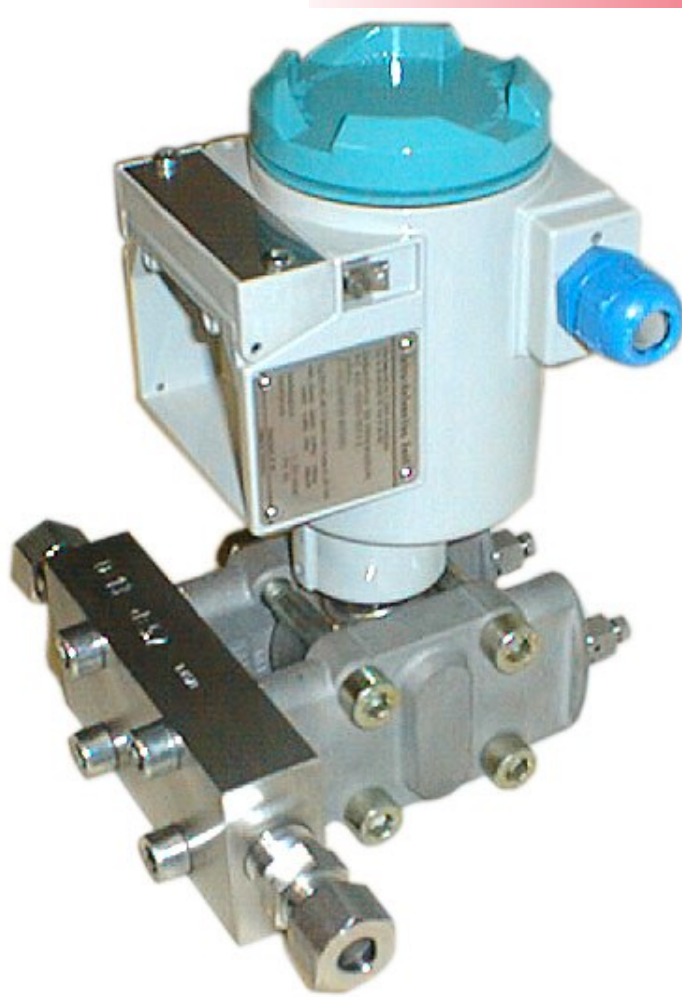


# INTRA-AUTOMATION



MESS- UND REGELINSTRUMENTE / MEASUREMENT AND CONTROL

## Integral Orifice Assembly Measuring Section for Small Flow Measurement Type: BB



Technical Information

03/2022

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**THE EXPERT FOR LEVEL AND FLOW**

Intra-Automation  
Integral Orifice Assembly  
Type BB  
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# Integral Orifice Assembly

## Measuring Section for Small Flow Measurement

Type: BB

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**BB**

## 1. Features

The integral orifice assembly is designed to be mounted to the differential pressure transmitter directly (see fig. 1).

The integral orifice assembly is a pipe segment for measurement of small flows. It is suitable for liquids and gases.

The integral orifice is the differential pressure sensor and is mounted inside the assembly. While the medium to be measured passes through the orifice, a pressure drop occurs. This value is proportional to the flow. A differential pressure transmitter transforms the pressure loss into a standardized signal, like a current output (4...20 mA).

$$q_v = c^* \sqrt{\Delta p}$$



fig. 1: Integral orifice assembly with transmitter

**BB**

## 2. Description of the Orifice Calculation

The integral orifice assembly is available with 6 different orifice sizes (size 1 to 6). To determine the differential pressure and the size of the orifice the mass flow under operation has to be converted to the equivalent volume flow of water or air. Using the Nomograms, it is possible to choose the size of orifice and to find a first approach of the span of the differential pressure.

The exact value of the differential pressure has to be calculated by using the equations of the calculation sheet (see following pages).

Once have changed to a different orifice size the calculation has to be redone.

**BB**

## 3. Technical Data

Media : Liquids, Gases

Measuring ranges:

- Liquids : 0.396 to 1109.52 GPH  
1.50 to 4200 l/h
- Gases : 1.766 to 4238 ft<sup>3</sup>/h  
0,05 to 120 m<sup>3</sup>/h

Inside diameter for the integrated orifice :

Size	d <sub>i</sub> [inch]	d <sub>i</sub> [mm]
1	0.197	0.500
2	0.694	1.000
3	0.591	1.500
4	0.787	2.000
5	0.984	2.500
6	1.181	3.000
7	1.378	3.500
8	1.575	4.000
9	1.772	4.500
10	1.969	5.000
11	2.165	5.500
12	2.362	6.000
13	2.559	6.500
14	2.756	7.000
15	2.953	7.500
16	3.150	8.000
17	3.346	8.500
18	3.543	9.000
19	3.740	9.500

Nominal pressure (max.) : ANSI 2500# (PN420)

Medium temperature : -40...+248 °F  
-40...+120 °C

Process connection : ½" NPT-F

Material, wetted parts : 316Ti (1.4571) (other material on request)

Weight : approx. 4.41 lbs (2kg)

