

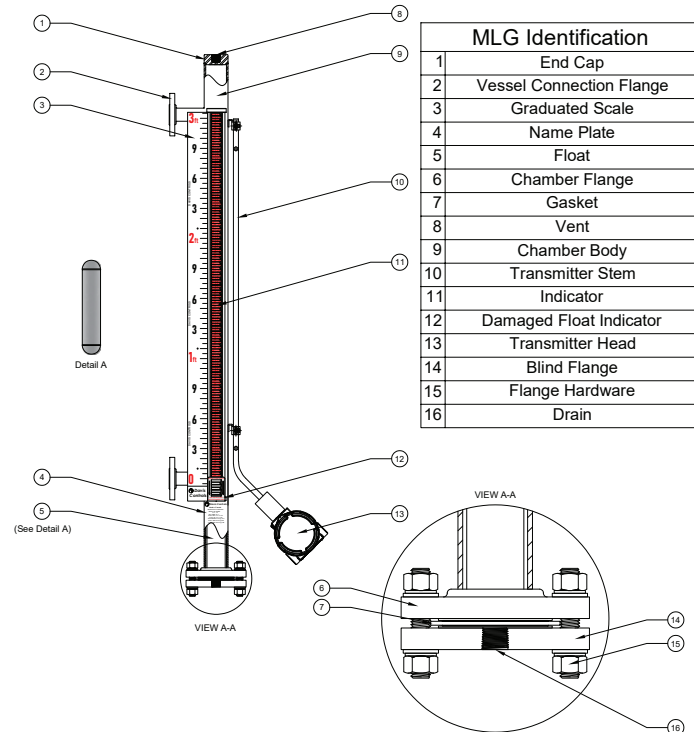


## Magnetic Level Gauge

Accurate, Affordable, Adaptable and Reliable

### General

The Davis Magnetic Level Gauge is designed to give an uninterrupted and immediate level indication of most liquids including steam condensate and chemicals. A variety of accessories can be factory or retro-fitted. These include 2-wire 4-20 mA transmitters and various alarm switches with approvals such as CSA for Hazardous locations.



### Principle of Operation

The magnetic gauge is designed so that the liquid being measured is enclosed within a sealed chamber. A float fitted with a permanent omni-direction magnet moves freely inside the chamber and actuates the magnetic wafer within the indicator. As the float rises or falls with the liquid level, each wafer rotates 180° and so presents a contrasting colour. These wafers above the level will show white, while those below will show red. The indicator then presents a clearly defined level of the liquid in the chamber. The wafers resist accidental disturbance (e.g. vibration) due to their edge magnetization and mutual attraction. Alternative red and green wafers are available for steam applications.

### Mounting of Gauge

Before mounting the gauge, the following points should be taken into account.

1. Vessel connections on the tank must be vertically in line.
2. Vessel connections should not be taken off from any inlet/discharge lines, as excessive surging may occur in the gauge.
3. Center to center dimension between vessel connections on tank and gauge must be within 1.5 mm of each other.
4. Supports should be fitted to prevent distortion of connecting pipework which may occur under the gauges own weight.

The gauges will normally be supplied with the indicator and transmitter (if required) attached to the chamber. The float and any alarm switches are packed separately. Remove gauge from packing case and fit to vessel using the appropriate fittings.

### Installation of the Float

Unpack the float from its protective case and proceed as follows:

1. Remove the bottom flange from the chamber.
2. Check that the float fits freely into the chamber. If it seems to be a tight fit, push down the bumpers on the side of the float accordingly.
3. Ensure the S.G. of the media is the same as the S.G. etched on top of the float.
4. Clean the float of any adhering steel particles and install the float with the cap marked "Top" uppermost in the chamber.
5. Replace the bottom flange of the chamber using a new joint if required.
6. If alarm switches are supplied, these should be attached using the clamps provided (see appropriate installation sheet).
7. If necessary, pass a magnet across the length of the indicator scale to align all the wafers presenting their white face.

N.B. when fitted with float failure warning indication, the bottom three wafers will now show red.

### Function Test

**Before** bringing the gauge into service, it is advisable to do a function test especially when switches or transmitters are fitted.

