



Australian Government
Department of Industry,
Science and Resources

**National
Measurement
Institute**

36 Bradfield Road, West Lindfield NSW 2070

**Certificate of Approval
NMI 14/3/49**

Issued by the Chief Metrologist under Regulation 60
of the
National Measurement Regulations 1999

This is to certify that an approval for use for trade has been granted in respect of the instruments herein described.

KROHNE OPTIFLUX 2300C water meter

submitted by KROHNE Australia Pty Ltd
5 Phiney Place
Ingleburn NSW 2565

NOTE: This Certificate relates to the suitability of the pattern of the instrument for use for trade only in respect of its metrological characteristics. This Certificate does not constitute or imply any guarantee of compliance by the manufacturer or any other person with any requirements regarding safety.

This approval has been granted with reference to document NMI R 49-1 Water Meters Intended for the Metering of Cold Potable Water and Hot Water, *Part 1 Metrological and Technical Requirements*, dated May 2022 and NMI M 10-1 Meters Intended for the Metering of Water in Full Flowing Pipes, *Part 1 Metrological and Technical Requirements*, dated July 2010.

This approval is subject to review at the decision of the Chief Metrologist in accordance with the conditions specified in the document NMI P 106.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern & variants 1 to 5 approved – certificate issued	15/01/20
1	Variant 1 amended (additional meter sizes), variants 6 to 9 approved – certificate issued	03/03/21
2	Pattern amended and Variant 10 approved (software), Variant 11 approved (PCB) – certificate issued	24/04/24

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI 14/3/49' and only by persons authorised by the submitter.

It is the submitter's responsibility to ensure that all instruments marked with this approval number are constructed as described in the documentation lodged with the National Measurement Institute (NMI) and with the relevant Certificate of Approval and Technical Schedule. Failure to comply with this Condition may attract penalties under Section 19B of the National Measurement Act and may result in cancellation or withdrawal of the approval, in accordance with document NMI P 106.

Signed by a person authorised by the Chief Metrologist to exercise their powers under Regulation 60 of the *National Measurement Regulations 1999*.



Alex Winchester
A/Manager
Policy and Regulatory Services

TECHNICAL SCHEDULE No 14/3/49

1. Description of Pattern

**approved on 15/01/20
amended on 24/04/24**

A DN25 sized KROHNE OPTIFLUX 2300C model water meter used to measure water supplies for trade.

1.1 Field of Operation

The field of operation of the measuring system using the DN25 sized KROHNE OPTIFLUX 2300C model water meter is determined by the following characteristics:

Minimum flow rate, Q_1 :	0.04 m ³ /h
Transition flow rate, Q_2 :	0.064 m ³ /h
Maximum continuous flow rate, Q_3 :	16.00 m ³ /h
Overload flow rate, Q_4 :	20.00 m ³ /h
Flow rate ratio, Q_3/Q_1 :	400
Maximum admissible temperature:	50 °C
Temperature Class	T50
Maximum admissible pressure:	1600 kPa
Pressure loss class:	Δp 25
Accuracy class:	2
Flow profile sensitivity class:	U0/D0 – see table 1
Electromagnetic class:	E2 (industrial)
Environmental class:	O (indoor and outdoor)
Orientation:	All positions
Flow Direction:	Forward and Reverse
Power supply:	100 – 230 V AC, 50/60 Hz

1.2 Features/Functions

The pattern (Figure 1) consists of the DN25 OPTIFLUX 2000 electromagnetic flow sensor and the IFC 300 signal converter (which incorporates the indicating device – Figure 2), in a compact arrangement (designated as the OPTIFLUX 2300C) and has features/functions as listed below:

- Connection type: Flanged
- Display: A digital, electronic, liquid crystal display allowing for a maximum indication range of 99,999 m³ in 0.0001 m³ increments
- Communications⁽¹⁾: Pulse output and Modbus
- Materials: Flow sensor housing: Steel
Flow sensor lining: Polypropylene (PP) or hard rubber (HR)
Flow converter: Polymer material
- Meter length: 150 mm

In the event of power failure an error alarm is triggered and logged in the IFC 300 signal converter display with the last totalised value retained in the meter memory.

- ⁽¹⁾ The pattern and variants may be fitted and/or configured with the communication options listed in this Certificate. However, the primary indication of volume displayed by the indicating device of the meter is the approved indication of volume.

