

# Tuffy® Liquid Level Controls with Pneumatic Switch

Installation and Operating Manual

*Side*

*Mounted*

*Float Level*

*Switch*



## UNPACKING

Unpack the instrument carefully. Make sure all components have been removed from the foam protection. Inspect all components for damage. Report any concealed damage to the carrier within 24 hours. Check the contents of the carton/crates against the packing slip and report any discrepancies to Magnetrol. Check the nameplate model number to be sure it agrees with the packing slip and purchase order. Check and record the serial number for future reference when ordering parts.



These units are in conformity with the provisions of:

1. The PED directive 97/23/EC (pressure equipment directive). Safety accessories per category IV module H1.

## MOUNTING

1. Ensure that the length and inside diameter of the mounting nozzle are sized correctly to allow for switch actuation at design levels. Refer to **Figure 1**.
2. Ensure that the mounting nozzle or coupling is within 3° of horizontal. If mounting the Tuffy in an external cage, ensure that the cage is mounted within 3° of horizontal and that the top/bottom piping is within 3° of vertical in all directions.
3. Ensure that the area is free of metallic particles which might be attracted to the magnet holder/counterbalance and interfere with the function of the Tuffy.
4. The Tuffy must be installed with the serial number plate on top to ensure correct switching action.
5. Inlet air should be filtered with a 5 micron or finer filter. This will extend the life of the valve mechanism. The inlet air pressure should be between 0–13,8 bar (0–200 psi).
6. Connect the inlet, outlet and exhaust air line(s) to the appropriate 1/4" NPT connection port(s) based on the required valve action. Refer to **Figure 1** and **Table 1**.

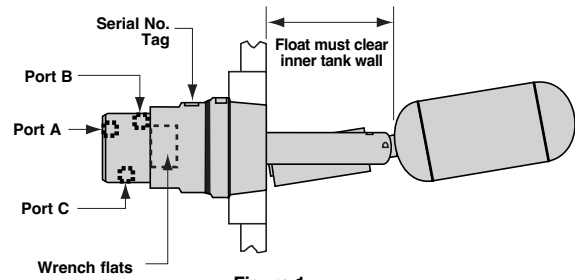


Figure 1

Port	3-way		Diverter	Selector	2-way	
	N.O.	N.C.			N.O.	N.C.
A	Inlet	Exhaust	Outlet	Inlet	Inlet	Plug
B	Exhaust	Inlet	Outlet	Inlet	Plug	Inlet
C	Outlet	Outlet	Inlet	Outlet	Outlet	Outlet

N.O.- Direct acting: air supply on switch condition.  
N.C.- Reverse acting: air cut-off on switch condition.

Table 1

## PRINCIPLE OF OPERATION

Tuffy liquid level switches are designed for horizontal mounting in a tank or vessel through threaded or flanged pipe connections. Standard models are equipped with a three-port/two-position valve, actuated by a magnetically actuated pivoted cam mechanism.

**Figures 2 and 3** illustrate the simple Magnetrol operating principle. Switching action is obtained through the use of a magnet attached to a float and a switching mechanism. These two basic component assemblies are separated by a non-magnetic, pressure tight barrier.

At a "low operating level" of liquid in a tank or vessel (refer to **Figure 2**), the float moves the magnet upward and into the field of the switch mechanism magnet. As a result, the magnets repel causing the pivot arm and valve plunger to move so that air is allowed to pass from air inlet A to air outlet C. As liquid level rises, the float moves the magnet downward until the switch mechanism magnet reverses position, allowing the valve plunger to move so that air is allowed to pass from air inlet B to air outlet C (refer to **Figure 3**).

For direct acting low level operation, air inlet A is closed off when liquid level increases. Conversely, for high level operation, air inlet B is closed off when liquid level recedes.

For reverse acting operation, air inlet A is used for high level and air inlet B is used for low level. Plug the air inlet that is not in use to prevent foreign materials from entering.

