

INTRA-AUTOMATION GmbH

D-41515 Grevenbroich * Otto-Hahn-Str. 20 * Tel: +49 2181-68761 * Fax: +49 2181-64492

WINFLOW 2.75 (I) Diff. Pressure Calculation ITABAR - Flow - Sensor

Company: Airlitec Sarl
Name(capital letters): Mr. Regis Houllier
Street:
Zip Code/City:
Offer-/Com. No: 11/29475Rev1
P. Order Number:
Tag No.: FT 1
Serial No.:
Pipe Data: ID=82,50/3,200 mm - horizontal
Date: 03.08.2011
Person in charge MP

Calculation: Mass rate Gas & steam
Fluid: Chlorine

Base Temperature	273,15 Kelvin
Base Pressure	101,33 kPa

Pipe Internal Dimensions to 20°C 82,50 mm

Flowing Temperature: 65,000 °C
Flowing Pressure: 4,000 bar A
Density: 3,215 kg/Nm³ ty corrected value: 10,2531
Viscosity: 0,0161 cPs
K-Factor: 0,6073 without unit

Comp. factor at operating cond. : 1,0000
Comp. factor at norm cond. : 1,0000
Ratio of Specific Heat: 1,31

	QMax	QNorm	QMin	
Flow Rate	1.500,00	750,00	150,00	kg/h
Reynolds No.	399.322	199.661	39.932	without unit
Permanent press. loss	1,250	0,310	0,010	mbar
Expansionsfactor	1,000	1,000	1,000	without unit
Velocity:	7,60	3,80	0,76	m/sec.
Differential Pressure	7,781	1,945	0,078	mbar

Itabar-Type: IBF-20
Material Sensor
Note:

Max. DeltaP: 614,10 mbar Max. Flow Rate: 13.327,91 kg/h
Natural Freq.: 837,02 hz Operat. Freq.: 12,21 hz

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Company: Airlitec Sarl
Name(capital letters): Mr. Regis Houllier
Street:
Zip Code/City:
Offer-/Com. No: 11/29475Rev1
P. Order Number:
Tag No.: FT 2
Serial No.:
Pipe Data: ID=70,30/2,900 mm - horizontal
Date: 03.08.2011
Person in charge MP

Calculation: Mass rate Gas & steam
Fluid: Chlorine

Base Temperature	273,15	Kelvin
Base Pressure	101,33	kPa

Pipe Internal Dimensions to 20°C 70,30 mm
Pipe Internal Dimensions 65,00 °C 70,30 mm
Flowing Temperature: 65,000 °C
Flowing Pressure: 4,000 bar A
Density: 3,215 kg/Nm³ ty corrected value: 10,2531
Viscosity: 0,0161 cPs
K-Factor: 0,5718 without unit

Comp. factor at operating cond. : 1,0000
Comp. factor at norm cond. : 1,0000
Ratio of Specific Heat: 1,31

	QMax	QNorm	QMin	
Flow Rate	650,00	520,00	130,00	kg/h
Reynolds No.	203.069	162.455	40.614	without unit
Permanent press. loss	0,530	0,340	0,020	mbar
Expansionsfactor	1,000	1,000	1,000	without unit
Velocity:	4,54	3,63	0,91	m/sec.
Differential Pressure	3,125	2,000	0,125	mbar

Itabar-Type: IBF-20
Material Sensor
Note:

Max. DeltaP 779,50 mbar Max. Flow Rate 10.265,84 kg/h
Natural Freq.: 985,92 hz Operat. Freq.: 10,47 hz

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Company: Airlitec Sarl
Name(capital letters): Mr. Regis Houllier
Street:
Zip Code/City:
Offer-/Com. No: 11/29475Rev1
P. Order Number:
Tag No.: FT 4
Serial No.:
Pipe Data: ID=82,50/3,200 mm - horizontal
Date: 03.08.2011
Person in charge MP

Calculation: Mass rate Gas & steam
Fluid: Chlorine

Base Temperature	273,15 Kelvin
Base Pressure	101,33 kPa

Pipe Internal Dimensions to 20°C 82,50 mm

Flowing Temperature: 65,000 °C
Flowing Pressure: 4,000 bar A
Density: 3,215 kg/Nm³ ty corrected value: 10,2531
Viscosity: 0,0161 cPs
K-Factor: 0,6073 without unit

Comp. factor at operating cond. : 1,0000
Comp. factor at norm cond. : 1,0000
Ratio of Specific Heat: 1,31

	QMax	QNorm	QMin	
Flow Rate	2.150,00	1.720,00	430,00	kg/h
Reynolds No.	572.362	457.890	114.472	without unit
Permanent press. loss	2,570	1,650	0,100	mbar
Expansionsfactor	1,000	1,000	1,000	without unit
Velocity:	10,90	8,72	2,18	m/sec.
Differential Pressure	15,992	10,232	0,639	mbar

Itabar-Type: IBF-20
Material Sensor
Note:

Max. DeltaP: 614,10 mbar Max. Flow Rate: 13.327,91 kg/h
Natural Freq.: 837,02 hz Operat. Freq.: 15,45 hz

