

INTRA-AUTOMATION



MESS- UND REGELINSTRUMENTE / MEASUREMENT AND CONTROL

Certified according to ISO 9001; PED 97/23/EC; ATEX 2014/34/EU

IntraNozzle Flow Nozzle

Type: IFN



Technical Information

03/2016



FLOW

THE EXPERT IN LEVEL AND FLOW

Intra-Automation
Technical Information
03/2016

Technical details subject to be changed without notice.

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IntraNozzle Flow Nozzle

Type: IFN

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1 General Description

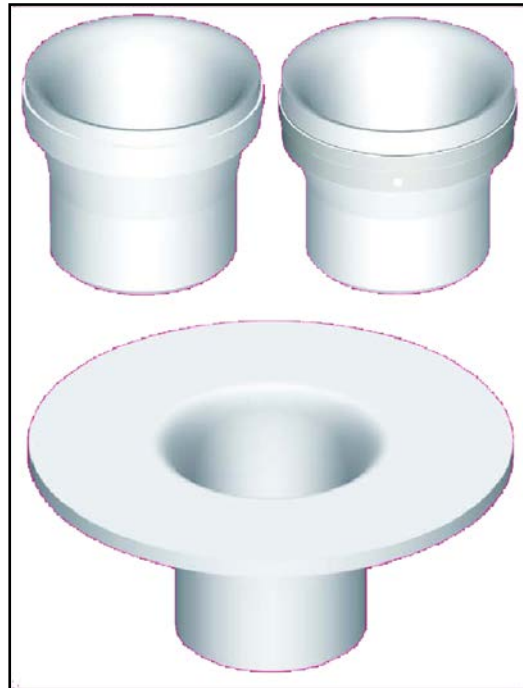
A flow nozzle is to be installed in a pipe line. While a fluid is flowing through this pipe line due to the nozzle a pressure difference is generated. From the value of this pressure difference, which can be measured by a differential pressure transmitter, the flow rate can be calculated.

Flow nozzles are designed to work with high pressure and high temperature applications. Their construction is more rugged than orifices. They allow the flow of more than 60 percent greater volume than orifices do. They are less sensible against solid particles in the fluid. Also, they are applicable for high-speed flowing fluids.

We can provide the nozzles assembled in a measurement section, inlet 4D and outlet 2D.

Available Standards:

- ISO-5167
- ISA 1932
- Venturi-Nozzles
- ASME MFC-30
- ASME PTC-6



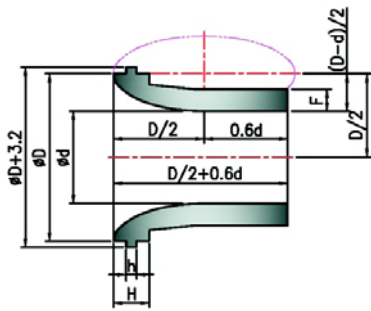
2 Specifications

- ◆ ISO-5167 Nozzle type: Long radius nozzles
 1. High ratio: $0,25 \leq \beta \leq 0,8$
 2. Low ratio: $0,2 \leq \beta \leq 0,5$
 ISA 1932 Nozzle, Venturi-Nozzle
- ◆ ASME MFC-3M, ASME PTC-6 Nozzle
 1. High ratio: $0,5 \leq \beta \leq 0,8$
 2. Low ratio: $0,2 \leq \beta \leq 0,5$
 3. Low ratio, with throat tap: $0,25 \leq \beta \leq 0,5$
- ◆ Pressure Taps: Pipe Wall Taps at D & D/2, Throat Tap
- ◆ Throat calculation codes:
 - ISO 5167
 - ASME MFC-3M
 - L.K. SPINK
 - AGA No. 3
- ◆ Construction types:
 - Weld-in type
 - Holding ring type
 - Knock pin type
 - Flanged type
- ◆ End connection:
 - Butt-weld type
 - Flanged type

