

[logo] **PTB**
Physikalisch-Technische Bundesanstalt
Nationales Metrologieinstitut [National Metrology Institute]

KBS
Konformitätsbewertungsstelle
[Conformity Assessment Body]

[Coat of Arms]

EU-Entwurfsprüfbescheinigung

EU Design-examination Certificate

Ausgestellt für: <i>Issued to:</i>	Sensus GmbH Hannover Meineckestr. 10 30880 Laatzen	
gemäß: <i>In accordance with:</i>	Anhang II Modul H1 der Richtlinie 2014/32/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung von Messgeräten auf dem Markt. <i>Annex II Module H1 of the Directive 2014/32/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments.</i>	
Geräteart: <i>Type of Instrument:</i>	Wasserzähler <i>Water meter</i> Ultraschall-Wasserzähler für Kalt und Warmwasser <i>Ultrasonic water meter for cold and hot water</i>	
Typbezeichnung: <i>Type designation:</i>	Cordonel	
Nr. der Bescheinigung: <i>Certificate No.:</i>	DE-19-MI001-PTB008	
Gültig bis: <i>Valid until:</i>	20.06.2029	
Anzahl der Seiten: <i>Number of pages:</i>	10	
Geschäftszeichen: <i>Reference No.:</i>	PTB-1.5-4096622	
Notifizierte Stelle: <i>Notified Body:</i>	0102	
Zertifizierung: <i>Certification:</i>	Braunschweig, 21.06.2019	
Im Auftrag <i>On behalf of PTB</i>	Siegel <i>Seal</i>	Bewertung: <i>Evaluation:</i>
Dr. Michael Rinker <i>[illegible signature]</i>	[official stamp: <i>Physikalisch-Technische Bundesanstalt]</i>	[illegible signature] <i>Silke Hansen]</i>

[logo] **PTB**
Physikalisch-Technische Bundesanstalt
Nationales Metrologieinstitut
[National Metrology Institute]

KBS
Konformitätsbewertungsstelle
[Conformity Assessment Body]

EU Design-examination Certificate DE-19-MI001-PTB008

dated 21.06.2019

Certificate History

Certificate edition	dated	Amendments
DE-19-MI001-PTB008	21.06.2019	- initial certificate

Examination results:

The instruments mentioned in this certificate are subject to the following fundamental requirements of the Directive **2014/32/EU** of the European Parliament and the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments (official journal L 96 page 149), last amended by amendment of 20.01.2016 (official journal L 13 page 57):

- Annex I “Fundamental Requirements”
- Annex III (MI-001) “Water Meters”,

in conjunction with §6 of the Metering and Calibration Act of 25.07.2013 (Federal Law Gazette I page 2722), last amended by article 1 of the Act of 11.04.2016 (Federal Law Gazette I page 718), and §8 of the Measuring and Calibration Ordinance of 11.12.2014 (Federal Law Gazette I page 2010), last amended by article 3 of the Ordinance of 30.04.2019 (Federal Law Gazette I page 579).

The measuring instrument’s technical design specified below complies with the above mentioned fundamental requirements. This certificate entitles the holder to mark the instruments manufactured in conformity with this certificate with the number of this certificate.

The instruments must comply with the following regulations:

1 Type description

Ultrasonic water meter for cold and hot water

1.1 Construction

The meter comprises a body with two pipe-shaped flanged end connections. The body has 6 gaps for mounting the ultrasonic transducer, as well as a gap for mounting an optional pressure sensor. In the area of the measuring section, the channel of measurement is constricted. Body and measuring section are of symmetrical construction.

[logo] **PTB**
Physikalisch-Technische Bundesanstalt
Nationales Metrologieinstitut
[National Metrology Institute]

KBS
Konformitätsbewertungsstelle
[Conformity Assessment Body]

EU Design-examination Certificate DE-19-MI001-PTB008

dated 21.06.2019

The ultrasonic transducers are internally flush with the measuring tube.
The electronic register is fixed in a register casing, which is waterproof encapsulated and snap-fitted with the hydraulic measurement sensor. Two outer body shells, connected together by snap-in hooks, as well as a locking cap encase the sensors and the electronic components of measurement and protect the hydraulic measurement sensor and the register against damages.

