



Physikalisch-Technische Bundesanstalt¹
Nationales Metrologieinstitut



KBS

Konformitätsbewertungsstelle²



EU Type-examination Certificate³

Issued to: Diehl Metering GmbH
Industriestr. 13
91522 Ansbach

In accordance with: Annex II Module B of the Directive 2014/32/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of measuring instruments.

Type of instrument: Water meter

Type designation: HYDRUS Type 174

Certificate No.: DE-19-MI001-PTB011, Revision 1

Valid until: 18/07/2029

Number of pages: 40

Reference No.: PTB-1.5-4099306

Notified Body: 0102

Certification: Braunschweig, 30/01/2020

On behalf of PTB Seal

Evaluation:
On behalf of PTB

Dr. Michael Rinker



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³ Translator's note: each page of the entire original document bears the wording „Notice protection note ISO 16016!“ across the text

Certificate History

Certificate Issue	Date	Revisions
DE-19-M1001-PTB011	19/07/2019	Initial Certification
DE-19-M1001-PTB011, Revision 1	30/01/2020	Extension to DN 150 and DN 200; Extension of software version; Optional casing of stainless steel for DN 50 to DN 100; Fitting option for circuit board; Pressure range adjusted; Editorial revision;

This revision 1 supersedes Certificate No. DE-19-M1001-PTB011 of 19/07/2019, ref. 4092262.

Examination Results

The instruments covered by this Certificate are subject to the essential requirements of Directive 2014/32/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of measuring instruments (official gazette L 96 page 149), last revised by correction dated 20/01/2016 (official gazette L 13 page 57):

- Annex I "Essential Requirements"
- Annex III (MI-001) "Water Meters",

in combination with Section 6 of the measurement and calibration Law of 25/07/2013 (Federal Law Gazette I page 2722), last revised by Section 1 of the law of 11/04/2016 (Federal Law Gazette I page 718), and Section 8 of the measurement and calibration ordinance of 11/12/2014 (Federal Law Gazette I page 2010), last revised by Section 3 of the law of 30/04/2016 (Federal Law Gazette I page 579).

The technical design of the measuring instrument as described below corresponds to the above-mentioned essential requirements. This certificate includes the authorization to label the instruments produced in compliance with this certificate with the number of this certificate.

The instruments must comply with the following specifications:

1 Design description

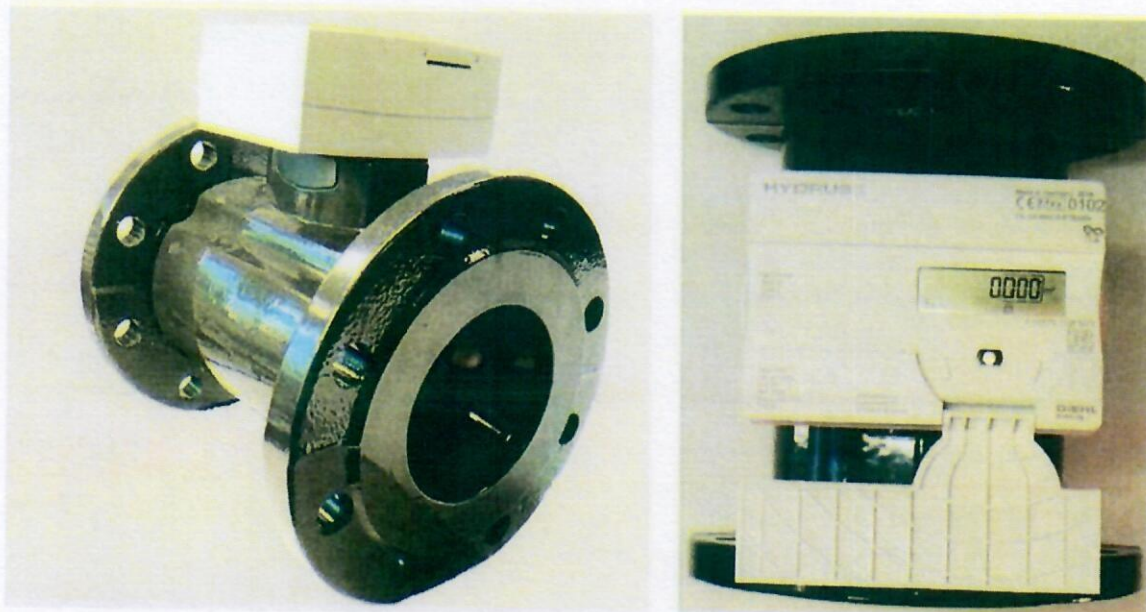
Inline meter with flanged casing for cold water T30/warm water T50, T70 and T90

1.1 Structure

The ultrasonic meter HYDRUS Type 174 is an electronic, static water meter operating with an ultrasonic transit time difference measuring method. The measuring distance is characterized by four sensors located diagonally in pairs. The flow volume is derived from the sensor signals. The electronic counter unit presents this volume in m³ with correct sign in a 9-digit LCD display. In addition, other, non-metrological values may be measured, indicated and stored in the log memory together with other data.

Design in accordance with the following drawings including materials list:

Drawings: P174001, P174003, P174004, P174005, P174006, P174007, P174008,
P174009, P174010, P174011, P174012, P174013, P174018
Materials list: P174002



HYDRUS Type 174

The HYDRUS Type 174 water meter is available in the nominal widths DN 50 / 65 / 80 / 100 / 125 / 150 / 200, and in different lengths covering the following Q3 nominal dimensions in PN10 and PN16.

Q3 in m³/h	25	40	63	100	160
DN	50	65	80	100	125
PN	10 / 16	10 / 16	10 / 16	10 / 16	10 / 16
Connection	Flange DN 50	Flange DN 65	Flange DN 80	Flange DN 100	Flange DN 125
Casing material	Gray cast iron or stainless steel				Gray cast iron
Installation length in mm	- 270mm - 270mm - 300mm	- 200mm - 300mm	- 200mm - 225mm - 300mm - 350mm	- 250mm - 350mm - 360mm	- 250mm
Casings with quick-exchange flange are available up to DN 100					
Q3/Q1 = R	See from 2.1.1 (Depending on: nominal size Q3, temperature range and installation length)				
Q4 in m³/h	31.25	50	78.75	125	200

Q3 in m³/h	250	400
DN	150	200
PN	10 / 16	10 / 16
Connection	Flange DN 150	Flange DN 200
Casing material	Gray cast iron	
Installation length in mm	- 300mm - 500mm	- 350mm
Q3/Q1 = R	See from 2.1.1 (Depending on: nominal size Q3, temperature range and installation length)	
Q4 in m³/h	312.5	500

The counter is always produced with a cast filler.

The electronic counter unit for HYDRUS type 174 is fitted with the following interfaces: M-BUS, L-BUS, pulse output, radio 434 or 868 MHz, as well as an optical IrDA interface for reading and inquiry systems. This optical IrDA interface is always provided.

The following electronic variants are available:

Variant	Radio	L-BUS	Pulse	M-BUS	IR	Cable (number of cores)
1	434 MHz				IR	0
2	434 MHz	L-BUS	Pulse		IR	3
3	868 MHz				IR	0
4	868 MHz	L-BUS	Pulse		IR	3
5				M-BUS	IR	2
6			Pulse 2x	M-BUS	IR	5
7			Pulse 2x		IR	3
8			Pulse 2x		IR	4

The counter is supplied by suitable battery (D cell) for the scheduled operating time. External supply via M-BUS, if any, must not be considered.

