

# Installation, Operation & Maintenance Instructions



FOR PRESSURE GAUGES—EN 837-1/2/3 and ANSI B40.1

Models AG, AA, AS, GA, GG, GS, SG (Pressure Gauges)  
 Models DA, DB, DG (Differential Pressure Gauges)  
 Models 37xxx (special construction)

## General

DELTA MOBREY Ltd. pressure gauges have been designed and manufactured in strict conformity to the safety requirements stated in the current international regulations.



THE RECOMMENDATIONS AND THE NOTES HERE BELOW STATED, WHICH THE USER MUST KNOW FOR THE CORRECT INSTALLATION and THE SAFE USE, ARE AN EXCERPT OF WHAT IS STATED IN EN 837-1/2/3 AND ANSI B40.1 STANDARDS.



UNITS MUST BE SELECTED AND INSTALLED BY SUITABLY TRAINED AND QUALIFIED PERSONNEL IN ACCORDANCE WITH APPROPRIATE CODES OF PRACTICE SO THAT THE POSSIBILITY OF FAILURE RESULTING IN INJURY OR DAMAGE CAUSED BY MISUSE OR MISAPPLICATION IS AVOIDED.

See the Technical Data sheet for a correct selection of the instruments, on our web site.



THE FINAL USER HAS THE RESPONSIBILITY FOR THE CORRECT INSTALLATION AND MAINTENANCE OF THE INSTRUMENTS. THE CHOICE OF CORRECT INSTRUMENTS AND THEIR INSTALLATION MUST BE DONE BY QUALIFIED PERSONNEL, ABLE TO EVALUATE ANY PROCESS ASPECT WHICH MAY PREVENT THE CORRECT OPERATION OF THE INSTRUMENTS AND CONSEQUENTLY AVOID POSSIBLE FAILURE AND ANOMALY.

## CERTIFICATION

DELTA MOBREY Ltd is able to deliver, when required, instruments manufactured in accordance with the directives and regulations.

### 2014/34/EU & S.I. 2016/1107 (as amended)

In particular meets the criterion of the 2014/34/EU (ATEX) directive & S.I. 2016/1107 regulation with the following compliance.



II 2 G Ex h IIC T6 Gb X  
 II 2 D Ex h IIIC T85°C Db X

Each pressure gauge ATEX Certified is supplied with an adhesive label with the below information, and cannot be removed:

- Manufacturer address
- Model/series number

- UKCA & ATEX marking
- Year of manufacturing



The below information are marked on the dial of the gauge:

- Serial number
- Manufacturer
- Material & sensing element and other information according EN837

## P.E.D. CONFORMITY 2014/68/EU & S.I. 2016/1105 (as amended)

In particular meets the criterion of the 2014/68/EU (P.E.D.) directive & S.I. 2016/1105 regulation for the following two categories:

-pressure up to 200 Bar – designed and manufactured in accordance with the so called “Sound Engineering Practice” and the CE & the UKCA mark is not required

-pressure over 200 Bar – designed and manufactured in conformity with the PED safety requirements, are classified under Category 1 and are certified as per Module A. The gauge must bear the CE & the UKCA mark.

## SAFETY ASPECT, SELECTION CRITERIA OF PRESSURE GAUGES

Process fluid under pressure	Case filling	Nominal diameter	Pressure range (bar)	Safety design minimum code
Liquid	Dry	< 100	≤25	0
			>25	0
		> 100	≤25	0
	Liquid	< 100	≤25	S1
			>25	S1
		> 100	≤25	S1
Gas or steam (see note 1)	Dry	< 100	≤25	0
			>25	S2
		> 100	≤25	S1
	Liquid	< 100	>25	S3
			> 100	>25
		< 100	≤25	S1
> 100	>25	S1		
> 100	>25	S3		

Safety design code  
 0 Pressure gauges without any safety device.  
 S1 Pressure gauges with safety device.  
 S2 Safety pressure gauges without baffle wall.  
 S3 Safety pressure gauges with baffle wall (providing a higher level of safety).  
 Note 1 – All pressure gauges for oxygen and acetylene measuring shall be of safety pattern.  
 Note 2 – Pressure gauges glycerine filled shall not be used for measuring oxygen or other strong oxidising process fluids. For those applications pressure gauges must be filled with fluorine or chlorine based liquids.  
 Note 3 – This table is showing the normal safety design code. The user must know their special requirements and they may use safety pattern gauges even for process pressure lower than 25 bar.

