Technical Datasheet

KROHNE

measure the facts

H250 M40

Variable area flowmeter

- Secure, cost-effective measurement and display, even without power supply
- Modular, can be expanded right down to FOUNDATION™ Fieldbus
- Sturdy, closed design for high resistance to pressure, temperature and media
- Available in variety of process connections
- Optional module with integrated LCD display and totalizer

Product Features

Intelligent Modularity

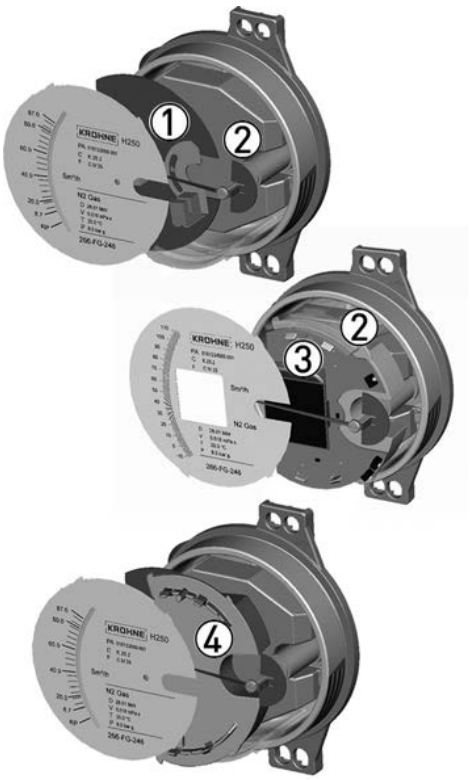
The H250 all-metal variable area flowmeters cover the entire range of requirements of the process industry. The modular device design and flexible production structure form the basis for application and customer-based device versions.

The basis of the H250 M40 is its purely mechanical design.

Additional electronic modules can be added or replaced at any time without interrupting the process.

This way, the functionality of the device adapts to any changed requirements. From analogue flow measurement without auxiliary power to digital integration into a fieldbus system.

Simply screw off the cover, insert the module until it clicks, screw the cover back on and that's it. It is just as easy to replace the measuring scale in the event of a change in application.



① 1 or 2 limit switches, type NAMUR Transistor (3-wire) or Reed

② 2-wire signal output 4...20 mA with HART

③ Additional LCD for flow rate value and/or volume counter, 2 configurable binary outputs for limit or pulse output and 1 binary input for starting/stopping or resetting the counter.

④ 2-wire fieldbus communication Foundation Fieldbus or Profibus PA

All modules are intrinsically safe (Ex-i)

Highlights

- Simple, low-cost installation: Measurement and indication without auxiliary power supply
- Universal Ex concept: Ex-i
- Modular scalability – from mechanical to fieldbus
- Robust measuring tube construction for high process temperatures and extreme operating pressures
- Choice of material: Stainless steel, PTFE
- Many connection variants: flanged, screwed, clamped
- High application safety, even with extremely low flows

Industries

Can be used in all industrial sectors, for example:

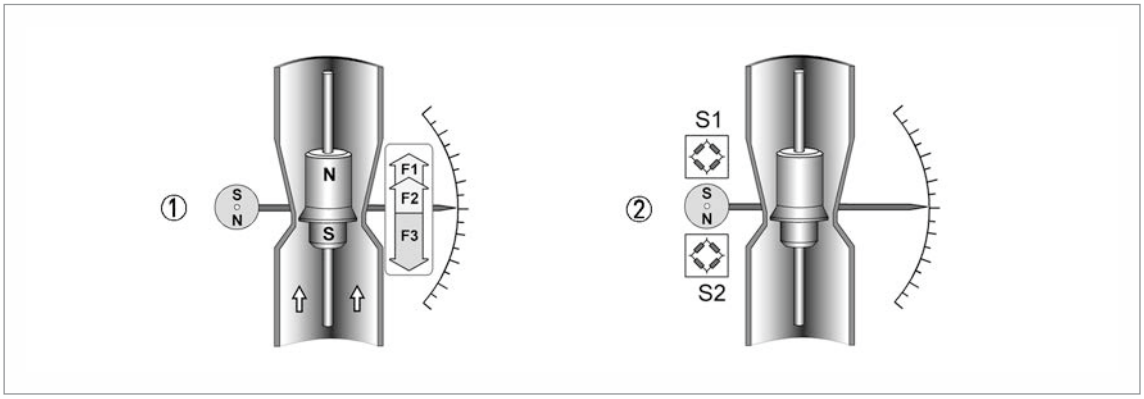
- Chemical
- Petrochemicals
- Pharma
- Machine building
- Food & Beverage
- Oil & Gas
- Iron, Steel & Metal
- Power plants
- Pulp & Paper
- Water & wastewater industries