1.3 Conditions

1.3.1 Installation Conditions:

No flow straightener or flow conditioner is required.

For Accuracy Class 2, the flow profile sensitivity class is U0/D0.

For Accuracy Class 2.5, the installation conditions are specified in table 1.

Table 1 minimum pipe lengths required by flow disturbance type

Disturbance Type ⁽¹⁾	Minimum upstream pipe length	Minimum downstream pipe length
1	0	0
2	0	0
3	0	0

- ⁽¹⁾ For information on the different types of flow disturbances which are examined as part of pattern approval, refer to NMI M 10-2.

1.3.2 Specified Installations and Open Channel Emplacements

The meter (pattern and variants) has not been tested or evaluated for performance in specified installations or open channel emplacements as part of this approval.

More information regarding specified installation and open channel emplacement testing may be found in NMI M 10-1 and NMI M 10-2.

1.3.3 Water Quality

The meter is approved for use in the metering of potable water supplies.

The meter is approved for use in the metering of non-potable water supplies of an unspecified nature.

1.4 Software Version

The Pattern is approved with the software versions specified in Table 2 below.

Table 2 Software Versions

Electronic revision Number	Identification	Software version	Checksum
3.4.0_	Sensor Electronic	2.2.1_00000004	7100 7100
	Main Software	3.0.6_00008547	38E8 38E8
	User Interface Software	3.4.0_20170106	5311 28AE
	IO2 (Exi IO Configuration)	2.2.3_00008548	2207 2207
	IO2 (Modular IO and Modbus configurations)	2.2.3_00008549	8E6A 8E6A

Additional approved software versions are listed under Variant 10 below.

1.5 Verification Provision

Provision is made for the application of a verification mark.

1.6 Sealing Provision

The flow converter is protected from unauthorised access and tampering via physical and electronic seals. The following seals are applied:

- The product label is fixed to the water meter and secured against removal by sealing (Figure 3).
- The display cover of the signal converter is sealed and locked against opening. Before physical sealing is applied (Figure 4) the “Weights and Measures jumper” is placed on the GDC-bus to lock the GDC-bus (Figure 5). This jumper prohibits the changing of the Weights and Measures parameters of the converter.

For the remote version (see Variant 5):

- The PCB in the Connection Box is mounted and sealed to the connection box (Figure 6).
- The serial number of the signal converter is mentioned on the measurement sensor and/or the serial number of the measurement sensor is mentioned on the signal converter.

1.7 Descriptive Markings and Notices

Instruments are marked with the following data, either grouped or distributed on the casing, the indicating device dial or an identification plate (Figure 7):

Manufacturer's name or mark	...
Serial number	...
Pattern approval number	NMI 14/3/49
Numerical value of maximum continuous flow rate, Q_3	...
Flow rate ratio, Q_3/Q_1	...
Unit of measurement	m^3
Maximum admissible pressure ⁽¹⁾	1600 kPa
Maximum pressure loss ⁽²⁾	25 kPa or Δp 25
Maximum admissible temperature ⁽³⁾	T50
Orientation ⁽⁴⁾	...
Flow profile sensitive class ⁽⁵⁾	U0/D0
Direction of flow	→ or similar
Accuracy class ⁽⁶⁾	2

⁽¹⁾ Optional for meters with MAP = 1400 kPa

⁽²⁾ Optional for class Δp 63

⁽³⁾ Optional for T30 meters

⁽⁴⁾ Optional for meters approved for all orientations

⁽⁵⁾ Optional for U0/D0 class meters

⁽⁶⁾ Optional for class 2 meters

For instruments that incorporate electronic devices, the following information can either be physically marked on the instrument or provided electronically via the indicating device or similar means:

Electromagnetic class	E2
Environmental class	O
For meters with an external power supply	the voltage and frequency
For battery powered meters	a replacement date or similar indication of expected battery life

2. Description of Variant 1

**approved on 15/01/20
amended on 03/03/21**

The Pattern and Variants are approved with a range of different sizes, flowrates and associated characteristics as specified in Tables 3.1 to 3.7 below. The Pattern is shown in **Bold** for completeness.

Note: The Pattern and Variants specified in Tables 3.1 to 3.7 are approved as Accuracy Class 2 water meters in accordance with NMI R 49-1.

