

# Engineering Data Sheet

Document No:- 004B04000D799 rev 1

Installation, Operation & Maintenance Instructions for  
M4000 Stainless Steel Metering Station

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Date 7<sup>th</sup> November 2001

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## CE MARKING AND THE PRESSURE EQUIPMENT DIRECTIVE 97/23/EC

This has been implemented in United Kingdom law by the Pressure Equipment Regulations 1999 (SI 1999/2001).

The regulations apply to all piping products with a maximum allowable pressure greater than 0.5 bar. Products with a maximum allowable pressure not exceeding 0.5 bar are outside the scope of the Directive. Products are categorised in accordance with the maximum working pressure, size and ascending level of hazard, which is dependent on the fluid being transported. Fluids are classified as Group 1, dangerous fluids or Group 2, all other fluids including steam. Categories are SEP (sound engineering practice) and for ascending levels of hazard, I, II, III or IV. All valves designated as SEP do not bear the CE mark nor require a Declaration of Conformity. Categories I, II, III or IV carry the CE mark and require a Declaration of Conformity (Note- all products up to and including 25mm (1") having a maximum allowable pressure greater than 0.5 bar are designated SEP regardless of fluid group.)

## PRODUCT LIFE CYCLE

The life of the metering station is dependent on its application, frequency of use and freedom from misuse. Compatibility with the system into which it is installed must be considered. The properties of the fluid being transported such as pressure, temperature and the nature of the fluid must be taken into account to minimise or avoid premature failure or non-operability. A well-designed system will take into consideration all the factors considered in the metering station design, but additionally electrolytic interaction between dissimilar metals in the metering station and the system must be examined. Before commissioning a system, it should be flushed to eliminate debris and chemically cleaned as appropriate to eliminate contamination, all of which will prolong the life of the metering station.

## LIMITS OF USE

The metering station to which these installation, operation and maintenance instructions apply have been categorised in accordance with the Pressure Equipment Directive.

**The fluid to be transported is limited to Group 2 liquids i.e. non-hazardous and on no account must these metering stations be used on any Group 2 gases, Group 1 liquids or Group 1 Gases.**

**Fig 4000 stainless steel metering stations in PN40 pressure ratings and in sizes up to and including 2 inch are categorised as SEP and do not require the CE mark**

## Operating pressures and temperatures

PN	Non-shock pressure at temperature range	Non-shock pressure at max. temperature
40	40 bar from -10°C to 120°C	34 bar at 180°C

Not suitable for fatigue loading, creep conditions, fire testing, fire hazard environment, corrosive or erosive service, transporting fluids with abrasive solids.

They must be installed into a piping system where the normal pressure and temperature do not exceed the above ratings.

The M4000 is fitted with Hattersley Figure 750 valve isolating test points.

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The temperature is restricted for the Figure 750 to 180°C due to their elastomeric seals.

The maximum allowable pressure in metering stations as specified in the standards is for non-shock conditions. Water hammer and impact for example, should be avoided.

If the limits of use specified in these instructions are exceeded or if the metering station is used on applications for which it was not designed, a potential hazard could result.

## **LAYOUT AND SITING**

It should be considered at the design stage where metering stations will be located to give access for operation, adjustment, maintenance and repair.

## **INSTALLATION**

Metering stations should be installed with a minimum of 5 diameters of straight pipe upstream having the same nominal diameter as the metering station and should not include any reducers or any other intrusions into the bore within this specified length.

Metering stations may be installed close coupled to a Fig 1200DR double regulating globe valve.

When Metering stations are used in isolation, a minimum of 3 diameters of straight pipe must be fitted downstream.

Prior to installation, a check of the body marking must be made to ensure that the correct metering station is being installed.

Metering stations are precision manufactured items and as such, should not be subjected to misuse such as careless handling, allowing dirt to enter the metering station through the end ports, lack of cleaning both metering station and system before operation.

All special packaging material must be removed.

Immediately prior to valve installation, the pipework to which the metering station is to be fastened should be checked for cleanliness and freedom from debris.

Packaging should only be permanently removed immediately before installation. The Metering station interior should be inspected to determine whether it is clean and free from foreign matter.

The mating flange (both Metering station and pipework flanges) should be checked for correct gasket contact face, surface finish and condition. If a condition is found which might cause leakage, no attempt to assemble should be made until the condition has been corrected.

