M-CONE Series EMF
Cone type Differential Pressure Producer

Principle

M-CONE is used as primary element in flow measurement of liquid, gas and steam according to the differential pressure principle using equations similar to equations for orifices and venturis.

The differential pressure is measured with a differential pressure transmitter between the up-stream tapping (+ tapping) in the wall of the cone meter and the down stream tapping (÷ tapping) in the cone.

The inlet cone has a good flow conditioning effect especially for small β values. This effect supports the short straight pipe run requirements.

Larger size M-CONEs are furnished with vanes for 2 reasons:

1. Better flow conditioning effect.
2. Mechanical support of cone.

Advantages

Wide range of applications.

Space saving.

Repeatability.

Ideal for difficult applications.

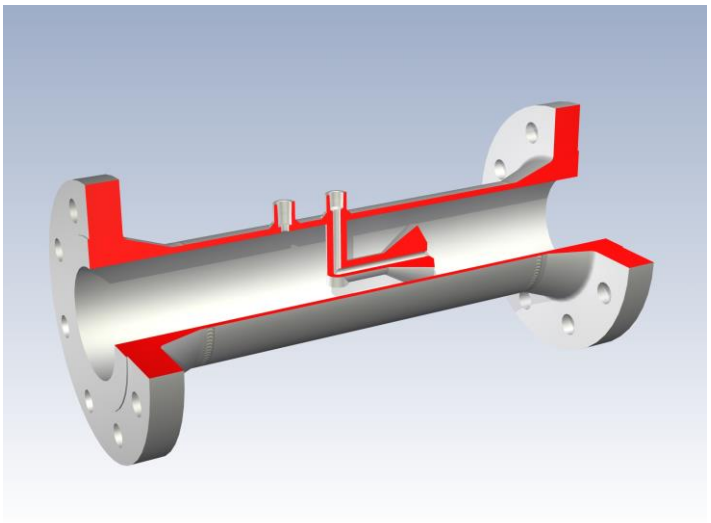
Suitable for erosive fluids.

No risk of clogging.

Self cleaning.

Suitable for wet gas metering.

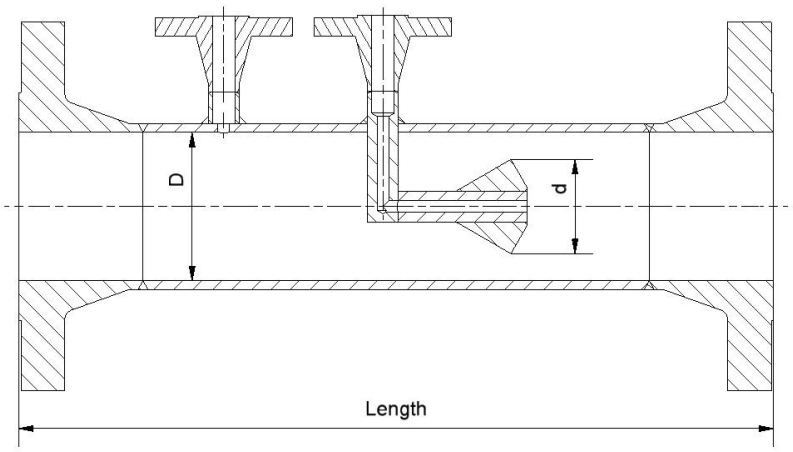
Fully in compliance to PED 2014/68/EU.



EMCO Controls A/S · Høgevej 6, DK-3400 Hillerød · Phone: +45 4576 9400 · Fax: +45 4576 9401 · emco@emco.dk · www.emco.dk

Construction

Design and calculation standards	:	EN, PED 2014/68/EU, ANSI/ASME and ISO 5167
Sizes	:	DN 50 - 1000 2" – 40"
Pressure rating	:	PN 10 - 400, 150 - 2500 lbs, 6.000 – 15.000 psi
Material	:	Carbon steel P235GH, P250GH, A105N, A350LF2, A106 Gr. B, AISI 316, 22 Cr. Duplex, 25 Cr. Duplex, 6Mo, 16Mo3 (F1), 13CrMo4-5 (F11) 10CrMo9-10 (F22), other materials on request
Mounting style	:	Weld ends according to EN 9692-1, ANSI B16.25. Flange connections according to DIN, ISO, ANSI, Norsok or API Hub connection for clamping between hubs (Grayloc or other brands).
Pressure taps	:	½", ¾" NPT ext., ½", ¾" flanged, others on request
Flange facing	:	Flat or raised face according to DIN 2526 or flat, raised face or ring type joint according to ANSI B 16.5
Beta ratio (d/D)	:	0,45, 0,5, 0,6, 0,7 and 0,75 (0,7 is standard). D : inner pipe diameter, d : cone diameter



The definition of β for cone meters is different from orifice plates and venturis where β = d/D.
The free area for a given M-CONE is the same as for orifice plates and venturi tubes.