1.2 Measurement sensors

The ultrasonic meter HYDRUS Type 174 casing is fitted with four ultrasonic sensors, arranged in pairs at an angle of 90 degrees, each, hence representing two orthogonally arranged measuring paths with diagonal transmission of ultrasound.

1.3 Measurement processing

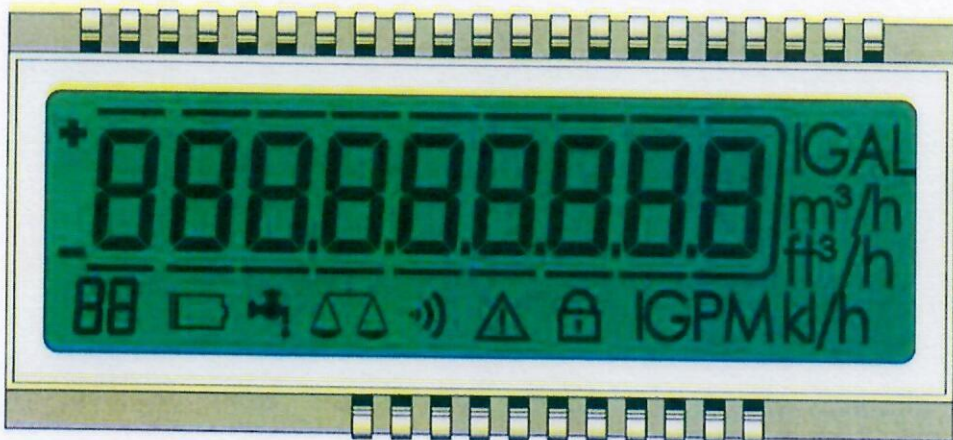
The electronics of the computer control the alternating measurement of the two measuring paths for the averaging of asymmetric flow profiles and realize the precise measurement of the transit time difference and hence the volume in m³.

The ultrasonic signals generated in the measuring section are used to determine the volume in m³ in the electronic meter. The adjustment is done electronically.

	Presentation in LCD:	
Software/ firmware version:	001.000.006	001.000.008
Checksum (CRC):	0H604A	0H1003
Significant portion:	001	001
Functional portion:	000	000
Patch portion:	006	008

1.4 Measured value display

Measured values are indicated in a 9-digit LCD (see figure below).



Presentation of all LCD segments

In the initial state of the display, the volume is shown with a maximum of 4 decimal places with correct sign. If the display is inactive, it has to be activated via the optical sensor.

	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200
Maximal number of places before the decimal point	5	5	6	6	6	6	6
Maximal number of decimal places	4	4	3	3	3	3	3
Smallest possible indicated value in LCD	0.1	0.1	1	1	1	1	1

The optical sensor may be used to set different types of indications, e. g. the software information.



LCD indicating the software version



LCD indicating the software version



LCD indicating the checksum (CRC)



LCD indicating the checksum (CRC)

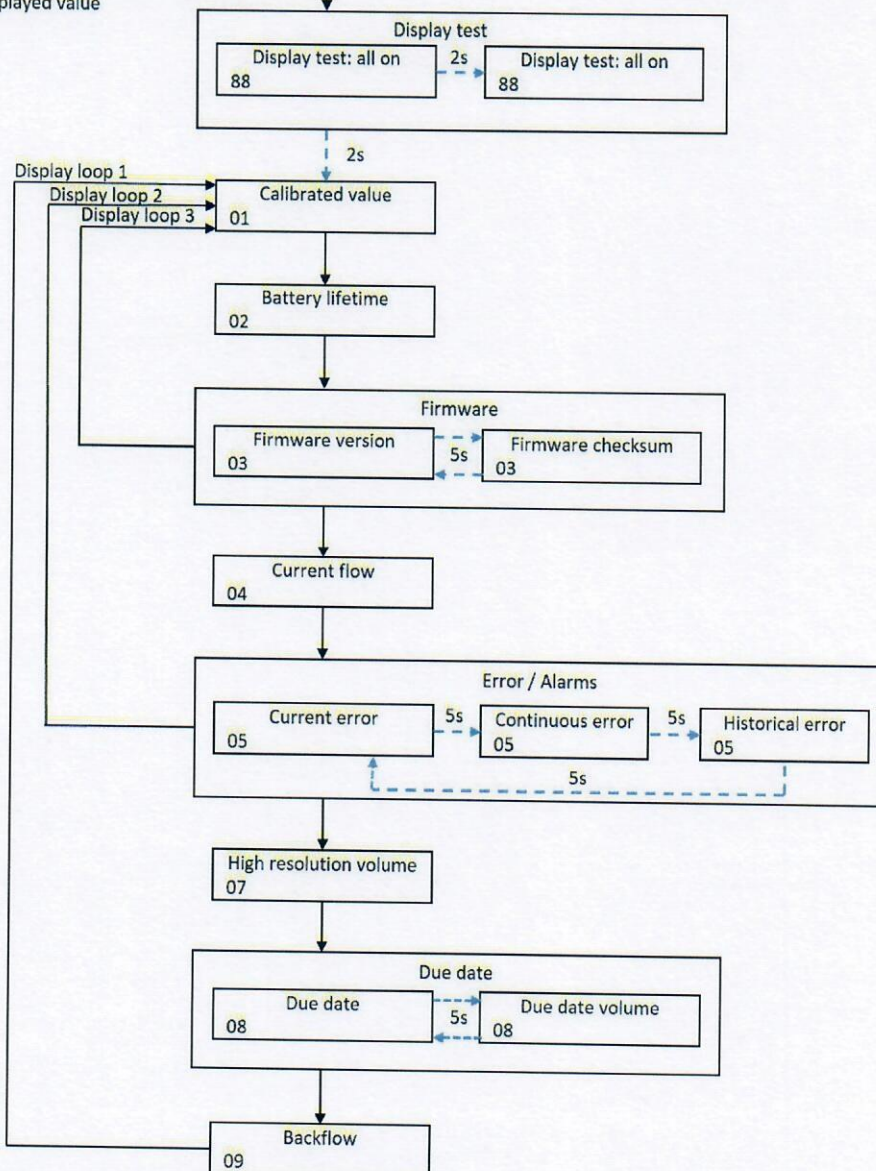
HYDRUS Type 174: LCD display flowchart

Explanation / Activity

- Actuation of the optical button (Covering with finger)
- The two-digit sequences (e.g. 01) in the display at the bottom left identify the displayed value

Explanation

- Actuation of the optical button
- - - - - Automatic display change (after specified time)



1.5 Optional settings and functions subject to the Measuring Instruments Directive

- none –

1.6 Technical documentation

The technical documents relating to this certificate are included in the associated set of certification documents filed with the PTB. The directory of the set of certification documents was dispatched to the certificate owner.