3 Nozzle types

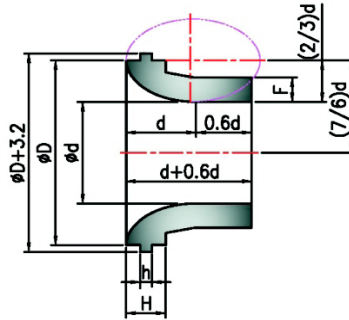
3.1 ISO 5167

- Nozzle types in full compliance with ISO-5167
- Two types of long radius nozzles
 - High ratio nozzles
 - Low ratio nozzle



$3 \leq H \leq 0,15D$
 $3 \leq F$

[A] High Ratio $0,25 \leq \beta \leq 0,8$

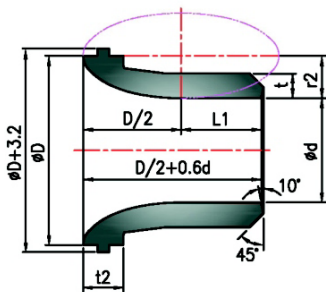


$3 \leq H \leq 0,15D$
 $3 \leq F$

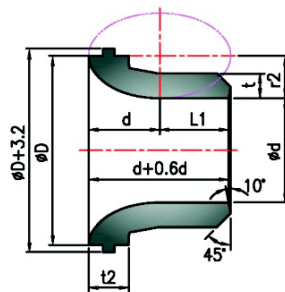
[B] Low Ratio $0,2 \leq \beta \leq 0,5$

3.2 ASME MFC-3M

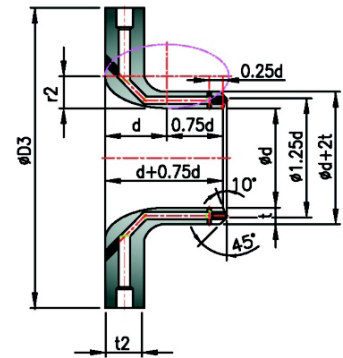
- Nozzle types in full compliance with ASME MFC-3M
- ASME PTC6 for throat tap
- 3 Types of long radius nozzles:



$0,5 \leq \beta \leq 0,8$
 $L1 \leq 0,6d$ or $\leq D/3$
 $R2 = (D-d)/2$
 $2t \leq D - (d + 6 \text{ mm})$
 $3 \text{ mm} \leq t2 \leq 0,15D$
[A] High β Nozzle



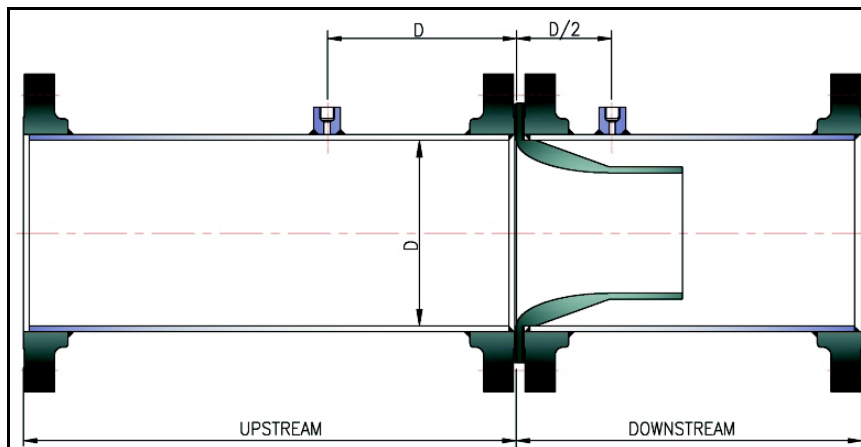
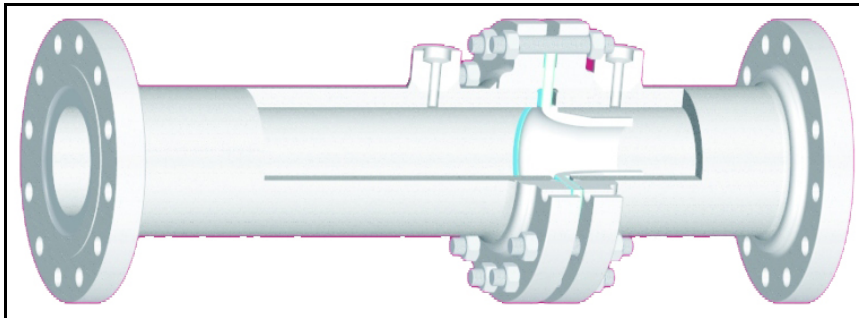
$0,2 \leq \beta \leq 0,5$
 $0,6d \leq L1 \leq 0,75d$
 $0,63d \leq r2 \leq 0,63d$
 $3 \text{ mm} \leq t \leq 12 \text{ mm}$
 $3 \text{ mm} \leq t2 \leq 0,15D$
[B] Low β Nozzle