Applications

- Nitrogen inerting to avoid explosive atmospheres
- Measurement of additives such as catalysts, tensides, anti-foaming and anti-corrosion agents
- Measurement of chlorine, sulphur and ethylene compounds
- Measurement of distilled or demineralised water
- Monitoring of lubricating and cooling agents for process pumps and rotating machines
- Monitoring of sealing systems on compressors
- Gas measurement for industrial furnaces
- Hygienic applications in the food industry and in pharmaceuticals

Functional principle

The H250 flowmeter operates in accordance with the float measuring principle. The measuring unit consists of a metal cone in which a float can move freely up and down. The flow goes from bottom to top. The float changes position so that the lifting force acting on it F1 is in equilibrium with the form drag F2 and its weight F3: F3 = F1 + F2



① Indication principle M40 magnetic coupling
② Magnetic coupling sensors

① For the indicator, the flow-dependent height of the float in the measuring unit is transmitted by means of a magnetic coupling and displayed on a scale.

② For a built-in signal converter (ESK4), the flow-dependent height of the float in the measuring unit is detected by the S1 and S2 magnetic field sensors and electronically processed.

Technical data

- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.

Measuring system

Application range	Flow measurement of liquids, gases and vapours
Function/Measuring principle	Variable area measuring principle
Measured value	
Primary measured value	Float position
Secondary measured value	Operating and standard volumetric flow

Measuring accuracy

Directive	VDI/VDE 3513, sheet 2 (q_G = 50%)
H250 / RR	1.6%
H250/PTFE	2.5%

Operating conditions

Temperature	
Max. operating temperature TS	-80..+300°C depending on the version
Pressure	
Max. operating pressure PS	depending on the version
Max. test pressure PT	depending on the version
Min. required operating pressure	2 times greater than pressure loss (see measuring ranges)
Protection category	
M40, M40R	IP 66/68
Float damping during gas measurement recommended	
DN15...25/½"...1"	Operating pressure <0.3 bar
DN50...100/2"...4"	Operating pressure <0.2 bar

Installation conditions acc. to VDI/VDE 3513 Sheet 3

Inlet section	≥ 5 x DN
Outlet section	≥ 3 x DN

Materials

Device	Flange	Measuring tube	Float	Float guide
H250/RR	SS316L	SS316L	SS316L	SS316L
H250/PTFE	SS316 with PTFE Flare	SS316 with PTFE	PTFE	PTFE

M40	Die Cast Aluminium
M40R	Stainless steel without coating

Temperatures

For devices to be used in hazardous areas, special temperature ranges apply. These can be found in the separate instructions

Temperatures H250/M40 - mechanical indicator without power supply

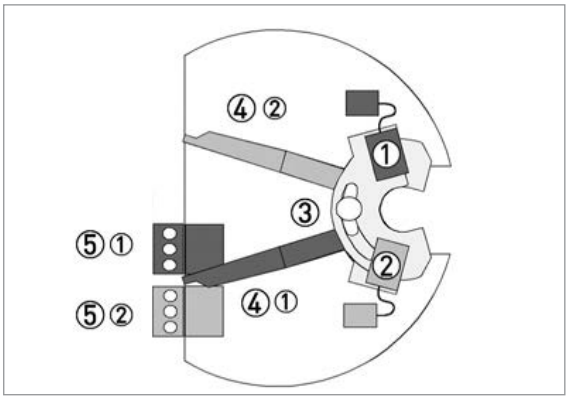
	Product temperature	Ambient temperature
	[°C]	[°C]
H250/RR	-80...+300	-40...+120
H250/PTFE	-80...+70	-40...+70

Electrical connection indicator M40

Limit switches K1/K2

The M40 indicator can be fitted with a maximum of two limit switches. The limit switch works as a slot sensor which is inductively activated via the semi-circular metal vane of the pointer. The switching points are set using the contact pointer. The position of the contact pointer is indicated on the scale.

