



Series 55 Liquid Level Switch for Shell Petroleum Company

Instruction Manual and Parts List

DESCRIPTION

Magnetrol's Series 55 level switches are float-operated devices for use on clean, free-flowing liquid applications for level alarm, pump control, and safety shutdown functions.

Each level switch utilizes body construction that conforms to Shell standard drawing S38.056-B.

OPERATING PRINCIPLE

Switching

The design of Magnetrol float-operated level switches is based upon the principle that a magnetic field will see through non-magnetic materials such as 316 stainless steel. In this case, the float moves a magnetic attraction sleeve within a non-magnetic enclosing tube and actuates a switch mechanism. The enclosing tube provides a pressure seal to the chamber and therefore to the process.

Liquid sensing

The minimum specific gravity, which a float is able to sense, is based on the size and apparent weight of the float. Low specific gravity applications, which would typically require large floats, are sensed using smaller, more compact floats with a counterbalancing weight mechanism. The counter weight, opposing the float via the pivot assembly, acts to reduce the apparent weight of the float. The result is a smaller, more compact level switch suitable for low specific gravity fluids.

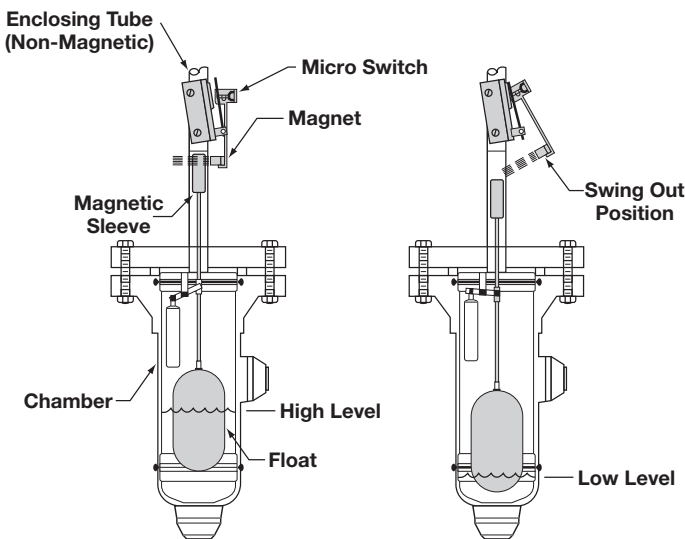
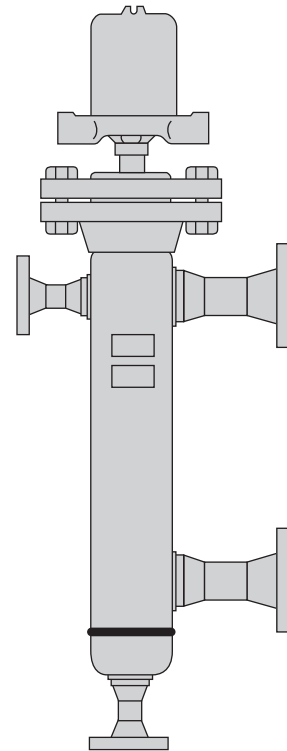


Figure 1

Figure 2

OPERATING CYCLE

As the liquid level rises in the chamber (Figure 1), the float moves the magnetic attraction sleeve up within the enclosing tube and into the field of the switch mechanism magnet. As a result, the magnet is drawn in tightly to the enclosing tube causing the switch to trip, changing the state of an electrical or pneumatic switch. As the liquid level falls, the float drops and moves the attraction sleeve out of the magnetic field, releasing the switch at a predetermined low level (Figure 2). The tension spring ensures the return of the switch in a snap action.

UNPACKING

Unpack the instrument carefully, inspecting all components for damage. Report any concealed damage to carrier within 24 hours. Check the contents listed on the packing slip and the purchase order. Check and record the serial number for future reference when ordering parts.

