

# Mobrey MLT100 displacer level transmitter

## MLT100 transmitter

- Level, contents or interface measurement.
- Direct or external cage mounting

## Features

- 2 wire 24v dc loop powered
- 4-20mA output
- HART communications :-
- EExd or EExia certification
- Simple local or remote calibration
- Non-interactive Zero and Span
- High temperature remote electronics option
- Option of local indicator
- Range of wetside materials

## Description

The Mobrey MLT100 Level Transmitter is one of the most advanced displacer based devices on the market, coupling the time proven buoyancy principle with state of the art electronics in an instrument of high reliability and stability.

Special care has been taken in design to ensure a small mounting envelope is maintained, resulting in reduced weight and associated savings in mounting. The displacer element is made to length for each order, and is suspended below the head on a stable spring arrangement which is designed to minimise friction effects and improve performance.

The transmitter can be mounted directly into a vessel or may be externally mounted in a chamber to allow isolation for planned maintenance or in-situ calibration checks.

## Operation

The 4 - 20 mA output from the head is proportional to the level or contents in the vessel, or may be set to follow an interface.

SMART electronics mean digital communication is possible. The Mobrey transmitter supports the HART protocol, which is superimposed on the 4-20mA signal. Thus the user can operate the transmitter without digital communications, or can take advantage of the many features of HART such as remote calibration, re-ranging, on-line diagnostics and multidrop installations.

## Typical applications

The Mobrey MLT will operate in most level measurement applications including :-

- Knock-out pots
- Condensate drums
- Separators
- Flash vessels
- Storage vessels
- Receiver tanks

Operating wetside temperatures are -60°C to +320°C at pressures between full vacuum and 200 bar. Remote electronics models available for high temperature and nuclear applications\*. Most liquids can be measured, with wetted materials chosen to suit. The liquid SG range is from 0.5 to 1.5, and interfaces with as low an SG difference of 0.1 are also practical. The range of the instrument is dependent only upon the length of the element specified, although 3000mm is considered the longest standard length.

*\* Remote electronics models are available to special order.*

## Approvals

ATEX II 1/2 GD EEx d IIC T6  
Tamb = -40°C to +75°C  
ATEX II 1 G D EEx ia IIC T5  
Tamb = -40°C to +40°C  
ATEX II 1 G D EEx ia IIC T4  
Tamb = -40°C to +80°C



## Operation

Changes of liquid level in the vessel cause the displacer element, which is supported on a spring, to rise or fall.

A core, located in the pressure tube of the head, is connected to the displacer and moves linearly up and down with the element. Around the outside of the pressure tube in the head is a Linear Variable Differential Transformer (LVDT), the output of which is proportional to the position of the core. The pressure tube is made of stainless steel and is welded to the union which connects the head to the process pressure and temperature.

The displacer length is dictated by the operating range requested, and the diameter and weight are factory calculated to ensure the correct operating movement of the core in the head.

Sophisticated surface mount electronics process the voltage signal from the LVDT into a 4-20mA output signal. Each transmitter is fitted with a visible LED which flashes once every 3 seconds to show the instrument is healthy and working.

## Field adjustments

### Calibration

The transmitter is set up by Mobrey to operate in the conditions advised at the time of order, and the displacer element dimensions are chosen to suit.

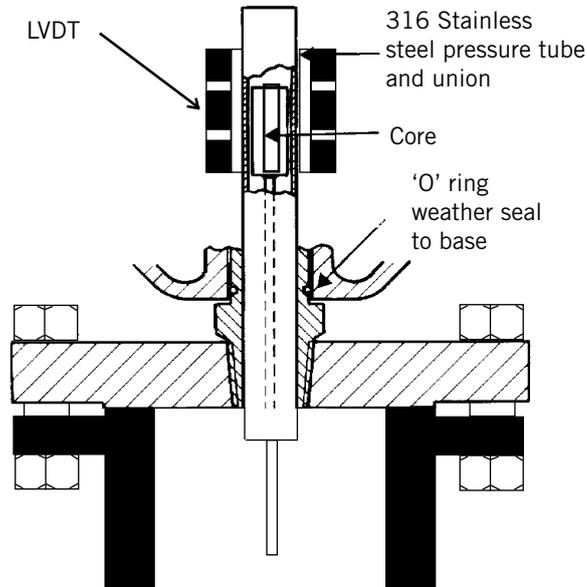
Provision is made for the customer to check this calibration once on site. A manual fine tune adjustment may be made with the instrument in an empty vessel at 20°C which will ensure correct readings at operating conditions.