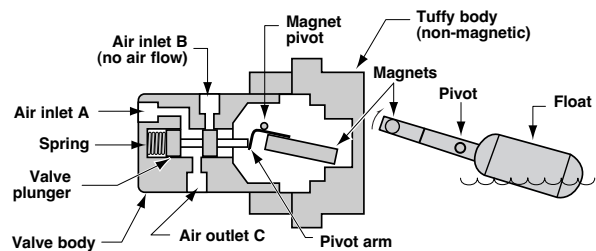


Figure 2: Low level operation – direct acting

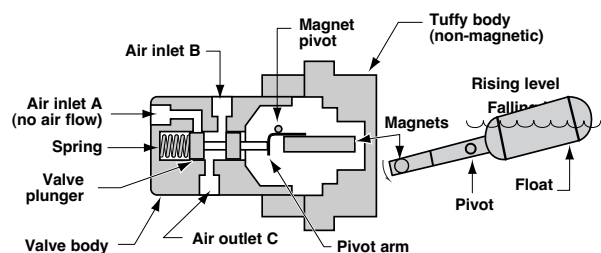


Figure 3: High level operation – direct acting

## MAINTENANCE

Periodic inspections are a necessary means to keep your Magnetrol level control in good working order. This control is a safety device to protect the valuable equipment it serves. A systematic program of preventive maintenance should be implemented when the control is placed into service. Based on utilizing a preventative maintenance program and observing the following section on "what to avoid", your Tuffy will provide reliable protection of your capital equipment for many years.

### WHAT TO AVOID

1. Use only the 2" wrench flats to install or remove the unit. Refer to **Figure 1**. Use of any other surface could change the calibration. The valve body is calibrated at the factory and locked in place.
2. **NEVER** attempt to make adjustments without reading the instructions carefully. When in doubt, consult the factory or your local representative.
3. **NEVER** use in systems which have excess iron particles in the solution. The magnet at the counterweight end of the float can attract the particles which could cause the float rod to jam.

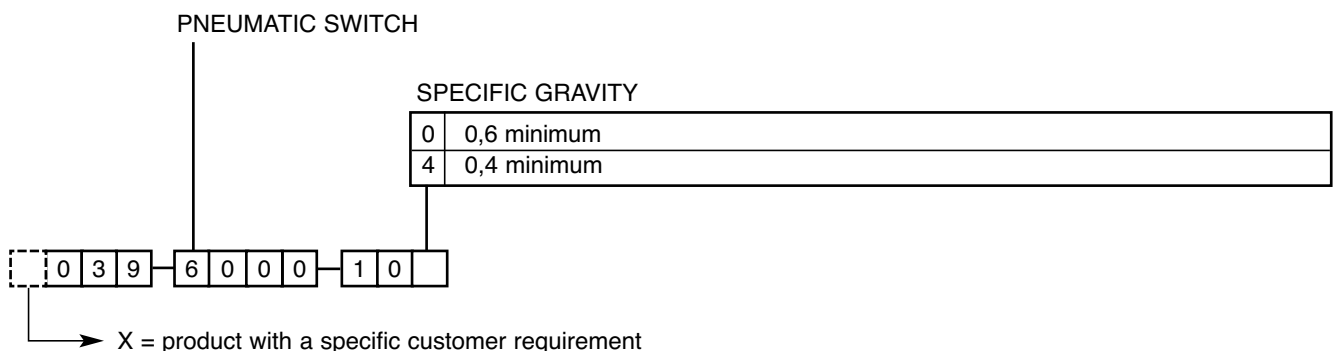
## TROUBLESHOOTING

### FAILURE TO SHUT OFF OR TURN ON INLET AIR

1. Check float for full range of travel; clicking of mechanism should be heard.
2. If the complete Tuffy mechanism operates properly when removed from service, check to be certain that liquid is entering the storage tank or vessel. A valve may be closed or a pipe line clogged.
3. If the float is determined to be filled with liquid or is collapsed, the entire level switch must be replaced. Do not attempt to repair the float.
4. The factory calibration setting should not require any adjustment in the field. Check to see that the unit is installed properly with the serial number tag positioned on the top of the unit. If the unit is still not operating correctly, please contact the factory.

