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beglaubigte Übersetzung aus dem Deutschen ins Englische
Certified Translation from German into English

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[Coat of Arms]

EC design-examination certificate

Issued to:	Sensus GmbH Hannover Meineckestraße 10 30880 Laatzen	
In accordance with:	Appendix H1 to Directive 2004/22/EC of the European Parliament and of the Council of 31 March 2004 on measuring instruments (OJ L 135 p. 1)	
Type of instrument:	Water Meter	
Type designation:	MeiStream	
Certificate number:	DE-09-MI001-PTB010, 5 th revision	
Valid until:	25 May 2019	
Number of pages:	31	
Reference no.:	PTB-1.5-4074588	
Notified Body:	0102	
Place, date of issue:	Braunschweig, 21 Apr. 2015	
Certification:	Seal	Evaluation:
On behalf of PTB	[Seal:]	On behalf of PTB
[Signature: illegible]	Federal Institute for Physics	[Signature: illegible]
Dr. Gudrun Wendt	and Engineering [Physikalisch- Technische Bundesanstalt] 53	Dr. Michael Rinker

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Certificate history

Certificate Version	Date	Amendments
DE-09-MI001-PTB010, 5 th revision	21 Apr. 2015	– Meter design “MeiStream MS - D HRI” with 7-rollers inserted – Electronic meter “eRegister C&I” inserted
DE-09-MI001-PTB010, 4 th revision	28 Feb. 2014	– Omission of anti-tampering device at the “Opto-window”
DE-09-MI001-PTB010, 3 rd revision	19 Oct. 2012	– Addition of PN 40 for sizes DN 50, DN 65, DN 80, DN 100 and DN 150; – Addition of sizes DN 125 and DN 150 in vertical installation position; – Component modifications without modifications of functionality; – Addition of sizes DN 150 without multiplier “x10”; – Amendment of technical documentation; – Meter insert defined as exchangeable, metrologic unit.
DE-09-MI001-PTB010, 2 nd revision	19 Mar. 2010	– Name change of manufacturer from Sensus Metering Systems GmbH Hannover to Sensus GmbH Hannover – Addition of vertical installation position for the sizes DN 40 to DN 100; – Optional marking of temperature class T30.
DE-09-MI001-PTB010, 1 st revision	06 Aug. 2008	– Amendment of technical documentation; – New, revised name plates
DE-09-MI001-PTB010	27 May 2009	– Initial certificate

This 5th revision replaces certificate no. DE-09-MI001-PTB010, 4th revision dated 28 Feb. 2014, reference number PTB-1.5-4068246.

Preliminary remarks

The following essential requirements of Directive 2004/22/EC of the European Parliament and of the Council of 31st March 2004 on measuring instruments (OJ L 135 p. 1), last amended by Regulation (EU) No 1025/2012 of the European Parliament and of the Council of 25 October 2012 (OJ L 316, S. 12) apply to the instruments indicated in this certificate:

- Appendix I, Basic requirements, and
- Appendix MI-001, water meters

in conjunction with Articles 7 and 8 of the Measurements and Verification Ordinance [Mess- und Eichverordnung] dated 11 Dec. 2014 (BGBl. [Federal Gazette] I p. 2010).

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The technical design of the measuring instrument as described below complies with the essential requirements mentioned above. This certificate includes the authorisation to mark the instruments manufactured in compliance with this certificate with the number of this certificate.

The measuring instruments have to fulfil the following specifications:

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1 Type description

Woltman meter for cold and hot water

1.1 Design

The meter consists of a casing with two tube-shaped flanged connection pipes and a meter insert, consisting of one Woltman impeller meter, design WP, as well as a mechanic or electronic dry running pointer roller type meter.

The meter disposes of a flow straightener integrated into the inlet of the casing.

The lid flange of the meter insert is securely fastened to the head flange of the corresponding casing with four screws.

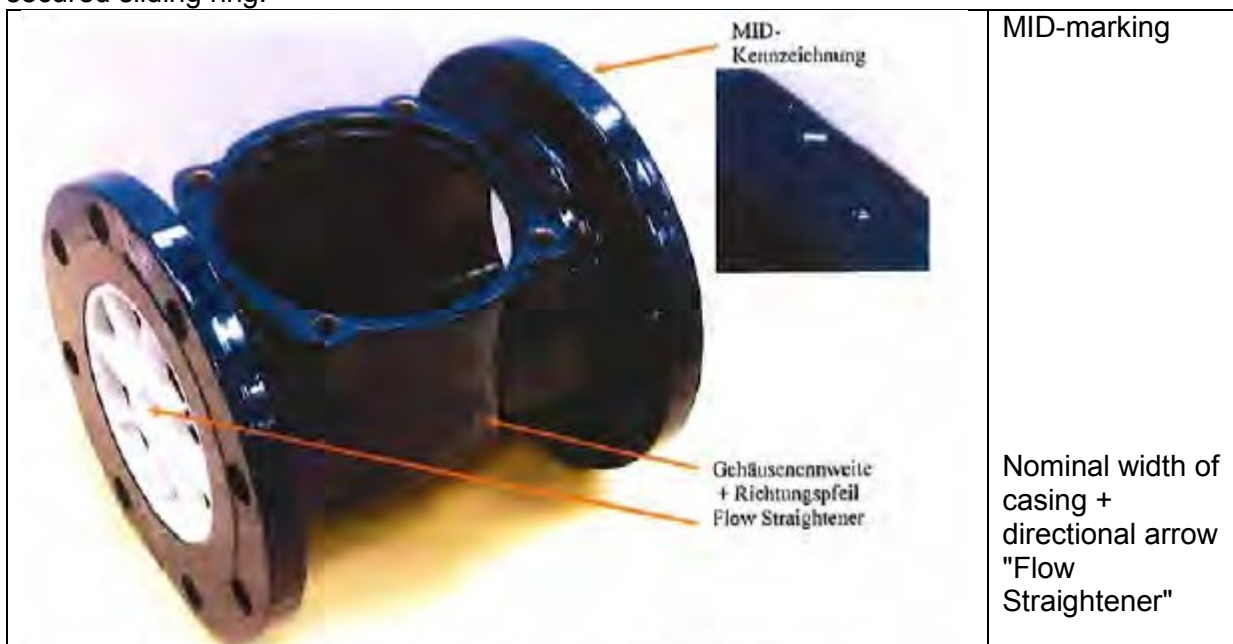
The meter consists of a casing (connection interface) with two tube-shaped flanged connecting branches und a metering insert (exchangeable metering unit), consisting of Woltman impeller meter, design WP, as well as a mechanic dry running pointer roller type meter.