The gasket should be suitable for the operating conditions or maximum pressure/temperature ratings and when connected to a bronze valve, it must be full faced.

The gaskets should be checked to ensure freedom from defects or damage.

Care should be taken to provide correct alignment of the flanges being assembled. Suitable lubricant on bolt threads should be used. In assembly, bolts are tightened sequentially to make the initial contact of flanges and gaskets flat and parallel followed by gradual and uniform tightening in an opposite bolting sequence to avoid bending one flange relative to the other.

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Parallel alignment of flanges is especially important in the case of assembly into an existing system.

Flanged joints depend on compressive deformation of the gasket material between the flange surfaces. The bolting must be checked for correct size, length, material and that all connection flange bolt holes are utilized.

It is important that the internal pipe bore at the point upstream to the metering station is free from internal burrs, weld spatter or other defects which will disrupt the velocity profile of the liquid and induce inaccuracies outside the flowrate accuracy specified.

It is important to ensure that the flow arrow on the metering station is coincident with the direction of flow in the pipeline. If close coupled to a valve the metering station must be upstream, that is the flow passing through the metering station before the valve.

It is preferable to have the plane of the test points above horizontal to prevent the accumulation of debris.

## **Test Point Fitment**

Test points are supplied loose and should be fitted during installation as follows:-

Remove the blanking plugs from the metering station.

Fit the test points to the metering station ensuring that the test point with the red strap is on the upstream side of the valve.

**Note:-** When tightening the test point excessive force is not necessary and care should be taken regarding the orientation of the test points to give sufficient room for manometer probe connection.  
A suitable sealing compound may be used on the test point threads but excessive use should be avoided.

Recommended attitudes for the test points are:

### **In horizontal pipework at low level**

With the upstream (HP) test point pointing vertically upwards. This will prevent the other (LP) test point from acting as a dirt pocket, since the latter will be horizontal and half way from the bottom of the pipe. Also the (HP) test point can be used to bleed air from the system.

Where pipework runs close to a wall or there is some other obstruction, it is essential that there is a 100mm clearance to allow a manometer probe to be connected to the test point.

This may mean that one test point (HP or LP) has to point up at 45 degrees which will still limit the extent to which its opposite serves as a dirt pocket, i.e. keep test points away from the bottom of the pipe.

### **In horizontal pipework at high level**

As for low level. Where pipework is enclosed in ceilings or voids it may be difficult to reach across other pipework, cable trays etc. in order to connect the manometer probes to the test points on the topside of the pipe.

Where this difficulty is likely to occur, it may be advantageous to have both test points pointing down at 45 degrees. This will ensure that neither is located as an obvious dirt pocket.

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## In vertical pipework

For vertical pipework, there is no obvious dirt entrapment areas and therefore the orientation of the test points is fully dependent upon the ease of manometer probe connection.

## OPERATING

The only operation required is during the commissioning stage. During this stage all entrained air must be expelled from the system before accurate measurements of differential pressure signals can be taken from the test points.

Each test point is fitted with a captive cap retained by a coloured strap:

Upstream (HP) - Red

Downstream (LP) - Blue

**Note:** For safety reasons all probe insertions during commissioning must be carried out with the system cold.

For the Figure 750, these measurements are taken by opening the isolation valve on the test point using an air vent key (Hattersley Fig. 426) after manometer probe connection.

## MAINTENANCE

Metering stations are maintenance free.

The metering station should be at zero pressure and ambient temperature prior to any inspection.

Maintenance Engineers & Operators are reminded to use correct fitting tools and equipment.  
A full risk assessment and methodology statement must be compiled prior to any maintenance.

The risk assessment must take into account the possibility of the limits of use being exceeded whereby a potential hazard could result.

A maintenance programme should therefore include checks on the development of unforeseen conditions, which could lead to failure.

For the supply of genuine Hattersley spares or technical assistance or Hattersley  
**Hattersley Newman Hender**  
**Peel House, Peel Road, West Pimbo, Skelmersdale, Lancashire. WN8 9PT**

Telephone : 01695 712800

Facsimile : 01695 712820

Email : [uksales@hattersley.com](mailto:uksales@hattersley.com)  
: [export@hattersley.com](mailto:export@hattersley.com)