I N S T R U C T I O N

for

EMCO Meter Run plate with carrier rings

type MSRS and MSRF

Liquid, gas, and steam

Application

EMCO meter run with carrier rings is the primary element in liquid, gas or steam flow measurement according to the differential pressure principle.
The fluid must be in one phase and the pipe shall run full in the measuring section.
Changes of flow shall be slowly i.e. without pulsation.

Storage

Before installation the primary element must be kept clean and protected against corrosion and physical damage.
Careful attention to the sharp edge of the orifice plate is important.

Pipe Run

The EMCO meter run with carrier rings shall be fitted between 2 sections of straight cylindrical pipe of constant cross-sectional area without any obstructions.

The required minimum straight lengths of pipe vary according to beta and the nature of obstruction - bends, reducers etc. From the table below it can be seen how many times the inner pipe diameter D is required for "zero additional uncertainty"
The values in the brackets give "+/-0,5% additional uncertainty". These are applicable when the length of the straight pipe run is between the unbracket and the bracket values.
If the straight lengths are shorter than the bracketed values no information is available of the value of any further uncertainty.

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ß	On upstream (inlet) side of the primary device							On down-stream (outlet) side
	Single 90° bend or tee (flow from one branch only)	**Two or more 90° bends in the same plane**	**Two or more 90° bends in different planes**	**Reducer (2 *D* to *D* over a length of 1,5 *D* to 3 *D*)**	**Expander (0,5 *D* to *D* over a length of 1 *D* to 2 *D*)**	**Globe valve fully open**	**Gate valve fully open**	**All fittings included in this table**
≤ 0,20	**10 (6)**	**14 (7)**	**34 (17)**	**5**	**16 (8)**	**18 (9)**	**12 (6)**	**4 (2)**
0,25	**10 (6)**	**14 (7)**	**34 (17)**	**5**	**16 (8)**	**18 (9)**	**12 (6)**	**4 (2)**
0,30	**10 (6)**	**16 (8)**	**34 (17)**	**5**	**16 (8)**	**18 (9)**	**12 (6)**	**5 (2,5)**
0,35	**12 (6)**	**16 (8)**	**36 (18)**	**5**	**16 (8)**	**18 (9)**	**12 (6)**	**5 (2,5)**
0,40	**14 (7)**	**18 (9)**	**36 (18)**	**5**	**16 (8)**	**20 (10)**	**12 (6)**	**6 (3)**
0,45	**14 (7)**	**18 (9)**	**38 (19)**	**5**	**17 (9)**	**20 (10)**	**12 (6)**	**6 (3)**
0,50	**14 (7)**	**20 (10)**	**40 (20)**	**6 (5)**	**18 (9)**	**22 (11)**	**12 (6)**	**6 (3)**
0,55	**16 (8)**	**22 (11)**	**44 (22)**	**8 (5)**	**20 (10)**	**24 (12)**	**14 (7)**	**6 (3)**
0,60	**18 (9)**	**26 (13)**	**48 (24)**	**9 (5)**	**22 (11)**	**26 (13)**	**14 (7)**	**7 (3,5)**
0,65	**22 (11)**	**32 (16)**	**54 (27)**	**11 (6)**	**25 (13)**	**28 (14)**	**16 (8)**	**7 (3,5)**
0,70	**28 (14)**	**36 (18)**	**62 (31)**	**14 (7)**	**30 (15)**	**32 (16)**	**20 (10)**	**7 (3,5)**
0,75	**36 (18)**	**42 (21)**	**70 (35)**	**22 (11)**	**38 (19)**	**36 (18)**	**24 (12)**	**8 (4)**
0,80	**46 (23)**	**50 (25)**	**80 (40)**	**30 (15)**	**54 (27)**	**44 (22)**	**30 (15)**	**8 (4)**

	Fittings	Minimum upstream (inlet) straight length required
For all ß values	**Abrupt symmetrical reduction having a diameter ratio ≥ 0,5**	**30 (15)**
	Thermometer pocket or well of diameter ≤ 0,03 *D* **Thermometer pocket or well of diameter between 0,03 *D* and 0,13 *D***	**5 (3)** **20 (10)**

It is recommended to use full bore valves upstream the primary element. The valves shall be fully open.

Installation

Steam and gas

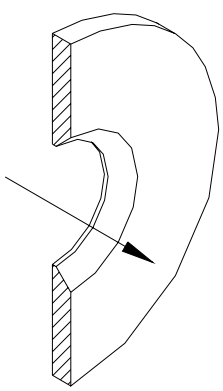
When the primary element is installed in a horizontal pipe measuring a flow which tends to condensate the orifice plate is provided with a drain hole to let the liquid pass the orifice plate.
The drain hole must be at the bottom of the pipe.

Liquid

If a liquid in a flow measurement tends to form a gas the orifice plate is provided with a vent hole to let the gas pass the orifice plate.
The vent hole must be in the top of the orifice plate.
When the primary element is welded into the pipe line an approved method of welding and if necessary heat treatment must be used.

The bevelled side of the orifice plate is the downstream side.

For type MSRF : Flange gaskets must suit the fluid and the service conditions.
The inner diameter of the flange gaskets must be greater than the inner pipe diameter.



Tap location

2 pressure tappings provide the pressure upstream and the pressure downstream. The upstream pressure tapping is marked " + " and the downstream pressure is marked " - ".

Liquid

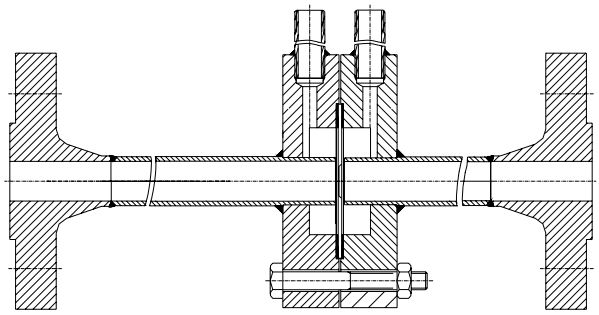
In a horizontal pipe the pressure taps shall be in the horizontal pipe axis or better below.

Gas

In a horizontal pipe the pressure taps shall be in the horizontal pipe axis or better above.

Steam

The orientation of the pressure taps is matched to either a vertical or horizontal pipe run. It is important that the 2 condensing chambers are at the same level to ensure equal water column above the differential pressure transmitter.



Instrument Connection

It is recommended to install the differential pressure transmitter below the meter run.
The " + " side of the meter run is connected to the " + " side of the differential pressure transmitter and the two " - " sides are connected.
The impulse lines must be installed with a slope to let captured air escape.
The impulse lines should not be less 12 x 2 mm in a material suitable to the service condition.
The meter run is normally supplied with the primary isolating valves.
It is recommended to use a 5-way manifold valve in connection with the differential pressure transmitter in order to isolate, equalize and blow-down or depressurize the transmitter.

Maintenance

The EMCO meter run with carrier rings requires no special maintenance. It is however important that the sharp edge of the orifice remains sharp and that the meter run are free from deposits .

References

ISO 5167, DIN 1952, DIN 19205 part 1, DIN 19207, DIN 19208, DIN 19209, DIN 19210, DIN 19211, DIN 19216, Shell Flow Meter Engineering Handbook, Flow Measurement Engineering Handbook.