Deltafluid
LA MESURE DE VOS EXIGENCES

Tél. : +33 (0)5 59 30 85 20
Fax : +33 (0)5 59 30 85 21
E-mail : delta64@deltafluid.fr

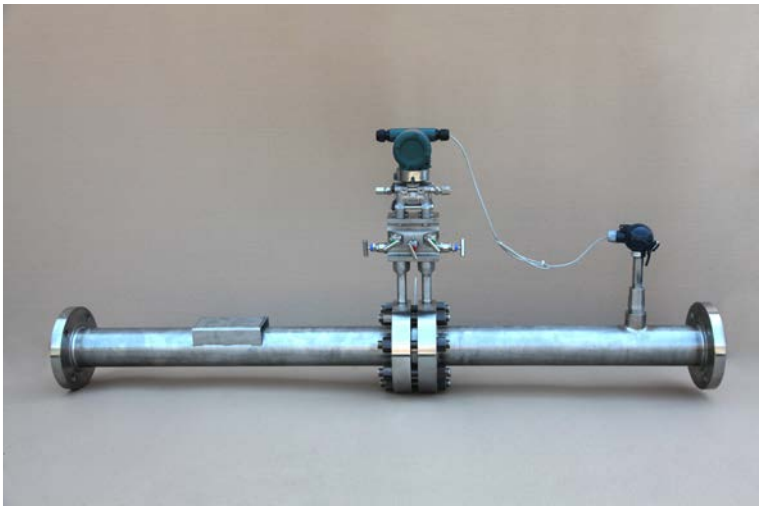
RD 817 - Chemin Les Augas
64170 LACQ - FRANCE

Datasheet
High precision flowmeter

Rev.1 Feb 2014

DeltaTMHP

- ✓ Warranty of high accuracy measurement
- ✓ Compliance with the requirements while limiting the measurement uncertainties to their minimum (ISO5167, ISO TR15377 : 2007, BS1042, ASME.MFC.3M standards)
- ✓ No need of calibration –standardised principle
- ✓ Ready-to-install flowmeter
- ✓ Efficient seal design to prevent leakage
- ✓ Pre-assembled complete set : quick and easy installation on site, incorrect assembly impossible
- ✓ Very long life time
- ✓ Possibility of integrated temperature and pressure compensation
- ✓ Preset differential pressure transmitter
- ✓ Delivered with all the relevant certificates



Contents

Overview

A **high precision measurement tube** is a **single piece assembly** of a primary element with mounting flanges and upstream and downstream pipe works according to the standards requirements. It includes as well pressure tappings, the manifold and the differential pressure transmitter. A temperature probe can be added for gas density compensation allowing a much more accurate mass flowrate calculation.

Controlling the **overall integral measurement system** and complying with all **the standard requirements** help overcoming the constraints that cause measurement uncertainties. All components of this assembly are independently checked and are precisely manufactured and set-up to achieve a great accuracy.

Whatever are the size and the type of your installation, the high precision tube allows very accurate flow measurements for all kind of industrial applications.

Technical specifications

Standards – Applications

Standards	ISO5167, BS1042, ASME.MFC.3M, ISO TR15377 :2007
Fluid temperature	-110°C to +800°C
Type of fluid	Gas, steam, liquid (single-phase fluids)
Nominal diameters	ND50 to ND1000 according ISO5167-1 (from 2 up to 40 inches) ND15 up to DN50 according ISO TR 15377 :2007 (from 1/2 up to 2 inches)
Maximum operating pressure	Limited by the flange rating

The high precision measurement tube is not limited to just a diameter of 2'' (DN50); it can be manufactured in larger diameters still complying with the standards requirements.