GENERAL INFORMATION

MODEL IDENTIFICATION

Model Number		Switch Type	Enclosure	Chamber Material	Chamber Rating	Branch Fitting	Float Material	Trim Material	Sleeve Material
Prefix	Suffix								
55-1465	-001	Dry Contact Hermetically Sealed	ATEX Ex II 2 G EEx d IIC T6	Carbon Steel	300# ANSI	2" 300# RFWN	316/316L Series SST	316 SS	446 SS
	-002				600# ANSI	2" 600# RFWN			
	-003				300# ANSI	2" 300# RFWN			
	-004				600# ANSI	2" 600# RFWN			
	-101	Pneumatic	NEMA 4X		300# ANSI	2" 300# RFWN			
	-102				600# ANSI	2" 600# RFWN			
	-103								
	-104								
	-105								
	-105								

SPECIFIC GRAVITY, PRESSURE RATINGS, LEVEL SETTINGS

Model Number		Minimum Specific Gravity	ANSI Class for Pressure and Temperature	Inches		Millimeters	
Prefix	Suffix			HL	LL	HL	LL
55-1465	-001	.55	300	2.60	3.76	66	96
	-002	.75	300	2.65	3.57	67	91
	-003	.55	600	2.60	3.50	66	89
	-004	.75	600	3.37	4.10	86	104
	-005	.90	600	3.73	4.38	95	111
	-101	.55	300	2.60	4.15	66	105
	-102	.75	300	2.65	3.86	67	98
	-103	.55	600	2.60	3.76	66	96
	-104	.75	600	3.37	4.29	86	109
	-105	.90	600	3.73	4.54	95	115

INSTALLATION

CRITICAL ALARM FUNCTION

It is recommended that, for critical alarm functions, an additional level switch be installed as a high-high or low-low level alarm for maximum protection.

PIPING

Figure 3 shows a typical piping installation of a Series 55 control to a pressure vessel. Level decals identify the actuation levels for the unit at minimum specific gravity.

Use pipe of sufficient strength to support the control. If necessary, provide a stand or hanger to help support its weight. All piping should be straight and free of low spots or pockets so that lower liquid line will drain towards the vessel and upper vapor line will drain toward the control. Shut-off valves are recommended for installation between the vessel and the control. If control is to be used with a low temperature liquid (one which will boil in the float chamber if outside heat is absorbed), the chamber and piping should be insulated. Such boiling in the chamber will cause false level indications. **DO NOT INSULATE SWITCH MECHANISM HOUSING.**

On controls equipped with a pneumatic switch assembly, consult bulletin on mechanism furnished for air (or gas) piping instructions.

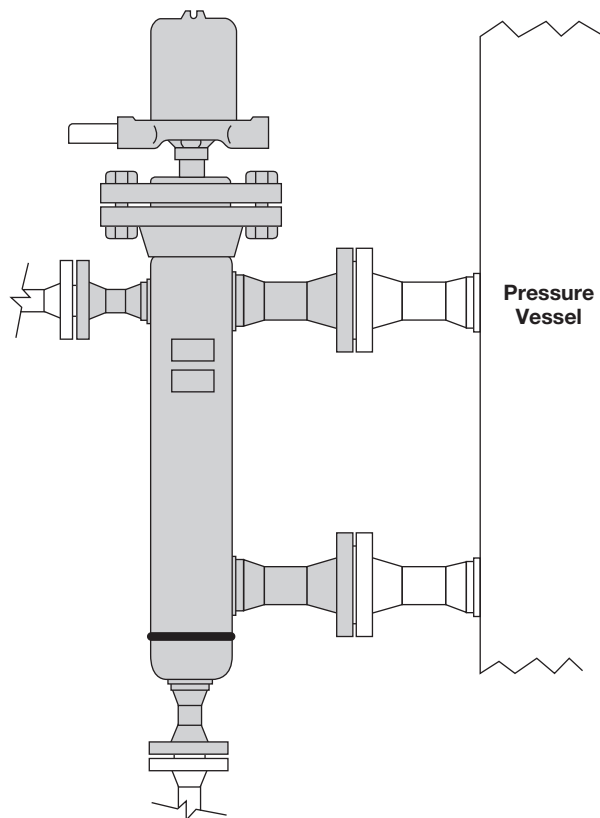


Figure 3
Typical Piping Arrangement

MOUNTING

Adjust piping as required to bring control to a vertical position. Magnetrol controls must be mounted within 3° of vertical in all directions. A three-degree slant is noticeable by eye, but installation should be checked with a spirit level on top and/or sides of float chamber.