### Local calibration

Several adjustments can be made in the field using the unique "Mobrey Magnetic Scroller" (MMS) and the "Caliplug".

The MMS is a calibration tool with a magnetic tip, and is used on this and other Mobrey instruments to access and adjust certain operating parameters.

The level transmitter is fitted with a calibration plug (Caliplug) which contains docking ports for the



MMS along with the heartbeat LED. The adjustments which may be made are as follows :-

### Setting the 4mA and 20mA points

This can be carried out locally at the transmitter by using the MMS to "zero" the device with the level at the required 4mA point, then to "Span" the device with the level at the 20mA point. The Zero and Span settings are non-interactive.

An additional feature is the ability to span the instrument in the same way but without the vessel being filled to the 20mA point. In this case, the vessel is filled to a known level and the output incremented to give the required mA level. The 20mA point is then electronically calculated by the instrument.

### Setting the damping

The user can field set the damping (smoothing or response time) using the MMS, to a value up to 100 seconds.

### Remote calibration

(not necessary for standard 4-20 mA operation).

Alternatively, the ranging can be carried out using a "SMART Communicator" by simply establishing digital communications and setting the 4 and 20mA points electronically (without the need for changing the liquid level) using HART protocol.

### Local indication (optional)

A multi-function LCD indicator housed in a cast aluminium Exd enclosure, finished in two pack epoxy white paint. The 2-line LCD display can be programmed to show output

in %, engineering units and other operating parameters using the smart communicator.

## Construction

### Transmitter head

The transmitter head is manufactured from cast iron with a paint finish of two pack Epoxy white paint suitable for offshore or coastal use. Weatherproof rating IP66 / IP67. Wetted parts are made from stainless steel, including the element, trim and pressure tube, except for the spring which is manufactured from a specialist corrosion resistant spring material, NIMONIC, chosen for its stability and repeatability under changing process conditions.

### Chamber (when specified)

The material used will be to the customer's specification or to suit the application. Only certified materials are used, and welding is qualified to ASME IX, BS EN 287 and BS EN 288.

All pressure retaining parts are hydrostatically pressure tested to a minimum of 1.25 times working pressures.

NDT including radiography & dye penetrant testing is available when specified at time of order. Inspection by customers or their appointed agents is welcome provided this is requested at time of order.

Options:

Wetside materials in Hastelloy, Inconel and others on request.

Compliance with NACE MR-01-75 for sour service duty.

