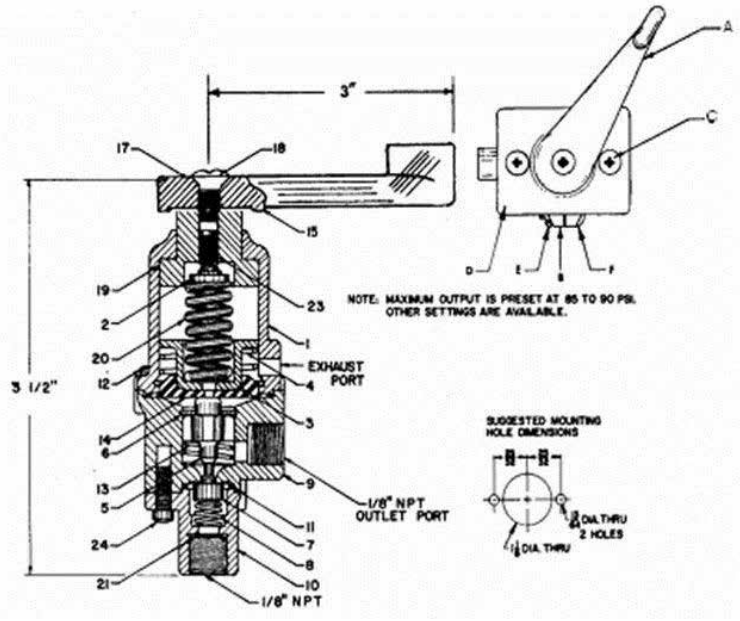
Available from Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WM224H HAND VALVE

Developed to answer the need for a small modulating and pressure limited type of control. It is available in two versions, one with a single "on" position and another with three "on" positions. Certain vehicles such as school busses and light trucks require a higher degree of operator control than available with simple on-off controls*. With this device, the driver may regulate the stopping force of the spring brakes to meet existing road conditions. Other usage would be as a pressure limited dash control for exhaust brakes.





PARTS LIST			106H	106R
			2 POSITION	4 POSITION
DWG. NO.	DESCRIPTION	QTY.	PART NO.	PART NO.
1	UPPER BODY	1	101456	101456
2	SPRING BUTTON ASSY.	1	101460	101460
3	SPRING PLATE	1	101463	101463
*4	EXHAUST SPRING	1	101464	101464
*5	STEM	1	101465	101465
*6	RETAINER RING	1	116179	116179
*7	POPPET	1	101466	101466
*8	POPPET SPRING	1	101467	101467
9	CENTER BODY	1	101468	101468
10	INLET BODY	1	101470	101470
*11	"O" RING	1	116303	116303
*12	MACHINE SCREWS	4	114657	114657
*13	STEM SPRING	1	101469	101469
*14	DIAPHRAGM	1	101471	101471
15	HANDLE	1	105115	105115
17	LOCK WASHER	1	115011	115011
18	MACHINE SCREWS	1	114664	114664
19	CAM	1	101809	101459
*20	SPRING	1	101474	101474
*21	SCREEN	1	116455	116455
22	OUTLET FITTING	1	115183	115183
23	SET SCREW	1	115523	115523
24	MACHINE SCREWS	3	114657	114657
X	HANDLE TRAVEL		75°	75°
	HANDLE POSITION		1 OFF – 1 ON	1 OFF – 3 ON
PSI	PRESSURE SETTING		85°–90°	85°–90°
*INCLUDED IN REPAIR KIT 114116				

B/M WM224 HAND CONTROL (MODULATING)				
ITEM	DESCRIPTION	WM224H	WM224HB	QTY.
1–24	BASE VALVE ASSY.	WM106H	WM106R	1
25	MT. BKT. ASSY.	101822	101822	1
26	ESCUTCHEON PLATE	103689	103689	1
29	MOUNTING SCREW	114786	114786	2
–	HANDLE POSITIONS	2	4	–

Available from Brake Systems Inc.

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WM317, WM333

The most significant design of the WM317 or WM333 Compensating Valve is the finger tip control. An operator need not have a sore arm to complete a day's work. Adjustable handle friction may be set to the requirement of the job, or the desire of the operator. The low reactionary pressure (a function of exclusive Williams valving) allows precise control with small effort. Long life of individual parts is a result of the low reactionary valving. There are also no cams to wear out, as the operating force is straight push or pull.

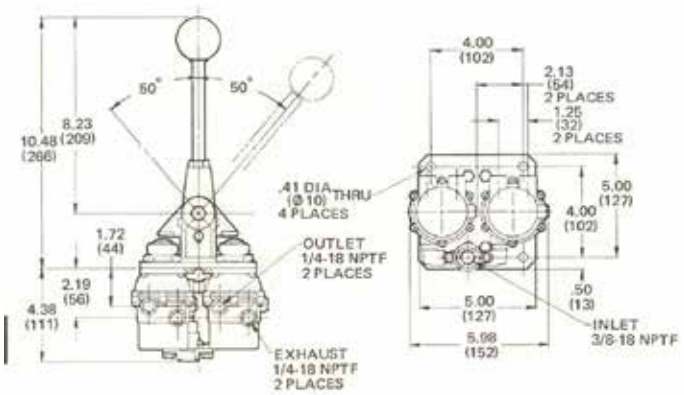
Pressure compensation range is variable from 0-60 PSI to 0-180 PSI, depending on the valve specified. This allows a wide choice for specific requirements.

Compact mounting is a bonus feature to save space in critical panel areas, and all lines point straight down. A common air supply feeds both valves, and an air strainer is included with the fittings.

Cartridge replacement of valving keeps unproductive time to a minimum. A removable barrier plate assembly renews the internal valving in minutes with simple hand tools.

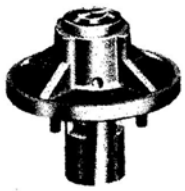
Air flow capacity is ample for all pilot controlled systems, and many direct hookups. One quarter inch cylinder parts flow over 35 CFM (standard air is measured at 100 PSI head pressure).

EXTERNAL CONFIGURATION



COMPENSATING DUAL/SINGLE VALVE

SINGLE	**WM333**
DUAL	**WM317**



1355 CARTRIDGE

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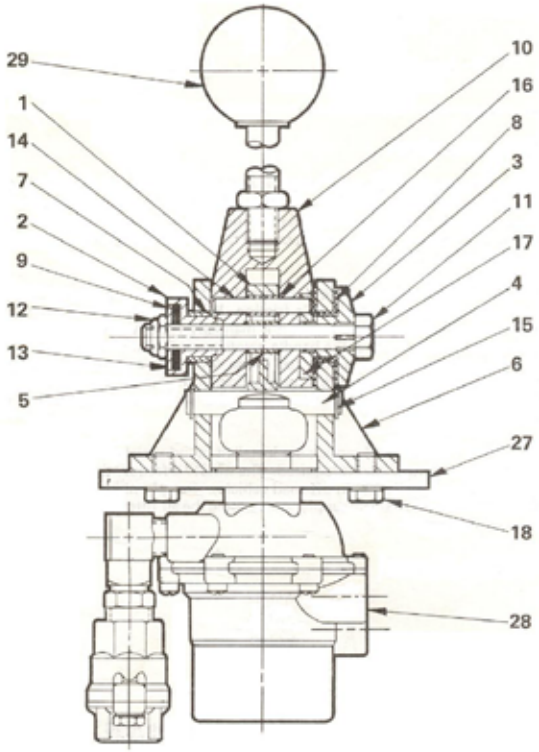

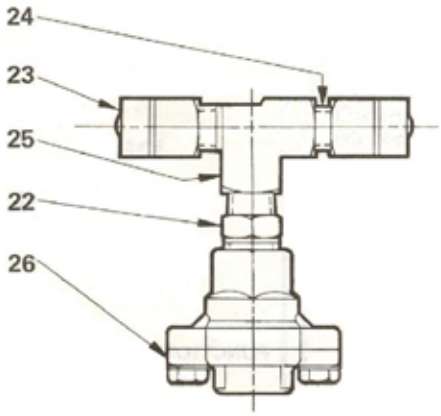

COMPENSATING RANGE	MAXIMUM OUTPUT	SINGLE WM333	DUAL WM317
0-60 PSI	60 PSI		E
0-85 PSI	85 PSI	T	T
0-120 PSI	FULL TANK	S	S
0-130 PSI	130 PSI	M	
0-180 PSI	FULL TANK	W	W

PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY
1	Rocker Arm (102030)	1	10	Handle Base (102041)	1	22	Fitting	1
2	Pivot Bushing (102031)	1	11	Bolt (102042)	1	23	Fitting	2
3	Thrust Plate (102032)	1	12	Nut (114608)	1	24	Fitting	1
4	Rocker Pin (102033)	1	13*	Washer (102040)	1	25	Fitting	1
5*	Bushing (102034)	1	14	Dowel Pin (115343)	1	26	WM290 Filter (111978)	1
6	Bracket (102035)	2	15	Retaining Ring	2	27	Mounting Plate (102036)	1
7*	Bushing (102038)	2	16*	Bushing (103009)	1	28	WM90 Series Valve	2
8*	Disc (102039)	2	17	Drive Plate (103029)	1	29	Knob & Shaft Assembly	1
9	Washer	1	18	Screw	4			

Service this unit with repair kit number 114260. Repair kit includes parts to service the WM90 series valves and cartridge assemblies. To replace each WM90 series valve, order the appropriate replacement unit as listed in the ordering information block. To service only one WM90 series valve, order repair kit number 114100. To replace the cartridge assembly in each WM90 series valve, order part number 101355. To replace only the handle shaft, order part number 102037. Other replacement items are followed by part numbers. *Asterisk designates parts that are included in repair kit number 114260.

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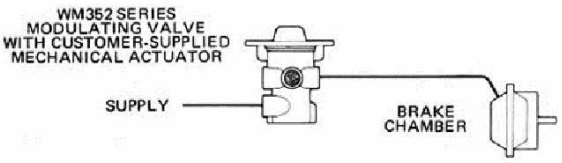
WM352 SERIES

PRODUCT DESCRIPTION The WM352 series valves are three-way pressure modulators that frequently serve as sub-assemblies in other Williams Air Controls products. A spring and push rod assembly (not included) are required to actuate the valve and to provide output compensation. The WM352 series is specifically designed for pneumatic braking systems that incorporate relay valves.

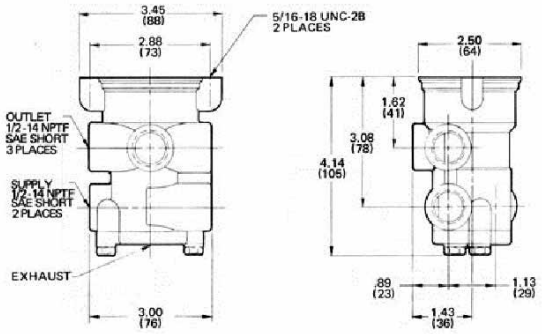
OPERATION When the mechanical actuator depresses the valve's balance piston, the piston seats to prevent pressure from escaping through the exhaust port. Further movement against the piston causes a path to open from the supply port to the outlet port. The outlet pressure balances against the spring in the actuating assembly. The valve achieves a balanced condition and the piston closes the supply port to maintain this condition. Additional piston movement or a change in downstream pressure will cause a new balance point to be established. When the mechanical actuator is released, the piston unseats and outlet pressure is discharged through the exhaust port.

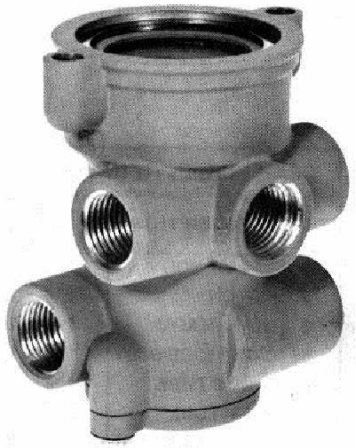
APPLICATION The WM352 is used in several Williams Air controls treadle valves to modulate pressure delivery to industrial or vehicular braking systems. These valves also serve as sub-assemblies for the WM400 and WM401 pressure regulators. As a treadle valve or regulator component, the WM352 valve is supplied with an actuating assembly. However, when the VM352 valve is purchased separately, the customer must supply spring-actuator.

TYPICAL INSTALLATION



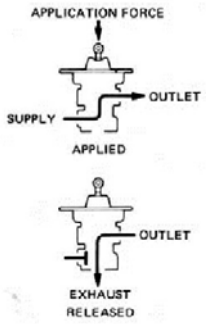
EXTERNAL CONFIGURATION



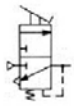


HIGH FLOW MODULATING VALVE

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



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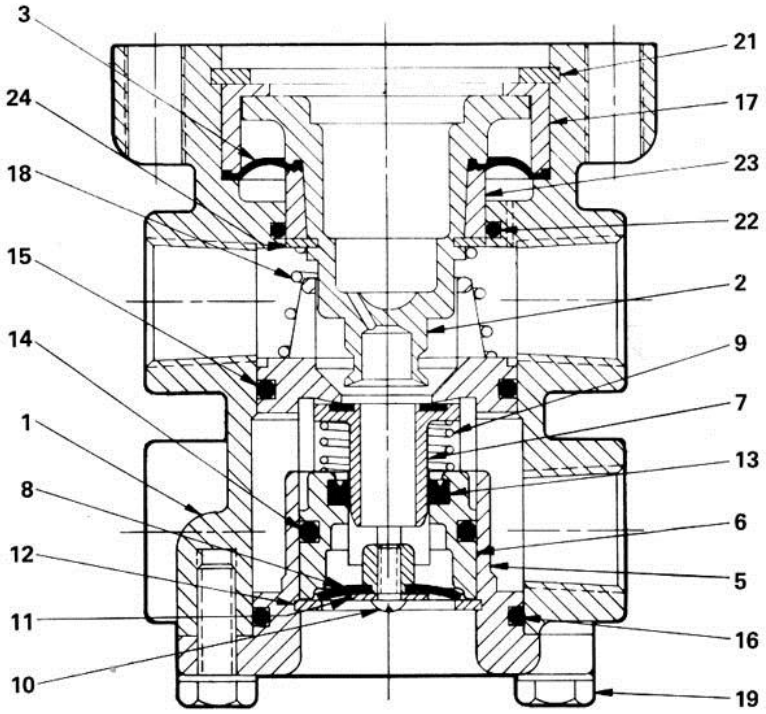
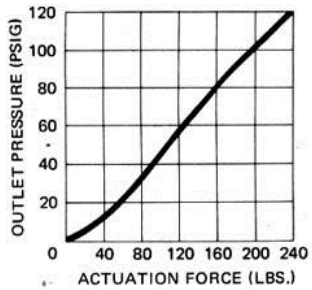


PARTS IDENTIFICATION			
ITEM	DESCRIPTION	QTY. A & D	QTY. F
1	VALVE BODY	1	1
2	PISTON	1	1
* 3	DIAPHRAGM	1	1
5	CARTRIDGE BODY	1	1
6	GUIDE TUBE	1	1
* 7	SEAT TUBE	1	1
* 8	CHECK DISC	1	1
9	SPRING	1	1
10	SCREW	1	1
11	WASHER	1	1
12	RETAINING RING	1	1
* 13	U-CUP	1	1
* 14	O-RING	1	1
* 15	O-RING	1	1
* 16	O-RING	1	1
17	CLAMP RING	1	1
18	SPRING	1	1
19	SCREW	2	2
21	RETAINING RING	1	1
* 22	O-RING	1	
23	CLAMP RING	1	1
24	RETAINING RING	1	1

Service this unit with repair kit number 114299. This repair kit also contains parts to service the cartridge assembly. To replace only the cartridge assembly (Items 5-16), order part number 101979. *Asterisk designates parts included in repair kit 114299.

SPECIFICATIONS

PORT SIZE . . . . . 1/2-14 NPTF
MAXIMUM OPERATING PRESSURE . . . . . 200 PSI (1379,0 kPa)
OPERATING TEMPERATURE* . . -20°F to 200°F (-28,9°C to 93,3°C)
FLOW RATING . . . . . 160 SCFM @ 100 PSI (4,5 m^3/min @ 690 kPa)
ACTUATION FORCE . . . . Refer to Graph of Force vs. Output Pressure
MOUNTING . . . . . With Two 5/16-18 Fasteners
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Valve Body . . . . . Die Cast Aluminum Alloy
Cartridge Body & Piston . . . . . Die Cast Zinc Alloy
Diaphragm . . . . . Fabric-Reinforced Buna N
Seals . . . . . Buna N
NET WEIGHT . . . . . 1 lb. 8 oz. (0,7 kg)
*For continuous operation beyond this range, contact factory.



TO ORDER, SPECIFY

WM352 ____
Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	SUB-ASSEMBLY APPLICATIONS
WM352 A	112468	WM353A,B,C,D,E & F; WM392,WM392A & D; WM399A & J; WM400A & C; WM401A,B,C & D
WM352 D	112471	WM399L & N
WM352 F	117983	WM305D & D1

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WM606 SERIES

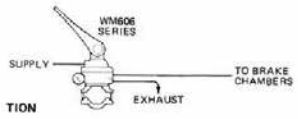
PRODUCT DESCRIPTION

DESCRIPTION TheWM606 series valves are adjustable, self-relieving, pressure modulating valves designed for column mounting. Actuated by a handle these normally-closed valves feature precise modulating control of air pressure delivery. Several models are available with various output ranges, and some models are equipped with gages and adjustable handle travel stops. The WM606 series valves incorporate the WM90 series pressure modulating valves.

OPERATION The WM606 valves are equipped with a friction adjustment which restricts or allows free movement of the handle. The desired handle friction is obtained by adjusting the three screws under the handle. Important: When these screws are loosened to product minimum handle friction, the operator must hold the handle in the applied position. Although the handle travels a maximum of 90 degrees, the handle position can be changed in 30 degree increments. If the WM 606 valve is equipped with adjustable handle travel stops, then the handle will travel only between the stop positions. This feature lets the customer establish minimum and maximum pressure limits within the valve's output range. When the WM606 valve handle is applied, the valve opens to modulate the delivery of air pressure. As the handle is returned to the rest position, air pressure at the outlet port is released through the exhaust.

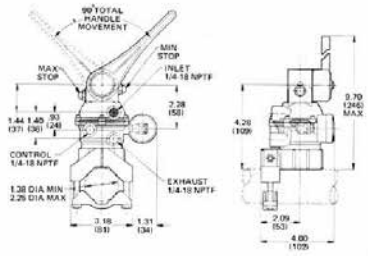
APPLICATION WM606 series valves are designed for applications requiring hand-controlled modulation of air pressure. WM606 valves are frequently used to provide hand control of trailer vehicle brakes. These valves are also used in marine and industrial machine control systems. WM606 valves can be mounted on the steering column or secured to the instrument panel. MARINE APPLICATIONS: This device meets the pressure test requirements specified in "Marine Engineering Regulations" (CG-115). Documentation is available upon request.

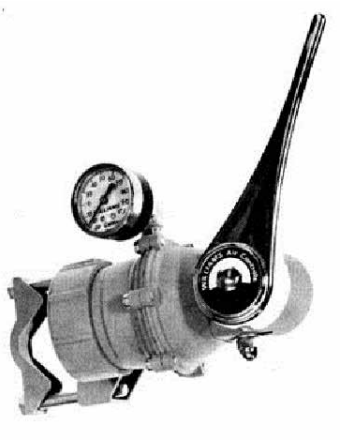
TYPICAL INSTALLATION



TION

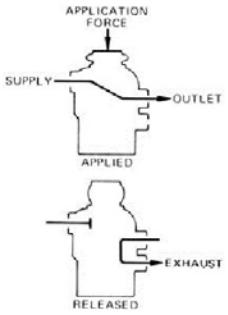
EXTERNAL CONFIGURATION



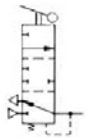


COLUMN-MOUNTED PRESSURE MODULATION VALVE

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



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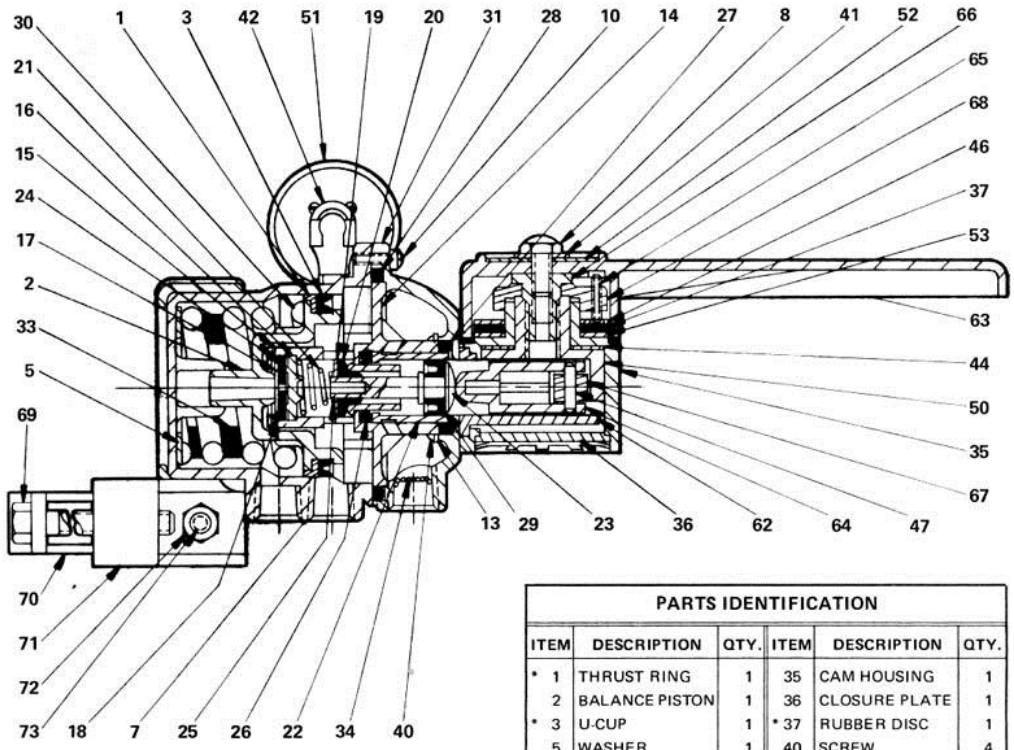

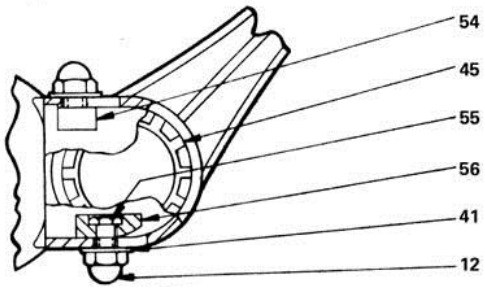

PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
* 1	THRUST RING	1	35	CAM HOUSING	1
2	BALANCE PISTON	1	36	CLOSURE PLATE	1
* 3	U-CUP	1	* 37	RUBBER DISC	1
5	WASHER	1	40	SCREW	4
7	OUTLET BODY	1	41	WASHER	3
8	SCREW	1	42	FITTING	1
10	SCREW	6	44	FRICTION DISC	1
12	CAP NUT	2	* 45	RETAINING RING	1
* 13	SEAL	4	* 46	FRICTION DISC	1
14	BARRIER PLATE	1	47	CAM ROLLER PIN	1
15	VALVE CAGE	1	50	ACTUATING CAM	1
16	SUPPORT PLATE	1	51	GAGE	1
* 17	POPPET	1	52	ESCUTCH. PLATE	1
18	POPPET DISC RING	1	* 53	FRICTION DISC	1
19	SUPPORT DISC	1	54	MAX STOP	1
* 20	POPPET	1	55	INSERT	1
21	SPRING	1	56	MIN STOP	1
22	CYLINDER SLEEVE	1	62	CAM GUIDE	1
23	PISTON	1	63	HANDLE	1
24	RETAINING RING	1	64	CAM FOLLOWER	1
25	RETAINING RING	1	65	SETSCREW	3
* 26	O-RING	1	66	SCREW	1
* 27	O-RING	1	67	CAM ROLLER	1
* 28	O-RING	1	68	CAM RETAINER	1
* 29	U-CUP	1	69	SCREW	2
30	SPRING	1	70	COLUMN CLAMP	1
31	INLET BODY	1	71	MOUNTING PLATE	1
* 33	BOOSTER †	1	72	NUT	1
34	SCREEN	1	73	SCREW	1

Service this unit with repair kit number **114471**. This repair kit contains parts to service the WM90 cartridge assembly.
To replace the cartridge assembly, order part number 101355.
*Asterisk designates parts included in repair kit number 114471.
†Part used only on units with 0-180 PSI output range.

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TO ORDER, SPECIFY

WM606 ____

Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	OUTPUT RANGE	MAXIMUM OUTPUT	GAGE (ITEM 51)	OPTIONS	SPRING BOOSTER (ITEM 33)
WM606 **A1**	113714	0-60 PSI (0-414 kPa)	60 PSI (414 kPa)	YES	None	NO
WM606 **B1**	113719	0-90 PSI (0-827 kPa)	90 PSI (827 kPa)	YES	None	NO
WM606 **B2**	100513	0-90 PSI (0-621 kPa)	90 PSI (621 kPa)	NO	None	NO
WM606 **B2C**	113722	0-90 PSI (0-621 kPa)	90 PSI (621 kPa)	NO	Both Handle Stops	NO
WM606 **C1**	113724	0-120 PSI (0-827 kPa)	Tank	YES	None	NO
WM606 **C1C**	113726	0-120 PSI (0-827 kPa)	Tank	YES	Both Handle Stops	NO
WM606 **C2** *	113727	0-120 PSI (0-827 kPa)	Tank	NO	None	NO
WM606 **C2C** *	113730	0-120 PSI (0-827 kPa)	Tank	NO	Both Handle Stops	NO
WM606 **D1**	113733	0-180 PSI (0-1241 kPa)	Tank	YES	None	YES

* MANUFACTURED BY WILLIAMS CONTROLS

SPECIFICATIONS

PORT SIZES: Inlet/Outlet/Exhaust . . . . . 1/4-18 NPTF
Gage . . . . . 1/8" NPT
MAXIMUM OPERATING PRESSURE. . . . . 200 PSI (1379,0 kPa)
OPERATING TEMPERATURE* . . . -20°F to 200°F (-28,9°C to 93,3°C)
FLOW RATING. . . . . 35 SCFM @ 100 PSI (1 m^3/min @ 690 kPa)
HANDLE MOVEMENT . . . . . 90° Maximum
MOUNTING. . . . . Bracket Clamps to 2.25 in. (57,2 mm) Maximum Diameter Column
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Piston. . . . . Die Cast Aluminum Alloy
Poppets and O-Rings . . . . . Buna N
NET WEIGHT. . . . . 3.75 lbs. (1,7 kg)

*For continuous operation beyond this range, contact factory.

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WM607 SERIES

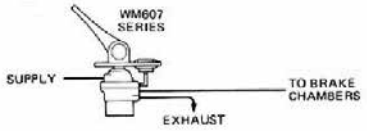
PRODUCT DESCRIPTION

DESCRIPTION The WM607 series valves are adjustable, self-relieving, pressure modulating valves designed for panel mounting. Actuated by a handle, these normally-closed valves are available in several models with various output pressure ranges. Some models are equipped with gages and adjustable handle travel stops. The WM607 series valves incorporate the WM 90 series pressure modulating valves.

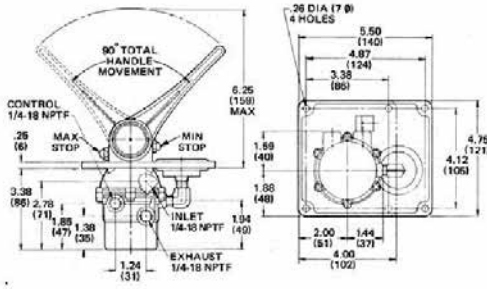
OPERATION The WM607 valves are equipped with a friction adjustment which restricts or allows free movement of the handle. The desired handle friction is obtained by adjusting the three screws located under the handle. Important: When these screws are loosened to produce minimum handle friction, the operator must hold the handle in the applied position. Although the handle travels a maximum of 90 degrees, the handle position can be changed in 30° increments. If the WM607 valve is equipped with adjustable handle travel stops, then the handle will travel only between the stops. This feature lets the customer establish minimum and maximum pressure limits within the valve's output range. When the WM607 valve is applied, the valve opens to modulate air pressure delivery. As the handle is returned to the rest position, air at the outlet port is released through the exhaust.

APPLICATION Designed for console mounting, WM607 valves are used in industrial, marine, and heavy duty vehicle applications. Typical applications include hand control of engine throttles, clutches, frictions, brakes, and hydraulic spool valves and pumps. MARINE APPLICATIONS: This device meets the pressure test requirements specified in "marine Engineering Regulations" (CG-115) Documentation is available upon request.

TYPICAL INSTALLATION

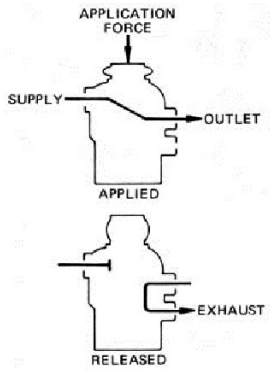


EXTERNAL CONFIGURATION

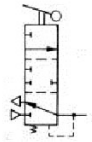


PANEL-MOUNTED PRESSURE MODULATING VALVE

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



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REV. DATE: 2010.06.16

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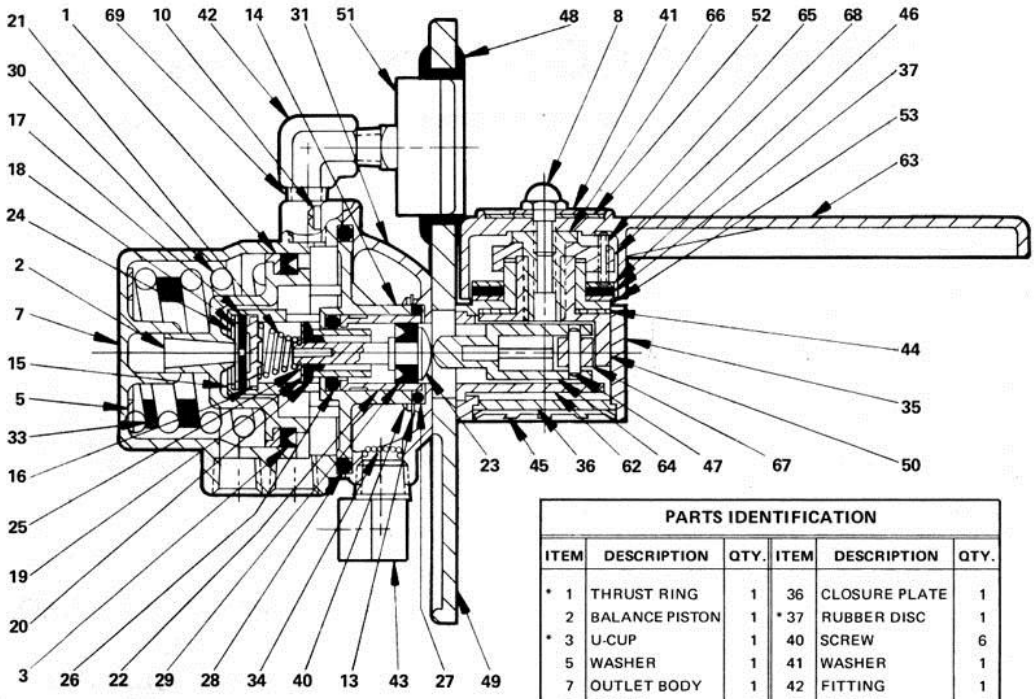

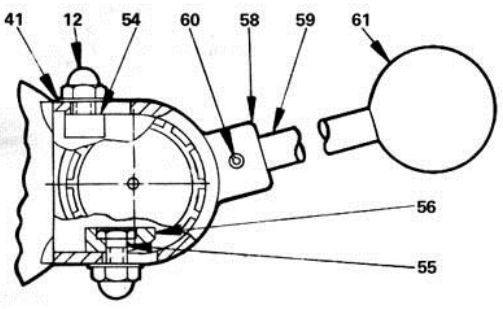

OPTIONAL HANDLE

SPECIFICATIONS

PORT SIZES: Inlet/Outlet/Exhaust . . . . . 1/4-18 NPTF
Gage . . . . . 1/8 NPT
MAXIMUM OPERATING PRESSURE. . . . . 200 PSI (1379,0 kPa)
OPERATING TEMPERATURE* . . . -20°F to 200°F (-28,9°C to 93,3°C)
FLOW RATING. . . . . 35 SCFM @ 100 PSI (1 m^3/min @ 690 PSI)
HANDLE MOVEMENT . . . . . 90° Maximum
MOUNTING. . . . . Built-In Mounting Plate for Panel Mounting
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Piston. . . . . Die Cast Aluminum Alloy
Poppets and O-Rings . . . . . Buna N
Mounting Plates. . . . . Aluminum
NET WEIGHT. . . . . .3.38 lbs. (1,5 kg)
*For continuous operation beyond this range, contact factory.

PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
* 1	THRUST RING	1	36	CLOSURE PLATE	1
2	BALANCE PISTON	1	* 37	RUBBER DISC	1
* 3	U-CUP	1	40	SCREW	6
5	WASHER	1	41	WASHER	1
7	OUTLET BODY	1	42	FITTING	1
8	SCREW	1	43	FITTING	1
10	SCREW	4	* 44	FRICTION DISC	1
12	CAP NUT	2	* 45	RETAINING RING	1
* 13	SEAL	4	46	FRICTION DISC	1
14	BARRIER PLATE	1	47	CAM ROLLER PIN	1
15	VALVE CAGE	1	48	GROMMET	1
16	SUPPORT PLATE	1	49	MOUNTING PLATE	1
* 17	POPPET	1	50	ACTUATING CAM	1
18	POPPET DISC RING	1	51	GAGE	1
19	SUPPORT DISC	1	52	ESCUTCH. PLATE	1
* 20	POPPET	1	*-53	FRICTION DISC	1
21	SPRING	1	54	MAX STOP	1
22	CYLINDER SLEEVE	1	55	INSERT	1
23	PISTON	1	56	MIN STOP	1
24	RETAINING RING	1	58	HANDLE BASE	1
25	RETAINING RING	1	59	HANDLE ROD	1
* 26	O-RING	1	60	ROLL PIN	1
* 27	O-RING	1	61	KNOB	1
* 28	O-RING	1	62	CAM GUIDE	1
* 29	U-CUP	1	63	HANDLE	1
30	SPRING	1	64	CAM FOLLOWER	1
31	INLET BODY	1	65	SETSCREW	3
* 33	BOOSTER †	1	66	SCREW	1
34	SCREEN	1	67	CAM ROLLER	1
35	CAM HOUSING	1	68	CAM RETAINER	1
			69	FITTING	1

Service this unit with repair kit number 114471. This repair kit contains parts to service the WM90 series valve and cartridge assembly.
To replace the WM90 series valve, contact factory for the appropriate replacement unit.
To replace the cartridge assembly in the WM90 series valve, order part number 101355.
*Asterisk designates parts included in repair kit number 114471.
†Part used only on units with 0-180 PSI output range.

Manufactured in the USA by Brake Systems Inc.

TO ORDER, SPECIFY

WM607 ____

Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	OUTPUT RANGE	MAXIMUM OUTPUT	GAGE (ITEM 51)	SPECIAL OPTIONS	HANDLE	SPRING BOOSTER (ITEM 33)
WM607 **A1**	113744	0-60 PSI (0-414 kPa)	60 PSI (414 kPa)	YES	None	Standard	NO
WM607 **A1X2**	113747	0-60 PSI (0-414 kPa)	60 PSI (414 kPa)	YES	None	Optional Handle	NO
WM607 **A3X2**	110464	0-60 PSI (0-414 kPa)	60 PSI (414 kPa)	NO	None	Optional Handle	NO
WM607 **B1** *	113754	0-90 PSI (0-621 kPa)	90 PSI (621 kPa)	YES	None	Standard	NO
WM607 **B3**	113760	0-90 PSI (0-621 kPa)	90 PSI (621 kPa)	NO	None	Standard	NO
WM607 **B3X2**	117300	0-90 PSI (0-621 kPa)	90 PSI (621 kPa)	NO	None	Optional Handle	NO
WM607 **C1** *	113762	0-120 PSI (0-827 kPa)	Tank	YES	None	Standard	NO
WM607 **C1X2**	100407	0-120 PSI (0-827 kPa)	Tank	YES	None	Optional Handle	NO
WM607 **C3**	113768	0-120 PSI (0-827 kPa)	Tank	NO	None	Standard	NO
WM607 **D1**	113771	0-180 PSI (0-1241 kPa)	Tank	YES	None	Standard	YES

* MANUFACTURED BY WILLIAMS CONTROLS

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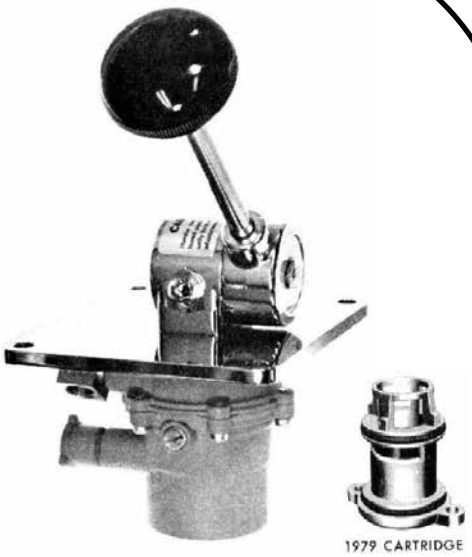
WM786 SERIES

PANEL MOUNT REGULATING VALVE

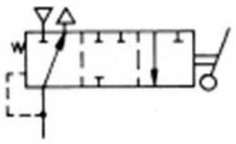
DESCRIPTION

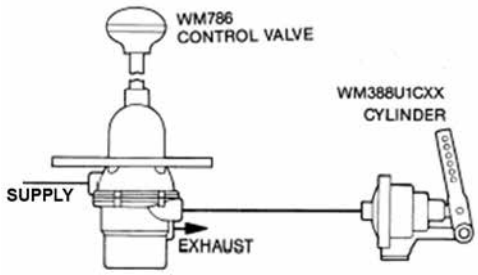
The WM786 is a panel-mounted, three-way regulating control valve. It is actuated by a handle which is equipped with adjustable stops so the operator can establish minimum and maximum pressure limits within a particular model's output range. When the stops are adjusted to allow maximum handle movement, the valve modulates through its entire output range and the handle has a rotation of 90°. The WM786 series also features a friction adjustment which restricts or allows free movement of the handle. IMPORTANT: WHEN FRICTION ADJUSTMENT SCREWS ARE LOOSENED TO PROVIDE MINIMUM HANDLE FRICTION, THE OPERATOR MUST HOLD THE HANDLE IN THE APPLIED POSITION OR IT WILL AUTOMATICALLY RETURN TO NEUTRAL.

WM786 series valves interchange in both mounting and function with WABCO's M (B models) and H (A models) series.



I.S.O SYMBOL





SPECIFICATIONS

PORT SIZES	1/4–18 NPTF
MAXIMUM SUPPLY PRESSURE	200 PSI (1378,0 kPa)
OPERATING TEMPERATURE	-20°F to 200°F (-28,9°C to 93,3°C)
FLOW RATING	35 SCFM @ 100 PSI (1 m³/min @ 690 kPa)
HANDLE MOVEMENT	90° Maximum
MOUNTING	Panel Mounted
MOUNTING ATTITUDE	Optional
MATERIALS: Body Castings	Die Cast Zinc Alloy
Poppets and Seals	Buna N
Knob	Black Plastic
Mounting Plate	Irridited Aluminum
WEIGHT	3.4 lbs. (1,5 kg)

Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.06.16

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TO ORDER, SPECIFY:

WM786 _____
MODEL NUMBER SUFFIX

PART NUMBER _____

SELECT PART NUMBER AND SUFFIX BELOW

SUFFIX	PART NUMBER	OUTPUT RANGE	MAXIMUM OUTPUT	KNOB&MNTG. PLATE SIZE	CLOSURE PLATE & CAM HOUSING FINISH
WM786A3	118338	0-120 PSI	TANK	LARGE	FLAT BLACK PAINT
WM786B1	118340	0-60 PSI	65 PSI	SMALL	FLAT BLACK PAINT
WM786B2	118341	0-90 PSI	95 PSI	SMALL	FLAT BLACK PAINT
WM786B3	USE WM786-100	-	-	-	-
WM786-100*	118569	0-115 PSI	TANK	SMALL	FLAT BLACK PAINT

***WM786-100 MANUFACTURED BY WILLLIAMS CONTROLS**

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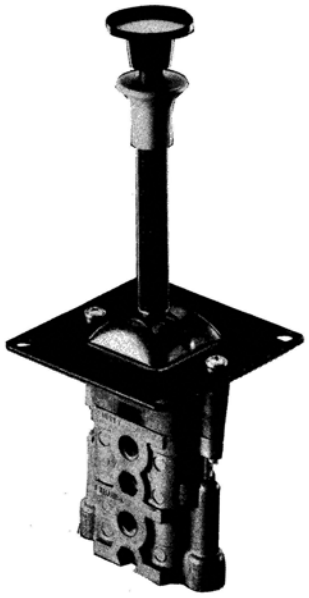
WILLIAMS CONTROLS INC.

WM787F THREE POSITION FOUR-WAY REGULATING CONTROLLER

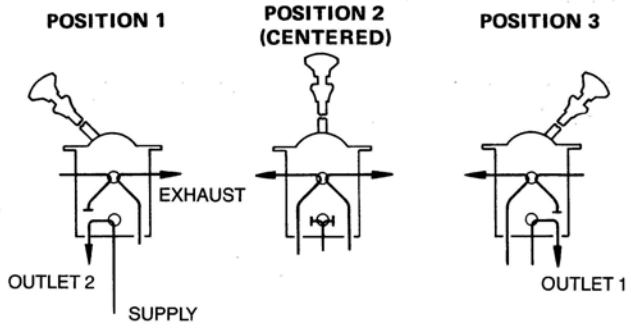
15 SCFM @ 100 PSI
1/8-27 NPTF



I.S.O. SYMBOL

DESCRIPTION

The WM787F dual control valve is a three-position, four-way pressure regulator. It features a control lever equipped with a safety lockout device to prevent unintentional lever movement. The lever locks in the "off" position. To actuate the valve, the operator must pull up on the lockout device and move the lever. The WM787F is a mounting & functional replacement for the WM787D.



SPECIFICATIONS

PORT SIZE	1/8-27 NPTF
MAXIMUM SUPPLY PRESSURE	150 PSI (1034 kPa)
OPERATING TEMPERATURE	−20°F to 160°F (−29°C to 74°C)
FLOW RATING	15 SCFM @ 100 PSI (0,4 m³/min @ 690 kPa)
OUTPUT RANGE	0-90 PSI (0-621 kPa)
MOUNTING	Panel Mounted
MOUNTING ATTITUDE	Optional
MATERIALS: Valve Body	Chromate Treated Aluminum
O-Rings	Buna N
Actuating Lever	Steel and Aluminum Components
Knob	Black Plastic
Mounting Plate	Steel with Black Oxide Finish
WEIGHT	1 lb., 4 oz. (0,6 kg)

119850

REV. E 5/89

SECTION 5: PRESSURE HOLDING VALVES

WM-48

WM-87

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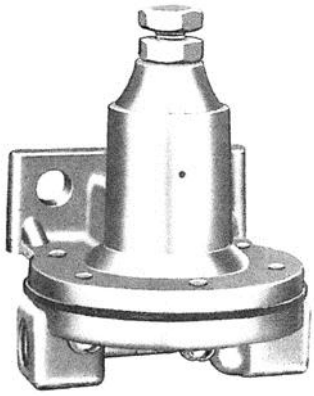
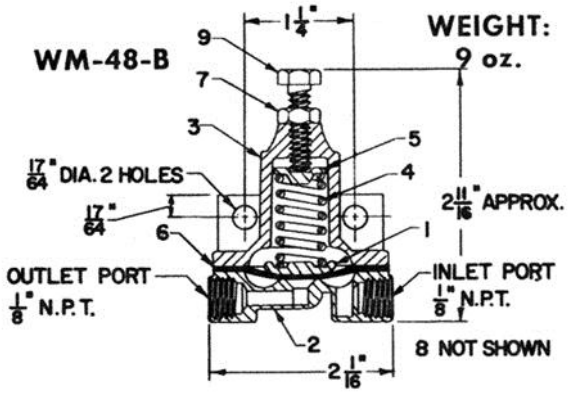
WM48B SERIES



PRESSURE HOLDBACK VALVE WM-48-B

A pressure holdback valve with bracket. Commonly used to isolate a secondary system until the primary system reaches desired pressure. Popular useage is on air ride suspensions to protect truck braking system. Holdback range adjustable to 80 PSI.



WM-48-B PARTS LIST			
DWG. NO.	NAME	PART NO.	QTY.
1	DIAPHRAGM PLATE	1108	1
2	BODY	1107	1
3	COVER ASSEMBLY	1109	1
*4	SPRING	1110	1
5	SPRING BUTTON	1111	1
*6	DIAPHRAGM	1090	1
7	NUT	2-W-11	1
*8	ASSEMBLY SCREW	3-W-5	6
9	ADJUSTING SCREW	3-W-31	1
*INCLUDED IN R-48 REPAIR KIT			

Manufactured in the USA by Brake Systems Inc.

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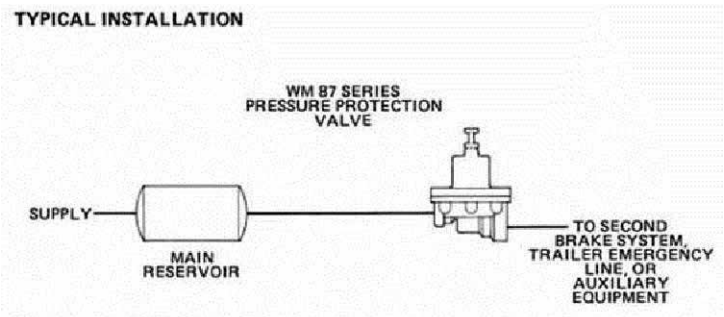
WM87

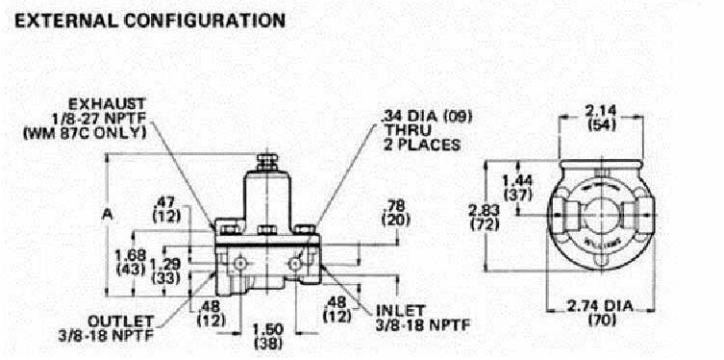
PRODUCT DESCRIPTION

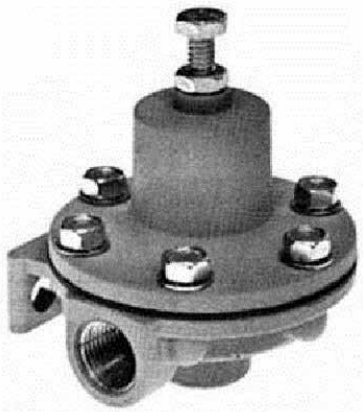
DESCRIPTION The WM87 series valves are normally closed adjustable pressure protection valves. To protect pressure in the main air system, these valves remain closed until adequate pressure is present to supply an auxiliary system. The customer must adjust the valve to select a pressure setting at which the valve will open. Until the supply pressure exceeds this setting, the WM87 series valve remains closed. Several models are available in the WM87 series, and each functions differently when the supply pressure drops below the pressure setting.

OPERATION When adequate supply pressure is present, the WM87 series valve yields and the supply port opens to the outlet port. Each of the three WM87 models operate differently when the supply pressure decreases below the opening pressure. The WM87 traps the pressure at the outlet port, while the WM87A, which has a flexible poppet, permits reverse flow until the supply pressure balances with the outlet pressure. On the WM87C, an exhaust port releases downstream pressure at the outlet port. All of the WM87 valves will reopen if the supply pressure increases above the preset opening pressure.

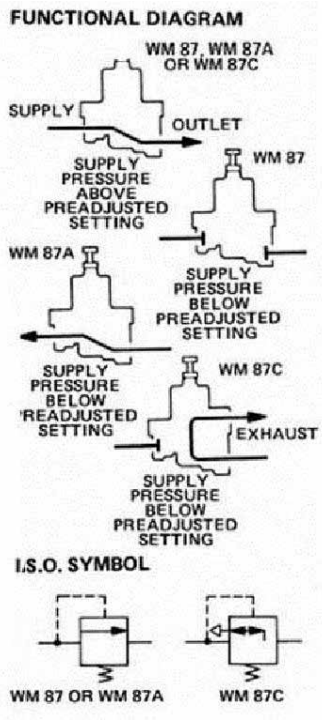
APPLICATION As shown in the installation schematic below, before opening and supplying pressure to a secondary system, the WM87 series valve allows pressure to build in a primary system to a preset level. Thus, a specific pressure is maintained in the primary system. For each application, the customer must adjust the valve to obtain the desired opening pressure.







ADJUSTABLE PRESSURE PROTECTION VALVE



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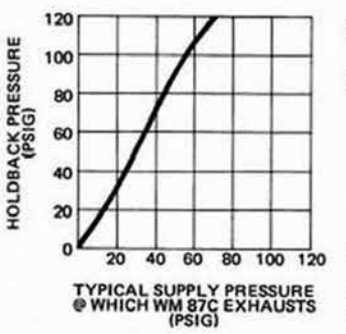

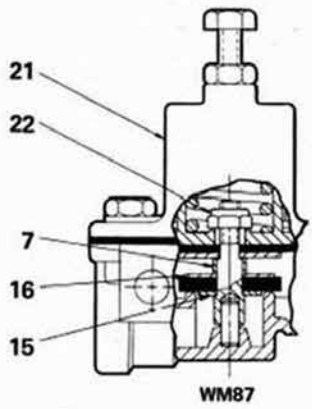

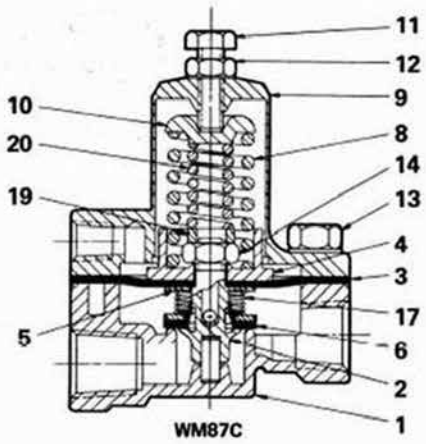

PARTS IDENTIFICATION

ITEM	DESCRIPTION	QUANTITY NO SUFFIX	A	C
1	BODY ASSEMBLY	1	1	1
+2	STEM	1	1	1
*+3	DIAPHRAGM	1	1	1
+4	SPRING PLATE	1	1	1
+5	WASHER	1	1	1
*+6	POPPET	1	1	1
+7	SPACER	1	1	
8	SPRING	1	1	
9	COVER			1
10	SPRING CAP	1	1	1
11	SCREW	1	1	1
12	NUT	1	1	1
13	SCREW	6	6	6
14	NUT			1
15	WASHER	1		
16	WASHER	1		
17	SPRING			1
19	WASHER			1
20	SPRING	1		
21	COVER	1	1	
22	NUT	1	1	

Service the WM87 with repair kit R87.
Service the WM87A with repair kit R87A.
Service the WM87C with repair kit R87C.
*Asterisk designates parts included in repair kit R87, R87C
+Plus sign designates parts included in repair kit R87A

SPECIFICATIONS

PORT SIZES: Inlet & Outlet . . . . . .3/8-18 NPTF
Exhaust (WM 87C only) . . . . . .1/8-27 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 . . . . . .155 SCFM @ 100 PSI (4,4 m³/min @ 690 kPa)
MOUNTING. .Pipe Mtg. or Mtg. w/ Bracket & Customer-Supplied Fasteners
MOUNTING ATTITUDE. . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Stems. . . . . .Brass
Diaphragms . . . . . Fabric-Reinforced Buna N
Poppets: WM 87 . . . . . Buna N
WM 87A&C . . . . . Buna N w/ Brass Insert
NET WEIGHT: WM 87 & WM 87A . . . . . 16 oz. (0,5 kg)
WM 87C . . . . . 17 oz. (0,5 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM 87 ___
Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	VALVE FUNCTION WITH SUPPLY PRESSURE DECREASE	ADJUSTABLE HOLDBACK PRESSURE*	MAX. HEIGHT A
WM 87 NO SUFFIX	111257	Valve Traps Pressure at Outlet	0-75/85 PSI (0-517/586 kPa)	3.84 in. (98 mm)
WM 87 A	111258	Valve Permits Reverse Flow	0-75/85 PSI (0-517/586 kPa)	
WM 87 C	111263	Valve Exhausts (Refer to Performance Curve)	0–70/80 PSI (0–483/552 kPa)	3.97 in. (101 mm)

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SECTION 6: PRESSURE REGULATORS

WM-43

WM-279

WM-400

WM-459

WM-517

WM-521

WM-522

WM-614

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WILLIAMS CONTROLS INC.

WM43 SERIES

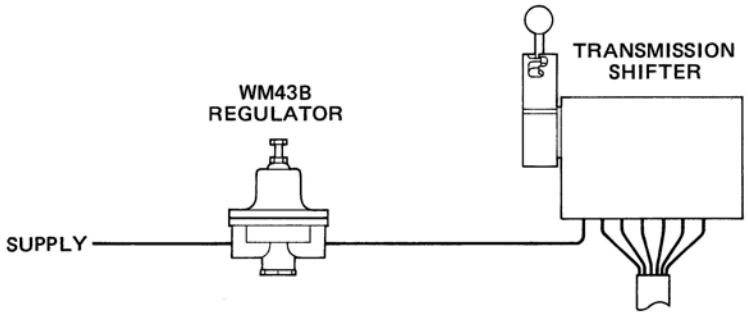
PRODUCT DESCRIPTION

DESCRIPTION The WM43 series is composed of a group of adjustable, non-relieving pressure regulators with varying outlet pressure adjustment ranges and mounting styles. These valves are adjusted by a hex screw, and function to limit and maintain downstream pressure at a preset level.

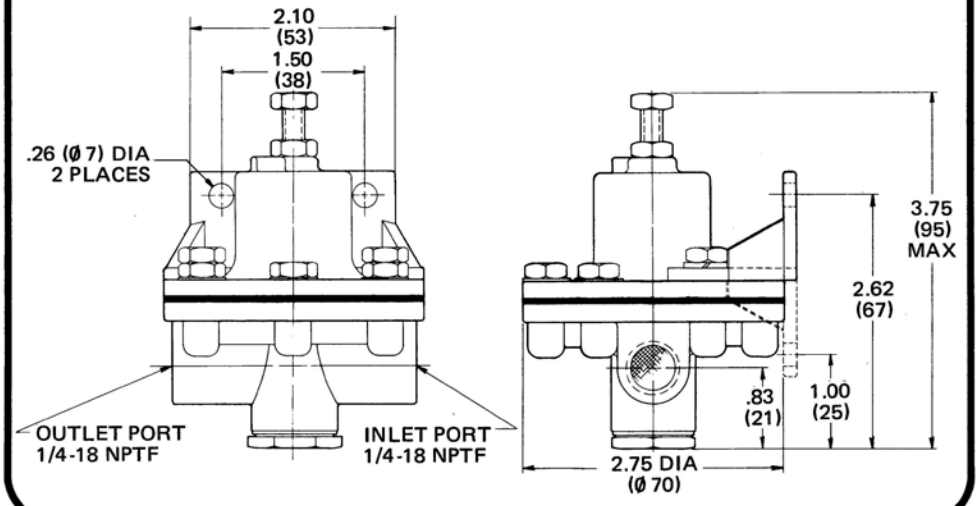
OPERATION The adjustment screw of a WM43 regulator is turned inward to acheive pressure delivery. This causes an internal diaphragm to flex, unseating the poppet and allowing supply pressure to flow to the outlet. When pressure at the regulator's outlet balances against the force of an internal spring, the poppet seats to maintain the balanced condition. If the adjustment screw is loosened, the poppet seats until outlet pressure is reduced to conform to the setting, then the regulator maintains the new output pressure. Since these models are not self-relieving, excess outlet pressure must either be consumed or exhausted through a pressure relief valve.

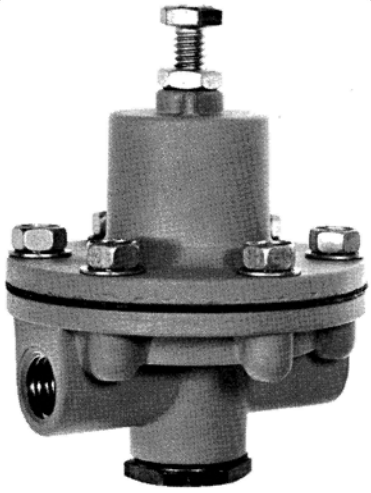
APPLICATION WM43 regulators are designed to maintain downstream pressure at a desired level. They are used in industrial and vehicular applications which require a non-exhausting pressure regulator, and are commonly used to govern supply pressure to pneumatic accessories and equipment. WM43 valves are ideal for limiting air supply to transmission shifters and other devices which consume air. Non-relieving regulators should not be used in dead headed circuits which do not consume air unless used in conjunction with pressure relief valves.

TYPICAL APPLICATION



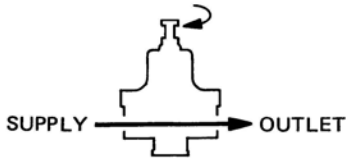
EXTERNAL CONFIGURATION

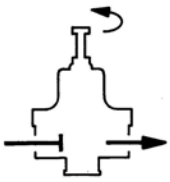




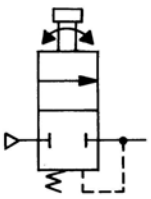
NON-RELIEVING PRESSURE REGULATOR

FUNCTIONAL DIAGRAM



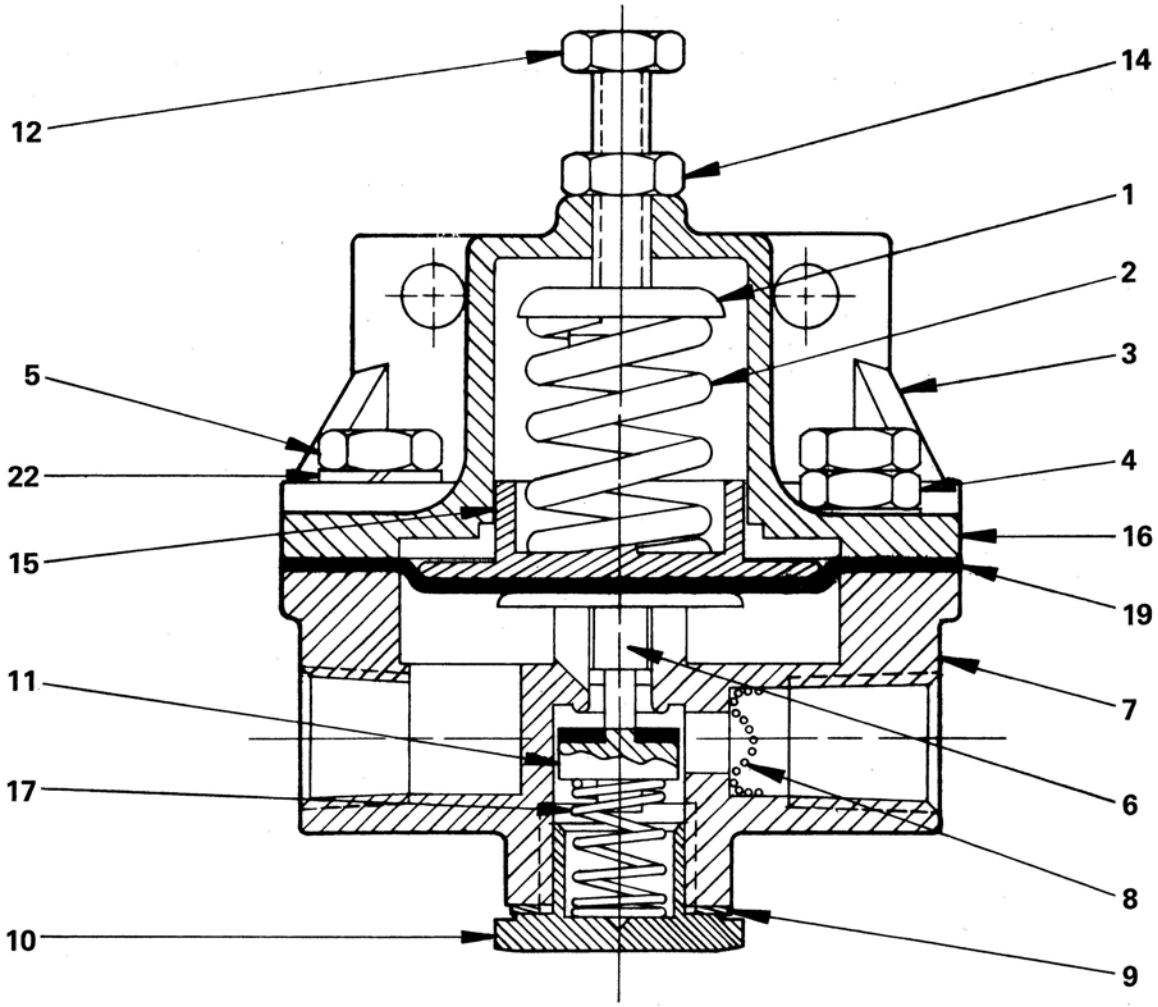


I.S.O. SYMBOL



WILLIAMS CONTROLS, INC.
14100 SW 72ND AVENUE, PORTLAND, OREGON 97224, TEL: (503) 684-8600, TELECOPIER: (503) 684-8610

119864
REL. 11/80



PARTS IDENTIFICATION

ITEM	DESCRIPTION	QUANTITY A&B	QUANTITY B1
1	SPRING CAP	1	1
2	SPRING	1	1
3	MTG. BRACKET (103960)		1
4	SCREW	6	3
5	SCREW		3
6	DIAPHRAGM PLATE	1	1
7	LOWER BODY	1	1
* 8	SCREEN	1	1
* 9	GASKET	1	1
10	END CAP	1	1
* 11	POPPET	1	1
12	SCREW (114679)	1	1
14	NUT (114537)	1	1
15	SPRING PLATE	1	1
16	COVER	1	1
17	SPRING	1	1
* 19	DIAPHRAGM	1	1
22	LOCKWASHER		3

Service this unit with repair kit number 114355. Replaceable items are followed by part numbers. *Asterisk designates parts included in repair kit number 114355.