Table 3.1 Meter sizes, flowrates and related information

Meter size	DN25	DN32	DN40	DN50
Minimum flowrate Q ₁ (m ³ /h)	0.04	0.0625	0.0625	0.10
Transitional flowrate Q ₂ (m ³ /h)*	0.064	0.10	0.10	0.16
Maximum continuous flowrate Q ₃ (m ³ /h)	16.00	25.00	25.00	40.00
Overload flowrate Q ₄ (m ³ /h)	20.00	31.25	31.25	50.00
Ratio Q ₃ /Q ₁	400	400	400	400
Meter Length (mm)	150	150	150	200
Verification scale interval (m ³)	0.0001			

*Only applicable for Accuracy Class 1 & 2 meters

Table 3.2 Meter sizes, flowrates and related information

Meter size	DN65	DN80	DN100	DN125
Minimum flowrate Q_1 (m ³ /h)	0.1587	0.2540	0.3968	0.6349
Transitional flowrate Q_2 (m ³ /h)*	0.2540	0.4063	0.6349	1.0159
Maximum continuous flowrate Q_3 (m ³ /h)	100	160	250	400
Overload flowrate Q_4 (m ³ /h)	125	200	312.50	500
Ratio Q_3/Q_1	630	630	630	630
Meter Length (mm)	200	200	250	250
Verification scale interval (m ³)	0.0001		0.001	

*Only applicable for Accuracy Class 1 & 2 meters

Table 3.3 Meter sizes, flowrates and related information

Meter size	DN150	DN200	DN225	DN250	DN300
Minimum flowrate Q_1 (m ³ /h)	0.6349	1.00	1.60	1.60	2.50
Transitional flowrate Q_2 (m ³ /h)*	1.0159	1.60	2.56	2.56	4.00
Maximum continuous flowrate Q_3 (m ³ /h)	400	1000	1600	1600	2500
Overload flowrate Q_4 (m ³ /h)	500	1250	2000	2000	3125
Ratio Q_3/Q_1	630	1000	1000	1000	1000
Meter Length (mm)	300	350	400	400	500
Verification scale interval (m ³)	0.001				

*Only applicable for Accuracy Class 1 & 2 meters

Table 3.4 Meter sizes, flowrates and related information

Meter size	DN350	DN375	DN400	DN450	DN500
Minimum flowrate Q ₁ (m ³ /h)	5.00	8.00	8.00	8	12.60
Transitional flowrate Q ₂ (m ³ /h)*	8.00	12.80	12.80	12.80	20.16
Maximum continuous flowrate Q ₃ (m ³ /h)	2500	4000	4000	4000	6300
Overload flowrate Q ₄ (m ³ /h)	3125	5000	5000	5000	7875
Ratio Q ₃ /Q ₁	500	500	500	500	500
Meter Length (mm)	500	600	600	600	600
Verification scale interval (m ³)	0.01				

*Only applicable for Accuracy Class 1 & 2 meters

Table 3.5 Meter sizes, flowrates and related information

Meter size	DN600	DN700	DN750	DN800	DN900
Minimum flowrate Q ₁ (m ³ /h)	39.375	125	125	125	200
Transitional flowrate Q ₂ (m ³ /h)*	63.00	200	200	200	320
Maximum continuous flowrate Q ₃ (m ³ /h)	6300	10000	10000	10000	16000
Overload flowrate Q ₄ (m ³ /h)	7875	12500	12500	12500	20000
Ratio Q ₃ /Q ₁	160	80	80	80	80
Meter Length (mm)	600	700	800	800	900
Verification scale interval (m ³)	0.1				

*Only applicable for Accuracy Class 1 & 2 meters

Table 3.6 Meter sizes, flowrates and related information

Meter size	DN1000	DN1050	DN1100	DN1200	DN1300
Minimum flowrate Q_1 (m ³ /h)	200	200	200	200	312.5
Transitional flowrate Q_2 (m ³ /h)*	320	320	320	320	500
Maximum continuous flowrate Q_3 (m ³ /h)	16000	16000	16000	16000	25000
Overload flowrate Q_4 (m ³ /h)	20000	20000	20000	20000	31250
Ratio Q_3/Q_1	80	80	80	80	80
Meter Length (mm)	1000	1100	1100	1200	1300
Verification scale interval (m ³)	0.1				1