Limit switch module



① Min. contact
② Max. contact
③ Locking screw
④ Maximum pointer
⑤ Connection terminal

The connection terminals feature a pluggable design and can be removed to connect the cables. The built-in limit switch types are shown on the indicator.

Limit switches K1/K2

Terminal connection	2.5 mm²	
Limit switches	SC3,5-N0	SB3,5-E2
NAMUR (IEC60947-5-6)	Yes	No
Type of connection	2-wire	3-wire
Switching element function	NC Contact	PNP NO Contact
Nominal voltage U_0	8.2 VDC	10...30 VDC
Pointer vane not detected	≥ 3 mA	≤ 0.3 VDC
Pointer vane detected	≤ 1 mA	U_B - 3 VDC
Continuous current	-	max. 100 mA
No load current I_0	-	≤ 15 mA
Switching cycles	-	-

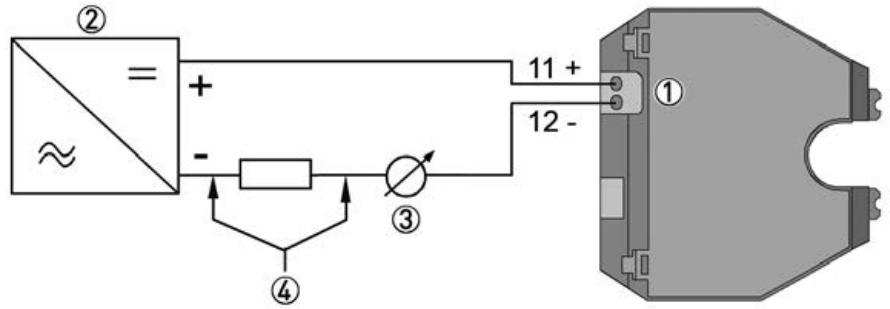
Temperature limits for H250/M40 - with electrical components (°C)

Size			Tamb < + 40°C	
EN	ASME	version with	Standard	HT version
DN 15, 25	½", 1"	ESK 4	200	300
		ESK 4 - T	200	300
		limit switch NAMUR	200	300
		3 wire limit switch	200	300
DN 50	2"	ESK 4	200	300
		ESK 4 - T	180	300
		limit switch NAMUR	200	300
		3 wire limit switch	200	300
DN 80,100	3", 4"	ESK 4	200	300
		ESK 4 - T	150	270
		limit switch NAMUR	200	300
		3 wire limit switch	190	300

Current output ESK4

The connecting terminals of the ESK4 have a pluggable design and can be removed in order to connect the cables.

ESK4 connection



1. Current output ESK4
2. Power supply 14...30 VDC
3. Measuring signal 4...20 mA
4. External load, HART® communication

Current output ESK4

Terminal connection	2,5 mm²
Power supply	14...30 VDC (12...30VDC without ESK4-T)
Min. power supply for HART®	20 V DC, load 250 Ohm
Measuring signal	4.00...20.00 mA = 0...100% flow value in 2-wire technology
Power supply influence	<0.1%
External resistance dependency	<0.1%
Temperature influence	<5 µA/K
Max. external resistance/load	650 Ohm (30 VDC)
Min. load for HART®	250 Ohm

ESK4 HART® configuration

Manufacturer name (code)	KROHNE Messtechnik (0x45 = 69)
Model name/HART® Revision	ESK4 (214 = 0xD6)/HART 5.9
Physical layer	FSK

Flow table

Flow table	
For liquids	CIV, DIV
For gases	TIV, DIV

100% flow values, maximum turn-down rate 10:1

Reference conditions

Water flows at 20°C or 68°F

Air flows in Nm³ /h converted to 0° and 1.013 bar abs. when the meter is operated at 20° C and 1.013 bar abs.