SPECIFICATIONS

PORT SIZE . . . . . 1/4-18 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 . . . . . 40 SCFM @ 100 PSI (1,08 m^3/min @ 690 kPa)
MOUNTING. . . . . Refer to Ordering Information Block
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Diaphragm . . . . . Fabric Reinforced Buna N
Poppet . . . . . Aluminum w/Buna N Backing
NET WEIGHT. . . . . 17 ounces (0, 5 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM43 ____

Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	ADJUSTABLE OUTPUT RANGE	MOUNTING
WM43 B1	111135	0-80 PSI	BRACKET

WM279 SERIES

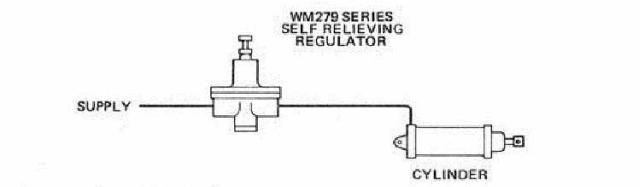
PRODUCT DESCRIPTION

DESCRIPTION The WM279 series valves are self-relieving pressure regulators that are available with different regulating devices-thumb screws, hex screws or knobs. The operator regulated the output level by manually changing the position of the regulating device. Output pressure ranges vary from model to model, but all models maintain a constant output within the regulator's pressure range. The WM279 regulators are also equipped with an adjustment feature that lets the customer limit the maximum output to a preset value.

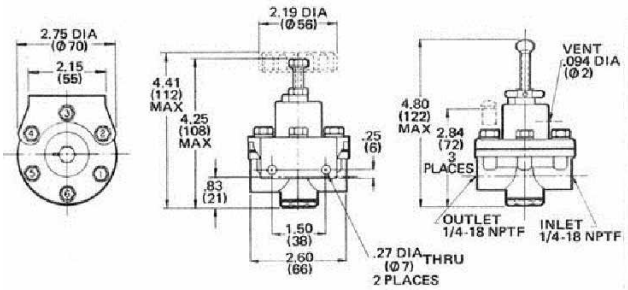
OPERATION The operator turns the regulator screw or knob inward from the zero delivery position to achieve pressure delivery. An internal diaphragm flexes, causing the poppet to unseat and open a path from the supply port to the outlet port. The output pressure increases and balances against the force of an internal spring. When a balanced condition is achieved, the supply poppet seats. If the downstream pressure becomes greater than the inlet pressure, the regulator bleeds off the excess to maintain constant output pressure. Further movement of the knob or screw causes the output to change and a new balance point to be established. When the knob or screw contacts the adjusting nut, the regulator is delivering the predetermined maximum output. If the knob or screw is backed out, the valve will exhaust through an unthreaded vent cover.

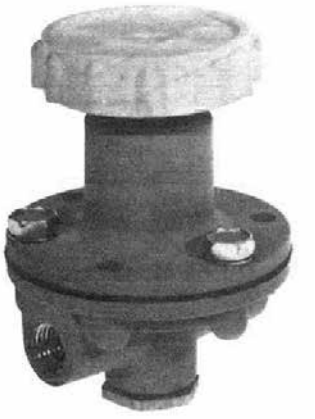
APPLICATIONS The WM279 series valves are engineered for industrial applications requiring a self-relieving pressure regulator with an adjustable output feature. Typical applications include regulating pressure delivery to axle lifts, air bags, and single-acting cylinders.

TYPICAL INSTALLATION



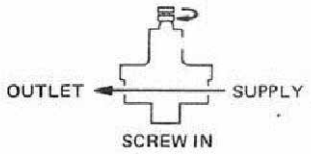
EXTERNAL CONFIGURATION

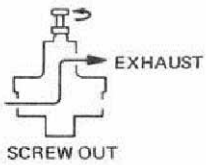




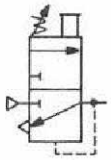
SELF-RELIEVING PRESSURE REGULATORS

FUNCTIONAL DIAGRAM





I.S.O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.06.16

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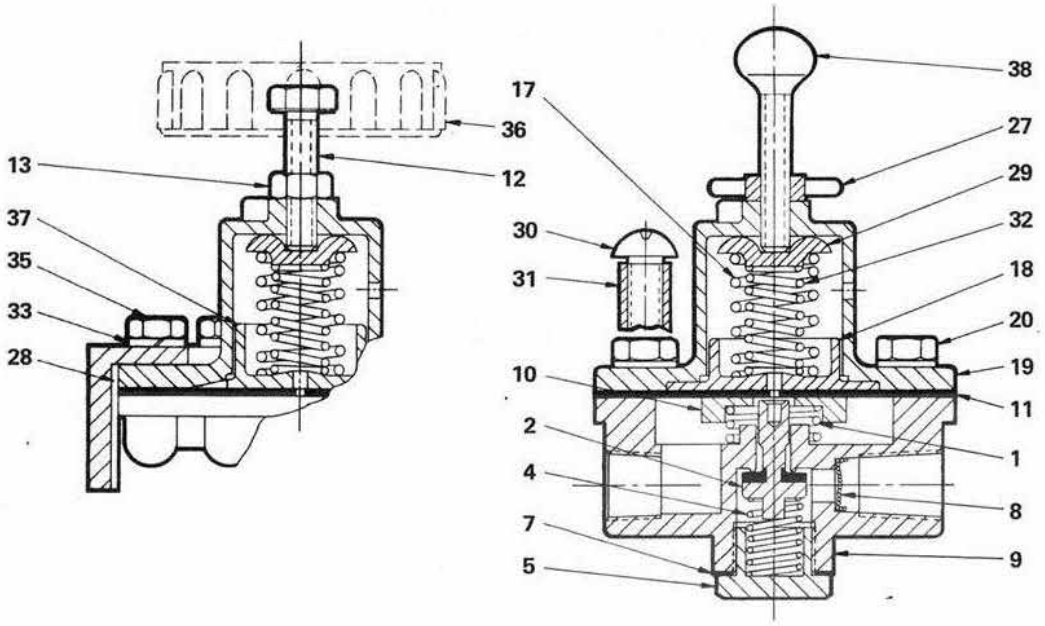

PARTS IDENTIFICATION

ITEM	DESCRIPTION	QUANTITY								
		D4	E	E1	F&F5	P	P3	P4	R	R2
1	SPRING	1	1	1	1	1	1	1	1	1
* 2	POPPET STEM	1	1	1	1	1	1	1	1	1
4	SPRING	1	1	1	1	1	1	1	1	1
5	CAP (101081)	1	1	1	1	1	1	1	1	1
* 7	GASKET (115032)	1	1	1	1	1	1	1	1	1
8	SCREEN (116456)	1	1	1	1	1	1	1	1	1
9	LOWER BODY	1	1	1	1	1	1	1	1	1
10	SPRING PLATE	1	1	1	1	1	1	1	1	1
* 11	DIAPHRAGM	1	1	1	1	1	1	1	1	1
12	SCREW	1	1	1						
13	NUT	1	1	1						
17	SPRING	1	1	1	1	1	1	1	1	1
18	DIAPH. PLATE		1	1	1	1	1	1	1	1
19	COVER ASSY.	1	1	1	1	1	1	1	1	1
20	SCREW	3	6	3	3	3	3	3	3	3
27	SPOKED NUT (101235)				1					
28	BRACKET (103960)			1						
29	SPRING CAP	1	1	1	1	1	1	1	1	1
30	SCREW (114684)	3					3	3		3
31	SPACER (101202)	3					3	3		3
32	SPRING					1	1	1	1	1
33	LOCKWASHER			3						
35	SCREW			3						
36	KNOB (104748)					1	1	1	1	1
37	DIAPH. PLATE	1								
38	THUMB SCREW (114700)				1					
NA	LABEL					1	1			
NA	ESCUTCH. PLATE						1			

Service this unit with repair kit number 114224. Items which can be replaced are followed by part numbers.
*Asterisk designates parts included in repair kit 114224.

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SPECIFICATIONS

PORT SIZE . . . . . 1/4-18 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 . . . . . 70 SCFM @ 100 PSI (2,0 m^3/min @ 690 kPa)
MOUNTING. . . . . Refer to Ordering Information Block
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
End Cap . . . . . .Brass
Poppet Stem . . . . . Aluminum w/ Buna N Backing
Diaphragm . . . . . Fabric-Reinforced Buna N
Gasket . . . . . Gray Fiber
Knob . . . . . White ABS Plastic
NET WEIGHT . . . . . 1 lb. 2 oz. (0,5 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM279 ____

Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	ADJUSTABLE OUTPUT RANGE	MAXIMUM OUTPUT	REGULATION METHOD	SCREW (ITEM 20) LOCATIONS	MOUNTING PROVISIONS
WM279 D4	110399	0-40/45 PSI (0-276/310 kPa)	45 PSI (310 kPa)	Hex Screw w/ Nut	Positions 2,4,6	Panel Mounting (Items 30,31 Included)
WM279 E	111939	0-80/85 PSI (0-552/586 kPa)	85 PSI (586 kPa)	Hex Screw w/ Nut	Positions 1,2,3,4,5,6	Pipe Mounting
WM279 E1 *	111940	0-80/85 PSI (0-552/586 kPa)	85 PSI (586 kPa)	Hex Screw w/ Nut	Positions 1,2,3,4,5,6	Bracket Included
WM279 F	111941	0-80/85 PSI (0-552/586 kPa)	85 PSI (586 kPa)	Thumb Screw w/ Spoked Nut	Positions 2,4,6	Panel Mounting (Items 30,31 Not Included)
WM279 F5	116701	0-80/85 PSI (0-552/586 kPa)	85 PSI (586 kPa)	Thumb Screw w/ Spoked Nut	Positions 1,3,5	Panel Mounting (Items 30,31 Not Included)
WM279 P	111946	0-100/105 PSI (0-689/724 kPa)	105 PSI (724 kPa)	Knob	Positions 2,4,6	Panel Mounting (Items 30,31 Not Included)
WM279 P3	111947	0-100/105 PSI (0-689/724 kPa)	105 PSI (724 kPa)	Knob	Positions 2,4,6	Panel Mounting (Items 30,31 Included)
WM279 P4	111948	0-100/105 PSI (0-689/724 kPa)	105 PSI (724 kPa)	Knob	Positions 2,4,6	Panel Mounting (Items 30,31 Included)
WM279 R	111949	0-80/85 PSI (0-552/586 kPa)	85 PSI (586 kPa)	Knob	Positions 2,4,6	Panel Mounting (Items 30,31 Not Included)
WM279 R2	117599	0-80/85 PSI (0-552/586 kPa)	85 PSI (586 kPa)	Knob	Positions 2,4,6	Panel Mounting (Items 30,31 Included)

*MANUFACTURED BY WILLIAMS CONTROLS

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WM400 SERIES

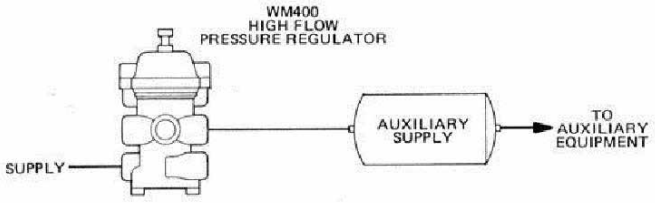
PRODUCT DESCRIPTION

DESCRIPTION Capable of high volume air flow, the WM400 series regulators are used in industrial applications to limit the output to a pre-adjusted maximum. Each regulator consists of a three-way, self-relieving WM352A pressure modulator and an actuating assembly that includes an adjustable screw. The regulator's output, which falls within a specific compensating range, corresponds to the position of this screw.

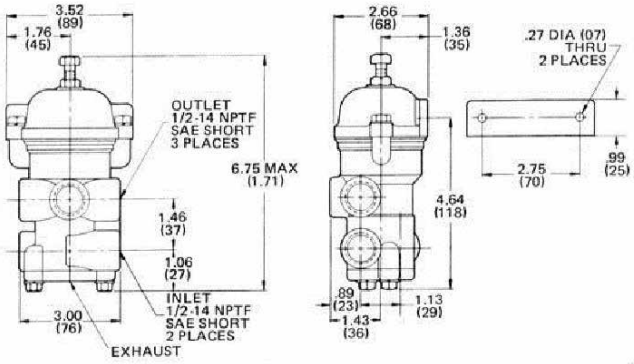
OPERATION The regulator is shipped from the factory with the screw in the zero delivery position. From this position, the screw is turned inward until the desired pressure setting is obtained. As the screw is turned in, the supply poppet unseats and pressure is delivered at the outlet port. When the outlet pressure builds to the pre-adjusted setting, the supply poppet seats to limit the output to this valve. If the screw is turned or downstream pressure increases, the exhausts any outlet pressure that exceeds the pressure setting.

APPLICATION The WM400 regulators are primarily used in industrial applications because of their high flows capacity and pressure-sensitive diaphragm construction. Typical applications include regulating pressure to air cylinders, auxiliary tanks, and other pneumatic accessories and equipment. The WM400 series regulators are available with different adjustable output ranges, and the appropriate model is selected according to the application and the desired pressure setting.

TYPICAL INSTALLATION

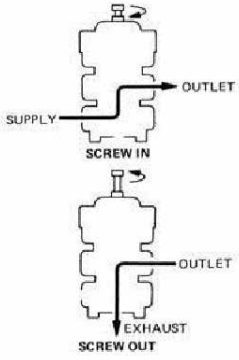


EXTERNAL CONFIGURATION

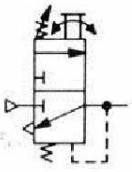


1/2" PRESSURE REGULATOR

FUNCTIONAL DIAGRAM



I. S. O. SYMBOL



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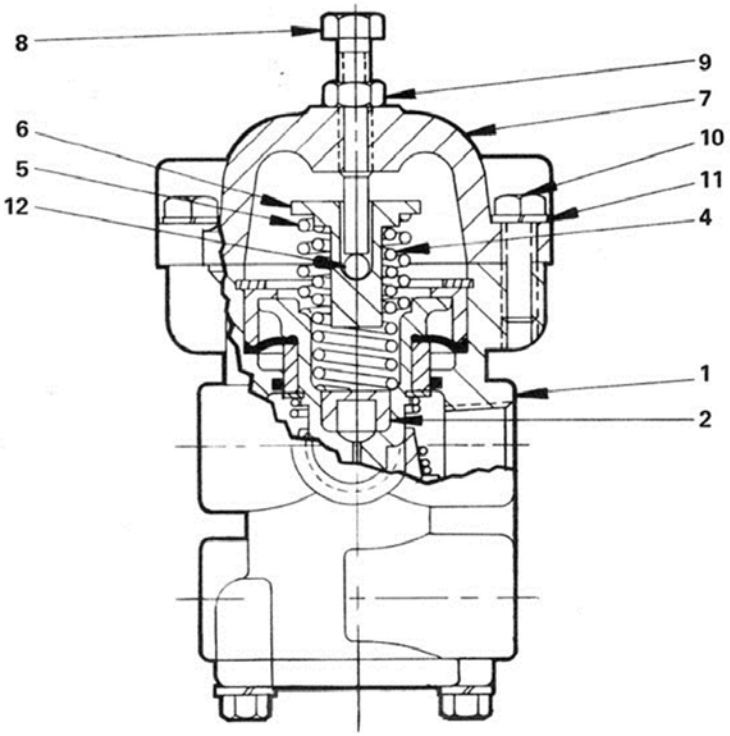

PARTS IDENTIFICATION			
ITEM	DESCRIPTION	QTY. A	QTY. C
1	WM352A VALVE	1	1
2	SPACER	1	1
4	SPRING	1	1
5	SPRING	1	
6	SPRING CUP	1	1
7	COVER	1	1
8	ADJUSTING SCREW	1	1
9	NUT	1	1
10	SCREW	2	2
11	LOCKWASHER	2	2
12	BALL	1	1

Service this unit with repair kit number 114299. Repair kit includes parts to service the WM352A valve and cartridge assemblies. To replace only the WM352A valve order part number 112468. To replace only the cartridge in the WM352A, order part number 101979. To replace only the spring (Item 4), on the WM400C, order part number 102784. Other replaceable items are followed by part numbers.

SPECIFICATIONS

PORT SIZE . . . . . .1/2-14 NPTF
MAXIMUM OPERATING PRESSURE . . . . . 200 PSI (1379,0 kPa)
OPERATING TEMPERATURE* . . -20°F to 200°F (-28,9°C to 93,3°C)
FLOW RATING . . . . . 160 SCFM @ 100 PSI (4,5 m^3/min @ 690 kPa)
MOUNTING. . . . . With Integral Bracket & Two 1/4" Fasteners
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Valve Body . . . . . Die Cast Aluminum Alloy
Cover . . . . . Iron
Diaphragm . . . . . Fabric-Reinforced Buna N
Seals . . . . . Buna N
NET WEIGHT. . . . . 2 lbs. (0,9 kg)
*For continuous operation beyond this range, contact factory.

PART NUMBER	COMPUTER NUMBER	ADJUSTMENT RANGE	MAXIMUM OUTPUT	PRESSURE GAUGE
WM400A	112803	0–120 PSI	120 PSI	NO
WM400B	112805	0–120 PSI	120 PSI	YES
WM400C	112806	0–50 PSI	50 PSI	NO
WM400D	112807	0-50 PSI	50 PSI	YES

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WM459L PRESSURE CONTROL PANEL

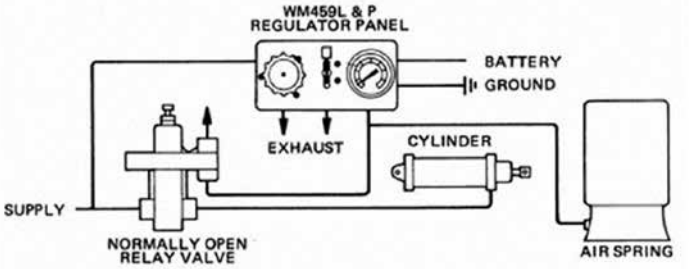
PRODUCT DESCRIPTION

DESCRIPTION The WM459 series regulator panels are complete pre-plumbed units designed for easy installation in industrial and vehicular applications. Each panel is comprised of an illuminated gage, a WM219C3 toggle valve and a self-relieving, knob-actuated WM279 series pressure regulator. The WM459 series panels are available with different adjustable output ranges depending on the WM279 series regulator used in the assembly.

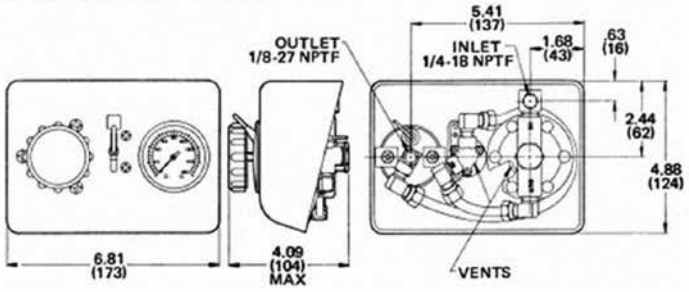
OPERATION The operator regulates pressure delivery with two manual controls-a large knob and a toggle switch. The knob controls the WM279 series regulator output, which is plumbed to the inlet port of the toggle valve. The operator flips the toggle to open this valve and allow delivery. The gage registers the pressure delivered, and by turning the knob, the operator may adjust the output level as necessary. If the operator backs out the knob to decrease the output, the regulator releases the excess pressure through an exhaust vent. The toggle valve also exhausts outlet pressure through a vent when the operator flips the switch to the OFF position.

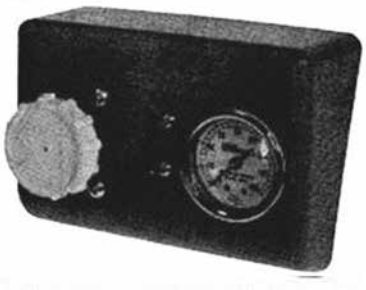
APPLICATION Engineered for industrial and vehicular applications, the WM459 series panels are typically used in the axle-lift installation below. In this type of application, the regulator panel provides a convenient means of manually controlling the air spring and the axle-lift cylinder. The WM459 panels are easily mounted in the dash of the operator's compartment; the customer may drill holes in the panel to the desired mounting configurations. To ground the gage lamp, each unit is supplied with an electrical connector and an extra hex nut.

TYPICAL INSTALLATION



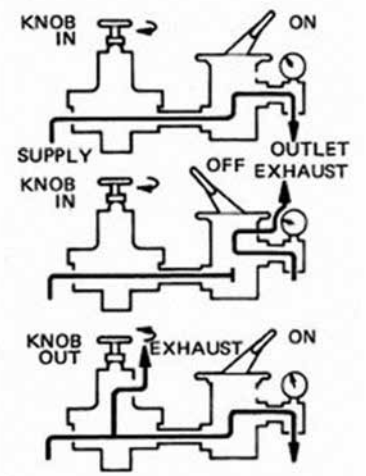
EXTERNAL CONFIGURATION



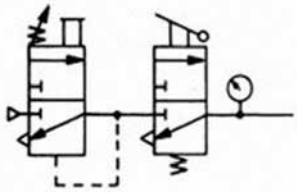


REGULATOR PANEL

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



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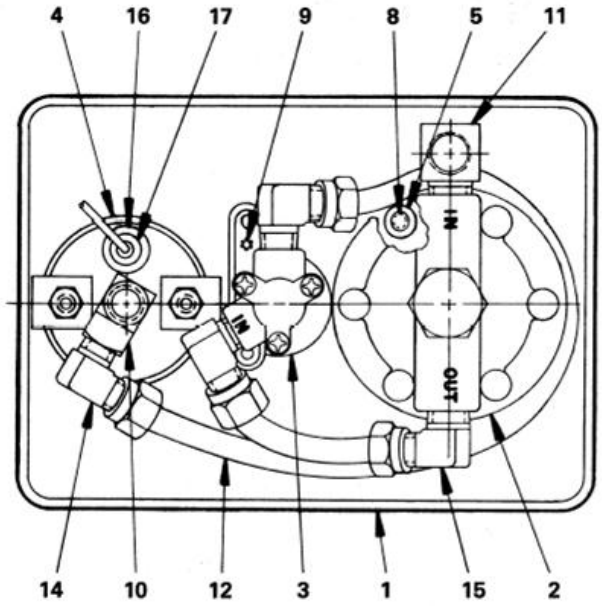


SPECIFICATIONS

PORT SIZES (Excluding Preplumbed Ports):
- Inlet . . . . . 1/4-18 NPTF
- Outlet . . . . . 1/8-27 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 . . . . 15 SCFM @ 100 PSI (0,4 m^3/min @ 690 kPa)
GAGE SCALE . . . . . 160 PSI
LAMP VOLTAGE . . . . . 12 VDC
MOUNTING. . . . . Panel Secured to Console or Bracket
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Valve Bodies . . . . . Die Cast Zinc Alloy
Diaphragm . . . . . Fabric-Reinforced Buna N
Panel . . . . . Gray ABS Plastic
Knob . . . . . White ABS Plastic
Hose . . . . . Extruded Nylon
NET WEIGHT. . . . . 2 lbs. 6 oz. (1,1 kg)

*For continuous operation beyond this range, contact factory.

PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY.
1	PANEL (104738)	1
2	WM279 REGULATOR	1
3	WM219C3 TOGGLE VALVE	1
4	GAGE	1
5	SPACER (101202)	3
8	SCREW (114684)	3
9	SCREW	2
10	FITTING (115190)	1
11	FITTING	1
12	HOSE	1
14	FITTING	1
15	FITTING	1
16	SOCKET	1
17	LAMP	1
NA	NUT	1
NA	ELEC. CONNECTOR	1

Service this unit with repair kit number 114399. Repair kit includes parts to service the WM279 series regulator and WM219C3 toggle valve. To replace only the WM279 series regulator, order the appropriate replacement unit as listed in the ordering information block. To replace only the WM219C3 toggle valve, order part number 111816. To replace the gage (Item 4) on the WM459L, order part number 104710; to replace the gage on the WM459P, order part number 104737. Other replaceable parts are followed by part numbers.

TO ORDER, SPECIFY

WM459 ___

Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	ADJUSTABLE OUTPUT RANGE	MAXIMUM OUTPUT	WM279 SERIES REGULATOR
WM459 L	113129	0-80/85 PSI (0-552/586 kPa)	85 PSI (586 kPa)	WM279R (P/N 111949)
WM459 P	113130	0-100/105 PSI (0-699/724 kPa)	105 PSI (724 kPa)	WM279P (P/N 111946)

Manufactured in the USA by Brake Systems Inc.

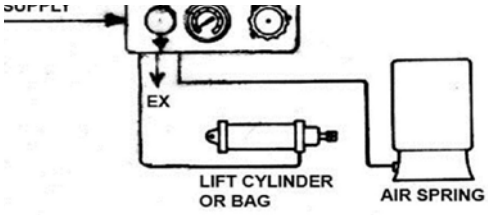
WM517A

LIFT AXLE CONTROL PANEL

DESCRIPTION

The WM517A panel is used to control pressurization of air springs on lift axles. The panel has two outlet ports. One delivers a regulated output and the other delivers full system pressure.

The WM517A incorporates a two position, four-way directional control valve, a three-way pressure regulator and a gage. When the directional control valve's lever is in the up position, the panel's outlet delivers full system pressure to lift the axle off the road. When the control lever is down, the panel delivers regulated pressure to control the axle weight distribution. Regulated output is indicated on the gage and is proportional to the position of the regulator's control knob.



SPECIFICATIONS

PORT SIZES:	Inlet	1/8-27 NPTF
	Outlet	1/8-27 NPTF
MAXIMUM SUPPLY PRESSURE		150 PSI (1034,2 kPa)
OPERATING TEMPERATURE*		-20°F to 200°F (-28,9°C to 93,3°C)
FLOW RATING		15 SCFM @ 100 PSI (0,4 m³/min @ 690 kPa)
GAGE RANGE		0-160 PSI
ADJUSTABLE OUTPUT RANGE		0-85 PSI (0-672,2 kPa)
MOUNTING		Panel Secured to Console or Bracket
MOUNTING ATTITUDE		Optional
MATERIALS:	Valve Bodies	Die Cast Zinc Alloy
	Panel	Steel
	Tubing	Nylon
	Knobs	Black Plastic
	Diaphragm	Buna N
	Seals	Buna N
WEIGHT		4 lbs., 9 oz. (2,1 kg)

*For continuous operation beyond this range, contact factory.

Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.06.16

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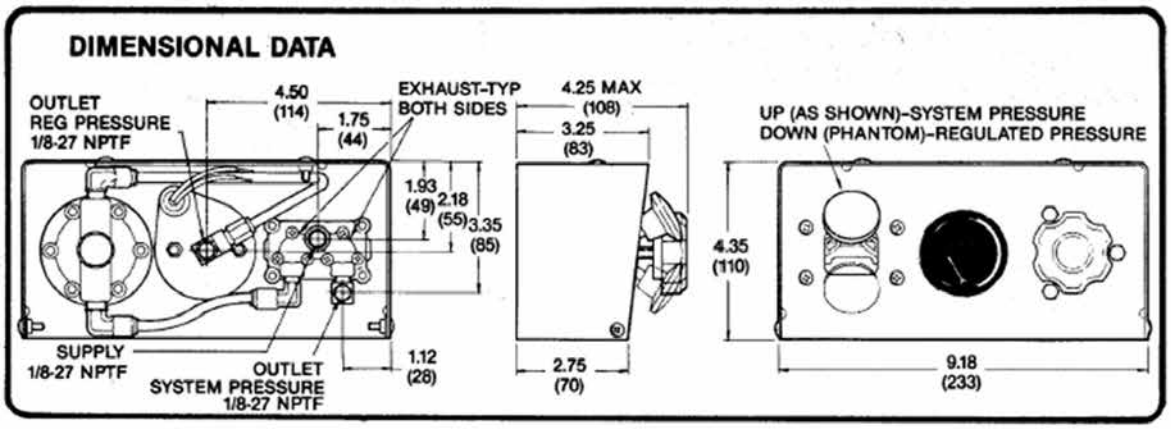
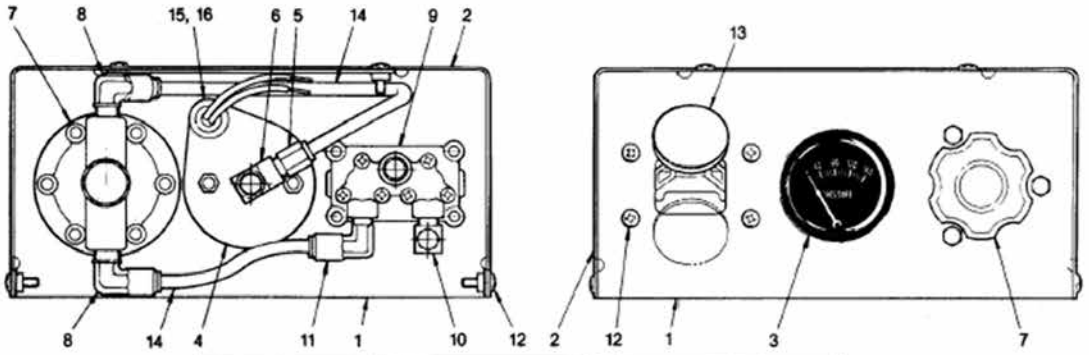
DIMENSIONAL DATA



SECTIONAL VIEW

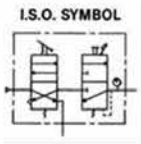


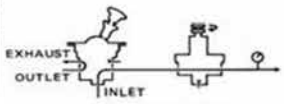
PARTS IDENTIFICATION

ITEM	DESCRIPTION	PART NUMBER	QTY
1	Front Panel	119490	1
2	Hood	119491	1
3	Gage	119397	1
4	Gage Cup	119399	1
5	Male Connector	119057	1
6	Pipe Tee	115190	1
7	WM279R2 Regulator	117599	1
8	Elbow	119492	2
9	WM782102 Valve	118789	1
10	Pipe Ell	115222	1
11	Elbow	119056	1
12	Screw	100110	8
13	Knob	118305	1
14	Hose	115555	2
15	Lamp	105004	1
16	Lamp Socket	119398	1

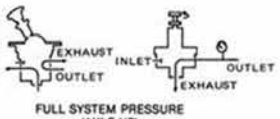
Service WM782102 with two 118400 repair kits.
Service WM279R2 with repair kit 114224.

I.S.O. SYMBOL





REGULATED OUTPUT
(AXLE DOWN)



FULL SYSTEM PRESSURE
(AXLE UP)

Manufactured in the USA by Brake Systems Inc.

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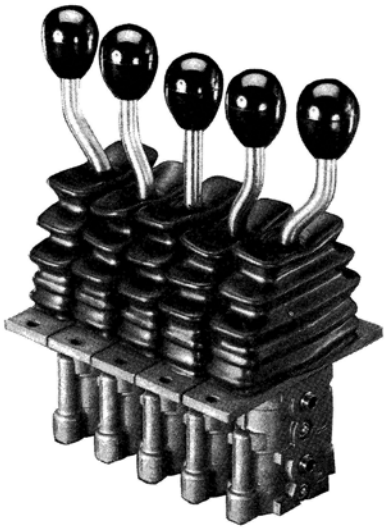
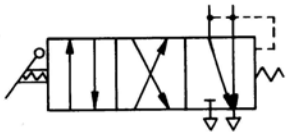
WILLIAMS CONTROLS INC.

WM521 SERIES ACTIVAIR CONTROLLERS

1-5 SECTIONS
20-85 PSI REGULATED OUTPUT
PUSH-TO-CONNECT PORT FITTINGS

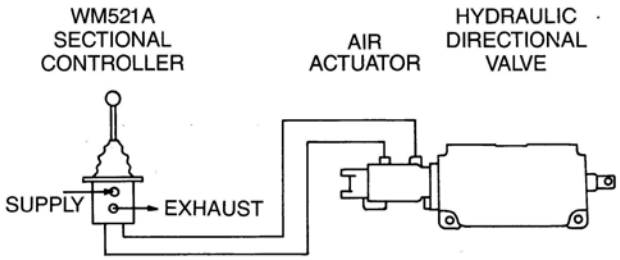


I.S.O. SYMBOL



DESCRIPTION

WM521 series Activair controllers are 4 way precision regulating valves which are factory assembled into banks of up to 5 units. Combined with the WM523 actuator, they comprise the customized Activair System, designed for specific hydraulic valves. For plumbing convenience, WM521 models with two or more valve units have a single inlet and a common exhaust port. WM521 control levers spring return to the neutral position when released and are designed with push-to-connect port fittings. Special models are available for field replacement of WM501 units.



SPECIFICATIONS

PORT SIZE	1/4 Tube Push-To-Connect
MAXIMUM SUPPLY PRESSURE	150 PSI (1034 kPa)
OUTPUT RANGE	20-85 PSI (138-586.5 kPa)
OPERATING TEMPERATURE	−20°F to 160°F (−29°C to 74°C)
FLOW RATING	15 SCFM @ 100 PSI (0.5 m³/min @ 690 kPa)
MOUNTING	Panel Mounted
MOUNTING ATTITUDE	Optional
MATERIALS: Valve Assembly	Aluminum
O-Rings	Buna N
Handle Stem	Stainless Steel
Knob	Black Plastic
Boot	Neoprene
WEIGHT: WM521A1	1 lb. (2,3 kg)
WM521B1	2 lbs., 2 oz. (4,7 kg)
WM521C1	3 lbs., 2 oz. (6,9 kg)
WM521D1	4 lbs., 3 oz. (9,2 kg)
WM521E1	5 lbs., 3 oz. (11,4 kg)

119720
REL. 4/89

ORDERING INFORMATION

TO ORDER, SPECIFY

WM521 _____

Model Number Suffix

PART NUMBER _____

SELECT SUFFIX AND PART NUMBER BELOW

SUFFIX	PART NUMBER	NUMBER OF VALVE UNITS	PORTS	REPLACES WM501 MODEL
WM521 **A1**	130300	1	1/4 Tube Push-To-Connect	No
WM521 **B1**	130424	2	1/4 Tube Push-To-Connect	No
WM521 **C1**	130425	3	1/4 Tube Push-To-Connect	No
WM521 **D1**	130426	4	1/4 Tube Push-To-Connect	No
WM521 **E1**	130427	5	1/4 Tube Push-To-Connect	No
WM521 **RA1**	130475	1	1/4 - 18 NPTF	Yes
WM521 **RB1**	130476	2	1/4 - 18 NPTF	Yes
WM521 **RC1**	130477	3	1/4 - 18 NPTF	Yes
WM521 **RD1**	130478	4	1/4 - 18 NPTF	Yes
WM521 **RE1**	130479	5	1/4 - 18 NPTF	Yes

WILLIAMS CONTROLS, INC.
14100 SW 72ND AVENUE, PORTLAND, OREGON 97224
TEL: (503) 684-8600, TELECOPIER: (503) 684-8610

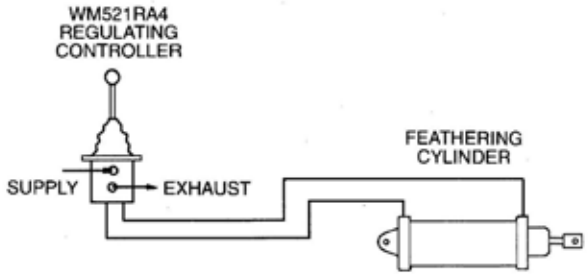
WILLIAMS CONTROLS INC.

WM521RA4 Regulating Controller

0-110 PSI REGULATED OUTPUT

DESCRIPTION

The WM521RA4 dual control valve is a three position, four way pressure regulator. The handle of the WM521RA4 pivots in two directions from the center rest position. When the handle is released from the applied position, it returns to the center position and the valve exhausts any outlet pressure to atmosphere.

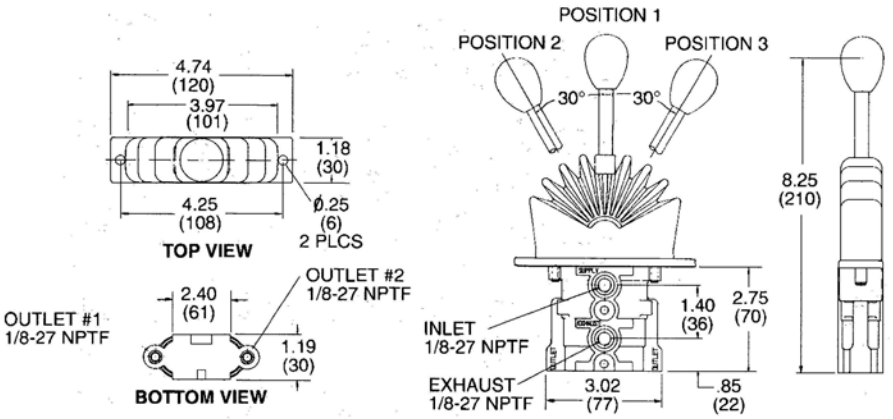


SPECIFICATIONS

Port size	1/8-27 NPTF
Maximum supply pressure	150 PSI (1034 kPa)
Operating temperature	-20ºF to 160ºF (-29ºC to 74ºC)
Output range	0-110 PSI (0-758 kPa)
Flow rating	15 SCFM @ 100 PSI (0.5 m^3/min @ 690 kPa)
Mounting	Panel mounted
Mounting attitude	Optional
Materials: Valve assembly	Chromate treated die cast aluminum
Handle stem	Stainless steel
Knob	Black plastic
Boot	Neoprene
O-rings	Buna N
Weight	1 lb. (2,3 kg)

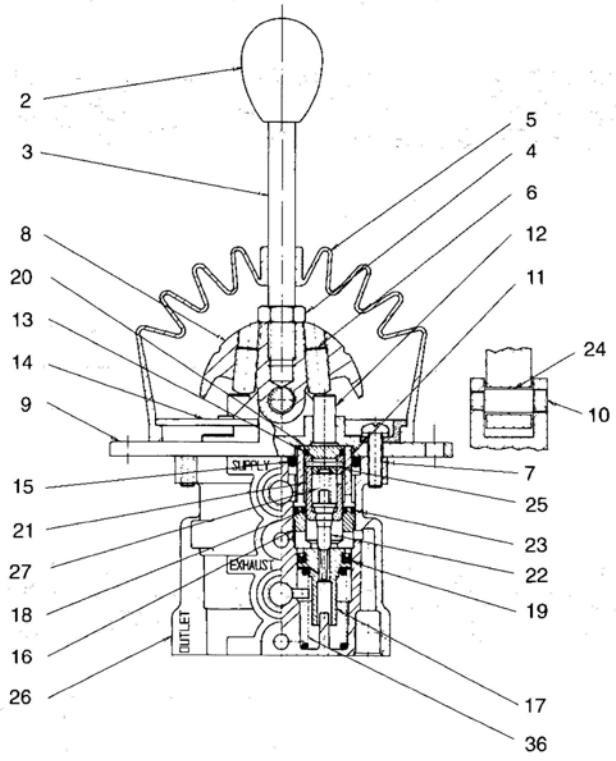
Document Number 119712 Rev A. 8/98

DIMENSIONAL DATA



HANDLE POSITION	PORT PRESSURIZED	
	PORT 1	PORT 2
1		
2	X	
3		X

CROSS SECTION & PARTS IDENTIFICATION



Item	Description	Part Number	Qty
2	Knob	130311	1
3	Lever	130360	1
4	Nut	114602	1
5	Dust Boot	130501	1
6	Screw	130113	2
7	Screw	118768	2
8	Rocker	130257	1
9	Lever Body	130228	1
10	Lever Pin	130304	1
11	Sleeve	130633	2
12	Stem	130256	2
*13	Bushing	115089	2
14	Boot Retainer	130262	2
*15	O-Ring	116318	2
16	Barrier Sleeve	130249	2
17	Piston	130250	2
*18	O-Ring	116345	2
*19	U-Cup	116338	2
20	Cartridge Cap	130255	2
21	Cartridge Body	130253	2
*22	Poppet	130151	2
*23	O-Ring	117074	2
*24	Bearing	130305	2
25	Pin	130368	2
26	Body	130481	1
*27	Spring	130369	2
36	Spring	130939	2

*Item is included in repair kit. Service this unit with repair kit 130463.
Highlighted items may be purchased separately.

ORDERING INFORMATION

To order, specify **WM521RA4,** part number 130940.

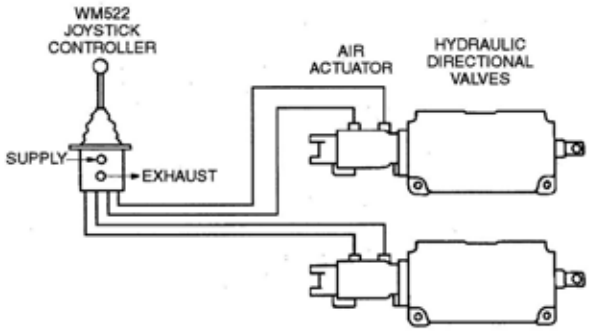
WILLIAMS CONTROLS INC.

WM522 Series Joystick Controller

1/4" TUBE PUSH-TO-CONNECT FITTINGS

DESCRIPTION

The WM522 series joystick is a pressure regulating controller with 1/4" tube push-to-connect fittings. The WM522D1 model has an electronic switch in the handle to control an additional function.



SPECIFICATIONS

Port size	1/4" tube push-to-connect
Maximum supply pressure	150 PSI (1034 kPa)
Operating temperature	-20ºF to 160ºF (-29ºC to 74ºC)
Output range: Lever at 3°	20 PSI (138 kPa)
Lever at 23°	85 PSI (586 kPa)
Mounting	Panel mounted
Mounting attitude	Optional
Materials: Valve body	Chromate treated die cast aluminum
Lever	Stainless steel
Knob	Black plastic
Boot	Neoprene
O-Rings	Buna N
Weight	2 lbs.,11 oz (1,2 kg)

Document Number 119719 Rev B. 8/98

ORDERING INFORMATION

To order, specify **WM522** _____(suffix) _____(part number). Select suffix and part number below.

Suffix	Part Number	Description
WM522 A1	130386	Joystick Controller
WM522 D1	131860	Joystick Controller with electric switch in lever

WILLIAMS CONTROLS INDUSTRIES, INC. 14100 SW 72nd Avenue Portland, Oregon USA 97224 (503) 684-8600 Fax (503) 684-8610

WM614

PRESSURE REGULATOR

ORDERING INFORMATION

WM-614 — X X

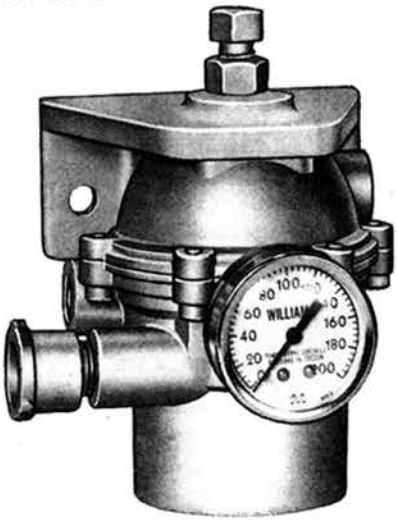
OUTPUT PRESSURE

	MODULATE	MAXIMUM
A.	0-60	60
B.	0-90	90
C.	0-120	TANK
D.	0-180	TANK

PRESSURE GAUGE

1. LESS GAUGE
2. WITH GAUGE

1355 CARTRIDGE



A FULLY MODULATED PRESSURE REGULATOR, BASED ON THE WM-90 VALVE

FEATURES INCLUDE:

1. **ALL FEATURES OF WM-90 VALVE BODY**—As utilized in the WM-606, WM-607 valves and many others.
2. **INTEGRAL MOUNTING BRACKET**—Furnished with assembly.
3. **FILTERED EXHAUST PORTS**—Self relieving.
4. **PRESSURE GAUGE**—Standard with some models.
5. **HIGH CAPACITY**—Flows over 35 CFM; ⅜" line is required for maximum output.
6. **PRECISION PRESSURE ADJUSTMENT.**
7. **NO BLEEDBACK**—Lowered inlet pressure will not cause a bleedback of down-stream pressure.
8. **LONG SERVICE LIFE**—Wearing surfaces are chrome plated.
9. **QUICK SERVICE**—Is feature of design; all internal parts may be removed and replaced, including barrier plate, in two minutes (without disconnecting any hoses).
10. **FOUR MODELS**—Available to suit your maximum pressure requirement.

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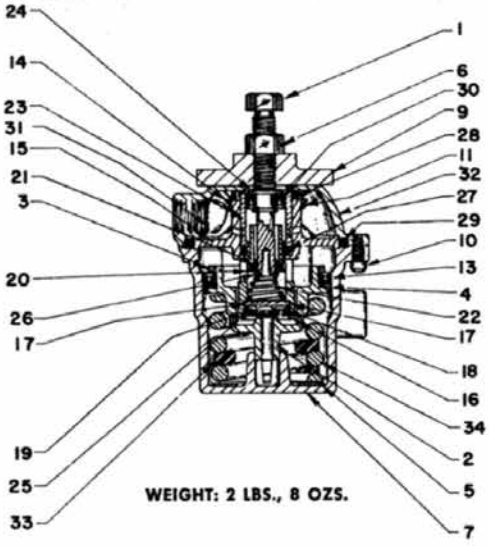
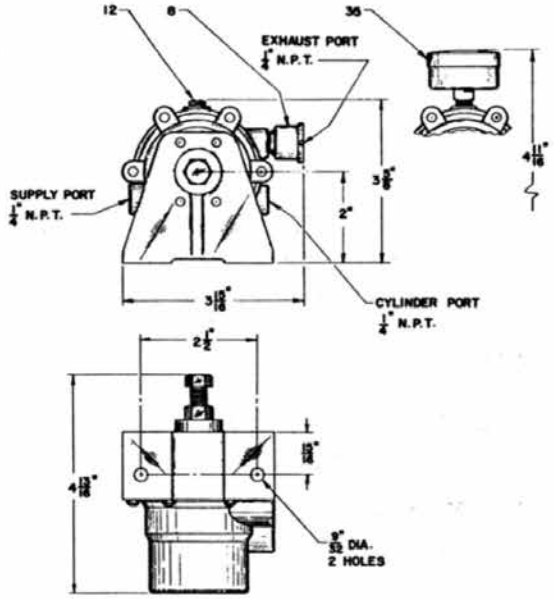
WM-614





WM-614 PARTS LIST

DWG. NO.	DESCRIPTION	QTY.	WM-614-AX	WM-614-BX	WM-614-CX	WM-614-DX
1	CAP SCREW	1	5156	5156	4351	4351
2	BALANCE PISTON	1	1366	1366	1366	1366
3	SEAL RETAINER	1	1368	1368	1368	1368
* 4	THRUST RING	1	1369	1369	1369	1369
5	SHIM	1	1371	1371	1371	1371
6	HEX. NUT	1	2-W-49	2-W-49	2-W-49	2-W-49
7	OUTLET BODY	1	2557	2557	2557	2557
8	AIR FILTER	1	WM-111-A	WM-111-A	WM-111-A	WM-111-A
9	BRACKET	1	4350	4350	4350	4350
10	MACHINE SCREW	6	3-W-74	3-W-74	3-W-74	3-W-74
11	MACHINE SCREW	4	3-W-90	3-W-90	3-W-90	3-W-90
*13	U-CUP	1	52-W-29U	52-W-29U	52-W-29U	52-W-29U
*14	SEAL WASHER	4	56-W-10	56-W-10	56-W-10	56-W-10
*	Barrier Plate Assembly	1	1355	1355	1355	1355
	Consists of Items 15 thru 30					
15	BARRIER PLATE	1	1356	1356	1356	1356
16	CAGE	1	1357	1357	1357	1357
17	POPPET PLATE SUP.	1	1358	1358	1358	1358
18	EXHAUST POPPET	1	1359	1359	1359	1359
19	DISC RING	1	1360	1360	1360	1360
20	SUPPORT DISC	1	1361	1361	1361	1361
21	INLET POPPET	1	1362	1362	1362	1362
22	SPRING	1	1363	1363	1363	1363
23	SLEEVE	1	1365	1365	1365	1365
24	PISTON	1	3217	3217	3217	3217
25	RETAINER RING	1	51-W-39	51-W-39	51-W-39	51-W-39
26	RETAINER RING	1	51-W-40	51-W-40	51-W-40	51-W-40
27	O-RING	1	52-W-10	52-W-10	52-W-10	52-W-10
28	O-RING	1	52-W-15	52-W-15	52-W-15	52-W-15
29	O-RING	1	52-W-106	52-W-106	52-W-106	52-W-106
30	U-CUP	1	52-W-322	52-W-322	52-W-322	52-W-322
31	SCREEN	2	53-W-2	53-W-2	53-W-2	53-W-2
32	INLET BODY	1	1376	1376	1376	1376
33	SPRING BOOSTER	1				1377
34	BALANCE SPRING	1	3104	1392	1367	1367
35	AIR GAUGE (USED WITH X2 MODELS)	1	(3006)	(3006)	(1372)	(3225)
12	PLUG (USED WITH X1 MODELS)	1	(7-W-1)	(7-W-1)	(7-W-1)	(7-W-1)
	COMPENSATION RANGE MAX. P.S.I.		0-60 60	0-90 90	0-120 TANK	0-180 TANK
	BARRIER PLATE REPAIR KIT		R-1355			
	*VALVE REPAIR KIT		R-614			

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SECTION 7: QUICK RELEASE VALVES

WM-314

WM-366

WM-513

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WM314

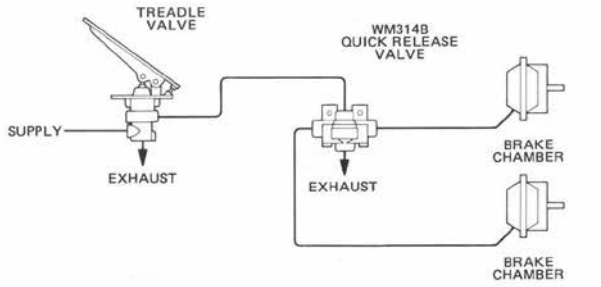
PRODUCT DESCRIPTION

DESCRIPTION In vehicular applications, the WM314B is used to release pressure from the brake chambers to the atmosphere. Because the WM314B features diaphragm construction, pressure is quickly exhausted through the WM314B rather than through the treadle valve. The WM314B is a self-relieving, three-way, normally closed valve that is suitable for single axle applications. This quick release valve has a supply-to-outlet flow rate of 163 SCFM (4,6 m^3/min) with a 100 PSI (689,5 kPa) supply.
In industrial applications, the WM314B exhausts downstream pressure from two ¼" NPT ports.

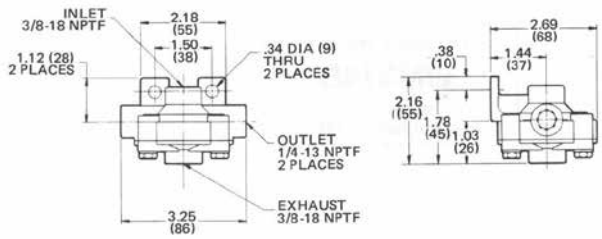
OPERATION Supply pressure acts against the diaphragm, which flexes to permit pressure delivery. The valve's output is approximately the same as the supply pressure applied. If the supply pressure decreases, the valve compensates and exhausts outlet pressure until the outlet pressure balances with the supply pressure.

APPLICATION The unit can be easily repaired in place. Many competitive units are throwaway and require removal and disconnection of air lines, half unions, and mounting bolts, etc.

TYPICAL INSTALLATION

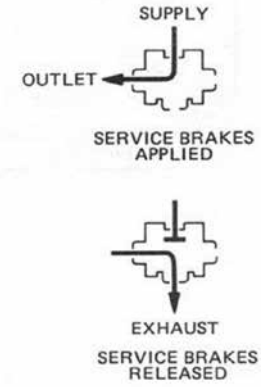


EXTERNAL CONFIGURATION

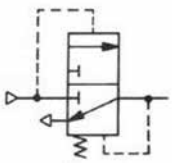


QUICK RELEASE VALVE

FUNCTIONAL DIAGRAM



I. S. O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2011.01.19

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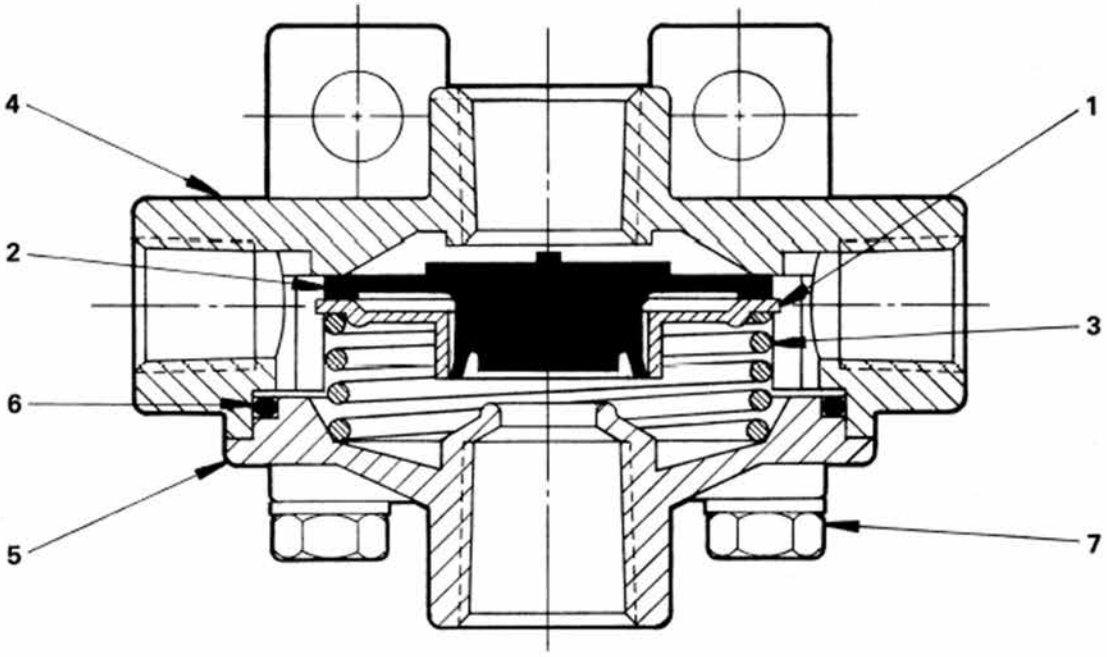

PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	DIAPHRAGM PLATE	1
* 2	DIAPHRAGM	1
3	SPRING	1
4	BRACKET BODY	1
5	COVER	1
* 6	O-RING	1
7	SCREW	4

Service this unit with repair kit number R314.
*Asterisk designates parts included in repair kit number R314.

SPECIFICATIONS

PORT SIZES: Inlet & Exhaust . . . . . 3/8-18 NPTF
Outlet . . . . . 1/4-18 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:
Supply-to-Outlet . . 163 SCFM @ 100 PSI (4,6 m^3/min @ 690 kPa)
Outlet-to-Exhaust . . 150 SCFM @ 100 PSI (4,2 m^3/min @ 690 kPa)
MOUNTING. . . . . .With Integral Bracket and Two 5/16" Fasteners
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Diaphragm & O-Ring . . . . . Buna N
NET WEIGHT. . . . . 13 oz. (0,4 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM314B
Model Number
PART NUMBER 112173

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
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WM366 SERIES

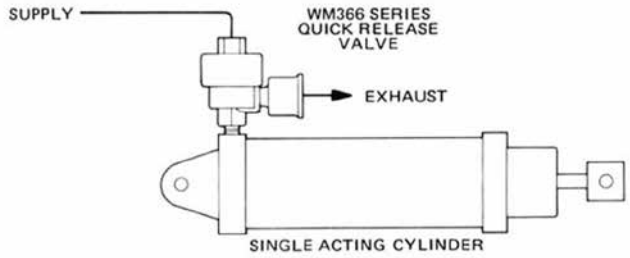
PRODUCT DESCRIPTION

DESCRIPTION The WM366 series quick release valves incorporate a durable poppet that acts like a diaphragm and flexes to control the direction of flow. These self- relieving three-way valves with or without a WM111B exhaust breather. The breather prevents dirt and particles from entering the valve; the supply and outlet ports are also equipped with screening for this purpose.

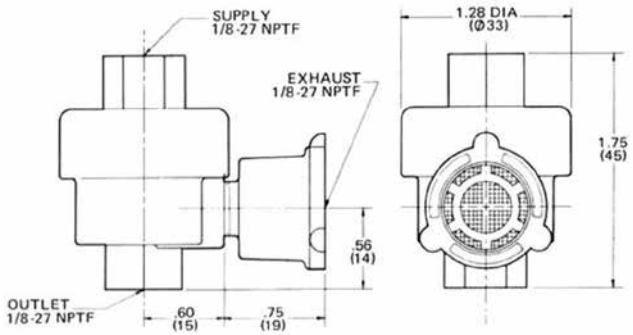
OPERATION As long as a supply signal is applied to the valve, it will deliver pressure at the outlet port. The flexible poppet seals the passage to the exhaust port and permits air flow to the outlet port at a rate of 75 SCFM (2,0 m3/min) with a 100 PSI (689,5 kPa) supply If the supply signal decreases, then the poppet flexes and outlet pressure is released through the exhaust.

APPLICATION The WM366 series valves are typically used to exhaust pressure from single or double-acting cylinders in a variety of quick release applications. In these applications, pressure is quickly transmitted from the control device to the cylinders because of the high flow rate. The WM366 series quick release valves are not recommended for safety-related applications.

TYPICAL INSTALLATION

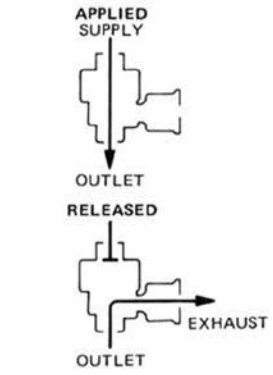


EXTERNAL CONFIGURATION

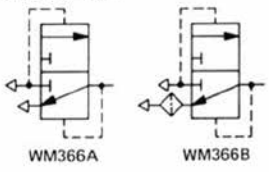


QUICK RELEASE VALVE

FUNCTIONAL DIAGRAM



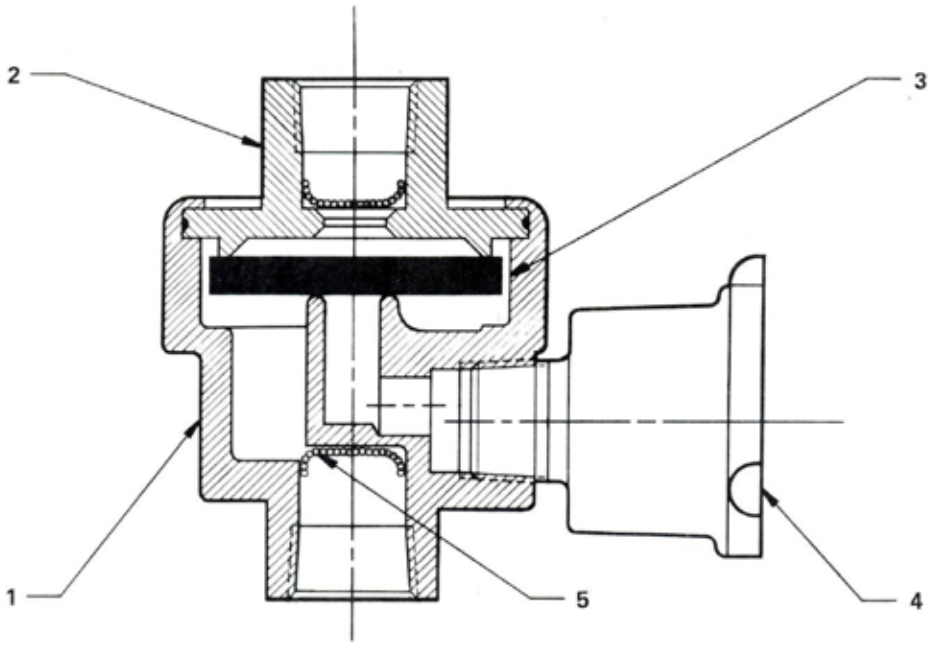
I.S.O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.06.16

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com



PARTS IDENTIFICATION			
ITEM	DESCRIPTION	QUANTITY A	QUANTITY B
1	BODY	1	1
2	CAP	1	1
3	POPPET	1	1
4	WM111B BREATHER (111412)		1
5	SCREEN	2	2

This component is classified as a non-repairable item. Replaceable items are followed by part numbers.