Controls should be mounted as close to the vessel as possible. This will result in a more responsive and accurate level change in the control. Liquid in a long line may be cooler and more dense than liquid in the vessel causing lower level indication in the control than actual level in the vessel.

Operation of all buoyancy type level devices should be done in such a way as to minimize the action of dynamic forces on the float or displacer sensing element. Good practice for reducing the likelihood of damage to the control is to equalize pressure across the device very slowly.

HOUSING ADJUSTMENT

Series 55 controls shipped with NEMA 4X housing can be configured as described in the steps below:

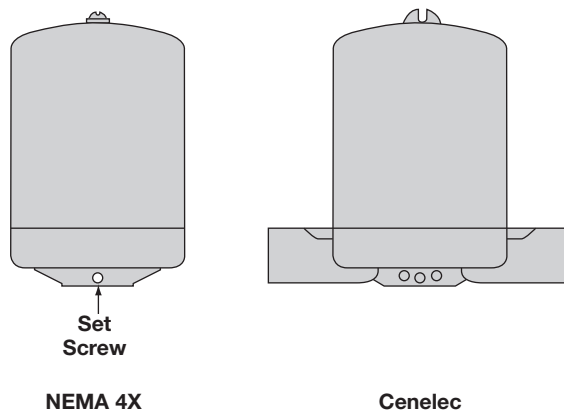


Figure 4

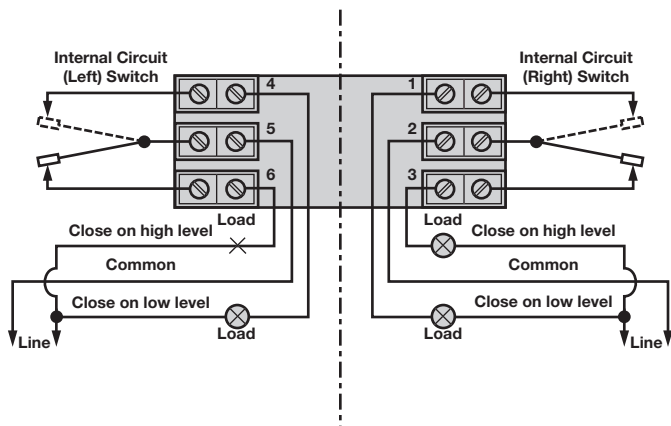
1. Loosen set screw at base of the switch housing. Refer to Figure 4.
2. Switch housing may be rotated 360° to allow correct positioning of conduit outlet.
3. Tighten set screw at base of switch housing.
4. Unscrew and remove switch housing cover or rotate the Cenelec housing. The threads have been lubricated to facilitate removal.

INSTALLATION cont.

SWITCH CONNECTIONS

Dry contact hermetically sealed wiring

1. Make sure power to control wires is disconnected.
2. Remove switch housing cover.
 - a. **NEMA 4X** - Remove screw, washer, and grommet at top of housing. Set aside.
 - b. **Cenelec** - Unscrew cover and set aside.
3. Bring in control wires through conduit connection.



DPDT Terminals for 5 amp HS switch only
Figure 5

4. Dress wiring to ensure no interference or contact with switch housing cover during replacement.

OBSERVE ALL APPLICABLE ELECTRICAL CODES AND PROPER WIRING PROCEDURES.

5. Prevent moisture seepage into the enclosure by installing approved seal-drain fittings in conduit run leading into the unit.
6. Replace housing cover.
7. Turn on power to the unit.
8. Test switch action by varying liquid level in float chamber.

CAUTION: In hazardous areas, do not power the unit until the conduit is sealed and the enclosure cover is tightened down securely.

9. Check cover to base fit to be certain gasketed joint is tight. A positive seal is necessary to prevent infiltration of moisture laden air or corrosive gases into switch housing.