*Only applicable for Accuracy Class 1 & 2 meters

Table 3.7 Meter sizes, flowrates and related information

Meter size	DN1400	DN1500	DN1600	DN1700	DN1800
Minimum flowrate Q_1 (m ³ /h)	312.5	312.5	312.5	500	500
Transitional flowrate Q_2 (m ³ /h)*	500	500	500	800	800
Maximum continuous flowrate Q_3 (m ³ /h)	25000	25000	25000	25000	25000
Overload flowrate Q_4 (m ³ /h)	31250	31250	31250	31250	31250
Ratio Q_3/Q_1	80	80	80	50	50
Meter Length (mm)	1400	1500	1600	1800	1800
Verification scale interval (m ³)	1				

*Only applicable for Accuracy Class 1 & 2 meters

3. Description of Variant 2 **approved on 15/01/20**

The Pattern and Variants are approved as Accuracy Class 1 water meters in accordance with NMI R 49-1 for the sizes DN65 to DN1800 with the flowrates and associated characteristics as specified in Tables 3.1 to 3.7.

4. Description of Variant 3 **approved on 15/01/20**

The Pattern and Variants are approved as Accuracy Class 2.5 water meters in accordance with NMI M 10-1 for the sizes DN25 to DN1800 with the flowrates and associated characteristics as specified in Tables 3.1 to 3.7.

5. Description of Variant 4 **approved on 15/01/20**

The Pattern and Variants are approved with the following alternative power supply options:

- 12 – 24 V DC (grounding mandatory)
- 24 V AC/DC, 50/60 Hz (grounding mandatory)

6. Description of Variant 5 **approved on 15/01/20**

The Pattern and Variants are approved with the alternative flow sensors and arrangements (Figure 8) as specified in Table 4.

Table 4 – Flow meter arrangements

Flow Sensor Model	Arrangement	Description
OPTIFLUX 4300C	Compact	Compact flow meter with either Perfluoroalkoxy Polymer-Chemical Compound (PFA), Polytetrafluoroethylene (PTFE), Ethylene tetrafluoroethylene (ETFE) or Polyurethane (PU) liner
OPTIFLUX 2000F	Remote	Remote flow sensor with either polyethylene (PE), HR, PP, or PU liner
OPTIFLUX 4000F	Remote	Remote flow sensor with either PFA, PTFE, ETFE or PU liner

7. Description of Variant 6

approved on 03/03/21

The Pattern and Variants approved as Accuracy Class 1 and 2 are approved with the alternative flowrate ratios (Q_3/Q_1) specified in Table 5.

Table 5 – Q_3/Q_1 Ratios (Accuracy Class 1 & 2)

DN25 to DN50	40; 50; 63; 80; 100; 125; 160; 200; 250; 315
DN65 to DN150	40; 50; 63; 80; 100; 125; 160; 200; 250; 315; 400; 500
DN200 to DN300	40; 50; 63; 80; 100; 125; 160; 200; 250; 315; 400; 500; 630; 800
DN350 to DN500	40; 50; 63; 80; 100; 125; 160; 200; 250; 315; 400
DN600	40; 50; 63; 80; 100; 125
DN700 to DN1600	40; 50; 63
DN1700 to DN1800	40

8. Description of Variant 7

approved on 03/03/21

The Pattern and Variants approved as Accuracy Class 2.5 are approved with the alternative flowrate ratios (Q_3/Q_1) specified in Table 6.

Table 6 – Q_3/Q_1 Ratios (Accuracy Class 2.5)

DN25 to DN50	10; 12.5; 16; 20; 25; 31.5; 40; 50; 63; 80; 100; 125; 160; 200; 250; 315
DN65 to DN150	10; 12.5; 16; 20; 25; 31.5; 40; 50; 63; 80; 100; 125; 160; 200; 250; 315; 400; 500
DN200 to DN300	10; 12.5; 16; 20; 25; 31.5; 40; 50; 63; 80; 100; 125; 160; 200; 250; 315; 400; 500; 630; 800
DN350 to DN500	10; 12.5; 16; 20; 25; 31.5; 40; 50; 63; 80; 100; 125; 160; 200; 250; 315; 400
DN600	10; 12.5; 16; 20; 25; 31.5; 40; 50; 63; 80; 100; 125
DN700 to DN1600	10; 12.5; 16; 20; 25; 31.5; 40; 50; 63
DN1700 to DN1800	10; 12.5; 16; 20; 25; 31.5; 40

9. Description of Variant 8

approved on 03/03/21

The Pattern and Variants are approved with all Q_3 values specified in NMI R 49-1 (2015), clause 4.1.3 that are less than the Q_3 values specified in Tables 3.1 to 3.7 for that size of meter and abiding by the approved Q_3/Q_1 ratios for the Accuracy Class.