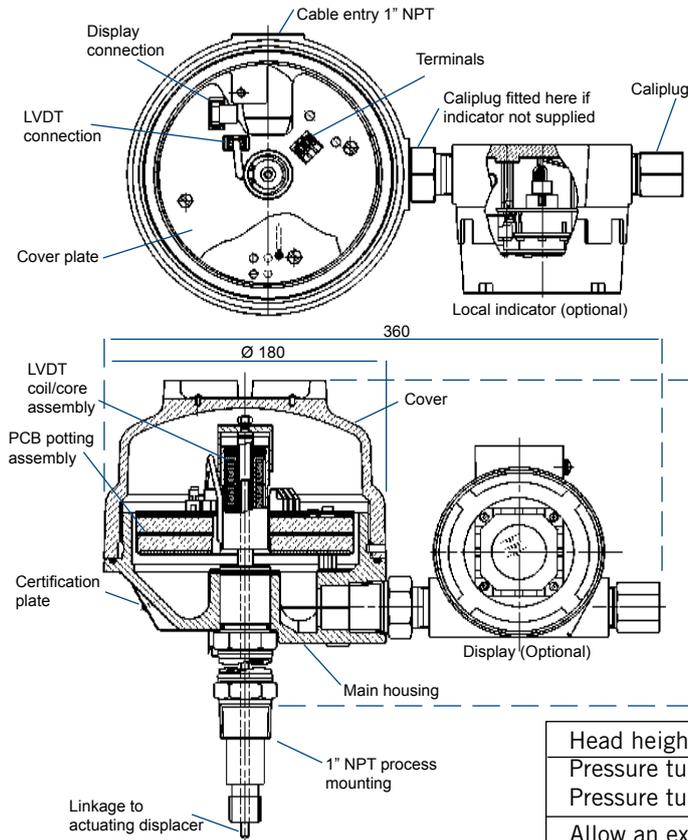
## Ordering information

<b>MLT</b>	<b>Mobrey Level Transmitter</b>										
	<b>Code</b>	<b>Flange material</b>									
	<b>C</b>	Carbon steel							<b>N</b>	No flange (1" NPT connection)	
	<b>S</b>	Stainless steel									
	<b>Code</b>	<b>Flange mounting</b>									
	<b>60</b>	3" ANSI # 150 RF			<b>65</b>	4" ANSI # 150 RF					
	<b>61</b>	3" ANSI # 300 RF			<b>66</b>	4" ANSI # 300 RF					
	<b>62</b>	3" ANSI # 600 RF			<b>67</b>	4" ANSI # 600 RF					
	<b>63</b>	3" ANSI # 900 RF			<b>68</b>	4" ANSI # 900 RF					
	<b>64</b>	3" ANSI # 1500 RTJ			<b>69</b>	4" ANSI # 1500 RTJ					
	<b>71</b>	DN80 PN16			<b>76</b>	DN100 PN16					
	<b>72</b>	DN80 PN25			<b>77</b>	DN100 PN25					
	<b>73</b>	DN80 PN40			<b>78</b>	DN100 PN40					
		<b>00</b>	No flange								
	<b>Code</b>	<b>Head variations : Weatherproof IP66/IP67</b>									
	<b>TS</b>	IS ATEX				<b>TF</b>	EExd ATEX				
	<b>TR</b>	Remote electronics, to special order. Note : electronics in safe area only.									
	<b>Code</b>	<b>Pressure tube type: Select from graph overleaf</b>									
	<b>A</b>	Std (up to 224°C condensing)				<b>B</b>	High temperature : over 224°C & up to 277°C condensing, 320°C non-cond, remote electronics to 320°C condensing.				
	<b>Code</b>	<b>Display</b>									
	<b>D</b>	With display				<b>N</b>	Without display				
	<b>Code</b>	<b>Spring</b>									
	*	The code number for the spring will be entered at time of quote/order									
	<b>Code</b>	<b>Displacer</b>									
	*	Code number for displacer will be entered at time of quote/order									
	<b>Code</b>	<b>Chamber - type &amp; orientation</b>									
	<b>A</b>	Not required									
	<b>B</b>	Side/bottom with no vent									
	<b>C</b>	Side/bottom with ½" NPT vent									
	<b>D</b>	Side/bottom with ¾" NPT vent									
	<b>F</b>	Side/bottom with ¾" flanged vent									
	<b>G</b>	Side/side with ½" NPT drain & no vent									
	<b>H</b>	Side/side with ¾" NPT drain & no vent									
	<b>J</b>	Side/side with 1" NPT drain & no vent (std)									
	<b>K</b>	Side/side with ½" NPT drain & vent									
	<b>L</b>	Side/side with ¾" NPT drain & vent									
	<b>M</b>	Side/side with 1" NPT drain & vent									
	<b>N</b>	Side/side with ¾" drain & no vent									
	<b>P</b>	Side/side with ¾" flanged drain & ¾" NPT vent									
	<b>Q</b>	Side/side with ¾" flanged drain & ¾" flanged vent									
	<b>Code</b>	<b>Chamber process connections</b>									
	<b>11</b>	1" ANSI # 150 RF			<b>25</b>	DN40 PN16					
	<b>12</b>	1" ANSI # 300 RF			<b>26</b>	DN40 PN25					
	<b>13</b>	1" ANSI # 600 RF			<b>27</b>	DN40 PN40					
	<b>14</b>	1" ANSI # 900 RF			<b>31</b>	2" ANSI # 150 RF					
	<b>18</b>	1" ANSI # 1500 RTJ			<b>32</b>	2" ANSI # 300 RF					
	<b>15</b>	DN25 PN16			<b>33</b>	2" ANSI # 600 RF					
	<b>16</b>	DN25 PN25			<b>34</b>	2" ANSI # 900 RF					
	<b>17</b>	DN25 PN40			<b>38</b>	2" ANSI # 1500 RTJ					
	<b>21</b>	1.5" ANSI # 150 RF			<b>35</b>	DN50 PN16					
	<b>22</b>	1.5" ANSI # 300 RF			<b>36</b>	DN50 PN25					
	<b>23</b>	1.5" ANSI # 600 RF			<b>37</b>	DN50 PN40					
	<b>24</b>	1.5" ANSI # 900 RF			<b>01</b>	Screwed 1" NPT					
	<b>28</b>	1.5" ANSI # 1500 RTJ			<b>J00</b>	Chamber not supplied					
<b>LT</b>	<b>C</b>	<b>61</b>	<b>TS</b>	<b>A</b>	<b>D</b>	<b>3</b>	<b>A</b>	<b>B</b>	<b>11</b>	<b>Typical ordering information</b>	

