



**E5313** – The temperature inside and on the surface of the instrument may increase significantly due to rapid compression of a gas measured, or an impact wave in a liquid measured. Internal overheating caused by adiabatic compression or by an impact wave can lead to spontaneous combustion of fluids measured, or ignition of explosive atmospheric conditions outside the casing. The surface temperature must not exceed the limit set for the temperature class required in the area in which the instrument is installed.

**N112** – When use is found to be incorrect or the sensitive element is cracked or broken, if the fluid measured is combustible or inflammable and measuring is continuous, an explosive atmosphere may be generated inside and around the instrument casing. In cases such as this it is vitally important that an appropriate maintenance program is activated to replace worn parts on the instrument before any leaks occur.

**NF21** – Regardless of the material with which the unit has been made or welded (connection to the process, Bourdon tube, terminal) it is not advisable to use the pressure gauges at temperatures exceeding 65°C (150°F). It is recommended to use a trap in cases where the pressure gauge is used with steam or liquid media at high temperatures. A trap or similar device should always be fitted near the instrument and filled with condensed fluid before pressurising the system, so as to prevent the hot fluid from reaching the instrument during the initial pressure rise. The fluid should not be allowed to freeze or crystallise inside the measuring element. However, if the instrument is used for measuring points at high temperature, it is recommended to use a hose with inside diameter of at least 6 mm to connect it to the pressure coupling. A hose about 1.5-2 metres long reduces the effective operating temperature to approximately ambient level. If the type of fluid does not permit the use of a small section hose, it is often necessary to insert a separator between the process fluid and the instrument, provided that the transmission fluid is suitable for the temperature of the process fluid.

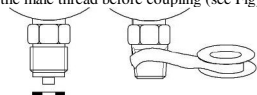
**Transport** - The characteristics of the instruments may be affected during transport, despite adequate packing, and must be checked before use. Correct calibration can be checked by excluding the instrument from the process by means of the shut-off valve and checking that the pointer returns to the zero mark (unless the temperature varies greatly from 20°C). Failure of the pointer to return to zero indicates serious damage to the instrument and requires maintenance to be carried out on the instrument.

**Storage** - Instruments must be kept in their original standard packaging until they are installed, and must be located in closed spaces that are free of any damp. If the instruments come with special packaging (in wooden boxes lined with tar paper or in barrier bags), it is always best to keep them in closed spaces wherever possible, and always where they are protected from the weather. The state of packaging materials must be checked every 3-4 months, especially if the boxes are exposed to the weather. The temperature of the storage area should be between -20 and +70 °C, except where otherwise specified in the catalogue data sheets.

**Installation - 2G1 and 2D1 version MGS pressure gauges must be installed in compliance with European Standard EN 837-2, and special care must be taken to avoid any loose mechanical connections.**

**Install the instrument in a position in which magnetic and electromagnetic induction, ionising radiation, ultrasound and exposure to sunlight will not increase the instrument's surface temperature.**

To facilitate removal for maintenance purposes, a shut-off valve can be installed between the pressure gauge and the plant. The pressure connection must be watertight. If the pressure connection has a cylindrical thread, the seal is achieved using an O-ring clamped between the two flat sealing surfaces, one on the pressure connection and the other on the instrument's process connection. If the pressure connection has a tapered thread, the seal is achieved by simply screwing the connection onto the coupling, through the mating of the threads. It is common practice to wrap PTFE tape around the male thread before coupling (see Fig).



In both cases the torque must be applied using two hexagonal spanners, one on the flat faces of the instrument/process coupling and the other on the

pressure connection.

**Do not use the case as a means of tightening as this may cause damage to the instrument.**

When pressurising the system for the first time, check the tightness of the connection seal. All instruments must be mounted in such a way that the dial is vertical, unless otherwise indicated on the dial itself. When the instrument includes a safety device, this must be at least 20 mm from any other object. - For wall or panel mount instruments, make sure that the pipe conveying the pressurised fluid is connected to the instrument coupling without exerting torsion or force.

**Effect of liquid columns** - The installer must be aware that, if the instrument is subjected to the load of a liquid column, it must be calibrated to compensate for this effect. This occurs when the instrument is fitted above or below the pressure connection to which it is connected. When dealing with gas or steam this does not occur. In this case, we recommend installing the instrument above the pressure connection.