Air flows in SCFM converted to 60°F and 14.7 psia when the meter is operated at 68°F and 14.7 psia.

H250/RR

Meter size			Water		Air		max. pressure loss		
DIN mm	ANSI inches	Cone No.	CIV l/h	DIV l/h	TIV Nm³/h	DIV Nm³/h	CIV mbar	TIV mbar	DIV mbar
15	1/2"	K 15.1	25	-	0.7	-	26	21	-
		K 15.2	40	-	1.0	-	26	21	-
		K 15.3	63	-	1.5	-	26	21	-
		K 15.4	100	-	2.2	-	26	21	-
		K 15.5	160	-	3.6	-	26	21	-
		K 15.6	250	-	5.5	-	26	21	-
		K 15.7	400	700	10	18	28	21	38
		K 15.8	630	1000	14	28	32	22	50
25	1"	K 25.1	630	1000	14	-	32	24	72
		K 25.2	1000	1600	23	-	33	24	74
		K 25.3	1600	2500	35	-	34	25	75
		K 25.4	2500	4000	50	110	38	26	78
		K25.5	4000	6300	95	180	45	30	103*
50	2"	K55.1	6300	8400	80	230	74	13	60
		K55.2	10000	14000	110	350	77	13	69
		K55.3	16000	25000	150	700	84	13	104
80	3"	K85.1	25000	37000	350	1000	68	16	95
		K85.2	40000	64000	400	1800	89	16	125
100	4"	K105.1	63000	100000	550	-	120	-	220

*300 mbar with damper (gas service)

The operating pressure should be at least twice the pressure loss for liquids and at least five times the pressure loss for gases.

H250/PTFE

Meter Size		Float	Float material		
			PTFE		
DIN	ANSI		Water	Air	max. pressure loss
DN mm	inches	No.	l/h	Nm^3/h	mbar
15	½"	E 17.2	25	0.7	65
		E 17.3	40	1.1	66
		E 17.4	63	1.8	66
		E 17.5	100	2.8	68
		E 17.6	160	4.8	72
		E 17.7	250	7	86
		E 17.8	400	10	111
25	1"	E 27.1	630	16	70
		E 27.2	1000	30	80
		E 27.3	1600	45	108
		E 27.4	2500	70	158
50	2"	E 57.1	4000	110	81
		E 57.2	6300	180	110
		E 57.3	10000	250	170
80	3"	E 87.1	16000	-	81
		E 87.2	25000	-	95
100	4"	E 107.1	40000	-	100

* Not for instruments fitted with heating device

** 300 mbar (4.35 psig) with damper (gas service) with float shape DIV T

Damper recommended for TIV floats with an operating inlet pressure of:

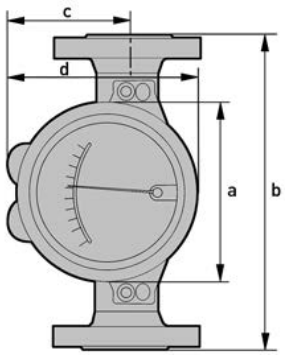
- ≤ 0.3 bar (≤ 4.35 psig) for meter size (DN 15, DN 25 (½",1"))
- ≤ 0.2 bar (≤ 2.90 psig) for meter size (DN 50(2"))
- and generally when DIV floats are used for gas service.

The specified pressure losses apply to water and air at max. flowrate. Conversion to other process liquids or operating data (pressure, temperature, density, viscosity) can be made using the calculation method specified in VDE/VDI Code 3513.

