InstMC Technical Presentation
Liquid Level Measurement Techniques

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Liquid Level Measurement Techniques

Agenda

- Glass Level Gauges
  Types and Applications
- Magnetic Level Gauges
  Principles and Applications
  Considerations in Chamber Design
- Transmitter Options
  Magnetostrictive and GWR
  Principles and Benefits of each
- Instrument Chambers
- Approvals, Materials, testing, welding & drawings
- Applications

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A Quick Company Overview

- The company was originally part of the Klinger group until it was acquired by Trouvay & Cauvin in 1999.

- In 2003 the UK arm agreed a management buyout.

- In 2004 it was renamed TC Fluid Control to give focus for it to develop in the liquid level instrumentation field.

- **UK manufacturer located in Swanley, Kent**

- **2012 TC Fluid Control was acquired by WIKA Instruments**
Key Partnerships

- Yokogawa
- Endress+Hauser
- VEGA
- Emerson

Endress+Hauser
People for Process Automation

Emerson
Process Management
Liquid Level Measurement Techniques

Level Gauges
Glass
Glass Level Gauges

“Everywhere liquid levels have to be directly read and defined”
Reflex

Transparent
Key Advantages - Glass Gauges

- Industry standard & well respected **est. 1888**
- Direct view of the Liquid Level
- Suitable for steam applications
- No electronic signal required
- **Glass Gauges are a regulatory requirement on most steam boilers**
  - (must have at least one installed)
Liquid Level Measurement Techniques

Level Gauges
Magnetic
Typical Glass Gauges
Magnetic Level Gauge vs Glass Gauge
Magnetic Level Gauge

Actuated by a chamber mounted Magnetic float which provides a clear liquid level through interaction with magnetically coupled coloured wafers or rollers
The Display Unit

- Aluminium display housing & St/Steel for corrosive environments-certified IP65
- The display is capable of accommodating media surges up to 400mm per second
Specific Gravity is Important!

Water
SG: 1.0

Hydrocarbon
SG: 0.38

‘U’ Dimension
Key Advantages - Magnetic Level Gauge

- Provide a clear level contrast up to **60m**
- **Switches** can be fitted for **high/low** level alarms
- **Transmitters** can be fitted for **4-20mA**
- **Liquid interface** applications
- **Chamber compliant to PED**
- **ATEX** Certified
Magnetic Level Indicators – Custom Configurations
Liquid Level Measurement Techniques

MagnetostRICTIVE Transmitters
Magnetostrictive Transmitter

1. Wire
2. Electronics Housing
3. Magnetic Field
4. Magnet
5. Torsional Wave
Key Advantages - Magnetostrictive Transmitter

- 4-20mA + HART communication
- Exia & Exd approvals (IEC Ex)
- Continuous & high accuracy measurement
  - Resolution & repeatability 0.8mm
- Can be retrofitted to a magnetic level gauge
Liquid Level Measurement Techniques

Combined Gauge and GWR Transmitter
Guided Wave Radar
LevelSure

- **Combined Magnetic Level Indicator** & **Guided Wave Radar measuring system**
LevelSure – Configurations
Key Advantages - LevelSure

- LevelSure combines the operation of a magnetic level gauge with a GWR Transmitter in **one** assembly
- Providing independent “**Redundant**” level indication from one set of vessel connections.
- **Bespoke** applications & assemblies
- Ideal for both **Interface & bulk** level indication.
- Supplied as complete package with pre-testing of transmitter, false echo suppression & range parameters set.
Level Chambers & Bridle Assemblies
Chamber Design Options

Standard Arrangement
Side/Back
Connected
Standard Construction
Side or Back
connections to
process. Vent and
Drain Plugged.

Flanged Vent and
Drain
Vent and Drain
flanged. Flanges can
be Slip-On or Weld
Neck type.