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

**Temperature** – If the process fluid temperature exceeds the upper limit, a trap or similar device should always be fitted near the instrument and filled with condensed fluid before pressurising the system, so as to prevent the hot fluid from reaching the instrument during the initial pressure rise. No fluid that is to be frozen or crystallised is to be allowed into the sensitive element. However, if the instrument is used for measuring points at high temperature, we recommend using a hose with an inside diameter of at least 6 mm for the connection to the pressure coupling. A pipe about 1.5 – 2 mt long, reduces the actual operating temperature to approximately the same as the ambient temperature. If the type of fluid does not permit the use of a small section hose, it is often necessary to insert a separator between the process fluid and the instrument, provided that the transmission fluid is suitable for the temperature of the process fluid.

**Adiabatic compression – For gaseous fluids that are compressed rapidly, the rate of pressure variation must be lowered until the maximum surface temperature falls to within the range permitted. When working with gaseous fluids the pressure must increase as slowly as possible. Suitably sized bottlenecks or shock-absorbers must be installed until the raise time 1 sec. is reached through pressure steps 80% of the full range value. If there is a possibility of great fluctuations in the pressure on the line, a suitable pressure limiting device must be installed upstream of the pressure gauge.**

**E721 - Mechanical stress** - Pressure gauges must not be subjected to mechanical stress. If the installation points are subject to mechanical stresses, the instrument must be installed at a distance and connected using flexible hoses. - The instruments selected must be of the surface, wall or panel mount type.

**E722 - Vibrations** - When the pressure gauge support is subject to vibrations, various solutions may be considered, such as:

a) the use of liquid-filled gauges; b) if the vibrations are strong or irregular, the instruments must be mounted at a distance and connected using a flexible hose or tubing.

The presence of vibrations is indicated by continuous, often irregular fluctuations of the pointer.

**E723 - Dynamic and cyclical pressures** – These generally occur when the instruments are fitted on pumps and/or when working with gaseous fluids, and significantly reduce the lifespan of the sensitive element, the pressure gauge's amplification movement, and excessively high surface temperatures. These pressures are generally indicated by the indicator oscillating widely. These pulsating pressures must be reduced by fitting shock-absorbers or bottlenecks between the source of the pressure and instrument, especially when working with combustible or inflammable fluids. Filling the case with a damper liquid can also reduce the harmful effect of pulsations on the moving parts of the pressure gauge. If there is a possibility of large fluctuations in pressure on the line, fit a pressure limiting device between the shut-off valve and the pressure gauge.

**E724 - Overpressure** - Any overpressures subject the measuring element to stress, with a consequent reduction in its lifespan and accuracy. It is therefore always advisable to choose an instrument whose full scale pressure is greater than the maximum operating pressure, so that it is better able to withstand

overpressures and pressure surges. Pressure surges can be handled in the same way as pulsating pressures. Overpressures of longer duration can be handled by installing a pressure-reducing valve on the pressure gauge line. The occurrence of even a single overpressure event can result in an overpressure failure.

**Equipotentiality** – **The instrument is made equipotential with the plant it is fitted on by means of an Ohmic contact between the threaded process connection and the pressure connection.**

### 10. Accessories

**Diaphragm seals:** These are required for transmitting the pressure exerted by corrosive, hot, high viscosity or crystallisable process fluids. See the relevant instruction manual: MGS9.

**Adjustable overload protection device:** These are useful on systems that may generate high excess pressures, as they automatically exclude the pressure gauge at a preset pressure, and automatically include them in the circuit again once the process pressure has been normalised. Valves, loops, blow-out vents, and pipe fittings and connection piping, and pressure stabilisers: See the relevant instruction manual: MP.

### 11. Use

**The user must be aware of the risks related to the chemical and physical characteristics of the gases, vapours, and/or powders in the system, and carry out a thorough preliminary check before putting into service.**

**Putting into service** - The instrument must always be put into service with care, to avoid pressure surges or sudden changes in temperature. **Shut-off valves must therefore be opened slowly.**

**Intermittent measuring** – It is advisable to measure when necessary by slowly opening the shut-off valve and then closing it again once the reading has been taken. This will ensure a long lifespan and safe operation of the instruments.