$0,25 \leq \beta \leq 0,5$
 $0,63d \leq r2 \leq 0,63d$
 $t = 0,25d$
 $t2 = 38 \text{ mm}$
[C] Low β Nozzle, with Throat Tap

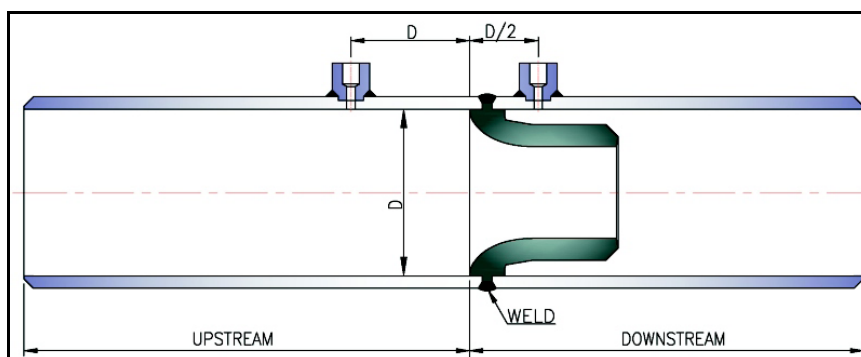
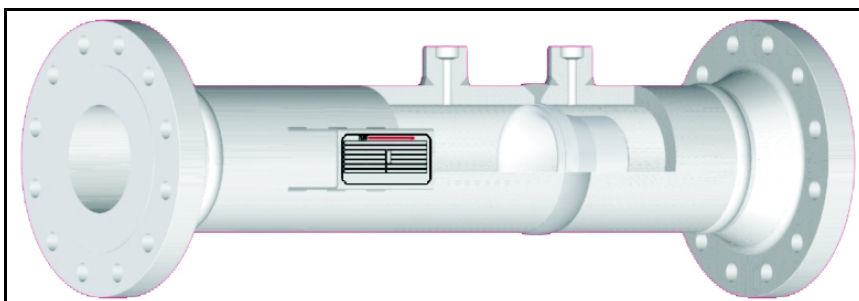
4 Nozzle Designs