- drawing no. MID 1001 dated 20.05.2019 (exploded view **Cordonel**, DN 50 in connection with electronic register;
- drawing no. MID 1010 dated 20.05.2013 (sectional view **Cordonel**, DN 50);
- drawing no. MID 1006 dated 20.05.2019 (exploded view **Cordonel**, DN 50) with corresponding bill of material no. MID 1100 pages 1 and 2 dated 21.05.2019.

1.2 Measurement sensor

Hydraulic measurement sensor with hexagonal cross-section and 3 ultrasonic paths arranged at an angle of 120 degrees. Each path comprises two ultrasonic transducers arranged in one plane.

The ultrasonic transducers are connected by means of cable with the electronic component of measurement.

- drawing no. MID 1011 dated 20.05.2019 (animated sectional view **Cordonel**, DN 50)

1.3 Measurement processing

The ultrasonic water meter operates according to the ultrasonic transit-time method. Three pairs of transducers send and receive ultrasonic signals in upstream and downstream direction. The electronic component of measurement calculates the transit-time difference and, by making use of the result, determines the flow velocity. Volume integration is effected by taking the invariable cross section and corrective calculations into account.

- drawing no. MID 1002 dated 20.05.2019 (3D animated view **Cordonel**, DN 50)
- drawing no. MID 1003 dated 20.05.2019 (animated exploded view **Cordonel**, DN 50);

1.4 Measurement indication

The ultrasonic water meter is equipped with an electronic register. The consumption value is shown permanently on a 7-segment LC display. Additional symbols show operating conditions. A separate line below the main

[logo] **PTB**
Physikalisch-Technische Bundesanstalt
Nationales Metrologieinstitut
[National Metrology Institute]

KBS
Konformitätsbewertungsstelle
[Conformity Assessment Body]

EU Design-examination Certificate DE-19-MI001-PTB008

dated 21.06.2019

reading continuously shows the current flowrate, the liquid temperature and optionally the pipe pressure by means of a 7-segment display.

- photo no. MID 1013 dated 05.05.2019 (top view display **Cordonel**, DN 50)

1.5 Optional equipment and features, which are subject to the Measuring Instruments Directive

- none –

1.6 Technical documents

The technical documents, which are part of this certificate, are on file at the PTB according to the corresponding set of certification documents. The table of contents of the set of certification documents has been sent to the certificate holder.

1.7 Integrated equipment and features, which are not subject to the Measuring Instruments Directive

The meter has:

- an integrated radio module, supplying consumption data and diagnostic information. This feature is provided by a separately operating part of the firmware receiving the volume data via non-interacting interface.
- a near field communication (NFC). For this purpose there is a NFC antenna located near the LC display. This component has no effect on the metrological characteristics of the **Cordonel**.
- an optional pressure sensor. The pressure sensor is arranged in such a way that there is no effect on the metrological characteristics. Measurement processing is provided by a separately operating part of the firmware, which operates without effect on the metrological part.
 - drawing no. MID 1002 dated 20.05.2019 (hardware construction with pressure sensor, **Cordonel**, DN 50)
- an IRDA interface transmitting data, which can be processed by an externally supplied, non-interacting pulse module. The data for the IRDA interface are supplied by a separately operating part of the firmware, which is operating without effect on the metrological part.
 - drawing no. MID 1008 dated 20.05.2019 (IRDA interface, **Cordonel**, DN 50)

[logo] PTB
 Physikalisch-Technische Bundesanstalt
 Nationales Metrologieinstitut
 [National Metrology Institute]

KBS
 Konformitätsbewertungsstelle
 [Conformity Assessment Body]