SPECIFICATIONS

PORT SIZE . . . . . 1/8-27 NPTF
MAXIMUM OPERATING PRESSURE . . . . . 150 PSI (1034,2 kPa)
OPERATING TEMPERATURE* . . -20°F to 200°F (-28,9°F to 93,3°C)
FLOW RATING:
Supply-to-Outlet . . 75 SCFM @ 100 PSI (2,0 m³/min @ 690 kPa)
Outlet-to-Exhaust . . 55 SCFM @ 100 PSI (1,6 m³/min @ 690 kPa)
MOUNTING. . .Designed for Pipe Mounting Using Inlet & Outlet Ports
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Poppet . . . . . Buna N
NET WEIGHT. . . . . 2.5 oz. (0,1 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM366___
Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	EQUIPPED WITH WM111B BREATHER
WM366 A	112534	No
WM366 B	112536	Yes

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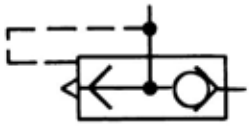
WILLIAMS CONTROLS INC.

WM513A QUICK RELEASE VALVE

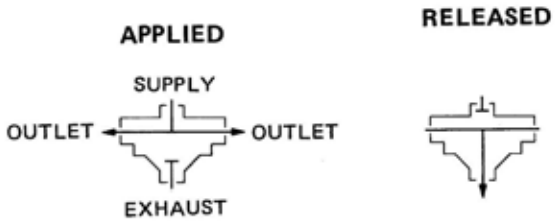
150 PSI
350 SCFM @ 100 PSI
(Outlets to Exhaust)

I.S.O. SYMBOL



DESCRIPTION

The WM513A quick release valve is used to reduce the time required to deactuate an air-operated device. It rapidly releases downstream pressure in response to decay in the valve's supply. The WM513A has two outlet ports so it can simultaneously exhaust two brake chambers or air bags. This low cost, high flow quick release valve can be used as a replacement for most competitive units.

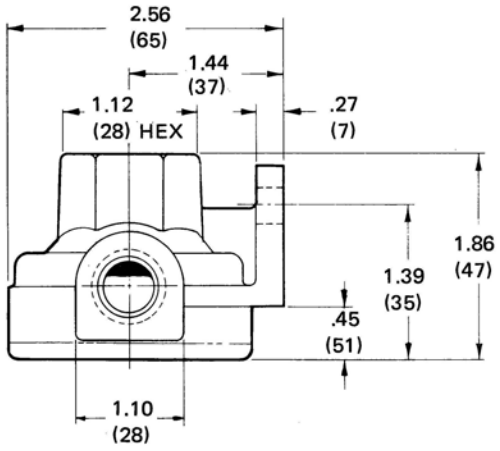


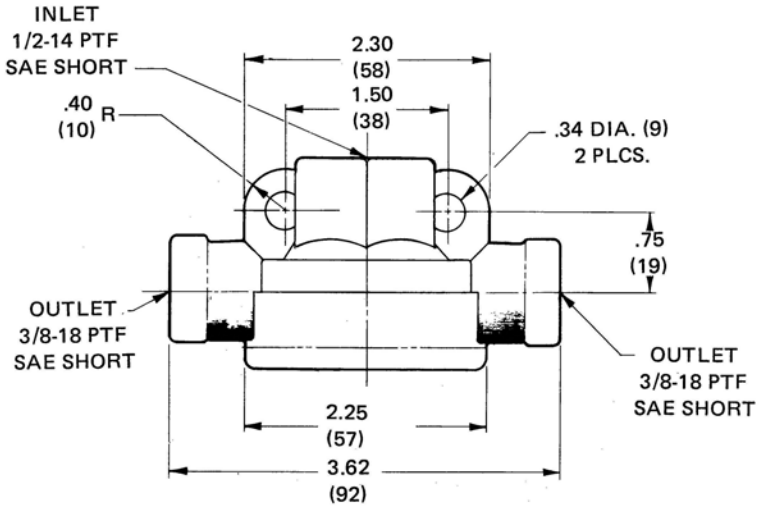
SPECIFICATIONS

PORT SIZE:	Inlet	1/2-14 NPTF SAE Short
	Outlets	3/8-18 NPTF
MAXIMUM OPERATING PRESSURE		150 PSI (1034,2 kPa)
OPERATING TEMPERATURE		-40°F to 200°F (-40°C to 93,3°C)
FLOW RATING:	Inlet to Outlets	380 SCFM @ 100 PSI (11,4 m^3/min @ 690 kPa)
	Outlets to Exhaust	350 SCFM @ 100 PSI (10,5 m^3/min @ 690 kPa)
CRACKING PRESSURE		Less than 1 PSI (6,9 kPa)
MOUNTING		Integral Bracket for 5/16" Fasteners
MOUNTING ATTITUDE		Exhaust Port Down Recommended
MATERIALS:	Body	Die Cast Zinc Alloy
	Cover	Die Cast Zinc Alloy
	Diaphragm	Buna N
	Seal	Buna N
WEIGHT		14 oz. (0,39 kg)

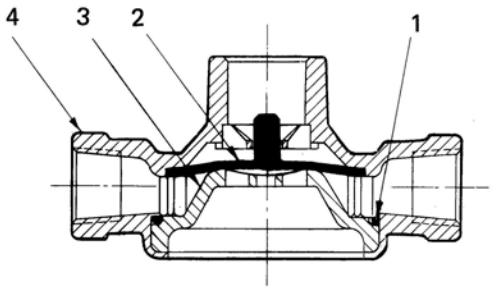
119775
REL. 7/85

DIMENSIONAL DATA





SECTIONAL VIEW



ITEM	DESCRIPTION	PART NUMBER	QTY.
1	Seal	119135	1
2	Diaphragm	119323	1
3	Cover	119140	1
4	Valve Body	119138	1
The WM513A valve is not repairable			

ORDERING INFORMATION

TO ORDER, SPECIFY **WM513A**

PART NUMBER 119136

WILLIAMS CONTROLS, INC.
14100 SW 72ND AVENUE, PORTLAND, OREGON 97224
TEL: (503) 684-8600, TELECOPIER: (503) 684-8610

SECTION 8: RELAY VALVES

WM-67

WM-68

WM-101

WM-147

WM-227

WM-292

WM-318

WM-320

WM-338

WM-577

WM-578

WM-617

WM-630

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WM67

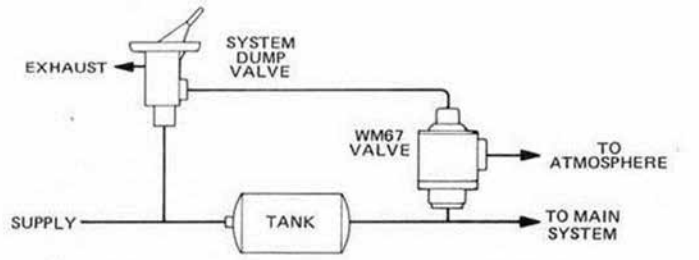
PRODUCT DESCRIPTION

DESCRIPTION the WM67 is a two-way, non-compensating relay valve. It is normally closed and requires a control pressure equal to approximately 50% of its supply pressure for actuation.

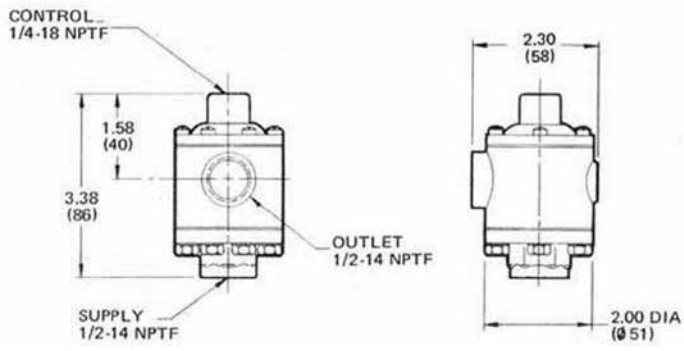
OPERATION When sufficient air pressure is applied to the WM 67's control port, an internal diaphragm flexes against a spring-loaded pin to unseat the valve's supply poppet. This allows air pressure to flow from the WM 67's inlet port to its outlet. When the control signal falls below the required level, the valve is returned to the normally closed position by air pressure and an internal spring.

APPLICATION The WM 67 valve is used in applications which require a noncompensating, normally closed relay. If the WM67's outlet port is left open to atmosphere, it can also be used as a pressure release or pilot operated dump valve.

TYPICAL INSTALLATION

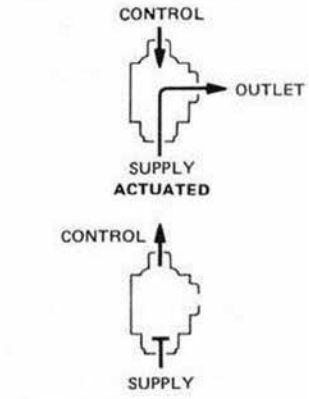


EXTERNAL CONFIGURATION

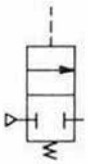


NORMALLY CLOSED TWO-WAY RELAY VALVE

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2011.01.19

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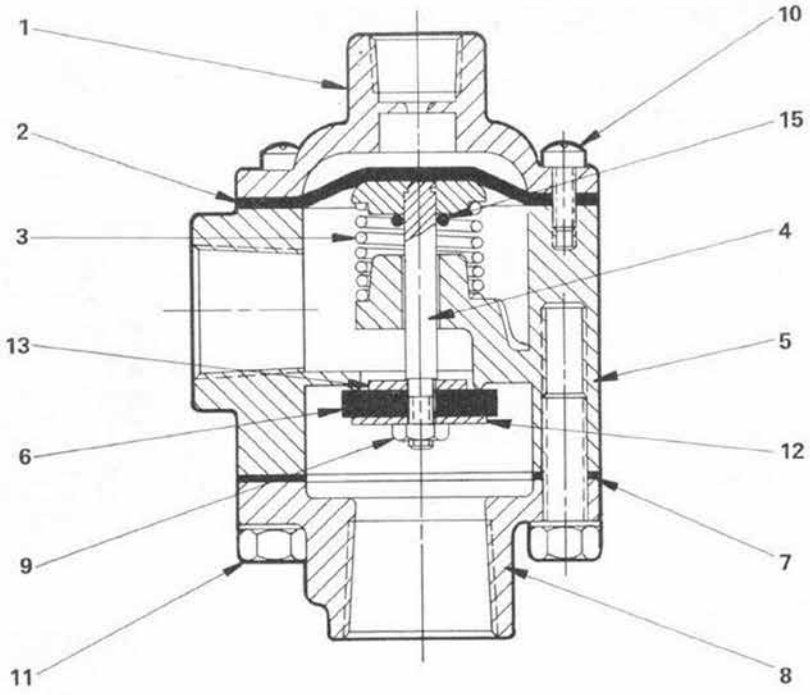


PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	COVER	1
* 2	DIAPHRAGM	1
3	SPRING	1
4	PIN ASSEMBLY	1
5	BODY	1
* 6	WASHER - POPPET	1
* 7	GASKET	1
8	INLET BODY	1
9	NUT	1
10	SCREW	6
11	SCREW	6
* 12	WASHER	1
* 13	WASHER	1
* 15	O-RING	1

Service this unit with repair kit **R67K**

*Asterisk designates items included in repair kit.

SPECIFICATIONS

PORT SIZE:	Inlet and Outlet	1/2-14 NPTF
	Control	1/4-18 NPTF
MAXIMUM OPERATING PRESSURE		150 PSI (1034,2 kPa)
CRACKING PRESSURE		Approximately 50% Supply Pressure
OPERATING TEMPERATURE*		-20°F to 200°F (-28,9°C to 93,3°C)
FLOW RATING		300 SCFM @ 100 PSI (8,1 m^3/min @ 690 kPa)
MOUNTING		In-Line
MOUNTING ATTITUDE		Optional
MATERIALS:	Body Castings	Die Cast Zinc Alloy
	Diaphragm	Fabric Reinforced Buna N
	Poppet	Buna N
	O-Ring	Buna N
WEIGHT		1 lb., 4 oz. (0,6 kg)

*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM 67
Model Number
PART NUMBER **111196**

Manufactured in the USA by Brake Systems Inc.

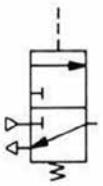
BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WM68A

THREE-WAY DIRECTIONAL RELAY VALVE

300 SCFM @ 100 PSI

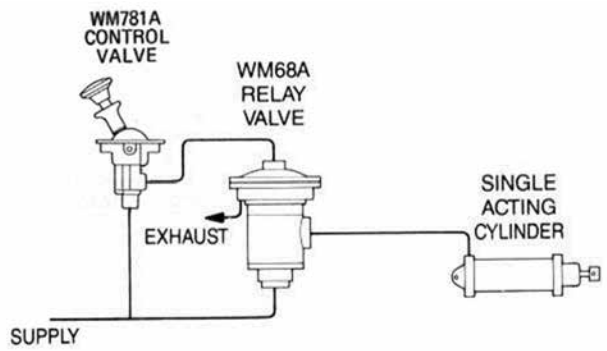
I.S.O. SYMBOL



DESCRIPTION

The WM68A is a three-way directional relay with a 300 SCFM flow capacity. A control signal equal to 15-20% of supply pressure is required to open this normally closed valve.

As illustrated in the schematic, the WM68A is used to speed response of large capacity pneumatic devices. A small control valve can deliver a sufficient signal to open or close the WM68A and move a large volume of air to or from the downstream actuator very rapidly.



SPECIFICATIONS

PORT SIZES: Inlet and Outlet	1/2-14 NPTF
Control	1/4-18 NPTF
MAXIMUM SUPPLY PRESSURE	150 PSI (1034 kPa)
OPERATING TEMPERATURE	-20°F to 200°F (-29°C to 93°C)
FLOW RATING	300 SCFM @ 100 PSI (8 m^3/min @ 690 kPa)
CRACKING PRESSURE	Approximately 15-20% Supply Pressure
MOUNTING	In-Line
MOUNTING ATTITUDE	Control Port Up Recommended
MATERIALS: Body Castings	Die Cast Zinc Alloy
Diaphragm	Fabric Reinforced Buna N
Poppets	Buna N
O-Ring	Buna N
WEIGHT	2 lbs. (0,9 kg)

Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2011.01.19

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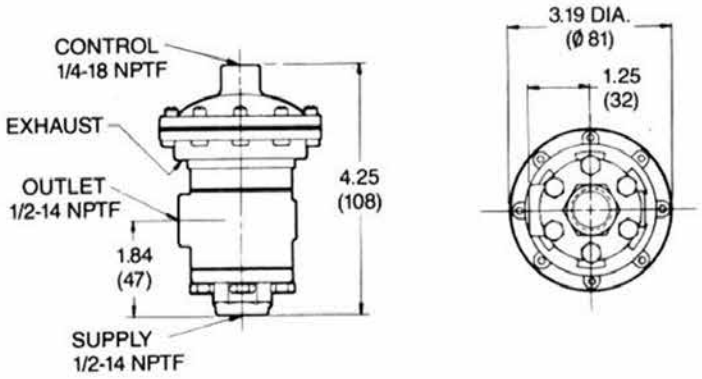
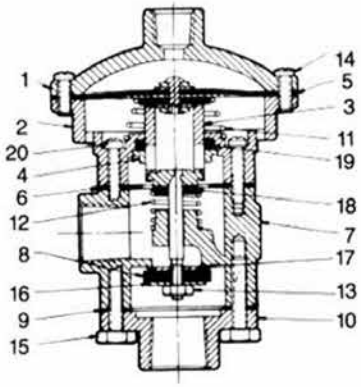
DIMENSIONAL DATA



SECTIONAL VIEW



ITEM	DESCRIPTION	PART NUMBER	QTY	ITEM	DESCRIPTION	PART NUMBER	QTY
1	Cover	101209	1	11	Spring	101215	1
2	Control Body	101210	1	12	Spring	101047	1
3	Tube	101216	1	13	Hex Nut	114530	1
4	Retaining Ring	101212	1	14	Screw	114658	8
* 5	Diaphragm Assembly	101213	1	15	Screw	116723	6
* 6	Gasket	101214	1	16	Washer	115035	1
7	Body	101088	1	17	Washer	115054	1
* 8	Washer	101205	1	*18	Bumper	105177	1
* 9	Gasket	101206	1	*19	O-Ring	116318	1
10	Inlet Body	101207	1	20	Screw	114729	6

Service this unit with repair kit R68. * Item is included in repair kit.

ORDERING INFORMATION

TO ORDER, SPECIFY WM68A
PART NUMBER 111199

Manufactured in the USA by Brake Systems Inc.

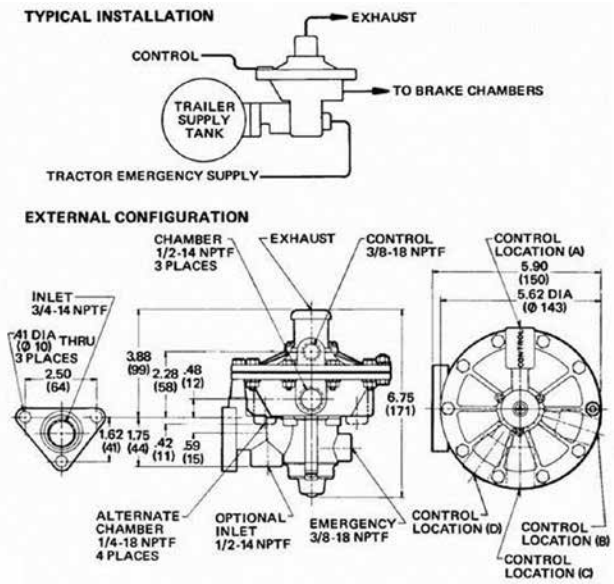
WM101 SERIES

PRODUCT DESCRIPTION

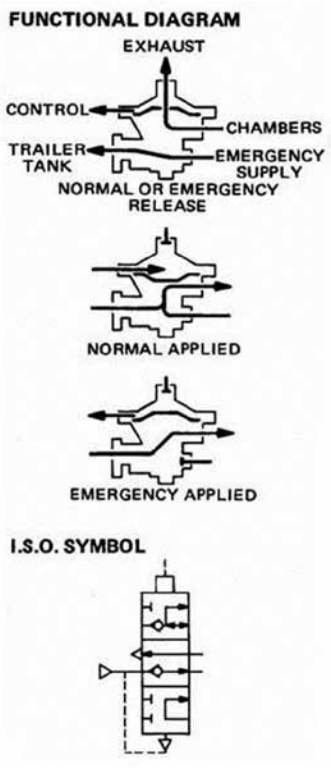
DESCRIPTION The WM101 series valves are three-way, compensating, pilot-operated emergency relay valves. Designed primarily for vehicular applications, the WM101 valves are used to supply air pressure to the brake chambers during both normal and emergency operating conditions. These valves are available with various porting configurations. All WM101 valves feature diaphragm construction for trouble-free operation over a wide range of environmental conditions.

OPERATION When the relay valve is in the "at rest" position, the trailer tank receives air pressure from the emergency line. A built-in check valve prevents pressure loss in the tank. Under normal operating conditions, the WM 101 valves are actuated by a hand or foot control located in the driver's compartment. When the driver activates the control, the relay valve will deliver air pressure to the brake chambers. When the emergency line pressure drops below 45 PSI (310,3kPa), the relay valve automatically applies the brake. During this emergency brake application, air pressure from the trailer tank passes through the relay valve to the brake chambers. When the emergency line decays to zero PSI, the brakes will be operating at almost the full pressure of the trailer tank. When the brakes are released after either a normal or emergency application, air pressure from the emergency line restores the relay valve to the "at rest" position. Air pressure from the brake chambers escape quickly through the relay valve's exhaust port.

APPLICATION Engineered for trailer applications, the WM101 valves are used to supply air pressure to the brake chambers. The WM101 emergency relay valves are designed to operate under either normal or emergency conditions. Equipped with a mounting bracket, the valves can be secured to a frame, bulkhead, or bracket. The valves can also be mounted directly to the reservoir tank.



EMERGENCY RELAY VALVE



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2011.01.19

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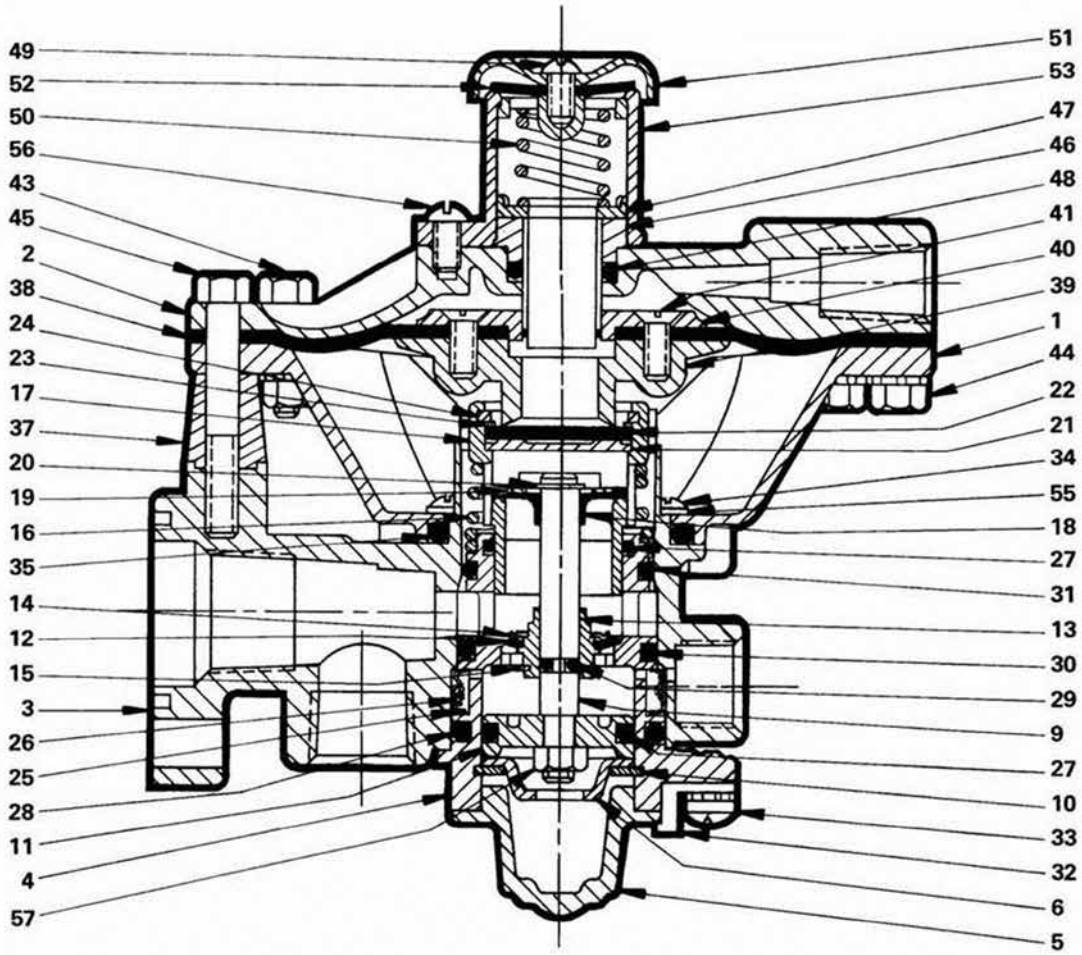
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com



PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	BODY	1	16	SPRING	1	*29	O-RING	1	44	LOCKNUT	9
2	COVER	1	17	INLET CAGE	1	*30	O-RING	1	45	SCREW	1
3	BRACKET	1	*18	POPPET	1	*31	O-RING	1	46	SEAL RETAINER	1
4	CART. BODY	1	19	WASHER	1	32	CLAMP	2	47	SPRING STOP	1
5	COVER	1	20	RETAINING RING	1	33	SCREW	2	*48	O-RING	1
6	PISTON STOP	1	21	EXHAUST DISC	1	34	SCREW	4	49	SCREW	1
9	PISTON ROD	1	*22	POPPET	1	*35	O-RING	1	50	SPRING	1
*10	RETAINING RING	1	23	WASHER	1	37	SUPPORT PILLAR	1	51	EXHAUST CAP	1
11	PISTON	1	24	RETAINING RING	1	*38	DIAPHRAGM	1	*52	EXHAUST CHECK	1
*12	CHECK DISC	1	25	SCREEN	1	*39	LOWER PLATE	1	53	SPRING RETAINER	1
13	BUSHING	1	26	RING	1	*40	DIAPH. PLATE	1	*55	WASHER	4
*14	RETAINING RING	1	*27	O-RING	2	*41	SCREW	6	56	SCREW	3
*15	RETAINING RING	1	*28	O-RING	1	43	SCREW	9	57	NUT	1

Service this unit with repair kit number **R101.** This repair kit includes a replacement diaphragm assembly and parts to service the cartridge assembly.
To replace only the cartridge assembly, order part number 104706.
*Asterisk designates parts included in repair kit R101.

Manufactured in the USA by Brake Systems Inc.

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SPECIFICATIONS

PORT SIZES: Chamber Ports: WM101R . . . . . 1/2-14 NPTF
WM101CA, F, P . . . . 1/4-18 NPTF
Control Port. WM101CA, P, R . . . . . 3/8-18 NPTF
Control Port. WM101F . . . . . 1/4-18 NPTF
Inlet Port . . . . . 1/2-14 NPTF
Optional Inlet Port . . . . . 3/4-14 NPTF
Emergency Port . . . . . 3/8-18 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. . . 400 SCFM @ 100 PSI (11,3 m^3/min @ 690 kPa)
CRACKING PRESSURE . . . .3-4 PSI (20,7-27,6 kPa) @ 100 PSI (690 kPa)
EMERGENCY BRAKE APPLICATION . . . Below 45 PSI (310,3 kPa)
MOUNTING. . .Bracket Secured to Frame, Bulkhead, Bracket, or Air Tank
MOUNTING ATTITUDE. . . . . Exhaust Check Cap Up Recommended
MATERIALS: Cover. . . . . Die Cast Aluminum Alloy
Body Castings . . . . . Die Cast Zinc Alloy
Poppets & Seals . . . . . Buna N
Diaphragm. . . . . Fabric-Reinforced Buna N
NET WEIGHT. . . . . 4 lbs. 13 oz. (2,2 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM101 ____
Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	CHAMBER PORTS		CONTROL PORT		FITTINGS SUPPLIED
		NUMBER	SIZE	LOCATION	SIZE	
WM101 CA	100352	4	1/4-18 NPTF	B	3/8-18 NPTF	Pipe Plug Fitting, Plug, & Hex Pipe Bushing
WM101 F	100354	4	1/4-18 NPTF	B	1/4-18 NPTF	Pipe Plug Fitting, Plug, & Hex Pipe Bushing
WM101 P	100361	4	1/4-18 NPTF	A	3/8-18 NPTF	Pipe Plug Fitting, Plug, & Hex Pipe Bushing
WM101 R	100362	3	1/2-14 NPTF	A	3/8-18 NPTF	Pipe Plug Fitting, Plug, & Hex Pipe Bushing

Manufactured in the USA by Brake Systems Inc.

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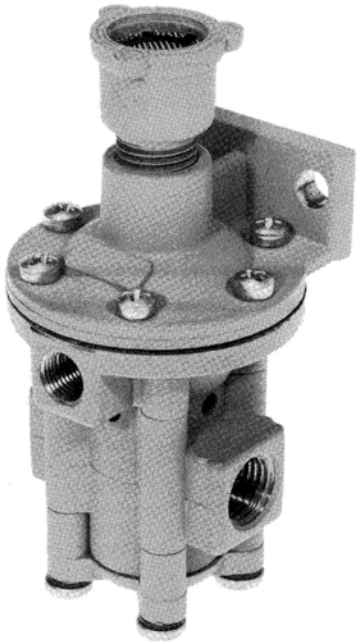
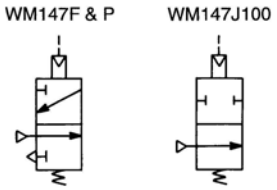
WILLIAMS CONTROLS INC.

WM147 SERIES NORMALLY OPEN RELAY VALVE

35 SCFM @ 100 PSI

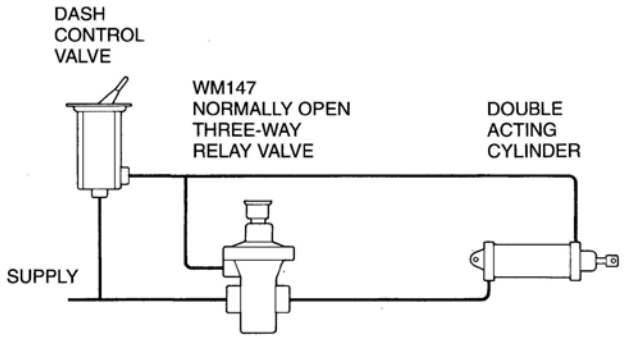


I.S.O. SYMBOL



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 two-way valves without an exhaust mode, or as three-way valves if the exhaust mode is desired. As shown in the installation drawing, the three-way models are used with a two-position control valve in applications where a four-way function is desired.



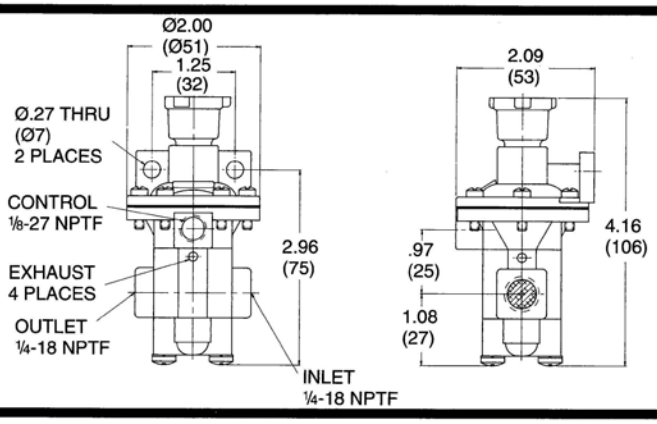
SPECIFICATIONS

PORT SIZES: Inlet & Outlet	1/4-18 NPTF
Control	1/8-27 NPTF
Exhaust (WM147 F & P)	Unthreaded
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 (1,0 m³/min @ 690 kPa)
MOUNTING	Integral Bracket on Cover 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)

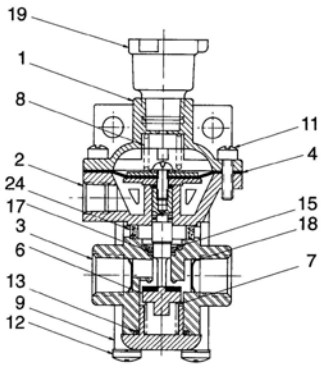
119961

REV. A 7/92

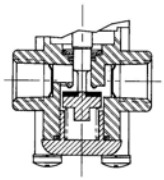
DIMENSIONAL DATA



SECTIONAL VIEW



WM147F & P



WM147J100

PARTS IDENTIFICATION					
ITEM	DESCRIPTION	WM147F	WM147J100	WM147P	QTY.
1	Inlet Body	103119	103119	103119	1
2	Center Body	103243	103243	103243	1
3	Lower Body	103290	103121	103290	1
*4	Diaphragm Assembly	110120	103368	110120	1
*6	Poppet	103879	103879	103879	1
7	Spring	101021	101021	101021	1
8	Spring	103292	101685	101685	1
9	End Cap	118132	118132	118132	1
11	Screw	119223	119223	119223	6
12	Screw	118770	118770	118770	4
*13	O-Ring	116380	116380	116380	1
*15	Snap Ring	116189	116189	116189	1
*17	O-Ring	116299	116299	116299	1
18	Screen	116456	116456	116456	2
19	WM111A Breather	111411	111411	111411	1
24	Filter	104077	–	104077	1

Service WM147F & P with repair kit 114161.
Service WM147J100 with repair kit 114160.
*Item included in repair kit.

ORDERING INFORMATION

TO ORDER, SPECIFY

WM147 ____
Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	DESCRIPTION	CONTROL PRESSURE	
			TO CLOSE	TO OPEN
WM147 **F**	111531	Three-Way	30-50 PSI (207-345 kPa)	15-30 PSI (103-207 kPa)
WM147 **J100**	130035	Two-Way	10-20 PSI (69-138 kPa)	5-10 PSI (35-69 kPa)
WM147 **P**	111542	Three-Way	10-30 PSI (69-207 kPa)	5-10 PSI (35-69 kPa)

WILLIAMS CONTROLS, INC.
14100 SW 72ND AVENUE, PORTLAND, OREGON 97224
TEL (503) 684-8600 TELECOPIER (503) 684-8610

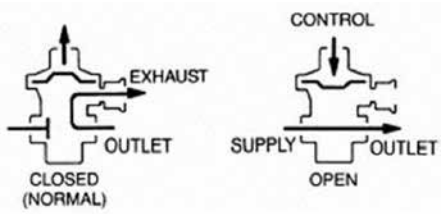
WM147 BC

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 down-stream pressure to atmosphere when pressure at its control port descends to 65–50 PSI.



SPECIFICATIONS

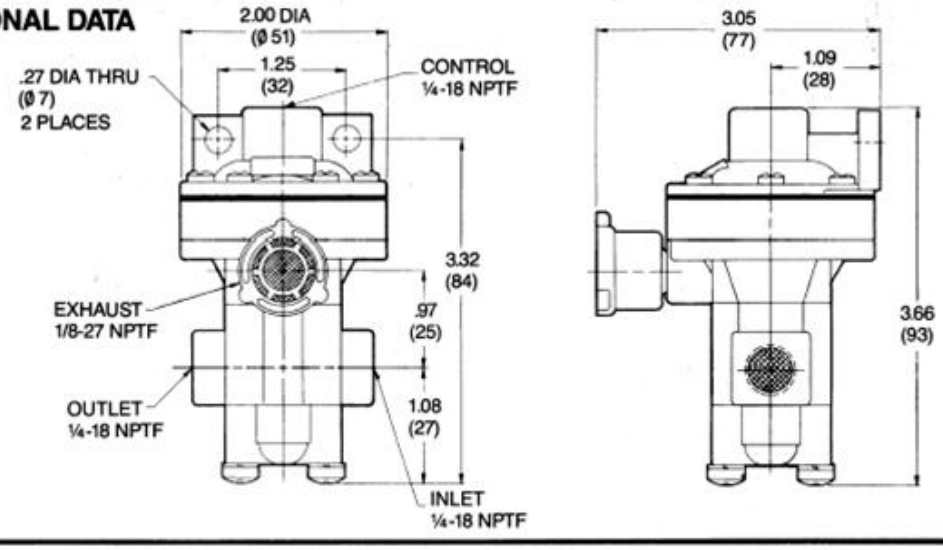
PORT SIZES: Inlet, Outlet & Control	¼-18 NPTF
Exhaust	1/8-27 NPTF
MAXIMUM SUPPLY PRESSURE	150 PSI (1034 kPa)
CONTROL PRESSURE (ASCENDING) TO OPEN	65-85 PSI (448-586 kPa)
CONTROL PRESSURE (DESCENDING) TO RECLOSE	65-50 PSI (448-345 kPa)
OPERATING TEMPERATURE	-20°F to 200°F (-29°C to 93°C)
FLOW RATING	35 SCFM @ 100 PSI (1,0 m³/min @ 690 kPa)
MOUNTING	Integral Bracket and Two ¼" 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)

Manufactured in the USA by Brake Systems Inc.

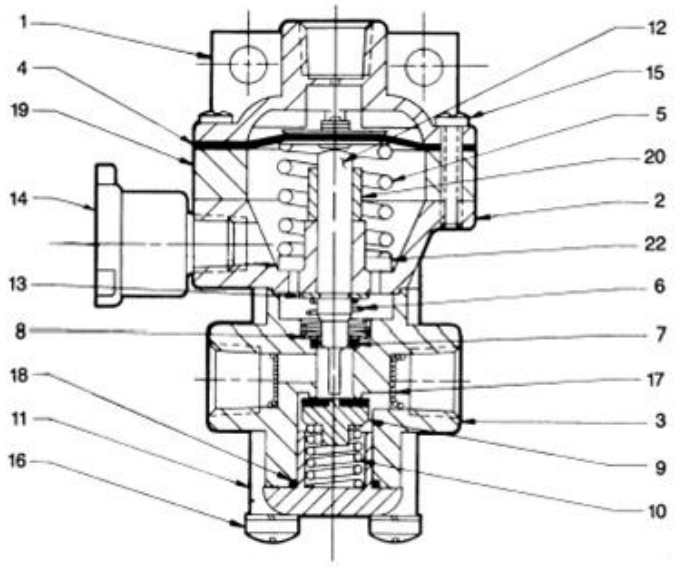
REV. DATE: 2010.06.16

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

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

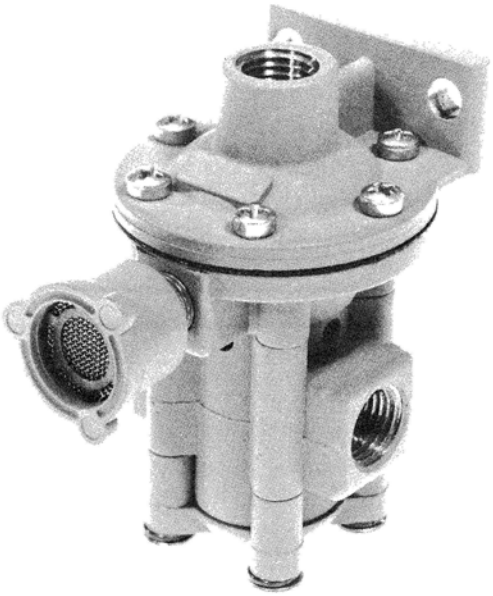
Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

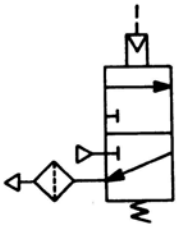
WILLIAMS CONTROLS INC.

WM147C NORMALLY CLOSED RELAY VALVE

15-30 PSI TO OPEN

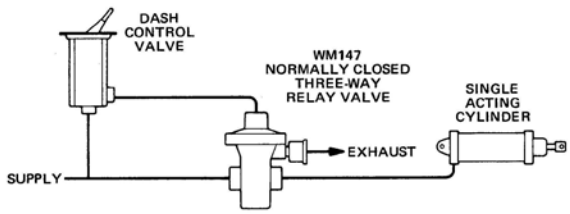


I.S.O. SYMBOL



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.



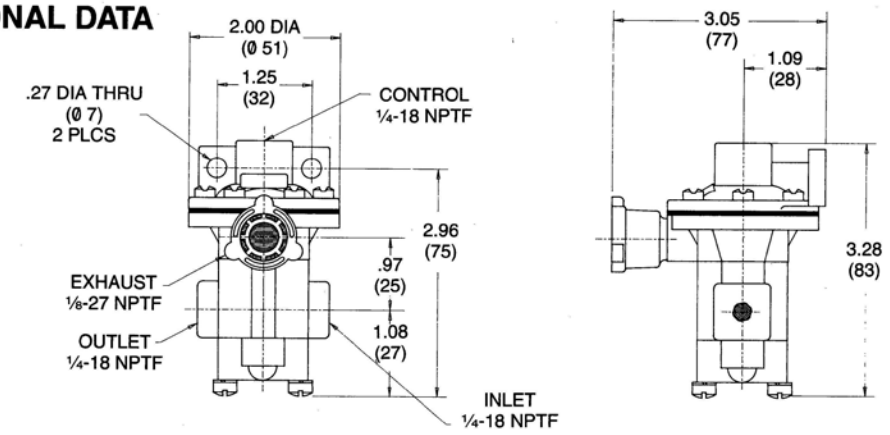
SPECIFICATIONS

PORT SIZES: INLET, OUTLET & CONTROL	¼-18 NPTF
EXHAUST	⅛-27 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 m³/min @ 690 kPa)
MOUNTING	Integral Bracket on Cover and Two ¼″ 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)

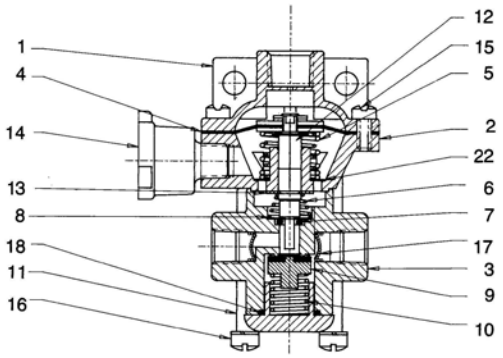
119962

REV. A 5/90

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

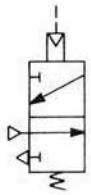
WILLIAMS CONTROLS, INC.
14100 SW 72ND AVENUE, PORTLAND, OREGON 97224
TEL: (503) 684-8600, TELECOPIER: (503) 684-8610

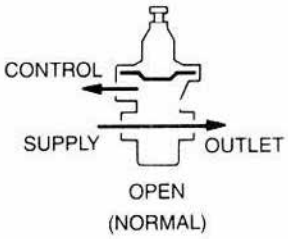
WM147 HC

NORMALLY OPEN DIRECTIONAL RELAY VALVE

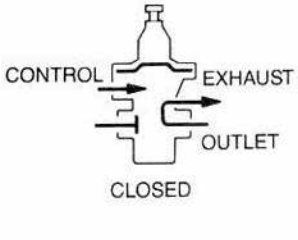
ADJUSTABLE CLOSING PRESSURE

I.S.O. SYMBOL





OPEN
(NORMAL)



CLOSED

DESCRIPTION

The WM147HC is a three-way, normally open directional relay which can be used with either a pneumatic or hydraulic control signal. WM-147HC valves can be adjusted to close at any control pressure between 15/45 and 90/120 PSI. Turning the relay's adjustment screw inward increases the control pressure required to close the valve and turning it outward decreases it. Units are shipped from the factory with this adjustment set at 75/80 PSI.

SPECIFICATIONS

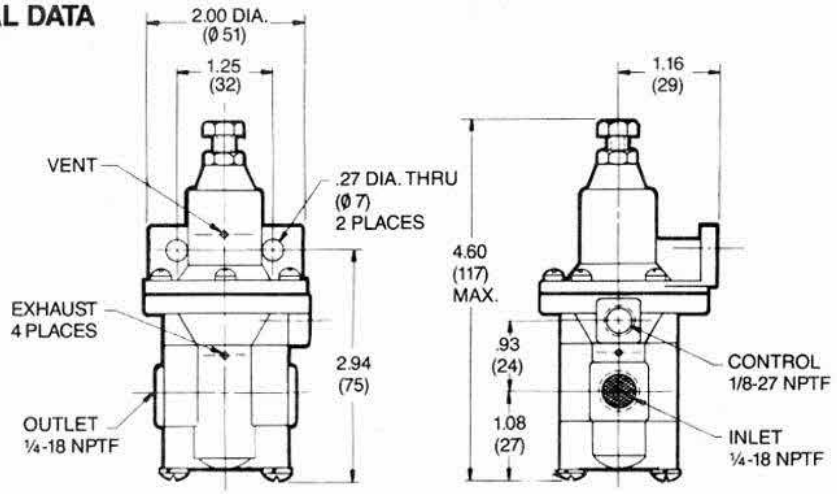
PORT SIZES: Inlet and Outlet	¼-18 NPTF
Control	1/8-27 NPTF
MAXIMUM SUPPLY PRESSURE	150 PSI (1034 kPa)
MAXIMUM CONTROL PRESSURE	250 PSI (1724 kPa)
OPERATING TEMPERATURE	-20°F to 200°F (-29°C to 93°C)
FLOW RATING	35 SCFM @ 100 PSI (1 m^3/min @ 690 kPa)
CONTROL PRESSURE TO CLOSE	Adjustable from 15/45 PSI (103/310 kPa) to 90/120 PSI (621/827 kPa)
MOUNTING	Integral Bracket
MOUNTING ATTITUDE	Optional
MATERIALS: Body Castings	Die Cast Zinc Alloy
Stem	Stainless Steel
Diaphragm	Fabric-Reinforced Buna N
Poppet	Buna N w/Aluminum Backing
O-Rings	Buna N
WEIGHT	15 oz. (0,4 kg)

Manufactured in the USA by Brake Systems Inc.

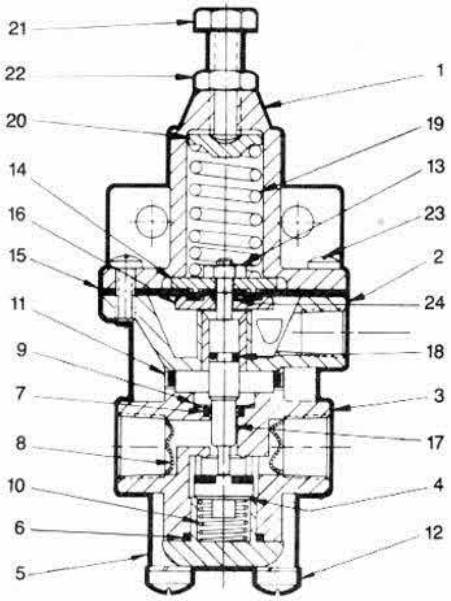
REV. DATE: 2010.06.16

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

DIMENSIONAL DATA



SECTIONAL VIEW



ITEM	DESCRIPTION	PART NUMBER	QTY
1	Cover	104275	1
2	Center Body	100108	1
3	Lower Body	103290	1
* 4	Poppet	103879	1
5	End Cap	118132	1
* 6	O-Ring	116380	1
* 7	O-Ring	116299	1
8	Screen	116456	2
* 9	Retaining Ring	116189	1
10	Spring	101021	1
*11	Filter	104077	1
12	Screw	118770	4
13	Lock Nut	114528	1
14	Upper Plate	100026	1
*15	Diaphragm	104272	1
16	Lower Plate	100025	1
17	Stem	105356	1
*18	O-Ring	110495	1
19	Spring	101110	1
20	Seat	101111	1
21	Adjusting Screw	100303	1
22	Jam Nut	114537	1
23	Screw	119223	6
*24	O-Ring	116442	1

Service these units with repair kit 114158.
*Item is included in repair kit.

ORDERING INFORMATION

TO ORDER, SPECIFY **WM147HC**

PART NUMBER 111535

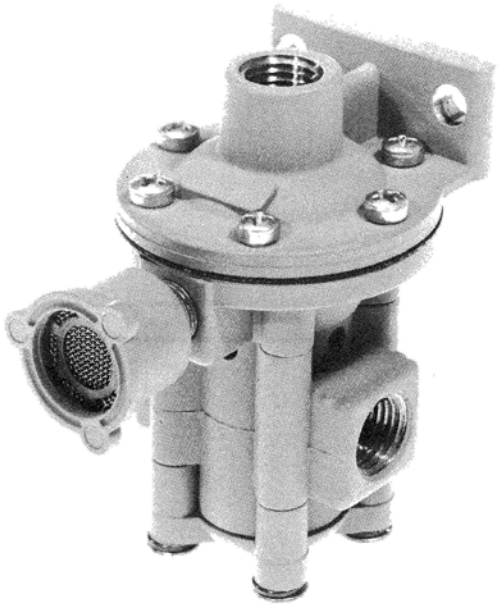
Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

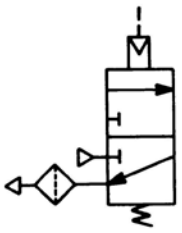
WILLIAMS CONTROLS INC.

WM147L1 NORMALLY CLOSED RELAY VALVE

35-45 PSI TO OPEN

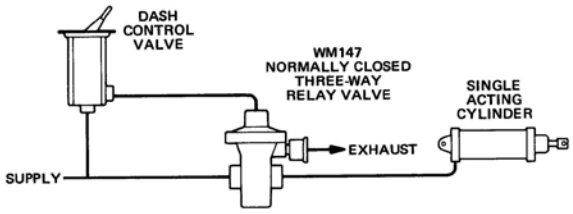


I.S.O. SYMBOL



DESCRIPTION

The WM147L1 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 (35-45 PSI, 241-310 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.



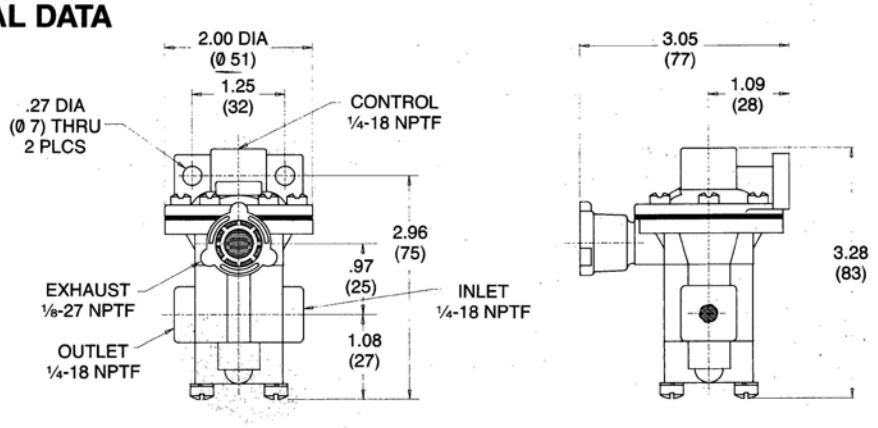
SPECIFICATIONS

PORT SIZES: INLET, OUTLET & CONTROL	¼-18 NPTF
EXHAUST	⅛-27 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 m³/min @ 690 kPa)
MOUNTING	Integral Bracket on Cover and Two ¼" 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)

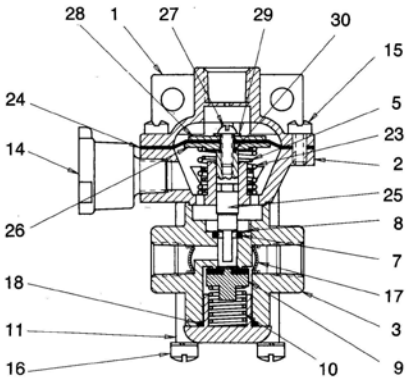
119717

REL. 5/90

DIMENSIONAL DATA



SECTIONAL VIEW



ITEM	DESCRIPTION	PART NUMBER	QTY.	ITEM	DESCRIPTION	PART NUMBER	QTY.
1	Inlet Body	103119	1	16	Screw	118770	4
2	Center Body	103242	1	17	Screen	116456	2
3	Lower Body	103121	1	*18	O-Ring	116380	1
5	Spring	130847	1	23	Spring	130848	1
*7	O-Ring	116299	1	*24	Diaphragm	101292	1
*8	Snap Ring	116189	1	*25	Stem	103361	1
*9	Poppet	103879	1	*26	Diaphragm Plate	104254	1
10	Spring	101021	1	*27	Screw	114723	1
11	End Cap	118132	1	*28	Washer	115048	1
14	WM111B Breather	111412	1	*29	Washer	115132	1
15	Screw	119223	6	*30	O-Ring	116442	1

Service these units with repair kit R147L1, part number 130972.
*Item is included in repair kit.

ORDERING INFORMATION

TO ORDER, SPECIFY WM147L1
PART NUMBER 130845

WILLIAMS CONTROLS, INC.
14100 SW 72ND AVENUE, PORTLAND, OREGON 97224
TEL: (503) 684-8600, TELECOPIER: (503) 684-8610

WM147 HC

AIR BRAKE RELAY VALVE

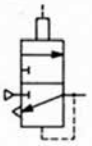
½" PORTS
400 SCFM @ 100 PSI

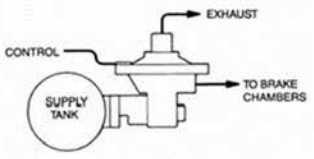
DESCRIPTION

The WM227F is a regulating relay valve used in vehicular air brake systems. It rapidly delivers supply pressure to the brake chambers when it receives a pilot signal from the service brake control. When the service brake treadle is released, pressure at the chambers is exhausted to atmosphere.

For optimum performance, the WM227F is usually mounted directly to its supply tank. WM227F relays can be used on trailers equipped with spring brakes as well as in tractor brake systems. For pre-121 trailers use a WM101 emergency relay valve.

I.S.O. SYMBOL





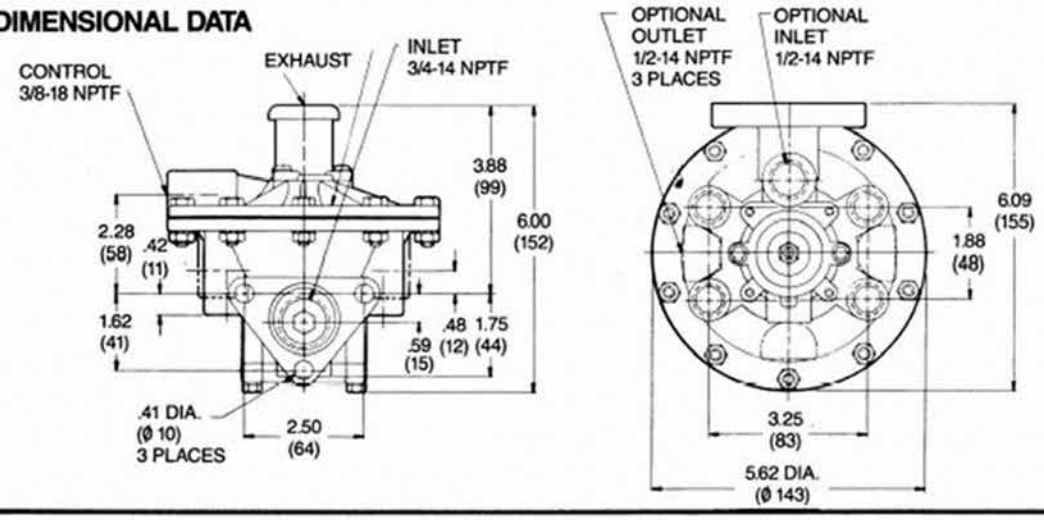
SPECIFICATIONS

PORT SIZES: Chamber Ports	1/2-14 NPTF
Control Port	3/8-18 NPTF
Inlet	3/4-14 NPTF
Optional Inlet	1/2-14 NPTF
MAXIMUM SUPPLY PRESSURE	150 PSI (1034 kPa)
OPERATING TEMPERATURE	-20°F to 200°F (-29°C to 93°C)
FLOW RATING	400 SCFM @ 100 PSI (11 m^3/min @ 690 kPa)
CRACKING PRESSURE	3 PSI w/100 PSI Supply (21 kPa w/690 kPa)
MOUNTING	On Tank or w/Integral Bracket
RECOMMENDED MOUNTING ATTITUDE	Exhaust Port Up
MATERIALS: Body Castings	Die Cast Zinc Alloy
Cover	Die Cast Aluminum Alloy
Poppets & Seals	Buna N
Diaphragm	Fabric-Reinforced Buna N
WEIGHT	4 lbs., 8 oz. (2,0 kg)

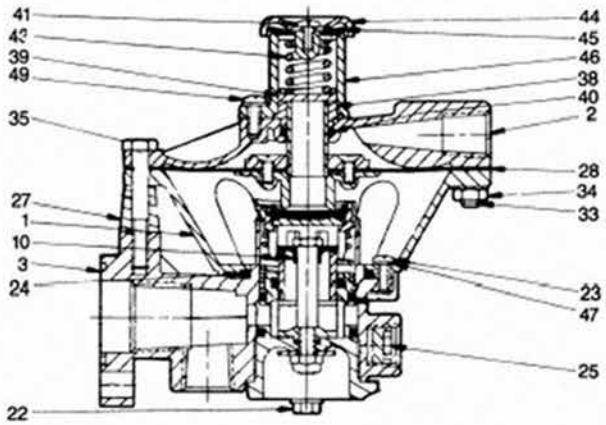
Available from Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

DIMENSIONAL DATA



SECTIONAL VIEW



ITEM	DESCRIPTION	PART NUMBER	QTY
1	Body	101961	1
2	Control Cover	100130	1
3	Bracket Body	101395	1
10	Cartridge Assembly	101840	1
22	Screw	118708	2
23	Screw	118445	4
*24	O-Ring	116341	1
25	Pipe Plug	116083	1
27	Support Pillar	101427	1
*28	Diaphragm Assembly	102868	1
33	Screw	114949	9
34	Lock Nut	114543	9
35	Screw	114849	1
38	Seal Retainer	101419	1
39	Stop Plate	101420	1
*40	O-Ring	116314	1
41	Screw	114768	1
43	Spring	101079	1
44	Cap	101421	1
*45	Exhaust Check	101422	1
46	Spring Retainer	101423	1
*47	Seal Washer	116488	4
49	Screw	100110	3

Service this unit with repair kit R227
*Item is included in repair kit.
Kit also contains parts to service cartridge assembly (item 10).

ORDERING INFORMATION

TO ORDER, SPECIFY **WM227F**

PART NUMBER 100512

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WM292 SERIES

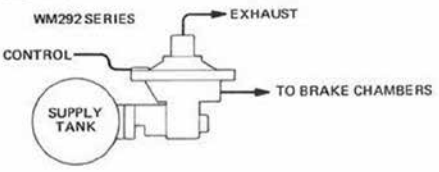
PRODUCT DESCRIPTION

DESCRIPTION Actuated by a control signal, the WM292B valves are three-way, compensating relay vales. Designed for either flange or pipe nipple mounting, these valves feature diaphragm construction and are capable of handling high volume air flow similar to the WM227 series relay valves the WM292B relay includes a steel-backed poppet for continued operation under severe conditions.

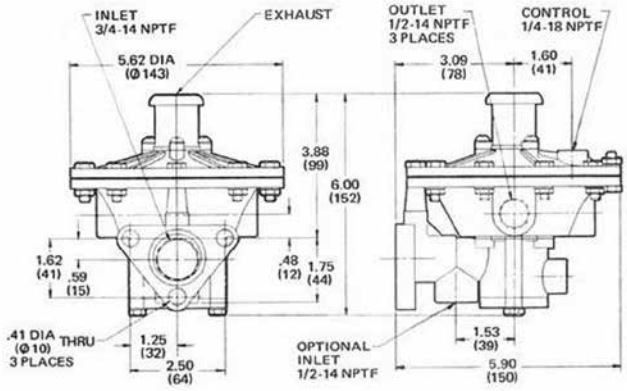
OPERATION The WM292B relay valves are pilot-operated by a pressure signal from a modulating control valve. To actuate the relay valve a control pressure of 3 PSI (20,7 kPa) is required against a 100 PSI (690 kPa) supply. When control pressure is applied, an internal diaphragm flexes, closing the exhaust port and opening the outlet port. Air flows from the supply port to the outlet port until the outlet pressure balances against the control pressure. When the operator decreases the control pressure, the valve decreases the outlet pressure a proportionate amount by exhausting the excess outlet pressure to the atmosphere. When the pilot control pressure is fully released, the valve discharges the outlet pressure through the exhaust port.

APPLICATION These relay valves are engineered for industrial or vehicular applications where precision modulation and large flow capacity are desired. In industrial applications, the WM292B relay valves are commonly used to activate large pneumatic cylinders. Each unit is supplied with two fittings to plug either of the two inlet ports.

TYPICAL INSTALLATION

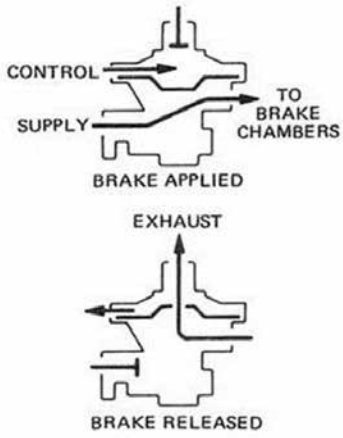


EXTERNAL CONFIGURATION

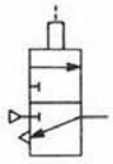


HIGH VOLUME COMPENSATING RELAY VALVE

FUNCTIONAL DIAGRAM



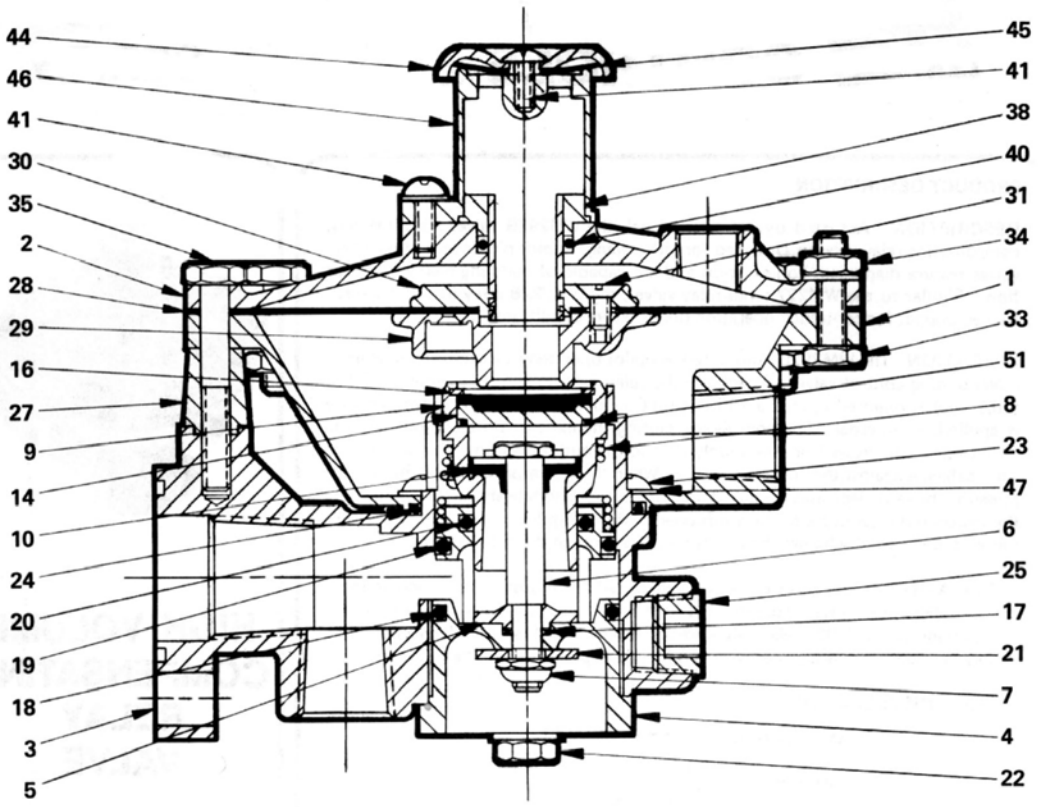
I.S.O. SYMBOL



Available from Brake Systems Inc.