4.1 Flanged Type



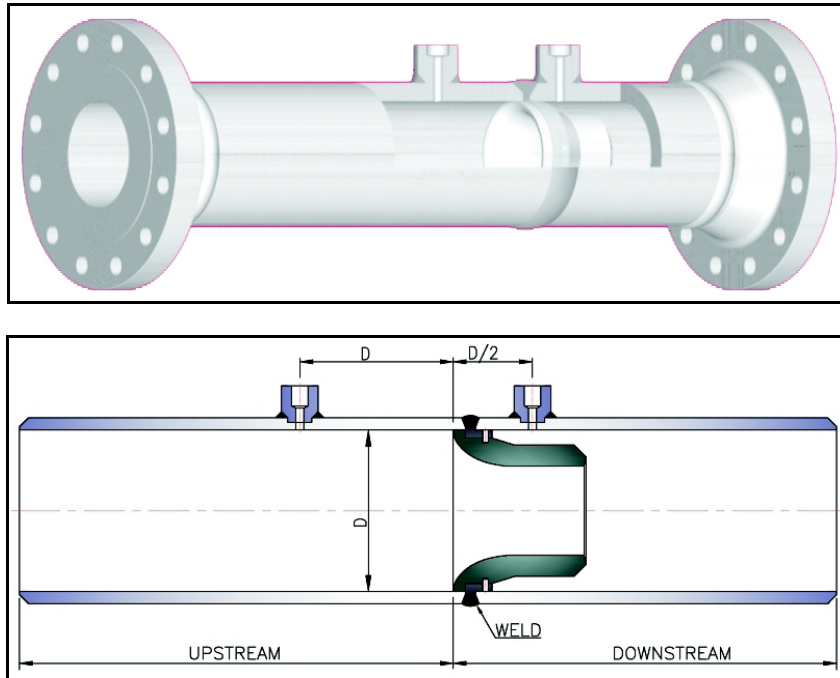
Flanged type flow nozzles are inserted between pipe flanges.

4.2 Weld-in Flow Nozzles



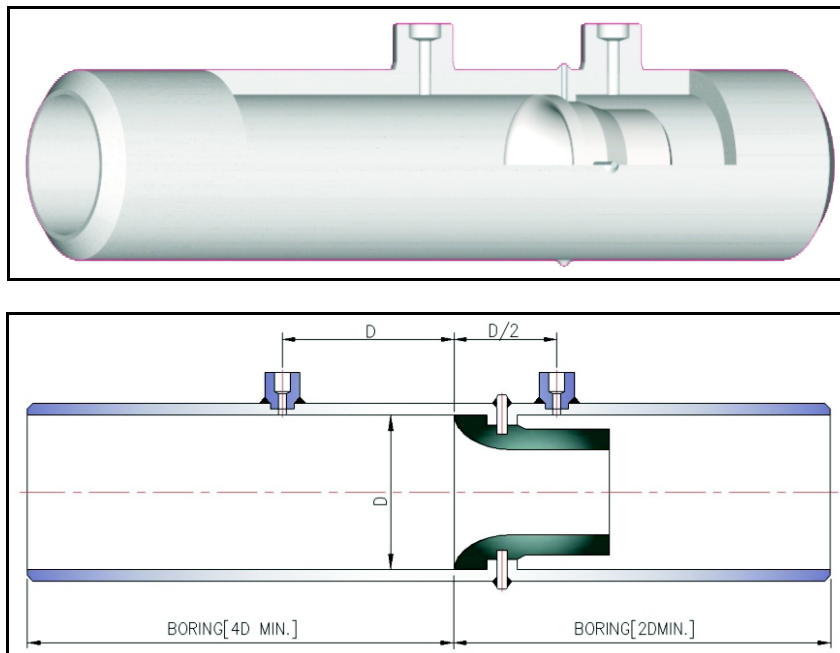
Weld-in flow nozzles are used where flanges are not applicable, such as high temperature and high pressure applications.

