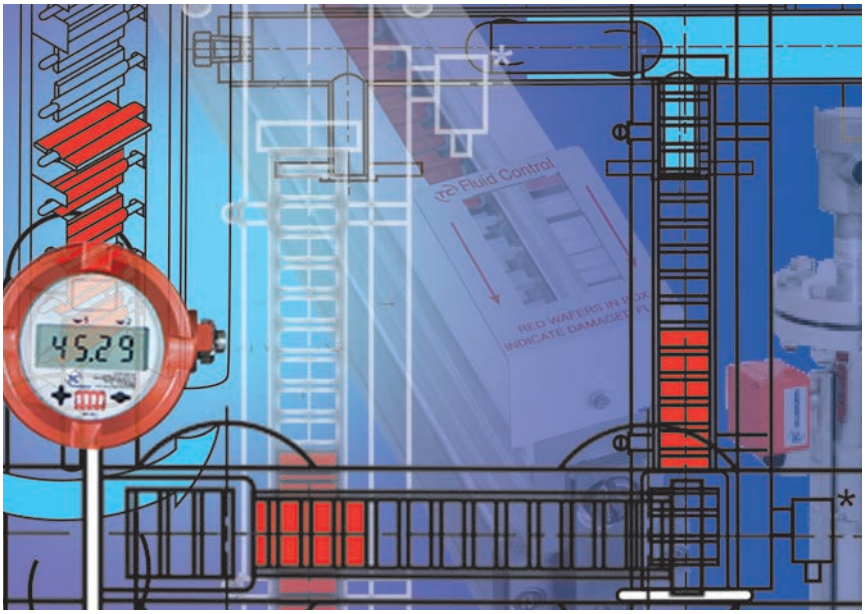
Magnetic Level Gauges



Used throughout the world within a vast range of industries the TC Fluid Control range of Magnetic Level Gauges is particularly suited to applications where hazardous liquids or gases are in use. All of these instruments are made to order and our engineers will provide expert guidance on the design and manufacture of Magnetic Level Gauges for specific applications.

Magnetic Level Gauges

The well proven TC Fluid Control Magnetic Level Gauge is particularly suitable for duties where dangerous and toxic liquids or gases are involved and where the following features, benefits and options are required:-

- **Immediate and accurate response to level changes, giving clear and sharp legibility.**
- **Continuous indication of liquid level.**
- **Local and remote display.**
- **Point switching facilities.**
- **Robust, shockproof and completely sealed for safety.**
- **No leakage to atmosphere. Particularly suitable for dangerous or toxic fluids.**
- **Ideal for liquid interface applications.**
- **Powerful omni-direction magnet system guide-free float.**
- **Display can be rotated through 360° irrespective of float position.**
- **Automatic float warning.**
- **High pressure capability – up to 400 bar unvented.**
- **High temperature capability – standard up to 450°C.**
- **Standard SG range 0.3 – 2.2**
- **Unlimited length (6m in continuous length).**
- **Top mounted options.**
- **PTFE/PFA lined, PP, PVDF and uPVC versions.**
- **Simple to engineer and easy to install.**
- **Eliminates preventive maintenance.**
- **An economical alternative to:-**
  Conventional level gauges and other level measuring systems.
- **Display unit protection up to IP66/67**

Design Considerations

Magnetic Level Gauges, depend not only on the integrity of the chamber but also on the float design and the ability to satisfy all design parameters, ie. specific gravity, pressure and temperature, without compromising the magnetic linkage to the display and associated controls.

Many competitive systems sacrifice display performance by using smaller and weaker magnet systems to achieve low SG and higher pressures, invariably with detrimental effect. Others use guided and vented floats to achieve the same result, which again can prove limiting and troublesome.

The Advantages Of The System

The system, built on many years experience, has taken all these factors into consideration and designed out these problem areas.

This unique system uses a patented ferrite moulded wafer system, which combined with a sealed guide-free float carrying a powerful omni-directional magnet system, provides ultimate performance and reliability, even under the most severe conditions.