1.7 Optional settings and functions not subject to the Measuring Instruments Directive

By using the optical sensors, other data may be displayed, e.g.:

- current flow in m³/h or L/h,
- due date volume and due date,
- backward volume in m³.
- high-resolution for test purposes in m³ with 4 or 5 decimal places
- energy monitoring for M-BUS / L-BUS

Accuracy of volume display in high-resolution presentation

Q3 in m ³ /h	25	40	63	100	160	250	400
	DN50	DN65	DN80	DN100	DN125	DN150	DN200
Accuracy	10 ⁻⁵ m ³	10 ⁻⁵ m ³	10 ⁻⁵ m ³	10 ⁻⁴ m ³	10 ⁻⁴ m ³	10 ⁻⁴ m ³	10 ⁻⁴ m ³

Depending on its application, the HYDRUS type 174 may be fitted with M - BUS, L - BUS, pulse output, radio and optical IrDA interface for reading and inquiry systems.

2 Technical Data

2.1 Nominal operating conditions

2.1.1 Size DN 50 for T30 for installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800, R1000)

Q_1 [m ³ /h]	0.63	0.50	0.40	0.31	0.25	0.20	0.16	0.13
Q_2 [m ³ /h]	1.00	0.80	0.63	0.50	0.40	0.32	0.25	0.20
Q_3 [m ³ /h]	25							
Q_4 [m ³ /h]	31.25							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.10	0.08	0.06	0.05	0.04	0.03	0.03
Q_2 [m ³ /h]	0.16	0.13	0.10	0.08	0.06	0.05	0.04
Q_3 [m ³ /h]	25						
Q_4 [m ³ /h]	31.25						
Q_2/Q_1	1.6						
Q_3/Q_1	250	315	400	500	630	800	1000

2.1.2 Size DN 50 for T30 for installation position V (including 90° and 45° tilted position/downpipe)

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800)

Q_1 [m ³ /h]	0.63	0.50	0.40	0.31	0.25	0.20	0.16	0.13
Q_2 [m ³ /h]	1.00	0.80	0.63	0.50	0.40	0.32	0.25	0.20
Q_3 [m ³ /h]	25							
Q_4 [m ³ /h]	31.25							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.10	0.08	0.06	0.05	0.04	0.03
Q_2 [m ³ /h]	0.16	0.13	0.10	0.08	0.06	0.05
Q_3 [m ³ /h]	25					
Q_4 [m ³ /h]	31.25					
Q_2/Q_1	1.6					
Q_3/Q_1	250	315	400	500	630	800

2.1.3 Size DN 65 for T30 for installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800, R1000)

Q_1 [m ³ /h]	1.00	0.80	0.63	0.50	0.40	0.32	0.25	0.20
Q_2 [m ³ /h]	1.6	1.28	1.02	0.80	0.64	0.51	0.40	0.32
Q_3 [m ³ /h]	40							
Q_4 [m ³ /h]	50							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.16	0.13	0.10	0.08	0.06	0.05	0.04
Q_2 [m ³ /h]	0.26	0.20	0.16	0.13	0.10	0.08	0.06
Q_3 [m ³ /h]	40						
Q_4 [m ³ /h]	50						
Q_2/Q_1	1.6						
Q_3/Q_1	250	315	400	500	630	800	1000

2.1.4 Size DN 65 for T30 for installation position V (including 90 ° and 45 ° tilted position/downpipe)
(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800)

Q_1 [m ³ /h]	1.00	0.80	0.63	0.50	0.40	0.32	0.25	0.20
Q_2 [m ³ /h]	1.60	1.28	1.02	0.80	0.64	0.51	0.40	0.32
Q_3 [m ³ /h]	40							
Q_4 [m ³ /h]	50							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.160	0.13	0.10	0.08	0.06	0.05
Q_2 [m ³ /h]	0.26	0.20	0.16	0.13	0.10	0.08
Q_3 [m ³ /h]	40					
Q_4 [m ³ /h]	50					
Q_2/Q_1	1.6					
Q_3/Q_1	250	315	400	500	630	800

2.1.5 Size DN 80 for T30 in installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800, R1000)

Q_1 [m ³ /h]	1.58	1.26	1.00	0.79	0.63	0.50	0.39	0.32
Q_2 [m ³ /h]	2.52	2.02	1.60	1.26	1.01	0.81	0.63	0.50
Q_3 [m ³ /h]	63							
Q_4 [m ³ /h]	78.75							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.25	0.20	0.16	0.13	0.10	0.08	0.06
Q_2 [m ³ /h]	0.40	0.32	0.25	0.20	0.16	0.13	0.10
Q_3 [m ³ /h]	63						
Q_4 [m ³ /h]	78.75						
Q_2/Q_1	1.6						
Q_3/Q_1	250	315	400	500	630	800	1000

2.1.6 Size DN 80 for T30 for installation position V (including 90 ° and 45 ° tilted position/downpipe)
(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800)

Q_1 [m ³ /h]	1.58	1.26	1.00	0.79	0.63	0.50	0.39	0.32
Q_2 [m ³ /h]	2.52	2.02	1.60	1.26	1.01	0.81	0.63	0.50
Q_3 [m ³ /h]	63							
Q_4 [m ³ /h]	78.75							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.25	0.20	0.16	0.13	0.10	0.08
Q_2 [m ³ /h]	0.40	0.132	0.25	0.20	0.16	0.13
Q_3 [m ³ /h]	63					
Q_4 [m ³ /h]	78.75					
Q_2/Q_1	1.6					
Q_3/Q_1	250	315	400	500	630	800

2.1.7 Size DN 100 for T30 in installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800, R1000)

Q_1 [m ³ /h]	2.50	2.00	1.59	1.25	1.00	0.80	0.63	0.50
Q_2 [m ³ /h]	4.00	3.20	2.54	2.00	1.6	1.28	1.00	0.80
Q_3 [m ³ /h]	100							
Q_4 [m ³ /h]	125							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.40	0.32	0.25	0.20	0.16	0.13	0.10
Q_2 [m ³ /h]	0.64	0.51	0.40	0.32	0.25	0.20	0.16
Q_3 [m ³ /h]	100						
Q_4 [m ³ /h]	125						
Q_2/Q_1	1.6						
Q_3/Q_1	250	315	400	500	630	800	1000

2.1.8 Size DN 100 for T30 for installation position V (including 90 ° and 45 ° tilted position/downpipe)

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800)

Q_1 [m ³ /h]	2.50	2.00	1.59	1.25	1.00	0.80	0.63	0.50
Q_2 [m ³ /h]	4.00	3.20	2.54	2.00	1.60	1.28	1.00	0.80
Q_3 [m ³ /h]	100							
Q_4 [m ³ /h]	125							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.40	0.32	0.25	0.20	0.16	0.13
Q_2 [m ³ /h]	0.64	0.51	0.40	0.32	0.25	0.20
Q_3 [m ³ /h]	100					
Q_4 [m ³ /h]	125					
Q_2/Q_1	1.6					
Q_3/Q_1	250	315	400	500	630	800

2.1.9 Size DN 125 for T30 in installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800, R1000)

Q_1 [m ³ /h]	4.00	3.20	2.54	2.00	1.60	1.28	1.00	0.80
Q_2 [m ³ /h]	6.40	5.12	4.06	3.20	2.56	2.05	1.60	1.28
Q_3 [m ³ /h]	160							
Q_4 [m ³ /h]	200							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.64	0.51	0.40	0.32	0.25	0.20	0.16
Q_2 [m ³ /h]	1.02	0.81	0.64	0.51	0.41	0.32	0.26
Q_3 [m ³ /h]	160						
Q_4 [m ³ /h]	200						
Q_2/Q_1	1.6						
Q_3/Q_1	250	315	400	500	630	800	1000