The meter disposes of a flow straightener integrated into the inlet of the casing.

The lid flange of the meter insert is securely fastened to the head flange of the corresponding casing with four screws.

Metering insert and casing in combination form the water meter. Only casings with flow straightener, directional arrow and MID-marking engraved into the upper surface of the flange are permitted (illustrated below at the example of nominal casing width DN 150).

Measuring element and metering element are connected with each other by means of a secured sliding ring.



The entire range consists of three meter inserts, where the lid flanges plus adjusting screw may optionally be designed in tin-coated brass (sizes DN 40 to DN 125) or a combination of

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brass and grey cast iron (size DN 150) or also plastic (sizes DN 40 to DN 125) and/or a combination of plastic and grey cast iron (size DN 150).

The smallest meter insert is represented by the sizes DN 40, DN 50 and DN 65. The medium-sized meter insert is represented by sizes DN 80, DN 100 and DN 125 and the largest meter insert is only installed in size DN 150.

Within the individual sizes, the respective meter inserts are identical, except for the casings. In the medium-sized meter insert range (DN 80 to DN 125) the size DN 125 is the only exception, being designed as partially admitted bypass meter whereas all other meter inserts are fully included in the flow.

For minimum lengths of the casings for the individual sizes, please refer to the table below:

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Size	Minimum length of casing
DN 40	220 mm
DN 50	200 mm
DN 65	200 mm
DN 80	200 mm
DN 100	250 mm
DN 125	250 mm
DN 150	300 mm

1.1.1 Design MeiStream DN 40, DN 50 and DN 65

Woltman meter with dry running pointer roller type meter and flanged connecting branches at both ends for installation into horizontal and vertical pipelines.

- Drawing no. SK_51567 dated 26 Feb. 2009 (cross and longitudinal section, perspective view and top view Woltman meter MeiStream / MeiStream Plus DN 40, DN 50 and DN 65, Q_3 16m³/h to Q_3 63 m³/h in connection with dry running pointer roller type meter and flow straightener, shown here: MeiStream DN 50) and
- Drawing no. SK_51563 dated 26 Feb. 2009 (cross and longitudinal section and top view meter insert MeiStream / MeiStream Plus DN 40, DN 50 and DN 65, Q_3 16m³/h to Q_3 63 m³/h in connection with dry running pointer roller type meter, details of impeller bearing and magnetic coupling, shown here: meter insert MeiStream DN 50)
- with respective materials list no. 5210 Sheet (Bl.) 1 dated 19 Nov. 2011.

1.1.2 Design MeiStream DN 80 and DN 100

Woltman meter with dry running pointer roller type meter and flanged connecting pipes at both ends for installation into horizontal and vertical pipelines.

- Drawing no. SK_51568 dated 27 Feb. 2009 (cross and longitudinal section, perspective view and top view Woltman meter MeiStream / MeiStream Plus DN 80 and DN 100, Q_3 40m³/h to Q_3 160 m³/h in connection with dry running pointer roller type meter and flow straightener, shown here: MeiStream DN 100) and
- Drawing no. SK_51564 dated 27 Feb. 2009 (cross and longitudinal section and top view meter insert MeiStream / MeiStream Plus DN 80 and DN 100, Q_3 40m³/h to Q_3 160 m³/h in connection with dry running pointer roller type meter, details of impeller bearing and magnetic coupling, shown here: meter insert MeiStream DN 100)
- with respective materials list no. 5210 p. 1 dated 19 Dec. 2011.

1.1.3 Design MeiStream DN 125

Woltman meter with dry running pointer roller type meter and flanged connecting branches at both ends for installation into horizontal pipelines.

- Drawing no. SK_51569 dated 27 Feb. 2009 (cross and longitudinal section, perspective view and top view Woltman meter MeiStream DN 125, Q_3 100 m³/h to Q_3 160 m³/h in connection with dry running pointer roller type meter and flow straightener)
and
- Drawing no. SK_51569 dated 27 Feb. 2009 (cross and longitudinal section and top view meter insert MeiStream DN 125, Q_3 100 m³/h to Q_3 160 m³/h in connection with dry running pointer roller type meter, details of impeller bearings and magnetic coupling)
- Materials list no. 5210 p. 1 dated 19 Dec. 2011.

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1.1.4 Design MeiStream DN 150

Woltman meter with dry running pointer roller type meter and flanged connecting branches at both ends for installation into horizontal pipelines.

- Drawing no. SK_51570 dated 27 Feb. 2009 (cross and longitudinal section, perspective view and top view Woltman meter MeiStream / MeiStream Plus DN 150, Q_3 160m³/h to Q_3 400 m³/h in connection with dry running pointer roller type counter and flow straightener, shown here: MeiStream DN 150) and
- Drawing no. SK_51566 dated 27 Feb. 2009 (cross and longitudinal section and top view metering insert MeiStream / MeiStream Plus DN 150, Q_3 160m³/h to Q_3 400 m³/h in connection with dry running pointer roller type counter, details of impeller bearing and magnetic coupling, shown here: metering insert MeiStream DN 150)
- with respective materials list no. 5211 p. 1 dated 19 Dec. 2011.

The meter may alternatively be produced with the metering element “MeiStream MS – D HRI”, the transmission of which is adjusted in such a manner, that the right-hand figure roller indicates m³. Thus, the imprint “x10” on the dial is not required in this design.

- Drawing no. SK_51685 dated 07 Aug. 2012 (roller type meter MeiStream MS-D HRI DN 150, T50, metering unit 1m³ without multiplier).

1.2 Transducer

Woltman – impeller wheel metering element, with impeller wheel axle located in the tube axis. Inflow via the integrated flow straightener, through the water passage cross member onto the Woltman impeller wheel. The rotary movement of the impeller wheel located in parallel to the flow is achieved via a worm gear and a transmission shaft to the magnetic coupling. The magnetic coupling is used to transmit the rotary movement from the measuring element to the metering element. The outflow is performed through the outlet situated on the opposite side. Calibration is performed by means of a bypass regulation device on the adjusting partition. Calibration is only possible when the sliding ring is removed.

- Drawing no. SK_51576 dated 27 Feb. 2009 (detail of adjusting partition MeiStream / MeiStream Plus DN 40 to DN 150, Q_3 16 m³/h to Q_3 400 m³/h, shown here: MeiStream Plus DN 100).