Operation

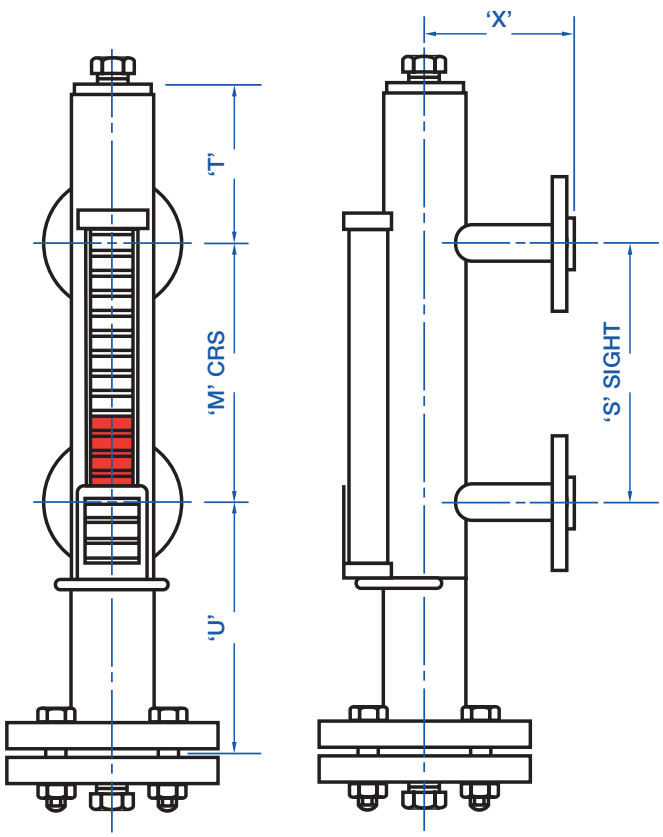
The TC Fluid Control Magnetic gauge is designed so that the liquid being measured is enclosed within a sealed chamber.

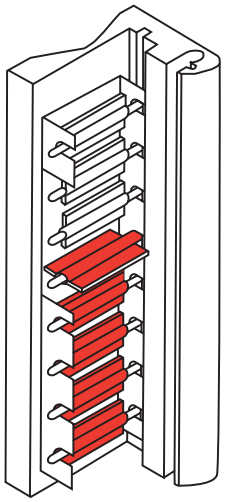
A stainless steel, titanium or plastic float fitted with a permanent omni-directional magnet moves freely inside the chamber and actuates the magnetic wafers within the indicator. As the float rises or falls with the liquid level each wafer rotates 180° and so presents a contrasting colour. Those wafers above the float show white, whilst those level and below show red – the indicator then presents a clearly defined and accurate level of the liquid in the chamber.

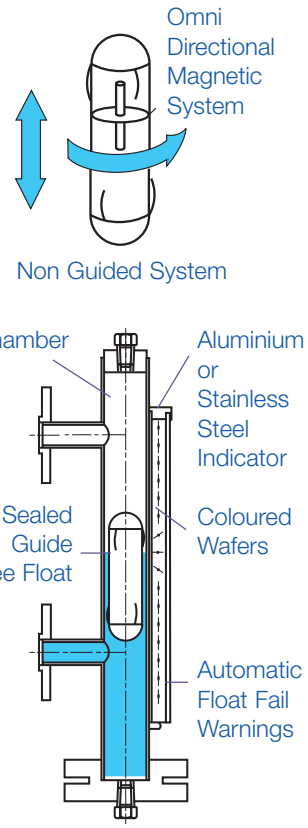
The wafers resist accidental disturbance (e.g. vibration) due to their edge magnetisation and mutual attraction.

To complement the range, the Magnetic Gauge can be supplied with Alarm Switches or Transmitter and Controller to remotely display the liquid level.