2.1.10 Size DN 125 for T30 for installation position V (including 90° and 45° tilted position/downpipe)
(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800)

Q ₁ [m ³ /h]	4.00	3.20	2.54	2.00	1.60	1.28	1.00	0.80
Q ₂ [m ³ /h]	6.40	5.12	4.06	3.20	2.56	2.05	1.60	1.28
Q ₃ [m ³ /h]	160							
Q ₄ [m ³ /h]	200							
Q ₂ /Q ₁	1.6							
Q ₃ /Q ₁	40	50	63	80	100	125	160	200

Q ₁ [m ³ /h]	0.64	0.51	0.40	0.32	0.25	0.20
Q ₂ [m ³ /h]	1.02	0.81	0.64	0.51	0.41	0.32
Q ₃ [m ³ /h]	160					
Q ₄ [m ³ /h]	200					
Q ₂ /Q ₁	1.6					
Q ₃ /Q ₁	250	315	400	500	630	800

2.1.11 Size DN 50 for T50 for installation position H

(R40, R50, R63, R80, R100, R125, R160, R250, R315, R400, R500, R630, R800)

Q ₁ [m ³ /h]	0.63	0.50	0.40	0.31	0.25	0.20	0.16
Q ₂ [m ³ /h]	1.00	0.80	0.63	0.50	0.40	0.32	0.25
Q ₃ [m ³ /h]	25						
Q ₄ [m ³ /h]	31.25						
Q ₂ /Q ₁	1.6						
Q ₃ /Q ₁	40	50	63	80	100	125	160

Q_1 [m ³ /h]	0.10	0.08	0.06	0.05	0.04	0.03
Q_2 [m ³ /h]	0.16	0.13	0.10	0.08	0.06	0.05
Q_3 [m ³ /h]	25					
Q_4 [m ³ /h]	31.25					
Q_2/Q_1	1.60					
Q_3/Q_1	250	315	400	500	630	800

2.1.12 Size DN 50 for T50 for installation position V (including 90 ° and 45 ° tilted position/downpipe)
(R40, R50, R63, R80, R100, R125, R160, R200, R250)

Q_1 [m ³ /h]	0.63	0.50	0.40	0.31	0.25	0.20	0.16	0.13	0.10
Q_2 [m ³ /h]	1.0	0.80	0.63	0.50	0.40	0.32	0.25	0.20	0.16
Q_3 [m ³ /h]	25								
Q_4 [m ³ /h]	31.25								
Q_2/Q_1	1.6								
Q_3/Q_1	40	50	63	80	100	125	160	200	250

2.1.13 Size DN 65 for T50 for installation position H

(R40, R50i R63, R80, R100, R125, R160, R200, R315, R250, R400, R500, R630, R800)

Q_1 [m ³ /h]	1.00	0.80	0.63	0.50	0.40	0.32	0.25	0.20
Q_2 [m ³ /h]	1.60	1.28	1.02	0.80	0.64	0.51	0.40	0.32
Q_3 [m ³ /h]	40							
Q_4 [m ³ /h]	50							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.16	0.13	0.10	0.08	0.06	0.05
Q_2 [m ³ /h]	0.26	0.20	0.16	0.13	0.10	0.08
Q_3 [m ³ /h]	40					
Q_4 [m ³ /h]	50					
Q_2/Q_1	1.6					
Q_3/Q_1	250	315	400	500	630	800

2.1.14 Size DN 65 for T50 for installation position V (including 90 ° and 45 ° tilted position/downpipe)
(R40, R50, R63, R80, R100, R125, R160, R200, R250)

Q_1 [m ³ /h]	1.00	0.80	0.63	0.50	0.40	0.32	0.25	0.20	0.16
Q_2 [m ³ /h]	1.60	1.28	1.02	0.80	0.64	0.51	0.40	0.32	0.26
Q_3 [m ³ /h]	40								
Q_4 [m ³ /h]	50								
Q_2/Q_1	1.6								
Q_3/Q_1	40	50	63	80	100	125	160	200	250

2.1.15 Size DN 80 for T50 in installation position H
(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800)

Q_1 [m ³ /h]	1.58	1.26	1.00	0.79	0.63	0.50	0.39	0.32
Q_2 [m ³ /h]	2.52	2.02	1.60	1.26	1.01	0.81	0.63	0.50
Q_3 [m ³ /h]	63							
Q_4 [m ³ /h]	78.75							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.25	0.20	0.16	0.13	0.10	0.08
Q_2 [m ³ /h]	0.40	0.32	0.25	0.20	0.16	0.13
Q_3 [m ³ /h]	63					
Q_4 [m ³ /h]	78.75					
Q_2/Q_1	1.6					
Q_3/Q_1	250	315	400	500	630	800

2.1.16 Size DN 80; temperature range T50 for installation position V (including 90° and 45° tilted position/downpipe)

(R40, R50, R63, R80, R100, R125, R160, R200, R250)

Q_1 [m ³ /h]	1.58	1.26	1.00	0.79	0.63	0.50	0.39	0.32	0.25
Q_2 [m ³ /h]	2.52	2.02	1.60	1.26	1.01	0.81	0.63	0.50	0.40
Q_3 [m ³ /h]	63								
Q_4 [m ³ /h]	78.75								
Q_2/Q_1	1.6								
Q_3/Q_1	40	50	63	80	100	125	160	200	250

2.1.17 Size DN 100, temperature range T50; installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800)

Q_1 [m ³ /h]	2.50	2.00	1.59	1.25	1.00	0.80	0.63	0.50
Q_2 [m ³ /h]	4.00	3.20	2.54	2.00	1.60	1.28	1.00	0.80
Q_3 [m ³ /h]	100							
Q_4 [m ³ /h]	125							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.40	0.32	0.25	0.20	0.16	0.13
Q_2 [m ³ /h]	0.64	0.51	0.40	0.32	0.25	0.20
Q_3 [m ³ /h]	100					
Q_4 [m ³ /h]	125					
Q_2/Q_1	1.6					
Q_3/Q_1	250	315	400	500	630	800

2.1.18 Size DN 100, temperature range T50 for installation position V (including 90 ° and 45 ° tilted position/downpipe)

(R40, R50, R63, R80, R100, R125, R160, R200, R250)

Q_1 [m ³ /h]	2.50	2.00	1.59	1.25	1.00	0.80	0.63	0.50	0.40
Q_2 [m ³ /h]	4.00	3.20	2.54	2.00	1.60	1.28	1.00	0.80	0.64
Q_3 [m ³ /h]	100								
Q_4 [m ³ /h]	125								
Q_2/Q_1	1.6								
Q_3/Q_1	40	50	63	80	100	125	160	200	250