REV. DATE: 2011.01.19

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com



PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	BODY	1	* 24	O-RING	1
2	COVER	1	25	FITTING	1
3	BRACKET	1	27	SUPPORT PILLAR	1
4	LOWER BODY	1	* 28	DIAPHRAGM	1
5	UPPER BODY	1	* 29	LOWER PLATE	1
6	STEM	1	* 30	UPPER PLATE	1
7	NUT	1	31	SCREW	6
8	SPRING	1	33	SCREW	9
9	INLET CAGE	1	34	LOCKNUT	9
* 10	POPPET	1	35	SCREW	1
* 14	EXHAUST DISC	1	38	SEAL RETAINER	1
16	RETAINING RING	1	* 40	O-RING	1
* 17	O-RING	1	41	SCREW	4
* 18	O-RING	1	44	EXHAUST CAP	1
* 19	O-RING	1	* 45	EXHAUST CHECK	1
* 20	O-RING	1	46	SPRING RETAINER	1
21	DISC	1	* 47	WASHER SEAL	4
22	SCREW	2	* 51	O-RING	1
23	SCREW	4			

Service this unit with repair kit number R292.
Repair kit includes parts to service the cartridge assembly. To replace only cartridge assembly, order part number 103384.
*Asterisk designates parts included in repair kit R292.

SPECIFICATIONS

PORT SIZES: Control . . . . . 1/4-18 NPTF
Inlet . . . . . 3/4-14 NPTF
Optional Inlet Port . . . . . 1/2-14 NPTF
Chamber Ports. . . . . 1/2-14 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. . . . .400 SCFM @ 100 PSI (11,3 m^3/min @ 690 kPa)
CRACKING PRESSURE . . 3 PSI (20,7 kPa) w/ 100 PSI (690 kPa) Supply
MOUNTING. . Bracket Secured to Frame, Bulkhead, Bracket or Air Tank
MOUNTING ATTITUDE . . . . . .Exhaust Port Up Recommended
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Poppet . . . . . Buna N w/ Steel Backing
Seals . . . . . Buna N
Diaphragm . . . . . Fabric-Reinforced Buna N
NET WEIGHT. . . . . 5.5 lbs. (2,5 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM292B
Model Number
PART NUMBER 111999

Available from Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WILLIAMS CONTROLS INC.

WM318 SERIES

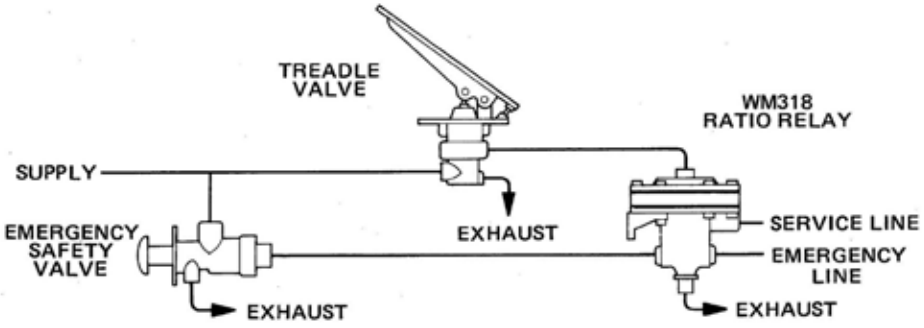
PRODUCT DESCRIPTION

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.

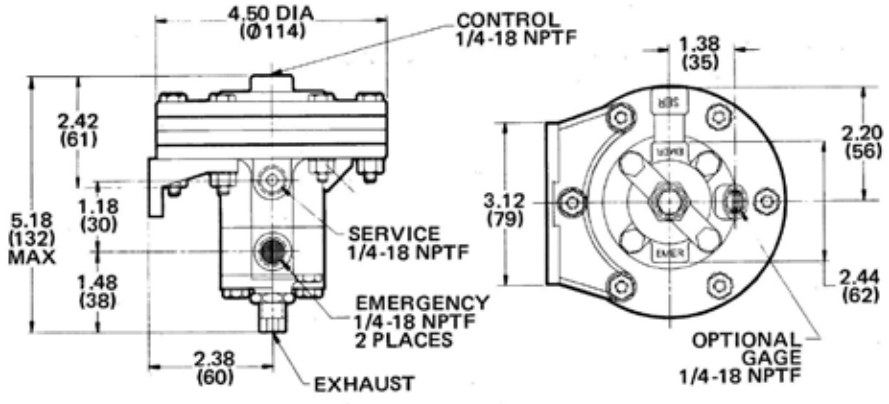
OPERATION To actuate a WM318 series relay valve, a maximum control pressure of 1.5 PSI (10,3 kPa) is required against a 100 PSI (690 kPa) supply. When control pressure is applied, two internal diaphragms expand, closing the exhaust port and opening the outlet port. Air flows from the supply port to the 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

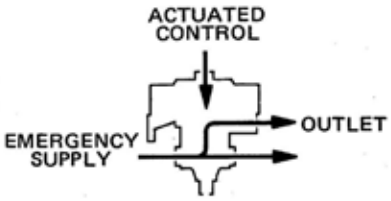


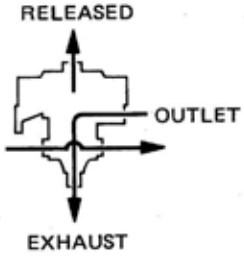
EXTERNAL CONFIGURATION



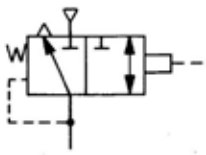
RATIO RELAY VALVES

FUNCTIONAL DIAGRAM





I.S.O. SYMBOL

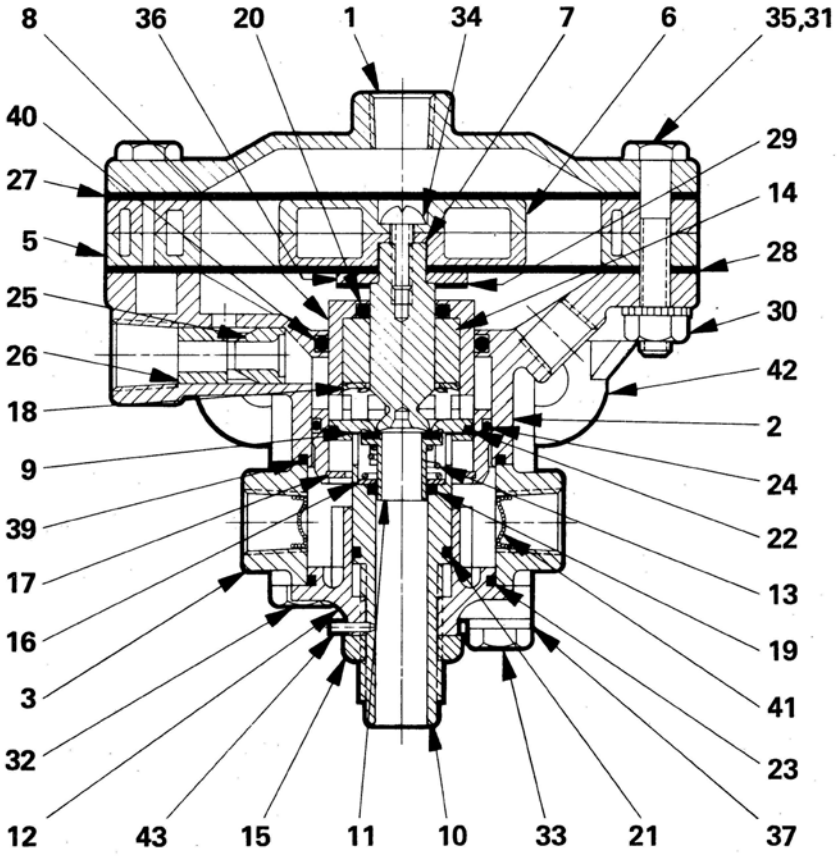


WILLIAMS CONTROLS, INC.
14100 SW 72ND AVENUE, PORTLAND, OREGON 97224, TEL: (503) 684-8600, TELECOPIER: (503) 684-8610

119910
REL. 4/91

PARTS IDENTIFICATION			
ITEM	DESCRIPTION	QUANTITY A	QUANTITY 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

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 TEMPERTURE ..... -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

WM320 SERIES

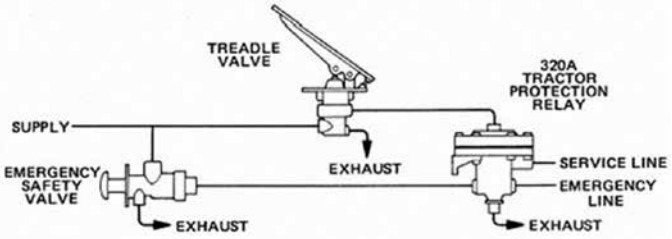
PRODUCT DESCRIPTION

DESCRIPTION Engineered for tractor-trailer braking systems, the WM320A is a pilot pressure-operated tractor protection relay valve. This three-way, compensating relay delivers an output that is proportional to the control signal applied. The output/control pressure ratio is fixed on the WM320A at 1 to 1. To order a ratio relay valve with an adjustable rather than a fixed ratio, review the information on the WM318A catalog page.

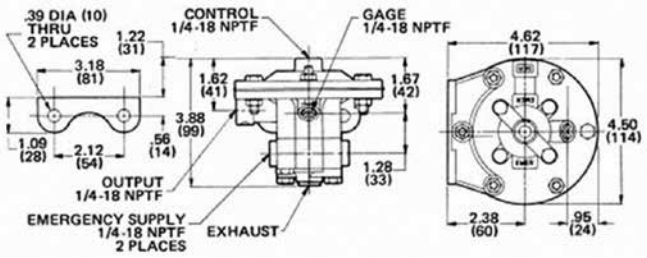
OPERATION When pilot pressure is applied to the WM320A, an internal diaphragm expands. The stem poppet blocks the exhaust vent, and the supply poppet unseats to allow pressure delivery. The outlet pressure increases and balances against the control pressure on the other side of the diaphragm. When a balanced condition is achieved, the supply poppet seats. To maintain this balanced condition, the valve compensated for any increase in control pressure or decrease in downstream pressure. As the control pressure decreases, the valve exhausts the outlet pressure to the atmosphere.

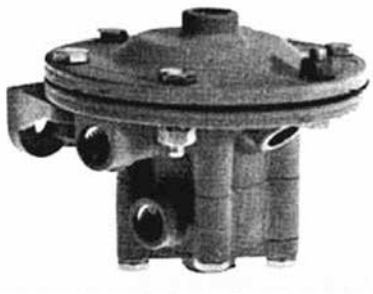
APPLICATION In tractor-trailer braking systems, the WM320A relay is used as a tractor protection valve. Because the control pressure cannot escape through the open service line, the relay valve protects pressure in the brake system when the service brakes are applied. Used in applications that require a relay valve with a fixed 1:1 output/control pressure ratio, this valve is furnished with an integral mounting bracket for installation on the truck or tractor.

TYPICAL INSTALLATION



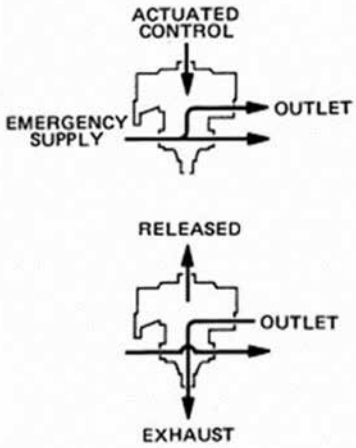
EXTERNAL CONFIGURATION



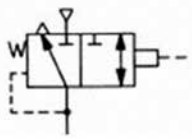


TRACTOR PROTECTION VALVE

FUNCTIONAL DIAGRAM



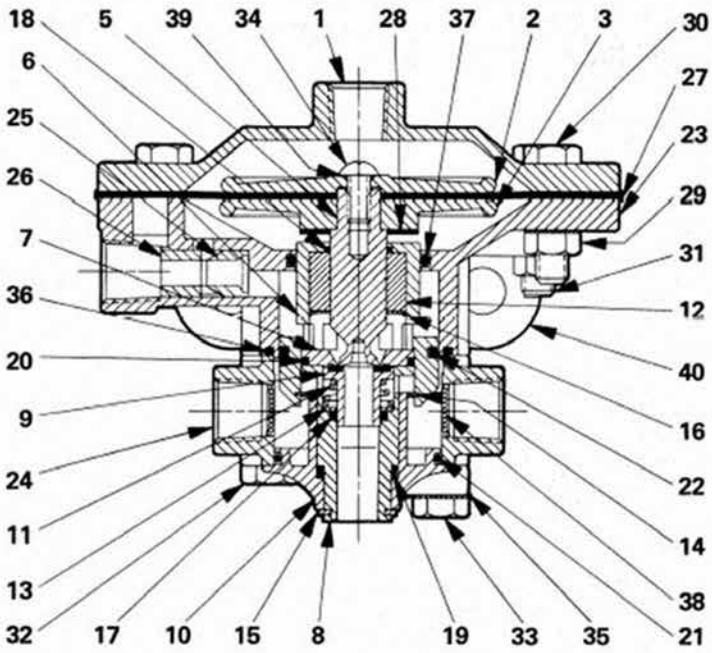
I.S.O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2011.01.19

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com



PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	COVER	1
2	UPPER PLATE	1
3	LOWER PLATE	1
5	EXHAUST STEM	1
6	INLET CAGE	1
7	INLET SEAT	1
8	STEM	1
* 9	POPPET	1
10	CARTRIDGE BODY	1
11	SPRING	1
12	STEM GUIDE	1
13	WASHER	1
14	RETAINING RING	1
15	RETAINING RING	1
16	RETAINING RING	1
* 17	O-RING	1
* 18	O-RING	1
* 19	O-RING	2
* 20	O-RING	1
* 21	O-RING	1
* 22	O-RING	1
23	BODY	1
24	EMERGENCY BODY	1
25	EJECTOR TUBE	1
26	EXPANSION TUBE	1
* 27	DIAPHRAGM	1
* 28	BUMPER	1
29	LOCKNUT	6
30	SCREW	3
31	SCREW	3
32	SCREW	2
33	SCREW	2
34	SCREW	1
35	LOCKWASHER	2
* 36	O-RING	1
* 37	O-RING	1
* 38	SCREEN	2
* 39	WASHER SEAL	1
40	BRACKET (105182)	1

Service this unit with repair kit number R320. Repair kit includes parts to service the cartridge assembly. To replace the cartridge assembly, order part number 102067. Other replaceable items are followed by part numbers.
*Asterisk designates parts included in repair kit R320.

SPECIFICATIONS

PORT SIZE . . . . . 1/4-18 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 . . . . . 50 SCFM @ 100 PSI (1,5 m^3/min @ 690 kPa)
CRACKING PRESSURE . . 1.5 PSI (10.3 kPa) w/100 PSI (690 kPa) Supply
OUTPUT/CONTROL PRESSURE RATIO . . . . . Fixed @ 1:1
MOUNTING . . With Integral Bracket & Two Customer-Supplied Fasteners
MOUNTING ATTITUDE . . . . . Control Port Up Recommended
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Diaphragm . . . . . Fabric-Reinforced Buna N
Poppet . . . . . Chrome-Plated Brass w/ Buna N Insert
Bumper & O-Rings . . . . . Buna N
NET WEIGHT . . . . . 3.25 lb. (1,5 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM320A
Model Number
PART NUMBER 112211

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WM338 SERIES

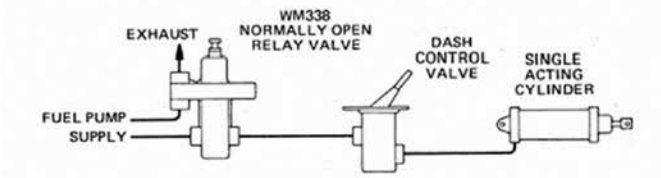
PRODUCT DESCRIPTION

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 as 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 valve. The non-adjustable models will close at a fixed control pressure.

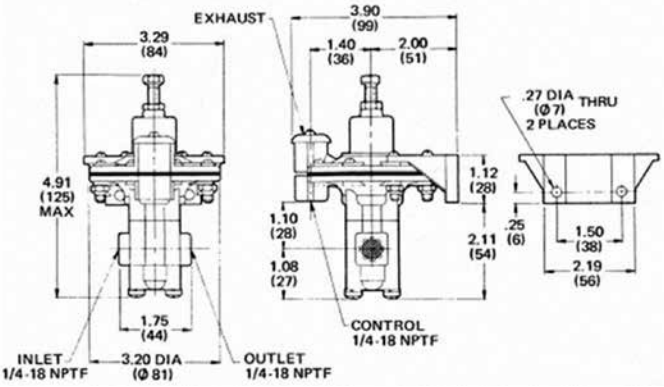
OPERATION When the Wm338 valve is in the normally open position, air flows from the supply port to the outlet port. In response to a sufficient control signal, the supply poppet seats and the valve closes. Pressure at the outlet port is exhausted to the atmosphere. The valve reopens when the control 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

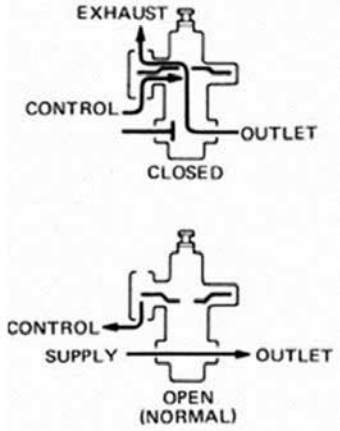


EXTERNAL CONFIGURATION

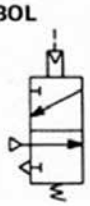


NORMALLY OPEN RELAY VALVE

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

SPECIFICATIONS

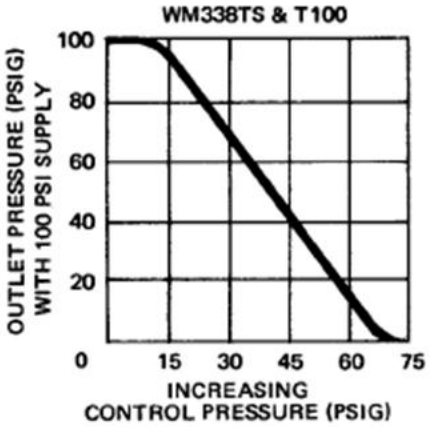
PORT SIZES:
- Inlet, Outlet, & Control . . . . . 1/4-18 NPTF
- Exhaust: WM338D,P,TS,T100 . . . Equipped with Cap and Check Disc
- WM338P2 . . . . Equipped with WM111A Exhaust Breather

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 m^3/min @ 690 kPa)
CONTROL PRESSURE TO CLOSE:
- WM338P2 . . . . . .Not Adjustable
- WM338D,P,TS & 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.



TO ORDER, SPECIFY

WM338____

Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

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 SUPPLY)
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
WM338 T101	131523	NORMALLY OPEN COMPENSATING ADJUSTABLE PRESSURE LIMITING VALVE	PRESET @ 50/60 PSI (345/414 KPA W/110/130 PSI (758/896 KPA) SUPPLY

Service the WM338P with repair kit number R338MP.
Service the WM338T100 and WM338T101 with repair kit number R338DSTS.
WM338T101 also comes with WM111A Breather.

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WM577 SERIES

PRODUCT DESCRIPTION

DESCRIPTION The WM577 is a three-way compensating valve which is normally closed. It requires a control pressure of approximately 1 1/2 PSI to open against a 100 PSI supply pressure.

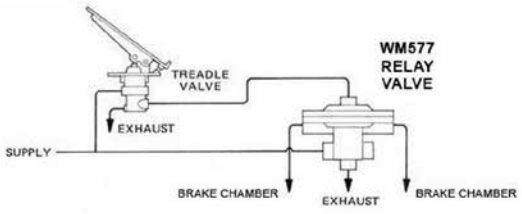
SPECIAL FEATURES Output pressure is available as a percentage of input pressure; from 50%–150%. WM577A is adjustable whereas other variations are preset and non adjustable.

APPLICATION Typical fleet operations include, new and older vehicles from several manufacturers with various types of foundation brakes, disc or drum, various lining frictions, different plumbing ideas, etc. If one axle is more or less powerful than necessary the braking power can be modified up or down with the BSI ratio relay valve. The adjustable version WM577A allows a variation in outlet pressure as much as 50% up or down from the input signal from the brake pedal. Preset (non adjustable) versions are also available.

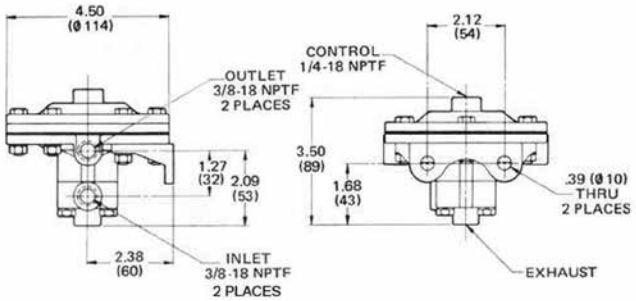
Two 3/8" chamber ports service a like number of brake chambers. Output variations are contained in the cartridge assembly, and thus after the initial installation, output air pressure characteristics are readily changeable by changing or adjusting the cartridge assembly.

SERVICE On occasion an air leak may be caused by dirt particles ingested through the air supply source and small enough to pass the port screens. If this happens, remove the cartridge, blow it off or replace it, a 2 minute job.

TYPICAL APPLICATION



EXTERNAL CONFIGURATION

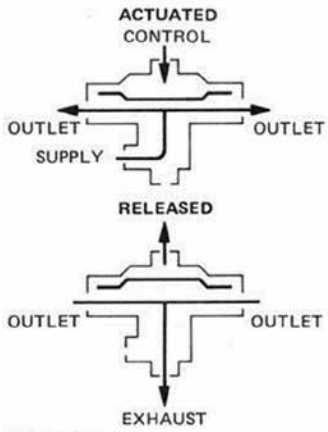


102047 CARTRIDGE (ADJUSTABLE)

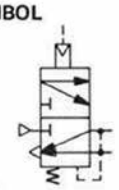
105343 CARTRIDGE (NON-ADJUSTABLE)

NORMALLY CLOSED BRAKE RELAY W/ VARIABLE RATIO OUTPUT

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



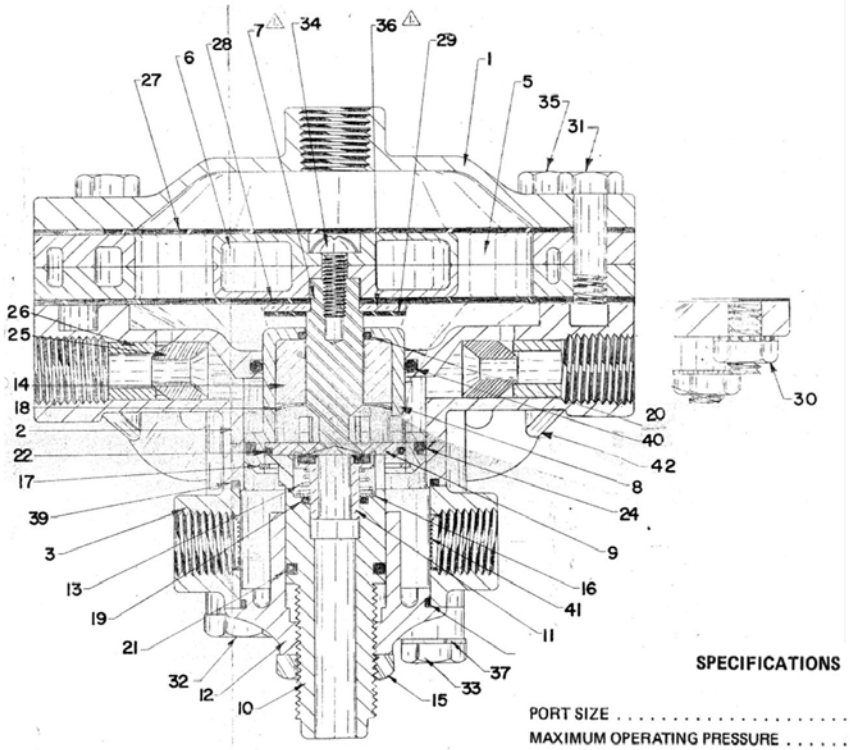
Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.12.21

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

PARTS IDENTIFICATION			
ITEM	DESCRIPTION	QUANTITY A	QUANTITY 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	
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		
26	EXPANSION TUBE		
*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

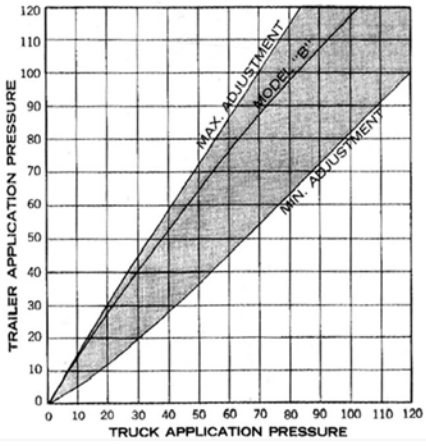
Service this unit with repair kit number 114262. Repair kit includes parts to service the cartridge assembly. To replace the cartridge assembly in the WM577A order part number 102047. To replace the cartridge assembly in the WM577, order part number 105343. Other replaceable items are followed by part numbers.
*Asterisk designates parts included in repair kit 114262.



Screw stem **IN** for more output and **OUT** for less.

SPECIFICATIONS

PORT SIZE . . . . . 3/8-18 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 . . . . . 50 SCFM @ 100 PSI (1,0 m^3/min @ 690 kPa)
CRACKING PRESSURE . . 1.5 PSI (10,3 kPa) w/ 100 PSI (690 kPa) Supply
OUTPUT/CONTROL PRESSURE RATIO:
WM577A . . . . . Adjustable from 1.3:1 to 1:1 to 0.8:1
WM577B . . . . . 0.8:1 Fixed
MOUNTING . . With Integral Bracket & Two Customer-Supplied Fasteners
MOUNTING ATTITUDE . . . . . Control Port Up Recommended
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Diaphragms . . . . . Fabric-Reinforced Buna N
Poppet . . . . . Chrome-Plated Brass w/ Buna N Insert
Bumper & O-Rings . . . . . Buna N
NET WEIGHT . . . . . 3.45 lb
*For continuous operation beyond this range, contact factory.



TO ORDER, SPECIFY

WM577 ____
Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	OUTPUT/CONTROL PRESSURE RATIO	CARTRIDGE
WM577 A	160163	VARIABLE	102047
WM577 B	160165	+20%	105343
WM577 C	160166	–20%	160164

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WM578 SERIES

PRODUCT DESCRIPTION

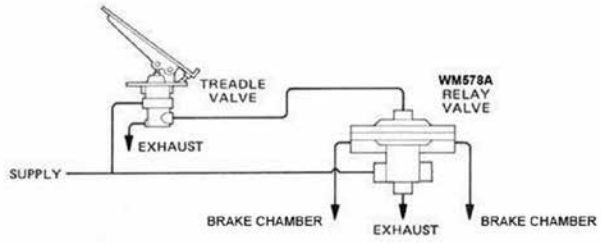
DESCRIPTION The 578S is a three-way, compensating relay valve which is normally closed. It requires a control pressure of approximately 1 PSI to open against 100 PSI supply, and has a fixed output/control pressure ratio of 1 to 1.

OPERATION When sufficient air pressure is applied at the WM578A's control port, an internal diaphragm flexes, depressing the valve stem. The stem blocks the exhaust port and unseats the poppet to allow supply pressure to flow to the outlet. When air pressure at the WM578A's outlet port balances against the control pressure, the poppet seats to maintain the balanced condition. If the control pressure increases, the valve delivers additional supply pressure to the outlet until a new balance is achieved. If the control pressure decreases, excess outlet pressure is exhausted to atmosphere.

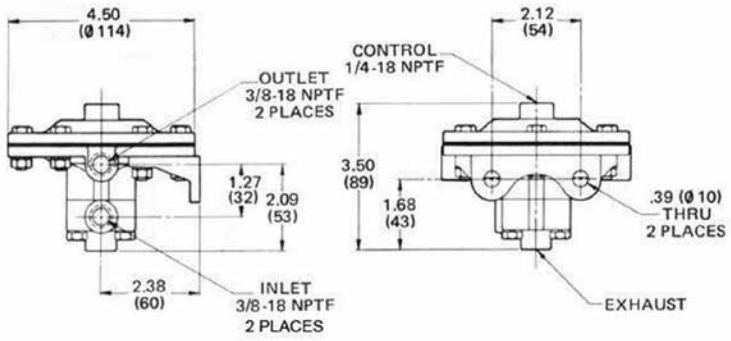
APPLICATION WM578A valves are applicable to industrial and vehicular installations which require a three-way, compensating relay. They are frequently used to provide modulating control in clutch and brake applications.

SERVICE On occasion an air leak may be caused by dirt particles ingested through the air supply source and small enough to pass the port screens. If this happens, remove the cartridge, blow it off or replace it, a 2 minute job.

TYPICAL APPLICATION

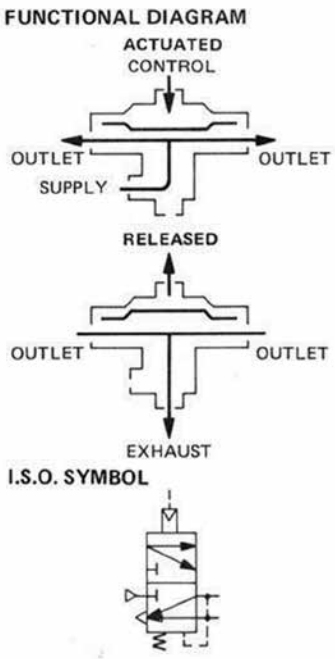


EXTERNAL CONFIGURATION



NORMALLY CLOSED COMPENSATING BRAKE RELAY

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL

Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.12.13

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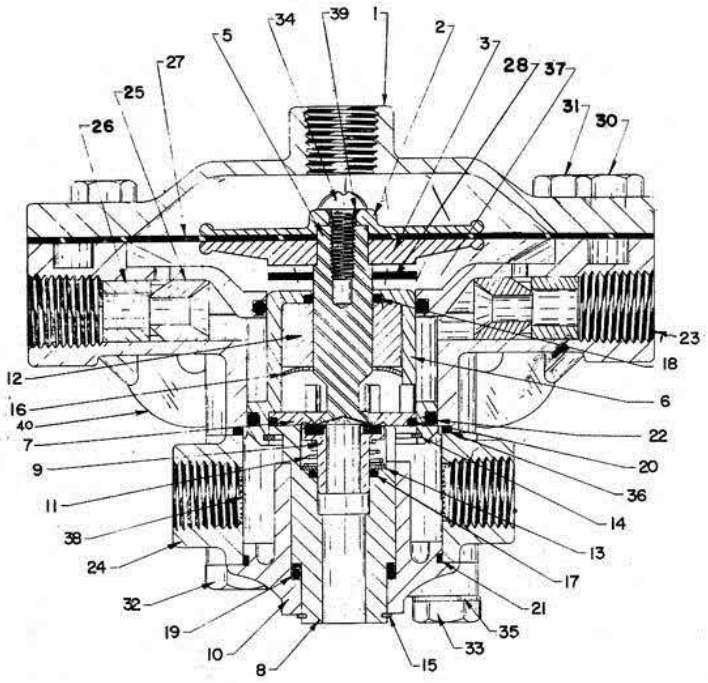


PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY.
1	COVER	1
2	UPPER PLATE	1
3	LOWER PLATE	1
5	EXHAUST STEM	1
6	INLET CAGE	1
7	INLET SEAT	1
8	STEM	1
* 9	POPPET	1
10	CARTRIDGE BODY	1
11	SPRING	1
12	STEM GUIDE	1
13	WASHER	1
* 14	RETAINING RING	1
* 15	RETAINING RING	1
* 16	RETAINING RING	1
* 17	O-RING	1
* 18	O-RING	1
* 19	O-RING	2
* 20	O-RING	1
* 21	O-RING	1
* 22	O-RING	1
23	BODY	1
24	EMERGENCY BODY	1
25	EJECTOR TUBE	
26	EXPANSION TUBE	
* 27	DIAPHRAGM	1
* 28	BUMPER	1
29	LOCKNUT	6
30	SCREW	3
31	SCREW	3
32	SCREW	2
33	SCREW	2
34	SCREW	1
35	LOCKWASHER	2
* 36	O-RING	1
* 37	O-RING	1
* 38	SCREEN	2
* 39	WASHER SEAL	1
40	BRACKET (105182)	1

Service this unit with repair kit number 114264. Repair kit includes parts to service the cartridge assembly. To replace the cartridge assembly, order part number 102067. Other replaceable items are followed by part numbers.
*Asterisk designates parts included in repair kit 114264.

SPECIFICATIONS

PORT SIZE	INLET/OUTLET	3/8-18 NPTF
	CONTROL	1/4-18 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	50 SCFM @ 100 PSI (1,5 m^3/min @ 690 kPa)	
CRACKING PRESSURE	1.5 PSI (10.3 kPa) w/100 PSI (690 kPa) Supply	
OUTPUT/CONTROL PRESSURE RATIO	Fixed @ 1:1	
MOUNTING	With Integral Bracket & Two Customer-Supplied Fasteners	
MOUNTING ATTITUDE	Control Port Up Recommended	
MATERIALS: Body Castings	ALUM + Die Cast Zinc Alloy	
Diaphragm	Fabric-Reinforced Buna N	
Poppet	Chrome-Plated Brass w/ Buna N Insert	
Bumper & O-Rings	Buna N	
NET WEIGHT	3.25 lb. (1,5 kg)	

*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM578A

Model Number

PART NUMBER 160141

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WM617A

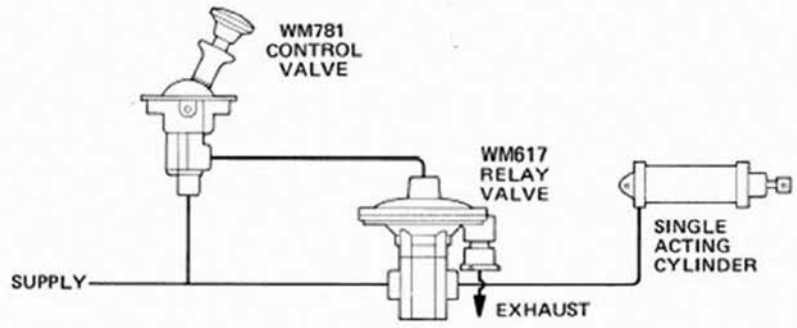
PRODUCT DESCRIPTION

DESCRIPTION The WM617A is a three-way, non-compensating relay valve which is normally closed. It is similar in function to the WM147C but required a lower control pressure actuation.

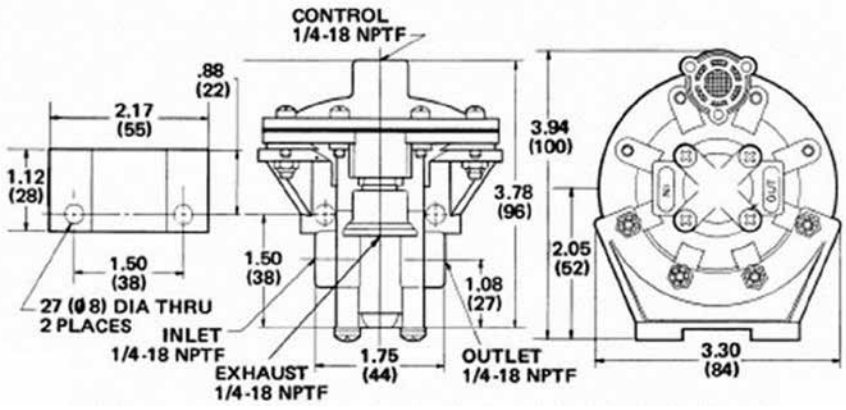
OPERATION When a sufficient pressure signal is applied at the WM617a's control port, an internal diaphragm expands, depressing the valve stem. This closes the exhaust port and unseats the supply poppet to allow supply pressure to flow to the outlet. When the control pressure falls below the required level, the valve returns to the normally closed position and air pressure at the outlet is exhausted to atmosphere.

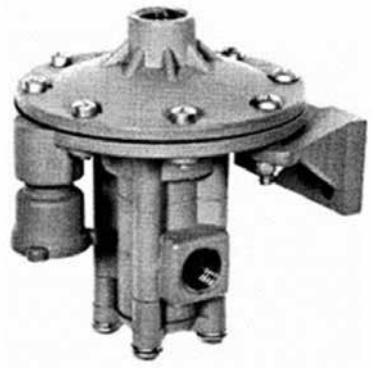
APPLICATION The WM617A is applicable to industrial and vehicular installations which require a three-way, non-compensating relay which is normally closed. It is engineered for use in circuits which operate with a moderate air flow rate.

TYPICAL APPLICATION



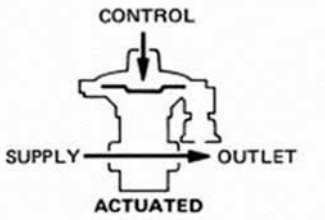
EXTERNAL CONFIGURATION



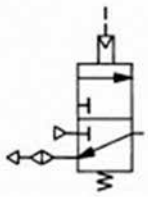


NORMALLY CLOSED RELAY

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2011.01.19

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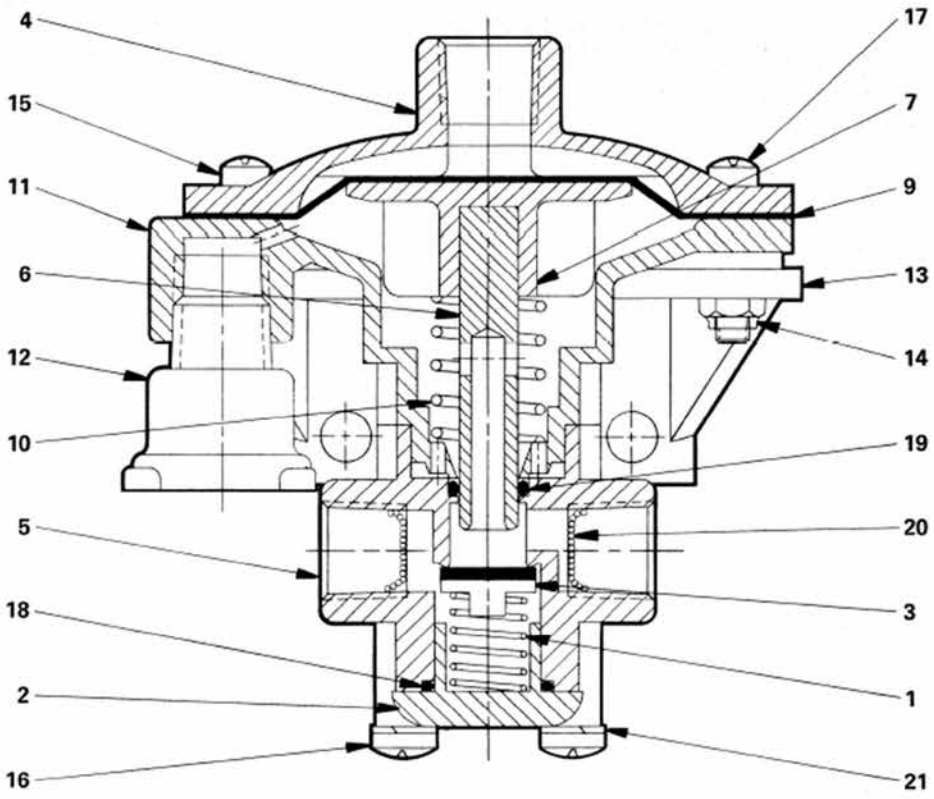


PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	SPRING	1
2	END CAP	1
* 3	POPPET	1
4	COVER	1
5	LOWER BODY	1
6	STEM	1
7	DIAPHRAGM PLATE	1
* 9	DIAPHRAGM	1
10	SPRING	1
11	CONTROL BODY	1
12	BREATHER (WM111A)	1
13	BRACKET (105181)	1
14	NUT	4
15	SCREW	4
16	SCREW	4
17	SCREW	4
* 18	O-RING	1
* 19	O-RING	1
* 20	SCREEN	2
21	WASHER	1

Service this unit with repair kit number R617.
*Asterisk designates items included in repair kit.

SPECIFICATIONS

PORT SIZE . . . . . 1/4-18 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 . . . . . 40 SCFM @ 100 PSI (1,1 m^3/min @ 690 kPa)
CRACKING PRESSURE . . 5 PSI (34,5 kPa) w/100 PSI (690 kPa) Supply
MOUNTING . . . . . Bracket Mounted
MOUNTING ATTITUDE . . . . . Breather Down
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Diaphragm . . . . . Fabric Reinforced Buna N
Poppet . . . . . Buna N
O-Rings . . . . . Buna N
NET WEIGHT . . . . . 1 lb., 6 oz. (0,6 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM617A
Model Number
PART NUMBER 113844

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

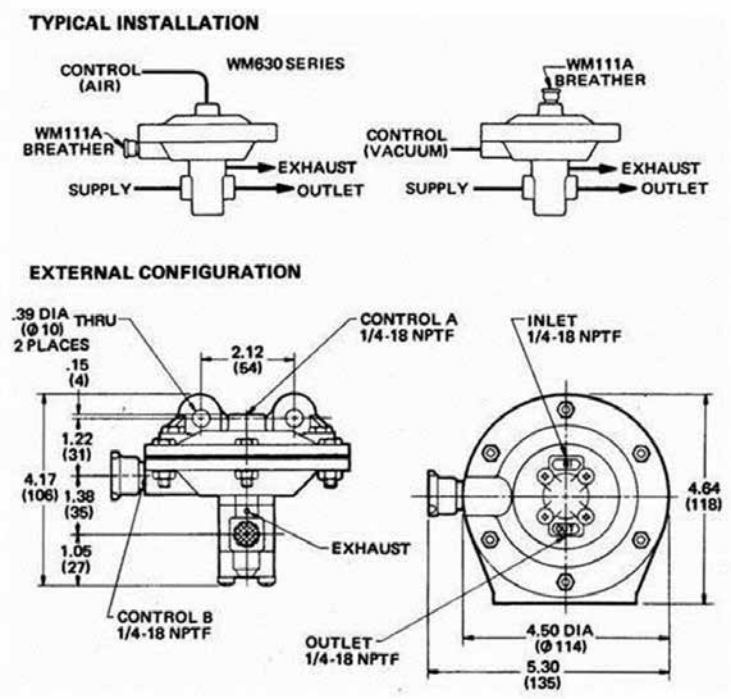
WM630-101

PRODUCT DESCRIPTION

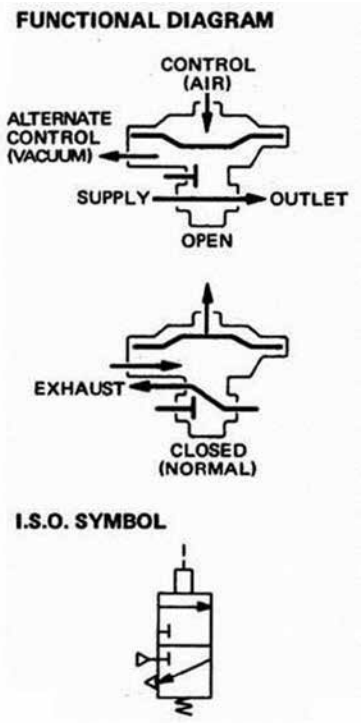
DESCRIPTION The WM630-101 is a reinforced version of the WM630B, a normally closed, non-compensating, three-way relay valve that is operated by air, vacuum, or hydraulic signal. A low pressure signal is required to open the valve against a minimum 100 PSI (6895 kPa) supply.

OPERATION To open this normally closed relay, air or hydraulic pressure is applied above the diaphragm, or vacuum is applied below the diaphragm. When a control signal is applied the diaphragm expands and unseats the poppet. Air flows from the supply port. The valve returns to the normally closed position when the control signal is released. Pressure at the outlet port escapes to the atmosphere through two exhaust vents.

APPLICATION Designed primarily for industrial applications, the WM630-101 is often used to sense low vacuum levels in turbo blower conveying systems. As shown in the diagrams below when the unit is installed with a vacuum control, the vacuum line is connected to control port "B" and the breather is attached to control port "A" If air or hydraulic fluid is used as the control medium, the control line is connected to port "A" and the breather is mounted on control "B". The unit is shipped from the factory with the breather installed in port "B".



PILOT-OPERATED RELAY VALVE



Manufactured in the USA by Brake Systems Inc.

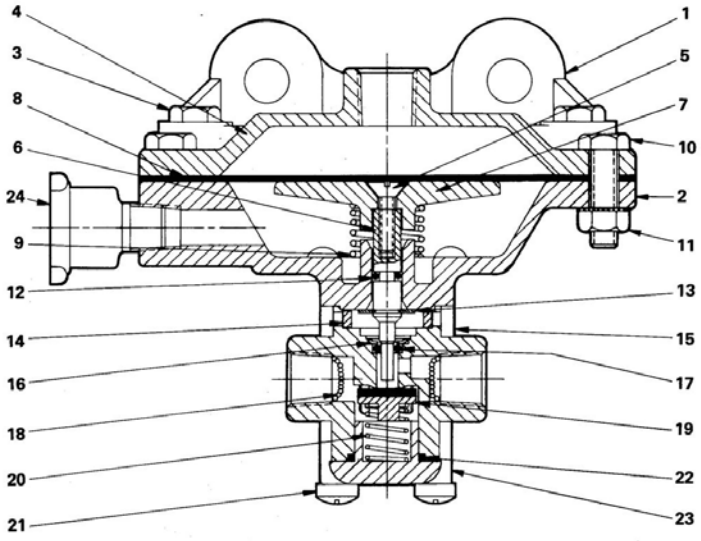
REV. DATE: 2011.01.19

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

Brake Systems, Inc.

ITEM	DESCRIPTION	QTY
1	BRACKET, 105182	1
2	CENTER BODY, 104577	1
3	SCREW, 114849	3
4	INLET COVER, 102064	1
5	SCREW, 114837	1
6	STEM, 104610	1
7	DIAPHRAGM PLATE, 104611	1
*8	DIAPHRAGM, 102061	1
9	SPRING, 101047	1
10	SCREW, 114837	3
11	LOCKNUT, 114543	6
*12	O-RING, 110495	1
13	RETAINING RING BIG, 116183	1
*14	FOAM FILTER, 104077	1
15	LOWER BODY, 104655	1
*16	RETAINING RING SMALL, 116184	1
*17	O-RING, 131571	1
18	SCREEN, 116458	2
*19	POPPET, 103283	1
20	SPRING, 101021	1
21	SCREW, 118770	4
*22	O-RING, 116380	1
23	END CAP, 118132	1
24	BREATHER, WM111A, 111411	1
25	SUPPORT RING, TOP, 118450	1
26	SUPPORT RING, LOWER, 118449	1
27	WASHER, BELVILLE, 131531	4

Service this unit with repair kit number R630.
*Asterisk designates items included in repair kit.



PILOT CONTROL AND BREATHER LOCATION			
PILOT CONTROL	PORT "A"	PORT "B"	PRESSURE TO OPEN WITH 100 PSI (689,5 kPa) Supply
AIR	AIR	BREATHER	1.5-2.5 PSI (10,3-17,2 kPa)
VACUUM	BREATHER	VACUUM	3.5-4.5 inches Hg (11,8-15,2 kPa)

SPECIFICATIONS

PORT SIZE . . . . . 1/4-18 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 . . . . . 12 SCFM @ 100 PSI (0,3 m^3/min @ 690 kPa)
CONTROL PRESSURE MEDIA . . . . . Air Pressure or Vacuum
MOUNTING . . . . . With Integral Bracket and Two 3/8" Fasteners
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Diaphragm . . . . . Fabric-Reinforced Buna N
Poppet . . . . . Buna N with Aluminum Backing
O-Rings . . . . . Buna N
NET WEIGHT . . . . . 2 lbs. 8 oz. (1,1 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM630-101
MODEL NUMBER
118393
PART NUMBER

Manufactured in the USA by Brake Systems Inc.

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SECTION 9: TRANSMISSION SHIFTS

WM-445

WM-458

WM-466

WM-487

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WM445, WM466, WM487

Brake Systems, Inc. Shift Control Devices include an operator control valve as shown above which routes air pressure to the appropriate actuator (cylinder or diaphragm type). One of the main uses of the product is for remote shifting of automatic transmissions (2-B-04) such as Allison, Clark, Twin Disc, etc. As this device is basically a sequence programming selector, it has many other uses such as single stick control of:

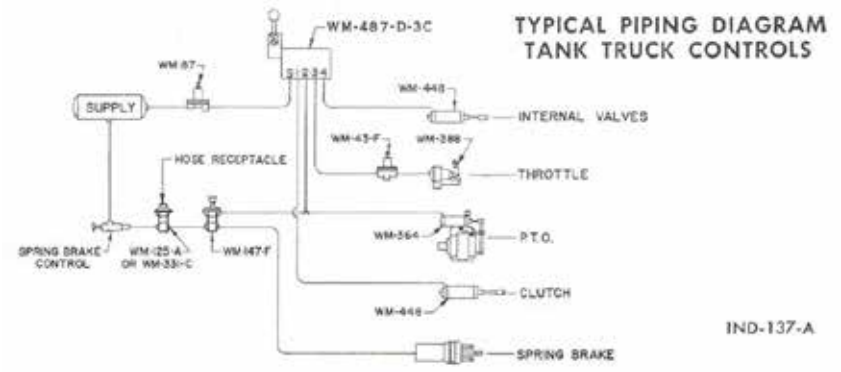
1.) Cement Mixer.
2.) Tank truck pumper.
3.) PTO clutch control for winch.
4.) General industrial.

All valves are custom assemblies of similar parts while the difference in part numbers define such items as:

1.) Number of valve units:
WM487 Series—4 valves
WM445 Series—6 valves
WM466 Series—8 valves
2.) Left hand or right hand assembly.
3.) Valve timing.
4.) Handle type.
5.) Shift gate pattern.
6.) Number of handle positions.

Heavy duty design includes these features:

1.) Lightweight housings of cast aluminum.
2.) Shift gate labyrinth of long wearing malleable iron.
3.) Stainless steel cam shaft.
4.) Die cast cams.
5.) Low effort spool type valves.
6.) Air flow approximate 15 CFM (1/8" NPT ports).
7.) Rubber dust boot over each operating stem.
8.) Repair may be effected without complete disassembly by removal of outlet fitting from bottom of each individual valve as necessary.



SHIFT CONTROL

WM-458-A INDIVIDUAL VALVE ASSEMBLY

Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.06.16

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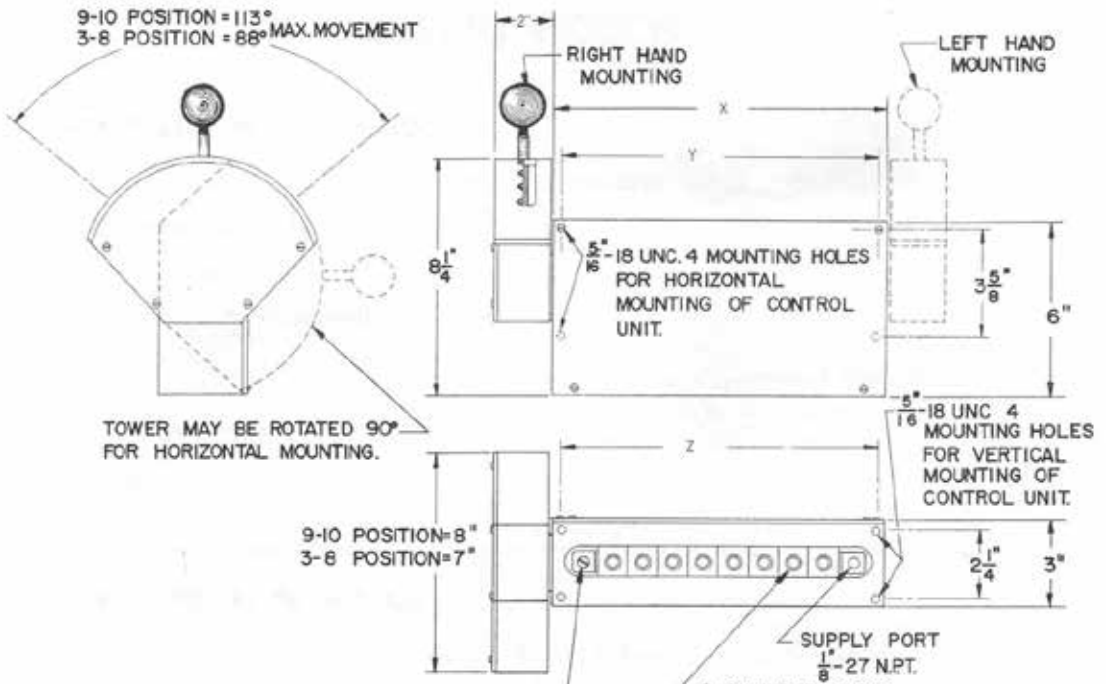
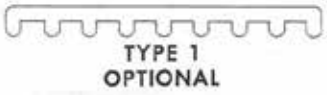


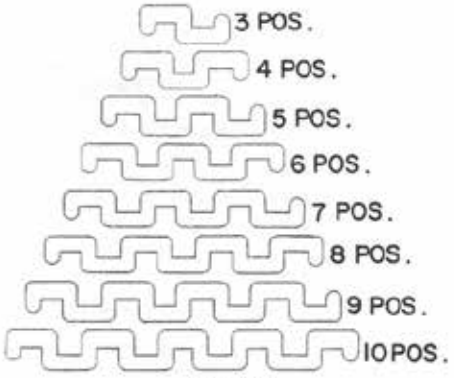
DIMENSIONS			
	WM-466	WM-445	WM-487
X	11	9	7
Y	10	8	6
Z	10½	8½	6½

SHIFT GATE PATTERNS



TYPE 1
OPTIONAL

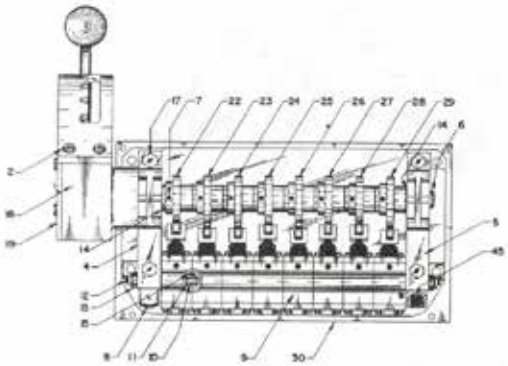
TYPE 4
OPTIONAL

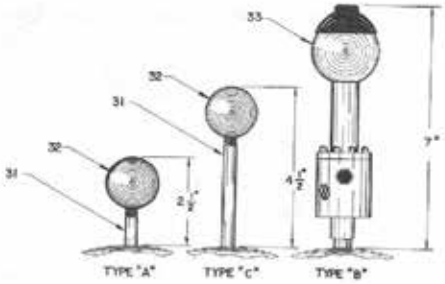


TYPE 3
(STANDARD LABYRINTH)

Manufactured in the USA by Brake Systems Inc.

WM-445-466-487





TYPICAL PARTS LIST

DWG. NO.	DESCRIPTION	WM-466-B-4A QTY.	WM-466-B-4A PART NO.	WM-445-A-3A QTY.	WM-445-A-3A PART NO.	WM-487-E-3A QTY.	WM-487-E-3A PART NO.
1	SCREW	8	3-W-156	8	3-W-156	8	3-W-156
2	CAP SCREW	4	3-W-226	4	3-W-226	4	3-W-226
3	CAP SCREW	4	3-W-251	4	3-W-251	4	3-W-251
4	SUPPLY BODY	1	3146	1	3146	1	3146
5	SUPPLY BODY	1	3457	1	3457	1	3457
6	CAM SHAFT	1	3473	1	3124	1	3472
7	SET SCREW	16	16-W-25	12	16-W-25	8	16-W-25
8	PIPE PLUG	1	7-W-43	1	7-W-43	1	7-W-43
9	CONTROL VALVE	8	WM-458-A	6	WM-458-A	4	WM-458-A
10	SEAL BUSHINGS	9	3193	7	3193	5	3193
11	O RING	18	52-W-3	14	52-W-3	10	52-W-3
12	TIE ROD	2	14-4-44	2	14-W-19	2	14-W-43
13	NUT	4	2-W-66	4	2-W-66	4	2-W-66
14	WASHER	2	4-W-29	2	4-W-29	2	4-W-29
15	ROLL PIN	9	10-W-24	7	10-W-24	5	10-W-24
16	CONTROL BOX COVER	1	3507	1	3117	1	3506
17	CAP SCREW	4	3-W-227	4	3-W-227	4	3-W-227
18	TOWER	1	3441	1	3438	1	3438
19	TOWER COVER	1	3442	1	3439	1	3439
20	SHIFT GATE	1	3599	1	3538	1	3534
21	HANDLE ASSY.	1	3493	1	3493	1	3495
22	#1 CAM	1	3408	1	3125	1	3126
23	#2 CAM	1	3408	1	3125	1	3126
24	#3 CAM	1	3408	1	3126	1	3125
25	#4 CAM	1	3408	1	3126	1	3125
26	#5 CAM	1	3406	1	3127	—	—
27	#6 CAM	1	3407	1	3127	—	—
28	#7 CAM	1	3408	—	—	—	—
29	#8 CAM	1	3409	—	—	—	—
30	CONTROL BOX	1	3469	1	3069	1	3457
45	SCREEN	1	53-W-1	1	53-W-1	1	53-W-1
	INDIVIDUAL VALVE REPAIR KIT R-458						
	COMPLETE REPAIR KIT (R-466) or (R-445) or (R-487)						

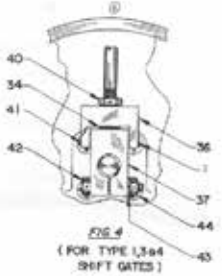


FIG 4
(FOR TYPE 1,3&4 SHIFT GATES)

HANDLE ASSEMBLY

DWG. NO.	DESCRIPTION	TYPE 3A (#3493)	TYPE 3B (#3496)	TYPE 3C (#3495)
31	HANDLE	3134	3497	3446
32	KNOB	62-W-7	—	62-W-7
33	PUSH BUTTON LEVER	—	WM-371-A	—
34	RUBBER SPRING	3142	3142	3142
35	HANDLE BASE	3132	3132	3132
37	LEVER BLOCK	3131	3131	3131
40	JAM NUT	2-W-76	2-W-76	2-W-76
41	ROLL PIN	10-W-4	10-W-4	10-W-4
42	CAP SCREW	3-W-26	3-W-26	3-W-26
43	LOCK WASHER	4-W-20	4-W-20	4-W-20
44	NUT	2-W-12	2-W-12	2-W-12

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SELECTION DETAIL

FOUR VALVE MODEL WM-487

NOTE: TO ORDER, SPECIFY: **WM-487-XX-XXX**

Handle Positions
A=8 D=5
B=7 E=4
C=6 F=3

Timing Sequence
—Leave Blank for Standard
—Number Assigned for Specials

Assembly Configuration
—Leave Blank for Standard
—L for Left Hand

Handle Type
A—Short Handle
B—Push Button Valve
C—Long Handle

Shift Gate Pattern
1—Optional Type 1
3—Standard Labyrinth
4—Optional Type 4

SIX VALVE MODEL WM-445

NOTE: TO ORDER, SPECIFY: **WM-445-XX-XXX**

Handle Positions
A=8 D=5
B=7 E=4
C=6 F=3

Timing Sequence
—Leave Blank for Standard
—Number Assigned for Specials

Assembly Configuration
—Leave Blank for Standard
—L for Left Hand

Handle Type
A—Short Handle
B—Push Button Valve
C—Long Handle

Shift Gate Pattern
1—Optional Type 1
3—Standard Labyrinth
4—Optional Type 4

EIGHT VALVE MODEL WM-466

NOTE: TO ORDER, SPECIFY: **WM-466-XX-XXX**

Handle Positions
A=10 E=6
B=9 F=5
C=8 G=4
D=7 H=3

Timing Sequence
—Leave Blank for Standard
—Number Assigned for Specials

Assembly Configuration
—Leave Blank for Standard
—L for Left Hand

Handle Type
A—Short Handle
B—Push Button Valve
C—Long Handle

Shift Gate Pattern
1—Optional Type 1
3—Standard Labyrinth
4—Optional Type 4

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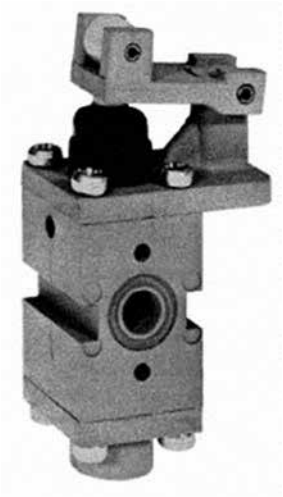
WM458B

REPLACEMENT VALVE FOR SHIFT SELECTORS

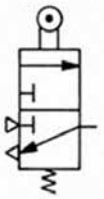
15 SCFM @ 100 PSI

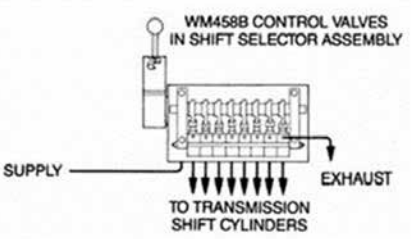


DESCRIPTION

The WM458B is a three-way directional valve designed for gang mounting in shift selector assemblies. WM458B valves have integral aligning pins on mating surfaces and are held together in shift selector assemblies by two tie bolts. A single valve can easily be removed for replacement, or repaired with kit 114395.