All Butt Welded
Standard Construction
Side or Back Vent
and Drain Plugged
Flanges are Weld
Neck type for all
Butt Welded
construction.
Note – the side
branch to chamber
weld is not a full
penetration butt weld.
Please advise if full
penetration weld
is required.
Chamber Design Options

**PVDF, PP, uPVC Magnetic Gauge**
Plastic Construction
Side or Back connections to process. These gauges are used for highly corrosive duties i.e. acids/alkalines or if the vessel is plastic as the gauge will ‘move’ with the vessel due to expansion and contraction in changing temperatures.

**Screwed Side/Back via Union Connections**
Process Connections are screwed via unions for easy gauge removal, or can be supplied with plain threaded ends in BSP or NPT.

**PVDF/PFA Lined Gauge**
Plastic Lined Construction Side or Back connections to process. These are used for highly corrosive duties i.e. acids/alkalines where the pressure is too great for all plastics gauges, or if the vessel is made from metals (or lined tanks).

**Top Mounted Gauge**
Top mounted gauge to process. For underground tanks that need visual indication. The gauge can also transmit signals or point alarms.
Liquid Level Measurement Techniques

Application Examples
LevelSure for EDF Hydraulic Power Plant

Before

After
Application

Diesel Dye tanks
SD2 Compressor Lubrication Package

- Vessel height lowered by client, space for gauge limited
- Client faced with having to design a sump in their skid to accommodate drain
- Proposed design for removing float from top and welding on elbow for drain valve to minimise height required
Application

FCCU Flare Drum
Application

TCO High Pressure Chamber – 721 Barg

Tested at 721 barg and passed with flying colours, contains a vented float to allow it to function and is the highest rated unit we have ever manufactured. Our PED has been increased to accommodate this design.
Application

TCO Magnetic Level Gauge
Application

Oil & Gas

Gorgon LNG Plant

Separator Skid – Mercury Process

Customer:
KBR – London Office
http://www.kbruk.co.uk/
SIC 8711/NACE 71.12

Product / Solution:
Combined Magnetic Level Gauge & Emerson Guided Wave Radar – 316ss

Solution to measure the level of Mercury within a separator system.
Facilities

- Design & Drawing
- Welding – ASME IX
- Float Manufacture
- Transmitter Manufacture
- Mechanical Assembly
- Testing
- Documentation
- Shipping / Logistics
Materials of construction

Magnetic Level Gauges & Instrument Chambers

- 6Mo (F44)
- Alloy 625 / 825
- Titanium
- Monel 400
- Seamless stainless steel 316
- Hastelloy C 276
- Plastics: PVC, PP, PVDF

Instrument Chambers Only

- Carbon steel A 106/ A 105
- Low temperature carbon steel LF2
- Duplex F51 & F53
Welder Approvals – ASME I

- 6Mo (F44)
- Alloy 625 / 825
- Titanium
- Monel 400
- Seamless stainless steel 316
- Hastelloy C 276
- Duplex (F51/F53) to 6Mo (F44)
- Carbon steel A 106/ A 105
- Low temperature carbon steel LF2
- Duplex F51 & F53
- Carbon steel to stainless steel

- Construction – Seam welded or seamless pipe
Non destructive testing

- Dye Penetrant Testing – In/Ext
- Positive Material Testing – In/Ext
- Radiograph of welds
- Hardness Testing
- Pickling / Passivation – In/Ext
- Offshore paint finishes
- Post Weld Heat Treatment – In/Ext
Approvals

- ISO 9001 – 2008
- SGS BASEEFA ATEX & IEC Ex QAN for Hazardous area manufacture – Exd & Exia certified.
- P.E.D. – ASME B31.3 & B31.1 (ANSI 2500 DN200 - 8”)
- FPAL – Achilles registered (Offshore UK) – Registered ID: 10040485
- JQS Achilles registered (Offshore Norway) – Registered ID: 26586
Unique breadth and depth of product

Electronic pressure measurement
Mechatronic pressure measurement
Mechanical pressure measurement
Diaphragm seals

Electrical temperature measurement
Mechatronic temperature measurement
Mechanical temperature measurement
Thermowells

Level measurement
Flow measurement
Calibration technology
Accessories
Thank You!
A strong Group for your success.