For example, a DN100 sized meter approved as Accuracy Class 2.5, is approved with a Q_3 of 63 m³/h and a Q_3/Q_1 ratio of 10.

Note: NMI R 49-1 (2015), clause 4.1.3 is provided below for convenience.

The value of Q_3 , expressed in m³/h or kL/h, shall be chosen from the following list:

1	1.6	2.5	4	6.3
10	16	25	40	63
100	160	250	400	630
1 000	1 600	2 500	4 000	6 300

The list may be extended to higher or lower values in the series.

From the values given, for DN20 sized water meters the value of Q_3 shall be 4.

10. Description of Variant 9

approved on 03/03/21

The Pattern and Variants approved as Accuracy Class 2.5 are approved with the alternative Q_3 values specified in Table 7 that are less than the Q_3 values specified in Tables 3.1 to 3.7 for that size of meter and abiding by the approved Q_3/Q_1 ratios for the Accuracy Class.

Table 7 – Alternative Q_3 values (Accuracy Class 2.5)

Maximum continuous flowrate Q_3 (m ³ /h)	12.5, 125, 1250, 12500
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11. Description of Variant 10

approved on 24/04/24

The Pattern and Variants are approved with the software versions specified in Table 8 below.

Table 8 Software Versions

Electronic revision Number	Identification	Software version	Checksum
3.4.0_	Sensor Electronic	2.2.1_00000004	7100 7100
	Main Software	3.0.6_00008547	38E8 38E8
	User Interface Software	3.4.0_20170106	5311 28AE
	IO2 (Exi IO Configuration)	2.2.3_00008548	2207 2207
	IO2 (Modular IO and Modbus configurations)	2.2.3_00008549	8E6A 8E6A
3.4.1_	Sensor Electronic	2.2.1_00000004	7100 7100
	Main Software	3.0.7_00008684	E2D0 E2D0
	User Interface Software	3.4.0_20170106	5311 28AE
	IO2 (Exi IO Configuration)	2.2.3_00008548	2207 2207
	IO2 (Modular IO and Modbus configurations)	2.2.3_00008549	8E6A 8E6A
3.4.2_	Sensor Electronic	2.2.1_00000004	7100 7100
	Main Software	3.0.7_00008684	E2D0 E2D0
	User Interface Software	3.4.0_20180411	6586 28AE
	IO2 (Exi IO Configuration)	2.2.3_00008548	2207 2207
	IO2 (Modular IO and Modbus configurations)	2.2.3_00008549	8E6A 8E6A
3.4.11_	Sensor Electronic	2.2.1_00000004	7100 7100
	Main Software	3.0.7_00008684	E2D0 E2D0
	User Interface Software	3.4.0_20180411	6586 28AE
	IO2 (Exi IO Configuration)	2.2.3_00008548	2207 2207
	IO2 (Modular IO and Modbus configurations)	2.2.3_00008549	8E6A 8E6A

12. Description of Variant 11

approved on 24/04/24

The Pattern and Variants are approved with an alternative printed circuit board design as described in the Documentation folder no. T10003-10.

13. Description of Variant 12

approved on 24/04/24

The Pattern and Variants are approved with the alternative remote signal transmitter models, with the model number IFC 300y, where y may be F, W or C. These alternative models are described in Table 9.

Table 9 – Signal Transmitters

Model number	Arrangement/description
IFC 300F	Remote field housing version
IFC 300W	Remote wall-mounted version
IFC 300C	Compact version

The Pattern and Variants are approved with the alternative flow sensor models, with the model number OPTIFLUX x000, where x may be 1, 2, 4, 5 or 6.

These alternative models are described in Table 10.

Table 10 – Flow Sensors

Model number	Arrangement/description
OPTIFLUX 1000	Flangeless flow sensor with a PFA liner
OPTIFLUX 2000	Flanged flow sensor with HR or PP liner
OPTIFLUX 4000	Fanged sensor with PE, PU, PFA, ETF, PTFE, SR or CER liners
OPTIFLUX 5000	Flanged or flangeless sensor with ceramic liner
OPTIFLUX 6000	Sanitary connection sensor with PFA liner

The model number of a complete meter is a combination of the above signal transmitter and flow sensor model numbers.