NOTE: If switch mechanism fails to function properly, check vertical alignment of control housing.

Pneumatic switch mechanisms

For installation and connection of **Series K** pneumatic switch mechanism, refer to Magnetrol bulletin 42-686.

PREVENTIVE MAINTENANCE

Periodic inspections are a necessary means to keep your Magnetrol level control in good working order. This control is, in reality, a safety device to protect the valuable equipment it serves. Therefore, a systematic program of preventive maintenance must be implemented when the control is placed into service. If the following is observed, your control will provide reliable protection of your capital equipment for many years.

WHAT TO DO

1. Keep control clean.

Be sure the switch housing cover is always in place on the control. This cover is designed to keep dust and dirt from interfering with switch mechanism operation. In addition, it protects against damaging moisture and acts as a safety feature by keeping bare wires and terminals from being exposed. Should the housing cover or any seals become damaged or misplaced, obtain a replacement immediately.

2. Inspect switch mechanism, terminals, and connections monthly.
 - a. **DO NOT** operate your control with defective or maladjusted switch mechanisms (refer to bulletin on switch mechanisms furnished for service instructions).
 - b. Magnetrol controls may sometimes be exposed to excessive heat or moisture. Under such conditions, insulation on electrical wiring may become brittle, eventually breaking or peeling away. The resulting bare wires can cause short circuits. Check wiring carefully, and replace it at the first sign of brittle insulation.
 - c. Vibration may sometimes cause terminal screws to work loose. Check all terminal connections to be certain that screws are tight. Air (or gas) operating medium lines, subjected to vibration, may eventually crack or become loose at connections causing leakage. Check lines and connections carefully, and repair or replace if necessary.

WHAT TO AVOID

1. **NEVER** leave switch housing cover off of the control longer than necessary to make routine inspections.
2. **NEVER** place a jumper wire across terminals to cut-out the control. If a jumper is necessary for test purposes, be certain it is removed before placing control into service.
3. **NEVER** attempt to make adjustments or replace switches without reading instructions carefully. Certain adjustments provided for in Magnetrol controls should not be attempted in the field. When in doubt, consult the factory or your local Magnetrol representative.

TROUBLESHOOTING

Usually the first indication of improper operation is failure of the controlled equipment to function, i.e., pump will not start (or stop), signal lamps fail to light, etc. When these symptoms occur, whether at time of installation or during routine service thereafter, check the following potential external causes first.

- Fuses may be blown.
- Reset button(s) may need resetting.
- Power switch may be open.
- Controlled equipment may be faulty.
- Wiring or medium lines leading to control may be defective.

If a thorough inspection of these possible conditions fails to locate the trouble, proceed next to a check of the control's switch mechanism.

CHECK SWITCH MECHANISM

Dry contact hermetically sealed switch

1. Pull disconnect switch or otherwise assure that electrical circuit(s) through control is deactivated.
2. Remove switch housing cover.
3. Disconnect power wiring from switch assembly.

Pneumatic Switch

1. Refer to Magnetrol switch bulletin 42-686.

NOTE: As a matter of good practice, spare switches should be kept on hand at all times.

If switch mechanism is operating satisfactorily, a test of the complete control's performance is the next likely step.

CHECK SENSING UNIT

1. Check to be certain liquid is entering float chamber. A valve may be closed or piping plugged.
2. Proceed to check level sensing action by removing switch housing assembly.
3. Disconnect power supply wires from switch mechanism. Pull wires out of conduit connection opening in housing base.

CAUTION: Unit must be normalized to atmospheric pressure before removing switch housing assembly.

- 4a. Perform system shut-down procedures as required to relieve pressure from float chamber of control. Allow unit to cool.
- 4b. Close shut-off valves (if so equipped) to isolate control from tank. Drain off liquid in float chamber. Refer to Figure 3.
- 4c. On installations without shut-off valves, relieve pressure from the tank. Drain liquid in tank to a level below the connections of the float chamber.

NOTE: Level control, connections and pipe lines need not be removed from the tank.