With the float in the chamber and the gauge isolated from the vessel, proceed as follows:

1. Wire in any switches or transmitters as required.
2. With the vent open and the drain closed off, steadily pour water in the chamber via the vent to simulate a rising level.
3. Make appropriate checks for transmitter, switch and indicator operation.
4. Open the drain and allow the water to run off, simulating a falling level.
5. Close the drain and vent after the appropriate checks have been completed.

If the gauge can not be isolated and the vessel is empty, operation can be simulated by pulling the float up and down the chamber with a length of string attached to the top of the float.

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## Installation and Service Guide

### Bringing in to Service

If vessel is not fitted with isolation valves, the level gauge will automatically come into correct operation as the liquid level rises. If plant is under temperature, the gauge should be allowed to heat up to the working temperature before bringing into service. When isolation valves are fitted, they should be operated in the following sequence:

1. Ensure the drain and vent connections are closed off.
2. **Slowly** open the valve fitted to the **upper** vessel connection.
3. **Slowly** open the valve fitted to the **lower** vessel connection. The liquid will now rise in the gauge chamber, thereby turning the wafers red. The actual liquid level is shown by the red wafer/white wafer interface.

### Maintenance

No maintenance is required other than a periodic inspection to ensure the gauge chamber is free of foreign particles or scale, etc. Freedom of float movement may be checked by momentarily opening the drain valve (if fitted). A drop in the indicated level will demonstrate that the float is free.

A damaged (punctured) float will be indicated by the bottom three wafers presenting their contrasting colours. In this event, the float must be removed and a new float installed.

### Important Note:

For gauges operating above 150°C or below 0°C, a temperature shield is fitted between the indicator and gauge body. This must be refitted whenever the indicator is removed.

### Spares

When ordering spares, the Davis Controls Ltd. tag number should be quoted. This information can be found on the lower portion of the chamber located just above the bottom flange. Fluid pressure, temperature and specific gravity should also be specified.

### Troubleshooting Guide

If the float is to be removed, the gauge should be isolated, relieved of pressure and drained beforehand.

<b>Problem</b>	<b>Possible Cause</b>	<b>Action</b>	
Float fails to rise or fall	Isolation valves closed	Open slowly as appropriate	
	Blockage in connecting pipe work	Clear blockage as required	
	Float getting stuck in chamber		Remove float and check clearance between bumpers and chamber wall. If tight, push bumpers down to give greater clearance.
			Check media or scale build up inside chamber.
	Float damage	Check for puncture and ingress of media into float	
Float shows incorrect level	S.G. of float different to that of media	Check S.G. range etched on top of float is same as media S.G.	
	Float installed upside down	See above Remove float and replace with top end uppermost in chamber.	
Banks or clusters of wafers not turning	Media surging and causing float to travel at abnormally high speed thus "missing" the magnetic field of the wafers.	Reduce surging e.g. by fitting valves between gauge and vessel, then throttling them down to reduce surge.	
	Damaged float magnet	Try new float or do a functional test to prove float.	
Inverse wafers operation	Indicator upside down	Check "top" is stamped on upper end cap of indicator.	
Wafers in indicator discolouring/burning up.	Maximum temperature on gauge tag plate has been exceeded	A heat shield will need to be fitted or its thickness increased (if already fitted)	
	Heat shield has been removed and not refitted	Refit between display and chamber.	

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A breed above the rest

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### Maintenance Schedule

Type	Description	Frequency
Service A	Inspect damaged float window for conformance. If red wafers are present, the float is damaged.	Daily
	Corrective Action: Replace float.	
	Inspect complete indicator, scale, transmitter or switches for visible external damage.	
	Corrective Action: Contact manufacturer.	
Service B	Remove float and inspect for visible damage	8000 hrs of use / 1 year
	Corrective Action: Contact manufacturer / replace float	
Service C	Remove transmitter from Magnetic Level Gauge for recalibration service by Davis Controls (if applicable)	24,000 hrs of use / 3 years
Service D	Replace float	40,000 hrs of use / 5 years
Service E	Replace indicator assembly	80,000 hrs of use / 10 years
Maintenance frequencies are recommended as whichever occurs first.		