TEST PROCEDURE No 14/3/49

This Approval and Certificate is issued only with respect to the design (the pattern and variants) of the water meter described herein. The calibration and measurement accuracy of individual water meters manufactured and marked in accordance with the approved pattern and variants should be verified in accordance with the test procedures specified below, or as required by relevant legislation.

Water meters tested for initial verification shall comply with the Certificate of Approval, Technical Schedule, and the maximum permissible errors for initial and subsequent verifications at the operating conditions in effect at the time of verification. Maximum permissible errors for the initial and subsequent verification of water meters are given in the *National Trade Measurement Regulations 2009* (Cth).

Water meters shall be verified in accordance with NITP 14 *National Instrument Test Procedures for Utility Meters*.

For accuracy class 2.5 meters:

- The maximum permissible errors for initial verification shall be $\pm 2.5\%$ from Q_1 to Q_4 .
- The flow rates specified for initial verification in NMI M 10-2 may replace the flow rates specified in NITP 14.

NOTE: NMI reserves the right to vary this procedure. Any such variation shall be notified in writing by NMI.

FIGURE 14/3/49 – 1



KROHNE OPTIFLUX 2300C water meter – The Pattern

FIGURE 14/3/49 – 2



Indicating device

FIGURE 14/3/49 – 3



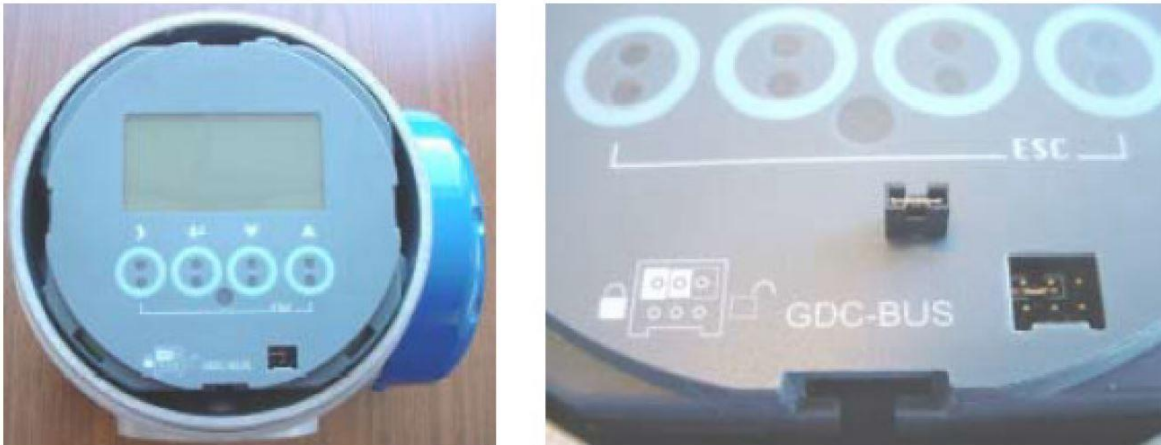
Sealing arrangements – Product label

FIGURE 14/3/49 – 4



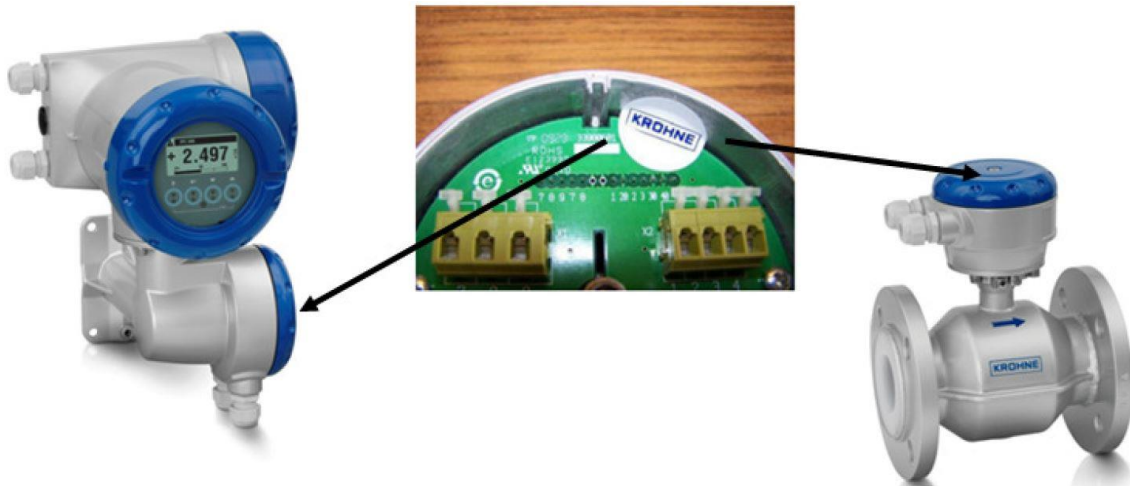
Sealing arrangements – Physical seal

FIGURE 14/3/49 – 5







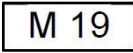
Sealing arrangements - Weights and Measures jumper