EU Design-examination Certificate DE-19-MI001-PTB008

dated 21.06.2019

2 Technical data

2.1 Rated operating conditions

Nominal diameter	DN 50 ¹⁾		
	Q ₃ 16	Q ₃ 25	Q ₃ 40
Nominal size			
Flowrate range: Q ₁	0,04 m ³ /h		
Q ₂	0.06 m ³ /h		
Q ₃	16 m ³ /h	25 m ³ /h	40 m ³ /h
Q ₄	20 m ³ /h	31,25 m ³ /h	50 m ³ /h
Q ₂ / Q ₁	1,6		
Q ₃ / Q ₁	40...400 ²⁾	40...630 ³⁾	40...1000 ⁴⁾
Accuracy class:	± 2 % (Q ₂ ≤ Q ≤ Q ₄) for water temperature ≤ 30°C		
	± 3 % (Q ₂ ≤ Q ≤ Q ₄) for water temperature > 30°C		
	± 5 % (Q ₁ ≤ Q < Q ₂)		
Temperature range:	0,1 °C bis 50 °C		
Pressure range:	0,3 bar (0,03 MPa) to 16 bar (1,6 MPa)		
Pressure loss class ΔP:	0,16 bar (0,016 MPa)		
Operating position:	horizontal and vertical		
Body length	≥ 200 mm		
Environmental conditions / influencing factors			
climatic	upper temperature limit: +70°C lower temperature limit: -10°C (condensing)		
mechanic:	M 2		
electromagnetic:	E 2		

- 1) It is allowed to manufacture the meter with flange connections according to DIN EN 1092-1 and DIN 2501-1.
- 2) It is also allowed to manufacture the meter for flowrate measuring ranges Q₃ / Q₁ = R = 400, 315, 250, 200, 160, 125, 100, 80, 63, 50, 40.
- 3) It is also allowed to manufacture the meter for flowrate measuring ranges Q₃ / Q₁ = R = 630, 500, 400, 315, 250, 200, 160, 125, 100, 80, 63, 50, 40.
- 4) It is also allowed to manufacture the meter for flowrate measuring ranges Q₃ / Q₁ = R = 1000, 800, 630, 500, 400, 315, 250, 200, 160, 125, 100, 80, 63, 50, 40.

[logo] **PTB**
Physikalisch-Technische Bundesanstalt
Nationales Metrologieinstitut
[National Metrology Institute]

KBS
Konformitätsbewertungsstelle
[Conformity Assessment Body]

EU Design-examination Certificate DE-19-MI001-PTB008

dated 21.06.2019

2.2 Further operating conditions

- none –

3 Interfaces and compatibility conditions

Tests of the meter are carried out by using an IRDA interface. The pulses are proportional to the volume at a pulse rate from 1 ml/pulse to 10 l/pulse.

4 Requirements for production, first operation and use

4.1 Requirements for production

The metrological verification test is carried out within the frame of a conformity assessment process based on an approved QM system according to ISO 9001:2008 (Reg.no. 03496/0).

The measured errors of indication must not exceed the maximum permissible value for any of the tested flow rates.

4.2 Requirements for first operation

Installation of inlet and outlet pipe lengths is not required (**U0, D0**).

It is recommended to secure the points of connection to the pipeline by means of a user seal. The user seal (adhesive stamp, lead seal or the like) preventing the meter being dismantled should be designed in such a way that it cannot be removed or detached without visible damage.

The pulse module is allowed to be retrofitted at the meter's point of installation. Retrofitting of pulse emitters is only allowed by fitters, who have been particularly trained for this purpose. The pulse emitter should be secured by user seal against dismantling.

4.3 Requirements for use

Any retrofitting shall be in compliance with the requirements according to no. 4.2.

5 Verification of instruments in operation

5.1 Documents for the test

The design-examination certificate in hand and the technical documents listed under no. 1.6.

5.2 Specific test equipment or software

The test can be carried out by volumetric or gravimetric methods or by using reference meters. The used test equipment must allow the adjustment of the

[logo] **PTB**
Physikalisch-Technische Bundesanstalt
Nationales Metrologieinstitut
[National Metrology Institute]

KBS
Konformitätsbewertungsstelle
[Conformity Assessment Body]

EU Design-examination Certificate DE-19-MI001-PTB008

dated 21.06.2019

flow rates specified in the test instructions Sensus-1-796;

- a) SIRT (Sensus Interface Radio Tool) for communicating with the unit under test
- b) Opto scanning head converting the light pulses of the LED, which are proportional to the volume, into an electrical signal, which can be utilized by the test rig;
- c) Pulse module – test mode for hydraulic test of the meter by means of pulse output;
- d) Switchover into the high-resolution test mode via near field communication (NFC) via mobile phone and a “download app”.