I.S.O. SYMBOL





SPECIFICATIONS

PORT SIZE	1/8-27 NPTF
MAXIMUM SUPPLY PRESSURE	150 PSI (1034 kPa)
OPERATING TEMPERATURE	-20°F to 200°F (-29°C to 93°C)
FLOW RATING	15 SCFM @ 100 PSI (0,4 m^3/min @ 690 kPA)
ROCKER TRAVEL TO ACTUATE	10° Maximum
MOUNTING	Designed for Gang Mounting in Shift Selector Assemblies
MOUNTING ATTITUDE	Optional
MATERIALS: Body Castings	Die Cast Aluminum Alloy
Push Rod	Brass
Roll Pins	Hardened Steel
Rollers	Nylon
Poppet	Buna N with Brass Backing
Dust Boot	Chloroprene Rubber
O-Rings	Buna N
WEIGHT	5 oz. (0,1 kg)

Manufactured in the USA by Brake Systems Inc.

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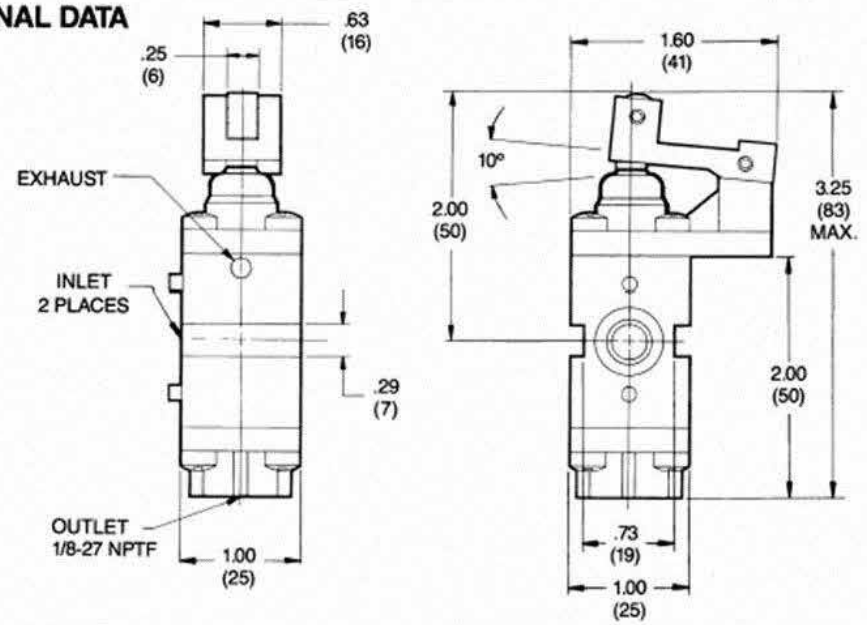
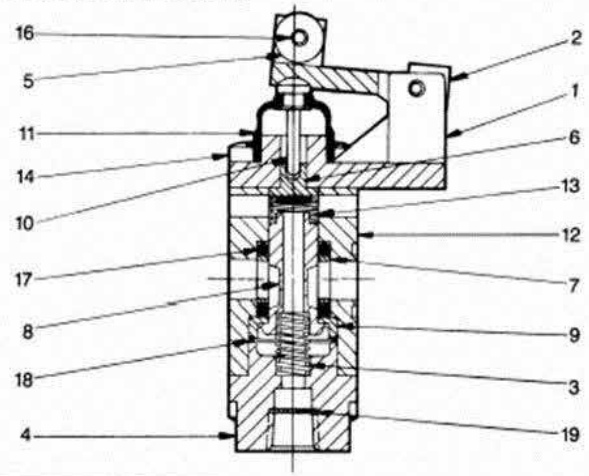
DIMENSIONAL DATA



SECTIONAL VIEW



ITEM	DESCRIPTION	PART NUMBER	QTY
1	Hinge Plate	103072	1
2	Rocker	103073	1
3	Spring	100724	1
4	Outlet Body	103118	1
5	Roller	103170	1
* 6	Poppet	103171	1
7	Spool	103172	1
* 8	Stem	103173	1
9	Seal Retainer	103174	1
10	Push Rod	103175	1
*11	Boot	103176	1
12	Main Body	105011	1
13	Exhaust Spring	103233	1
14	Screw	119224	8
16	Spring Pin	115349	2
*17	O-Ring	116304	2
*18	O-Ring	116380	1
19	Screen	116455	1

Service this unit with repair kit 114395.
* Item is included in repair kit.

ORDERING INFORMATION

TO ORDER, SPECIFY **WM458B**

PART NUMBER 113117

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SECTION 10: TREADLES

WM-305

WM-353

WM-386

WM-392

WM-399

WM-453

WM-472

WM-476

WM-640

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WM305

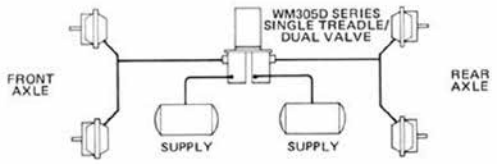
PRODUCT DESCRIPTION

DESCRIPTION The WM305D series valve is a floor-mounted single treadle/dual valve that is engineered for split systems applications. The treadle features an adjustment which permits proportional delivery between split braking systems. On some models, a debris displacer is available to prevent foreign material from entering the treadle mechanism and interfering with pedal movement. Models which incorporate this displacer are recommended for adverse operating conditions in which debris may accumulate.

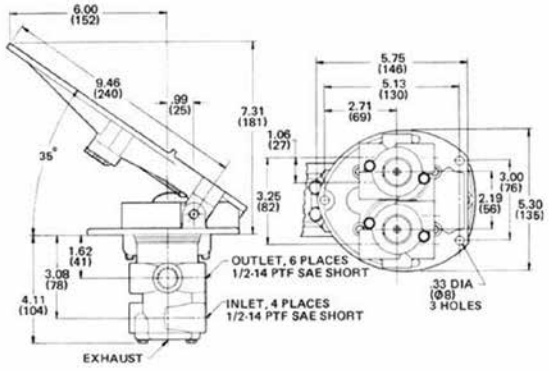
OPERATION The WM305D series valve incorporated two compensating pressure regulators that are mounted to a common plate. To assure split system protection, each regulator has independent supply and delivery ports. By adjusting the radius link on the walking beam, the delivery ratio between the two regulators can be modified for a specific application. All models are shipped from the factory with this delivery ratio preset at 1 to 1.

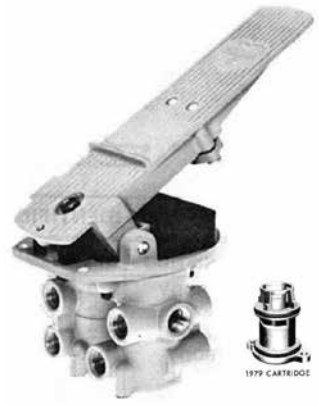
APPLICATION Used in both on and off-road applications, the WM305D series valve is installed in split air brake systems that require proportional delivery. This single treadle/dual valve is recognized for its modulation characteristics and may be used in FMVSS-121 applications.

TYPICAL INSTALLATION



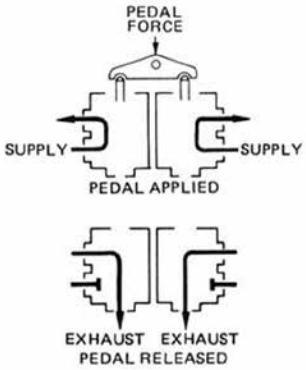
EXTERNAL CONFIGURATION



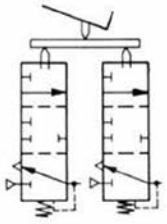


SINGLE TREADLE/ DUAL VALVE

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2011.01.19

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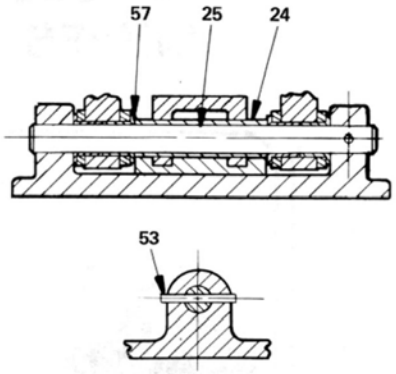
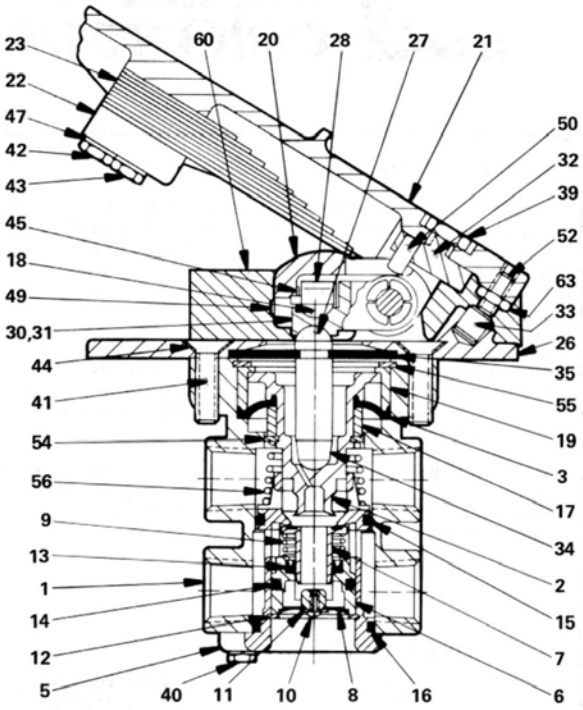




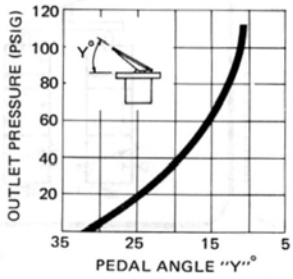
PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	VALVE BODY	2	28	BEAM (101996)	1
2	PISTON	2	+30	LEFT GUIDE	1
* 3	DIAPHRAGM	2	+31	RIGHT GUIDE	1
5	CART. BODY	2	+32	ADJ. CAM (102000)	1
6	GUIDE TUBE	2	33	STOP PIN (102001)	1
* 7	SEAT TUBE	2	34	STEM (102002)	2
* 8	EXHAUST DISC	2	* 35	COVER (102003)	1
9	SPRING	2	39	NUT	1
10	SCREW	2	40	SCREW	4
11	WASHER	2	41	SCREW (116804)	4
12	RETAINING RING	2	42	SCREW	2
* 13	U-CUP	2	43	SCREW	2
* 14	O-RING	2	44	WASHER (115082)	4
* 15	O-RING	2	* 45	WASHER (115088)	2
* 16	O-RING	2	47	WASHER	4
17	CLAMP RING	2	49	PIN (117917)	1
* 18	BEARING (101986)	2	50	DOWEL (115331)	1
19	CLAMP RING	2	52	SET SCREW	1
20	RADIUS LINK	1	+53	ROLL PIN	2
21	TREADLE	1	54	RETAINING RING	2
22	SPRING CLAMP	1	55	RETAINING RING	2
23	SPR. PACK (117906)	1	56	SPRING	2
* 24	BUSHING	1	* 57	BUSHING (110370)	4
* 25	TREADLE PIN	1	+ 60	DISPLACER (119100)	1
26	BRACKET	1			
* 27	BEARING (101995)	2	63	NUT	1

Service this unit with major repair kit number R305 or minor repair kit number R305D. To service only a WM352F valve, order part number R352-400. To replace each valve, order part number WM352F. To replace only the cartridge assembly (Items 5–16) in each WM352F valve, order part number 101979. Other replaceable items are followed by part numbers.
*Asterisk designates items included in repair kit R305 and R305D.
+Plus sign designates additional items included in repair kit R305.

SPECIFICATIONS

PORT SIZE . . . . . 1/2-14 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 (per valve) . . 90 SCFM @ 100 PSI (2,6 m^3/min @ 690 kPa)
ADJUSTMENT RANGE . . . . . From 2:1 to 1:1 to 1:2
MOUNTING . . Through 5.00 in. (127 mm) Diameter Hole in Floorboards
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Treadle & Bracket . . . . . Cast Aluminum Alloy
Valve Castings . . . . Die Cast Aluminum & Zinc Alloys
Radius Link . . . . . Ductile Iron (Hardened)
Walking Beam . . . . . Investment Cast Steel Alloy
Diaphragm . . . . . Fabric-Reinforced Buna N
Dust Seals . . . . . Chloroprene Rubber
Debris Displacer . . . . . Polynorbornene Rubber
O-Ring & U-Cup Seals . . . . . Buna N
NET WEIGHT . . . . . 6.50 lb. (3,0 kg)
*For continuous operation beyond this range, contact factory.



TO ORDER, SPECIFY
WM305D1
Model Number
PART NUMBER 118266

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
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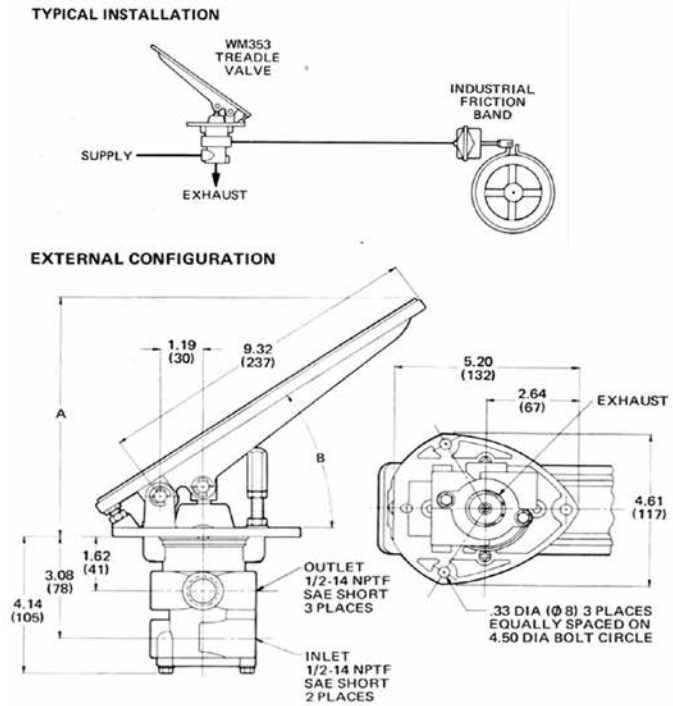
WM353 SERIES

PRODUCT DESCRIPTION

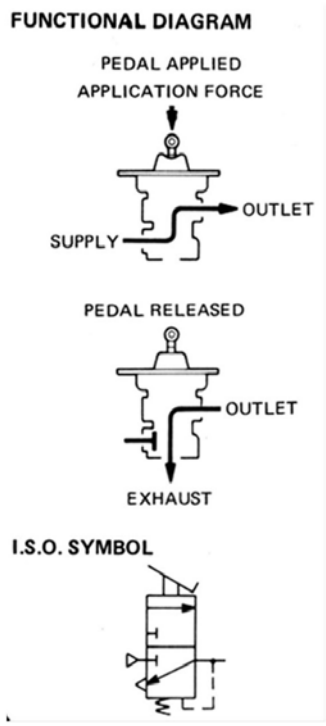
DESCRIPTION the WM353 series consists of several treadle valves engineered for industrial applications. Each unit incorporates a three-way, compensating WM352A pressure regulator that features diaphragm construction and precise response to pedal movement. The WM353 treadle valves are available with various compensating output ranges and treadle angles. Certain models are equipped with an adjustable treadle stop which lets the customer limit the valve's output pressure.

OPERATION When the pedal is applied, the balance piston closes the exhaust port and opens the supply port. In relation to the amount that the pedal is depressed, the regulator valve modulates the air pressure to the outlet port. If the WM353 treadle valve is equipped with an adjustable treadle stop, the valve will achieve its preset maximum output maximum output pressure when the pedal contacts the stop. As the pedal returns to the rest position, the valve exhausts the outlet pressure to the atmosphere.

APPLICATION The WM353 three-way, compensating treadle valves are commonly installed in industrial applications. Typical uses include the operation of drum friction bands, industrial clutches, and other sensitive machinery.



INDUSTRIAL APPLICATION VALVE



Manufactured in the USA by Brake Systems Inc.

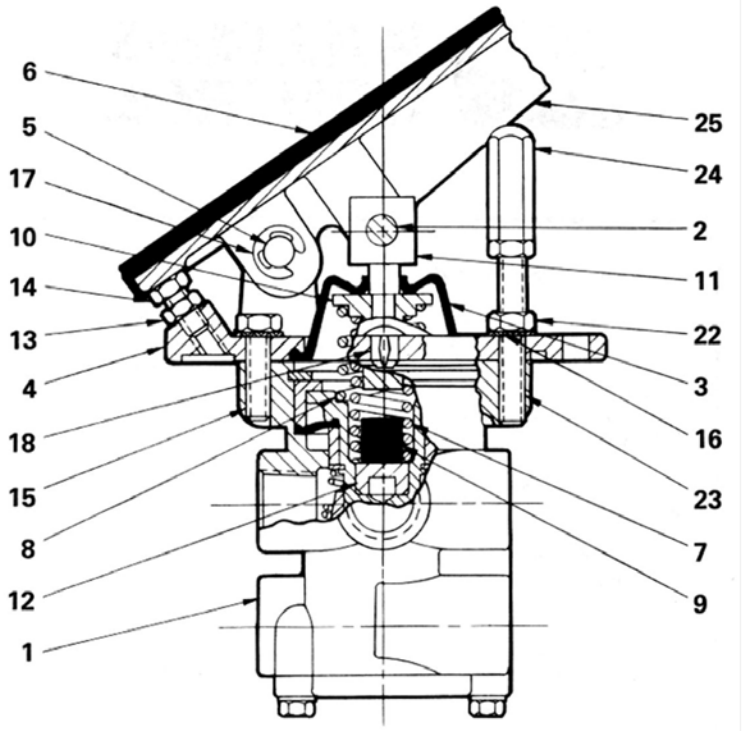
REV. DATE: 2011.01.19

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY. A	C	D	E
1	VALVE (WM352A)	1	1	1	1
2	PIN	1	1	1	1
* 3	DUST BOOT	1	1	1	1
4	MOUNTING PLATE	1	1	1	1
5	TREADLE PIN	1	1	1	1
6	TREADLE COVER	1	1	1	1
7	SPRING	1	1	1	1
8	SPRING		1	1	1
* 9	RUBBER SPRING	1		1	1
10	SPRING CUP	1	1	1	1
11	PUSH ROD	1	1	1	1
12	SPACER	1	1	1	1
13	NUT	1		1	
14	SCREW	1	1	1	1
15	SCREW	1	1	1	1
16	LOCKWASHER	2	2	2	2
17	RETAINING RING	4	4	4	4
18	HOLE PLUG	2	2	2	2
22	NUT		2		2
23	TIE ROD		1		1
24	ADJUSTING NUT		1		1
25	TREADLE	1	1	1	1

Service these units with repair kit number R353AF. Repair kit includes parts to service the WM352A valve and cartridge assemblies. To replace only the WM352A valve, order part number WM352A. To replace only the cartridge in the WM352A, order part number 101979. To replace only the treadle cover, order part number 103670.
*Asterisk designates parts included in repair kit 114306.



SPECIFICATIONS

PORT SIZE . . . . . 1/2-14 NPTF
MAXIMUM OPERATING PRESSURE . . . . . 200 PSI (1379,0 kPa)
OPERATING TEMPERATURE* . . -20°F to 200°F (-28,9°C to 93,3°C)
FLOW RATING. . . . . 160 SCFM @ 100 PSI (4,5 m^3/min @ 690 kPa)
VALVE POSITION IN BRACKET . . . Rotatability on 90° Increments
MOUNTING. . . . . Integral Bracket Secured to Floor
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Aluminum Alloy
Treadle . . . . . Die Cast Aluminum Alloy
Treadle Cover . . . . . Fiber-Reinforced Rubber
Dust Boot & Rubber Spring . . . . Chloroprene Rubber
Diaphragm . . . . . Fabric-Reinforced Buna N
O-Ring & U-Cup Seals . . . . . Buna N
NET WEIGHT. . . . . 3 lbs. 8 oz. (1,6 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM353___

Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	HEIGHT A	ANGLE B	COMPENSATING RANGE	MAXIMUM OUTPUT	TREADLE STOP
WM353 A	112475	6.5 in. (165 mm)	30°	0-110/130 PSI (0-758/896 kPa)	Equal to Supply	NO
WM353 C	112477	8.5 in. (216 mm)	45°	0-55/65 PSI (0-379/448 kPa)	65 PSI (448 kPa)	YES
WM353 D	112478	6.5 in. (165 mm)	30°	0-110/130 PSI (0-758/896 kPa)	Equal to Supply	NO
WM353 E	112479	8.5 in. (216 mm)	45°	0-110/130 PSI (0-758/896 kPa)	Equal to Supply	YES

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WM386, WM392

WM-392 Twin Treadle features a new concept in air application control. The operator may select either or both pedals with his foot and in so doing control, in a modulated fashion, two functions either singly or together. Low pedal effort has been engineered into the valving and therefore combined pedal pressure of both left and right pedals together is approximately the same as one standard truck-type treadle application valve. Typical uses of the twin treadle are:

A. Industrial trucks (left brake—right brake).
B. Yarders (main clutch—haul back clutch).
C. Hiway trucks (truck brake—trailer brake).

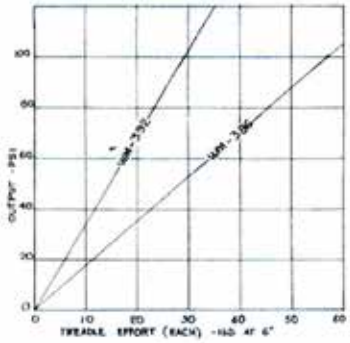
Other features are:

1. **Low Pedal Effort** (30 lbs. per treadle for 100 psi output).
2. **Generous Pedal Travel** (25° application travel) affords easily controlled pressure selection.
3. **High Air Flow Valving** with ½" N.P.T. outlet ports (3 ports per side).
4. **Cartridge Servicing** of all wearing parts. Less than one minute required to change the cartridge and no lines must be disconnected.
5. **Compensation Range** is 0 to 120 psi. Full tank pressure is transmitted at end of compensation range.
6. **Compact Mounting** to ease installation problems.
7. **Light Weight** is obtained through extensive use of high strength aluminum alloys. WM-392 weight is 9 ½ lbs. including rubber treadle covers.
8. **Relative Insensitivity** to dust is a feature of valving design which includes exhaust port check.

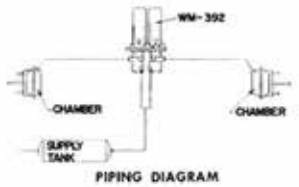
WM-386 Twin Treadle has two different features as compared to the WM-392 valve. The differences are:

1. **Standard Pedal Effort** (60 pounds per treadle for 100 psi output).
2. **Very High Air Flow** valving (over 320 c.f.m measured at standard conditions and 100 psi inlet pressure).

TWIN TREADLE VALVES



APPLICATION CHART



PIPING DIAGRAM

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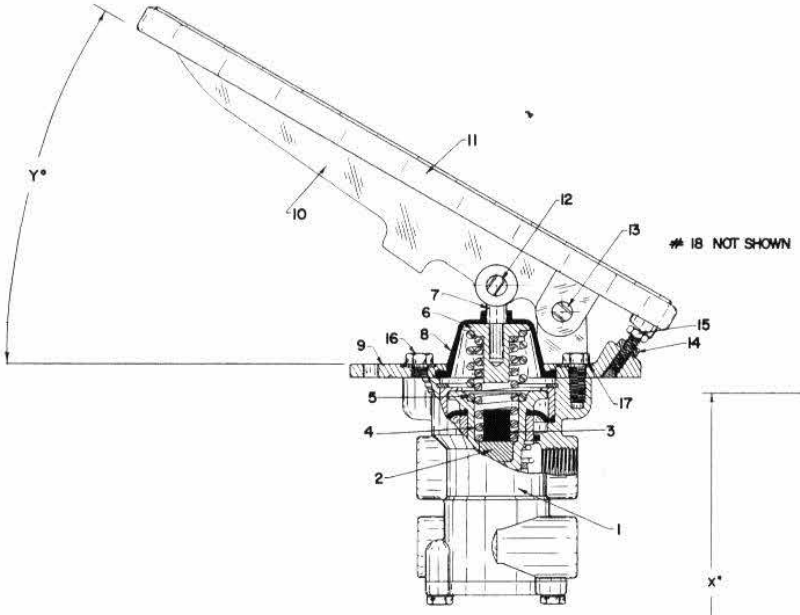

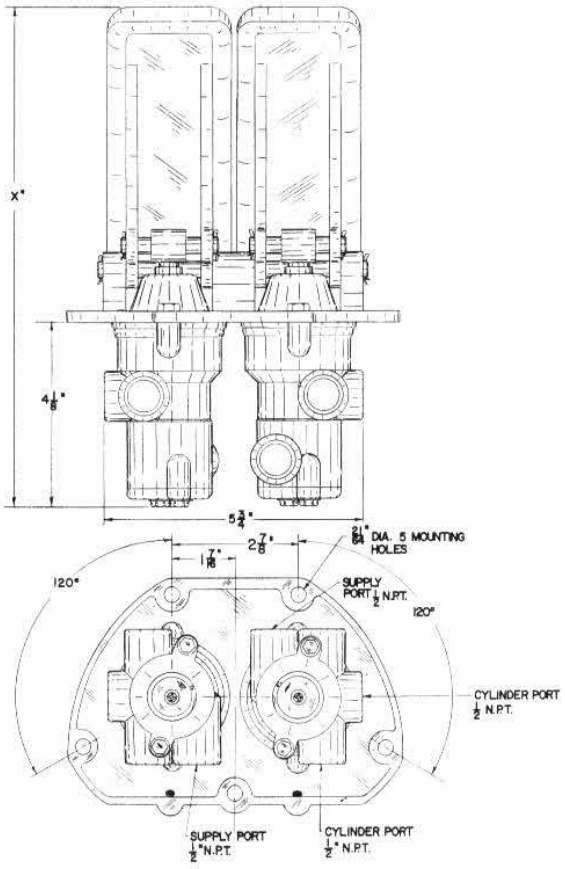

PARTS LIST					
DWG. NO.	DESCRIPTION	WM-392	QTY.	WM-386	QTY.
1	VALVE BODY ASSY.	WM-352-A	2	WM-396	2
2	SPACER	2478	2	—	—
3	RUBBER SPRING	2783	2	2388	2
4	INNER SPRING	2784	2	2368	2
5	OUTER SPRING	2785	2	—	—
6	SPRING CUP	2786	2	2369	2
7	PUSH ROD	2787	2	2370	2
8	DUST BOOT	2372	2	2372	2
9	MOUNTING PLATE	2780	1	2780	1
10	TREADLE	2788	2	2375	2
11	TREADLE COVER	2376	2	2376	2
12	PUSH ROD PIN	2371	2	2371	2
13	TREADLE PIN	2779	1	2779	1
14	JAM NUT	2-W-11	2	2-W-11	2
15	CAP SCREW	3-W-30	2	3-W-30	2
16	CAP SCREW	3-W-54	4	3-W-54	4
17	LOCK WASHER	4-W-99	4	4-W-99	4
18	COTTER KEY	6-W-1	6	6-W-1	6
X" (OVER-ALL HEIGHT)		11"		11½"	
Y° (TREADLE TRAVEL)		30°		35°	
CARTRIDGE REPAIR KIT		1779		2389	
COMPLETE REPAIR KIT		R-392		R-386	

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WM399 SERIES

MULTIPLE CONTROL PEDALS are set up to handle two functions with one compact part. Standard parts are grafted together with a common mounting plate.

Typical functions are possible such as:

1. BRAKE-THROTTLE
2. BRAKE-RETARDER
3. RETARDER-BRAKE
4. CUSTOM MOUNTING

Features of individual valves include:
1. Cartridge servicing
2. Precision pressure control
3. Various pressure ranges available
4. Low pedal effort
5. Lightweight aluminum components
6. Pedal travel-generous 25 degrees
7. High air flow valving:

	*CFM	HOSE SIZE
Brake Pedal	160	1/2
Air Throttle	35	1/4
Retarder	35	1/4

8. Compact mounting
9. Rubber treadle cover

Custom design is available for OEM installations.
Several standard models are listed on the next page for aftermarket use.

*Standard test conditions @ 100 PSI head pressure

DUAL BRAKE TREADLES

Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2011.02.03

BRAKE SYSTEMS, INC.
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WM399E, WM399M

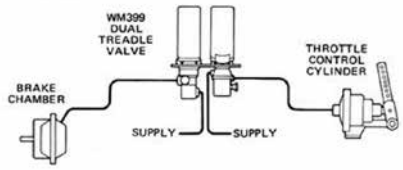
PRODUCT DESCRIPTION

DESCRIPTION The WM399 series valves are dual function pneumatic treadle valves. Each model combines a throttle control valve and a brake control valve in one compact unit. Both of the throttle and brake valves are three-way, compensating, pedal actuated pressure regulators. Several models are available in the WM399 series with various output pressure ranges. Designed for convenient installation, theWM399readle valve is mounted through a single hole in the floor of the driver's compartment.

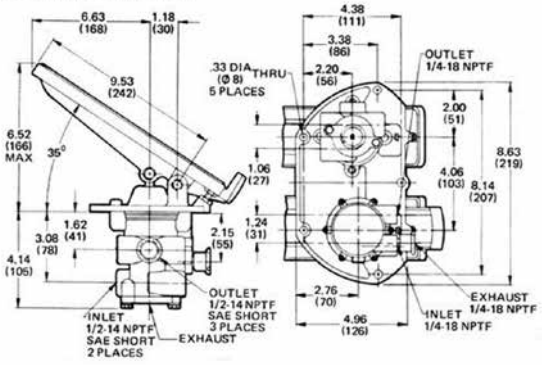
OPERATION although the throttle and brake valves are mounted to a single plate, these valves operate independently. When the accelerator pedal is depressed, the throttle regulator delivers pressure to the throttle control cylinder. When released, the throttle pedal returns to the rest position, and the valve exhausts any outlet pressure through the WM111A exhaust breather. The brake control valve function in a similar fashion: the brake pedal is applied to deliver pressure to the brake cylinders. When the brake pedal is released, outlet pressure escapes to the atmosphere through the valve's exhaust vent.

APPLICATION The WM399 series dual treadle valves are used in industrial and vehicular applications where dual function, pedal-actuated valves are required. Since they mount conveniently in a single hole in the floor, these valves are frequently used when space and ease of installation are important considerations. The WM399 series treadle valves do not conform to FMVSS-124.

TYPICAL INSTALLATION

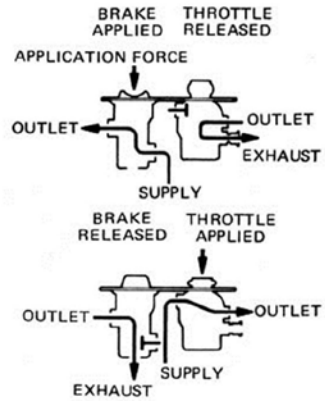


EXTERNAL CONFIGURATION

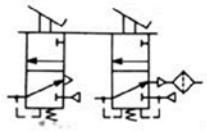


DUAL TREADLE BRAKE/ THROTTLE VALVE

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



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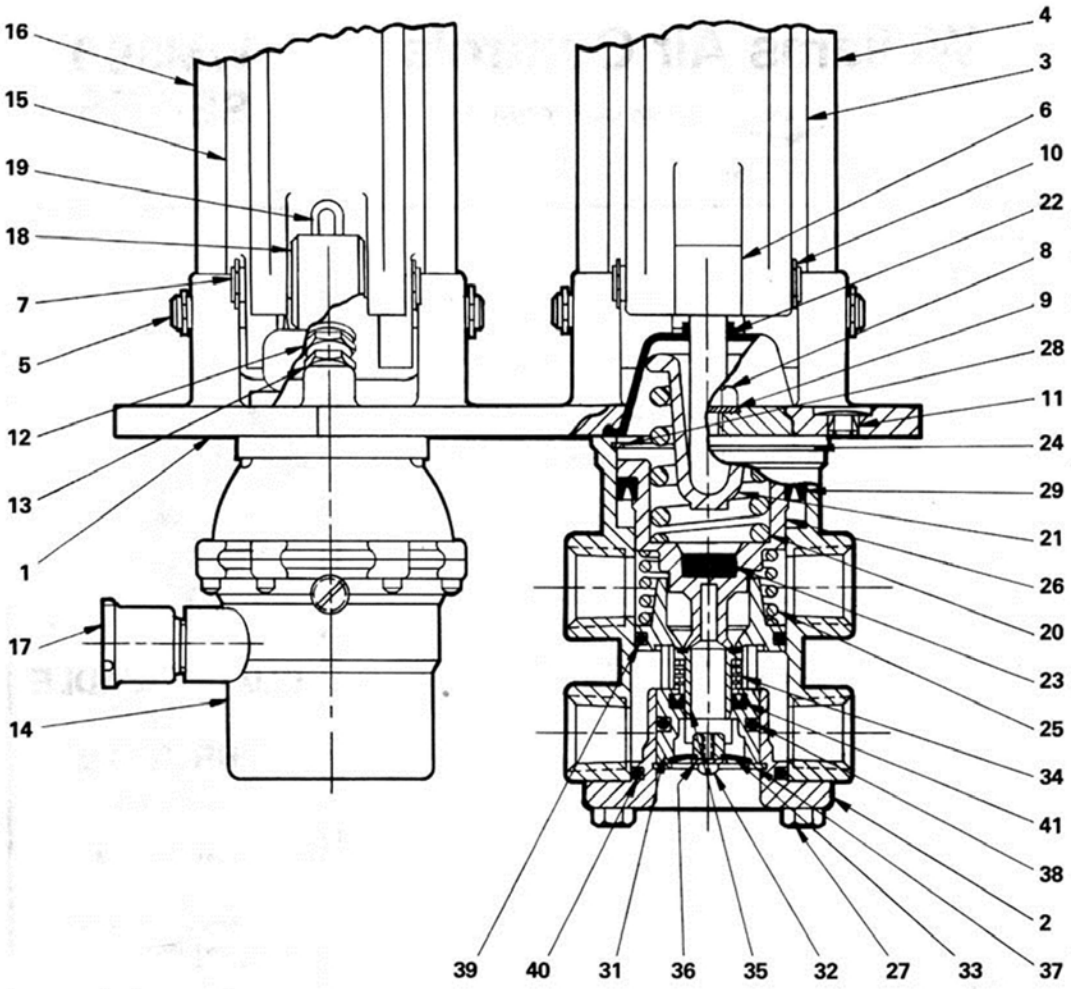


PARTS IDENTIFICATION

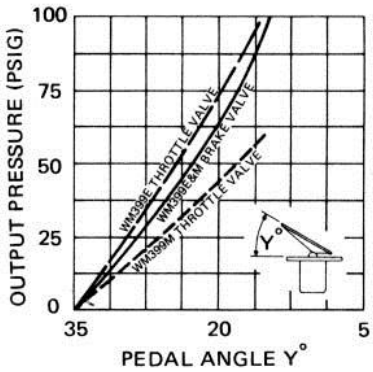
ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	MOUNTING PLATE	1	11	HOLE PLUG	2	21	SPRING CUP	1	32	SCREW	1
2	CART. BODY	1	12	SCREW	2	* 22	DUST BOOT	1	* 33	CHECK DISC	1
3	TREADLE	1	13	NUT	2	* 23	SPRING CUP STOP	1	34	SPRING	1
4	TREADLE COVER	1	14	WM 90 REGULATOR	1	24	VALVE BODY	1	35	SEAT TUBE	1
5	TREADLE PIN	2	15	TREADLE (w/ HEEL)	1	25	SPRING	1	36	WASHER	1
6	PUSH ROD	1	16	TREADLE COVER	1	26	PISTON	1	* 37	RETAINING RING	1
7	PIN	2	17	EXH. BREATHER	1	27	SCREW	2	* 38	O-RING	1
8	SCREW	2	18	ROLLER	1	28	RETAINING RING	1	* 39	O-RING	1
9	LOCKWASHER	2	19	SPRING	1	* 29	U-CUP	1	* 40	O-RING	1
10	RETAINING RING	8	20	BALANCE SPRING	1	31	GUIDE TUBE	1	* 41	U-CUP	1

Service these units with repair kit R399. Repair kit includes parts to service the WM 90 series regulator (Item 14) and the brake valve subassembly. To replace the WM 90 series regulator, order the appropriate replacement unit as listed in the ordering information block. To repair only the WM 90 series regulator, order repair kit R90. To replace the cartridge in the WM 90 series regulator, order part number 132846. To replace the brake valve subassembly, order part number 103541. To replace only the cartridge in the brake valve subassembly, order part number 101979. To replace the treadle cover (Item 4), order part number 102376. To replace the other treadle cover (Item 16), order part number 103670. To replace the WM111A exhaust breather (Item 17), order part number WM111A.
*Asterisk designates parts included in repair kit R399.

Manufactured in the USA by Brake Systems Inc.

SPECIFICATIONS

PORT SIZE: Throttle Regulator (WM 90 Series) . . . . . 1/4-18 NPTF
Brake Valve . . . . . 1/2-14 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:
Throttle Regulator. . . 35 SCFM @ 100 PSI (1,0 m^3/min @ 690 kPa)
Brake Valve . . . . 160 SCFM @ 100 PSI (4,5 m^3/min @ 690 kPa)
TREADLE ANGLE . . . . . 35° to Mounting Surface
TREADLE TRAVEL: Throttle Treadle . . . . . 18° Maximum
Brake Treadle . . . . . 22° Maximum
MOUNTING. . . . . Bracket Secured to Floor
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . Die Cast Aluminum and Zinc Alloys
Treadles . . . . . Die Cast Aluminum Alloy
Treadle Covers. . . . . Fiber-Reinforced Rubber
Spring Stop Cup & Dust Boots . . . Chloroprene Rubber
O-Ring & U-Cup Seals . . . . . Buna N
NET WEIGHT. . . . . 7 lbs. 14 oz. (3,6 kg)
*For continuous operation beyond this range, contact factory.



TO ORDER, SPECIFY

WM399____
Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	WM 90 SERIES THROTTLE REGULATOR			BRAKE VALVE MAX. OUTPUT
		REPLACEMENT	COMP. RANGE	MAX. OUTPUT	
WM399 E	112794	WM 90 D (P/N 111300)	0-55/65 PSI (0-379/448 kPa)	65 PSI (448 kPa)	92/102 PSI (634/703 kPa)
WM399 M	112800	WM 90 DT (P/N 111304)	0-85/95 PSI (0-586/655 kPa)	95 PSI (655 kPa)	92/102 PSI (634/703 kPa)

Manufactured in the USA by Brake Systems Inc.

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WM399L

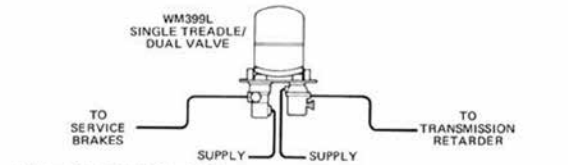
PRODUCT DESCRIPTION

DESCRIPTION The WM399L is a single treadle/dual valve designed for dual system applications. The unit consists of two compensating three-way pressure regulators mounted to a common plate. Each regulator valve has independent supply and delivery ports to insure dual function protection. Engineered for easy installation, the WM399L can be mounted through a single hole in the floor of the operator's compartment.

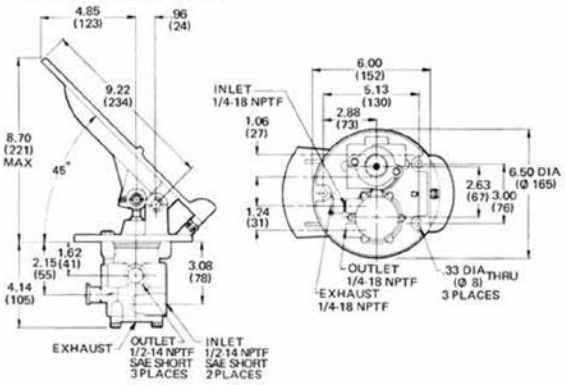
OPERATION Each regulator valve functions independently but both valves are actuated by the same pedal. When the pedal is depressed, the WM90DB retarder valve modulates the delivery of air pressure. As illustrated in the performance curve, the WM90DM retarder valve achieves its maximum rated output at approximately the same time that the WM352D brake valve begins to open. The operator must continue to exert force on the WM352D brake valve to obtain maximum output from this regulator. When the treadle is released, both valves will exhaust outlet pressure to the atmosphere.

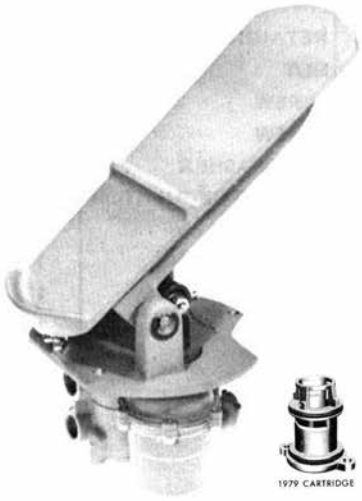
APPLICATION The WM399L single treadle/dual valve is designed for special industrial and vehicular dual system applications. The valve is commonly used to provide a pneumatic control signal to the transmission retarder and the braking system. In this type of application, the WM399L delivers maximum output to the retarder before supplying a pressure signal to the brakes. The WM399L can also be used as a clutch and drum brake control for crane/hoist applications.

TYPICAL INSTALLATION

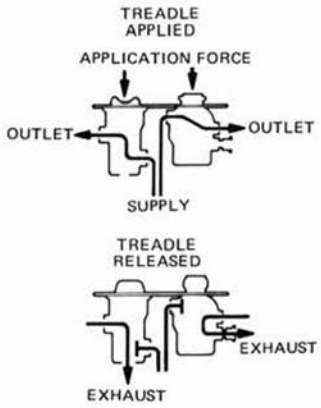


EXTERNAL CONFIGURATION

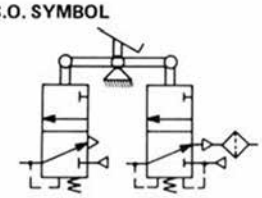




SINGLE TREADLE/ DUAL VALVE



I.S.O. SYMBOL



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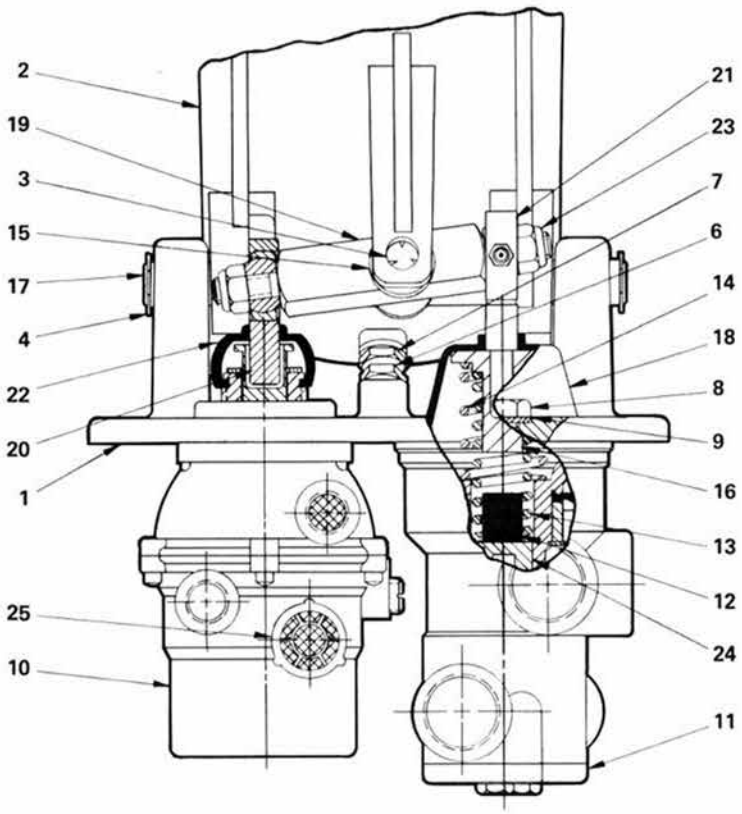
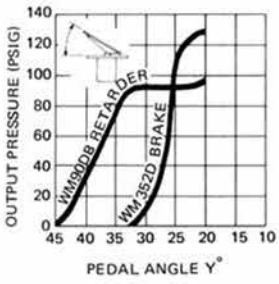
PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	MOUNTING BRACKET	1
2	TREADLE	1
3	PIN	1
4	RETAINING RING	1
6	NUT	1
7	SCREW	1
8	SCREW	2
9	LOCKWASHER	2
10	WM 90DB REGULATOR	1
11	WM352D VALVE	1
12	RUBBER SPRING	1
13	SPRING	1
14	SPRING	1
15	WASHER	1
16	SPRING CUP	1
17	TREADLE PIN	1
* 18	DUST BOOT	1
19	PIVOT ARM	1
20	BEARING & ROD ASSY.	1
21	BEARING & ROD ASSY.	1
* 22	DUST BOOT	1
23	LOCKNUT	2
24	SPACER	1
25	WM111A EXH. BREATHER	1

Service this unit with repair kit **R399**. Repair kit includes parts to service the WM 90DB regulator and WM352D control valve assemblies. To replace only the WM 90DB regulator, order part number **WM90DB**.To replace only the cartridge in the WM 90DB, order part number **132846**. To replace only the WM352D control valve, order part number **WM352D**.To replace only the cartridge in the WM352D, order part number **101979**. To replace WM111A exhaust breather (Item 25), order part number **WM111A**.
*Asterisk designates parts included in repair kit **R399**.





TO ORDER, SPECIFY
WM399L
Model Number
PART NUMBER 112799

SPECIFICATIONS

PORT SIZES: Retarder Valve (WM 90DB) . . . . . 1/4-18 NPTF
Brake Valve (WM352D) . . . . . 1/2-14 NPTF
MAXIMUM OPERATING PRESSURE . . . . . 200 PSI (1379,0 kPa)
OPERATING TEMPERATURE* . . -20°F to 200°F (-28,9°C to 93,3°C)
FLOW RATING:
Retarder Valve . . . 35 SCFM @ 100 PSI (1,0 m^3/min @ 690 kPa)
Brake Valve . . . . . 160 SCFM @ 100 PSI (4,5 m^3/min @ 690 kPa)
COMPENSATING RANGE:
Retarder Valve . . . . . 0-75/85 PSI (0-517,1/586,1 kPa)
Brake Valve . . . . . 0-120/140 PSI (0-827,4/965,3 kPa)
TREADLE ANGLE . . . . . 45° to Mounting Surface
TREADLE TRAVEL:
To Achieve Maximum Output in Retarder Valve . . . Approx. 17°
To Achieve Maximum Output in Brake Valve . . . . . Approx. 30°
MOUNTING . . . . . Bracket Secured to Floor
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . Die Cast Zinc and Aluminum Alloys
Treadle . . . . . Die Cast Aluminum Alloy
Rubber Spring & Dust Boots . . . . Chloroprene Rubber
O-Ring & U-Cup Seals . . . . . Buna N
NET WEIGHT . . . . . 9 lbs. (4,1 kg)
*For continuous operation beyond this range, contact factory.

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WM453 SERIES

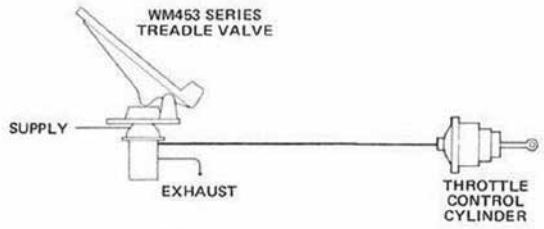
PRODUCT DESCRIPTION

DESCRIPTION The WM453A, B, C and D are compensating treadle valves designed for industrial and vehicular applications. Mounted through the floor of the operator's compartment, the WM453 treadle valves are used to control the air pressure supply to the throttle control cylinder.

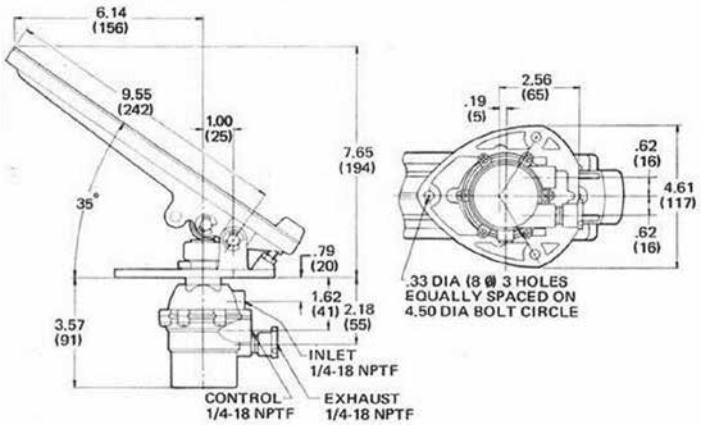
OPERATION The WM453A, B, C, and D treadle valves consist of a WM90 series control valve mounted to a single treadle. When the treadle is depressed, the control valve opens to regulate the delivery of air pressure to the throttle control cylinder. The control valve balances the output pressure against the force of an internal spring. When the treadle is released, pressure at the outlet port is discharged through the exhaust.

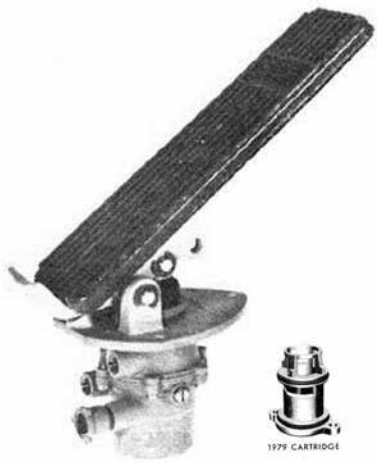
APPLICATIONS Designed for industrial and vehicle applications, these valves are commonly used as pressure regulators in air throttle systems. The WM453A, B, C, and D treadle valves are not approved for FMVSS-124 applications.

TYPICAL INSTALLATION



EXTERNAL CONFIGURATION

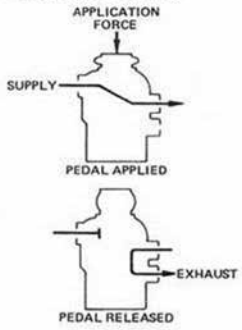




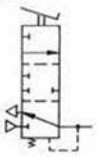
PNEUMATIC THROTTLE PEDAL

THROUGH-THE-FLOOR MOUNT FOR NON-FMVSS-124 APPLICATIONS

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.06.16

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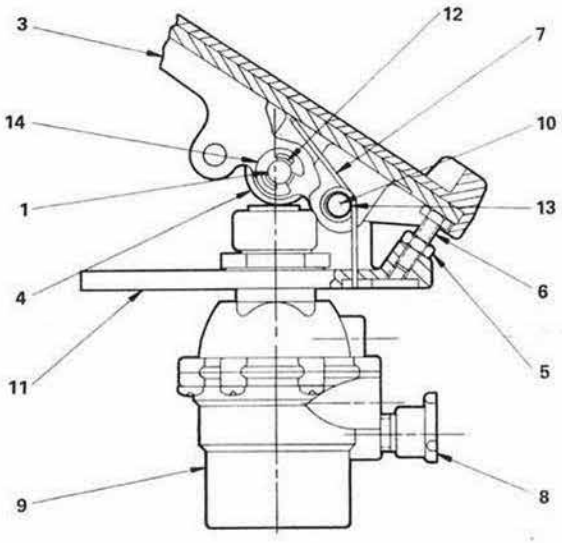

PARTS IDENTIFICATION

ITEM	DESCRIPTION	SINGLE UNIT P/N	SINGLE UNIT QTY.	DUAL UNIT P/N	DUAL UNIT QTY.
1	PIN	102371	1		
3	TREADLE ASSY.	118775	1	118775	2
4	ROLLER	103113	1	103113	2
5	JAM NUT	114607	1	114607	2
6	SCREW	117796	1	117796	2
*7	SPRING	103704	1	103704	2
8	BREATHER	111411	1	111411	2
9	CONTROL VALVE		1		2
10	PIN	102371	1	102779	1
11	MOUNTING PLATE	116721	1	10334	1
12	RETAINER	106857	4	106857	8
13	BUSHING	110370	2	110370	4
14	RETAINER	118388	2	118388	4

Service this unit with repair kit number 114378. *Indicates items included in repair kit. Kit also contains parts to service control valve sub-assy. To service control valve sub-assy. only, use repair kit 114100. To replace cartridge in control valve sub-assy., order order part number 101355. If treadle assy. (item 3) is used as a replacement part, new bushings (item 13) must be installed.

SPECIFICATIONS

PORT SIZE . . . . . 1/4-18 NPTF
MAXIMUM OPERATING PRESSURE. . . . . 200 PSI (1379,0 kPa)
OPERATING TEMPERATURE* . . -20°F to 200°F (-17,8°C to 93,3°C)
TREADLE ANGLE. . . . . 35° to Mounting Surface
TREADLE TRAVEL . . . . . 20° Maximum
VALVE POSITION IN MOUNTING BRACKET . . . 360° Rotatability
MOUNTING. . . . . .Secured to Floor
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Valve Body . . . . . Die Cast Zinc Alloy
Treadle Assy. . . . . Die Cast Aluminum Alloy w/ Fiber-Reinforced Rubber Cover
Mounting Plate . . . . . Die Cast Aluminum Alloy
NET WEIGHT. . . . . 4 lbs. 5 oz. (2,0 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM453 ____
Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	CONTROL VALVE	COMPENSATING RANGE	MAXIMUM OUTPUT
WM453 A	113072	WM90D	0-55/65 PSI	65 PSI
WM453 B	113073	WM90DT	0-85/95 PSI	95 PSI
WM453 C *	113074	WM90DM	0-120/140 PSI	140 PSI
WM453 D	113075	WM90DW	0-170/190 PSI	EQUAL TO SUPPLY

*MANUFACTURED BY WILLIAMS CONTROLS

SPECIAL ORDER ASSEMBLIES

WM453E	DUAL ASSEMBLIES
WM453F	DUAL ASSEMBLIES
WM453G	DUAL ASSEMBLIES
WM453H	DUAL ASSEMBLIES
WM453-100	SPECIAL ORDER
WM453-M2	SPECIAL ORDER
WM453-M100	SPECIAL ORDER
WM453-M101	SPECIAL ORDER
WM453-M102	SPECIAL ORDER
WM453-M110	SPECIAL ORDER

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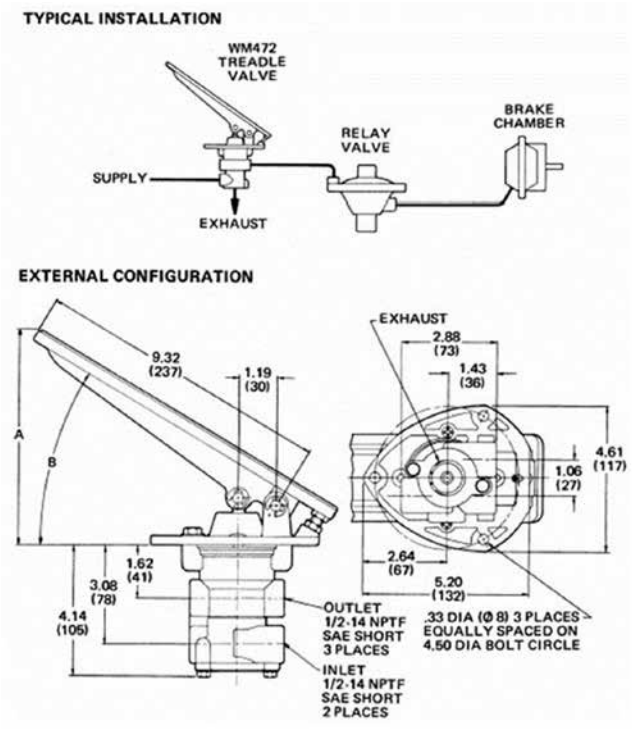
WM472 SERIES

PRODUCT DESCRIPTION

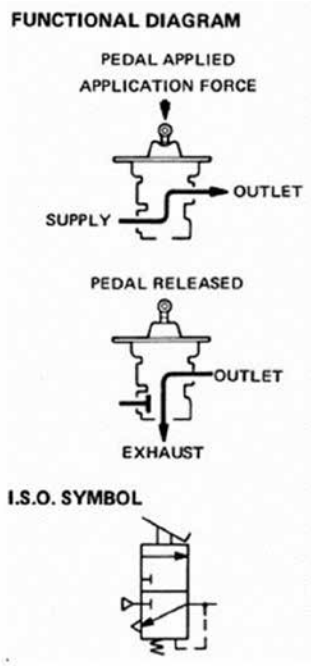
DESCRIPTION Commonly used in pneumatic braking systems, the WM472 series treadle valves are three-way, compensating pressure regulators. Each unit consists of a valve subassembly that responds to movement of the pedal. The WM472 models are designed with various treadle-to-mounting surface angles. The WM472E model is a valve subassembly without the mounting bracket or pedal.

OPERATION As the operator depresses the pedal, the exhaust port closes and the supply port opens to allow delivery. The valve subassembly modulates the output in relation to the position of the pedal. When the pedal is released, the outlet pressure is discharged through an exhaust port located in the valve bottom.

APPLICATION The WM472 series valves are used in industrial and vehicular applications where a three-way, compensating treadle valve is required. These treadle valves are primarily installed in relay-type brake systems. Mounted through the floor of the operator's compartment, the valve subassembly can be rotated on 90 degrees increments for plumbing convenience.



TREADLE VALVE



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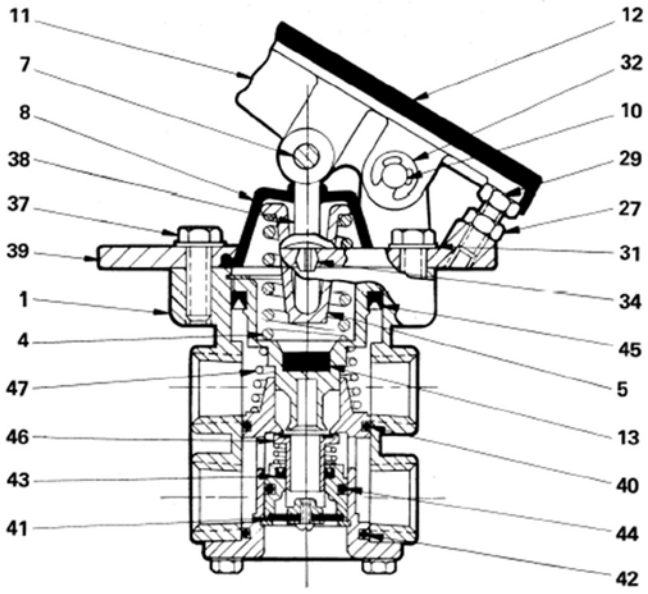
PARTS IDENTIFICATION				
ITEM	DESCRIPTION	QTY. A&C	QTY. D	QTY. E
1	VALVE SUBASSY.	1	1	1
4	BALANCE SPRING	1	1	1
5	SPRING CUP	1	1	1
7	PIN	1	1	
* 8	DUST BOOT	1	1	1
10	TREADLE PIN	1	1	
11	TREADLE	1	1	
12	TREADLE COVER	1	1	
* 13	SPRING CUP STOP	1	1	1
27	NUT	1		
29	SCREW	1	1	
31	LOCKWASHER	2	2	
32	RETAINING RING	4	4	
34	HOLE PLUG	2	2	
37	SCREW	2	2	2
38	PUSH ROD	1	1	1
39	MOUNTING PLATE	1	1	
* 40	O-RING	1	1	1
* 41	CHECK DISC	1	1	1
* 42	O-RING	1	1	1
* 43	U-CUP	1	1	1
* 44	O-RING	1	1	1
* 45	U-CUP	1	1	1
* 46	SEAT TUBE	1	1	1
47	SPRING	1	1	1

Service this unit with repair kit number 114417. Repair kit includes parts to service the valve subassembly. To replace only the valve subassembly, order part number 103541. To replace only the cartridge in the valve subassembly, order number 101979. To replace the treadle cover (Item 12), order part number 102376.
*Asterisk designates parts included in repair kit 114417.