2.1.19 Size DN 125, temperature range T50; installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800)

Q_1 [m ³ /h]	4.00	3.20	2.54	2.00	1.60	1.28	1.00	0.80
Q_2 [m ³ /h]	6.40	5.12	4.06	3.20	2.56	2.05	1.60	1.28
Q_3 [m ³ /h]	160							
Q_4 [m ³ /h]	200							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.64	0.51	0.40	0.32	0.25	0.20
Q_2 [m ³ /h]	1.02	0.81	0.64	0.51	0.41	0.32
Q_3 [m ³ /h]	160					
Q_4 [m ³ /h]	200					
Q_2/Q_1	1.6					
Q_3/Q_1	250	315	400	500	630	800

2.1.20 Size DN 125 for T50 for installation position V (including 90 ° and 45 ° tilted position/downpipe)
(R40, R50, R63, R80, R100, R125, R160, R200, R250)

Q_1 [m ³ /h]	4.00	3.20	2.54	2.00	1.60	1.28	1.00	0.80	0.64
Q_2 [m ³ /h]	6.40	5.12	4.06	3.20	2.56	2.05	1.60	1.28	1.02
Q_3 [m ³ /h]	160								
Q_4 [m ³ /h]	200								
Q_2/Q_1	1.6								
Q_3/Q_1	40	50	63	80	100	125	160	200	250

2.1.21 Size DN 50, temperature range T70; installation position H
(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630)

Q_1 [m ³ /h]	0.63	0.50	0.40	0.31	0.25	0.20	0.16	0.13
Q_2 [m ³ /h]	1.00	0.80	0.63	0.50	0.40	0.32	0.25	0.20
Q_3 [m ³ /h]	25							
Q_4 [m ³ /h]	31.25							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q ₁ [m ³ /h]	0.10	0.80	0.06	0.05	0.04
Q ₂ [m ³ /h]	0.16	0.13	0.10	0.08	0.06
Q ₃ [m ³ /h]	25				
Q ₄ [m ³ /h]	31.25				
Q ₂ /Q ₁	1.6				
Q ₃ /Q ₁	250	315	400	500	630

2.1.22 Size DN 50, temperature range T70 for installation position V (including 90° and 45° tilted position/downpipe)

(R40, R50, R63, R80, R100, R125, R160, R200)

Q ₁ [m ³ /h]	0.63	0.50	0.40	0.31	0.25	0.20	0.16	0.13
Q ₂ [m ³ /h]	1.00	0.80	0.63	0.50	0.40	0.32	0.25	0.21
Q ₃ [m ³ /h]	25							
Q ₄ [m ³ /h]	31.25							
Q ₂ /Q ₁	1.6							
Q ₃ /Q ₁	40	50	63	80	100	125	160	200

2.1.23 Size DN 65, temperature range T70; installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630)

Q ₁ [m ³ /h]	1.00	0.80	0.63	0.50	0.40	0.32	0.25	0.20
Q ₂ [m ³ /h]	1.60	1.28	1.02	0.80	0.64	0.51	0.40	0.32
Q ₃ [m ³ /h]	40							
Q ₄ [m ³ /h]	50							
Q ₂ /Q ₁	1.6							
Q ₃ /Q ₁	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.16	0.13	0.10	0.08	0.06
Q_2 [m ³ /h]	0.26	0.20	0.16	0.13	0.10
Q_3 [m ³ /h]	40				
Q_4 [m ³ /h]	50				
Q_2/Q_1	1.6				
Q_3/Q_1	250	315	400	500	630

2.1.24 Size DN 65, temperature range T70 for installation position V (including 90 ° and 45 ° tilted position/downpipe)

(R40, R50, R63, R80, R100, R125, R160, R200)

Q_1 [m ³ /h]	1.00	0.80	0.63	0.50	0.40	0.32	0.25	0.20
Q_2 [m ³ /h]	1.60	1.28	1.02	0.80	0.64	0.51	0.40	0.32
Q_3 [m ³ /h]	40							
Q_4 [m ³ /h]	50							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

2.1.25 Size DN 80, temperature range T70, installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R630)

Q_1 [m ³ /h]	1.58	1.26	1.00	0.79	0.63	0.50	0.39	0.32
Q_2 [m ³ /h]	2.52	2.02	1.60	1.26	1.01	0.81	0.63	0.50
Q_3 [m ³ /h]	63							
Q_4 [m ³ /h]	78.75							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.25	0.20	0.16	0.10
Q_2 [m ³ /h]	0.40	0.32	0.25	0.16
Q_3 [m ³ /h]	63			
Q_4 [m ³ /h]	78.75			
Q_2/Q_1	1.6			
Q_3/Q_1	250	315	400	630

2.1.26 Size DN 80, temperature range T70 for installation position V (including 90° and 45° tilted position/downpipe)

(R40, R50, R63, R80, R100, R125, R160, R200)

Q_1 [m ³ /h]	1.58	1.26	1.00	0.79	0.63	0.50	0.39	0.32
Q_2 [m ³ /h]	2.52	2.02	1.60	1.26	1.01	0.81	0.63	0.50
Q_3 [m ³ /h]	63							
Q_4 [m ³ /h]	78.75							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

2.1.27 Size DN 100, temperature range T70, installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630)

Q_1 [m ³ /h]	2.50	2.00	1.59	1.25	1.00	0.80	0.63	0.50
Q_2 [m ³ /h]	4.00	3.20	2.54	2.00	1.60	1.28	1.00	0.80
Q_3 [m ³ /h]	100							
Q_4 [m ³ /h]	125							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q ₁ [m ³ /h]	0.40	0.32	0.25	0.20	0.16
Q ₂ [m ³ /h]	0.64	0.51	0.40	0.32	0.25
Q ₃ [m ³ /h]	100				
Q ₄ [m ³ /h]	125				
Q ₂ /Q ₁	1.6				
Q ₃ /Q ₁	250	315	400	500	630

2.1.28 Size DN 100 for T70 for installation position V (including 90 ° and 45 ° tilted position/downpipe)
(R40, R50, R63, R80, R100, R125, R160, R200)

Q ₁ [m ³ /h]	2.50	2.00	1.59	1.25	1.00	0.80	0.63	0.50
Q ₂ [m ³ /h]	4.00	3.20	2.54	2.00	1.60	1.28	1.00	0.80
Q ₃ [m ³ /h]	100							
Q ₄ [m ³ /h]	125							
Q ₂ /Q ₁	1.6							
Q ₃ /Q ₁	40	50	63	80	100	125	160	200

2.1.29 Size DN 125 for T70 installation position H
(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630)

Q ₁ [m ³ /h]	4.00	3.20	2.54	2.00	1.60	1.28	1.00	0.80
Q ₂ [m ³ /h]	6.40	5.12	4.06	3.20	2.56	2.05	1.60	1.28
Q ₃ [m ³ /h]	160							
Q ₄ [m ³ /h]	125							
Q ₂ /Q ₁	1.6							
Q ₃ /Q ₁	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.64	0.51	0.40	0.32	0.25
Q_2 [m ³ /h]	1.02	0.81	0.64	0.51	0.41
Q_3 [m ³ /h]	160				
Q_4 [m ³ /h]	200				
Q_2/Q_1	1.6				
Q_3/Q_1	250	315	400	500	630

2.1.30 Size DN 125 for T70 for installation position V (including 90° and 45° tilted position/downpipe)
(R40, R50, R63, R80, R100, R125, R160, R200)