5.3 Identification

The meter must correspond to the technical documents under no. 1.6, the inscriptions to the specification under no. 7.2. The firmware release number is shown alternately on the meter’s display.

5.4 Calibrating and adjusting methods

The metrological test must be carried out within the rated operating conditions. Due to the linear measuring principle, the meter is adjusted on the basis of a selective point of flow. The error compared to the reference volume is calculated and programmed into the instrument as a percentage corrective factor. After completed calibration, the instrument is to be secured electronically against changes.

6 Security measures

6.1 Mechanical sealing

The two outer body shells are joined together in a non-detachable way. The locking hooks are snapped into place in indentations and break in case of forceful opening.

The locking cap, together with the register below, is snap-fitted in such a manner that wilful opening is only possible by force leaving visible traces.

- figure MID 1014 dated 04.05.2019 **Cordonel DN50** (view of sealing of locking cap and the outer body shells);
- figure MID 1014 dated 04.05.2019 **Cordonel DN50** (view of sealing of pulse module).

[logo] **PTB**
Physikalisch-Technische Bundesanstalt
Nationales Metrologieinstitut
[National Metrology Institute]

KBS
Konformitätsbewertungsstelle
[Conformity Assessment Body]

EU Design-examination Certificate DE-19-MI001-PTB008

dated 21.06.2019

The marking affixed on the locking cap (metrological marking, CE marking, as well as meter data) must be permanent.

To prevent any soiling or damage during the transport to the fitting site the inlet and outlet passages must be covered.

6.2 Electronic sealing

After fully completed manufacture and configuration, the instrument is electronically closed by a defined bit pattern. Afterwards any modifications to the calibrated values are no longer possible.

7 Marking and inscriptions

7.1 Information to be added to the instrument

Operating / mounting instructions:

Each meter is to be accompanied by descriptive operating / mounting instructions. They have to include the following items for particular observation:

- a) Check of the sealing surfaces and the seals before fitting. It must be ensured that, in case of need, particular measures prevent the seals at the meter from getting out of place, dropping out or being damaged during the transport from the manufacturer to the fitting site. If required, the seals are to be pasted in.
- b) Check of the readability of the meter characteristics after fitting. The visual readability of the register reading, all characteristics of the meter and the conformity and metrological marking must not be impaired.
- c) Suitable measures must secure that any soiling or damage during transport to the fitting site is prevented.

7.2 Marking and inscriptions

The following information must at least be available on the meter:

- manufacturer's name or company name or his trademark and his postal delivery address
- Q_3 and the ratio Q_3/Q_1 (R)
- year of manufacture and individual serial number of the meter
- number of the design-examination certificate
- the temperature class T50
- the maximum operating pressure in „bar" or MPa, if >1 MPa or 10 bar
- flow direction (e.g. on the body or on the display
- unit of measurement m^3 ,

[logo] **PTB**
Physikalisch-Technische Bundesanstalt
Nationales Metrologieinstitut
[National Metrology Institute]

KBS
Konformitätsbewertungsstelle
[Conformity Assessment Body]

EU Design-examination Certificate DE-19-MI001-PTB008

dated 21.06.2019

- flow profile sensitivity class
- expected date, by which the meter must be exchanged at the latest

Conformity and metrological marking is affixed in accordance with article 20 of the Directive 2014/32/EU.

Additional inscriptions are allowed, as long as they cannot be mistaken for the above mentioned data.

- photo no. MID 1013 dated 04.05.2019 (**Cordonel** – marking and inscription according to MID)