*WM472-101,102
**WM472A,C,D

SUFFIX	PART NUMBER	HEIGHT A	ANGLE B
WM472-101	130982	7.5 in. (191mm)	27 DEG.
WM472-102	131314	7.5 in. (191mm)	35 DEG.
WM472A *	113218	7.5 in. (191mm)	35 DEG.
WM472C	113220	6.0 in. (152mm)	22 DEG.
WM472D	113222	8.5 in. (216mm)	45 deg.
WM472E *	113224	NO TREADLE BASE VALVE ONLY	

*MANUFACTURED BY WILLIAMS CONTROLS

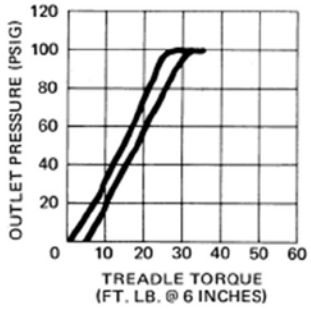


SPECIFICATIONS

PORT SIZE . . . . . 1/2-14 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 . . . . . 160 SCFM @ 100 PSI (4,5 m^3/min @ 690 kPa)
COMPENSATING RANGE† . . . . . 0-92/102 PSI (0-634,3/703,3 kPa)
VALVE POSITION IN BRACKET . . . Rotatability on 90° Increments
MOUNTING . . . . . Integral Bracket Secured to Floor
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Aluminum Alloy
Treadle . . . . . Die Cast Aluminum Alloy
Treadle Cover . . . . . Fiber-Reinforced Rubber
Dust Boot & Spring Stop Cup . . . . Chloroprene Rubber
O-Ring & U-Cup Seals . . . . . Buna N
NET WEIGHT: WM472A,C,D . . . . . 3 lbs. 11 oz. (1,7 kg)
WM472E . . . . . 1 lb. 13 oz. (0,8 kg)

*For continuous operation beyond this range, contact factory.

†If unit is to be frequently operated with output in excess of 60 PSI contact factory.



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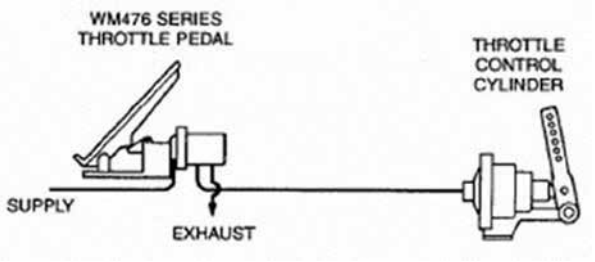
WM476 SERIES

PNEUMATIC THROTTLE PEDAL

SURFACE MOUNT FOR NON-FMVSS-124 APPLICATIONS

DESCRIPTION

WM476 series treadles are surface mounted, pedal actuated throttle controls. Each WM476 model incorporates a regulating valve assembly from the WM90 series. When the WM476's pedal is applied, the valve subassembly delivers an output proportional to the pedal position. The output controls a throttle cylinder which positions an engine's fuel pump lever.



Important: The WM476 series models do not comply with the FMVSS-124 specifications. See WM476F series for FMVSS-124 approved models.

SPECIFICATIONS

Port size	1/4-18 NPTF
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)
Treadle angle	45° to mounting surface
Treadle travel	16°
Mounting	Bracket to floor
Materials: Valve body	Die cast zinc alloy
Treadle assembly	Die cast aluminum alloy with rubber cover
Weight	4 lb, 13 oz (2,2 kg)

Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.06.16

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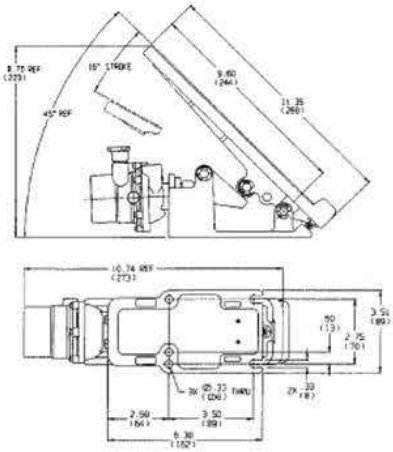
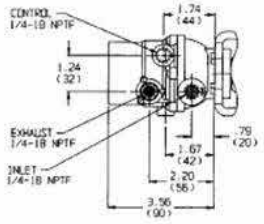
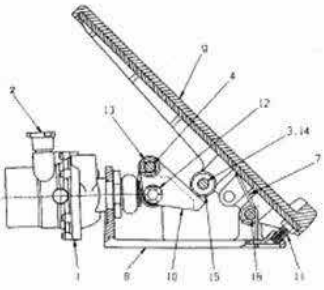
DIMENSIONAL DATA



VIEW OF VALVE PORTS



CROSS SECTION & PARTS INFORMATION



Item	Part No.	Description	WM476B	WM476C	
1	111304	Control Valve	1		
1	111301	Control Valve		1	
3	102371	Treadle Pin	2	2	
4	117216	Treadle Pin	1	1	
7	103704	Spring	1	1	*
8	119049	Treadle Base	1	1	
9	118775	Treadle Assembly	1	1	
10	117259	Transfer Lever	1	1	
12	106857	Retaining Ring	8	8	
13	110370	Bushing	4	4	
14	118388	Bushing	4	4	*
15	103113	Roller	2	2	
16	119162	Treadle Pin	1	1	

*Item is included in repair kit. Service these units with repair kit 114438. Kit also includes parts to service control valve subassembly. For additional service part information, see page 40. Highlighted items may be purchased separately.

ORDERING INFORMATION

To order, specify **WM476** _____(suffix) _____(part number). Select suffix and part number below.

Suffix	Part Number	Control Valve	Regulated Output Range	Maximum Output
WM476 A	113258	WM90D 111300	0-55/65 PSI (0-379/448 kPa)	65 PSI (448 kPa)
WM476 B	113259	WM90DT 111304	0-85/95 PSI (0-586/655 kPa)	95 PSI (655 kPa)
WM476 C	113260	WM90DA 111301	0-110/130 PSI (0-758/896 kPa)	Equal to supply

Model	Part Number	Regulated Output Range	Maximum Output
WM476B	113259	0-85/95 PSI (0-586/655 kPa)	95 PSI (655 kPa)
WM476C	113260	0-110/130 PSI (0-758/896 kPa)	Equal to supply

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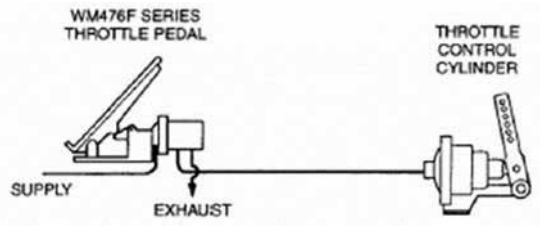
WM476F SERIES

PNEUMATIC THROTTLE PEDAL

SURFACE MOUNT
FOR
FMVSS-124 APPLICATIONS

WM476F series treadles are surface mounted, pedal actuated throttle controls for on-highway applications. Each WM476F model incorporates a regulating valve subassembly from the WM90DX series. When the WM476F's pedal is applied, the valve subassembly delivers an output proportional to the pedal position. The output controls a throttle cylinder which positions an engine's fuel pump lever.



When installed according to Williams Controls Industries' specifications, the WM476F series models comply with FMVSS-124.

SPECIFICATIONS

Port size	1/4-18 NPTF
Maximum supply pressure	150 PSI (1034 kPa)
Operating temperature	-40°F to 200°F (-40°C to 93°C)
Flow rating	35 SCFM @ 100 PSI (1,0 m^3/min @ 690 kPa)
Treadle angle	45° to mounting surface
Treadle travel	16°
Mounting	Bracket to floor
Materials: Valve body	Iridited die cast zinc alloy
Treadle assembly	Die cast aluminum alloy with rubber cover
Weight	4 lb, 13 oz (2,2 kg)

Manufactured in the USA by Brake Systems Inc.

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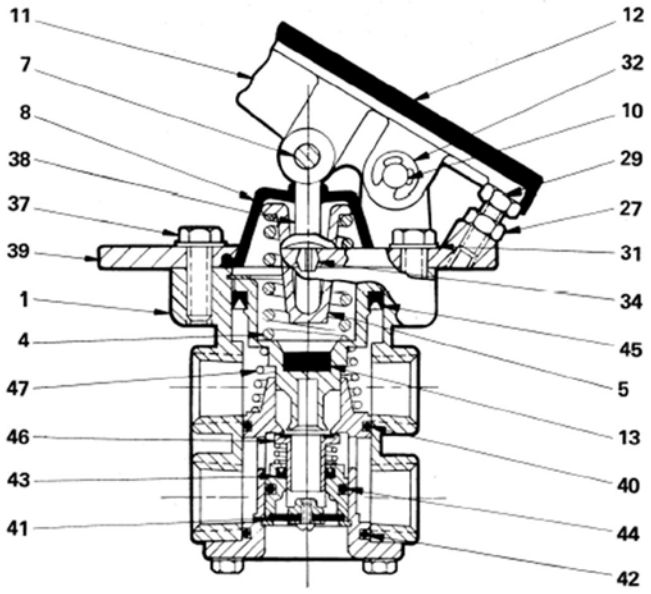
PARTS IDENTIFICATION				
ITEM	DESCRIPTION	QTY. A&C	QTY. D	QTY. E
1	VALVE SUBASSY.	1	1	1
4	BALANCE SPRING	1	1	1
5	SPRING CUP	1	1	1
7	PIN	1	1	
* 8	DUST BOOT	1	1	1
10	TREADLE PIN	1	1	
11	TREADLE	1	1	
12	TREADLE COVER	1	1	
* 13	SPRING CUP STOP	1	1	1
27	NUT	1		
29	SCREW	1	1	
31	LOCKWASHER	2	2	
32	RETAINING RING	4	4	
34	HOLE PLUG	2	2	
37	SCREW	2	2	2
38	PUSH ROD	1	1	1
39	MOUNTING PLATE	1	1	
* 40	O-RING	1	1	1
* 41	CHECK DISC	1	1	1
* 42	O-RING	1	1	1
* 43	U-CUP	1	1	1
* 44	O-RING	1	1	1
* 45	U-CUP	1	1	1
* 46	SEAT TUBE	1	1	1
47	SPRING	1	1	1

Service this unit with repair kit number 114417. Repair kit includes parts to service the valve subassembly. To replace only the valve subassembly, order part number 103541. To replace only the cartridge in the valve subassembly, order number 101979. To replace the treadle cover (Item 12), order part number 102376.
*Asterisk designates parts included in repair kit 114417.

*WM472-101,102
**WM472A,C,D

SUFFIX	PART NUMBER	HEIGHT A	ANGLE B
WM472-101	130982	7.5 in. (191mm)	27 DEG.
WM472-102	131314	7.5 in. (191mm)	35 DEG.
WM472A *	113218	7.5 in. (191mm)	35 DEG.
WM472C	113220	6.0 in. (152mm)	22 DEG.
WM472D	113222	8.5 in. (216mm)	45 deg.
WM472E *	113224	NO TREADLE BASE VALVE ONLY	

*MANUFACTURED BY WILLIAMS CONTROLS

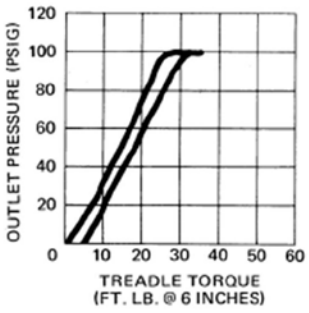


SPECIFICATIONS

PORT SIZE . . . . . 1/2-14 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 . . . . . 160 SCFM @ 100 PSI (4,5 m³/min @ 690 kPa)
COMPENSATING RANGE† . . . . . 0-92/102 PSI (0-634,3/703,3 kPa)
VALVE POSITION IN BRACKET . . . Rotatability on 90° Increments
MOUNTING . . . . . Integral Bracket Secured to Floor
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Aluminum Alloy
Treadle . . . . . Die Cast Aluminum Alloy
Treadle Cover . . . . . Fiber-Reinforced Rubber
Dust Boot & Spring Stop Cup . . . . Chloroprene Rubber
O-Ring & U-Cup Seals . . . . . Buna N
NET WEIGHT: WM472A,C,D . . . . . 3 lbs. 11 oz. (1,7 kg)
WM472E . . . . . 1 lb. 13 oz. (0,8 kg)

*For continuous operation beyond this range, contact factory.

†If unit is to be frequently operated with output in excess of 60 PSI contact factory.



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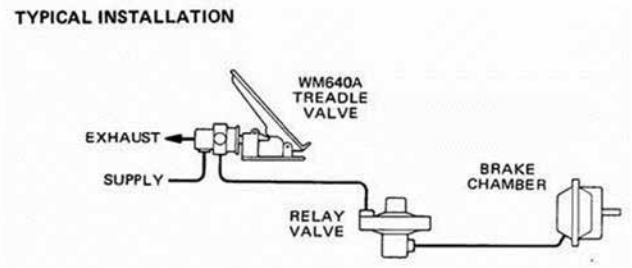
WM640 SERIES

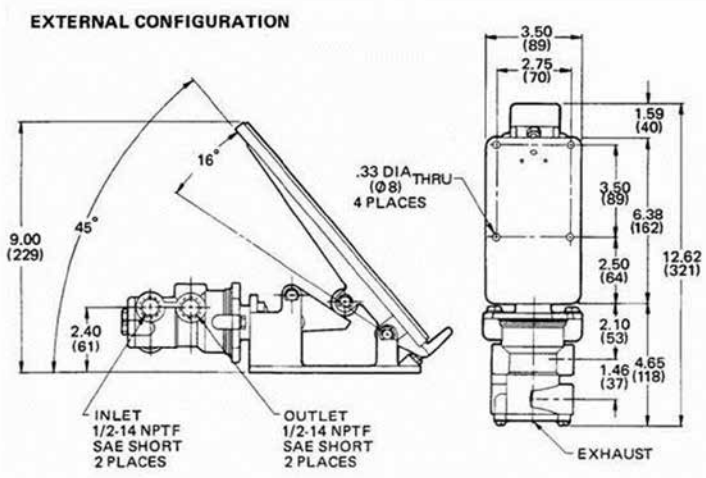
PRODUCT DESCRIPTION

DESCRIPTION Unlike other treadle valves which are mounted through the floor, the WM640A treadle valve is secured to the floor surface. This treadle valve incorporates a three-way, compensating valve subassembly that can be rotated 360 degrees for plumbing convenience. The valve subassembly regulates air pressure to the brake chambers in relation to the position of the pedal.

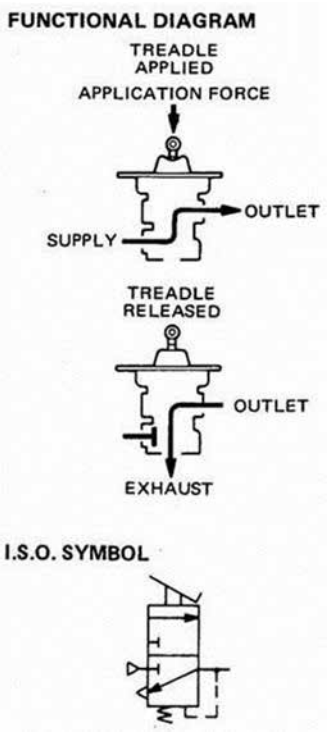
OPERATION As the pedal is depressed, the valve subassembly opens to permit air flow from the supply port to the outlet port. The valve balances the outlet pressure against the force of an internal spring. The pedal is released to exhaust the outlet pressure which escapes to the atmosphere through an exhaust check valve.

APPLICATION The WM640A treadle valve is commonly used in pneumatic, relay-type braking systems. This treadle valve is used in vehicular and industrial applications where surface mounting is preferred over other methods of installation.





SURFACE MOUNT TREADLE VALVE



Manufactured in the USA by Brake Systems Inc.

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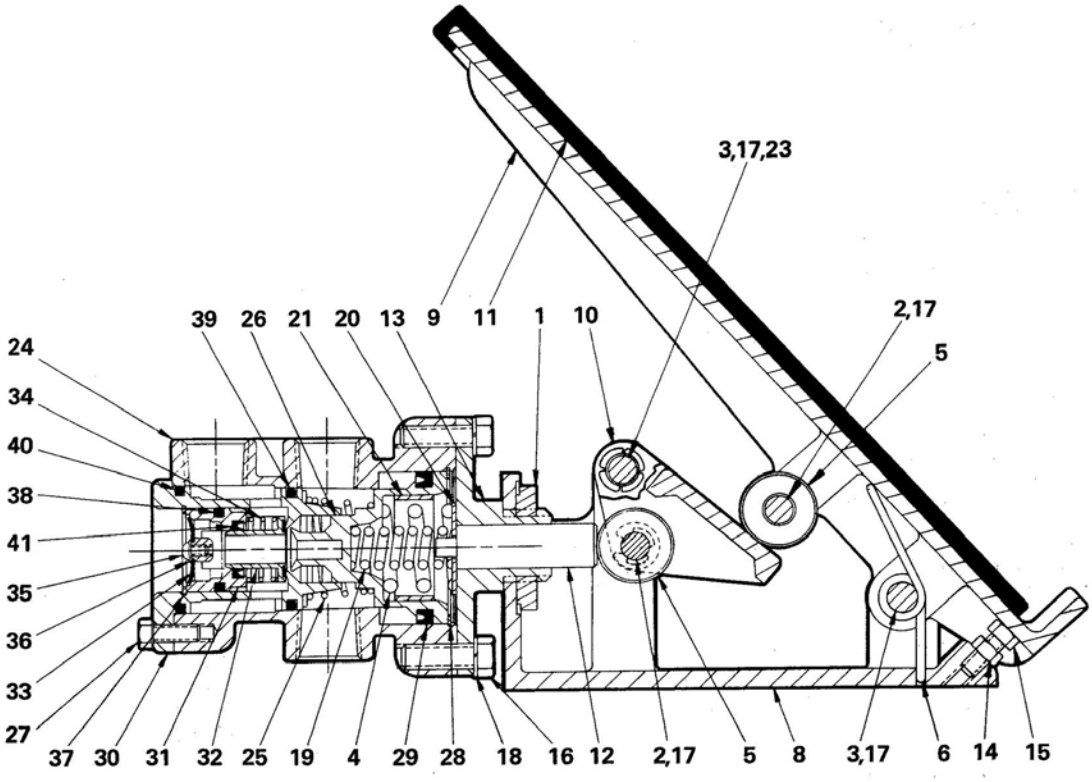

PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	MOUNTING NUT	1	23	BUSHING	2
2	PIN	2	24	VALVE BODY	1
3	TREADLE PIN	2	25	SPRING	1
4	SPRING	1	26	PISTON	1
5	ROLLER	2	27	SCREW	2
6	SPRING	1	28	RETAINING RING	1
8	TREADLE BASE	1	* 29	U-CUP	1
9	TREADLE (W/ HEEL)	1	30	CARTRIDGE BODY	1
10	TRANSFER LEVER	1	31	GUIDE TUBE	1
11	TREADLE COVER	1	* 32	SEAT TUBE	1
12	PUSH ROD	1	* 33	EXHAUST CHECK	1
13	MTG. FLANGE	1	34	SPRING	1
14	NUT	1	35	SCREW	1
15	SCREW	1	36	WASHER	1
16	SCREW	2	37	RETAINING RING	1
17	RETAINING RING	8	* 38	O-RING	1
18	LOCKWASHER	2	* 39	O-RING	1
19	SPRING	1	* 40	O-RING	1
20	WASHER	1	* 41	U-CUP	1
* 21	BUSHING	1			

Service this unit with repair kit number R640A. Repair kit includes parts to service the valve sub-assembly. To replace only the valve sub-assembly, order part number 103541. To replace only the cartridge assembly, order part number 101979. To replace only the treadle cover, order part number 103670.
*Asterisk designates parts included in repair kit R640A.

SPECIFICATIONS

PORT SIZE . . . . . 1/2-14 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 . . . . . 160 SCFM @ 100 PSI (4,5 m^3/min @ 690 kPa)
COMPENSATING RANGE . . . . . 0-125/135 PSI (0-861,8/930,8 kPa)
MAXIMUM OUTPUT . . . . . 135 PSI (930,8 kPa)
TREADLE ANGLE . . . . . 45° to Mounting Surface
TREADLE TRAVEL . . . . . 16° Maximum
VALVE POSITION IN MOUNTING BRACKET . . . 360° Rotatability
MOUNTING . . . . . Bracket Secured to Floor Surface
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Valve Body & Treadle . . . . . Die Cast Aluminum Alloy
Push Rod . . . . . Stainless Steel
Treadle Cover . . . . . Fiber-Reinforced Rubber
O-Ring & U-Cup Seals . . . . . Buna N
NET WEIGHT . . . . . 4 lbs. 4 oz. (1,9 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM640A
Model Number
PART NUMBER 113935

Manufactured in the USA by Brake Systems Inc.

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SECTION 11: UNIVERSAL VALVES

BRAKE SYSTEMS, INC.
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WILLIAMS/BSI UNIVERSAL CONTROL VALVES

Williams universal valves are multi-purpose control valves. The following catalog section includes only non-compensating models; see the modulating valve section of your catalog for compensating control valves.

An assortment of actuators are used in Williams universal valves. Models are available with a variety of lever, handle, push button, roller and toggle control devices. Individual catalog pages describe actuator operation in relation to valve function, as well as special features such as dead man control and lockout safety devices which are found in some models.

Williams manufactures universal valves with both three-way and four-way operation. Some models function simply as "on" or "off" while others have a number of distinct functional positions. A holding position in some Williams universal valves traps air pressure at the outlet port and makes these models ideal for controlling pressure levels in air bags, air seats and similar devices.

Williams universal valves are engineered for versatility and are available to conform to the requirements of a wide range of industrial and vehicular applications. If you require further assistance in selecting a universal valve contact your Williams distributor or Williams Air Controls.

In addition to the above reference for standard Williams Universal Controls WM 781, 782, 783, 784 and 786 please be advised that Brake Systems Inc. offers a variety of modifications to fit customers' requirements such as

1. Pull up positive detents
2. Spring loaded detents
3. Various handle lengths
4. Knob colors
5. Indicator light or lights (12V LED)

Contact BSI's sales/engineering department for quotations on specific details and quantity purchases.

BRAKE SYSTEMS, INC.
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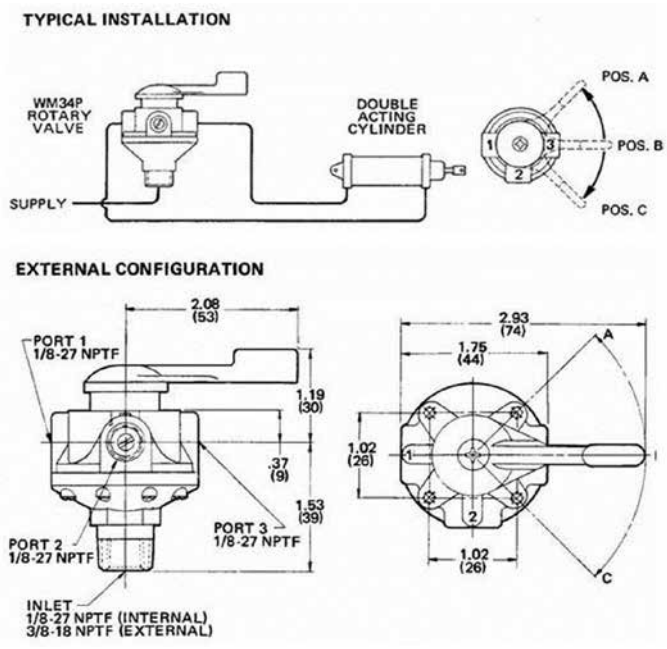
WM34

PRODUCT DESCRIPTION

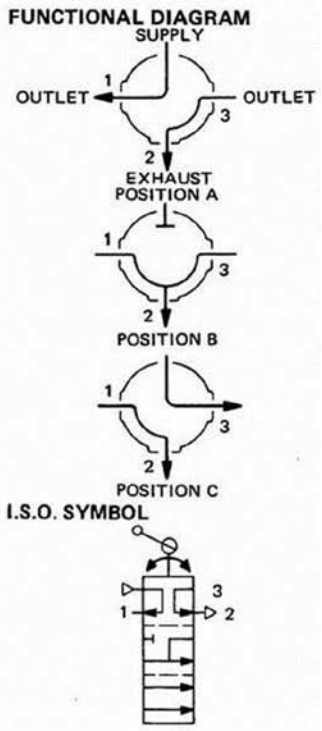
DESCRIPTION The WM34P is a multi-purpose, four-way rotary-action control valve. The handle rotates freely through a 90° arc and passes through three functional positions. The valve inlet port is threaded both internally (1/8-27 NPTF) and externally (3/8-18 NPTF). The valve can be panel-mounted using the four fasteners provided, or it can be mounted with a pipe fitting and the external threads of the supply port.

OPERATION As shown in the installation schematic below, the WM34P is normally installed so that Port 2 is used for exhaust and Ports 1 and 3 are used as outlets. With the handle in Position A (fully counter-clockwise), supply pressure is directed to Port 1 and Port 3 exhausts through Port 2. When the handle is rotated to Position B (45° clockwise from Position A) pressure at Ports 1 and 3 is exhausted through Port 2. With the handle in Position C (fully clockwise), supply pressure is directed to Port 3, and Port 1 exhausts through Port 2.

APPLICATION The WM34P is a universal application valve that is ideal for controlling a double-acting cylinder or a pair of single-acting cylinders. Designed for industrial and vehicular pneumatic control systems, this valve is used where cost is an important concern and minor leakage can be tolerated.



FOUR-WAY 3-POSITION ROTARY VALVE



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.06.16

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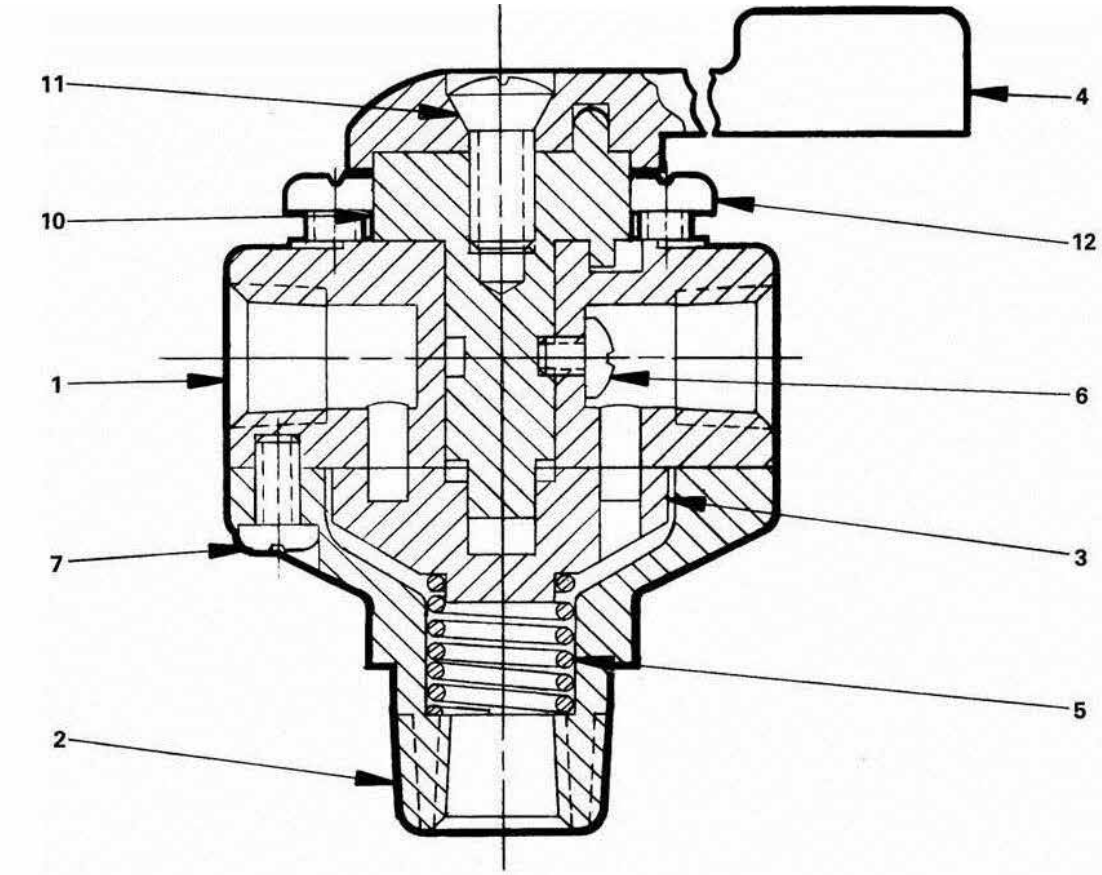

PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	MAIN BODY	1
2	INLET BODY	1
3	ROTOR	1
4	HANDLE	1
5	SPRING	1
6	SCREW	1
7	SCREW	8
10	STEM	1
11	SCREW	1
12	SCREW	4

This component is classified as a non-repairable item.

SPECIFICATIONS

PORT SIZES: Inlet . . . . . 1/8-27 NPTF or 3/8-18 NPTF
Outlet . . . . . 1/8-27 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 . . . . . 12 SCFM @ 100 PSI (0,3 m^3/min @ 690 kPa)
MOUNTING . . . . . .Pipe or Panel Mounting (Fasteners Included)
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Zinc Alloy
Handle . . . . . Chrome-Plated Die Cast Zinc Alloy
Rotor . . . . . Plastic
NET WEIGHT. . . . . 8.5 oz. (0,2 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM34P
Model Number
PART NUMBER 111118

Manufactured in the USA by Brake Systems Inc.

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WM55

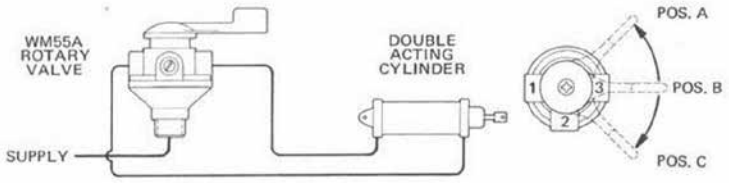
PRODUCT DESCRIPTION

DESCRIPTION The WM55A is a multi-purpose, four-way rotary-action control valve. The handle rotates freely through a 90° arc and passes through three functional positions. The valve's inlet port is threaded both internally (1/8-27 NPTF) and externally (3/8-18 NPTF). The valve can be mounted with the external threads of the supply port, or it can be panel-mounted using the four fasteners provided.

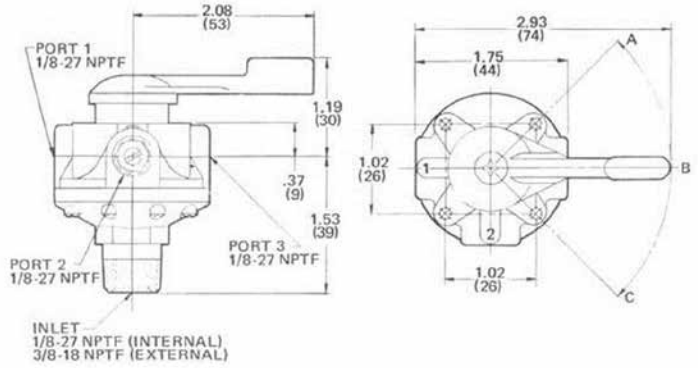
OPERATION The WM55A is normally installed so that Port 2 is used for exhaust and Ports 1 and 3 are used as outlets (refer to the installation schematic below). With the handle in Position A (fully counter clockwise), supply pressure is directed to Port 3, and Port 1 exhausts through Port 2. When the handle is rotated to Position C (fully clockwise), port 3 exhausts through Port 2 and supply pressure is directed to Port 1. With the handle in Position B (any point between Position A and Position C), all ports are closed and the valve is in a HOLD mode.

APPLICATIONS The WM55A is a universal application valve that is ideal for controlling a double-acting cylinder or a pair of single-acting cylinders. The WM55A is frequently used in industrial and vehicular applications where cost is a consideration and minor leakage can be tolerated.

TYPICAL INSTALLATION

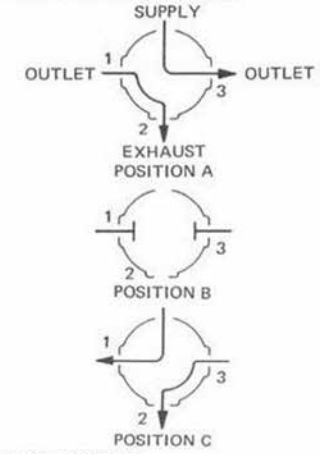


EXTERNAL CONFIGURATION

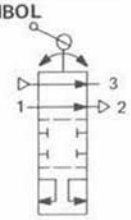


FOUR-WAY 3-POSITION ROTARY VALVE

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.06.16

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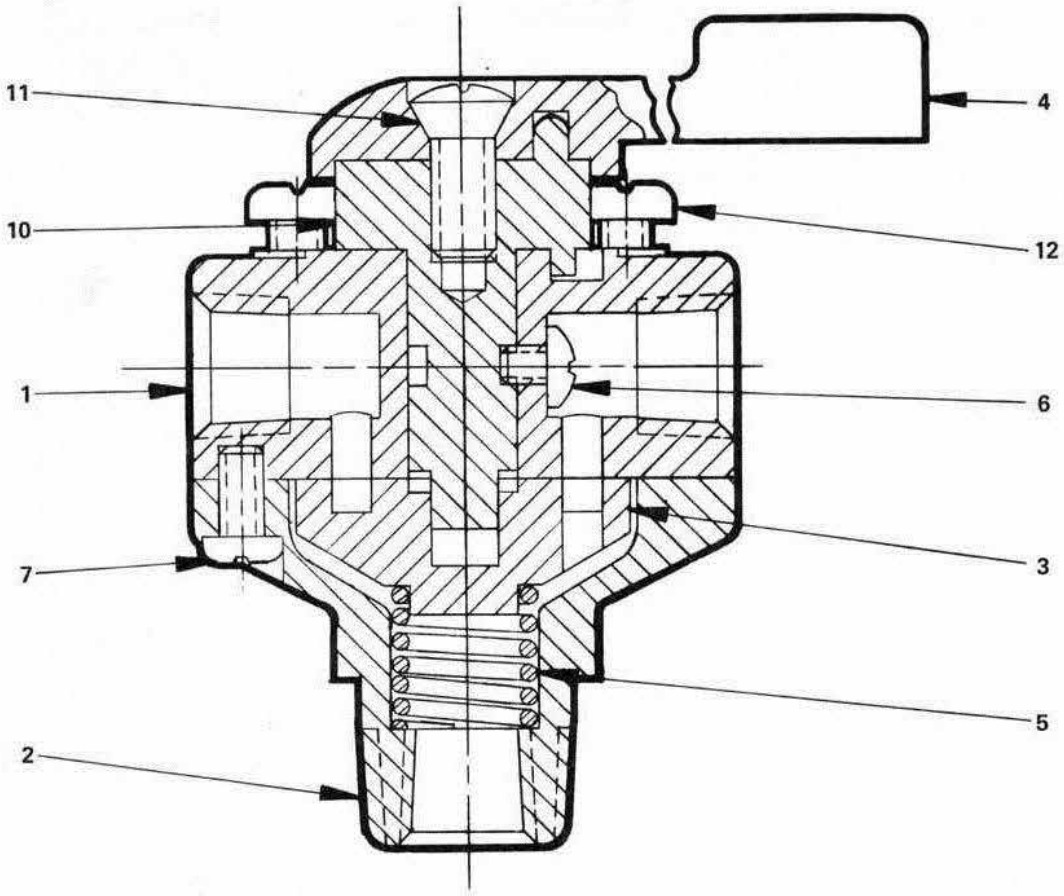

PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	MAIN BODY	1
2	INLET BODY	1
3	ROTOR	1
4	HANDLE	1
5	SPRING	1
6	SCREW	1
7	SCREW	8
10	STEM	1
11	SCREW	1
12	SCREW	4

This component is classified as a non-repairable item.

SPECIFICATIONS

PORT SIZES: Inlet . . . . . 1/8-27 NPTF or 3/8-18 NPTF
Outlet . . . . . 1/8-27 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 . . . . . 12 SCFM @ 100 PSI (0,3 m^3/min @ 690 kPa)
MOUNTING . . . . . Pipe or Panel Mounting (Fasteners Included)
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Zinc Alloy
Handle . . . . . Chrome-Plated Die Cast Zinc Alloy
Rotor . . . . . Plastic
NET WEIGHT . . . . . 8.5 oz. (0,2 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM 55A
Model Number
PART NUMBER 117083

Manufactured in the USA by Brake Systems Inc.

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WM125A

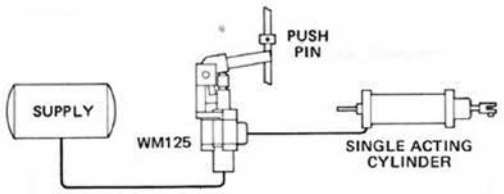
PRODUCT DESCRIPTION

DESCRIPTION The WM125A is a spring returned, normally closed, three-way valve. It is actuated by a lever and mounted by an integral bracket attached to the lever pivot body.

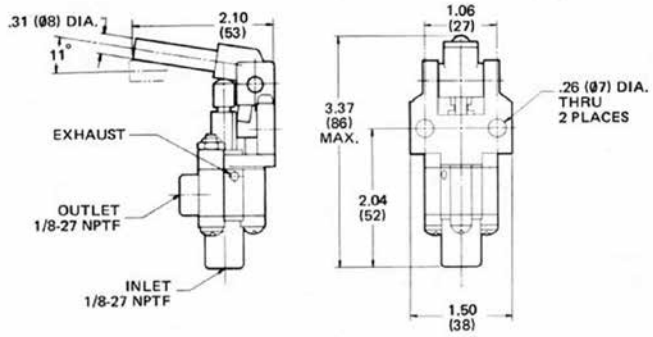
OPERATION the WM125A is actuated by moving the lever, which in turn depresses the valve stem. This closes the exhaust port and opens the supply port, allowing supply pressure to flow to the outlet. When the lever is released the stem returns to the normally closed position. The supply port is closed and the exhaust port is opened to allow the pressure at the outlet to be released to atmosphere.

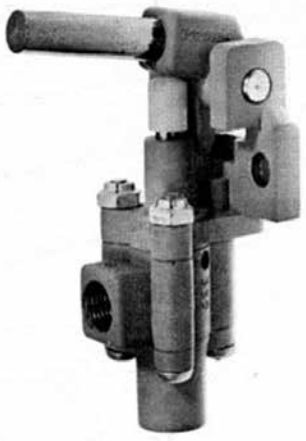
APPLICATION The WM125A is a versatile valve which is commonly used to activate an air system in response to a mechanical motion. WM125A valves can also be used for controlling cylinders and relay valves in a variety of industrial and vehicular air systems.

TYPICAL APPLICATION



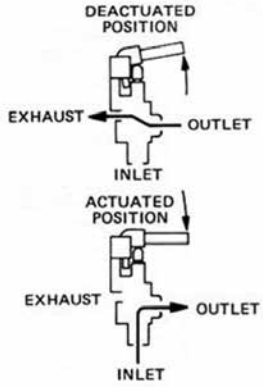
EXTERNAL CONFIGURATION



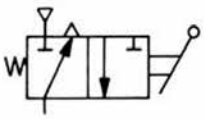


THREE-WAY LEVER-ACTUATED VALVE

FUNCTIONAL DIAGRAM



I. S. O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.06.16

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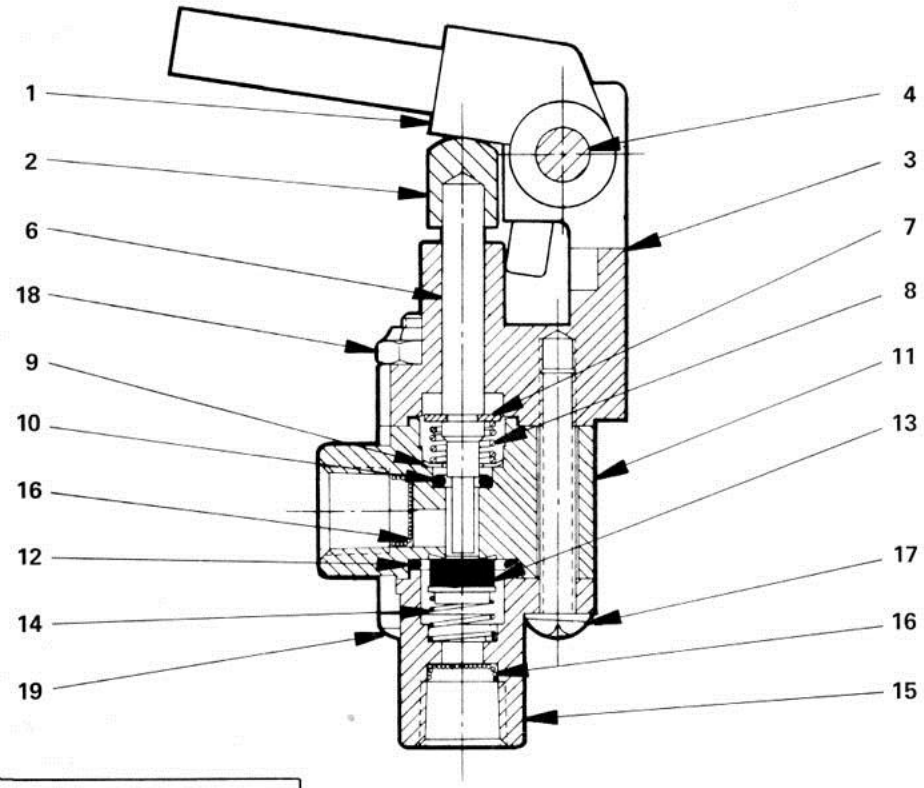

PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	LEVER ASSEMBLY	1
2	CAP	1
3	BRACKET	1
4	LEVER PIN	1
6	STEM	1
7	SNAP RING	1
8	SPRING	1
9	SNAP RING	1
10	O-RING	1
11	BODY ASSEMBLY	1
12	O-RING	1
13	POPPET	1
14	SPRING	1
15	INLET BODY	1
16	SCREEN	1
17	SCREW	1
18	LOCK NUT	2
19	SCREW	2

This unit is classified as a non-repairable item.

SPECIFICATIONS

PORT SIZE . . . . . 1/8-27 NPTF
MAXIMUM OPERATING PRESSURE. . . . . 150 PSI (1034,2 kPa)
FLOW RATING. . . . . 12 scfm @ 100 PSI (0,3 m^3/min @ 690 kPa)
OPERATING TEMPERATURE* . . -20°F to 200°F (28,9°C to 93.3°C)
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Zinc Alloy
Poppet & O-rings . . . . . Buna N
Trip Lever . . . . . Hardened Steel
NET WEIGHT. . . . . 7 oz. (0.2 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM125A
Model Number
PART NUMBER 111446

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
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WM148

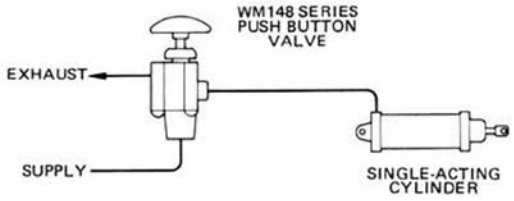
PRODUT DESCRIPTION

DESCRIPTION The WM148 series consists of various spring-returned, three-way push button valves. These are available with several different button designs. All of the WM148 valves are operated manually by a button device mounted to an actuating push stem.

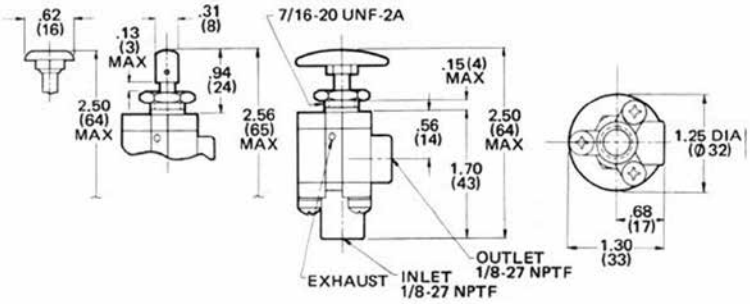
OPERATION the operator actuated the WM148 valve by depressing the button and stem. The stem closes the exhaust vent, opens the supply port, and allows supply pressure to flow to the outlet port. When the button and stem are released, the supply port closes to block pressure delivery. Any outlet pressure is released, the supply port closed to block pressure delivery. Any outlet pressure is released to the atmosphere through the exhaust vent.

APPLICATION the WM148 push button valves are universal application valves designed for controlling small air cylinders, relay valves, or air-operated accessories in industrial or vehicular pneumatic systems. Because these valves are often used to provide a control signal to other Williams Air Controls products, the WM148 valves are frequently supplied as components in Williams valve kits.

TYPICAL INSTALLATION

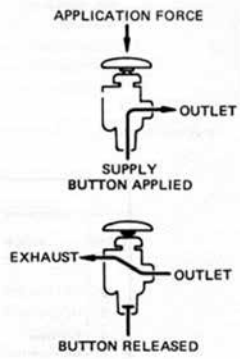


EXTERNAL CONFIGURATION



THREE-WAY PUSH BUTTON VALVE

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL

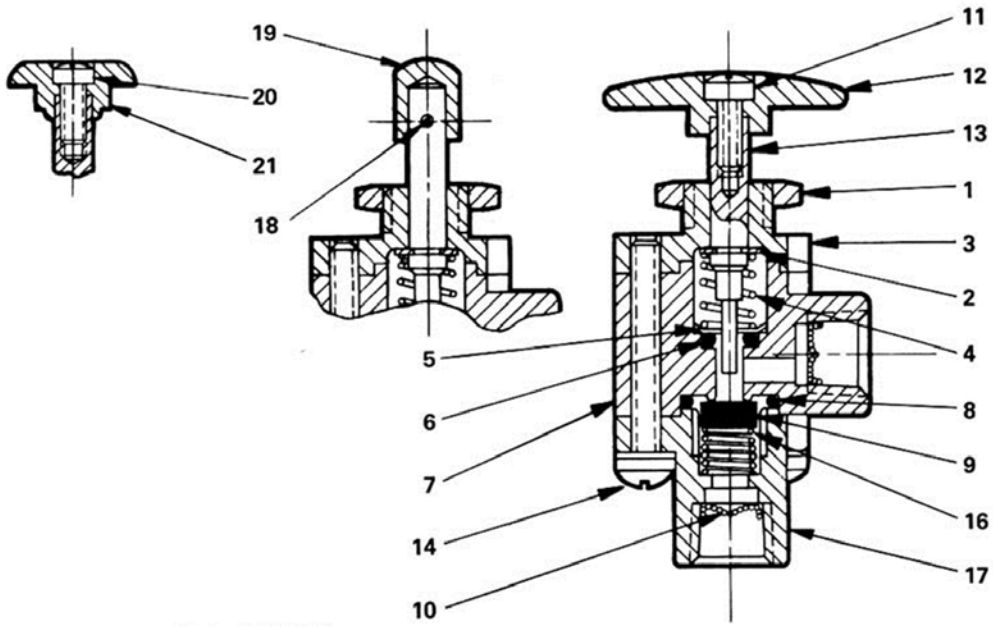
Manufactured in the USA by Brake Systems Inc.

SECTION 11

205

REV. DATE: 2010.08.10

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com



SPECIFICATIONS

PORT SIZE . . . . . 1/8-27 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 . . . . . 15 SCFM @ 100 PSI (0,4 m^3/min @ 690 kPa)
MOUNTING . . . . . Secured to Instrument Panel or Bracket
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Zinc Alloy
Stems:
WM148A & W . . . . . Stainless Steel
WM148B . . . . . Aluminum
Button Actuators:
WM148A & W . . . . . Chrome-Finished Zinc Alloy
WM148B . . . . . Nylon
NET WEIGHT . . . . . 3.0 oz. (0,1 kg)
*For continuous operation beyond this range, contact factory.

*MANUFACTURED BY WILLIAMS CONTROLS

TO ORDER, SPECIFY

WM148 ___

Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	ACTUATOR DESCRIPTION
WM148 W	111561	Large Button 101173
WM148 A*	111549	Small Knob 111549
WM148 B*	111550	Stem Cap 111550

PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY. A	QTY. B	QTY. W	ITEM	DESCRIPTION	QTY. A	QTY. B	QTY. W
1	NUT	1	1	1	12	BUTTON			1
2	RETAINING RING	1	1	1	13	STEM	1	1	1
3	MOUNTING BODY	1	1	1	14	SCREW	3	3	3
4	SPRING	1	1	1	NA	SPRING CAP	1		
5	RETAINING RING	1	1	1	16	SPRING	1	1	1
6	O-RING	1	1	1	17	INLET BODY	1	1	1
7	CENTER BODY	1	1	1	18	ROLL PIN		1	
8	O-RING	1	1	1	19	STEM CAP		1	
9	POPPET	1	1	1	20	SCREW	1		
10	SCREEN	1	1	1	21	KNOB	1		
11	SCREW			1					

This component is classified as a non-repairable item.

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

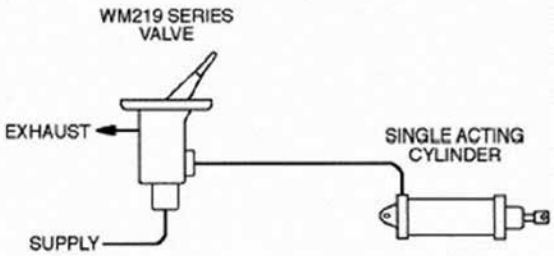
WM219 SERIES

THREE-WAY TWO POSITION TOGGLE VALVE

150 PSI MAXIMUM

DESCRIPTION

The WM219 series are two position, three-way toggle valves, which are equipped with heavy duty metal control levers. Designed for panel mounting, these valves are available with various porting configurations. The WM219 toggle valves are universal application valves that are commonly used to control air pressure-operated relay valves, cylinders, PTOs and fifth wheels.



SPECIFICATIONS

Port size	1/8-27 NPTF
Maximum supply pressure	150 PSI (1034 kPa)
Operating temperature*	-20ºF to 200ºF (-29ºC to 93ºC)
Flow rating	15 SCFM @ 100 PSI (0,4 m^3/min @ 690 kPa)
Mounting	Secured to control panel with two 10-24 fasteners
Mounting attitude	Optional
Materials: Body castings & lever	Iridited die cast zinc alloy
Poppet and O-rings	Buna N
Weight	5 oz (0,1 kg)

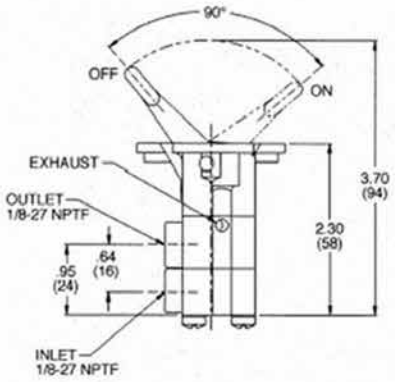
* For continuous operation beyond this range, contact factory.

Manufactured in the USA by Brake Systems Inc.

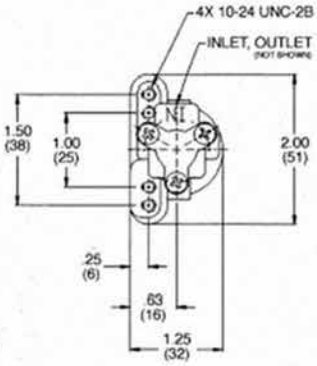
REV. DATE: 2010.08.10

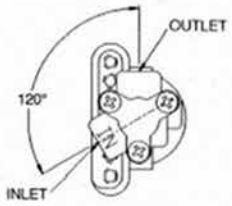
BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

DIMENSIONAL DATA

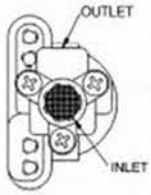


WM219C1



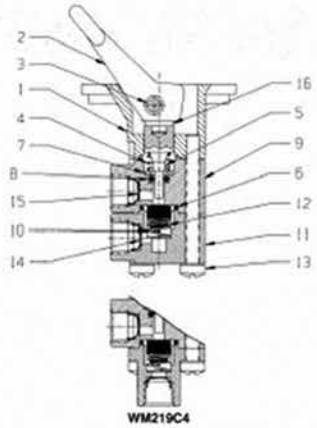


WM219C3



WM219C4

CROSS SECTION & PARTS INFORMATION



WM219C4

ITEM	DESCRIPTION	WM219C1	WM219C3	WM219C4	QTY
1	Bracket body	101791	101791	101791	1
2	Lever	118363	118363	118363	1
3	Groove pin	118057	118057	118057	1
4	Spring	101526	101526	101526	1
5	Stem guide	118806	118806	118806	1
6	O-ring	116303	116303	116303	1
7	Snap ring	117927	117927	117927	1
8	O-ring	116296	116296	116296	1
9	Body	101519	101519	101519	1
10	Spring	101467	101467	101467	1
11	Inlet body	103743	103743	101470	1
12	Inlet poppet	119141	119141	119141	1
13	Screw	119573	119573	119573	3
14	Screen	116455	116455	116455	1
15	Screen	101410	101410	101410	1
16	Cap	104765	104765	104765	1

These valves are non-repairable items.

ORDERING INFORMATION

To order, specify **WM219** _____(suffix) _____(part number). Select suffix and part number below.

Suffix	Part Number	Inlet Port Location (see drawing above)
WM219 C1	111814	Inlet "C1"
WM219 C3	111816	Inlet "C3"

WM219C4 (PART #111817) MANUFACTURED BY WILLIAMS CONTROLS

An escutcheon plate (part number 103642), is not supplied with valve, but may be ordered separately.

Manufactured in the USA by Brake Systems Inc.

WM232, WM234

LEVER MOUNTED CONTROL VALVES

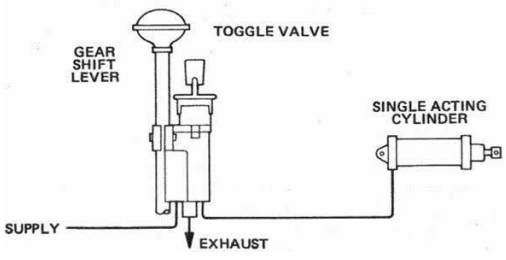
Flipper Valve (219) and Bkt. Assy. = WM232
Push Valve (148) and Bkt. Assy. = WM234

This is a convenient way to put one of those little dash valves on the shift lever. With 1/8" NPT pipe ports they can be plumbed with 1/8" or 1/4" tubing. The face plate may be identified with several vinyl decals to match the function. Special decals including Spanish are available in standard or optional language. Standard options include hi-lo, on-off, engage-disengage, lock-unlock, etc.

Plates are printed in both horizontal and vertical, as well as left and right hand variations. Not every variation is off the shelf but most are or can be special ordered.

Typical Application: Toggle (flipper) valves are used as an on-off universal control for various functions such as cylinders, relays, PTO's, fifth wheel locks, etc.

TYPICAL INSTALLATION



	With Flipper Valve WM219			With Push Valve WM148A
	WM232A	WM232B	WM232V	WM234
Base Valve	WM219C4	WM219C4	WM219V	WM148A
Esc. Decal	103644D	103645D	103644D	—
Clamp	101849	101849	101849	101849
Screws	114757	114757	114757	—
Screws	114786	114786	114786	114786
Lock Nut	114564	114564	114564	114564
Bkt.	101848	101848	101848	101850
Face Reading	On-Off	Hi-Lo	On-Off	—
System	Air	Air	Vacuum	Air

Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.06.16

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WM331 SERIES

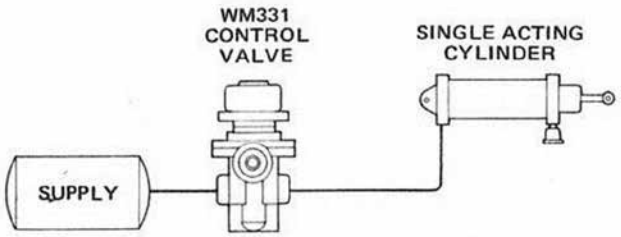
PRODUCT DESCRIPTION

DESCRIPTION the WM331 is a spring-returned, normally closed, non-compensating valve designed for floor mounting. It is actuated by a plunger which is intended for foot pressure operation.

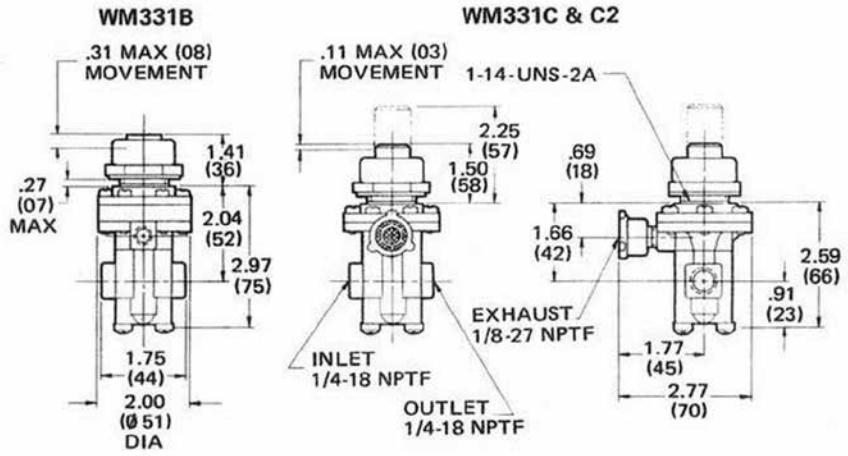
OPERATION The WM331 is actuated by depressing the plunger. This closes the exhaust port and opens the supply port to allow supply pressure to flow to the outlet. When the plunger is released, the valve returns to the normally closed position. The supply port is closed and the exhaust port is opened to allow pressure at the outlet port to be released to atmosphere.

APPLICATION The WM331 is a heavy duty universal application valve which is ideal for controlling pneumatic cylinders or relay valves in industrial air systems.

TYPICAL APPLICATION

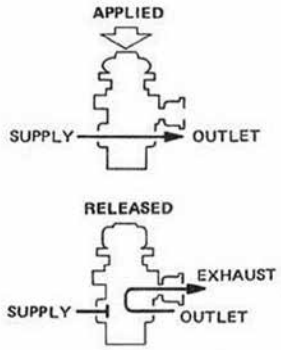


EXTERNAL CONFIGURATION

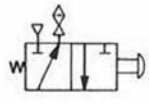


THREE-WAY FOOT CONTROL VALVE

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL

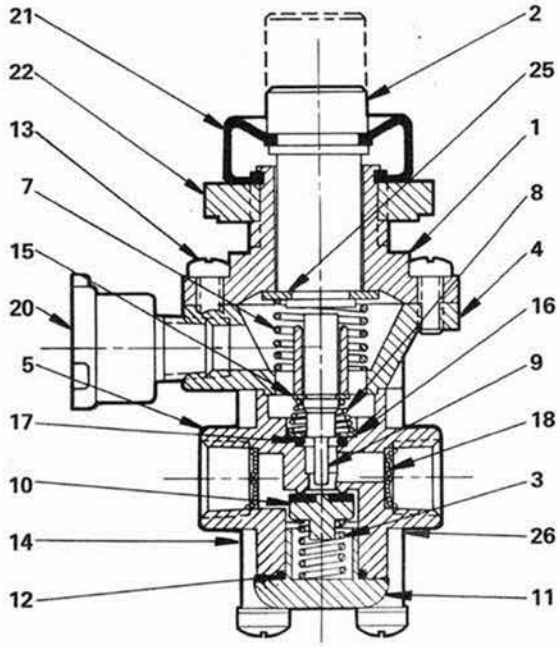


Manufactured in the USA by Brake Systems Inc.

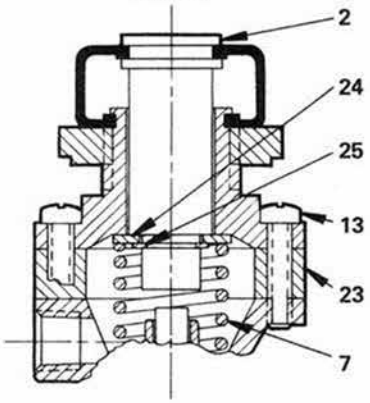
REV. DATE: 2011.01.19

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WM331C & WM331C2



WM331B



PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	ROD GUIDE & MOUNT	1
2	PUSH ROD	1
3	SPRING	1
4	CENTER BODY	1
5	LOWER BODY	1
7	SPRING	1
8	SPRING	1
9	STEM	1
* 10	POPPET	1
11	END CAP	1
* 12	O-RING	1
13	SCREW	6
14	SCREW	4
15	RETAINING RING	1
16	RETAINING RING	1
* 17	O-RING	1
* 18	SCREEN	2
20	BREATHER (WM111A)	1
* 21	DUST BOOT	1
22	NUT (101114)	1
23	SPACER	1
24	WASHER	1
25	RETAINING RING	1
26	WASHER	1

Service this unit with repair kit number R331-471.
*Asterisk designates parts included in repair kit.