**A432** - It is not advisable to use the instruments for measuring pressures near zero, as in that range the accuracy tolerance can represent a significant percentage of the applied pressure. For this reason, these instruments should not be used for measuring residual pressures inside large volume containers such as tanks, surge tanks, and the like. In fact, such containers may retain pressures that are dangerous for the operator, even when the instrument indicates a zero pressure. It is recommended to install a ventilation device on tanks in order to achieve zero pressure before removing covers or connections, or performing similar tasks.

**A44** - It is not advisable to successively install instruments on systems with different operating media, to avoid initiating chemical reactions that may cause explosions resulting from contamination of the wetted parts.

**Caps** – The filling and vent caps must not be removed while the system is working.

### 12. Possible malfunctions

- **No indication** (pointer on zero): Initial valve closed.
- **Indication steady on the same value:** Pressure pipes clogged. Initial valve closed.
- **Indication steady outside the graduated scale:** Excess pressure – temporary or permanent reading error.
- **Indication error exceeds that stated for the instrument:** Calibration altered.
- **Pointer oscillating rapidly:** Harmful pulsations in the process fluid. Harmful mechanical vibrations.
- **Ejection of the safety cap:** Excess Temperature: Breaking / cracking of the sensitive element probable.

### 13. Maintenance

**Maintenance is to be carried out in accordance with the requirements of European Standards EN60079-14, EN50281-1-2.**

Maintenance of the initial mechanical and construction characteristics must be ensured by means of a specific maintenance programme, drawn up and managed by qualified technicians. Mechanical parts must be maintained in such a way as to avoid the dangers associated with high temperatures, and the risk of fire and explosion due to any abnormality that arises when they are working.

**Thorough check** – The window must not show any crack. Filling plug and blow out vent must be placed in the right position. The pointer must be within the graduated scale. Il trasparente non deve presentare incrinature.

**As for the liquid filled instrument, they must be refilled when the level is 85%. Use Nuova Fima liquids only.**

**Routine check** - Instruments used on plants subject to demanding conditions (vibrations, pulsating pressures, corrosive or combustible / inflammable fluids) must be replaced at the time intervals indicated in the maintenance programme. Where not covered by the maintenance programme, the state of the sensitive element should be checked every 3/6 months, as well as the indicating precision, degree of corrosion on the sensitive element (for fluid separators), the seal on the gaskets, and the presence of condensate inside the casing. If the instrument malfunctions, an unscheduled check must be carried out.

**Check from time to time that dust deposits on the instrument are not thicker than 5 mm. Where this occurs the instrument must be cleaned. Use a cloth soaked in a water and soap solution.**

**Removal** – The instruments must be cut off from the system by closing the initial valve, and the pressure inside the instrument must be reduced to zero by opening the vent in the system. The process fluid left in the instrument's process connection must not be disposed of in the environment, so as not to cause pollution or harm people. Dangerous and toxic fluids must be handled with care.

**Detailed check** - The testing fluid must be compatible with the fluid to be measured in the pressurised system. Fluids containing hydrocarbons must not be used when the fluids to be measured are oxygen or any other oxidising substance. To check the integrity of the sensitive element, fit the instrument on a pressure generator, with a shut-off valve between the two. Submit the instrument to the maximum pressure allowed and disconnect it from the pressure source by closing the shut-off valve. If there are any leaks on the sensitive element, the pointer will slowly return to zero. In order to check indication precision, a stable pressure must be generated in a laboratory and applied to the instrument being checked and to a pressure sample or primary pressure. The precision of the latter must be 4 times higher than the nominal precision for the instrument being checked. The values indicated by the two instruments as the pressure rises and falls a number of times makes it possible to establish non-linearity, hysteresis, and repeatability for the instrument being checked.

**Check the soundness of the gaskets and the consequent IP protection level.**

**Recalibration** – If the calibration check produces measured values that differ from the nominal values indicated in the catalogue, the instrument must be recalibrated. We recommend returning the instrument to NUOVA FIMA for recalibration.

**NUOVA FIMA does not accept any responsibility for instruments used that are subject to work not expressly authorised by them, and such work shall cause the CE Declaration of Conformity and Contractual Guarantee to be null and void.**

### 14. Demolition

We recommend removing transparent parts and caps and disposing of them as aluminium and stainless steel. The fluid left in the instrument may be dangerous or toxic.