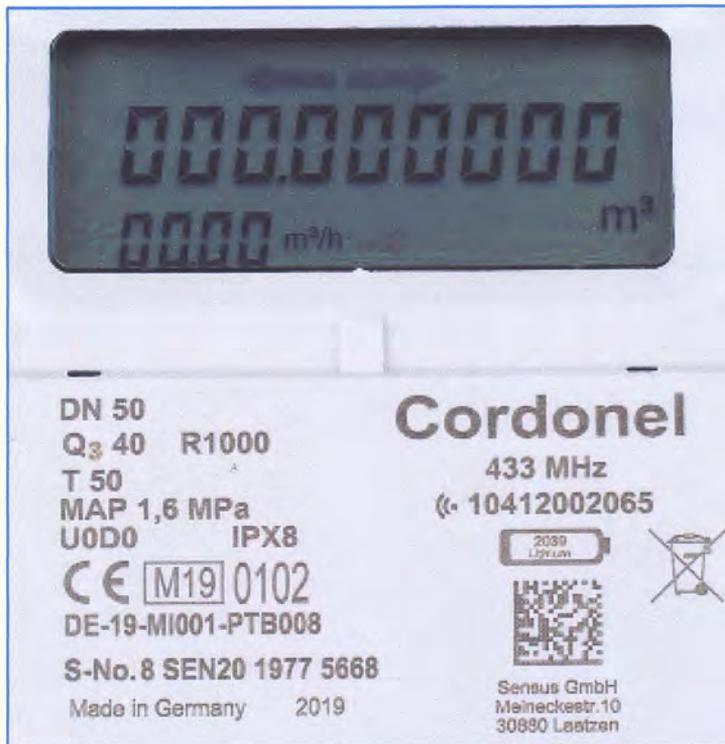
[logo] PTB
Physikalisch-Technische Bundesanstalt
Nationales Metrologieinstitut
[National Metrology Institute]

KBS
Konformitätsbewertungsstelle
[Conformity Assessment Body]

EU Design-examination Certificate DE-19-MI001-PTB008

dated 21.06.2019

8 Illustration – photos (by way of example)



Cordonel DN 50: Inscription on the meter: marking according to MID



Cordonel DN 50: Display – Register reading

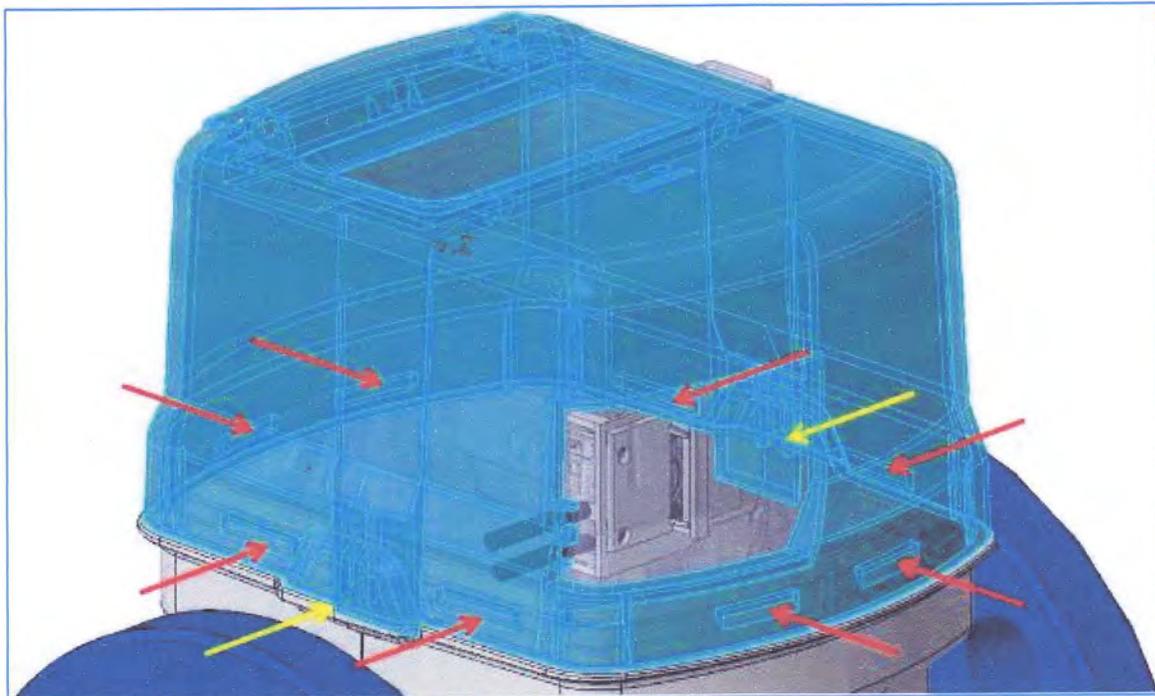
[logo] **PTB**
Physikalisch-Technische Bundesanstalt
Nationales Metrologieinstitut
[National Metrology Institute]