As per EN 837-2 paragraph 4.2.2. and table shown above it is suggested to select the proper type of instrument with suitable safety degree related to the specific application. DELTA MOBREY pressure gauges are to code **S1** when fitted with a safety blow out plug which opens as soon as the pressure into the case is exceeding a certain safety value discharging it to the atmosphere, and are of code **S3** when the back discharge is a full case blow out disc (pressure gauges solid front type) which is a further protection for the operator.

### OPERATING PRESSURE

The selected instrument should have the full-scale (f.s.) value such that the operating pressure is contained between the 25% and the 75% of the said full scale. A good practice is to select a pressure gauge with a full scale pressure two times the intended operating pressure. In the case of the pressure gauge dial having a black triangle at end scale, this means the operating pressure could be raised up to 90 % of f.s. for fluctuating pressures and up to 100 % of f.s. for steady pressure.

### PULSATING PRESSURE

This normally occurs in applications with pumps, compressors, etc. and are the cause of movement wear as well as a potential failure of the sensing element due to the fatigue stress. It is recommended to place a pressure snubber between the socket and the process pressure side.

It is likewise suggested to fill the pressure gauge case with a suitable dampening fluid which will reduce the harmful effect of the pulsation on both the movement and the sensing element.

### OVERPRESSURE

Any abnormal overpressure may cause stress to the sensing element, consequently compromising the life, accuracy and repeatability of the instrument. It is recommended to select a pressure gauge where the f.s. value is greater than the max operating pressure, which consequently may easily absorb potential overpressure and surges which may cause the same harmful effect on the sensing element. The pressure gauge can be protected from surges in the same way as for pulsating pressures and for long periods of overpressure it is recommended to fit an automatic overload protector (pressure limiting valve).

### MATERIALS OF PARTS IN CONTACT WITH THE PROCESS FLUID

Carefully select the material of the sensing element taking into account the chemical compatibility with the process fluid. If none of the available sensing element materials are suitable then consider fitting the pressure gauge with a diaphragm seal, which are available manufactured in a variety of exotic materials.

### OXYGEN USE

Pressure gauges suitable for oxygen service, will have the dial clearly marked in red colour:



oxygen-use no oil- and a crossed-out oil can.

For such use the pressure gauges are manufactured with a suitable cleaning and degreasing procedure, packed in a single sealed plastic bag, with pressure port protected by a cup.

The final user must guarantee to keep such cleanness until the installation.

### VIBRATIONS

When the installation produces severe vibrations various solution may be chosen, such as :

- select pressure gauges with case liquid filled
- install the instruments at a distance from vibration sources and connect the pressure gauge with flexible pipe.

### MECHANICAL SHOCK

Must be avoided as much as possible, the instrument must be installed at a distance from the possible source, and connected to the pressure source with flexible pipe.

### LIQUID FILLED PRESSURE GAUGES

It has been general practice to use glycerine or silicone filling fluids, but care has to be taken to select a suitable filling fluid, depending on the process fluid to be measured, and the ambient temperature where the pressure gauge is to work.

If the application is to measure oxidizing process mediums such as oxygen, chlorine, nitric acid, hydrogen peroxide, etc. a potential hazard can result from chemical reaction, ignition or explosion. Fluorine or chlorine based filling fluids must be used for such applications.

As far as the ambient temperature (Ta) is concerned the maximum is +60°C (+140°F) and select the filling fluid in accordance with the below table of the minimum temperature based on gauge type and mechanism:

(\*) available only on limited version. Please consult factory.