5. Loosen enclosing tube nut with a 1 $\frac{1}{16}$ " wrench. Unscrew enclosing tube counterclockwise (switch and housing base will rotate also), until it is free.
6. Inspect attraction sleeve and inside of enclosing tube for excessive corrosion or solids buildup which could restrict movement, preventing sleeve from reaching field of magnet.
7. Move the float stem upward and downward to verify that there is no excessive force required to actuate the float. Flanged cage units may be unbolted and head flange removed to inspect for excessive corrosion or solids buildup which could restrict movement of the pivot and counterweight assemblies.

NOTE: The flange gasket should always be replaced after unbolting the head flanges.

8. Fill chamber with liquid. Check float to be certain it is buoyant in the liquid (float chamber must have adequate liquid level). If float is determined to be filled with liquid or collapsed, entire float chamber assembly (sensing unit) should be replaced.

CHECK COMPLETE UNIT

Reassemble unit. Reconnect power supply and carefully actuate switch mechanism manually (using a non-conductive tool) to determine whether controlled equipment will operate.

If all components in the control are in operating condition, the trouble is likely located external to the control. Repeat inspection of external conditions previously described.

CAUTION: With electrical power "on", care should be taken to avoid contact with switch leads and connections at terminal block.

NOTE: If difficulties are encountered which cannot be identified, consult the factory or your local representative for assistance. A complete description of the trouble should be provided along with information concerning your piping and mounting arrangement, plus a description of your operating sequence. Sketches or photographs showing the installation are also beneficial.

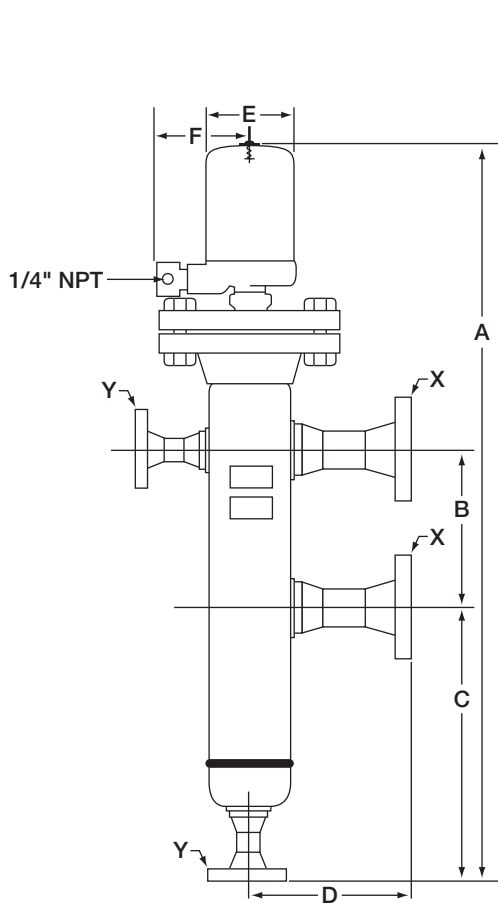
When communicating about your control, be certain always to specify the complete Model and Serial numbers.