4.3 Holding Ring Type



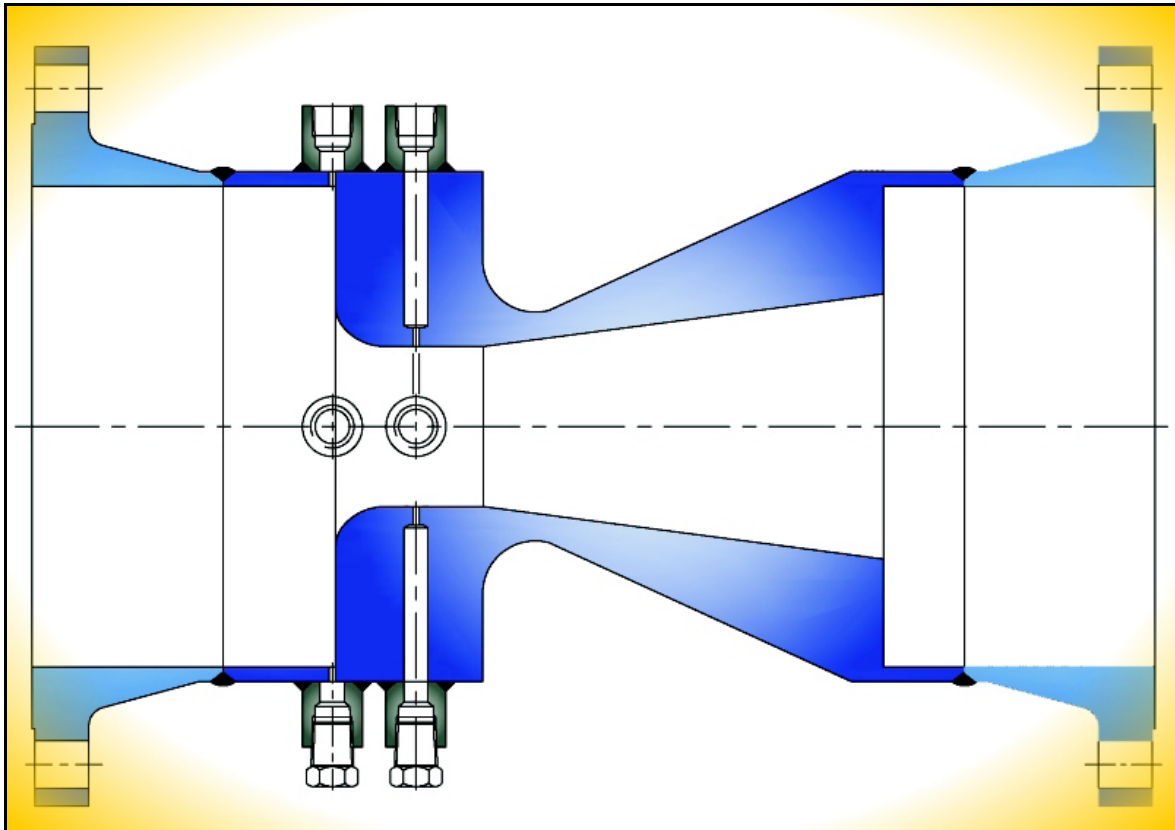
The holding ring flow nozzle design eliminates the welding of dissimilar materials, because the ring, pins and pipe are made of compatible material.

4.4 Knock-Pin Type



Knock-pin flow nozzles avoid welding operation between dissimilar materials.