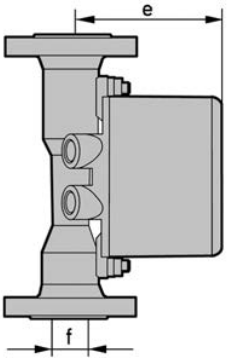
Dimensions and weights

Dimensions H250/M40

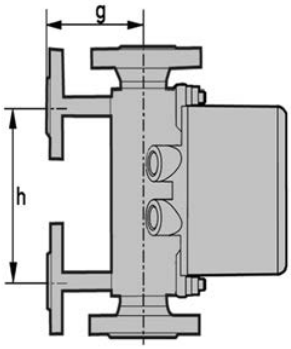
Front view



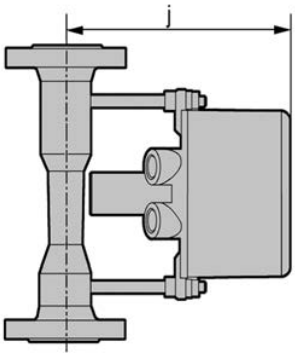
Side view



with heating



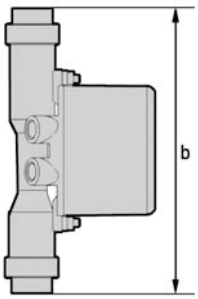
High-temperature



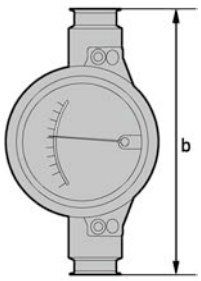
	a		b		d		h	
	[mm]	["]	[mm]	["]	[mm]	["]	[mm]	["]
H250/RR Flange	141	5.56	250	9.85	150	5.91	150	5.91
H250/RR from 2" 600 lb			300	11.82				

EN	ASME	c		e		Ø f		g		j	
		[mm]	["]	[mm]	["]	[mm]	["]	[mm]	["]	[mm]	["]
DN15	½"	94	3.70	114	4.49	20	0.80	97	3.82	197	7.76
DN25	1"	94	3.70	127	5.00	32	1.28	109	4.27	209	8.23
DN50	2"	107	4.22	141	5.55	65	2.57	125	4.90	222	8.74
DN80	3"	107	4.22	157	6.18	89	3.51	143	5.61	238	9.37
DN100	4"	107	4.22	167	6.57	114	4.50	150	5.91	248	9.76

Female thread screwed



H250 Tri Clamp connection



Weights

		H250/RR		with heating	
Nominal meter size		EN 1092-1		Flange connection	
EN	ASME	[kg]	[lb]	[kg]	[lb]
DN15	½"	3.5	7.7	5.6	12.6
DN25	1"	5	11	7.5	16.5
DN50	2"	8.2	18.1	11.2	24.7
DN80	3"	12.2	26.9	14.8	32.6
DN100	4"	14	30.9	17.4	38.4

		H250/PTFE					
Nominal meter size		EN 1092-1		ASME 150 lb		ASME 300 lb	
EN	ASME	[kg]	[lb]	[kg]	[lb]	[kg]	[lb]
DN15	½"	3.5	7.7	3.2	7.1	3.5	7.7
DN25	1"	5	11	5.2	11.5	6.8	15
DN50	2"	10	22.1	10	22.1	11	24.3
DN80	3"	13	28.7	13	28.7	15	33.1
DN100	4"	15	33.1	16	35.3	17	37.5

Process connections

	Conn. dim.	Pressure rating
Flanges (H250/RR/PTFE)	DN15...150	PN16...40
	½...6"	150...300 lb
Clamp connections (H250/RR)	Size 25...139.7	10...16 bar
Female thread (H250/RR)	½...2" NPT	≤ 50 bar ≤ 735 psig
Meters (H250/RR) with heating:		
Heating with flange connection	½"	150 lb/RF

Higher pressure ratings and other connections on request

Sales and Service Network

Head Office:
A 34/35 MIDC Estate,
H Block, Pimpri,
Pune 411 018, India
Tel.: +91-20-27442020

Ahmedabad
4,Shetoor Bunglows,
Opp.Drive in Petrol Pump,
Ahmedabad-380 054
Tel.: +91-79-26851738
+91-79-26856374

Alibag
Row house No.14, 'B' wing,
Bafna Baug Complx-B,
Behind Big Splash Hotel
Chendhare,
Alibag - 404201
Tel.: +91-2141-223795