1.3 Feedback processing

Not applicable, because the Woltman meter is equipped with a mechanic metering element.

1.3.1 Dry-running pointer roller-type meter

The revolutions of the Woltman impeller wheel are transmitted to the metering element by means of transmission shaft and magnetic coupling. Within the metering element, the rotational movement is finally transmitted via a worm gear box to the fastest, continuously moving digit roller.

1.3.2 Electronic meter “eRegister C&I”

The rotational movement of the impeller is transmitted via a magnetic coupling from the wet area of the meter to the dry area of the electronic meter. In the interior of the meter, a

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magnetic coupling following the rotations is located, which is scanned by an electronic sensor. Rotational movement and direction of rotation are converted and processed electronically and registered on the LCD. The calculated, displayed data can be read out via an encoded wireless protocol.

The meter may be rotated by 359° maximum in relation to the meter housing; it is equipped with an anti-twist device.

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- Drawing no. SK_51721 dated 22 Jan. 2015 (Electronic meter "eRegister" MeiStream / MeiStream Plus / MeiTwin meter 30 °C)
- Materials list no. 5242 dated 20 Jan. 2015 (electronic meter "eRegister C&I")

1.4 Display of measured values

1.4.1 Metering element design "MeiStream MS - D HRI" with inductive pulse generator HRI-Mei and optoelectronic pulse generator OD

Dry running – pointer – roller-type meter with magnetic coupling to the measuring element. The metering element includes 6 white figure rollers with black digits for the display of cubic metres and 3 red pointers (graduated circles) for the display of places behind the decimal point in the sizes DN 40 to DN 125, or two red pointers and one black pointer for the size DN 150, plus star wheel.

The pointer with the wraparound value of 10 litres (l) (Sizes DN 40 to DN 125) or 100 l (size DN 150) may be equipped with a modulator (metering element prepared for HRI). The display shows cubic metres (m³). The fastest figure roller rotates continuously. The smallest scale interval on the metering element rotating fastest is 0.5 l (sizes DN 40 to DN 125) or 5 l (size DN 150).

The metering element is equipped with an anti-twist device and can be rotated in relation to the meter casing by 359° maximum.

All gears required for the necessary gear reduction are located between an upper and lower board, which are simultaneously serving as bearing plates. The upper board is simultaneously serving as dial.

The metering element "MeiStream MS - D HRI" may, if necessary at the installation site of the meter, also be equipped with a retrofittable inductive pulse generator HRI Mei and/or an optical pulse generator OD.

Design and functioning of the inductive pulse generator HRI-Mei:

In case of the sizes DN 40 to DN 125, a modulator (non-magnetic equalising piece) is located on the pointer with the revolution value of 10 litres (l). The pulse value is not less than 10 l per pulse.

In case of size DN 150, the modulator is located on the pointer with the wraparound value 100 l. Accordingly; the pulse value is not less than 100 l per pulse.

This modulator may be scanned by the inductive pulse generator HRI-Mei, without generating any interactions, and is thus serving the purpose of generating pulses of identical volume.

The electronic evaluation system with the oscillating circuit for scanning is located in a separate casing, fastened on the hood of the metering element by means of a bayonet, which is lockable by means of a sliding ring.

The casing holds two spools; this permits discovery of clockwise and counter clockwise rotations of the pointer, which is scanned without any interaction. The hardware includes a processor, which evaluates the signals of the oscillating circuit and calculates the output pulses.

The casing of the pulse generator has the protection system IP 68.

To enable installation of the inductive pulse generator HRI on the metering element, the inspection glass has been flattened in the area, where the HRI is to be fastened.

Design and functioning of the optical pulse generator OD:

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Several gears are combined with magnet carriers or a reflector wheel. They serve the purpose of generating pulses of identical volume, which can be scanned by means of a pulse generator.

The reflector wheel with 10 reflection faces for the optical pulse generator OD is, in case of the sizes DN 40 to DN 125, located at the metering link with the wraparound value of 10 l per revolution and in case of the size DN 150 on the metering link with the wraparound value of 100 l per revolution. The pulse value is not less than 1 l per pulse (sizes DN 40 to DN 125) or 10 l per pulse (size DN 150).

- Drawing no. SK_51572 dated 27 Feb. 2009 (section of dry-running pointer roller type meter MeiStream / MeiStream Plus MS – D HRI) with respective
- Materials list no. 5212 p. 1 dated 18 May 2009.

1.4. 2. Metering element design „MeiStream MS- Encoder” with inductive pulse generating device HRI

Dry running – pointer – roller-type counter with magnetic coupling to the measuring element.

The metering element includes 6 black figure rollers with white digits for the display of cubic metres and 3 red pointers (graduated circles) for the display of places behind the decimal point in the sizes DN 40 to DN 125, or two red pointers and one black pointer for the size DN 150, plus star wheel.

The display shows cubic metres (m³). The fastest figure roller rotates continuously. The smallest scale interval on the metering element rotating fastest is 0.5 l (sizes DN 40 to DN 125) or 5 l (size DN 150).

The metering element is equipped with an anti-twist device and can be rotated in relation to the meter casing by 359° maximum.

The individual rollers of the roller-type counter are equipped with concentric encoding slits. These can be scanned by means of light barriers, thus recording the meter count.

The read-out device is connected via cable and interface. During read-out, the electronic system within the metering element is supplied with electricity from an external source.

When it is not operating, this electronic system is idle (without power). The interface operates without any interaction.

The metering element „MeiStream MS – Encoder” may, if necessary, be operated with a retrofittable, inductive pulse generator HRI at the installation site of the meter.

In case of sizes DN 40 to DN 125, the modulator is located on the pointer with the wraparound value 100 l. The pulse value is not less than 100 l per pulse.

In case of size DN 150, the modulator is located on the pointer with the wraparound value 1000 l. Accordingly; the pulse value is not less than 1000 l per pulse.

Design and functioning of the inductive pulse generator HRI is largely identical with the pulse generator device HRI-Mei described under Nr. 1.4.1. Only fastening of the model HRI is, other than in case of model HRI-Mei, achieved by means of screws.

- Drawing no. SK_51577 dated 02 Mar. 2009 (section of dry-running pointer roller type counter MeiStream / MeiStream Plus MS – Encoder) with respective
- Materials list no. 5208 p. 1 dated 18 May 2009.