4.5 Venturi Type

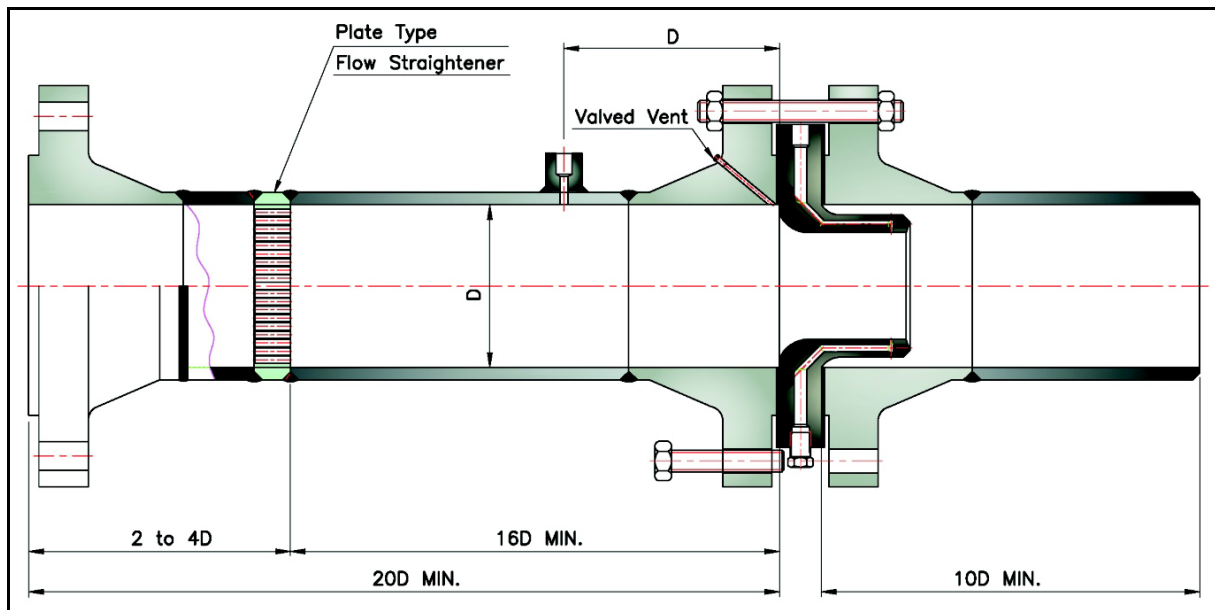


The profile of a Venturi-nozzle is axis-symmetric. It consists of a convergent section with a rounded profile, a cylindrical throat and a divergent section. The upstream face is identical with that of an ISA 1932 nozzle.

The upstream tappings shall be corner tappings [see drawing above]. The tappings may be located in the pipe or its flanges or in carrier rings.

The throat pressure tappings shall comprise at least 4 single pressure tappings. Piezometer ring on request only.

5 Typical Construction of Flow Nozzle with Throat Tap [ASME PTC-6-Standard]



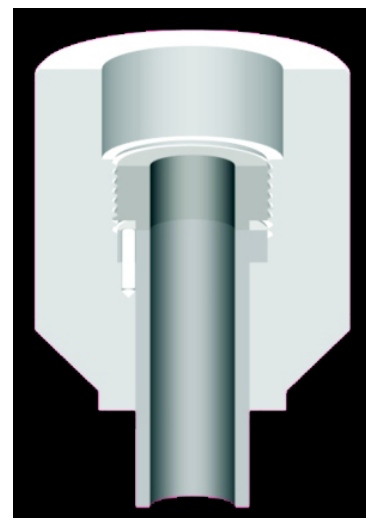
6 Pressure Tapping



Full penetration groove weld
[Welding Adaptor]



Up to 425°C (800°F)
[Welding Adaptor]



For temperature above 425°C
(800°F)
[Thermal Sleeve Welding
Adaptor 2 ¼ Cr-Mo Steel]

Nominal inside pipe diameter (ID)		Recommended max. of pressure tap holes	
DIN	ANSI	inch	mm
< DN50	< 2"	1/4"	6,35 mm
DN50...DN80	2"...3"	3/8"	9,5 mm
DN100...DN200	4"...8"	1/2"	12,7 mm
≥ DN250	≥ 10"	3/4"	19,05 mm

7 Specification Sheet

FLOW NOZZLES

General Data

Standard: ISO-5167 ISA-1932 Venturi-Nozzle ASME MFC-30 ASME PTC-6
 other standard: _____ (Please specify)

Type: Long radius nozzle other: _____ (Please specify)
 High ratio Low ratio Low ratio with Throat Tap

Bore: max. rate nearest 1/8" other: _____ (Please specify)

Material: 316SS 304SS CS other: _____ (Please specify)

Ring material & Type _____ (Please specify)

Taps: Radius Throat other: _____ (Please specify)