Q_1 [m ³ /h]	4.00	3.20	2.54	2.00	1.60	1.28	1.00	0.80
Q_2 [m ³ /h]	6.40	5.12	4.06	3.20	2.56	2.05	1.60	1.28
Q_3 [m ³ /h]	160							
Q_4 [m ³ /h]	125							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

2.1.31 Size DN 50 for T90 for installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400)

Q_1 [m ³ /h]	0.63	0.50	0.40	0.31	0.25	0.20	0.16	0.13
Q_2 [m ³ /h]	1.00	0.80	0.63	0.50	0.40	0.32	0.25	0.20
Q_3 [m ³ /h]	25							
Q_4 [m ³ /h]	31.25							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q ₁ [m ³ /h]		0.10	0.08	0.06
Q ₂ [m ³ /h]		0.16	0.13	0.10
Q ₃ [m ³ /h]	25			
Q ₄ [m ³ /h]	31.25			
Q ₂ /Q ₁	1.6			
Q ₃ /Q ₁		250	315	400

2.1.32 Size DN 50 for T90 for installation position V (including 90° and 45° tilted position/downpipe)
(R40, R50, R63, R80, R100, R125, R160)

Q ₁ [m ³ /h]	0.63	0.50	0.40	0.31	0.25	0.20	0.16
Q ₂ [m ³ /h]	1.00	0.80	0.63	0.50	0.40	0.32	0.25
Q ₃ [m ³ /h]	25						
Q ₄ [m ³ /h]	31.25						
Q ₂ /Q ₁	1.6						
Q ₃ /Q ₁	40	50	63	80	100	125	160

2.1.33 Size DN 65 for T90 for installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400)

Q ₁ [m ³ /h]	1.00	0.80	0.63	0.50	0.40	0.32	0.25	0.20
Q ₂ [m ³ /h]	1.60	1.28	1.02	0.80	0.64	0.51	0.40	0.32
Q ₃ [m ³ /h]	40							
Q ₄ [m ³ /h]	50							
Q ₂ /Q ₁	1.6							
Q ₃ /Q ₁	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.16	0.13	0.10
Q_2 [m ³ /h]	0.26	0.20	0.16
Q_3 [m ³ /h]	40		
Q_4 [m ³ /h]	50		
Q_2/Q_1	1.6		
Q_3/Q_1	250	315	400

2.1.34 Size DN 65 for T90 for installation position V (including 90° and 45° tilted position/downpipe)
(R40, R50, R63, R80, R100, R125, R160)

Q_1 [m ³ /h]	1.00	0.80	0.63	0.50	0.40	0.32	0.25
Q_2 [m ³ /h]	1.60	1.28	1.02	0.80	0.64	0.51	0.40
Q_3 [m ³ /h]	40						
Q_4 [m ³ /h]	50						
Q_2/Q_1	1.6						
Q_3/Q_1	40	50	63	80	100	125	160

2.1.35 Size DN 80 for T90 for installation position H
(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400)

Q_1 [m ³ /h]	1.58	1.26	1.00	0.79	0.63	0.50	0.39	0.32
Q_2 [m ³ /h]	2.52	2.02	1.60	1.26	1.01	0.81	0.63	0.50
Q_3 [m ³ /h]	63							
Q_4 [m ³ /h]	78.75							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.25	0.20	0.16
Q_2 [m ³ /h]	0.40	0.32	0.25
Q_3 [m ³ /h]	63		
Q_4 [m ³ /h]	78.75		
Q_2/Q_1	1.6		
Q_3/Q_1	250	315	400

2.1.36 Size DN 80 for T90 for installation position V (including 90 ° and 45 ° tilted position/downpipe)
(R40, R50, R63, R80, 00, R125, R160)

Q_1 [m ³ /h]	1.58	1.26	1.00	0.79	0.63	0.50	0.39
Q_2 [m ³ /h]	2.52	2.02	1.60	1.26	1.01	0.81	0.63
Q_3 [m ³ /h]	63						
Q_4 [m ³ /h]	78.75						
Q_2/Q_1	1.6						
Q_3/Q_1	40	50	63	80	100	125	160

2.1.37 Size DN 100 for T90 for installation position H
(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400)

Q_1 [m ³ /h]	2.50	2.00	1.59	1.25	1.00	0.80	0.63	0.50
Q_2 [m ³ /h]	4.00	3.20	2.54	2.00	1.60	1.28	1.00	0.80
Q_3 [m ³ /h]	100							
Q_4 [m ³ /h]	125							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.40	0.32	0.25
Q_2 [m ³ /h]	0.64	0.51	0.40
Q_3 [m ³ /h]	100		
Q_4 [m ³ /h]	125		
Q_2/Q_1	1.6		
Q_3/Q_1	250	315	400

2.1.38 Size DN 100 for T90 for installation position V (including 90 ° and 45 ° tilted position/downpipe)
(R40, R50, R63, R80, R100, R125, R160)

Q_1 [m ³ /h]	2.50	2.00	1.59	1.25	1.00	0.80	0.63
Q_2 [m ³ /h]	4.00	3.20	2.54	2.00	1.60	1.28	1.00
Q_3 [m ³ /h]	100						
Q_4 [m ³ /h]	125						
Q_2/Q_1	1.6						
Q_3/Q_1	40	50	63	80	100	125	160

2.1.39 Size DN 125 for T90 for installation position H
(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400)

Q_1 [m ³ /h]	4.00	3.20	2.54	2.00	1.60	1.28	1.00	0.80
Q_2 [m ³ /h]	6.40	5.12	4.06	3.20	2.56	2.05	1.60	1.28
Q_3 [m ³ /h]	160							
Q_4 [m ³ /h]	200							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	0.64	0.51	0.40
Q_2 [m ³ /h]	1.02	0.81	0.64
Q_3 [m ³ /h]	160		
Q_4 [m ³ /h]	200		
Q_2/Q_1	1.6		
Q_3/Q_1	250	315	400

2.1.40 Size DN 125 for T90 for installation position V (including 90 ° and 45 ° tilted position/downpipe)
(R40, R50, R63, R80, R100, R125, R160)

Q_1 [m ³ /h]	4.00	3.20	2.54	2.00	1.60	1.28	1.00
Q_2 [m ³ /h]	6.40	5.12	4.06	3.20	2.56	2.05	1.60
Q_3 [m ³ /h]	160						
Q_4 [m ³ /h]	200						
Q_2/Q_1	1.6						
Q_3/Q_1	40	50	63	80	100	125	160

2.1.41 Size DN 150 for T30 for installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800, R1000)

Q_1 [m ³ /h]	6.25	5.00	3.97	3.13	2.50	2.00	1.56	1.25
Q_2 [m ³ /h]	10.00	8.00	6.35	5.00	4.00	3.20	2.50	2.00
Q_3 [m ³ /h]	250							
Q_4 [m ³ /h]	312.50							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	1.00	0.79	0.63	0.50	0.40	0.31	0.25
Q_2 [m ³ /h]	1.6	1.27	1.00	0.80	0.63	0.50	0.40
Q_3 [m ³ /h]	250						
Q_4 [m ³ /h]	312.5						
Q_2/Q_1	1.6						
Q_3/Q_1	250	315	400	500	630	800	1000

2.1.42 Size DN 150 for T30 for installation position V (including 90° and 45° tilted position)

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800)