1.4.3 Meter design “MeiStream MS - D HRI” with 7-rollers meter without multiplier, „x10”

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The meter of size DN 150 is alternatively produced with a mechanical 7-roller metering element "MeiStream MS - D HRI". This transmission is adjusted in such a manner that the digit roller on the far right shows m³ and thus the imprint "x10" on the dial is not required in this model any more.

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- Drawing no. SK_51742 dated 24 Mar. 2015 (roller type counter MeiStream MS - D HRI DN 150/200-300 T50 7 rollers) with associated
- Materials list no. 5211 p. 1 dated 18 May 2009.

1.4.4 Electronic meter “eRegister C&I”

Electronic meter with 9-digit volume display in LCD-technology with dark digits against a light background. The decimal point can be adjusted at the factory as required (3 decimal places, smallest unit displayed 1 Litre for DN 40 to DN125 and 2 decimal places, smallest unit displayed 10 Litres from DN 150 onwards).

The display can be put into a test mode for inspection purposes (smallest fractional value of the display 0.625 Litres for DN 40 to DN125 and 6.25 Litres from DN 150 onwards).

- Drawing no. SK_51722 dated 26 Jan. 2015 (dial “eRegister” MeiStream / MeiStream Plus / MeiTwin meter 30°C)
- Drawing no. SK_51743 dated 24 Mar. 2015 (head assembly with nameplate, MeiStream with eRegister C&I, DN 65, DN 100, DN 150)

1.5 Optional devices and functions subject to the Measuring Instruments Directive

- none -

1.6 Technical documentation

Drawing or document no.	Date	Description
SK_51556	23 Feb. 2009	Plastic flange; MeiStream / MeiStream Plus DN40 - 65
SK_51557	24 Feb. 2009	Plastic flange; MeiStream* / MeiStream Plus DN80 – 125*
SK_51558	26 Feb. 2009	Plastic flange; MeiStream / MeiStream Plus DN 150
SK_51563	26 Feb. 2009	Meter insert; MeiStream / MeiStream Plus DN40 - 65
SK_51564	27 Feb. 2009	Meter insert; MeiStream / MeiStream Plus DN80 - 100
SK_51565	27 Feb. 2009	Meter insert; MeiStream DN125
SK_51566	27 Feb. 2009	Meter insert; MeiStream / MeiStream Plus DN 150
SK_51567	26 Feb. 2009	Complete meter; MeiStream / MeiStream Plus DN40 - 65
SK_51568	27 Feb. 2009	Complete meter; MeiStream / MeiStream Plus DN80 - 100
SK_51569	27 Feb. 2009	Complete meter; MeiStream DN125
SK_51570	27 Feb. 2009	Complete meter; MeiStream / MeiStream Plus DN150
SK_51571	27 Feb. 2009	Meter elements MeiStream / MeiStream Plus (photos)
SK_51572	27 Feb. 2009	Roller type meter, complete; MS-D HRI, MeiStream / MeiStream Plus
SK_51573	27 Feb. 2009	Meter types; MeiStream / MeiStream Plus DN 65 (photos)
SK_51574	27 Feb. 2009	Meter types; MeiStream / MeiStream Plus DN 100 (photos)
SK_51575	27 Feb. 2009	Meter types; MeiStream / MeiStream Plus DN 150 (photos)
SK_51576	27 Feb. 2009	Bypass regulation; MeiStream / MeiStream Plus DN 40 - 150
SK_51577	02 Mar. 2009	Roller type counter MS-Encoder, complete; MeiStream / MeiStream Plus; roller type counter 50 C

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SK_51578	03 Feb. 2014	Lead-sealing MeiStream / MeiStream Plus DN 65 (photos)
SK_51579	03 Feb. 2014	Lead-sealing; MeiStream* / MeiStream Plus DN 80-125* (photos)
SK_51580	03 Feb. 2014	Lead-sealing MeiStream / MeiStream Plus DN 150 (photos)

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SK_51581	03 Mar. 2009	Head assembly with nameplate; MeiStream DN 65, DN 100, DN 150 (photos)
SK_51586	14 May 2009	Complete meter, including all pulse generators; MeiStream / MeiStream Plus DN 40 - 150
SK_51587	18 May 2009	MeiStream / MeiStream Plus DN 40 -150; Comparison HRI, HRI-Mei and Opto-OD (photos)
SK_51600	03 Aug. 2009	Head assembly; MeiStream/MeiStream Plus DN 40-150
SK_51601	04 Aug. 2009	MeiStream/MeiStream Plus; Lid design GWF, Aquametro (photos)
SK_51608	22 Feb. 2010	Name plate Aquametro MeiStream/MeiStream Plus (photo)
SK_51609	23 Feb. 2010	Name plate GWF MeiStream/MeiStream Plus (photo)
SK_51610	23 Feb. 2010	Name plates Vertical; MeiStream H/V; MeiStream H and V (photos)
SK_51645	14 Jun. 2011	Transmission roller MeiStream/MeiStream Plus DN40 - 100
SK_51646	14 Jun. 2011	Protective pipe MeiStream/MeiStream Plus DN40 - 100
SK_51647	14 Jun. 2011	Impeller wheel bearing complete, MeiStream/MeiStream Plus DN40 -150
SK_51648	14 Jun. 2011	Magnetic coupling complete, MeiStream/MeiStream Plus DN40 -150
SK_51655	15 Dec. 2011	Name plate design MeiStream / MeiStream Plus with indication of the required start-up and trail length
SK_51656	19 Dec. 2011	Name plate design MeiStream / MeiStream Plus with pressure level 4 Mpa
SK_51684	03 Aug. 2012	Comparison MeiStream MID old/new head assembly
SK_51685	07 Aug. 2012	Roller type meter MeiStream MS-D HRI DN 150, TN50 metering element 1m ³ without multiplies
SK_51721	22 Jan. 2015	Electronic meter "eRegister" MeiStream / MeiStream Plus / MeiTwin meter 30°C
SK_51722	26 Jan. 2015	Dial "eRegister" MeiStream / MeiStream Plus / MeiTwin meter 30°C
SK_51742	24 Mar. 2015	Roller-type meter MeiStream MS - D HRI DN 150/200-300 T50 7 rollers
SK_51743	24 Mar. 2015	Head assembly with nameplate, MeiStream Plus with eRegister C&I, DN 65, DN 100, DN 150
5208 p. 1	18. May 2009	Materials list MeiStream / MeiStream Plus; Roller type meter MS-Encoder T50
5210 p. 1	19 Dec. 2011	Materials list MeiStream* / MeiStream Plus DN 40-125* T50
5211 p. 1	19 Dec. 2011	Materials list MeiStream / MeiStream Plus DN 150 T50
5212 p. 1	18. May 2009	Materials list MeiStream / MeiStream Plus; Roller type meter MS D HRI T50
5242	20 Jan. 2015	Electronic meter "eRegister"
ME 1500	09/2008	Spare parts list MeiStream DN 40-150 / 50°C/PN 16
MB 9202 DE	09/2009	Installation instructions Meistream
MB 8210	47/2007	Instructions for connecting Opto OD and HRI-Mei to Meistream