Gauge type	Mechanism	Fill	Ta Minimum
Pressure	Bourdon Tube	None	-40°C (-40°F)
Pressure	Bourdon Tube	Silicone	-40°C (-40°F)
Pressure	Bourdon Tube	Glycerine	-20°C (-4°C)
Pressure	Bourdon Tube	Fluorolube	-50°C (-58°F)
Pressure	Diaphragm	All	-20°C (-4°C)
Pressure	Capsule	Not fillable	-10°C (-50°F)
Differential	Bourdon Tube	All	-20°C (-4°C)
Differential	Bellows	Glycerine/Silicone	-20°C (-4°C)
Differential	Bellows	Fluorolube (*)	-50°C (-58°F)
Differential	Diaphragm	Glycerine/Silicone	-30°C (-22°F)
Differential	Diaphragm	Fluorolube (*)	-50°C (-58°F)

## PROCESS FLUID TEMPERATURE

To protect a pressure gauge from high process fluid temperatures (over 60 °C) it is recommended to fit a siphon or similar device in a way to get the fluid to form condensate before it reaches the sensing element. A siphon or similar device must always be set as close as possible to the pressure gauge, and filled with condensed fluid before the system is pressurized, this will avoid the hot process fluid reaching the pressure gauges during the start up.

Make sure that the process fluid does not freeze or crystallize inside the sensing element.

For very high process temperatures it is recommended to connect the pressure gauge to the process source by piping with an outside diameter of approximately 6 mm, and length of 2 meters, to reduce the process fluid temperature close to the ambient temperature.

When the process fluid composition or temperature does not permit the connection with small diameter pipe it is often necessary to fit to the pressure gauge a diaphragm seal, ensuring that the diaphragm seal filling fluid is suitable with the process fluid temperature.

## TRANSPORT

Check before installation that the instrument has not been damaged during transport, check that the pointer falls into the zero band. The pointer not returning to the zero position could mean significant damage to the instrument which must not be installed before the calibration has been checked.

## INSTALLATION

The installation should be carried out by suitable trained personnel in accordance with all relevant Local and National regulations and codes. The safe working practices for the media & processes concerned should be followed during installation.

The final user must make sure before installation that the selected pressure gauge is correct for the application and also that the range and features are correct. It is recommended to fit between the pressure gauge and the process side an isolating valve which will make removal easier for any maintenance or replacement.

The process connection must be pressure tight :

-pressure gauges with parallel threads : sealing of the pressure is achieved on the top flat face of the socket by means of a ring gasket of material compatible with the process fluid data

-pressure gauges with taper threads : sealing of the pressure is achieved by threading coupling, it is common practice to wrap PTFE tape around the male thread of the pressure gauge before coupling

-pressure gauges with flanged connection must be installed in accordance with the recommendation of the pertaining rules. In the case of direct mounting pressure gauges with threaded socket the torque must be applied to the socket flats with a spanner, where available another spanner must be used on the process side female nut. Never use the pressure gauge case as tightening point, any case distortion may cause inner damage to the sensing element or movement. At start up make sure the socket is pressure tight. All pressure gauge dials must be mounted vertically, unless any other position has been marked on the front dial.

When pressure gauges include a safety device (blow out disc) or a back safety device system (solid front) it must be a guaranteed minimum clearance of 20 cm from the nearest solid object.

For panel mounting or wall mounting designs make sure that the process fluid pipe does not apply any torque or tensions to the pressure gauge connection.

## LIQUID COLUMN EFFECT

The final user must be aware that any static pressure head of a liquid column acting on the pressure gauge will affect the reading, the pressure gauge then has to be calibrated accordingly to compensate for the liquid column effect, with the value of compensation marked on the dial.

## ZERO POINTER READING

It is not recommended to use pressure gauges to check values close to the zero pressure value, because in this area the accuracy is not guaranteed. For this reason pressure gauges must not be used to check possible residual pressure inside a tank or container of high volume because, despite the pressure gauge showing zero pressure, there could still be pressure left inside the tank that could be a danger to the operator.