Q_1 [m ³ /h]	6.25	5.00	3.97	3.13	2.50	2.00	1.56	1.25
Q_2 [m ³ /h]	10.00	8.00	6.35	5.00	4.00	3.20	2.50	2.00
Q_3 [m ³ /h]	250							
Q_4 [m ³ /h]	312.50							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	1.00	0.79	0.63	0.50	0.40	0.31
Q_2 [m ³ /h]	1.6	1.27	1.00	0.80	0.63	0.50
Q_3 [m ³ /h]	250					
Q_4 [m ³ /h]	312.5					
Q_2/Q_1	1.6					
Q_3/Q_1	250	315	400	500	630	800

2.1.43 Size DN 200 for T30 for installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800, R1000)

Q_1 [m ³ /h]	10.00	8.00	6.35	5.00	4.00	3.20	2.50	2.00
Q_2 [m ³ /h]	16.00	12.80	10.16	8.00	6.40	5.12	4.00	3.20
Q_3 [m ³ /h]	400							
Q_4 [m ³ /h]	500							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	1.60	1.27	1.00	0.80	0.64	0.50	0.40
Q_2 [m ³ /h]	2.56	2.03	1.60	1.28	1.00	0.80	0.64
Q_3 [m ³ /h]	400						
Q_4 [m ³ /h]	500						
Q_2/Q_1	1.6						
Q_3/Q_1	250	315	400	500	630	800	1000

2.1.44 Size DN 200 for T30 for installation position V (including 90 ° and 45 ° tilted position/downpipe)

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800)

Q_1 [m ³ /h]	10.00	8.00	6.35	5.00	4.00	3.20	2.50	2.00
Q_2 [m ³ /h]	16.00	12.80	10.16	8.00	6.40	5.12	4.00	3.20
Q_3 [m ³ /h]	400							
Q_4 [m ³ /h]	500							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	1.60	1.27	1.00	0.80	0.64	0.50
Q_2 [m ³ /h]	2.56	2.03	1.60	1.28	1.00	0.80
Q_3 [m ³ /h]	400					
Q_4 [m ³ /h]	500					
Q_2/Q_1	1.6					
Q_3/Q_1	250	315	400	500	630	800

2.1.45 Size DN 150 for T50 for installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800)

Q_1 [m ³ /h]	6.25	5.00	3.97	3.13	2.50	2.00	1.56	1.25
Q_2 [m ³ /h]	10.00	8.00	6.35	5.00	4.00	3.20	2.50	2.00
Q_3 [m ³ /h]	250							
Q_4 [m ³ /h]	312.5							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	1.00	0.79	0.63	0.50	0.40	0.31
Q_2 [m ³ /h]	1.6	1.27	1.00	0.80	0.64	0.50
Q_3 [m ³ /h]	250					
Q_4 [m ³ /h]	312.5					
Q_2/Q_1	1.6					
Q_3/Q_1	250	315	400	500	630	800

2.1.46 Size DN 150 for T50 for installation position V (only 90° and 45° tilted position)
(R40, R50, R63, R80, R100, R125, R160, R200, R250)

Q_1 [m ³ /h]	6.25	5.00	3.97	3.13	2.50	2.00	1.56	1.25
Q_2 [m ³ /h]	10.00	8.00	6.35	5.00	4.00	3.20	2.50	2.00
Q_3 [m ³ /h]	250							
Q_4 [m ³ /h]	312.5							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	1.00
Q_2 [m ³ /h]	1.6
Q_3 [m ³ /h]	250
Q_4 [m ³ /h]	312.5
Q_2/Q_1	1.6
Q_3/Q_1	250

2.1.47 Size DN 200 for T50 for installation position H

(R40, R50, R63, R80, R100, R125, R160, R200, R250, R315, R400, R500, R630, R800)

Q_1 [m ³ /h]	10.00	8.00	6.35	5.00	4.00	3.20	2.50	2.00
Q_2 [m ³ /h]	16.00	12.80	10.16	8.00	6.40	5.12	4.00	3.20
Q_3 [m ³ /h]	400							
Q_4 [m ³ /h]	500							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	1.60	1.27	1.00	0.80	0.64	0.50
Q_2 [m ³ /h]	2.56	2.03	1.60	1.28	1.00	0.80
Q_3 [m ³ /h]	400					
Q_4 [m ³ /h]	500					
Q_2/Q_1	1.6					
Q_3/Q_1	250	315	400	500	630	800

2.1.48 Size DN 200 for T50 for installation position V (including 90 ° and 45 ° tilted position/downpipe)

(R40, R50, R63, R80, R100, R125, R160, R200, R250)

Q_1 [m ³ /h]	10.00	8.00	6.35	5.00	4.00	3.20	2.50	2.00
Q_2 [m ³ /h]	16.00	12.80	10.16	8.00	6.40	5.12	4.00	3.20
Q_3 [m ³ /h]	400							
Q_4 [m ³ /h]	500							
Q_2/Q_1	1.6							
Q_3/Q_1	40	50	63	80	100	125	160	200

Q_1 [m ³ /h]	1.60
Q_2 [m ³ /h]	2.56
Q_3 [m ³ /h]	400
Q_4 [m ³ /h]	500
Q_2/Q_1	1.6
Q_3/Q_1	250

2.2 Miscellaneous operating conditions

Accuracy class	$\pm 2\%$ ($Q_2 \leq Q \leq Q_4$)
	$\pm 3\%$ ($Q_2 \leq Q \leq Q_4$) for water temperatures $> 30^\circ\text{C}$
	$\pm 5\%$ ($Q_1 \leq Q \leq Q_4$) for water temperatures 0.1 to 90°C
Installation position	Horizontally tilted by 90° , tilted by 45° , rising pipe, downpipe and upside down
Temperature range	0.1°C to 90°C (T30, T50, T70, T90)
Flow profile sensitivities	U0 / D0
Pressure category	MAP 16
Pressure range	0.3 bar (0.03 MPa) to 16 bar (1.6 MPa)
Pressure loss category	Δp 0.16 bar (0.016 MPa)

2.3 Ambient conditions

Climatic	$-25^\circ\text{C} / 55^\circ\text{C}$
Mechanical	M1 / M2
Electromagnetic	E1 / E2

3 Interfaces and compatibility requirements

M-BUS, L-BUS, pulse output, radio and optical IRDA interface for retrieval and readout systems.

4 Production, commissioning and application requirements

4.1 Production requirements

It is recommended to perform the final measurement with the three flows indicated below and at a water temperature of 0.1 - 30°C :

$$Q_1 \leq Q \leq 1.1 Q_1$$

$$Q_2 \leq Q \leq 1.1 Q_2$$

$$0.9 Q_3 \leq Q \leq Q_3$$

The indicated measurement deviation must not exceed the maximum permissible value for any of the above-stated flows.

4.1.1 Conventional examination

The counters may be examined conventionally with inactive Start and Stop. The counter is switched to the high-resolution display during the examination. The volume is hence indicated in m³ with a maximum of 4 decimal places in the LCD. This means that the resolution of the counter is 0.1 liters (C) or higher. The largest recordable volume may be indicated with a maximum of 9 decimal places in the high-resolution display mode. If displayed with 4 decimal places, the maximum volume that can be indicated is: 99999.9999 m³.