Model Number

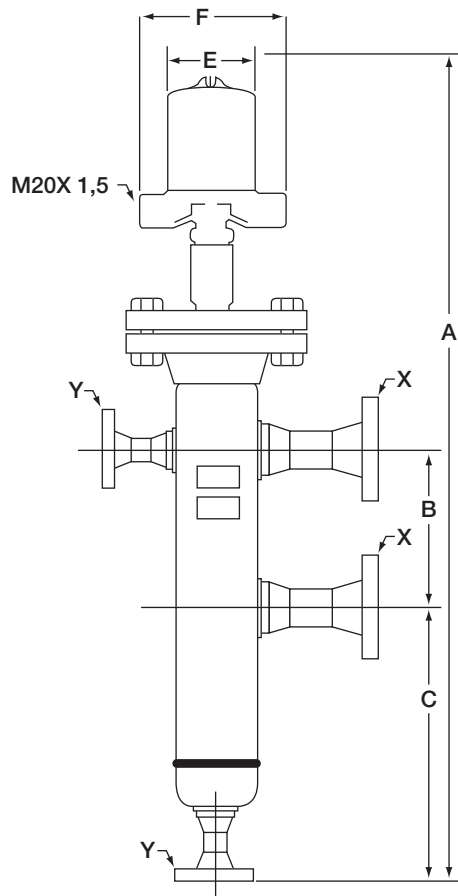
Serial Number

DIMENSIONAL SPECIFICATIONS

Model Number	Dimensions — inches (mm)							
	A	B	C	D	E	F	G	H
55-1465-001	50.73 (1289)	14.00 (356)	14.75 (375)	8.58 (218)	5.63 (143)	8.66 (220)	2" - 300#	¾" - 300#
55-1465-002	49.87 (1289)	14.00 (356)	14.82 (375)	8.05 (218)	5.63 (143)	8.66 (220)	2" - 300#	¾" - 300#
55-1465-003	52.31 (1329)	14.00 (356)	14.84 (377)	9.64 (249)	5.63 (143)	8.66 (220)	2" - 600#	¾" - 600#
55-1465-004	52.31 (1329)	14.00 (356)	14.84 (377)	9.64 (249)	5.63 (143)	8.66 (220)	2" - 600#	¾" - 600#
55-1465-005	52.31 (1329)	14.00 (356)	14.84 (377)	9.64 (249)	5.63 (143)	8.66 (220)	2" - 600#	¾" - 600#
55-1465-101	46.15 (1172)	14.00 (356)	14.75 (375)	8.58 (218)	4.62 (117)	5.00 (127)	2" - 300#	¾" - 300#
55-1465-102	45.20 (1148)	14.00 (356)	14.82 (376)	8.05 (204)	4.62 (117)	5.00 (127)	2" - 300#	¾" - 300#
55-1465-103	47.71 (1212)	14.00 (356)	14.84 (377)	9.64 (249)	4.62 (117)	5.00 (127)	2" - 600#	¾" - 600#
55-1465-104	47.71 (1212)	14.00 (356)	14.84 (377)	9.64 (249)	4.62 (117)	5.00 (127)	2" - 600#	¾" - 600#
55-1465-105	47.71 (1212)	14.00 (356)	14.84 (377)	9.64 (249)	4.62 (117)	5.00 (127)	2" - 600#	¾" - 600#



Models 55-1465-101
 55-1465-103
 55-1465-104
 55-1465-105
 55-1465-102 (non-counter balanced unit)



Models 55-1465-001
 55-1465-003
 55-1465-004
 55-1465-005
 55-1465-002 (non-counter balanced unit)

REPLACEMENT PARTS LIST

Item	Pneumatic Switch Units		Hermetically Sealed Dry Contact		
	Description	Part Number	Description	Part Number	
1	Housing Kit Cover Only	089-9102-001	Housing Kit Cover and Base	089-9103-001	
2	Switch Mechanism w/Integral Housing Base	089-7503-001	Switch Mechanism	089-8302-001	
3	Head assembly from float up (including housing kit, cover, base, and switch mechanism)				
4	Spiral Wound Head Gasket For 55-1465	-101	012-1204-008	-001	012-1204-008
		-102	012-1204-012	-002	012-1204-012
		-103 thru -105	012-1204-035	-003 thru -005	012-1204-035