Tap type and size: 1/2" SW 1/2" NPT other: _____ (Please specify)

Flange type: Weld neck Slip-on Threaded

Flange included Yes No (by others)

Flange rating acc. to ANSI _____ acc. to DIN _____
 other: _____ (Please specify)

Fluid Data

TAG-No. _____

Service _____

Line no. _____

Fluid name _____

Fluid state liquid gas steam

Flow data [m ³ /h] (max/norm/min)			
Pressure [bar] (max/norm)			
Temperature [°C] (max/norm)			

Standard density [kg/dm³] _____

Op. density [kg/dm³] _____

Super Comp. Factor [Z] _____

Mol. W.T [Cp/Cv] _____

Op. viscosity [cp] _____

Base press/Base temp. _____

Flow Meter

Quantity _____

Nozzle design: Flanged type Weld-in type Holding Ring type
 Knock-Pin type Venturi type

Δp-range [mbar] _____

Static press. range [bar] _____

Full scale range [m³/h] _____

Chart multiplier _____

Nozzle & Flange or Pipe

Flange Rating DIN _____ ANSI _____ (please specify)

Line Size DIN _____ ANSI _____ (please specify)

Line material: _____ (please specify)

Pair(s) of tapping _____ (please specify)

Flange type _____ (please specify)

Accessories

Nipple _____ (please specify)

Block Valve _____ (please specify)

8 Order Codes	
Code	Description
IFN	Flow Nozzle
	Pipe size
	ID ____ /WT ____ Inside diameter & Wall thickness in mm
	Standards
	I5 ISO 5167
	I1 ISA 1932
	VN Venturi nozzle
	AM ASME MFC-3M
	AP ASME PTC-6
	99 other standard, please specify
	Nozzle types
	A High ratio
	B Low ratio
	C Low ratio with throat tap (only ASME nozzles)
	Nozzle designs
	F Flanged type
	W Weld-in type
	H Holding ring type
	K Knock-pin type
	V Venturi type
	Connection flange
	0000 no flange
	XXXX DIN flange (please see table 1)
	XXXX ANSI flange (please see table 2)
	9999 other standard flange (please specify)
	Pressure taps
	S 1/2" SW
	N 1/2" NPT
	9 others (please specify)
	Materials:
	Nozzle
	S 316SS
	C CS
	9 others, please specify
	Flange
	S 316SS
	C CS
	9 others, please specify

Table 1 DIN flanges*:

		Pressure ratings				
	Pipe size	PN40	PN64	PN100	PN160	PN200
Code 1	Code 2 →	1	2	3	4	5
D01	DN50					
D02	DN80					
D03	DN100					
D04	DN150					
D05	DN200					
D06	DN250					
D07	DN300					
D08	DN350					
D09	DN400					
D10	DN450					
D11	DN500					
D12	DN550					
D13	DN600					

Table 2 ANSI flanges*:

		Pressure ratings				
	Pipe size	150#	300#	600#	900#	2500#
Code 1	Code 2 →	1	2	3	4	5
A01	2"					
A02	2 1/2"					
A03	3"					
A04	3 1/2"					
A05	4"					
A06	5"					
A07	6"					
A08	8"					
A09	10"					
A10	12"					
A11	14"					
A12	16"					
A13	18"					
A14	20"					
A15	22"					
A16	24"					

*Other sizes and pressure ratings on request.

Besides the products covered by this brochure, Intra-Automation GmbH also manufactures other high-quality and high precision instruments for industrial measurement tasks. For more information, please contact us (contact details on the backside of this brochure).

Flow measurement



Itabar®-Flow Sensor



IntraSonic IS210 Ultrasonic Flow Meter

Level measurement



ITA-mag. Level Gauge



MAGLINK Level Indicator

Other Measurement Tasks:



DigiFlow Flow and Level Computers



IntraCon Digital Controllers



IntraDigit Digital Indicators / Meters



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