4.2 Commissioning requirements

The installation of inlet and outlet sections is not required.

It is recommended to secure the connection points on the piping with a user lock.

The user lock (adhesive label, lead seal or the like) to prevent that the counter is dismantled should be of a type that cannot be removed or loosened without being visible damaged.

Each counter is to be delivered with a comprehensible operation/installation manual (see Section 7.1).

4.3 Application requirements

The user is to be advised (e.g. In the installation manual) that measuring instruments for applications subject to statutory measurement inspections in the relevant EU member state may only be used in compliance with the nominal operating conditions listed in Section 2.1.

5 Inspection of instruments in operation

5.1 Inspection documents

The present draft examination certificate and the technical documentation as listed in Section 1.

5.2 Special examination systems or software

The examinations may be volumetric, gravimetric or by use of master meters. The flow values indicated in Section 4.1 must be adjustable on the examination system used. The examination does not require any special software.

5.3 Identification

- Hardware

The counter must comply with the technical documentation listed in Section 1.6, labelling must comply with the requirements stated in Section 7.2.

- Software

The software version and checksum may be displayed by activating the optical switch.

Software version: 001.000.006 or 001.000.008

Checksum: 0H604A or 0H1003

5.4 Calibration and adjustment procedures

The counters are adjusted electronically. Upon adjustment and examination, the counter is locked electronically.

6 Security measures

6.1 Mechanical seals

The counter must be screwed to the casing and secured by an adhesive label in a manner so that intended opening is not possible without using violence and leaving visible traces.

6.2 Electronic seals

A logbook is kept. Rewritable due date and monthly values as well as error memories do exist. Recorded modifications include:

- change of the volume decimal places;
- reinitialization of the volume;
- parameterization.

7 Marking and labelling

7.1 Information to be delivered with the instrument

Operation/ installation instructions:

Each counter is to be delivered with a comprehensible operation/installation manual. This manual must include the following items to be specifically observed.

- a) Check of sealing surfaces and seals before installation. It must be ensured, may be by appropriate action, that loss of or damage to the seals is avoided during the transport from the manufacturer to the place of installation.
- b) Check of readability of counter characteristics after installation. The visual readability of the counter display, all counter characteristics and the conformity and metrology label must not be affected.
- c) Appropriate action must be taken to ensure that any contamination or damage is excluded during the transport to the place of installation.

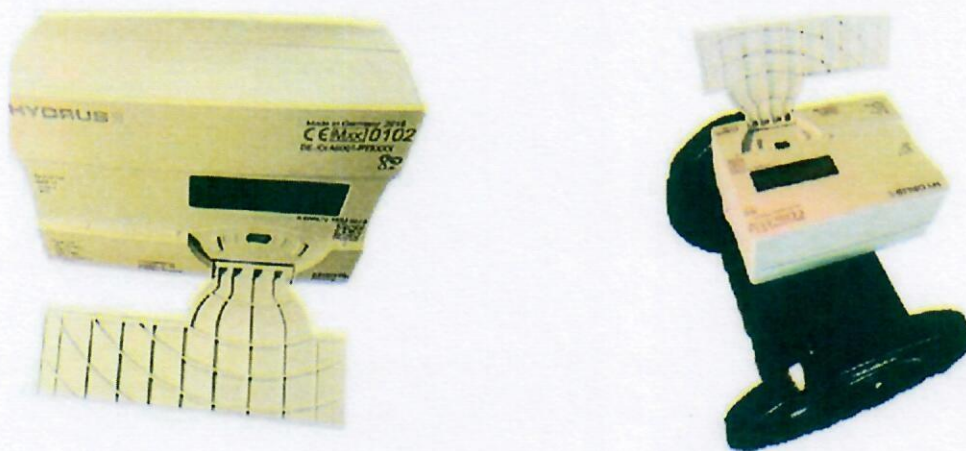
7.2 Marking and labelling

The counter must show the following information as a minimum requirement:

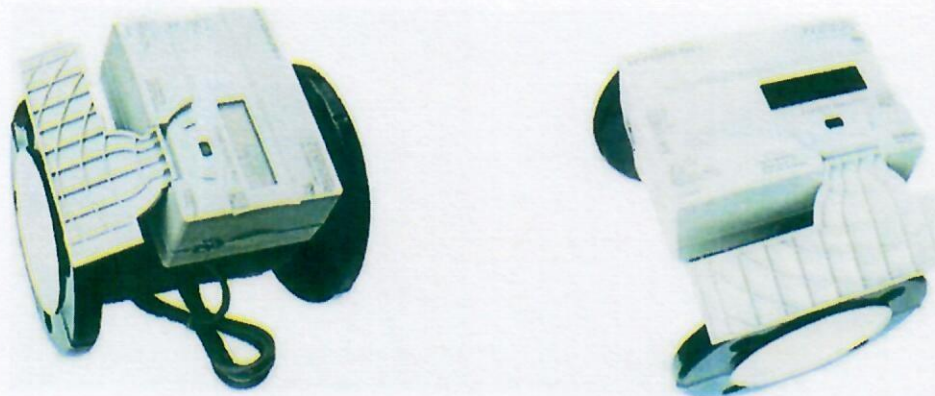
- Measuring unit;
- Accuracy class if deviating from accuracy class 2;
- Numeric value of Q3 and the ratio Q3/Q1;
- Type-examination certificate number;
- Name or trademark and address of manufacturer;
- Year of construction: the last two figures of the year of construction or the month and year of construction;
- Serial number (as close as possible to the display);
- Direction of flow indicated by an arrow (on both sides of the casing or on one side only, if the flow arrow is clearly visible in all circumstances);
- Maximum allowable pressure (MAP), if it exceeds 1 MPa (10 bar);
- Letter V or H, if the counter may only be used in the vertical or horizontal installation position;
- Temperature class, if deviating from T30;
- Pressure loss class, if deviating from Δp 63;
- Installation sensitivity, if deviating from U0/D0;
- Conformity and metrology labelling in accordance with Directive 2014/32/EU.

Additional labelling is permissible as long as it cannot be confused with the above-stated data.

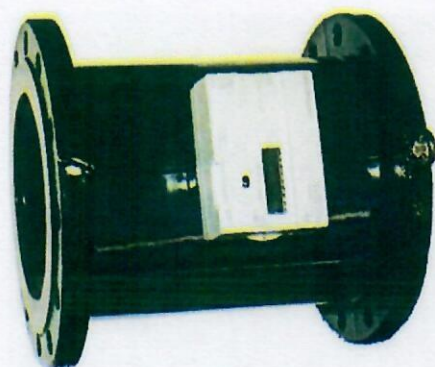
8 Figures (by way of example)



HYDRUS Type 174



HYDRUS Type 174



Hydrus Type 174

(figure shows DN 200 in grey cast iron casing)



Hydrus Type 174

(figure shows DN 80 in stainless steel casing)

**Translator's note:*

The flowchart on page 7 of the document was not translated by me and does not represent a literal translation of the German original, but apparently illustrates the function of the display correctly.

As duly appointed and sworn translator for the English language by the Regional Court of Karlsruhe, I certify that the foregoing is, to the best of my knowledge and belief, a true and correct translation of the German document presented to me.

Kraichtal, 09 September 2020