SPECIFICATIONS

PORT SIZE . . . . . 1/4-18 NPTF
MAXIMUM OPERATING PRESSURE. . . . . 150 PSI (1034, 2 kPa)
FLOW RATING. . . . . 45 scfm @ 100 PSI (1,2 m^3/min @ 690 kPa)
TEMPERATURE RANGE* . . . -20°F to 200°F (-28, 9°C to 93, 3°C)
MOUNTING. . . . . .Floor Mounted
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Poppet . . . . . Buna N
O-Rings. . . . . Buna N
NET WEIGHT. . . . . 1 Pound (0,5 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM331 ___

Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	BUTTON HEIGHT	BUTTON STROKE	PUSH ROD
WM331 B*	112261	.06 in. (1,5 mm)	.31 in. (7,9 mm)	103382
WM331 C	112262	.32 in. (8,1 mm)	.11 in. (2,8 mm)	103433
WM331 C2	110227	1.24 in. (31,5 mm)	.11 in. (2,8 mm)	110226

*The WM331B is a special design for use in the WM471 Treadle Valve Assembly.

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WM371 SERIES

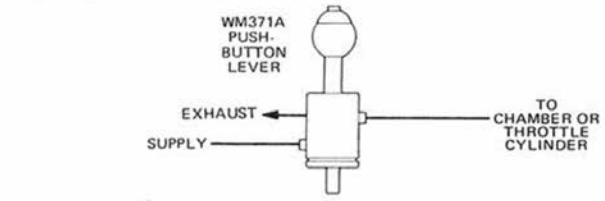
PRODUCT DESCRIPTION

DESCRIPTION The WM371A push button lever is a three-way, non-compensating control valve designed to replace or supplement an existing handle. Unlike most handles, this lever has a recessed push button that provides an additional manual control. The WM371A is equipped with a special dust boot that prevents dirt entry and gives the operator a firm grip on the bottom.

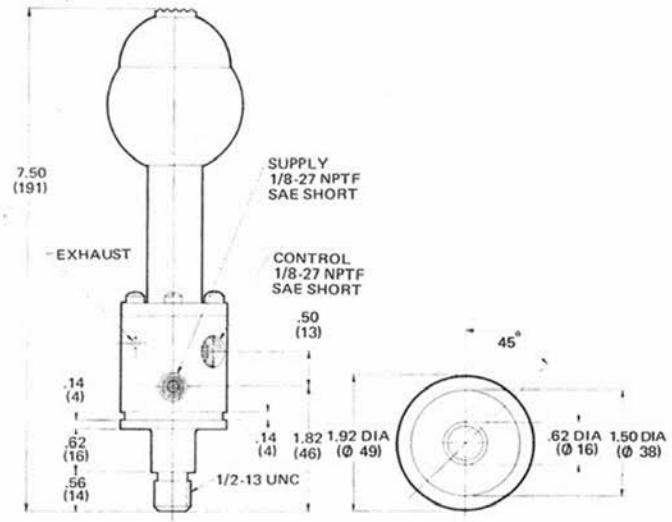
OPERATION When depressed, the button acts against a stem which unseats the supply poppet. Air pressure is directed from the supply port to the outlet port. When the operator releases the button, an internal spring seats the supply poppet and returns the stem to the rest position. Outlet pressure escapes to the atmosphere through an unthreaded exhaust vent.

APPLICATION The WM371A push button is frequently used in pneumatic control systems for industrial equipment and off-road vehicles. Typical applications include usage as a drum reverse or drag line control on a grapple or bucket. The WM317A lever can be mounted in place of a handle control, or with the appropriate fittings, the unit can be adapted for mounting with an existing lever.

TYPICAL INSTALLATION

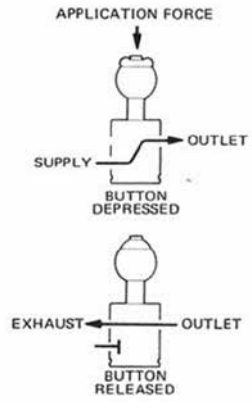


EXTERNAL CONFIGURATION

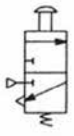


PUSH BUTTON LEVER

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL



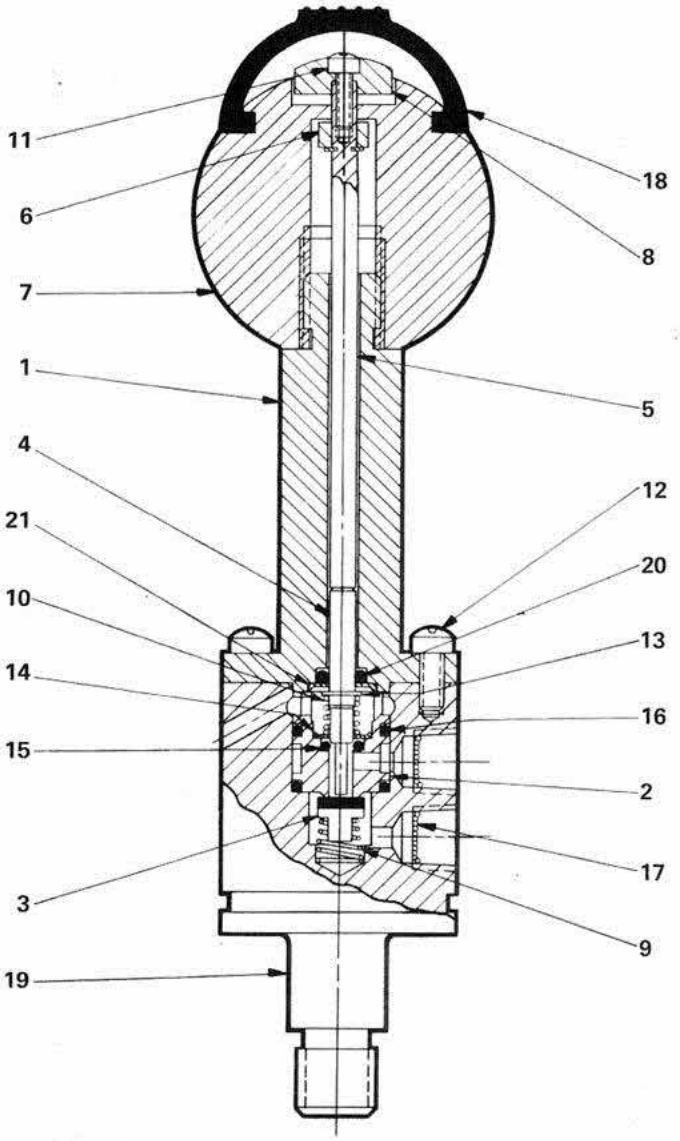
Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.06.16

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	HANDLE BODY	1
2	SPOOL	1
* 3	POPPET	1
4	STEM	1
5	PUSH ROD	1
6	SPACER (102641)	1
7	KNOB (103587)	1
8	BUTTON (102643)	1
9	SPRING	1
10	SPRING	1
11	SCREW	1
12	SCREW	6
13	RETAINING RING	2
* 14	RETAINING RING	1
* 15	O-RING	1
* 16	O-RING	2
17	SCREEN (116455)	1
* 18	DUST BOOT (103588)	1
19	VALVE BODY	1
* 20	O-RING	1
* 21	RETAINING RING	

Service this unit with repair kit number 114310. Replaceable items are followed by part numbers.
*Asterisk designates parts included in repair kit number 114310.



SPECIFICATIONS

PORT SIZE . . . . . 1/8-27 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 . . . . . 15 SCFM @ 100 PSI (0,4 m^3/min @ 690 kPa)
MOUNTING . . . . . Using 1/2-13 UNC Male Threads on End of Body
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Valve & Handle Bodies . . . . . Zinc-Plated Steel Alloy
Stem . . . . . Aluminum
Push Rod . . . . . Brass
Knob . . . . . Phenolic
Poppet . . . . . Buna N with Aluminum Backing
Dust Boot . . . . . Chloroprene Rubber
NET WEIGHT . . . . . 1 lb. 7 oz. (0,7 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM371A
Model Number
PART NUMBER 112550

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WILLIAMS CONTROLS INC.

WM397 SERIES

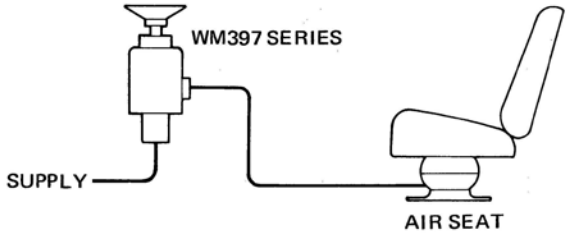
PRODUCT DESCRIPTION

DESCRIPTION These WM397 series control valves are manually operated, three-way pneumatic valves that are actuated by a push button. Designed for control panel or console mounting, these valves have three operating positions—APPLY, EXHAUST, and HOLD.

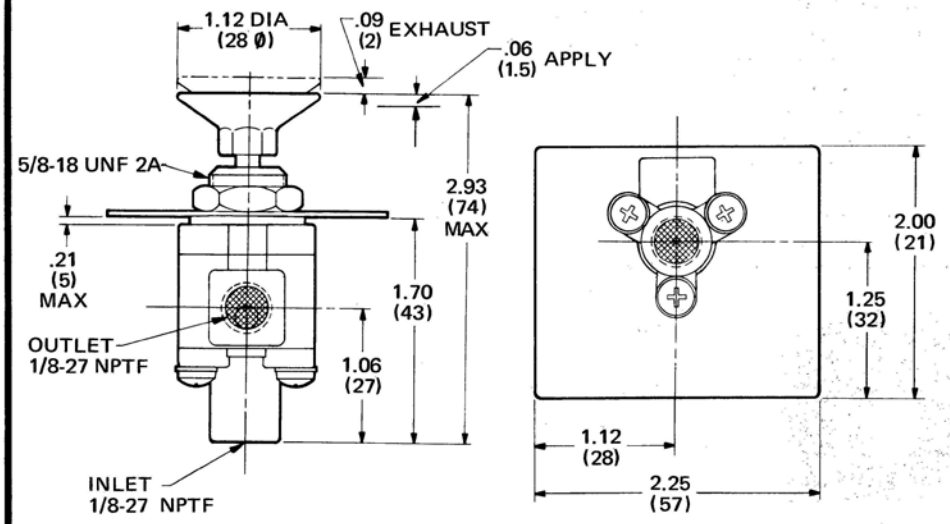
OPERATION When the control valve is in its normal, holding position, all the valve ports are closed and the pressure at the outlet port is held. The valve will trap a minimum pressure of 35 PSI (241,3 kPa) at the outlet port. When the push button is depressed, a path opens from the supply port to the outlet port. Pulling the button out to the EXHAUST position allows pressure at the outlet port to escape through the exhaust port. When the button is released from either the APPLY or EXHAUST position, a spring returns the valve to the normal, holding position.

APPLICATION The WM397 control valves are engineered for industrial or vehicular applications that require a manually controlled air pressure to be held in a closed system. A common application is the air seat system shown below. In this application, the operator depresses the button until the desired seat height is achieved. The valve's holding function maintains this seat position until the button is pulled and pressure is released.

TYPICAL INSTALLATION

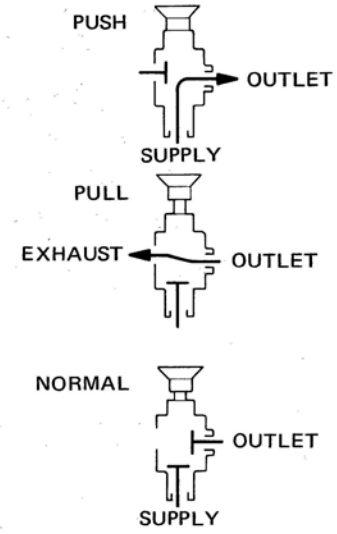


EXTERNAL CONFIGURATION

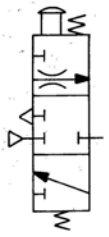


THREE-WAY HOLDING VALVE

FUNCTIONAL DIAGRAM



I.S.O. SYMBOL

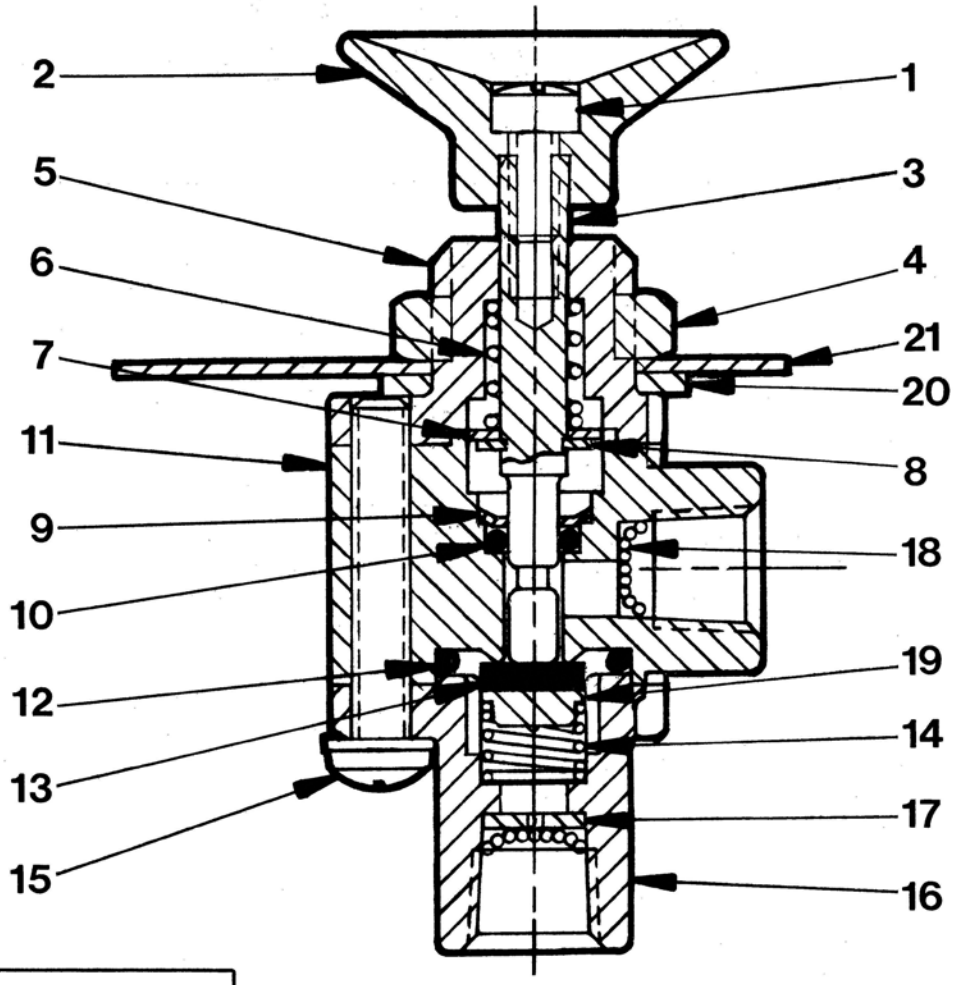


WILLIAMS CONTROLS, INC.
14100 SW 72ND AVENUE, PORTLAND, OREGON 97224, TEL: (503) 684-8600, TELECOPIER: (503) 684-8610, TELEX: 15-1145

119983
REL. 6/79

PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	SCREW	1
2	BUTTON	1
3	STEM	1
4	NUT	1
5	MOUNTING BODY	1
6	SPRING	1
7	WASHER	1
8	RETAINING RING	1
9	RETAINING RING	1
10	O-RING	1
11	BODY	1
12	O-RING	1
13	POPPET	1
14	SPRING	1
15	SCREW	3
16	INLET BODY	1
17	RESTRICTOR	1
18	SCREEN	2
19	SPRING CAP	1
20	LOCKWASHER	1
21	ESCUTCH. PLATE	1

This component is classified as a non-repairable item.



TO ORDER, SPECIFY

WM397____

Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	RESTRICTOR	ESCUTCHEON PLATE
WM397 D	112782	YES	STYLE B
WM397 E	112783	YES	NONE
WM397 F	112784	YES	STYLE A
WM397 J	100708	YES	NONE
WM397 L	110408	NO	NONE

STYLE A
(PART # 103939)

STYLE B
(PART # 103942)

SPECIFICATIONS

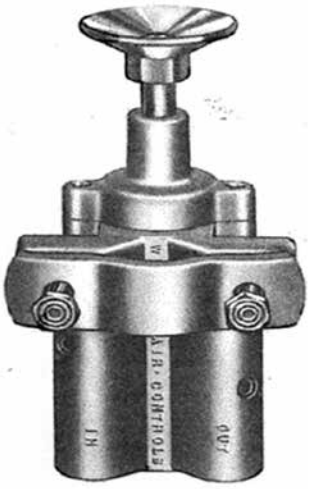
PORT SIZE . . . . . 1/8-27 NPTF
MAXIMUM OPERATING PRESSURE. . . . . 150 PSI (1034,2 kPa)
OPERATING TEMPERATURE* . . . -20°F to 200°F (-28,9° to 93,3°C)
FLOW RATING: Supply (With Restrictor). . . . . .0.9 SCFM @ 100 PSI (0,03 m^3/min @ 690 kPa)
Supply (Without Restrictor). . . . . .12 SCFM @ 100 PSI (0,3 m^3/min @ 690 kPa)
Exhaust . . . . . .3.8 SCFM @ 100 PSI (0,1 m^3/min @ 690 kPa)
MOUNTING. . . . . On Control Panel or Console
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Zinc Alloy
Poppet & O-Rings. . . . . Buna N
NET WEIGHT. . . . . .6 oz. (0,2 kg)
*For continuous operation beyond this range, contact factory.

WM371 SERIES

WM608 PUSH-PULL VALVE

A push-pull valve specifically designed for mounting on shift, dump, hoist or control levers for both automotive and industrial uses.

- **COMPACT DESIGN** fits into a small area around the lever.
- **PORTS ON BOTTOM** eliminating the need for protruding 90° elbow fittings.
- **LONGER LIFE** with chrome finished spool type valving.
- **LIGHT WEIGHT** made of aluminum.

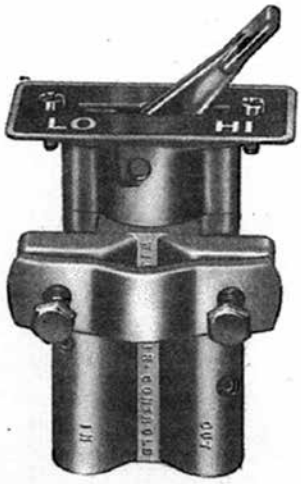


WM-608

WM609 TOGGLE VALVE

Is the same basic valve as the WM-608 except for a toggle control.

- **FEATURES** – compact design, ports on the bottom, chrome finished spool type valving and made of light weight aluminum.
- **MOUNTING** designed to mount back to back with the WM-608 or WM-609.



WM-609

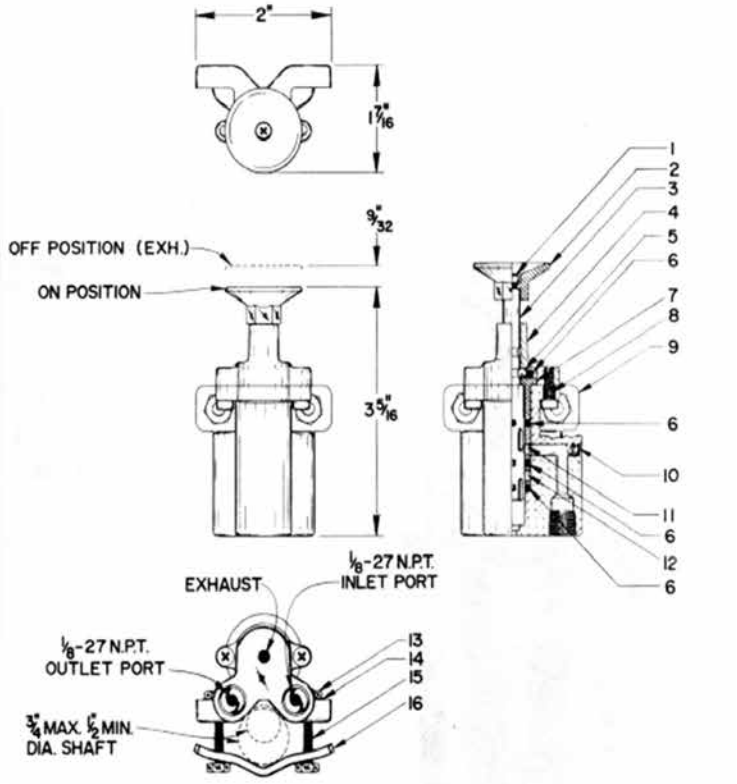
Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.06.16

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

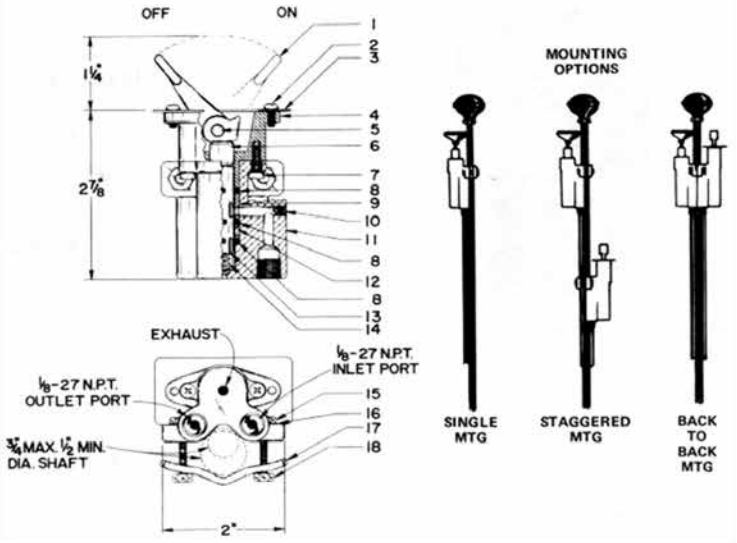
WM-608 PARTS LIST			
ITEM	DESCRIPTION	QTY.	PART NO.
1*	MACH. SCREW	1	3-W-2
2	BUTTON	1	2769
3	STEM	1	4216
4	COVER	1	4217
5*	BALL	3	15-W-4
6*	O-RING	4	52-W-8
7	TOP BUSHING	1	4215
8*	MACH. SCREW	2	3-W-10
	BODY ASSY. (ITEMS 9 & 10)	1	5409
9	BODY	1	5404
10	SET SCREW	2	16-W-3
11	SPACER	1	4214
12	SPACER	1	4213
13*	NUT	2	2-W-7
14*	LOCKWASHER	2	4-W-6
15*	MACH. SCREW	2	3-W-18
16	CLAMP	1	1849

*REPAIR KIT R-608
FLOW CAPACITY (APPLICATION) 12CFM @ 100 psi
FLOW CAPACITY (EXHAUST) 12CFM @ 100 psi
WEIGHT 6½ OZS.



WM-609 PARTS LIST			
ITEM	DESCRIPTION	QTY.	PART NO.
1	TOGGLE	1	1792
2	MACH. SCREW	2	3-W-76
3	ESCUTCHEON PLATE	1	5398
4	TOP CAP	1	5397
5	PIN	1	10-W-47
6	STEM CAP	1	5403
7*	MACH. SCREW	2	3-W-10
8*	O-RING	3	52-W-8
9	SPACER	1	4214
	BODY ASSY. (ITEMS 10 & 11)	1	5409
10	SET SCREW	2	16-W-3
11	BODY	1	5404
12	SPACER	1	4213
13	STEM	1	5396
14*	SPRING	1	5406
15*	NUT	2	2-W-7
16*	LOCK WASHER	2	4-W-6
17	CLAMP	1	1849
18*	MACH. SCREW	2	3-W-18

*REPAIR KIT R-609
FLOW CAPACITY (APPLICATION) 12 CFM @ 100 psi
FLOW CAPACITY (EXHAUST) 12 CFM @ 100 psi
WEIGHT 6½ OZS.



Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WM781 SERIES

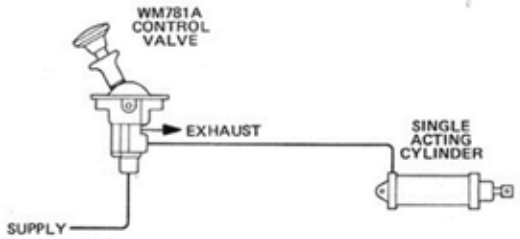
PRODUCT DESCRIPTION

DESCRIPTION The WM781A is a non-compensating, two position, three-way control valve which is normally closed. The valve is actuated by a control lever which is equipped with a spring-loaded lockout safety device which locks in both positions to prevent unintentional lever movement. The yellow lockout device is a visual indicator of the safety latching feature of this control valve series.

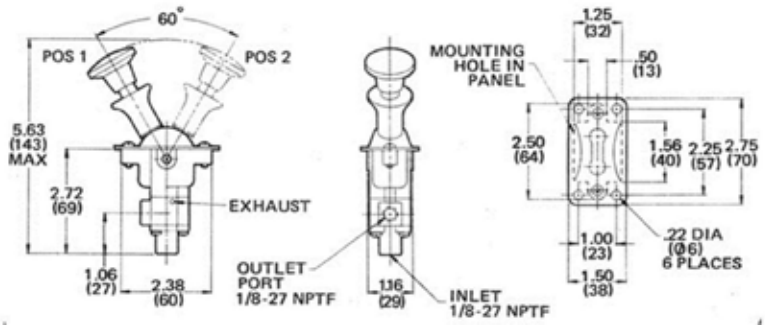
OPERATION To actuate the WM781A valve, the operator must pull up on the lockout device and move the lever approximately 60°. This depresses the valve stem, which closes the exhaust port and unseats the inlet poppet, allowing supply pressure to flow to the outlet. When the operator pulls up on the lockout device and returns the lever to the "normally" closed, the poppet seats, closing off air flow from the supply port to the outlet, and the exhaust port opens to release outlet pressure to atmosphere.

APPLICATION WM781A valves can be used to control any system which requires a two position, normally closed control valve. They are ideally suited to control the actuation of power take off systems which are engaged by an air pressure signal and spring disengaged.

TYPICAL INSTALLATION

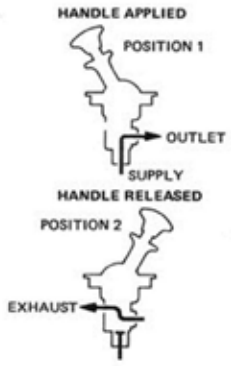


EXTERNAL CONFIGURATION

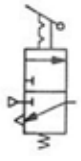


TWO POSITION THREE-WAY CONTROL VALVE

FUNCTIONAL DIAGRAM



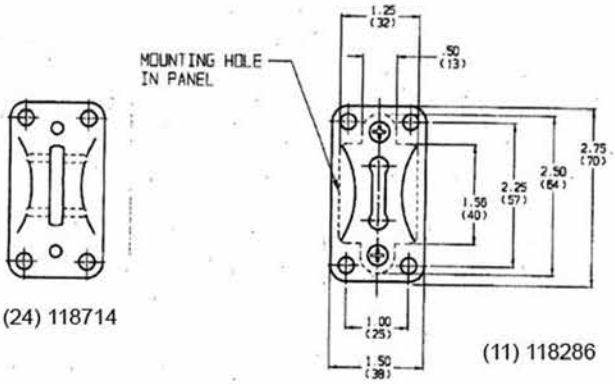
I. S. O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

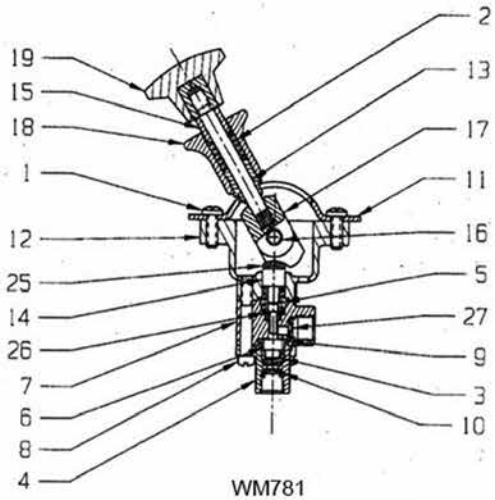
REV. DATE: 2010.06.16

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

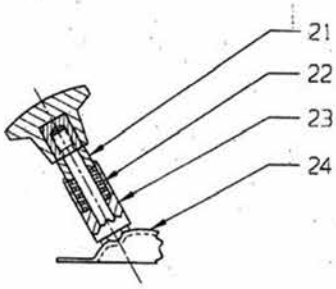


(24) 118714

(11) 118286



WM781
DETENT, PULL UP



WM781A
DETENT, SPRING LOADED

PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	SCREW	2
2	SPRING	1
* 3	SPRING	1
4	INLET BODY	1
* 5	SPRING	1
* 6	POPPET	1
7	BODY ASSEMBLY	1
8	SCREW	3
* 9	O-RING	1
10	SCREEN	2
11	VALVE COVER (118286)	1
12	UPPER BODY	1
13	HANDLE STEM (118291)	1
14	VALVE STEM	1
15	HANDLE BUSHING (118295)	1
16	LEVER PIN	1
17	CAM	1
18	LATCH ASSEMBLY (118303)	1
19	KNOB (118306)	1
21	BUSHING HANDLE	
22	SPRING, DETENT	
23	DETENT, HANDLE	
24	COVER, VALVE	

Service this unit with repair kit number 114201.
*Asterisk designates parts included in repair kit number 114201.

SPECIFICATIONS

PORT SIZE . . . . . 1/8-27 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. . . . . 15 SCFM @ 100 PSI (0,4 m³/min @ 690 kPa)
MOUNTING. . . . . .PANEL MOUNTED
MOUNTING ATTITUDE . . . . . .OPTIONAL
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Actuating Cam . . . . . Die Cast Zinc Alloy
Poppet . . . . . Buna N
O-Rings. . . . . Buna N
Actuating Lever Shaft . . . . . .Steel
Knob . . . . . Black Plastic w/ Yellow Safety Latch
NET WEIGHT. . . . . 9 oz. (0,3 kg)
*For continuous operation beyond this range, contact factory.

MODEL #	PART #
WM781A *	118315
WM781A1	118710
WM781-100*	133280

* MANUFACTURED BY WILLIAMS CONTROLS

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WM782 SERIES

PRODUCT DESCRIPTION

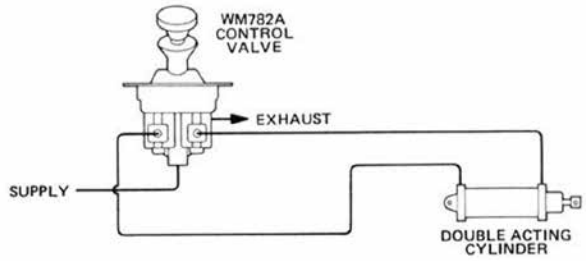
DESCRIPTION The WM782 series is composed of non-compensating, four way control valves with two functional positions, Two models are available: The WM781A1 which features a detent in each of the control lever's functional positions, and the WM781A which is equipped with a spring-loaded lockout safety device which locks the control lever in both positions to prevent unintentional movement.

OPERATION When the WM782's control lever is in Position 1 (Refer to External Configuration.), outlet port 2 receives supply pressure and outlet 1 is exhausted. When the control lever is moved 60° to Position 2, outlet port 1 receives supply pressure and outlet 2 is exhausted.

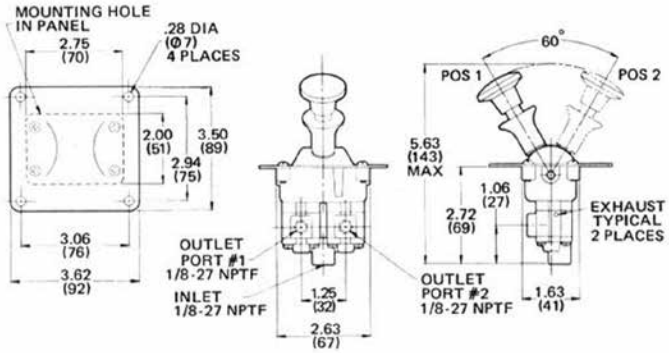
APPLICATION WM782A valves are designed for the control of double acting cylinders. They are frequently used to control the actuation of poser take off systems which engage and disengage by an air pressure signal.

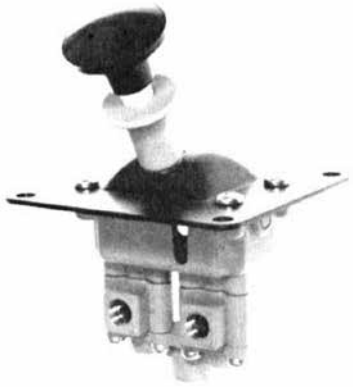
TYPICAL INSTALLATION

*WM782A and WM782-102 Manufactured by Williams Controls



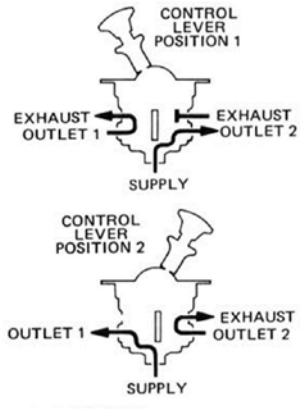
EXTERNAL CONFIGURATION



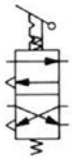


TWO POSITION FOUR-WAY CONTROL VALVE

FUNCTIONAL DIAGRAM



I. S. O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.06.16

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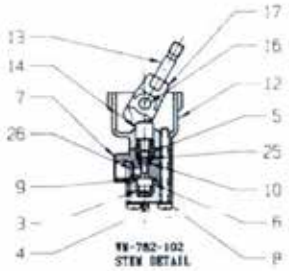
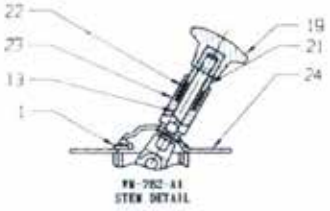
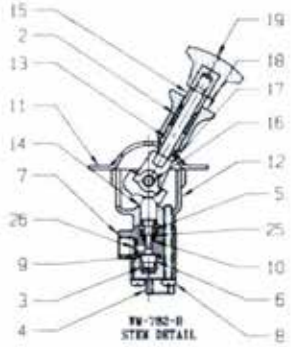
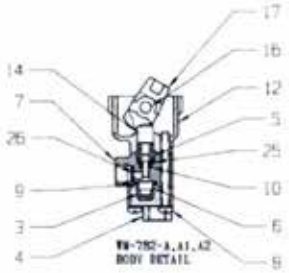
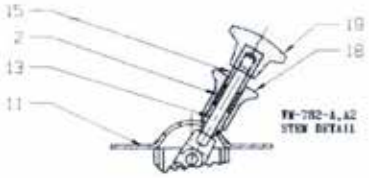
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com











PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY WM782A	QTY WM782A1
1	SCREW (100110)	4	4
2	SPRING (101082)	1	
*3	SPRING	2	2
4	INLET BODY	1	1
*5	SPRING	2	2
*6	POPPET	2	2
*7	BODY ASSY.	2	2
8	SCREW	6	6
*9	O-RING	2	2
11	VALVE COVER (118288)	1	
12	UPPER BODY	1	1
*14	VALVE STEM	2	2
15	HANDLE BUSHING (118295)	1	
16	LEVER PIN	1	1
17	CAM ASSY. (118491)	1	1
18	LATCH ASSY. (118303)	1	
19	KNOB (118305)	1	1
21	HANDLE BUSHING (118718)		1
22	SPRING (101685)		1
23	HANDLE DETENT (118719)		1
24	VALVE COVER (118715)		1
NA	1/8 MALE TO 1/4 FEMALE NPTF 90° ELBOW (FOR OUTLETS)		2
NA	1/8 MALE TO 1/4 FEMALE NPTF ADAPTER (FOR INLET)		1

Service these units with two number 118400 repair kits.
*Asterisk designates parts included in repair kit.

SPECIFICATIONS

PORT SIZE . . . . . 1/8-27 NPTF
(WM782A1 supplied w/1/4-18 NPTF adapters)
MAXIMUM OPERATING PRESSURE. . . . . 150 PSI (1034, 2 kPa)
OPERATING TEMPERATURE* . . 20°F to 200°F (-28, 9°C to 93, 3°C)
FLOW RATING, 15 SCFM @ 100 PSI (0,4 m^3/min @ 690 kPa) each side
MOUNTING. . . . . Panel Mounted
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Actuating Cam . . . . . Die Cast Zinc Alloy
Poppet . . . . . Buna N
O-Rings. . . . . Buna N
Actuating Lever Shaft . . . . . Steel
Knob . . . . . Black Plastic
Safety Lockout (WM782A1 only) . . . Yellow Plastic
NET WEIGHT: WM782A. . . . . 1 lb.,1 oz.(0, 5 kg)
WM782A1 . . . . . 1 lb.,4 oz. (0, 6 kg)

*For continuous operation beyond this range, contact factory.

Model Number	Part Number
WM782A*	118316
WM782A1	118711
WM782A2	130439
WM782B	119068
WM782-100*	118374
WM782-102*	118789
WM782-105	131385

*Manufactured by Williams Controls

Manufactured in the USA by Brake Systems Inc.

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

WM783 SERIES

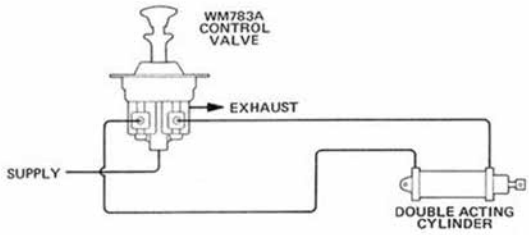
PRODUCT DESCRIPTION

DESCRIPTION The WM783A is a non-compensating, four-way control valve with three functional positions. The control lever which actuates the WM783A valve is equipped with a spring-loaded lockout safety device which locks in all three positions to prevent unintentional lever movement. The yellow lockout device is a visual indicator of the safety latching feature of the control valve series.

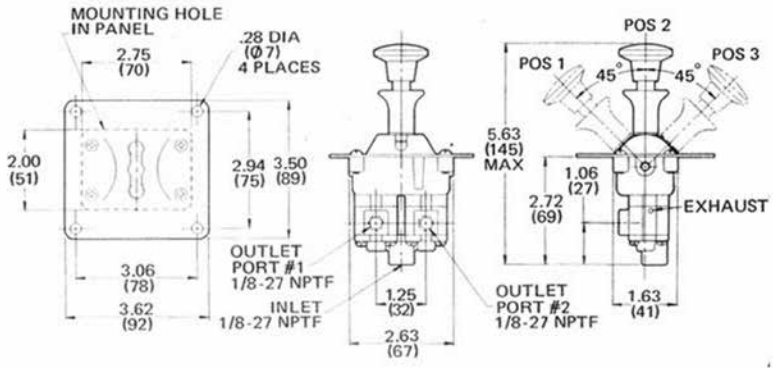
OPERATION When the WM783A valve's control lever is in Position 1 (Refer to External Configuration.), outlet port 2 receives supply pressure and outlet 1 is exhausted. Both outlet ports are exhausted in Position 2, which is the neutral or "hold" position; and in Position 3, outlet port 1 receives supply pressure and outlet 2 is exhausted. In order to move the control lever from one functional position to an adjacent position, the operator must pull up on the lockout device and move the lever approximately 45°. When he releases his hold on the lockout device, a spring will lock the control lever into whichever of the three positions he has selected.

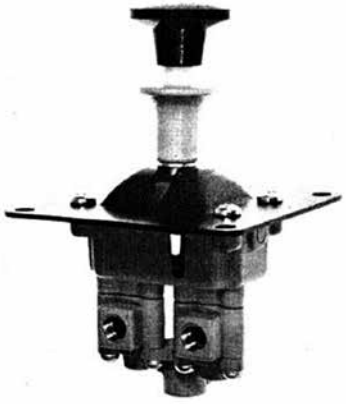
APPLICATION The WM783A is a versatile control valve with a variety of industrial and vehicular applications. WM783AA valves are frequently used to control air operated relay valves, cylinders and power take off systems.

TYPICAL INSTALLATION



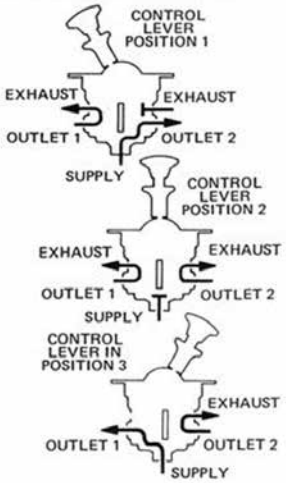
EXTERNAL CONFIGURATION



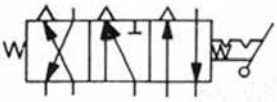


FOUR-WAY THREE POSITION CONTROL VALVE

FUNCTIONAL DIAGRAM



I. S. O. SYMBOL



Manufactured in the USA by Brake Systems Inc.

REV. DATE: 2010.06.16

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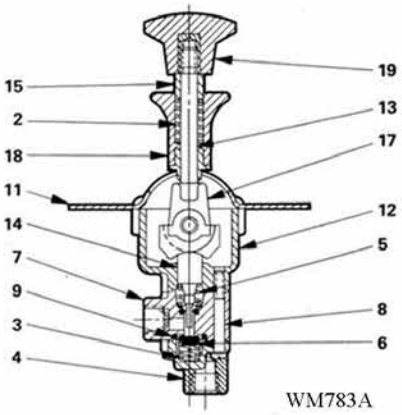
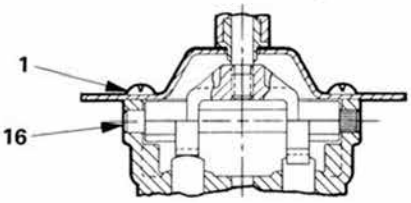
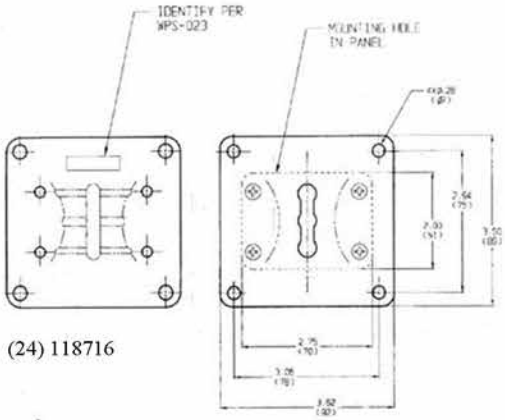


WM783A

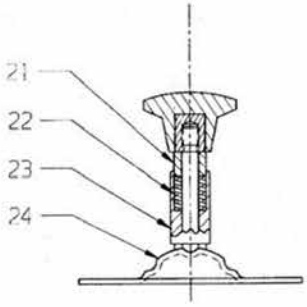


WM783A

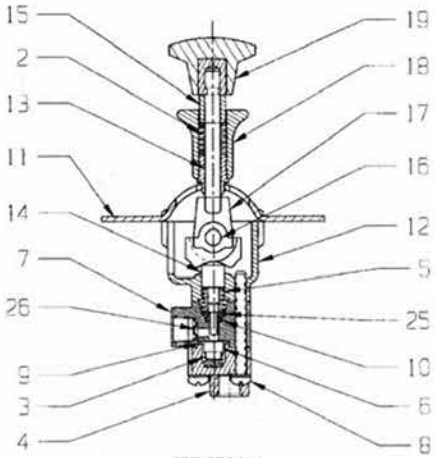


(24) 118716

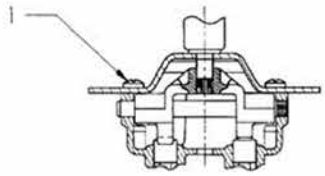
(11) 118289



WM783A1
Detent: Spring Loaded



WM783A
Detent: Pullup



PARTS IDENTIFICATION		
ITEM	DESCRIPTION	QTY.
1	SCREW	4
2	SPRING	1
* 3	SPRING	2
4	INLET BODY	1
* 5	SPRING	2
* 6	POPPET	2
7	BODY ASSEMBLY	2
8	SCREW	6
* 9	O-RING	2
11	VALVE COVER (118289)	1
12	VALVE UPPER BODY	1
13	HANDLE STEM (118291)	1
14	VALVE STEM	2
15	HANDLE BUSHING (118295)	1
16	LEVER PIN	1
17	VALVE CAM	1
18	LATCH ASSY. (118303)	1
19	KNOB (118306)	1

Service this unit with two number 114201 repair kits.
*Asterisk designates parts included in number 114201 repair kits.

SPECIFICATIONS

PORT SIZE . . . . . 1/8-27 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 . . . 15 SCFM @ 100 PSI (0,4 m³/min @ 690 kPa) each side
MOUNTING. . . . . Panel Mounted
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Actuating Cam . . . . . Die Cast Zinc Alloy
Poppets. . . . . Buna N
O-Rings. . . . . Buna N
Actuating Lever Shaft . . . . . .Steel
Knob . . . . . Black Plastic w/ Yellow Safety Latch
WEIGHT . . . . . 1 lb. 1 oz. (0,5 kg)
*For continuous operation beyond this range, contact factory.

MODEL #	PART #
WM783A *	118317
WM783A1	118712
WM783100	118375

* MANUFACTURED BY WILLIAMS CONTROLS

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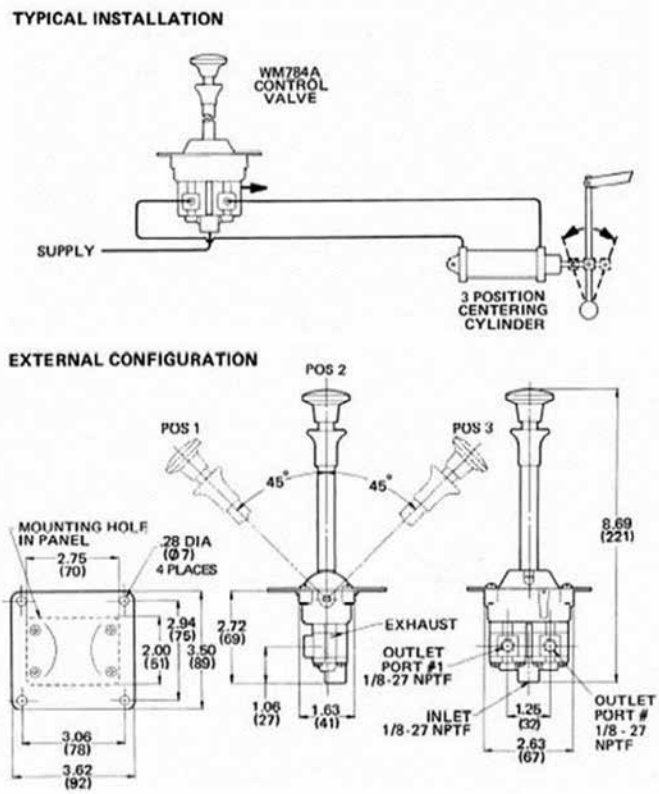
WM784 SERIES

PRODUCT DESCRIPTION

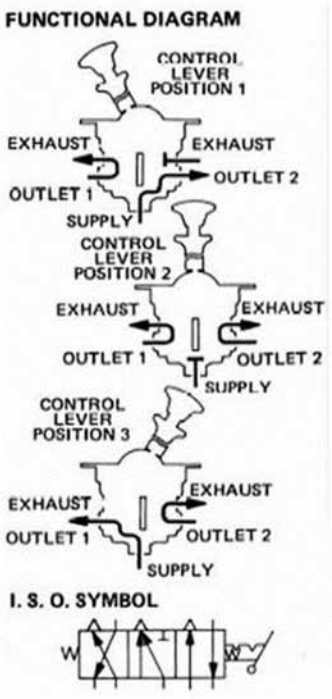
DESCRIPTION The WM784 series is composed of non-compensating, four-way control valves with three functional positions. These valves are actuated by control levers which spring return to the neutral position when they are not manually held in an applied position. WM84B1 models have a detent in the neutral position and WM784A and B models are equipped with a spring-loaded lockout safety device that locks the control lever in the neutral position to prevent unintentional movement.

OPERATION When a WM784 valve's control lever is held in Position 1 (refer to External Configuration.), outlet port 2 receives supply pressure and outlet 1 is exhausted. In Position 2 ("neutral") both outlet ports are exhausted; and outlet port 1 receives supply pressure while outlet 2 is exhausted if the lever is held in Position 3. Whenever the operator released his hold on the control lever, it will spring-return to the neutral position.

APPLICATION The WM784A is a versatile control valve with a variety of industrial and vehicular applications. WM784A valves are frequently used to control air operated relay valves, cylinder and power take off systems.



THREE POSITION SPRING RETURN FOUR-WAY CONTROL VALVE



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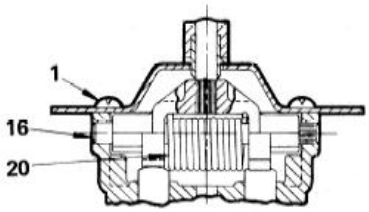
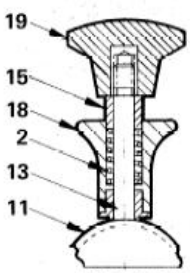
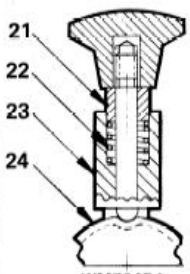
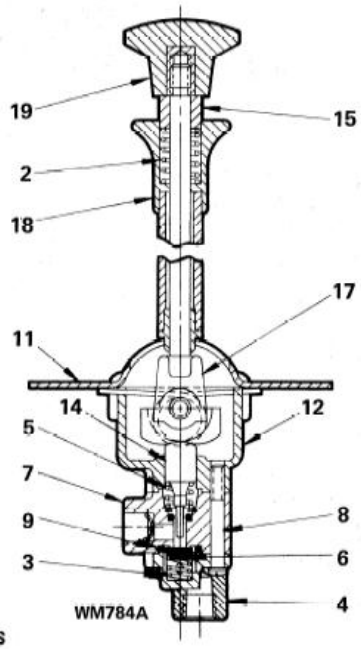




WM784B



WM784B1



WM784A

PARTS IDENTFICATION

ITEM	DESCRIPTION	QTY WM784A	QTY WM784B	QTY WM784B1
1	SCREW (100110)	4	4	4
2	SPRING (101082)	1	1	
*3	SPRING	2	2	2
4	INLET BODY	1	1	1
*5	SPRING	2	2	2
*6	POPPET	2	2	2
7	BODY ASSY.	2	2	2
8	SCREW	6	6	6
*9	O-RING	2	2	2
11	VALVE COVER (118333)	1	1	
12	UPPER BODY	1	1	1
*14	VALVE STEM	2	2	2
15	HANDLE BUSHING (118295)	1	1	
16	LEVER PIN	1	1	1
17	CAM ASSY. (118496 FOR WM784A, 118495 FOR WM784B MODELS)	1	1	1
18	LATCH ASSY. (118304 FOR WM784A,118303 FOR WM784B)	1	1	
19	KNOB (118305)	1	1	1
20	SPRING	1	1	1
21	HANDLE BUSHING (118718)			1
22	SPRING (101685)			1
23	HANDLE DETENT (118719)			1
24	VALVE COVER (118717)			1
NA	1/8 MALE TO 164 FEMALE NPTF 90° ELBOW (FOR OUTLETS)			2
NA	1/8 MALE TO 1/4 FEMALE NPTF ADAPTER (FOR INLET)			1

Service these units with two 118400 repair kits. *Asterisk designates items included in repair kit.

SPECIFICATIONS

PORT SIZE . . . . . 1/8-27 NPTF
(WM784B1 supplied w/1/4-18 NPTF adapters)
MAXIMUM OPERATING PRESSURE. . . . . 150 PSI (1034, 2 kPa)
OPERATING TEMPERATURE* . -20°F to 200°F (-28, 9°C to 93, 3°C)
FLOW RATING. .15 SCFM @ 100 PSI (0,4 m^3/min @ 690 kPa) each side
MOUNTING . . . . . Panel Mounted
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body Castings . . . . . Die Cast Zinc Alloy
Actuating Cam . . . . . Die Cast Zinc Alloy
Poppets . . . . . Buna N
O-Rings . . . . . Buna N
Actuating Lever Shaft . . . . . Steel
Knob . . . . . Black Plastic
Safety Lockout (WM784A & B only) . Yellow Plastic
NET WEIGHT: WM784A . . . . . 1 lb.,3 oz.(0, 5 kg)
WM784B . . . . . 1 lb.,1 oz. (0, 5 kg)
WM784B1 . . . . . 1 lb., 4 oz. (0, 6 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY
WM784A___
Model Number Suffix
PART NUMBER _____
SELECT SUFFIX & PART NUMBER BELOW

SUFFIX	PART NUMBER	LEVER FEATURES	1/8 to 1/4 NPTF FITTINGS	INTERCHANGES W/ WABCO P/N
WM784 A	118318	6" LEVER SAFETY LOCKOUT	NO	2-HA-2Z (P59339)
WM784 B	118437	3"LEVER' SAFETY LOCKOUT	NO	
WM784 B1	118713	3" LEVER NEUTRAL DETENT	YES	

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SECTION 12: ENGINE CONTROLS

WM-499

WM-568

WM-642

WM-663

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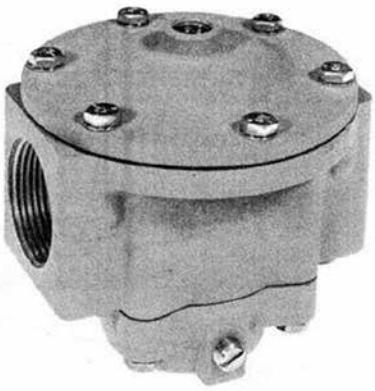
WM499 SERIES

PRODUCT DESCRIPTION

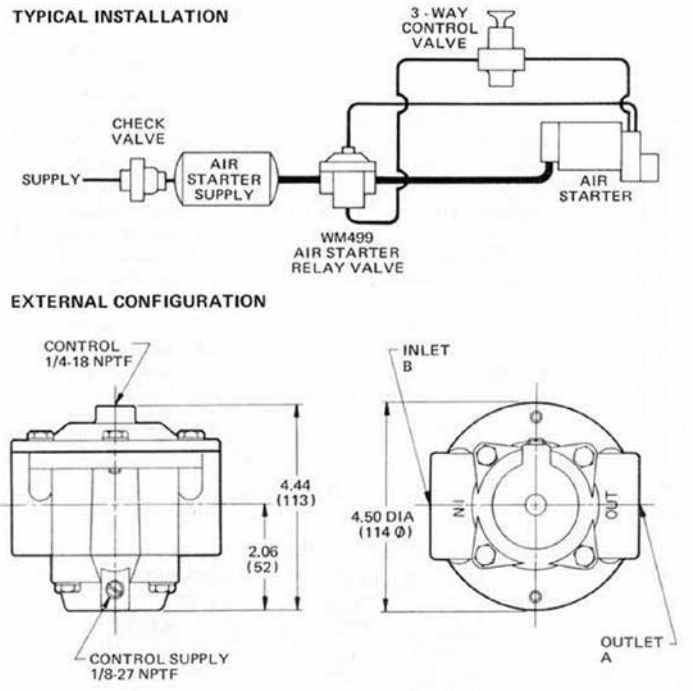
DESCRIPTION The WM499 air starter relay valves are normally closed, non-compensating, two-way relay valves engineered specifically for use with air starters. Suitable for large tubing, the WM499 relay valves are capable of high air flow capacity.

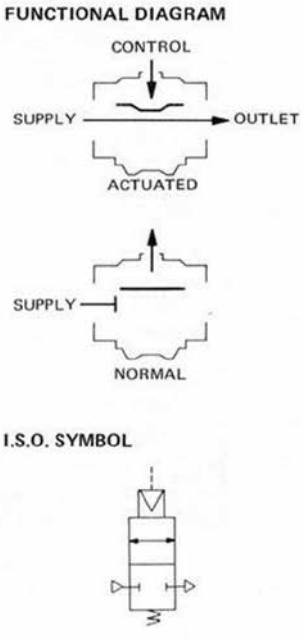
OPERATION To open the valve and allow delivery, the WM499 relay valve is actuated by pressure from a control. With a control pressure of only 30%–35% of the supply pressure, the WM499 valve will open to permit large capacity delivery. A control pressure of approximately 30 PSI (207 kPa), for example, will open the valve against a supply of 100 PSI (690 kPa). When open, the relay valve slows 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 The WM499 relay valves are engineered for use with air starters in industrial and vehicular applications. The WM499 air starter relay valves are especially suited for other applications requiring high flow capacity.



AIR STARTER RELAY





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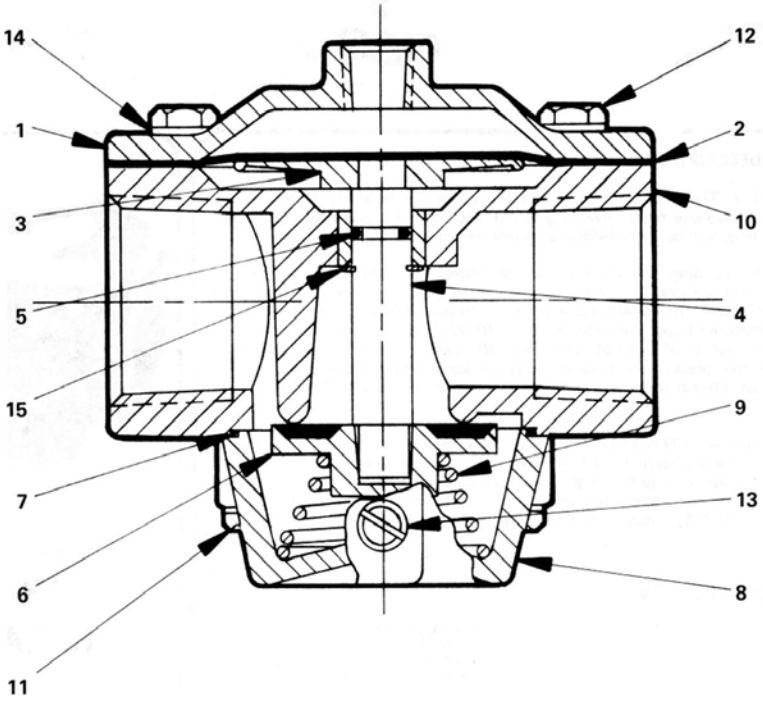

SPECIFICATIONS

PORT SIZES:	Inlet and Outlet: WM499B	1" NPTF
	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 m^3/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 **R499.**

*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 B	113469	1" NPTF	1" NPTF
WM499 C	113470	1¼" NPTF	1¼" NPTF

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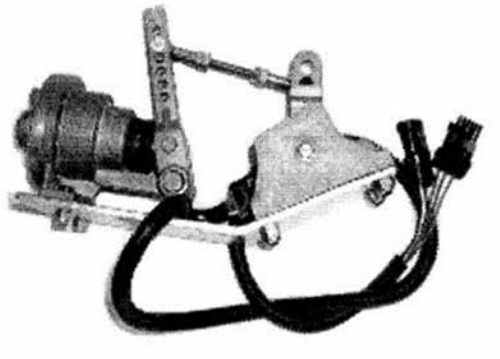
WM568 SERIES



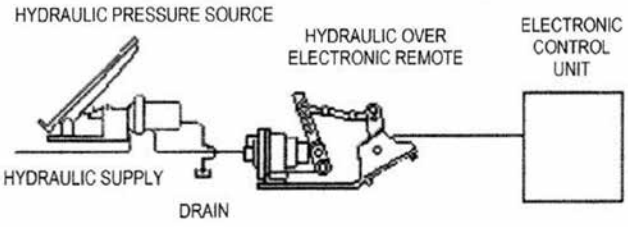
HYDRAULIC / ELECTRONIC REMOTE SENSOR ASSEMBLY

DESCRIPTION

The WM568 Hydraulic over electronic remote control assembly is composed of a hydraulic cylinder which positions an electronic sensor. It is used to control an electronic engine with a variable hydraulic pressure source, 0 to 80 PSI.

- Unit can be used to dampen the response of an electronic engine to accelerator pedal position changes.
- Different sensors can be fit onto the unit to control different models of electronic engines.

DAMPENING APPLICATION



SPECIFICATIONS

Port Size	SAE 6 (9/16-18 UNF) straight thread with o-ring
Maximum operating pressure	125 PSI (850 kPa)
Operating Temperature	-20°F to 200°F (-29°C to 93°C)
Piston area	3.14 in² (20 cm²)
Cylinder stroke	0.5 in (1,3 cm)
Mounting	Bracket on main body
Materials: Body	Iridited die cast aluminum alloy
Cover	Iridited die cast aluminum alloy
Piston assembly	Iridited die cast aluminum alloy
Dynamic seals	Viton
Static seals	Buna N

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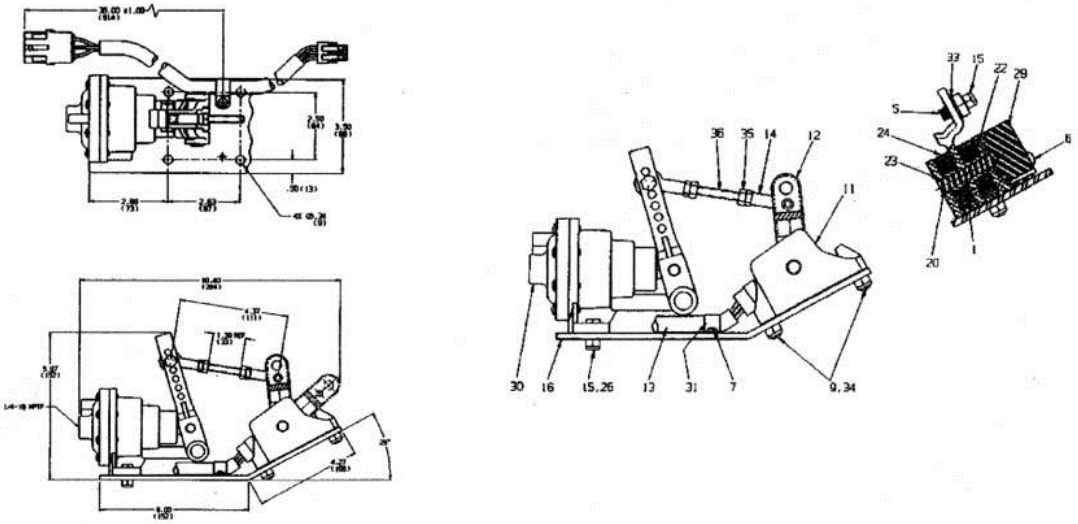
DIMENSIONAL DATA / CROSS SECTION & PARTS INFORMATION



ORDERING INFORMATION

To order, specify WM568 _____(part number). Select part number below.