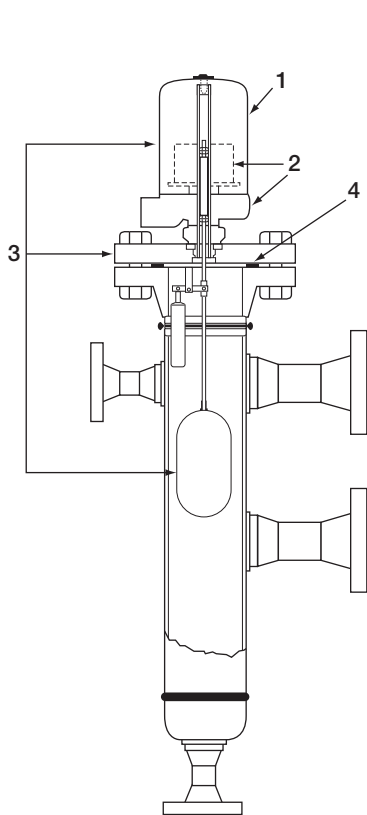


Figure 6

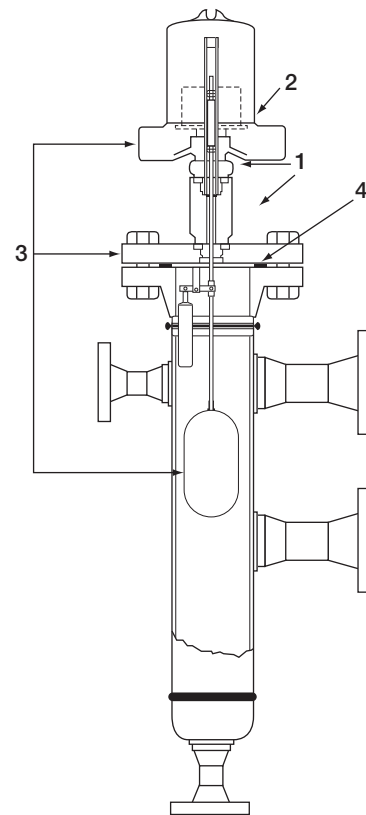


Figure 7

IMPORTANT

PRODUCT WARRANTY

All Magnetrol mechanical level and flow controls are warranted free of defects in materials or workmanship for five full years from the date of original factory shipment.

If returned within the warranty period; and, upon factory inspection of the control, the cause of the claim is determined to be covered under the warranty; then, Magnetrol will repair or replace the control at no cost to the purchaser (or owner) other than transportation.

Magnetrol shall not be liable for misapplication, labor claims, direct or consequential damage or expense arising from the installation or use of equipment. There are no other warranties expressed or implied, except special written warranties covering some Magnetrol products.

QUALITY ASSURANCE

The quality assurance system in place at Magnetrol guarantees the highest level of quality throughout the company. Magnetrol is committed to providing full customer satisfaction both in quality products and quality service.



Magnetrol's quality assurance is registered to ISO 9001 and Z299.1 affirming its commitment to known international quality standards providing the strongest assurance of product/service quality available.

ASSURED QUALITY & SERVICE COST LESS

SERVICE POLICY

Owners of Magnetrol controls may request the return of a control or any part of a control for complete rebuilding or replacement. They will be rebuilt or replaced promptly. Controls returned under our service policy must be returned by Prepaid transportation. Magnetrol International will repair or replace the control at no cost to the purchaser (or owner) other than transportation if:

- a. Returned within the warranty period; and
- b. The factory inspection finds the cause of the claim to be covered under the warranty.

If the trouble is the result of conditions beyond our control; or, is NOT covered by the warranty, there will be charges for labor and the parts required to rebuild or replace the equipment.

In some cases it may be expedient to ship replacement parts; or, in extreme cases a complete new control, to replace the original equipment before it is returned. If this is desired, notify the factory of both the model and serial numbers of the control to be replaced. In such cases, credit for the materials returned will be determined on the basis of the applicability of our warranty.

No claims for misapplication, labor, direct or consequential damage will be allowed.

RETURN MATERIAL PROCEDURE

So that we may efficiently process any materials that are returned, it is essential that a "Return Material Authorization" (RMA) number be obtained from the factory, prior to the material's return. This is available through Magnetrol's local representative or by contacting the factory. Please supply the following information:

1. Company Name
2. Description of Material
3. Serial Number
4. Reason for Return
5. Application

Any unit that was used in a process must be properly cleaned in accordance with OSHA standards, before it is returned to the factory.

A Material Safety Data Sheet (MSDS) must accompany material that was used in any media.

All shipments returned to the factory must be by prepaid transportation.

All replacements will be shipped F.O.B. factory.



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Heikensstraat 6 • B 9240 Zele, Belgium • 052 45.11.11 • Fax 052 45.09.93
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