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MS 8100	11/2008	Installation and operating instructions HRI
MS 8400	05/2008	Installation and operating instructions HRI-Mei
LB 8300 DE	06/2007	Information Opto OD
LS 8100 DE	06/2007	Information HRI
LS 8400 DE	08/2008	Information HRI-Mei

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1.7 Integrated devices and functions not subject to the Measuring Instruments Directive

1.7.1 Mechanic metering element with pulse generator

The meters shall also be equipped in connection with two different types of pulse generators:

- inductive pulse generator HRI-Mei and/or HRI (refer to no. 1.4.1 and no. 1.4.2),
- optoelectronic pulse generator OD (refer to no. 1.4.1).

All contact makers can be exchanged at the operational site of the meter, if necessary.

- Drawing no. SK_51586 dated 14 May 2009 (transverse view and top view Woltman meter MeiStream / MeiStream Plus DN 40 to DN 150 with dry-running pointer roller type meter and pulse generators HRI-Mei, HRI and OD, shown here: Woltman meter MeiStream DN 50 with opened protective lid).

1.7.2 Electronic meter

The electronic meter is equipped with an integrated wireless module, which allows to read out the calculated and displayed data via an encoded wireless protocol.

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2 Technical data

2.1 Nominal operational conditions

2.1.1 Size DN 40, installation position horizontal

Q ₁ [m ³ /h]	0.4	0.397	0.25	0.2
Q ₂ [m ³ /h]	0.64	0.635	0.4	0.32
Q ₃ [m ³ /h]	16	25	25	25
Q ₄ [m ³ /h]	20	31.25	31.25	31.25
Q ₂ /Q ₁	1.6			
Q ₃ /Q ₁	40	63	100	125

2.1.2 Size DN 40, installation position vertical

Q ₁ [m ³ /h]	0.4	0.397
Q ₂ [m ³ /h]	0.64	0.635
Q ₃ [m ³ /h]	16	25
Q ₄ [m ³ /h]	20	31.25
Q ₂ /Q ₁	1.6	
Q ₃ /Q ₁	40	63

2.1.3 Size DN 50, installation position horizontal

Q ₁ [m ³ /h]	0.4	0.397	0.4	0.32	0.25
Q ₂ [m ³ /h]	0.64	0.635	0.64	0.512	0.4
Q ₃ [m ³ /h]	16	25	40	40	40
Q ₄ [m ³ /h]	20	31.25	50	50	50
Q ₂ /Q ₁	1.6				
Q ₃ /Q ₁	40	63	100	125	160

2.1.4 Size DN 50 installation position vertical

Flow range:

Q ₁ [m ³ /h]	0.4	0.397	0.4
Q ₂ [m ³ /h]	0.64	0.635	0.64
Q ₃ [m ³ /h]	16	25	40
Q ₄ [m ³ /h]	20	31.25	50
Q ₂ /Q ₁	1.6		
Q ₃ /Q ₁	40	63	100

2.1.5 Size DN 65, installation position horizontal

Q ₁ [m ³ /h]	0.625	0.635	0.63	0.504	0.394
Q ₂ [m ³ /h]	1	1.016	1.008	0.806	0.63
Q ₃ [m ³ /h]	25	40	63	63	63
Q ₄ [m ³ /h]	31.25	50	78.75	78.75	78.75
Q ₂ /Q ₁			1.6		
Q ₃ /Q ₁	40	63	100	125	160

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2.1.6 Size DN 65, installation position vertical

Q ₁ [m ³ /h]	0.625	0.635	0.63
Q ₂ [m ³ /h]	1	1.016	1.008
Q ₃ [m ³ /h]	25	40	63
Q ₄ [m ³ /h]	31.25	50	78.75
Q ₂ /Q ₁	1.6		
Q ₃ /Q ₁	40	63	100

2.1.7 Size DN 80, installation position horizontal

Q ₁ [m ³ /h]	1	1	1	0.5	0.318
Q ₂ [m ³ /h]	1.6	1.6	1.6	0.8	0.508
Q ₃ [m ³ /h]	40	63	100	100	100
Q ₄ [m ³ /h]	50	78.75	125	125	125
Q ₂ /Q ₁	1.6				
Q ₃ /Q ₁	40	63	100	200	315

2.1.8 Size DN 80, installation position vertical

Q ₁ [m ³ /h]	1	1	1	0.8
Q ₂ [m ³ /h]	1.6	1.6	1.6	1.28
Q ₃ [m ³ /h]	40	63	100	100
Q ₄ [m ³ /h]	50	78.75	125	125
Q ₂ /Q ₁	1.6			
Q ₃ /Q ₁	40	63	100	125

2.1.9 Size DN 100, installation position horizontal

Q ₁ [m ³ /h]	1.575	1.587	1.6	0.8	0.508
Q ₂ [m ³ /h]	2.52	2.54	2.56	1.28	0.813
Q ₃ [m ³ /h]	63	100	160	160	160
Q ₄ [m ³ /h]	78.75	125	200	200	200
Q ₂ /Q ₁	1.6				
Q ₃ /Q ₁	40	63	100	200	315

2.1.10 Size DN 100, installation position vertical

Q ₁ [m ³ /h]	1.575	1.587	1.6	1
Q ₂ [m ³ /h]	2.52	2.54	2.56	1.6
Q ₃ [m ³ /h]	63	100	160	160
Q ₄ [m ³ /h]	78.75	125	200	200
Q ₂ /Q ₁	1.6			
Q ₃ /Q ₁	40	63	100	160

2.1.11 Size DN 125, installation position horizontal

Q ₁ [m ³ /h]	2.5	2.54	1.6	1	0.64
Q ₂ [m ³ /h]	4	4.064	2.56	1.6	1.024
Q ₃ [m ³ /h]	100	160	160	160	160
Q ₄ [m ³ /h]	125	200	200	200	200
Q ₂ /Q ₁	1.6				
Q ₃ /Q ₁	40	63	100	160	250