Features

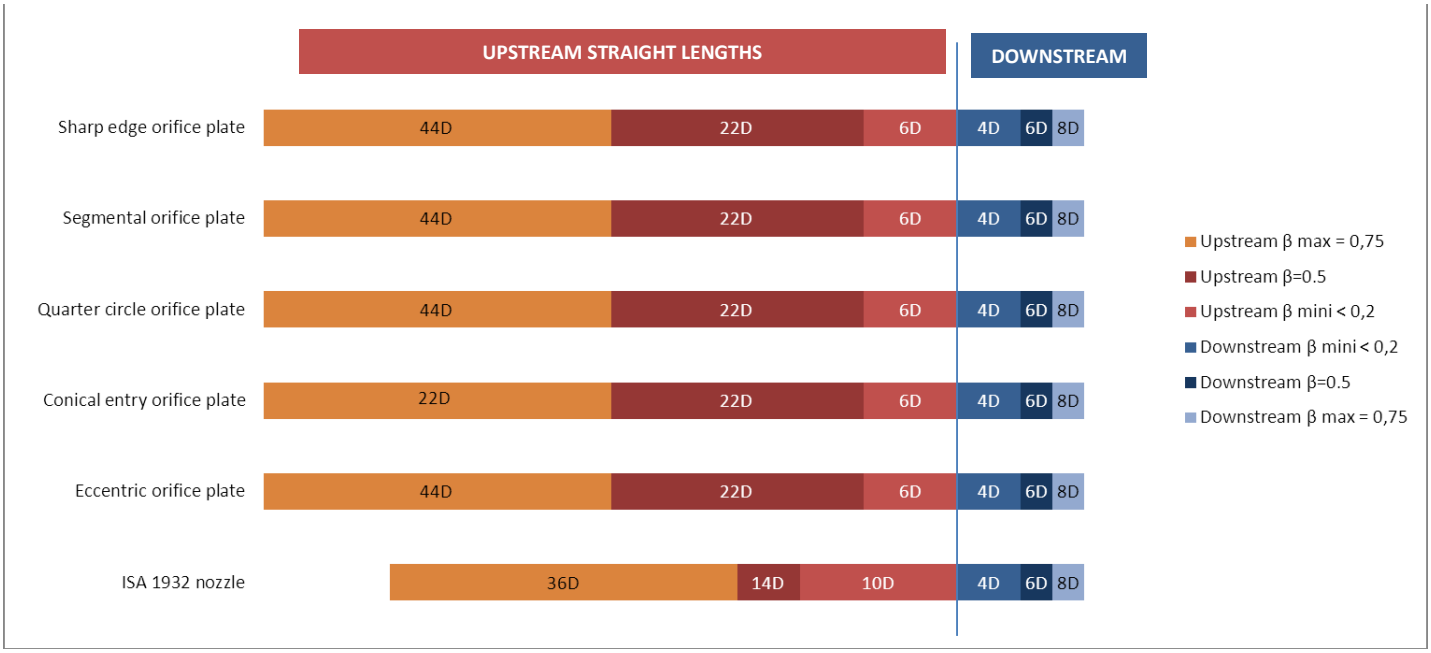
Accuracy	≤ 0,5 to 1 %
Material	Orifice plate : Carbon steel, Stainless steel, Monel alloy, Hastelloys, Inconels, Titanium, Tantalum, PVC, etc Flanges : according specifications Pipe works : according specifications
Pressure taps	According specifications
Process connection	Deltafluid recommends a flange connection (RF or RTJ) for a better measurement accuracy

The Delta TMHP measurement tube is provided with a data plate mentioning the main features of the device.

Mounting

Straight lengths	See diagram 1
Pipe alignment	The pipe is considered to be straight when the deviation from a straight line does not exceed 0,4% over its length
Roughness of the upstream pipe section	Ra roughness criterion to be respected in a length < 10D - See diagram 2 See ISO5167-2 standard
Circularity of the upstream pipe section	D ≤ D ± 0,3% D in a length ≤ 2D
Circularity of the downstream pipe section	D ≤ D ± 3% D in a length ≤ 2D
Temperature probe location	Downstream of the primary device, at a distance of 5D to 15D between it and the primary element