## AMBIENT TEMPERATURE

It is difficult to isolate the pressure gauge from an ambient temperature that is too high or too low. A solution might be to remove the pressure gauge away from the cold or heat source, when possible. When pressure gauges with accuracy 0,6% or better are used at an ambient temperature different from the reference temperature of 20°C (+/- 2 °C) proper correction must be applied.

## REUSE OF PRESSURE GAUGES

It is not recommended that pressure gauges are moved from one application to another because they may have different process fluids. This may cause chemical reactions, or explosions due to the contamination of the wetted parts. Remain-

der of the process fluid contained in the pressure sensing element may be hazardous or toxic. Take suitable precautions when handling and storing pressure gauges that are removed from an application to avoid personal injuries.

### OPERATION CHECK THROUGH THE INDICATING POINTER

Make sure that a pressure reading that unusually does not change for a long time, is not due to the clogging of the pressure inlet to the sensing element, the inlet pipework or isolation valve. Especially if the pressure gauge's pointer is at zero, make sure that there is not pressure left inside of the pressurized system before removing the pressure gauge.

### CLEANING

Some applications require that pressure gauges are purchased specially cleaned. In this case the final user must check that the pressure gauge is correctly specified and installed (for example: pressure gauges free of oil for oxygen applications).

### VENTILATIONS

The casing must be ventilated as indicated in the instructions shown on the sticker supplied with the instrument.

When a low scale range pressure gauge is installed it is necessary to ventilate the case following the instructions shown on tags applied on the gauge. This procedure allows to bring the internal pressure of the case back to the atmospheric pressure value.

### MAINTENANCE

The maintenance should be carried out by suitable trained personnel in accordance with all relevant Local and National regulations and codes. The safe working practices for the media & processes concerned should be followed during maintenance.

In most applications the general safety of an installation or process plant often depends on the operating conditions of the instrumentation which control it. Reliability of the instruments is essential for safety purposes. Any instrument which may seem to the operator not to be operating correctly must be removed from the application, so the function and calibration can be checked. The accuracy of pressure gauges must be confirmed by scheduled checks and recalibration.

Any calibration or safety checks should be done by qualified personnel, by using appropriate test

equipment. The calibrating fluids must be compatible with the process fluid. Fluid containing hydrocarbon must not be used when the process medium is oxygen or others oxidising media.

Instruments should be stored in their original standard packing (carton, box) in a dry, clean room, the suggested storage temperature should be between  $-30$  to  $+60$  °C, unless stated differently in the catalogue.

### PRESSURE GAUGES FITTED WITH ELECTRICAL CONTACT

DELTA MOBREY Ltd will supply upon request, the conformity declaration relating to electric contact assembled to gauges:

snap action contacts – conformity to 2014/35/EU;

electronic contacts – conformity to EN 60947-5-2;

inductive contacts – PTB 99 ATEX 2219 X.

### WARNING

DELTA MOBREY LTD declines all responsibility for any direct or indirect damage to property or person as well as for the consequences, for example, of lost production resulting from failure to observe the instructions in this leaflet, and all information in our catalogue, see our web site.

The responsibility of the classification of zones lies with the plant operator and not the manufacturer/supplier of the equipment.

### SPECIAL CONDITION OF USE (X condition):

Observe the surface temperature limits for ATEX application. The permissible medium temperature depends also by the ignition temperature of the gas, vapour or dust. Take this information into account during installation (see section on Process Fluid Temperature) . Install the instrument in such a way that, taking into account the ventilation and influence of convection and heat radiation, no deviation can occur, above or below the permissible ambient temperature (see table on page 2).



Clean the pressure gauge with moist cloth and ensure that no electrostatic charge is generated.

The instrument is earthed via the process connection. Electrically conductive sealings should be used at the process connection. Alternatively, take other measures for grounding.



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