**BB**

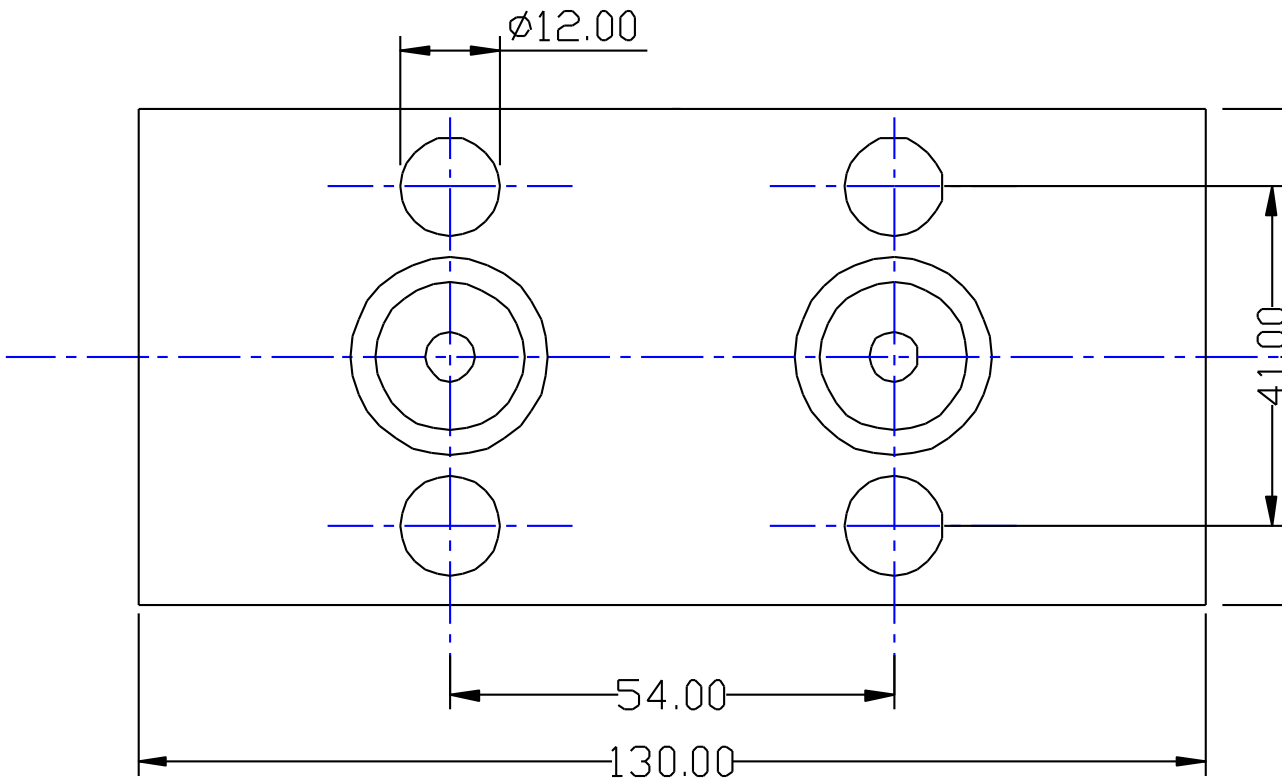
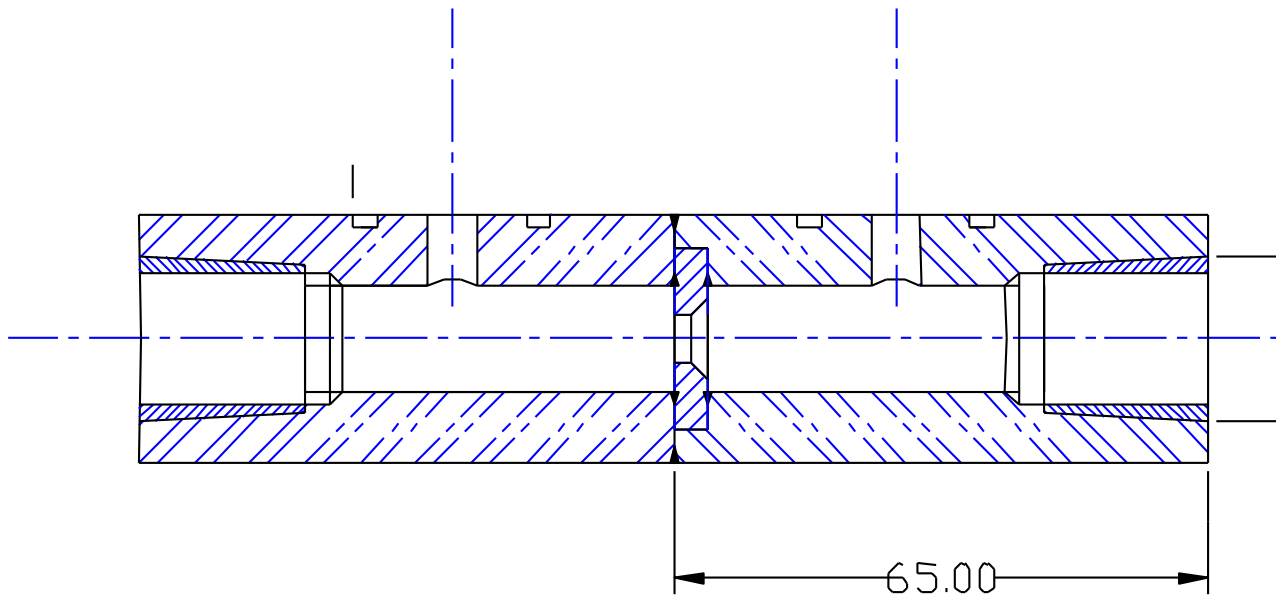
## 4. Flow Calculation

Flow Calculation with Conval®-Software and subsequent water calibration.