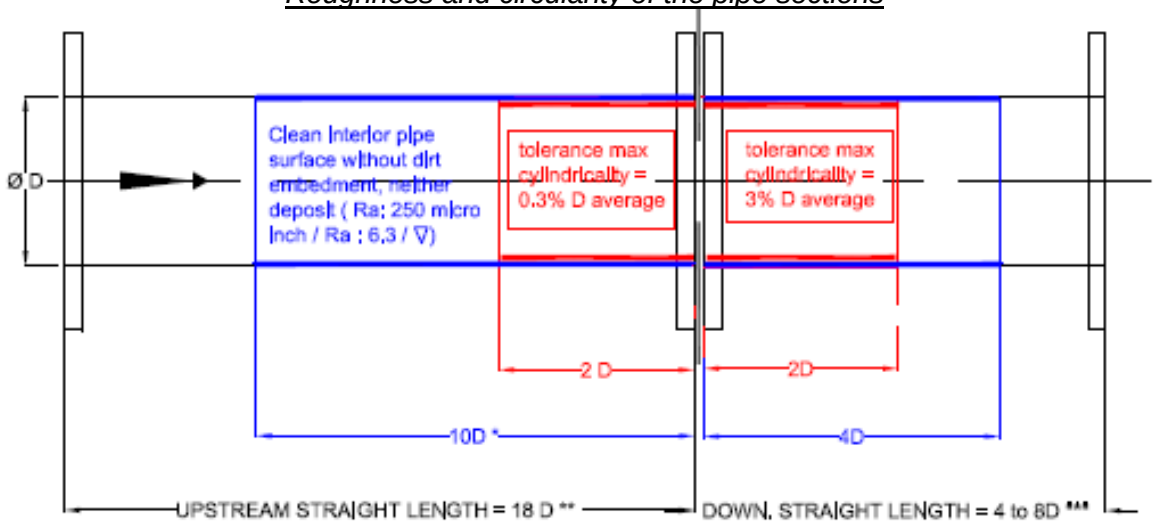
Diagram 1
Required straight lengths between orifice plates and single 90° bend fittings



For more details concerning requirements of installation, straight lengths to be respected depending on the different types of fittings, please refer to the relevant orifice plate or nozzle datasheets or to the ISO5167 standard.

Possibility to reduce the upstream pipe lengths using flow conditoners or flow starighteners : bundle flow, AMCA straightener types, Gallagher, NOVA K-Lab, NEL, Sprenkle, Zanker conditioner types.

Diagram 2
Roughness and circularity of the pipe sections

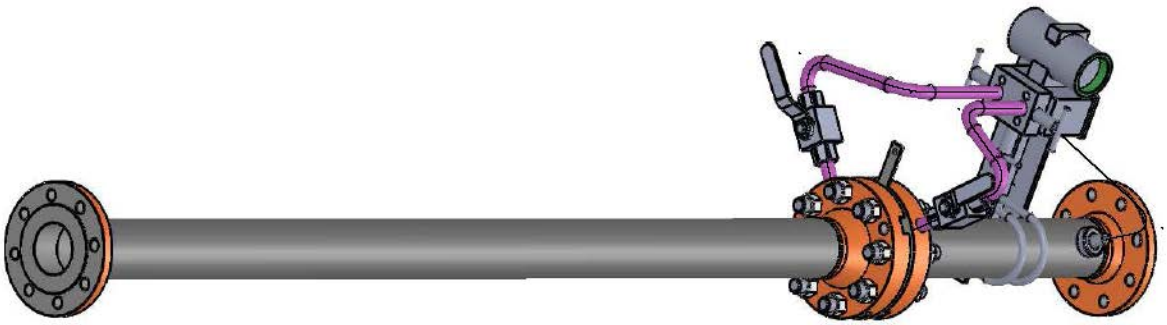


* for straight lengths between 2D to 10D, no additional uncertainty in the discharge coefficient is involved provided that the maximum tolerance on cylindricality does not exceed 0,3%D

** minimum distance from the primary element to the nearest upstream fitting with a 19-tube bundle flow straightener

*** minimum length between the primary element and the nearest downstream fitting depending on the d/D value

Example high precision measurement tube :
Integral 25/25 flowmeter including straight lengths according to standards, multivariable differential pressure transmitter and temperature sensor (for density compensation and calculation of mass flowrate).



Primary element

Mounting

Assembly	Flowmeter 25/25 : between orifice flanges Flowmeter 0/0 : inserted between 2 annular chamber elements or monoblock
Type of gaskets	Flat seal (spiral wound, graphite, PTFE) or RTJ (mild steel, stainless steel, monel alloy,…)
Location of primary element / pipe	Primary element perpendicular to the centerline of the pipe within 1° Centering : distance e between the centerline of the orifice and the centerline of the pipe on the upstream and downstream sides : $e \leq 0{,}002\ 5D / (0{,}1 + 2{,}3\ \beta^4)$

Different types of primary elements

Orifice plate	Sharp edge Conical entry Quarter circle Eccentric Segmental
Nozzle	ISA1932

For more details, please refer to orifice plate and nozzle datasheets.