Part Number	Applicable Engine
WM568E	DDEC II
WM568D	Caterpillar
WM568C	Navistar
WM568B	DDEC III without idle validation switch*
WM568A	Cummins, DDEC III with idle validation switch*

Service Kit	Service Kit Number	Kit Components
Cylinder repair kit	R512	119280 Repair kit, body lever assy. 119153
Part Number WM568A	Sensor Kit 132034	130446 screw, 130996 clamp, 131165 harness, 131308 screw, 131856 sensor
WM568B	132035	130446 screw, 130996 clamp, 131308 screw, 131856 sensor, 131970 harness
WM568C	340000	— — —
WM568D	131384	130446 screw, 130996 clamp, 131272 sensor, 131308 screw
WM568E	131140	130063 harness, 130446 screw, 130656 sensor, 130996 clamp, 131308 screw

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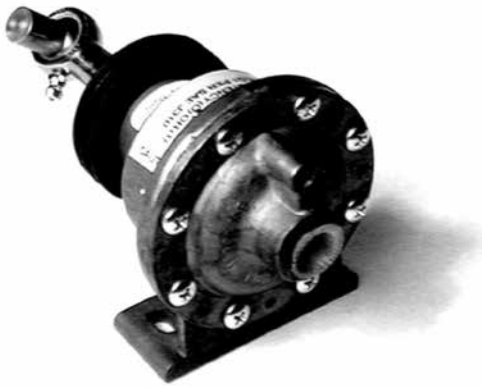
WM642F SERIES

PNEUMATIC THROTTLE CONTROL KIT

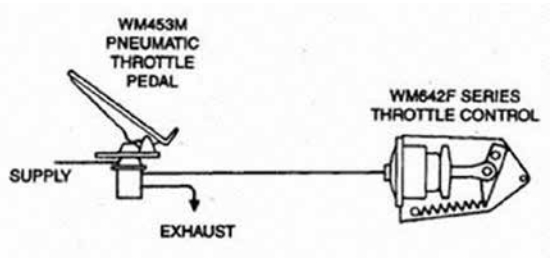
FOR DETROIT DIESEL V-71 AND V-92TT SERIES ENGINES IN FMVSS-124 APPLICATIONS



DESCRIPTION

WM642F series throttle control kit is used to position an engine's throttle lever in response to an air pressure signal from a control valve. The kit contains a WM388U1A1A throttle cylinder, mounting bracket, throttle lever and spring. The mounting bracket installs the cylinder on the limiting speed governor of a Detroit Diesel V-71 or V-92TT series engine. The external spring is provided for compliance with FMVSS-124 requirements. It returns the throttle lever to idle In the event of internal spring failure.

Important: The distance between the control valve and the cylinder must not be subjected to mechanical interference or excessive temperature. When installed according to Williams Controls Industries' specifications, the W642F series complies with FMVSS-124.



SPECIFICATIONS

Port size	1/4-18 NPTF
Maximum supply pressure	150 PSI (1034 kPa)
Operating temperature	-40ºF to 200ºF (-40ºC to 93ºC)
Piston area	3.14 in^2 (20,3 cm^2)
Cylinder stroke	0.5 in (1,3 cm)
Pressure range	0 to 55-60 PSI (0 to 380-414 kPa)
Mounting	Includes bracket for mounting on governor
Materials: Body, cover and piston assembly	Iridited die cast aluminum alloy
Dust boot	Rubber
Bracket	Steel
Weight	2 lb, 8 oz (1,1 kg)

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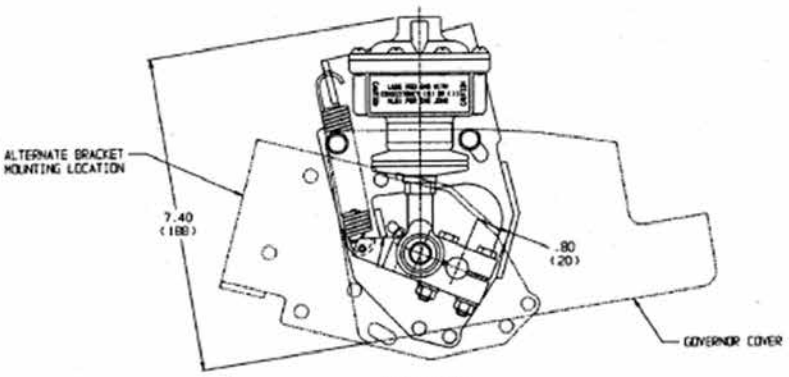
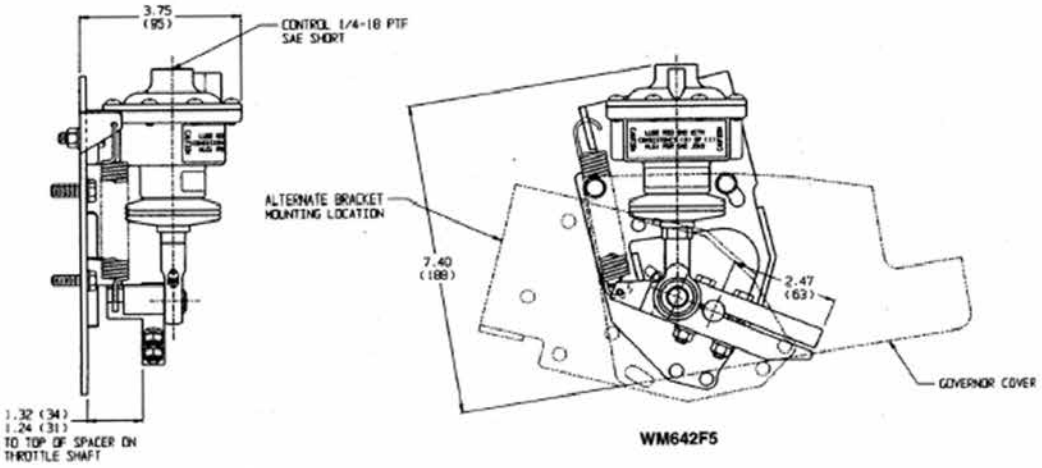
DIMENSIONAL DATA



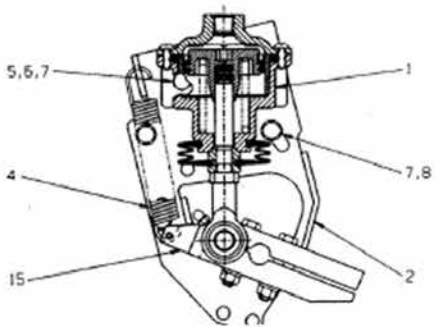
WM642F3



WM642F5

Application shown is for Detroit Diesel V-71 series engine with limiting speed governor. Alternate shown is for V-92TT series with limiting speed governor.

CROSS SECTION & PARTS INFORMATION



ITEM	DESCRIPTION	WM642F3	WM642F5	QTY.
1	Cylinder	117402	117402	1
2	Bracket	119050	119050	1
4	Spring	117404	117404	1
5	Screw	114833	114833	2
6	Nut	114535	114535	2
7	Washer	115023	115023	5
8	Screw	114722	114722	3
15	Lever Assy.	117789	117908	1

Service these units with repair kit 117612. Repair kit includes parts to service the WM388U1A1A cylinder, part number 117402.

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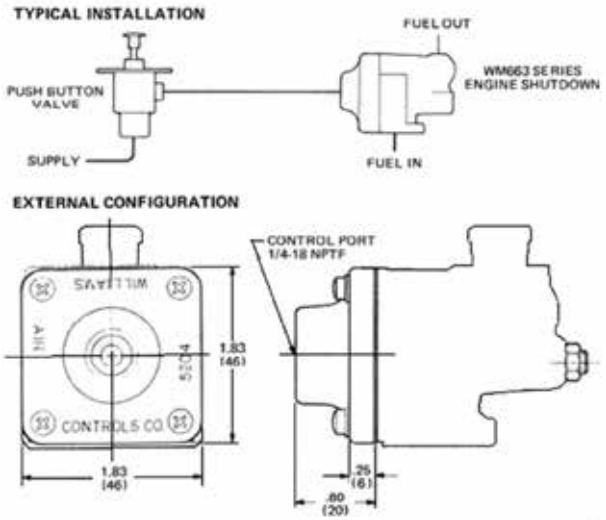
WM663

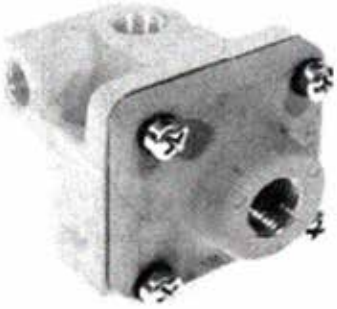
The WM663 engine shutdowns and shutdown kits are designed to replace the electrical solenoid Cummins fuel shutoff valve on Cummins diesel engines. The WM663 engine shutdown valves are normally open, pilot-operated, air pressure-actuated units which provide trouble-free shutdown of the engine's fuel supply. The WM663 shutdown kits consist of the WM663 engine shutdown, an escutcheon plate (part number 105109), and a WM148A push-button control valve.

A driver operated control valve, such as the WM148A push-button valve, is used to supply air pressure to the WM663 engine shutdown. When the control valve is activated, air pressure causes the poppet to seat. The seated poppet blocks the flow of fuel to the engine, thus actuating engine shutdown. When the control valve is released, the poppet is spring-returned and the valve returns to the normally open position.

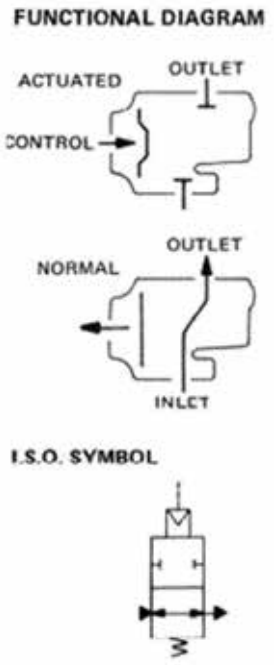
The WM663 engine shutdowns and shutdown kits are designed to replace the standard Cummins fuel pump solenoid on Cummins diesel engines. To install the shutdown valve, the standard solenoid and manual override button shaft are removed. The button shaft hole is plugged with the plug assembly provided. The spring, poppet, diaphragm and cover are secured to the valve body. The WM663 engine shutdown should be used only in applications where the fuel supply tank is lower than the valve. (Otherwise, fuel could accumulate in the engine cylinders during a long shutdown.) The push-button valve supplied in the M663 shutdown kit should be installed on the dashboard near the operator.

IMPORTANT: Consult the Cummins engine manual for information on correct shutdown procedures. The WM663 engine shutdown will operate only at normal idle speeds when there is sufficient air line pressure in the accessory air supply.





ENGINE SHUTDOWN AND SHUTDOWN KIT



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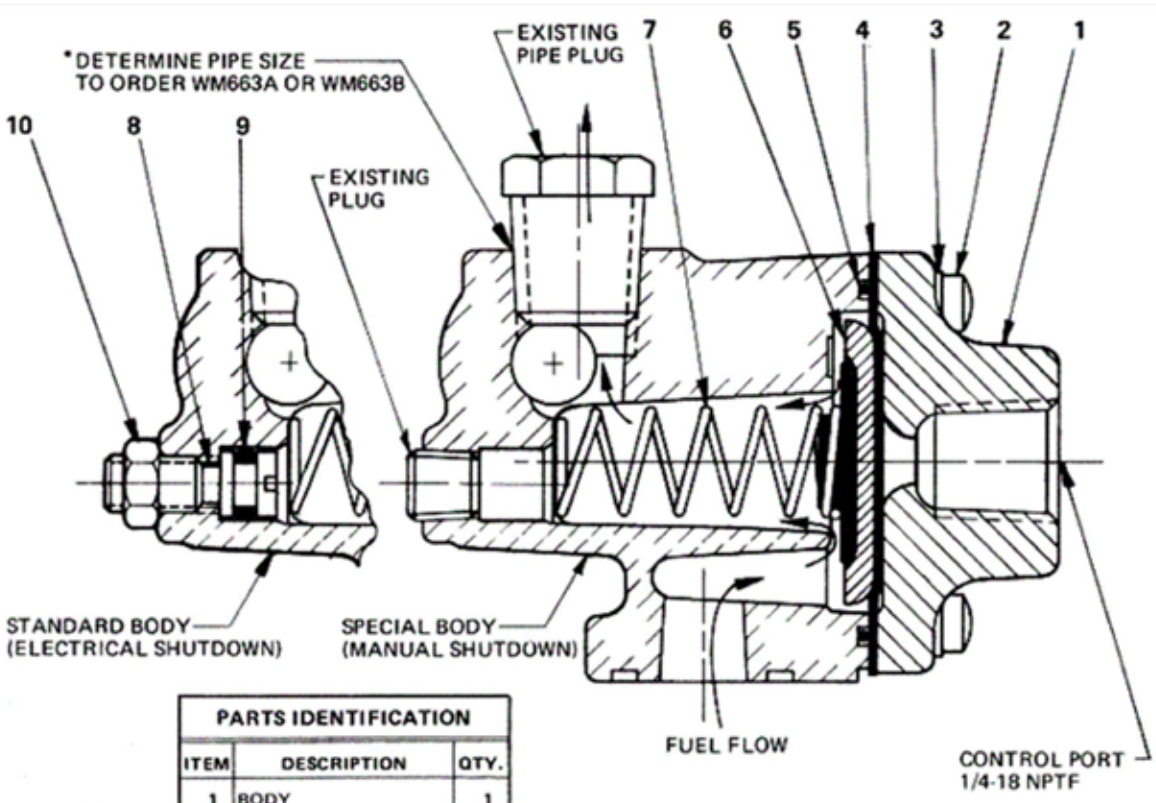

PARTS IDENTIFICATION

ITEM	DESCRIPTION	QTY.
1	BODY	1
2	SCREW	4
3	WASHER	4
4	DIAPHRAGM	1
5	O-RING	1
6	POPPET	1
7	SPRING	1
8	PLUG	1
9	O-RING	1
10	NUT	1

This component is classified as a non-repairable item.

SPECIFICATIONS

PORT SIZE: Control (WM663 Series) . . . . . 1/4-18 NPTF
MAXIMUM OPERATING PRESSURE. . . . . 150 PSI (1034,2 kPa)
OPERATING TEMPERATURE* . . . -20°F to 200°F (-28,9°C to 93,3°C)
MOUNTING. . . . . In Place of Standard Solenoid
MOUNTING ATTITUDE . . . . . Optional
MATERIALS: Body . . . . . Die Cast Aluminum Alloy
Diaphragm. . . . . Fabric-Reinforced Buna N
Poppet . . . . . Buna N
O-Rings. . . . . Buna N
NET WEIGHT (WM663 Shutdown Valve Only). . . . . 2.75 oz. (0,1 kg)
*For continuous operation beyond this range, contact factory.

TO ORDER, SPECIFY

WM663____
Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

SUFFIX*	PART NUMBER	DESCRIPTION
WM663 A	113999	Low Flow Engine Shutdown
WM663 AK1	114000	Low Flow Shutdown Kit
WM663 B	117918	High Flow Engine Shutdown
WM663 BK1	117919	High Flow Shutdown Kit

*On low flow pumps (with 1/8 NPTF pipe fittings), use the WM663A.
On high flow pumps (with 1/4 NPTF pipe fittings), use the WM663B.

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SECTION 13: ACCESSORIES

GAGES

WM-342

WM-778

BRAKE SYSTEMS, INC.
2221 N.E. Hoyt Street • Portland, Oregon 97232 • 503/236-2116 • FAX 503/239-5005 • E-Mail: brakesystems@brakesystemsinc.com

BRAKE SYSTEMS, INC.
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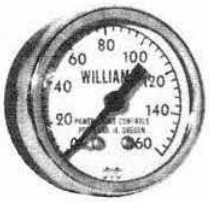
Brake Systems, Inc.

#101203
Air Pressure
0 to 30
1 ½" Face

#101477
Air Pressure
0 to 60
1 ½" Face

#103006
Air Pressure
0 to 100
1 ½" Face

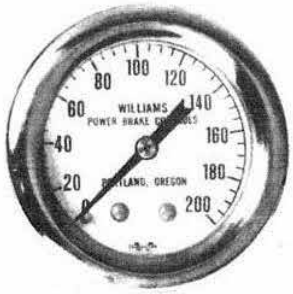


#101372
Air Pressure
0 to 160
1 ½" Face

#103225
Air Pressure
0 to 200
1 ½" Face

#104710
#104712 - 12 VOLT*
Air Pressure
Illuminated Dial
0 to 160
2" Face

#104714 - 12 VOLT
Air Pressure, Duplex Gage
Illuminated Dial
0 to 150
2" Face



#102943
Air Pressure
0 to 200
2" Face

#103717
Air Scale Gage
For Lift Chamber
WM-652
0 to 32 ½
2 ½" Face

#103751
Air Scale Gage
For Lift Chamber
WM-651
0 to 23
2 ½" Face

#101177
Air Pressure
0 to 160
2" Face

#101069
Vacuum
0 to 30
2" Face

ALL GAGES ARE ⅛" N.P.T. THREADS
*PANEL MOUNTING BRACKETS COME WITH GAGES.
WARRANTY DOES NOT APPLY TO GAUGES.

Manufactured in the USA by Brake Systems Inc.

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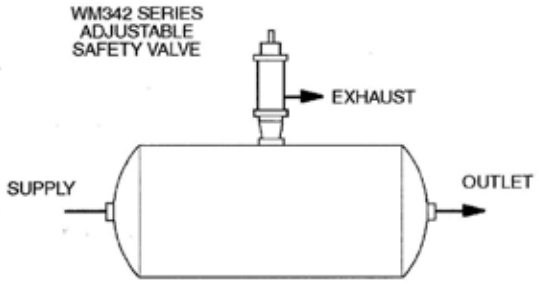
WILLIAMS CONTROLS INC.

WM342 Series Adjustable Safety Valve

EXHAUST ADJUSTABLE FROM 2-300 PSI

DESCRIPTION

Designed for safety-related applications, the WM342 series valves are adjustable air pressure relief valves. They are used primarily in conjunction with air tanks in industrial and vehicular applications. Available with different inlet port sizes, these valves are engineered to relieve supply pressure that exceeds the preadjusted setting. The WM342 valves are factory preset to exhaust above 140/160 PSI. This setting may be adjusted to any value from 2 to 300 PSI.

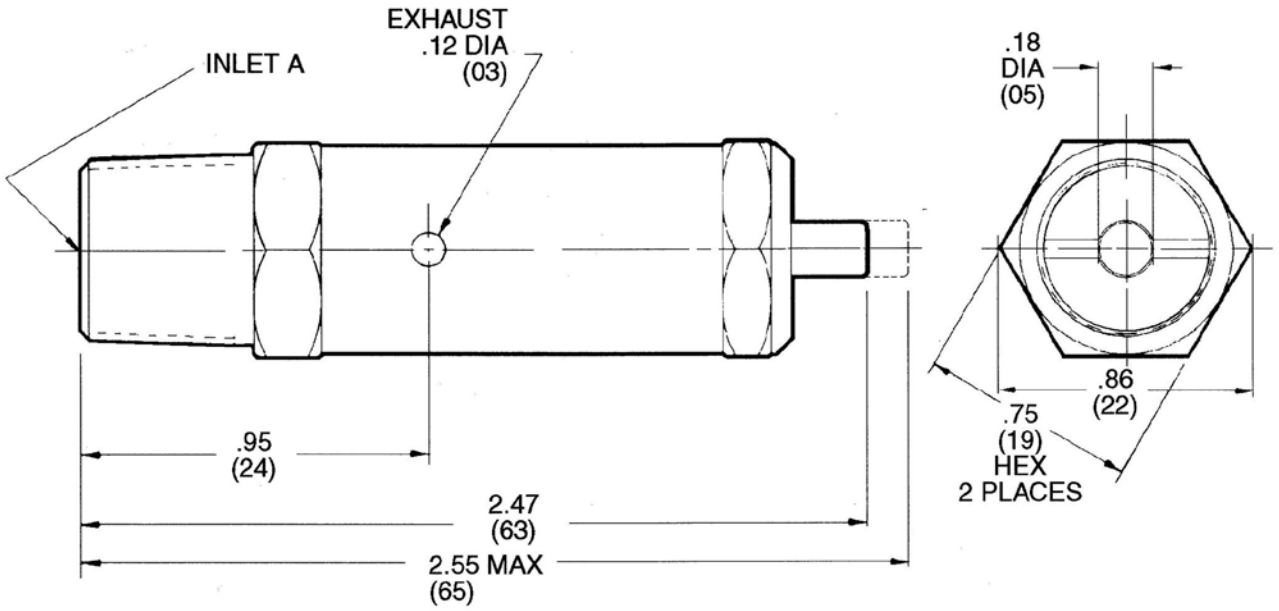


SPECIFICATIONS

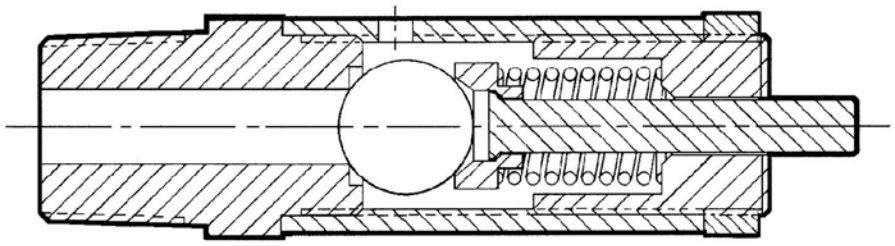
Port size	WM342A	3/8-18 NPTF
	WM342B	1/4-18 NPTF
Maximum supply pressure		300 PSI (2068 kPa)
Operating temperature		-40ºF to 250ºF (-40ºC to 121ºC)
Flow rating at opening		24 SCFM @ 160 PSI (0,7 m^3/min @ 1103 kPa)
Relief pressure adjustment range		2-300 PSI (14 - 1068 kPa)
Relief pressure		Factory preset at 140/160 PSI (965/1103 kPa)
Stem stroke		0.35 inch (9 mm)
Mounting		Designed for pipe mounting using valve inlet port
Mounting attitude		Optional
Materials:	Body	Brass
	Seat	Brass
	Ball	Steel
Weight	WM342A	5 oz (0,1 kg)
	WM342B	4 oz (0,1 kg)

Document Number 119894 Rel. 8/96

DIMENSIONAL DATA



CROSS SECTION



Note: WM342 series are non-repairable items.

ORDERING INFORMATION

To order, specify **WM342** _____(suffix) _____(part number). Select suffix and part number below.

Suffix	Part Number	Inlet A
WM342 A	112405	3/8-18 NPTF
WM342 B	112407	1/4-18 NPTF

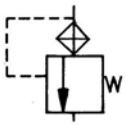
WILLIAMS CONTROLS INDUSTRIES, INC. 14100 SW 72nd Avenue Portland, Oregon USA 97224 (503) 684-8600 Fax (503) 684-8610

WILLIAMS CONTROLS INC.

WM778 SERIES PRESSURE PROTECTION VALVE

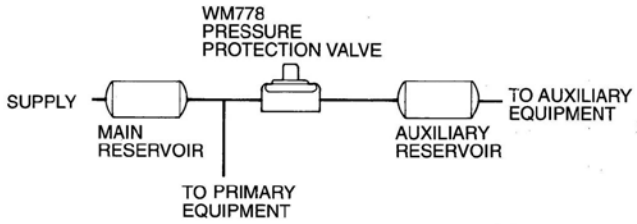
70 PSI NOMINAL HOLDBACK

I.S.O. SYMBOL



DESCRIPTION

The WM778 series are normally closed pressure protection valves often used when an auxiliary system is supplied off a primary system. The valve will protect primary system air pressure by reclosing automatically at a nominal 70 PSI (482 kPa). The WM778 is available with or without a filter installed in its inlet port. The filter will reduce ingestion of contaminants.

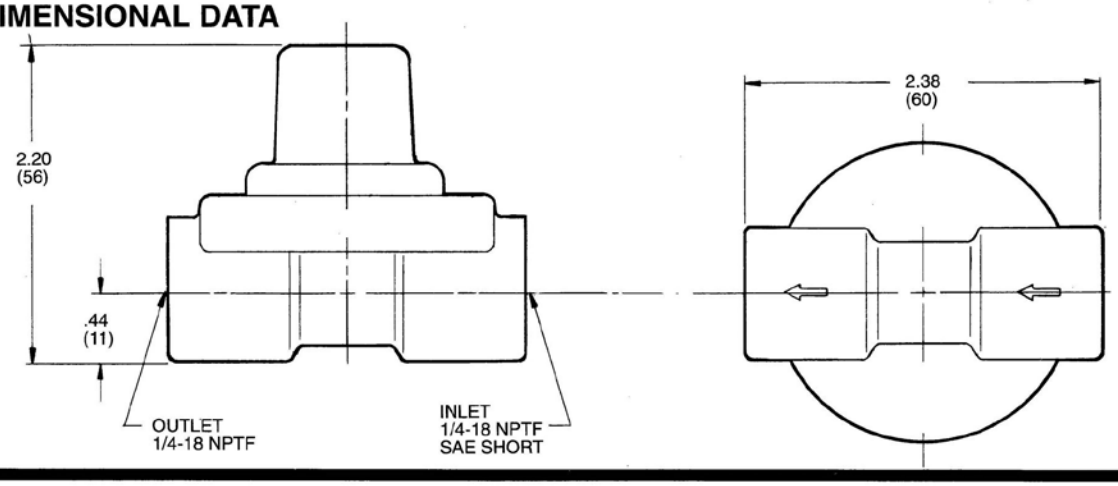


SPECIFICATIONS

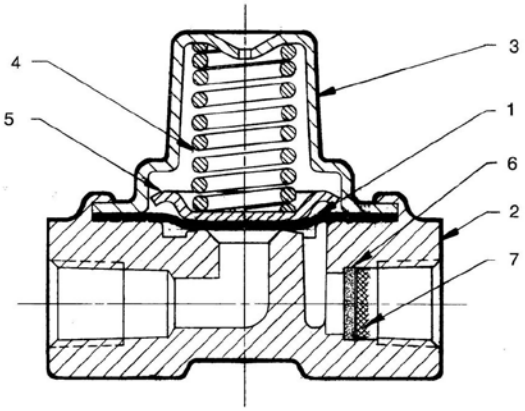
PORT SIZE	1/4-18 NPTF
MAXIMUM OPERATING PRESSURE	150 PSI (1034 kPa)
OPERATING TEMPERATURE	-40°F to 180°F (-40°C to 82°C)
MOUNTING	By Inlet and Outlet Ports
MOUNTING ATTITUDE	Optional
MATERIALS: Body	Die Cast Zinc Alloy
Cover	Zinc-Plated Steel
Diaphragm	Fabric-Reinforced Buna N
WEIGHT	9.5 oz. (0,3 kg)

119998
REV. D 3/93

DIMENSIONAL DATA



SECTIONAL VIEW



ITEM	DESCRIPTION	WM778A	WM778A1	QTY.
1	Diaphragm	118186	118186	1
2	Body	118183	118183	1
3	Cover	118184	118184	1
4	Spring	131367	131367	1
5	Diaphragm Plate	118185	118185	1
6	Filter Disc	—	118587	1
7	Screen	—	116456	1

ORDERING INFORMATION

TO ORDER, SPECIFY

WM778 ____
Model Number Suffix

PART NUMBER _____

SELECT SUFFIX & PART NUMBER BELOW

MODEL	PART NUMBER	WITH FILTER
WM778 **A**	118181	NO
WM778 **A1**	118588	YES

WILLIAMS CONTROLS, INC.
14100 SW 72ND AVENUE, PORTLAND, OREGON 97224
TEL (503) 684-8600 TELECOPIER (503) 684-8610

SIX DIGIT CROSSOVER

6 DIGIT	PART #	DESCRIPTION
100160	R498J-672	Repair Kit
100161	R498R-674	Repair Kit
100162	R498P-673	Repair Kit
100237	R622G	Repair Kit S/A R622X but no piston
100285	WM680A	Quick Release PH 1/4
100294	WM680B	Quick Release PH 3/8
100320	WM460AC	Shift Assembly
100324	WM394-102	Cylinder Assembly
100352	WM101CA	Relay Emerg. 4 Port 3/8 Lid
100354	WM101F	Relay Emerg. 4 Port 1/4 Lid
100361	WM101P	Relay Emerg. 4 Port
100362	WM101R	Relay Emerg.
100407	WM607C1X2	Valve, Hand
100424	R449-102	Repair Kit
100512	WM227F	Relay Valve Assembly
100529	WM227D	Relay Valve Assembly
100561	R608-609	Repair Kit
100578	R680	Repair Kit
100708	WM397J	Valve, Level Low Control
100943	WM394-106	Cylinder Assembly
100965	WM384SE	Cylinder Assembly
100980	R498BCHM	Repair Kit
104067	WM498D	Manifold, Center S/A 104480 Except end port open
104075	WM498A	End Cap
104474	WM498B	Toggle Valve. Zinc Handle Version of WM498W
104475	WM498C	Push Button Valve
104480	WM498D1	Manifold, End S/A 104067 except end port not open
104481	WM498G	Spring Brake Push. Or WM498R which is pull for emergency emergency
104517	WM498F	Push/Pull
104522	WM498E	Dash Valve
104621	WM498H	Toggler Valve
105180	WM129	Bracket
105181	WM129B	Bracket
106704	WM498-108	Panel Assembly
106839	WM498J	Panel Valve
106841	WM674A	Valve, Dual

6 DIGIT	PART #	DESCRIPTION
106848	WM498R	Valve, Dual
106849	WM498P	Control, Spring Brake
106850	WM672A	Valve, Dash
110084	R454B-455	Repair Kit
110208	WM384-107	Cylinder Assembly
110227	WM331C2	Valve, Floor
110245	WM672D	Valve, Dash
110394	WM901A	Control Kit. Includes 110379 solenoid. Can sub WM901F
110402	WM90DM2	Base Valve
110408	WM397L	Valve, Seat Control
110464	WM607A3X2	Valve, Panel
110495	WM7	Check Valve
110504	WM90DN	Base Valve
111112	WM31	Check Valve
111118	WM34P	4 Way Rotary Valve
111135	WM43B1	Regulator. Mounting Bracket 103960
111144	WM44	Water Relay
111148	WM47	Mounting Bracket
111150	WM48B	Pressure Holdback set 60 PSI
111153	WM48C	Pressure Holdback S/A WM48B but w/ small orifice in ouput
111183	WM61	Relay, Vac Re
111196	WM67	Valve, Relay
111198	WM68A1	Valve, Relay, 3 Way with Bracket
111199	WM68A	Valve, Relay, 3 Way Noncompensating
111209	WM71	Water Nozzle Bracket
111228	WM79C	Valve, Check
111231	WM80	Valve, Check, 2 Way
111232	WM80A	Valve, Check, 2 Way
111237	WM81	Switch, Adj Low Pressure
111245	WM83	Check Valve 1/8
111250	WM84	Valve, Check
111257	WM87	Valve, Pressure Holdback
111258	WM87A	Valve, Pressure Holdback
111263	WM87C	Valve, Pressure Holdback
111276	WM90A	Base Valve

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6 DIGIT	PART #	DESCRIPTION
111277	WM90AE	Base Valve
111282	WM90AT	Base Valve
111285	WM90B	Base Valve
111286	WM90BA	Base Valve
111288	WM90BE	Base Valve
111289	WM90BC	Base Valve
111292	WM90BM	Base Valve
111293	WM90BR	Base Valve
111294	WM90BT	Base Valve
111297	WM90BW	Base Valve
111300	WM90D	Base Valve
111301	WM90DA	Base Valve
111302	WM90DB	Base Valve
111303	WM90DM	Base Valve
111304	WM90DT	Base Valve
111305	WM90DW	Base Valve
111366	WM106F	Valve Assembly
111370	WM106H	Control Valve Assembly use WM224H
111411	WM111A	Breather
111412	WM111B	Breather
111416	R148	Repair Kit
111442	WM124A	Breather/Oiler With 1/8 NPT Male
111443	WM124K	Kit Oiler/Breather. Goes with WM728BK1
111443	WM124KM	Kit Breather. Goes with WM728BK1
111446	WM125A	Lever Valve
111526	WM147BC	Valve, Relay NC
111527	WM147C	Valve, Relay NC
111529	WM147D	Valve, Relay NC 2 Way. Actuates at 55 PSI. Super to WM147E
111530	WM147E	Valve, Relay NC
111531	WM147F	Valve, Relay NO
111535	WM147HC	Valve, Relay NO
111538	WM147J	Valve, Relay NO
111542	WM147P	Valve, Relay NO
111549	WM148A	Valve, Push Button
111561	WM148W	Valve, Push Button
111628	WM197A	Check Valve 1/2. Sub WM774A

6 DIGIT	PART #	DESCRIPTION
111630	WM197B	Check Valve 3/4
111659	WM204B	Check Valve 3/4
111776	WM218G1	Cylinder
111814	WM219C1	Valve, Dash
111816	WM219C3	Valve, Dash
111817	WM219C4	Valve, Dash
111817	WM219C4A	Valve, Dash
111841	WM224H	Valve, Hand
111863	WM232A	Valve Assy, Lever Mt
111870	WM242	Bracket, Column Mounting 219
111874	WM245	Bracket, Mounting
111913	WM271A	Valve, Control
111918	WM271D	Valve, Control
111940	WM279E1	Regulator
111946	WM279P	Pressure Regulator 0-100. Use WM279R2
111949	WM279R	Regulator
111978	WM290	Inlet Assembly
111984	WM291S	Valve Assy., Quad
111999	WM292B	Valve, Relay
112013	WM298	Tank
112328	WM336A	Cylinder
112330	WM336B	Cylinder
112331	WM108W	Use WM336C
112331	WM336C	Cylinder
112333	WM336D	Cylinder
112336	WM336G	Cylinder
112341	WM336K	Cylinder
112371	WM338P	Relay Emergency. Input 60 PSI set 22 lbs.
112381	WM338T100	Valve, Relay
112391	WM341D	Tank Saddle
112394	WM341H	Tank. WM341H2 is 8 in. diameter
112396	WM341R	Use WM341R2
112405	WM342A	Valve, Safety
112407	WM342B	Valve, Safety
112468	WM352A	Valve, Base
112471	WM352D	Valve, Base
112475	WM353A	Treadle Valve Assembly
112476	WM353B	Treadle Valve Assembly
112477	WM353C	Treadle Valve Assembly

SIX DIGIT CROSSOVER

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Brake Systems, Inc.

6 DIGIT	PART #	DESCRIPTION
112478	WM353D	Treadle Valve Assembly
112479	WM353E	Valve, Treadle
112481	WM353F	Valve, Treadle
112534	WM366A	Valve, Quick Release
112536	WM366B	Valve, Quick Release
112550	WM371A	Valve, Push Button
112609	WM384AK	Cylinder Assembly
112610	WM384B	Cylinder Assembly
112624	WM384H	Cylinder Assembly
112625	WM384HB	Cylinder Assembly
112628	WM384J	Cylinder Assembly
112628	WM384JBK	Cylinder Assembly
112639	WM384N	Cylinder Assembly
112641	WM384P	Cylinder Assembly
112643	WM384R	Cylinder Assembly
112644	WM384TBK	Cylinder Assembly
112646	WM384RAK2	Cylinder Assembly
112652	WM384S	Cylinder Assembly
112655	WM384SB	Cylinder Assembly
112657	WM384SC	Cylinder Assembly
112659	WM384T	Cylinder Assembly
112663	WM384TB	Cylinder Assembly
112670	WM384U	Cylinder Assembly
112671	WM384V	Cylinder Assembly
112675	WM384W	Cylinder Assembly
112675	WM384WA	Cylinder Assembly
112677	WM384WAK	Cylinder Assembly
112726	WM394B	Cylinder Assembly
112729	WM394C	Cylinder Assembly
112730	WM394CA	Cylinder Assembly
112731	WM394CB	Cylinder Assembly
112732	WM394D	Cylinder Assembly
112733	WM394DA	Cylinder Assembly
112734	WM394E	Cylinder Assembly
112735	WM394EA	Cylinder Assembly
112736	WM394F	Cylinder Assembly
112740	WM394R	Cylinder Assembly
112741	WM394RA	Cylinder Assembly
112742	WM394S	Cylinder Assembly
112743	WM394SA	Cylinder Assembly
112744	WM394SB	Cylinder Assembly
112745	WM394SC	Cylinder Assembly
112746	WM394SD	Cylinder Assembly

6 DIGIT	PART #	DESCRIPTION
112747	WM394SE	Cylinder Assembly
112749	WM394T	Cylinder Assembly
112750	WM394TA	Cylinder Assembly
112759	WM394W	Cylinder Assembly
112760	WM394WA	Cylinder Assembly
112761	WM394WAK	Cylinder Assembly
112766	WM394-100	Cylinder Assembly
112773	WM396C	Valve Assembly
112774	WM396D	Valve Assembly
112780	WM397C	Valve, Seat Control
112794	WM399E	Dual Treadle Assembly
112799	WM399L	Treadle, Double
112800	WM399M	Treadle, Double
112803	WM400A	Pressure Regulator
112805	WM400B	Pressure Regulator
112806	WM400C	Pressure Regulator
112808	WM401A	Pressure Control
112809	WM401B	Pressure Control
112841	WM412A	Valve, Shuttle
112848	WM413A	Valve, Shuttle
112972	WM448A1	Cylinder Assembly
112973	WM448A2	Cylinder Assembly
112974	WM448A2A	Cylinder Assembly
112975	WM448A3	Cylinder Assembly
112979	WM448B1	Cylinder Assembly
112981	WM448B2	Cylinder Assembly
112982	WM448B3	Cylinder Assembly
112990	WM448B3K2	Cylinder Assembly
112991	WM448B3K3	Cylinder Assembly
112993	WM448C1	Cylinder Assembly
112994	WM448C2	Cylinder Assembly
112995	WM448C3	Cylinder Assembly
113002	WM449A1	Cylinder Assembly
113008	WM449A2	Cylinder Assembly
113009	WM449A3	Cylinder Assembly
113014	WM449B1	Cylinder Assembly
113015	WM449B1A	Cylinder Assembly
113017	WM449B2	Cylinder Assembly
113018	WM449B3	Cylinder Assembly
113019	WM449B3A	Cylinder Assembly. 1-3/16 Stroke Std. End Cap Align
113021	WM449C1	Cylinder Assembly
113024	WM449C2	Cylinder Assembly

SIX DIGIT CROSSOVER

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6 DIGIT	PART #	DESCRIPTION
113025	WM449C2A	Cylinder Assembly
113026	WM449C3	Cylinder Assembly
113028	WM449D1	Cylinder Assembly
113029	WM449D2	Cylinder Assembly
113030	WM449D3	Cylinder Assembly
113032	WM449E1	Cylinder Assembly
113033	WM449E2	Cylinder Assembly
113034	WM449E3	Cylinder Assembly
113035	WM449F1	Cylinder Assembly
113036	WM449F2	Cylinder Assembly
113037	WM449F3	Cylinder Assembly
113038	WM449G	Cylinder Assembly
113039	WM449G2	Cylinder Assembly
113041	WM449H	Cylinder Assembly
113043	WM449J	Cylinder Assembly
113051	WM449-101	Cylinder Assembly
113051	WM449-102	Cylinder Assembly
113072	WM453A	Pedal, Throttle
113073	WM453B	Pedal, Throttle
113074	WM453C	Pedal, Throttle
113117	WM458B	Valve, Control. For 445/466/487
113122	WM459D	Panel, Control. Use WM459L
113125	WM459F	Panel, Control
113129	WM459L	Panel, Control
113130	WM459P	Panel, Control. 100 PSI version of WM459L which is 85 PSI
113131	WM459L2	Panel, Control. With duplex gauge
113155	WM463A	Cylinder Assembly
113156	WM463B	Cylinder Assembly
113157	WM463C	Cylinder Assembly
113158	WM463D	Cylinder Assembly
113159	WM463E	Cylinder Assembly
113160	WM463F	Cylinder Assembly
113161	WM463H	Cylinder Assembly
113162	WM464A	Cylinder Assembly
113163	WM463I	Cylinder Assembly
113163	WM464B	Cylinder Assembly
113164	WM464C	Cylinder Assembly
113165	WM464D	Cylinder Assembly
113218	WM472A	Valve, Treadle

6 DIGIT	PART #	DESCRIPTION
113220	WM472C	Valve, Treadle
113222	WM472D	Valve, Treadle
113224	WM472E	Valve, Treadle
113245	WM475B1	Cylinder Assembly
113248	WM475B2	Cylinder Assembly
113250	WM475C1	Cylinder Assembly
113251	WM475C2	Cylinder Assembly
113253	WM475C2K	Cylinder Assembly
113258	WM476A	Use WM476F5A1
113259	WM476B	Valve, Treadle
113260	WM476C	Valve, Treadle
113273	WM479A	Relay
113361	WM493A	Reverse Treadle
113364	WM493D	Reverse Treadle
113367	WM494A	Relay
113370	WM495B	Cylinder Assembly
113412	WM498-602	Panel Assembly. S/A WM498ACCA
113413	WM498-603	Panel Assembly. S/A WM498ACCCCA
113469	WM499B	Relay, Starter
113470	WM499C	Relay, Starter
113714	WM606A1	Valve, Hand
113717	WM606A2	Valve, Hand
113719	WM606B1	Valve, Hand
113724	WM606C1	Valve, Hand
113726	WM606C1C	Valve, Hand
113727	WM606C2	Valve, Hand
113730	WM606C2C	Valve, Hand
113733	WM606D1	Valve, Hand
113736	WM606E1	Valve, Hand
113744	WM607A1	Valve, Hand
113747	WM607A1X2	Valve, Hand
113750	WM607A3	Valve, Hand. Can sub WM607A3X2
113754	WM607B1	Valve, Hand
113760	WM607B3	Valve, Hand
113762	WM607C1	Valve, Hand
113768	WM607C3	Valve, Hand
113778	WM607E1	Panel Valve
113793	WM608A	Push/Pull Lever MT
113795	WM609A	Valve, Flipper
113820	WM612C1	Cylinder Assembly

SIX DIGIT CROSSOVER

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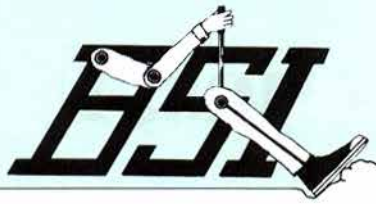

Brake Systems, Inc.

6 DIGIT	PART #	DESCRIPTION
113827	WM614A1	Pressure Regulator
113828	WM614A2	Pressure Regulator
113829	WM614B1	Pressure Regulator
113830	WM614B2	Pressure Regulator
113831	WM614C1	Pressure Regulator
113832	WM614C2	Pressure Regulator
113833	WM614D1	Pressure Regulator
113834	WM614D2	Pressure Regulator
113837	WM615SC	Cylinder Assembly
113840	WM615-100	Cylinder Assembly
113841	WM615-101	Cylinder Assembly
113842	WM616A	Quick Release
113844	WM617A	Valve, Relay
113862	WM622B	Cylinder Assembly
113864	WM622D	Cylinder Assembly
113866	WM622F	Cylinder Assembly
113867	WM622G	Cylinder Assembly
113881	WM626B	Push Button Valve
113891	WM628B	Control Valve Assembly
113898	WM629BK1	
113911	WM633B	Cylinder Assembly
113917	WM635A3	Cylinder Assembly
113919	WM635B3	Cylinder Assembly
113923	WM637A3	Cylinder Assembly 1.25 D.A.
113925	WM637B3	Cylinder Assembly 1.25 D.A.
113927	WM637C3	Cylinder Assembly 1.25 D.A.
113928	WM637D3	Cylinder Assembly 1.25 D.A.
113934	WM639A	Valve, Shuttle
113935	WM640A	Valve, Treadle
113944	WM642A	Slave Throttle
113970	WM651A	Chamber, Scale 18 in.
113973	WM652A	Chamber, Scale 21 in.
113978	WM653C	Pop Off Standard Lift
113979	WM653D	Pop Off High Lift
113981	WM654A	Valve Air Saver
113983	WM655A	Switch. Use WM655B
113989	WM660B	SL Switch 1/8 MNPT. See WM660A
113993	WM660F	SL Switch 1/8 MNPT. Use WM660A or B
113999	WM663A	See WM663B or WM663AK1
114049	R87	Repair Kit
114059	R44	Repair Kit

6 DIGIT	PART #	DESCRIPTION
114067	R57	Repair Kit
114068	R58	Repair Kit
114069	R61	Repair Kit
114072	R64	Repair Kit
114074	R67	Repair Kit
114075	R68	Repair Kit
114087	R80	Repair Kit
114093	R86	Repair Kit
114094	R87	Repair Kit
114095	R87A	Repair Kit
114097	R87C	Repair Kit
114100	R90	Repair Kit
114112	R101	Repair Kit
114116	R106	Repair Kit
114127	R108	Repair Kit
114134	R125A	Repair Kit
114139	R126	Repair Kit
114149	R147	Repair Kit
114154	R147F	Repair Kit. Use R147
114158	R147HCHDHE	Repair Kit
114160	R147J-TT	Repair Kit
114161	R147P	Repair Kit
114174	R198	Repair Kit
114188	R218AC	Repair Kit
114189	R218AF	Repair Kit
114200	R218Z3K2	Repair Kit
114208	R227	Repair Kit
114224	R279	Repair Kit
114228	R288	Repair Kit
114233	R292	Repair Kit
114238	R305	Repair Kit
114240	R309AJSR	Repair Kit
114241	R309	Repair Kit
114258	R314	Repair Kit
114260	R317	Repair Kit
114262	R318	Repair Kit
114264	R320	Repair Kit
114266	R321	Repair Kit
114267	R325	Repair Kit
114269	R326	Repair Kit
114279	R331-471	Repair Kit
114282	R332A	Repair Kit
114283	R332B	Repair Kit

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6 DIGIT	PART #	DESCRIPTION
114287	R336	Repair Kit
114289	R338DSTS	Repair Kit
114293	R338MP	Repair Kit
114299	R352-400	Repair Kit
114306	R353AF	Repair Kit
114310	R371	Repair Kit
114321	R384-394	Repair Kit
114329	R388	Repair Kit
114331	R392	Repair Kit
114332	R394TUVW-105	Repair Kit
114336	R397	Repair Kit
114340	R399	Repair Kit
114346	R401	Repair Kit
114353	R413	Repair Kit
114355	R43-70	Repair Kit
114356	R445	Repair Kit
114367	R448	Repair Kit
114371	R449	Repair Kit
114375	R4517	Repair Kit
114375	R498EF	Repair Kit
114378	R453ABCD	Repair Kit
114395	R458	Repair Kit
114399	R459	Repair Kit
114400	R460	Repair Kit
114402	R460AA	Repair Kit
114406	R462	Repair Kit
114408	R463-601	Repair Kit
114417	R472	Repair Kit
114428	R475ABE	Repair Kit
114430	R475BE	Repair Kit. Super to R475ABE
114432	R475CDF	Repair Kit
114433	R475C2	Repair Kit
114438	R476	Repair Kit
114441	R479	Repair Kit
114444	R486	Repair Kit
114447	R488	Repair Kit
114453	R493	Repair Kit
114454	R494A	Repair Kit
114455	R495	Repair Kit
114461	R499	Repair Kit
114471	R606-607	Repair Kit
114477	R611	Repair Kit
114478	R612A	Repair Kit

6 DIGIT	PART #	DESCRIPTION
114479	R612A2	Repair Kit
114484	R615	Repair Kit
114485	R616A	Repair Kit
114488	R617	Repair Kit
114490	R621	Repair Kit
114493	R622B	Repair Kit
114494	R622D	Repair Kit
114496	R622	Repair Kit
114500	R626B	Repair Kit
114501	R628	Repair Kit
114503	R630	Repair Kit
114505	R631	Repair Kit
114508	R633	Repair Kit
114510	R635-637A	Repair Kit
114511	R640A	Repair Kit
114513	R653B	Repair Kit
114514	R653C	Repair Kit
114515	R653D	Repair Kit
114516	R654A	Repair Kit
116697	WM90DX	Base Valve
116702	WM607C3C2	Valve, Hand
116714	WM111D	Breather
116731	WM453M	Pedal, Throttle
116736	WM607A1C2	Valve, Hand
116772	WM384-109	Cylinder Assembly
116773	WM384-110	Cylinder Assembly
116784	WM642C	Throttle, Slave
116857	WM453M100	Treadle Assembly
117005	WM774A	Valve, Check 1/2
117067	WM764A6A	Dash Valve
117069	WM762A2A	Valve, Dash Tractor
117083	WM55A	Control 4 Way
117103	R90DX	Repair Kit
117126	WM763A4A	Dash Valve Blue Knob
117209	WM476F5A1	Valve, Treadle. FMVSS 124 0-60 WM90DX
117262	WM90DX1	Valve, Base 10-60
117266	WM763-101	Control. Std WM763 with blank knob
117269	WM90DX2	Valve, Base 0-90
117270	WM453N	Pedal, Throttle
117360	WM476F4A	Valve, Treadle
117366	WM901F	Control Kit

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6 DIGIT	PART #	DESCRIPTION
117402	WM388U1A1A	Throttle, Slave
117431	WM901E	Control Kit
117451	WM762A1A	Dash Valve
117527	WM453-109	Pedal, Throttle
117535	WM90DX3	Base Valve 0-75. S/A WM90DX2 for most purposes
117538	R476F	Repair Kit
117558	WM902A	Mounting Kit. 770 to 5 in. OD
117559	WM902B	Mounting Kit
117560	WM902C	Mounting Kit 4 ID. 770 to 4 in. ID
117561	WM902D	Kit 770. To 4 Bolt
117562	WM902E	Mounting Kit 3.5 ID
117582	R453M	R453M/N/100 Repair Kit
117583	R453N	Repair Kit. Superceded to R453M
117599	WM279R2	Regulator
117612	R642E	Repair Kit
117638	WM642-101	Throttle Slave
117643	R388D3TW	Repair Kit
117659	R762-763	Repair Kit
117660	R764	Repair Kit
117661	R642CD	Repair Kit
117670	R449G2H	Repair Kit
117679	R466	Repair Kit
117683	WM498W	Valve, Toggle
117684	R635-637	Repair Kit
117686	R635-637CD	Repair Kit
117697	R642-102	Repair Kit
117775	R388U1CXX	Repair Kit
117830	WM775B	Modulator Trans
117835	WM903A	Mounting Kit 3.5 ID
117836	WM903B	Mounting Kit 3.0 ID
117837	WM903C	Mounting Kit 2.5 ID. WM760/780 to 2.5 in.
117838	WM903D	Mounting Kit 58mm OD. WM760A to 58mm
117872	WM612-101	Cylinder Assy, Throttle
117873	R612-101	Cylinder Repair Kit
117886	WM388U1C2B	Throttle Slave
117888	WM388U1C1D	Throttle Slave
117889	WM384-112	Cylinder Assembly
117894	WM642F1	Throttle Slave
117898	R388-100	Repair Kit
117903	WM453M2	Treadle Assembly

6 DIGIT	PART #	DESCRIPTION
117914	WM448B1B	Cylinder Assembly
117916	R622X	Repair Kit
117930	WM498K1	Repair Kit
117931	WM498K2	Repair Kit
117979	R388U1AXX	Parts Kit WM388U1A1A
117983	WM352F	Valve, Base
117985	WM388-105	Cylinder, Control. S/A WM388U1C1D
117996	WM780-100	Brake Assembly
118012	WM780A	Brake Assembly
118017	WM124K3H	Remote Breather Kit
118041	WM111C	Breather - Hi Temp
118051	WM763A8A	Dash Valve Black Knob
118058	WM769A	Cylinder Assembly
118065	WM493-100	Reverse Treadle
118090	WM388-106	Cylinder, Control
118116	R770D/780	Repair Kit. Shell Assembly separately 117035
118117	WM453M3	Treadle Assembly
118139	WM770D	Brake Assembly
118147	R305D	Repair Kit
118150	WM777A	Switch, Stop Light 1/8 Male NPT
118181	WM778A	Valve, Pressure Holdback
118217	WM388-109	Throttle Slave
118250	WM779A	Switch Kit
118266	WM305D1	Valve, Treadle
118279	WM325D	Dash Valve with red knob
118315	WM781A	Valve, Control, 3 Way 2 Position
118316	WM782A	Valve, Control, 4 Way
118317	WM783A	Valve, Control, 4 Way
118318	WM784A	Valve, Control
118336	WM786A1	Valve, Panel Hand
118337	WM786A2	Valve, Panel Hand
118338	WM786A3	Valve, Panel Hand
118339	WM786A4	Valve, Panel Hand. Replaced by WM786A3
118340	WM786B1	Valve, Pressure Regulator
118341	WM786B2	Valve, Panel Hand
118342	WM786B3	Valve, Panel Hand
118365	WM778-100	PHB Valve
118374	WM782-100	Valve, Dual
118375	WM783-100	Valve, Control, 4 Way
118393	WM630-101	Valve, Relay

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6 DIGIT	PART #	DESCRIPTION
118400	R781	R781,782,783,784SER Repair Kit
118401	WM787A	Valve Assembly. Super by WM787D
118406	WM770F	Brake Assembly
118421	WM788A	Cyl Assy Throttle
118437	WM784B	Valve, 3 Position Dual
118446	R788A	Repair Kit
118472	WM475H	Cylinder Assembly
118499	WM388U1D1A	Cylinder, Control
118552	WM792A1	Control
118558	WM792D3	Control
118562	WM793C2	Control
118566	WM794D1	Control
118569	WM786-100	Valve, Panel Hand
118573	WM787-100	Control, 4 Way Mod
118584	R475H	Repair Kit
118588	WM778A1	Valve, Pressure Holdback
118591	WM763-103	Control, Dash
118705	WM787B	Valve Assembly. Use WM787D
118710	WM781A1	Control Valve 3 Way
118711	WM782A1	Control. Use WM782A
118712	WM783A1	Valve, Control 4 Way S/A WM783A w/ different handle
118713	WM784B1	Valve, Control
118741	WM642G	Throttle Slave
118742	WM642G1	Kit, Throttle Slave. With one WM769A
118743	WM642G2	Kit, Throttle Slave. With two WM769A
118760	R791-234	Repair Kit
118789	WM782-102	Valve, Control
118872	WM453-110	Treadle Assembly
118882	WM787C	Valve Assembly. Replaced by WM787F
118962	WM453M110	Treadle Assembly
119068	WM782B	Valve, Control
119070	WM484L	Panel with guage. New as WM484L1
119073	WM484M1	Valve. Handle valve is WM782B
119120	R484LMN	Repair Kit
119125	R507C	Repair Kit
119128	WM514C	Valve, Base for WM511C/515C
119129	WM515C	Valve, Treadle

6 DIGIT	PART #	DESCRIPTION
119130	WM511C	Valve, Treadle. Base Valve WM514C
119131	WM514H	Valve, Control. Repair Kit R511
119132	WM515H	Valve, Treadle. Base Valve WM514H
119136	WM513A	Valve, Quick Release
119142	WM642F3	Control, Throttle
119151	WM642F5	Control, Throttle
119195	WM775-101	Modulator. Use WM775B
119252	WM901H	Control Kit
119280	R512	Repair Kit
119305	R511	R511,514,515 Series Repair Kit
119417	WM901J	Control Kit
119431	WM901K	Control Kit
119436	WM512C	Cyl. Hyd Slave
119439	R271AB	Repair Kit
119440	R271DE	Repair Kit
119480	R147BCCDE	Repair Kit. S/A R147/147L/114149
119493	WM517A	Panel, Control. Repl valve
119518	WM779B	Switch Kit
119566	WM901L	Control Kit. With Whisker Switch 119570
119568	R501	Repair Kit, Minor.
119666	WM453-114	Treadle Assembly
119667	WM388U1C3D	Throttle/Fast Idle
119684	WM453M102	Treadle Assembly
130035	WM147J100	Relay
130046	WM770-102	Brake Assembly
130046	WM780-102	Brake Assembly
130065	WM518A	Transmission Valve, 4 Way
130091	WM902A1	Mounting Kit
130100	WM902C2	Kit 770. Ford 3208T Kit 4 in. OD
130203	R388-U1C3D	Repair Kit
130233	WM901M	Control Kit
130291	WM523F	
130300	WM521A1	Valve, Control
130364	WM476F5A2	Treadle Assembly
130386	WM522A1	Valve, Quad
130424	WM521B1	Valve, Control, 2 Set
130425	WM521C1	Valve, Control, 3 Set
130426	WM521D1	Valve, Control, 4 Set
130427	WM521E1	Valve, Control, 5 Set. Sell WM521RE1

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6 DIGIT	PART #	DESCRIPTION
130439	WM782A2	Valve, Control, 4 Way. S/A WM782A Except Chrome Mtg.
130463	R521x1	R521,787 F,G Repair Kit
130475	WM521RA1	Valve, Control. Can use WM521A1 hass different ports
130476	WM521RB1	Valve, Control. Use WM521B1
130477	WM521RC1	Valve, Control
130478	WM521RD1	Valve, Control
130479	WM521RE1	Valve, Control
130492	WM787F	Control, 4 Way Mod
130500	WM522C1	Superceded by WM522D1
130506	WM459R	Panel, Control. Like 459L with different plumbing
130521	R787DE	Repair Kit
130524	WM901N	Control Kit
130562	R787F	Repair Kit. Replaced by R521X1
130591	R523F	Repair Kit
130635	R522A	Repair Kit
130640	WM901E2	Control Kit
130658	WM903G	Mounting Kit 3.0 ID
130663	WM279E3	Regulator
130772	R279E3	Repair Kit
130823	WM453-115	Treadle Assembly
130845	WM147L1	Valve, Relay
130877	WM413A1	Shuttle Double
130940	WM521RA4	Control Valve
130953	WM770-105	Brake Assembly
130972	R147L1	Repair Kit
130982	WM472-101	Treadle Assembly
131224	WM770-106	Brake Assembly
131302	WM388U1C4D	Slave from WM568
131310	WM81-110	Adj. Press. Swit S/A WM81 set at 35 PSI
131314	WM472-102	Treadle Assembly
131333	WM770-109	Brake Assembly
131376	WM318C1	Tractor Protection
131383	WM782-104	Control Valve
131385	WM782-105	Control Valve
131494	WM902F	Mounting 4 ID
131495	WM903H	Mounting Kit
131523	WM338T101	Relay NO
131618	R388U1C4D	Repair Kit. Identical to R388U1CXX
131635	WM511H	Base Valve WM514H

6 DIGIT	PART #	DESCRIPTION
131860	WM522D1	Control Valve
131934	WM655B	Swith, Stoplight
133280	WM781-100	Control Valve 3 Way
134116	WM472F	Treadle Assembly
135235	WM781	Control 3 Way 2 Position
160026	WM901R	Control Kit FL50
160111	WM576A	Kit, Trailer Brake Test
210714	WM359C	
231080	WM394FWD	Cylinder Assembly
811790	WM218TA	Cylinder

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BRAKE SYSTEMS, INC.

WARRANTY POLICY TERMS AND CONDITIONS
For New Pneumatic Systems

Brake Systems, Inc. warrants that products furnished by it will be free from defects in materials and workmanship until the first of the following occurs:

One (1) year after delivery of the product to the ultimate user;

50,000 miles of operation on highway vehicles;

1000 hours of operation on other types of equipment.

This warranty does not extend to 1.) any losses due to misuse, accident, abuse, neglect, normal wear and tear, or improper installation, maintenance or application; 2.) products that have been repaired or altered outside of Brake Systems, Inc. factory unless authorized in writing by Brake Systems, Inc.; or 3.) any labor charges for removal and/or replacement of the nonconforming or defective product or part thereof.

In the event that claims are made with regard to the defective product, the responsibility of Brake Systems, Inc. is limited to repairing or replacing any units which shall, within the provisions of the warranty specified above, be returned with transportation charges prepaid, and found to be defective. All warranty claims shall be presented within thirty (30) days after the defect is discovered. In no event shall Brake Systems, Inc. be liable for consequential damages related to misuse or misapplication of products.

The foregoing states Brake Systems Inc. sole responsibility for breach of this warranty. In no event shall Brake Systems be liable for consequential damages.

No other warranty, whether expressed or implied by operation of law or otherwise (including any warranty of merchantability, fitness or performance), shall exist in connection with the sale or use of any product sold by Brake Systems, Inc.

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