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2.1.12 Size DN 125, installation position vertical

Q ₁ [m ³ /h]	2.5	2.54	1.6	1.28
Q ₂ [m ³ /h]	4	4.06	2.56	2.05
Q ₃ [m ³ /h]	100	160	160	160
Q ₄ [m ³ /h]	125	200	200	200
Q ₂ /Q ₁	1.6			
Q ₃ /Q ₁	40	63	100	125

2.1.13 Size DN 150, installation position horizontal

Q ₁ [m ³ /h]	4	3.968	4	2	1
Q ₂ [m ³ /h]	6.4	6.349	6.4	3.2	1.6
Q ₃ [m ³ /h]	160	250	400	400	400
Q ₄ [m ³ /h]	200	312.5	500	500	500
Q ₂ /Q ₁	1.6				
Q ₃ /Q ₁	40	63	100	200	400

2.1.14 Size DN 150, installation position vertical

Q ₁ [m ³ /h]	4	3.97	4	2
Q ₂ [m ³ /h]	6.4	6.35	6.4	3.2
Q ₃ [m ³ /h]	160	250	400	400
Q ₄ [m ³ /h]	200	312.5	500	500
Q ₂ /Q ₁	1.6			
Q ₃ /Q ₁	40	63	100	200

2.1.15 Accuracy grade, temperature range and environmental conditions

Accuracy grade: $\pm 2\%$ ($Q_2 \leq Q \leq Q_4$)
 $\pm 5\%$ ($Q_1 \leq Q < Q_2$)
 Temperature range: 0.1°C to 50°C
 Environmental conditions, mechanics: M2
 Environmental conditions, climate: 5°C to 70°C
 Environmental conditions, electro-mechanics: - not applicable -

2.1.16 Pressure range and pressure loss

Nominal width	<i>P_{min}</i>	<i>P_{max}</i>	ΔP
DN 40	0.3 bar (0.03 MPa)	16 bar (1.6 MPa)	0.1 bar (0.01 MPa)
DN 50		16 bar (1.6 MPa or 40 bar (4.0 MPa))	0.25 bar (0.025 MPa)
DN 65			0.4 bar (0.04 MPa)
DN 80			0.25 bar (0.025 MPa)

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DN 100			0.4 bar (0.04 MPa)
DN 125		16 bar (1.6 MPa)	0.25 bar (0.025 MPa)
DN 150		16 bar (1.6 MPa) or 40 bar (4.0 MPa)	0.4 bar (0.04 MPa)

2.2 Other operating conditions

- none -

3 Interfaces and conditions for compatibility

- none -

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4. Requirements for production, commissioning and use

4.1 Requirements for production

Final inspection under aspects of measuring technology is carried out according to OIML R 49-1, edition 2006, with the following flows and at a water temperature of 20°C ± 10°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 measuring deviation of the display must not exceed the maximum permissible value for any of above flows.

4.2 Requirements for commissioning

Installation of inlet and outlet sections is not required.

It is recommended to secure the connections in the pipeline with an anti-tampering device.

The anti-tampering device (sticker, lead-sealing or similar) to prevent removal of the meter has to be designed in such a manner, that it cannot be removed or loosened without visible breaking.

Each meter has to be provided with clear operating / installation instructions (refer to no. 7.1).

The pulse generators HRI-Mei, HRI or OD may, if necessary, also be built in at the installation site of the meter. Retrofitting of pulse generators may only be performed by technicians with specific training for this task. The pulse generators should be secured against removal by way of an anti-tampering device.

4.3 Requirements for use

Users have to be informed (e.g. in the installation instructions) that:

- the meter may, in case of applications subject to a statutory control under metrological aspects, only be operated under the nominal operating conditions indicated in 2.1;
- the exchangeable metering unit (metering insert) forms the meter (water meter) in combination with one of the connection interfaces specified in the type-examination certificate;
- the exchangeable metering unit may only be operated in connection with one of the connection interfaces specified in the type-examination certificate.

5 Check of devices in operation

5.1 Documentation for the inspection

This design-examination certificate and the technical documentation listed under no. 1.6.

5.2 Special test devices or software

The verification may be carried out volumetrically, gravimetrically or with benchmarking meters. It must be possible to set the flows indicated in no. 4.1 in the test device applied.

Special software is not required for the verification.

5.3 Identification

The meter has to comply with the technical documentation listed under no. 1.6; the labelling has to fulfil the specifications under no. 7.2.

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5.4 Calibration and adjustment procedure

Adjustment of the meters is performed by means of the bypass adjusting partition, with the sliding ring removed. A description of functioning is also available under no. 1.2. Following adjustment, the metering element and the sliding ring are replaced and the meter tested. The metrological verification has to be carried out within the range of the nominal operating conditions.

The anti-tampering measures described under no. 6.1 prevent that calibration and adjustment is modified subsequently.

6 Anti-tampering measures

6.1 Lead-sealing

The sliding securing ring with the metering element situated underneath has to be snapped in and secured in such a manner, that intentional opening is only possible with force and leaving visible traces.

Furthermore, the meter insert has to be secured against unauthorised removal by covering a head flange screw with an inserted cap and/or sticker or by securing it with seal wire.

The pulse generators should be secured against removal by way of an anti-tampering device.

- Photo no. SK_51578 dated 03 Feb. 2014 (illustration of lead sealings, Woltman meter MeiStream / MeiStream Plus DN 40, DN 50 and DN 65, shown here: MeiStream DN 65),
- Photo no. SK_51579 dated 03 Feb. 2014 (illustration of lead sealings, Woltman meter MeiStream* / MeiStream Plus DN 80, DN 100 and DN 125*, shown here: MeiStream DN 100), and
- Photo no. SK_51580 dated 03 Feb. 2014 (illustration of lead sealings, Woltman meter MeiStream / MeiStream Plus DN 150).

To protect the inlet and outlet openings of the casing against contamination or damaging on the transport to the place of installation, these have to be covered.

6.2 Logbook

- Not applicable -

7 Identifications and inscriptions

7.1 Information to be enclosed with the device

Operating / installation instructions:

Each meter has to be provided with clear operating / installation instructions. It has to contain the following points, which have to be noted in particular:

- a) Inspection of sealing areas and sealings before installation. If necessary, special measures have to be taken to prevent that sealings in the metering device are displaced, lost or are damaged during transport from the manufacturer to the place of installation. If necessary, sealings have to be glued in.
- b) Verification of readability of the meter ratings after installation. Visual readability of metering element readings, of all meter ratings and conformity and metrology certifications must not be affected.
- c) It has to be warranted by suitable measures, that any contamination or damaging during transportation to the place of installation is excluded.