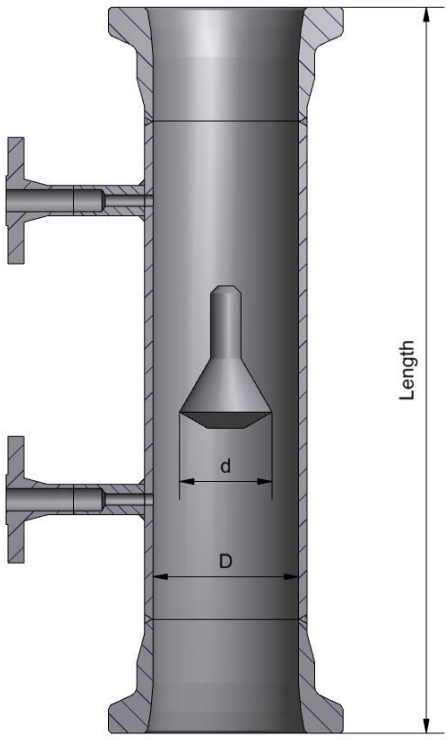
Cone meter: $$\beta = \sqrt{1 - \frac{d^2}{D^2}}$$

Pressure loss comparison

The pressure loss of a differential pressure flow meter depends on the mechanical design of the element. Especially the outlet section of the restriction determines the pressure loss.
DP elements with high pressure recovery have low pressure loss and low-pressure recovery elements have high pressure loss.
An orifice plate create turbulence downstream consequently the pressure recovery is low and therefore the pressure loss is high.
The classical venturi tube has a high-pressure recovery due to the long outlet cone creating a steady velocity decrease and pressure increase. Therefore, the classical venture tube has a very low pressure loss.
The M-CONE cone meter has an outlet cone with a large angle creating some turbulence but certainly not so much as the orifice plate. The pressure recovery for a cone meter is not as high as a classical venturi tube and therefore the pressure loss is higher for a cone meter than a classical venturi tube.
The cone meters do not require pipeline reduction in order to measure correctly in the full range as the Vortex flow meter. This pipeline reduction causes pressure loss. Therefore, the pressure loss of a cone meter is lower than a vortex meter.

Technical Data

Accuracy	:	+/- 1-2 % un-calibrated, +/- 0,5 % calibrated. (of discharge coefficient)
Repeatability	:	+/- 0,1 %
Pressure loss	:	40 % of measured differential pressure with beta ratio 0,7
Limits for Reynolds No.	:	Re > 10.000, lower Re. Consult factory
Installation requirement	:	Down to 5 x D up-stream and 2 x D down-stream.



Accessories

Primary shut-off valves
Condensing chambers for steam flow measurement.
Steam jacket (only type EMF-WT)

Dimensions, lengths

DN/Inch	Weld ends	150 lbs PN 16	300 lbs PN 40	600 lbs PN 100	900 lbs PN 160	1500 lbs PN 250	2500 lbs PN 400	Hub connection
50 / 2"	275	400	400	450	-	500	600	350
65 / 2½"	325	450	450	500	-	550	600	350
80 / 3"	360	500	500	550	650	650	750	460
100 / 4"	400	550	550	600	700	700	800	500
150 / 6"	570	750	750	800	900	900	1100	800
200 / 8"	650	850	850	900	1100	1100	1300	900
250 / 10"	700	900	900	1000	1200	1200	1600	1000
300 / 12"	770	1000	1000	1100	1250	1300	1700	1100
350 / 14"	800	1050	1050	1100	1250	1400	-	1200
400 / 16"	800	1050	1050	1150	1300	1400	-	1250
450 / 18"	820	1100	1150	1200	1450	1500	-	1300
500 / 20"	910	1200	1300	1350	1600	1700	-	1400
600 / 24"	1195	1500	1500	1600	1800	1900	-	1600
700 / 28"		1700	1800	1900	2000	2050	-	-
800 / 32"		1700	1950	1950	-	-	-	-
900 / 36"		1700	1950	2000	-	-	-	-
1000 / 40"		2000	2200	-	-	-	-	-

All dimensions in mm