The following information must be supplied at time of order :-

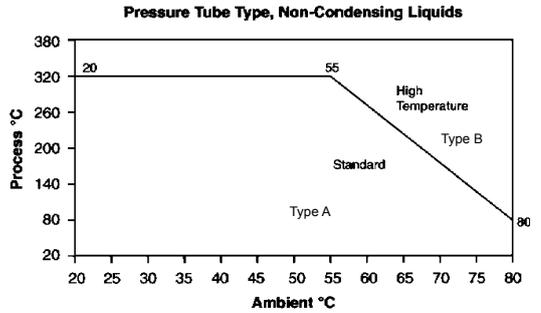
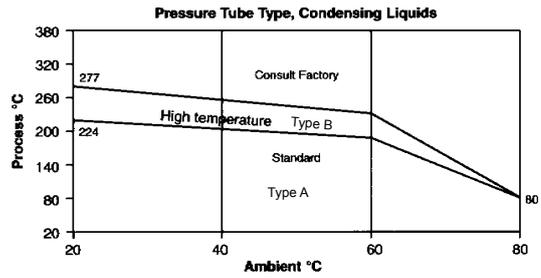
- Operating pressure, temperature, specific gravities (upper / lower ), viscosity
- Liquid and nature of vapour :condensing or non-condensing - Maximum or design pressures and temperatures
- Ambient temp. and local environmental conditions - Operating range. (This will be taken as the process connection centres unless otherwise stated)
- Mounting arrangement and any specific materials of construction required. If a chamber is required, please specify all relevant dimensions. In addition to the above standard configurations, chambers may be made to special order.
- Any options : Meter, chamber connections or vent/drain, special paint, inspection and NDT requirements, or other.

**Dimensions : IP66 / IP67 transmitter head**



Head height	H
Pressure tube A	200
Pressure tube B	422
Allow an extra 90 for cover removal	

**Pressure tube type selection**



**Mobrey Palm style Hand Held Communicator**

The HPC allows full access to all of the MLT100 parameters.  
Ordering information: MHC-HPC. See brochure IP2037 for full details.

**Mobrey Universal Hand Held Communicator**

The Universal HHC can be programmed with the Device Description (DD) of any registered HART device and will then allow full access to all of the instrument parameters.

**Mobrey H-Conf401**

A Windows based PC programming tool which allows full communication with Mobrey Measurement HART products. H-Conf401 gives access to all of the instrument parameters, allowing programming and interrogation. See brochure IP2037 for full details.

**Specification**

<b>Output</b>	4 - 20mA SMART/HART digital	<b>Ambient temp.</b>	-40 to+80°C (Subject to process temperature)
<b>Range</b>	300 - 3000mm to order	<b>Accuracy</b>	< +/- 1% output span
<b>Max. operating pres.</b>	200 bar	<b>Repeatability</b>	+/- 0.2% of output span
<b>Min operating pres.</b>	Full vacuum	<b>Linearity</b>	0.2% of output span
<b>SG range</b>	standard 0.5 to 1.5 interface 0.1 diff.	<b>Resolution</b>	0.1% of output span
<b>Max. operating temp.</b>	320°C non-condensing 320°C condensing with remote electronics	<b>Hysteresis</b>	0.3% of output span
<b>Min. operating temp</b>	-60°C	<b>Power supply</b>	12-40V dc loop powered
		<b>Turndown</b>	3 : 1
		<b>Power consumption</b>	21mA/40V : 840mW max

Reference List : Mobrey MLT100 transmitters are used all over the world by major organisations including SHELL UK, National Iranian Oil Co., Kuwait National Oil Co., Qatar General Petroleum, Conoco, GEC Alstom.

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