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Company: Airlitec Sarl
 Name(capital letters): Mr. Regis Houllier
 Street:
 Zip Code/City:
 Offer-/Com. No: 11/29475Rev1
 P. Order Number:
 Tag No.: FT 11
 Serial No.:
 Pipe Data: ID=82,50/3,200 mm - horizontal
 Date: 03.08.2011
 Person in charge: MP

Calculation: Mass rate Gas & steam
 Fluid: Chlorine

Base Temperature	273,15 Kelvin
Base Pressure	101,33 kPa

Pipe Internal Dimensions to 20°C 82,50 mm

Flowing Temperature: 65,000 °C
 Flowing Pressure: 2,600 bar A
 Density: 3,215 kg/Nm3 ty corrected value: 6,6645
 Viscosity: 0,0161 cPs
 K-Factor: 0,6073 without unit

Comp. factor at operating cond. : 1,0000
 Comp. factor at norm cond. : 1,0000
 Ratio of Specific Heat: 1,31

	QMax	QNorm	QMin	
Flow Rate	1.500,00	1.200,00	150,00	kg/h
Reynolds No.	399.322	319.458	39.932	without unit
Permanent press. loss	1,930	1,230	0,020	mbar
Expansionsfactor	1,000	1,000	1,000	without unit
Velocity:	11,70	9,36	1,17	m/sec.
Differential Pressure	11,977	7,663	0,120	mbar

Itabar-Type: IBF-20
 Material Sensor
 Note:

Max. DeltaP 614,10 mbar Max. Flow Rate 10.745,31 kg/h
 Natural Freq.: 837,02 hz Operat. Freq.: 13,89 hz

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Company: Airlitec Sarl
Name(capital letters): Mr. Regis Houllier
Street:
Zip Code/City:
Offer-/Com. No: 11/29475Rev1
P. Order Number:
Tag No.: FT 12
Serial No.:
Pipe Data: ID=43,10/2,600 mm - horizontal
Date: 03.08.2011
Person in charge MP

Calculation: Mass rate Gas & steam
Fluid: Chlorine

Base Temperature	273,15 Kelvin
Base Pressure	101,33 kPa

Pipe Internal Dimensions to 20°C 43,10 mm
Pipe Internal Dimensions 65,00 °C 43,10 mm
Flowing Temperature: 65,000 °C
Flowing Pressure: 3,500 bar A
Density: 3,215 kg/Nm³ ty corrected value: 8,9715
Viscosity: 0,0161 cPs
K-Factor: 0,4649 without unit

Comp. factor at operating cond. : 1,0000
Comp. factor at norm cond. : 1,0000
Ratio of Specific Heat: 1,31

	QMax	QNorm	QMin	
Flow Rate	400,00	320,00	80,00	kg/h
Reynolds No.	203.830	163.064	40.766	without unit
Permanent press. loss	4,360	2,790	0,170	mbar
Expansionsfactor	1,000	1,000	1,000	without unit
Velocity:	8,49	6,79	1,70	m/sec.
Differential Pressure	14,485	9,270	0,579	mbar

Itabar-Type: IBF-20
Material Sensor
Note:

Max. DeltaP 1.549,60 mbar Max. Flow Rate 4.137,70 kg/h
Natural Freq.: 1.487,61 hz Operat. Freq.: 14,74 hz

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Company: Airlitec Sarl
Name(capital letters): Mr. Regis Houllier
Street:
Zip Code/City:
Offer-/Com. No: 11/29475Rev1
P. Order Number:
Tag No.: FT 21
Serial No.:
Pipe Data: ID=43,10/2,600 mm - horizontal
Date: 03.08.2011
Person in charge MP

Calculation: Mass rate Gas & steam
Fluid: Chlorine

Base Temperature	273,15 Kelvin
Base Pressure	101,33 kPa

Pipe Internal Dimensions to 20°C 43,10 mm
Pipe Internal Dimensions 65,00 °C 43,10 mm
Flowing Temperature: 65,000 °C
Flowing Pressure: 3,300 bar A
Density: 3,215 kg/Nm3 ty corrected value: 8,4588
Viscosity: 0,0161 cPs
K-Factor: 0,4649 without unit

Comp. factor at operating cond. : 1,0000
Comp. factor at norm cond. : 1,0000
Ratio of Specific Heat: 1,31

	QMax	QNorm	QMin	
Flow Rate	250,00	200,00	50,00	kg/h
Reynolds No.	127.394	101.915	25.479	without unit
Permanent press. loss	1,800	1,150	0,070	mbar
Expansionsfactor	1,000	1,000	1,000	without unit
Velocity:	5,63	4,50	1,13	m/sec.
Differential Pressure	6,000	3,840	0,240	mbar

Itabar-Type: IBF-20
Material Sensor
Note:

Max. DeltaP 1.549,60 mbar Max. Flow Rate 4.017,74 kg/h
Natural Freq.: 1.487,61 hz Operat. Freq.: 12,74 hz