Standard design (see enquiry form on page 33 for other options)







Features and benefits

- **Indicator** Aluminium or Stainless Steel outer housing can be assembled to any length and mounted to suit the best viewing position.
- **Coloured Wafers** 25mm wide, red and white (or green, red, black and yellow) remain magnetically locked in the vertical position until disturbed by the greater magnetic force of the float magnet.
- **Automatic Float Warning** The wafers at the bottom of the indicator are mounted with their colours reversed. Should the float reach that level, they again present a sharp, immediately readable indication of float failure.
- **Sealed Float** of reinforced stainless steel, titanium or corrosion resistant plastic.
- **Sealed Chamber** Sealed chamber fabricated from stainless steel pipe, corrosion resistant plastics or other 'exotic' non magnetic metals.
- **Interface** The gauge is ideally suited for measuring liquid interfaces. Floats are available to meet a variety of specific gravities to suit the liquids being monitored.
- **Point Switches** can be fitted on the gauge at any level to provide signals at high, low and intermediate points.
- **Transmission and Monitoring for Remote Display** Can be offered as a complete original equipment package or retro-fitted to an existing Magnetic Gauge.
- **Versatility -** The simple concept of the Magnetic Gauge allows for flexible design to adapt to a variety of installation needs. Gauges can be manufactured to an almost unlimited length and in any configuration.

Switches

- **Simple Latching Operation suitable for I.S. Circuits with Approved Barriers**
- **Readily Adjustable Height Position**
- **Explosion Proof and I.S. Designs**
- **0.5 to 6 Amp Options**
- **Micro Switch and Inductive proximity Options**

TC Fluid Control Magnetic Gauge switches, attached to the side of the chamber can be used to provide a variety of alarm functions. The range comprises of three basic types, DR2, DR3 and DR8 (BGUV) series for a low cost solution on temperatures up to 150°C, with connection via a flying lead - available in non-hazardous, intrinsically safe and explosion proof and I.S. options. The DR4 (STMU) is for high temperature applications in non-hazardous environments (with inductive proximity variants) and the DR6 (MDA) is for explosion proof applications, plus heavy duty switching via micro switch operation.

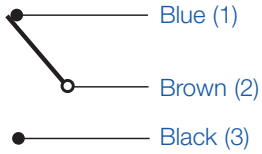
Other options are available on request including:-

- Special Variants for switching PLC control circuits
- NAMUR Circuit options to EN 60947-5-6
- Pneumatic operation

Type DR2, DR3, DR8

Contact	Reed Contact
Contact Type	1 SPDT (Bistable)
Switch Rating	230V AC, 60VA, 1 AMP 230V DC, 30W, 0.5 AMP (for intrinsically safe circuits, certified 100mA and 30V max)
Max. Temperature	150°C
Cable Connection	3 metre silicon (longer on request)
Housing	(Junction Box available on request)
Housing Protection	Stainless Steel
Marking	IP65 (IP68 EExd version) DR3 Non Hazardous - None DR2 Intrinsically Safe - II 1G Ex ia IIC T3-T6 DR8 Explosion Proof - II 2G Ex d IIC T3-T6 LCIE 05 ATEX 6092X

Latching Changover

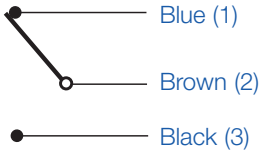


Type DR4

Contact	Reed Contact (Latching Rocker Arm)
Contact Type	1 SPDT (Bistable)
Switch Rating	230V AC, 60VA, 1 AMP 230V DC, 30W, 0.5AMP
Max. Temperature	380°C
Cable Connection	M20 Entry
Housing	Aluminium (Coated Red)
Housing Protection	IP65

(Note - Inductive Proximity Version available on request)

Latching Changover

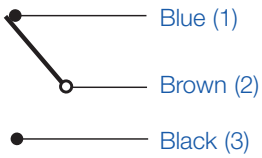


Type DR6

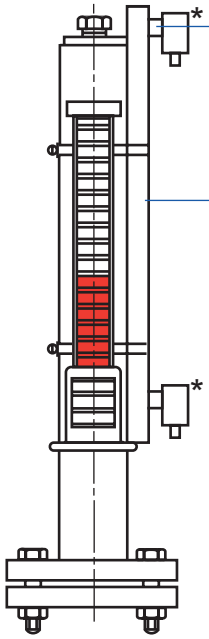
Contact	Reed Contact
Contact Type	1 SPDT (Bistable)
Switch Rating	230V AC, 60VA, 1 AMP 230V DC, 30W, 0.5 AMP
Max. Temperature	150°C
Cable Connection	1 x M20 entry (2 plugged 3/4" NPT)
Housing	Aluminium (Coated Grey)
Housing Protection	IP66