- d) The pulse generators HRI-Mei, HRI or OD may, if necessary, also be built in at the installation site of the meter. Retrofitting of the pulse generator may only be performed by technicians with specific training for this task. The pulse generators should be secured against removal by way of an anti-tampering device.

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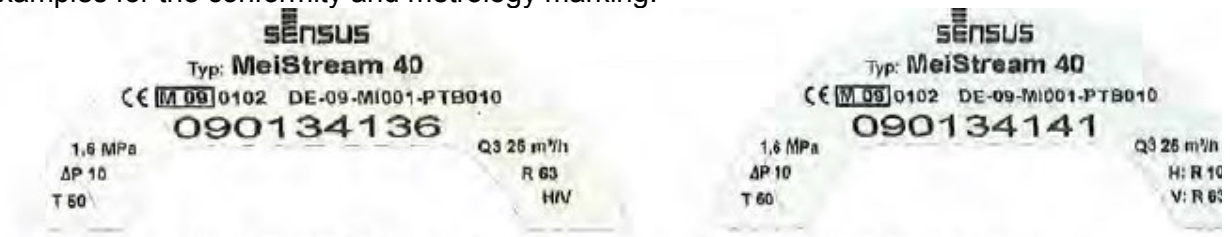
7.2 Identifications and inscriptions

The following information has to be provided on the meter, as a minimum:

- name or company name of manufacturer or his factory label,
- Q_3 and the ratio Q_3/Q_1 ,
- Year of manufacture und manufacturing code of the individual meter,
- Code of the design-examination certificate,
- the temperature class T30 or T50,
- the pressure loss class in ΔP in kPa
- the maximum operating pressure in “bar” or MPa,
- the installation position,
- flow direction (e.g. on the casing) and
- measuring unit m^3 .

Conformity and metrology marking is carried out according to Article 7 of Directive 2004/22EC. Additional inscriptions are permitted, as long as they cannot be confused with the information listed above.

Examples for the conformity and metrology marking:



- Drawing no. SK_51600 dated 03 Aug. 2009 (top views of Woltman meters MeiStream/MeiStream Plus DN 40 to DN 150 dry-running pointer roller type meter, shown here: MeiStream DN 65 with , pulse generators OD and MRI-Mei as well as MeiStream Plus DN 65, illustration of identifications and inscriptions with opened protection lid);
- Photo no. SK_51581 dated 03 Mar. 2009 (top views, Woltman meters MeiStream Plus DN 40 to DN 150, shown here: MeiStream Plus DN 65, DN 100 and DN 150, illustration of identifications and inscriptions with opened protection lid) and
- Drawing no. SK-51610 dated 23 Feb. 2010 (photographic illustrations of name plate H/V and/or H and V for Woltman meters MeiStream DN 40 to DN 100, shown here. MeiStream DN 40 H/V [with identical measuring range] and MeiStream DN 40 H and V [with different measuring ranges]).

The meters may also be marketed under the names of the companies:

Aquametro AG	Ringstrasse 75	CH-4106 Therwil	Switzerland
or			
GWF MessSysteme AG	Obergrundstrasse 119	CH-6002 Luzern	Switzerland

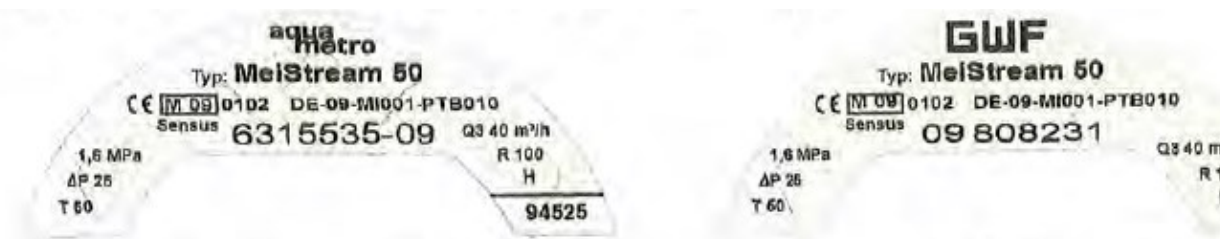
In this case, the name “Sensus”, being the name of the manufacturer bearing responsibility for the conformity declaration, has to be indicated directly beside or below the conformity or metrology marking.

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Examples for the conformity and metrology marking:



- Photo no. SK_51601 dated 04 Aug. 2009 (top views of Woltman meters MeiStream DN 40 to DN 150, shown here. MeiStream DN 50, protective lid models GWF and Aquametro);
- Drawing no. SK_51608 dated 22 Feb. 2010 (photographic illustration of name plate Aquametro Woltman meters MeiStream*/MeiStream Plus DN 40 to DN 150 [*DN 125 MeiStream only], shown here: name plate Aquametro MeiStream DN 50) and
- Drawing no. SK-51609 dated 23 Feb. 2010 (photographic illustration of name plate GWF Woltman meters MeiStream*/MeiStream Plus DN 40 to DN 150 [*DN 125 MeiStream only], shown here: name plate GWF MeiStream DN50);
- Drawing no. SK_51655 dated 15 Dec. 2011 (name plate design MeiStream/MeiStream Plus with indication of the required start-up and trail length);
- Drawing no. SK_51656 dated 19 Dec. 2011 name plate design MeiStream/MeiStream Plus with pressure level 4 MPa).