KBS
Konformitätsbewertungsstelle
[Conformity Assessment Body]

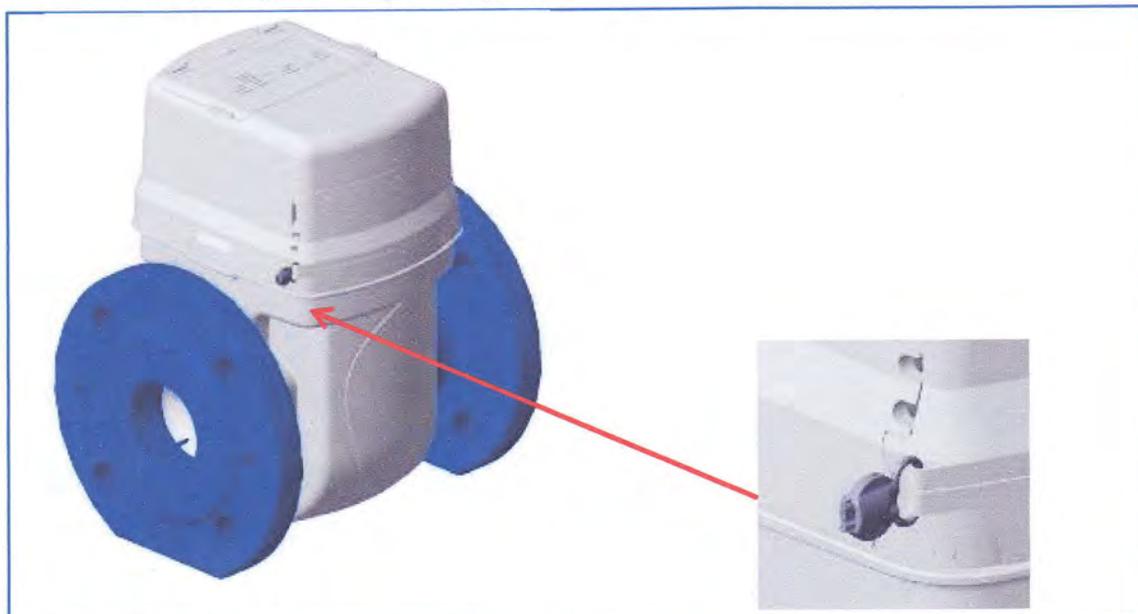
EU Design-examination Certificate DE-19-MI001-PTB008

dated 21.06.2019

Cordone! DN 50: view of sealing of the locking cap and the two outer body shells



Cordone!: Snap-fitting of the cap – safety lugs and indentations



Cordone!: View of the sealing of the pulse module

[logo] PTB
Physikalisch-Technische Bundesanstalt
Nationales Metrologieinstitut
[National Metrology Institute]

KBS
Konformitätsbewertungsstelle
[Conformity Assessment Body]

EU Design-examination Certificate DE-19-MI001-PTB008

dated 21.06.2019

Cordonel DN 50



Cordonel DN 50 in perspective view



Cordonel DN 50 in front view



Cordonel DN 50 in top view with open and closed protective lid



Beatrix Amon – governmentally certified translator of the English language,
Friedhofstr.34a, D-67105 Schifferstadt – Germany
Phone +49 (0)6235/98249, e-mail beatrix.amon@web.de

Certified translation from the German language

page 13 of 13

[logo] **PTB**
Physikalisch-Technische Bundesanstalt
Nationales Metrologieinstitut
[National Metrology Institute]

KBS
Konformitätsbewertungsstelle
[Conformity Assessment Body]

EU Design-examination Certificate DE-19-MI001-PTB008

dated 21.06.2019

PTB / Physikalisch-Technische Bundesanstalt
Nationales Metrologieinstitut / National Institute of Metrology
Bundesallee 100, D-38116 Braunschweig, Germany
Abbestrasse 2-12, D-10587 Berlin, Germany

Konformitätsbewertungsstelle
Conformity Assessment Body

The translation from the German language is certified to be correct and complete.

Schifferstadt, 21 July 2019

Beatrix Amon

Beatrix Amon – governmentally certified translator of the English language
authorised by the president of the Regional High Court OLG
Zweibruecken for legal affairs in Rhineland-Palatinate