(Note - Micro switch option available - up to 6amp capacity)

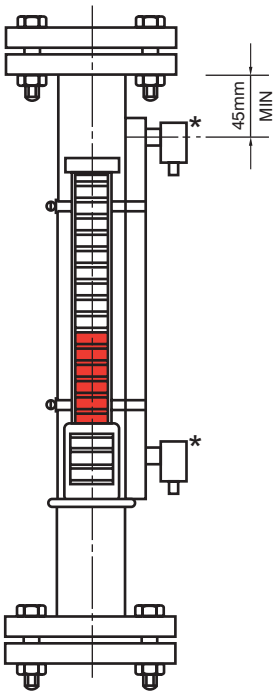
Latching Changover



Reed Chain Transmitters



KTX Transmitter



Flanged end connected arrangement

Liquid Level Transmitter

(See also 'Magnetostrictive' section - pages 15-17 for more options)

KTX.I.S. (Intrinsically Safe)

II 2G Ex ia IIC T4-T6 KEMA 04 ATEX 1232X

KTX.EXD (Explosion Proof)

II 2G Ex d IIC T6 TUV 09 ATEX 7632X

- **Two wire 4-20mA current loop.**
- **Resolution 5mm, 10mm, 20mm Standard.**
- **Remote display and control.**
- **Transmits up to 6Km.**
- **No media contact.**
- **Simple application.**
- **Can be retro-fitted.**
- **Cost effective level measuring system.**
- **Approved ATEX Ex ia IIC T4-T6, Ex d IIC T4-T6.**
- **Low cost Non Approved version.**
- **HART® - Protocol (optional).**
- **PROFIBUS® PA (optional).**
- **FOUNDATION™ FIELDBUS (optional).**

The transmitter is attached to the side of the magnetic level gauge chamber where it senses the position of the float. It can be supplied as an original equipment package or retro-fitted to an existing magnetic gauge, without interrupting the process.

The transmitter consists of a sensor tube containing a series of reed switches and resistors and an electronic circuit contained within a connection head, which can be supplied orientated to suit any gauge configuration or cable arrangement.

As the float rises and falls within the gauge chamber the corresponding reed switch closes altering the circuit resistance, this resistance is converted into a 4-20mA output signal by the electronic circuit.

The transmitter is approved intrinsically safe to Ex ia IIC T4-T6 when used with approved barriers.

For explosion proof duty approved to Ex d IIC T4-T6.

Specification

Supply voltage 10-30Vdc. Polarity protected.

Output 4-20mA (profiled optional)

Float warning - Default Signal

Cable connections via epoxy coated aluminium or stainless steel mounted junction box with M20 cable entry

Protection IP65

Lengths to suit magnetic level gauge

For enquiry information: Refer to Separate Order Form on page 33

Specification

Standard Chamber Materials

Body:	Austenitic stainless steel to suit customers requirements.
Flanges:	Austenitic stainless or carbon steel depending upon application.
Float:	Austenitic Stainless Steel, Titanium, Hastelloy, Monel or Corrosion Resistant Plastic.
Display Housing:	Aluminium Alloy 6063T6 or Stainless Steel Outer Housed.
RATINGS	Process Pressures up to 400 bar (5800 psi). Saturated Steam pressure up to 180 bar. Temperatures from: -150°C to +450°C Higher temperatures on application.

Special Chamber Material

Alloy 825, Titanium, Hasteloy, Sanicro 28/Duplex, Monel 400, 6Mo, Corrosion resistant plastics. Others on request.

Approvals

CE PRESSURE EQUIPMENT DIRECTIVE 97/23/EC CATEGORY IV
Type Approval COV 0312119/TEC Module B
Certificate of Conformity COV 0312785/01 Module D

Ex II 1/2 Gc T1-T6 SIRA 04 ATEX 6126

GOST - R