Type	<b>Integral Orifice Plate, BB-102</b>
Size	<b>DN15 (1/2")</b>
Appl.	<b>Gas / Liquid</b>
	<b>1. Design:</b>
<b>BB-102-</b>	Measuring section for measuring small flows in accordance with EN ISO 5167 with water calibration
	<b>2. Connection</b>
<b>N12-</b>	Threaded hole 1/2"NPT
<b>Y99-</b>	Special Design
	<b>3. Sizing calculation by INTRA:</b>
<b>0-</b>	without
<b>M-</b>	Design calculation according to EN ISO 5167
	<b>4. Material (orifice plate):</b>
<b>1-</b>	1.4571 (316Ti)
<b>2-</b>	1.4539 (904L)
<b>3-</b>	2.4610 (Hastelloy C4)
<b>4-</b>	2.4360 (Monel 400)
<b>Y-</b>	Special Design
	<b>5. Material (measuring section)</b>
<b>6-</b>	1.4571 (316Ti)
<b>7-</b>	1.4539 (904L)
<b>8-</b>	2.4610 (Hastelloy C4)
<b>9-</b>	2.4360 (Monel 400)
<b>Y-</b>	Special Design
	<b>6. Pipe run / flow direction</b>
<b>HL-</b>	horizontal, left
<b>HR-</b>	horizontal, right
<b>Y9-</b>	Special Design
	<b>7. Differential pressure connection:</b>
<b>E1-</b>	Flange plate IEC 61518
<b>Y9-</b>	Special Design
	<b>8. Special equipment process connection:</b>
<b>000-</b>	without
<b>E12-</b>	1 pair Ermeto-threads, 1/2" NPT-M on Ø 12 mm, mat.: 316SS
<b>Y99-</b>	Special Design
	<b>9. Documentation</b>
<b>+00</b>	without
<b>+A1</b>	EN10204-3.1 material certificate
<b>+A2</b>	EN10204-3.1 material certificate, NACE MR0175
<b>+A3</b>	EN10204-3.2 material certificate
<b>+A4</b>	cleaned from oil & grease certificate
<b>+A5</b>	oxygen service certificate
<b>+F8</b>	pressure test certificate
<b>+F9</b>	positive material inspection certificate (PMI)
<b>+FA</b>	dimensional drawing (pdf-file)
<b>+FC</b>	dimensional check report
<b>+FF</b>	3-point water calibration (<DN300)
<b>+YY</b>	Special Design

# INTEGRAL ORIFICE ASSEMBLY TYPE BB

## BB 6. Dimensions



All dimensions in mm.

# INTRA-AUTOMATION



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Since its founding in 1977, Intra-Automation GmbH focused its corporate activities on measurement and control systems for flow, level, pressure, absolute pressure and differential pressure. Our mag. level gauges ITA and our flow sensors Itabar were the locomotives for the successful development of Intra-Automation GmbH.

Over the years, our product range has been extended by devices for flow correction and ultrasonic measurement as well as auxiliary equipment for flow and level. In a further step, the core competences "differential pressure flow measurement" and "bypass level measurement" have been strengthened by broadening the product line.

Today, Intra-products enjoy a good reputation in more than 72 countries and many industries all around the world, including chemical and pharmaceutical industry, the oil and gas sector, shipbuilding, machinery and plant construction, the food and beverage industry, water treatment as well as environmental engineering.

Our product range includes instruments for level measurement and control for temperatures up to 400°C and a pressure range up to PN320 as well as differential pressure measuring instruments up to 1200°C and up to PN400.

A continuous quality management according to DIN EN ISO 9001 and constant development guarantee recognized quality and reliability as well as reproducible parameters for all products.

## HEAD OFFICE

INTRA-AUTOMATION GmbH  
Deutschland / Germany

Otto-Hahn-Str. 20 ♦ 41515 Grevenbroich

☎ +49-(0)2181-75665-0 ♦ 📠 +49-(0)2181-64492

✉ [info@intra-automation.de](mailto:info@intra-automation.de)

## SALES BENELUX

INTRA-AUTOMATION HTP BV  
Niederlande / The Netherlands

Keulsveld 17 ♦ 4705 RS Roosendaal

☎ +31-(0)165-322201 ♦ 📠 +31-(0)165-322970

✉ [info@intra-automation.nl](mailto:info@intra-automation.nl)