**NOTE:** When in doubt about the condition or performance of a control, please contact the factory for assistance.

## MODEL IDENTIFICATION



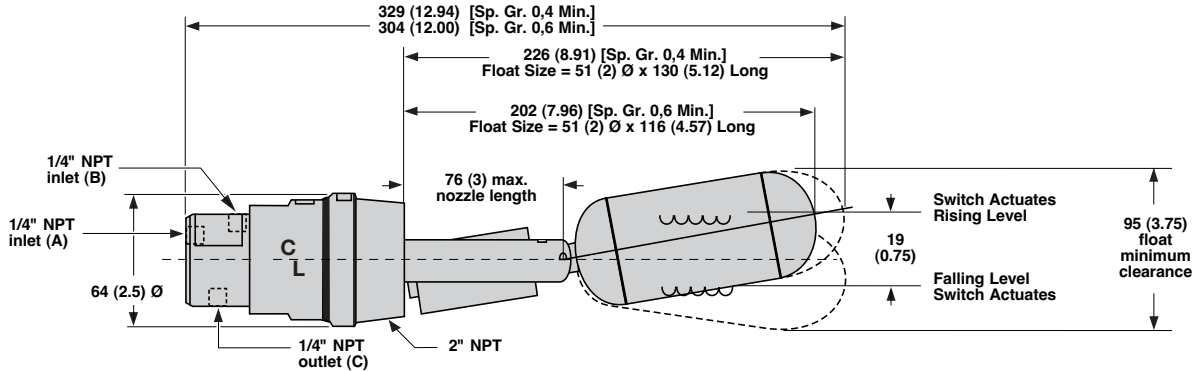
## MECHANICAL SPECIFICATIONS

Description	Specification
Process pressure	Min. S.G. = 0,6: 103 bar @ 150 °C (1500 psi @ 300 °F) Min. S.G. = 0,4: 34,5 bar @ 150 °C (500 psi @ 300 °F)
Process temperature	-40 °C to +150 °C (-40 °F to +300 °F)
Ambient temperature	Max. 40 °C (100 °F) with max. process temperature
Pneumatic switch supply pressure	Full vacuum up to 13,8 bar (200 psi)
Max. leakage rate	14,16 l/h @ 6,9 bar (0.5 SCFH @ 100 psi)
Max. air flow	0,34 m³/h @ 6,9 bar (12 SCFH @ 100 psi)
Specific gravity	0,6 minimum or 0,4 minimum
Wetted parts	316/316L (1.4401/1.4404) including ANSI/ASME B31.3 & NACE
Housing material	316/316L (1.4401/1.4404), IP 65

## REPLACEMENT PARTS

The pneumatic Tuffy is designed for years of trouble free use. Due to the nature of the valve design and the factory calibration required for proper operation, no specific replacement parts are offered.

## DIMENSIONS in mm (inches)



# IMPORTANT

## SERVICE POLICY

Owners of Magnetrol products 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. Magnetrol International will repair or replace the control, at no cost to the purchaser, (or owner) **other than transportation cost** if:

- a. Returned within the warranty period; and,
- b. The factory inspection finds the cause of the malfunction to be defective material or workmanship.

If the trouble is the result of conditions beyond our control; or, is **NOT** covered by the warranty, there will be charges for labour 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, labour, direct or consequential damage will be allowed.

## RETURNED MATERIAL PROCEDURE

So that we may efficiently process any materials that are returned, it is essential that a "Return Material Authorisation" (RMA) form will be obtained from the factory. It is mandatory that this form will be attached to each material returned. This form is available through Magnetrol's local representative or by contacting the factory. Please supply the following information:

- |                                  |                      |
|----------------------------------|----------------------|
| 1. Purchaser Name                | 4. Desired Action    |
| 2. Description of Material       | 5. Reason for Return |
| 3. Serial Number and Ref. Number | 6. Process details   |

Any unit that was used in a process must be properly cleaned in accordance with the proper health and safety standards applicable by the owner, before it is returned to the factory.

A material Safety Data Sheet (MSDS) must be attached at the outside of the transport crate or box.

All shipments returned to the factory must be by prepaid transportation. Magnetrol **will not accept** collect shipments.

All replacements will be shipped Ex Works.

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UNDER RESERVE OF MODIFICATIONS



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