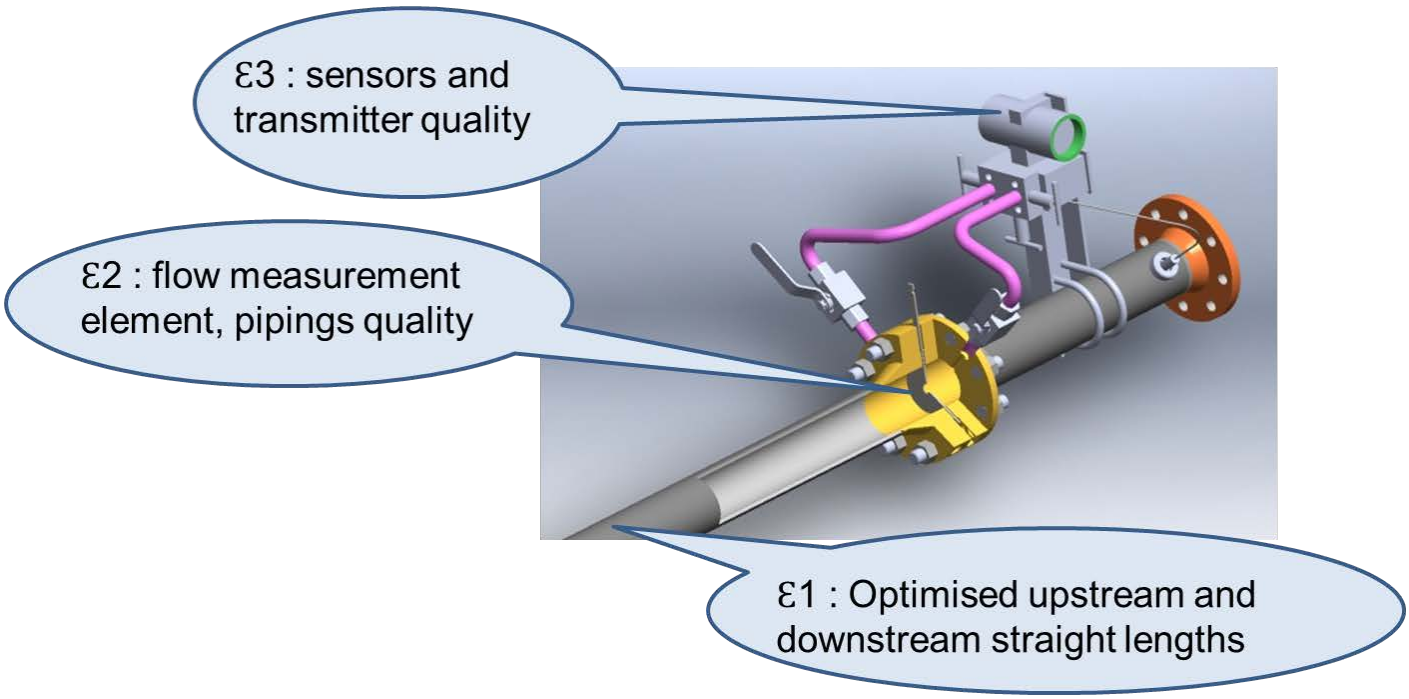
The overall uncertainty of the measurement device is assessed with the following formula :

Overall uncertainty ε= ε1+ ε2+ ε3

ε1 related to the installation requirements : optimized upstream and downstream straight lengths.

ε2 related to the primary element and pipes quality : roughness, circularity of the pipe sections, centering and flatness of the orifice plate according to standards.

ε3 related to the primary element type, to the temperature and pressure sensors quality, to the differential pressure transmitter, to their calibration and possible drifts.



The control of all the components of this measurement device, in accordance with the standards requirements, the selection of reliable and high-quality products, the close manufacturing control during assembly allow Deltafluid to offer a device intended to achieve a high accuracy measurement around 0,5%.