FIGURE 14/3/49 – 6



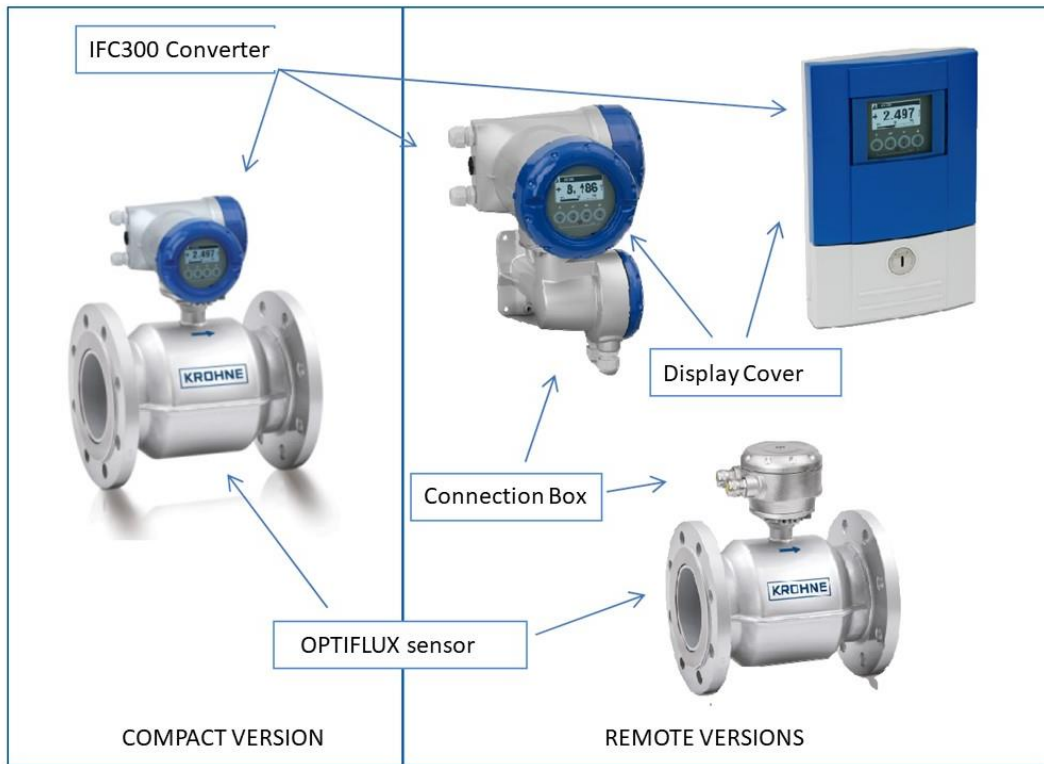
Image(s) of sealing arrangements – Remote connection box PCB

FIGURE 14/3/49 – 7

		
Altometer, Dordrecht NL - 3313LC12		
OPTIFLUX 2300 C CG30011100 S/N: A19xxxxxx Mfd.: 2019 in The Netherlands		
  www.krohne.com		
GK: 3.8281 f field = f line / 6 GKL: 7.7726 DN 200 mm/ 8 inch ER3.4.2_		
100-230 VAC 50-60 Hz 22 VA Wetted materials: H HC22 IP66/67 — PED/G1/II:		Approval no.: T10003 Q3 500 m3/h; R80; cl.1; MAP 16 bar; T50 Tamb: -25 °C / +55 °C Environmental class: M1/E2/O Installation class: U5/D0; Pressure loss class: Δp 10
PS1=10 bar @ TS1<=20 °C PS2=9.4 bar @ TS2= 80 °C PT =15 bar @ TT= 20 °C		  0122 0038

Require markings - Example

FIGURE 14/3/49 – 8



Remote arrangement

~ End of Document ~