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8 Illustrations – Photos (by way of example)

Woltman meters **MeiStream / MeiStream Plus DN 40, DN 50 and DN 65** without and with HRI-Mei / HRI /OD

[Photograph]

[Photograph]

MeiStream DN 65 with dry-running pointer roller type meter MeiStream MS - D HRI, flow straightener, lid flange made of metal or plastic and lead sealing (perspective view)

[Photograph]

[Photograph]

MeiStream DN 65 with dry-running pointer roller type meter MeiStream MS - D HRI, lid flange made of metal and lead sealing (top and lateral view)

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Woltman meter **MeiStream / MeiStream Plus DN 40, DN 50 and DN 65**
without and with HRI-Mei / HRI / OD

[Photograph]

[Photograph]

MeiStream DN 65 with dry-running pointer roller type meter MeiStream MS - D HRI, lid flange made of metal, pulse generators HRI-Mei and OD (perspective view)

27 Feb. 2009

SK_51573

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Woltman meters **MeiStream* / MeiStream Plus DN 80, DN 100 and DN 125***
without and with HRI-Mei / HRI /OD

[Photograph]

[Photograph]

MeiStream DN 100 with dry-running pointer roller type meter MeiStream MS - D HRI, flow straightener, lid flange made of metal or plastic and lead sealing (perspective view)

[Photograph]

[Photograph]

MeiStream DN 100 with dry-running pointer roller type meter MeiStream MS - D HRI, lid flange made of metal and lead sealing (top and lateral view)

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Woltman meters **MeiStream* / MeiStream Plus DN 80, DN 100 and DN 125***
without and with HRI-Mei / HRI /OD

[Photograph]

[Photograph]

MeiStream DN 100 with dry-running pointer roller type counter MeiStream MS - D HRI, lid flange made of metal, pulse generators HRI-Mei and OD (perspective view)

27 Feb. 2009

SK_51574

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Woltman meter **MeiStream / MeiStream Plus DN 150** without and with HRI-Mei / HRI / OD

[Photograph]

MeiStream DN 150 with dry-running pointer roller type meter MeiStream MS - D HRI, flow straightener, lid flange made of metal and lead sealing (perspective view)

[Photograph]

[Photograph]

MeiStream DN 150 with dry-running pointer roller type meter MeiStream MS - D HRI, head flange made of metal and lead sealing (top and lateral view)

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Woltman meter **MeiStream / MeiStream Plus DN 150** without and with HRI-Mei / HRI / OD

[Photograph]

[Photograph]

MeiStream DN 150 with dry-running pointer roller type counter MeiStream MS - D HRI, lid flange made of metal, pulse generators HRI-Mei and OD (perspective view)

27 Feb. 2009

SK_51575

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Woltman meter **MeiStream / MeiStream Plus**
Dry-running pointer roller type meters (identical types)

[Photograph]

MeiStream MS - D HRI
DN 40 to DN 125

[Photograph]

MeiStream MS - D HRI DN 150

[Photograph]

MeiStream MS - Encoder
DN 40 to DN 125

[Photograph]

MeiStream MS - Encoder DN 150

[Photograph]

MeiStream Plus eRegister C&I
DN 40 to DN 125

[Photograph]

MeiStream Plus eRegister C&I
DN 150

24 Mar. 2015

SK_51571

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Woltman meter **MeiStream / MeiStream Plus DN 40, DN 50 and DN 65**
without and with HRI-Mei / HRI / OD
Sealings (lead-sealing, sticker)

[Photograph]

[Photograph]

MeiStream / MeiStream Plus DN 65
Metal flange

MeiStream / MeiStream Plus DN 65
Plastic flange

[Photograph]

[Photograph]

MeiStream / MeiStream Plus DN 65
Opto OD

MeiStream / MeiStream Plus DN 65
HRI-MEI

03 Feb. 2014

SK_51578

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Woltman meter **MeiStream* / MeiStream Plus DN 80. DN 100 and DN 125***
without and with HRI-Mei / HRI / OD
Sealings (lead-sealing, sticker)

[Photograph]

MeiStream / MeiStream Plus DN 100
Metal flange

[Photograph]

MeiStream / MeiStream Plus DN 100
HRI-MEI

[Photograph]

MeiStream / MeiStream Plus DN 100
Plastic flange

[Photograph]

MeiStream / MeiStream Plus DN 100
Opto OD

03 Feb. 2014

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Woltman meter **MeiStream / MeiStream Plus DN 150** without and with HRI-Mei / HRI / OD
Sealings (lead seal, sticker)

[Photograph]

MeiStream / MeiStream Plus DN 150
Metal flange

[Photograph]

MeiStream / MeiStream Plus DN 150
Opto OD

[Photograph]

MeiStream / MeiStream Plus DN 150
HRI-MEI

03 Feb. 2014

SK_51580

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Woltman meter **MeiStream DN 40 to DN 150**
without HRI-Mei / HRI / OD
Head assembly with nameplate

[Photograph]

[Photograph]

MeiStream DN 65 with metal lid flange, head ring with all significant characteristic data of the meter, conformity and metrology marking (protective lid opened)

MeiStream DN 100 with metal lid flange, head ring with all significant characteristic data of the meter, conformity and metrology marking (protective lid opened)

[Photograph]

MeiStream DN 150 with metal lid flange, head ring with all significant characteristic data of the meter, conformity and metrology marking (protective lid opened)

03 Mar. 2009

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dated 21 Apr. 2015

Woltman meter **MeiStream DN 40 to DN 150**
with electronic meter
Head assembly with nameplate

[Photograph]

[Photograph]

MeiStream DN 65 with metal lid flange, head ring with all significant characteristic data of the meter, conformity and metrology marking (protective lid opened)

MeiStream DN 100 with metal lid flange, head ring with all significant characteristic data of the meter, conformity and metrology marking (protective lid opened)

[Photograph]

MeiStream DN 150 with metal lid flange, head ring with all significant characteristic data of the meter, conformity and metrology marking (protective lid opened)

23 Mar. 2015

SK_51743

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Woltman meter **MeiStream / MeiStream Plus DN 40 to DN 150**
with HRI-Mei / HRI / OD
Head assembly with nameplate

[Photograph]

[Photograph]

MeiStream DN 65 with metal lid flange and inductive pulse generator HRI-Mei, head ring with all significant characteristic data of the meter, conformity and metrology marking (protective lid opened)

MeiStream DN 65 with metal lid flange and inductive pulse generator HRI-Mei, head ring with all significant characteristic data of the meter, conformity and metrology marking (protective lid opened)

[Photograph]

MeiStream DN 65 with metal lid flange and opto-electronic pulse generator OD, head ring with all significant characteristic data of the meter, conformity and metrology marking (protective lid opened)

18 May 2009

SK_51587

staatlich geprüfte und vereidigte
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Woltman meter **MeiStream / MeiStream Plus DN 40 to DN 150**
without HRI-Mei / HRI / OD
other lid designs

[Photograph]

MeiStream DN 50 with metal lid flange with
closed protective lid, design Aquametro AG

[Photograph]

MeiStream DN 50 with metal lid flange with
closed protective lid, design GWF
MessSysteme AG

04 Aug. 2009

SK_51601

Federal Institute for Physics and Engineering
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