Bangalore
No.373, HBR Layout
Stage-1, Block II
A Main, Kalyangar Post
Bangalore - 560 043
(Land Mark: Near Hennur
Depot/Petrol Bunk)
Tel.: +91-80-25435965
+91-80-25436400

Chandigarh
SCF-38, Phase-XI,
Sas Nagar Mohali
Punjab-160065,
Tel.: +91-172-5039314
+91-172-5039315

Chennai
Flat No. III-B,
Calve Chateau Complex
808 P.H. Road, Kilpauk
Chennai - 600010
Tel.: +91-44-26611238
+91-44-26611228

Coimbatore
10/21, V.R. Gardens,
Thottipalayam Pirivu
Kalapatti,
Coimbatore - 641 014.
Tel.: +91-422-3054990
+91-422-3054991

Delhi
D-109 & 110,1st Floor
Okhla Indl. Area Phase - 1
New Delhi – 110 020.
Tel.: +91-11-42831521
+91-11-42831522
+91-11-41723015
+91-11-41723016
+91-11-41723017

Hyderabad
Plot No. A-19/2 and T-4/2 ,
I.D.A. Nacharam
Hyderabad - 500 076
Tel.: +91-40-27152276
+91-40-27150691

Indore
E 21, Ground Floor,
Ravi Shankar Shukla Nagar,
HIG Colony, Indore - 452 003
Tel.: +91-731-2552561

Jamshedpur
H.No. 306, Road No. 7,
Sonari West Layout,
Jamshedpur-831011
Tel.: +91-657-2301143
+91-657-2300742

Kolkata
Rishi Tower,
Premises No. 02/315,
New Town, Kolkata,
West Bengal - 700 156.
Behind Tata Medical Centre
and opposite Unitech Building
Gate No.2.
Tel.: +91-33-30261254

Lucknow
1st floor, 3/44,
Viram Khand,
Gomti Nagar,
Lucknow- 226 010,
Tel.: +91-522-2303223

Mumbai
107 MG Road, Fort,
Mumbai - 400 023
Tel : +91-22-22673821
+91-22-22673822

Nagpur
17, FCI Housing Society,
Narendranagar Extension,
Manish Nagar Railway
Crossing Road,
Nagpur - 440 015
Tel.: +91-712-3025020

Navi Mumbai
101/102, Building No: 4,
Sector: 3,
Millenium Business Park,
Mahape,
Navi Mumbai – 400 710
Tel.: +91-22-27782518
+91-22-27782517

Pune
PB 29 Mumbai Pune Rd.,
Kasarwadi,
Pune - 411 034
Tel.: +91-20-27145754

Surat
7B Ground Floor,
Navchetan Society,
Opp. Krushimangal Hall,
Ring Rd, Surat - 395 007
Tel.: +91-261-2651448

Vadodara
10, Shreeji Krupa Society,
Gotri Rd.,
B/H Kalpavruksha Complex
Vadodara - 390 023
Tel.: +91-265-2343733

Visakhapatanam
Flat no. 112,
Ground floor MVV Presidency,
Venkojipalem, H B Colony Post,
Visakhapatanam - 530022
Tel.: +91-891-2552538

Area Representaives
Bhopal
Madurai
Pondicherry
Kanpur
Trichy

Bangladesh
Forbes Marshall Pvt. Ltd.
11th floor Bay Tower,
50 Mohakhali,
Dhaka- 1212
Tel.: +88-02-9890719

Sri Lanka
Forbes Marshall Lanka Pvt Ltd
No.8/1, Malwatte Avenue,
Kohuwala, Nugegoda,
Sri Lanka.
Te.l: +94-11-2809544
+94-11-4011127

Nepal
Ekta Engineering and Marketing Pvt. Ltd.
402,4th Floor, Bagmati Chamber,
Milan Marg, Teku Road, Tripureshwor,
Kathmandu, Nepal
Tel.: +977-1-4247676
+977-1-4238131

Note: The subject flow meters cannot be used as a weight or measures under the Legal Metrology Act. Specifications subject to changes without prior notice DOC#FMKRH/0216/2302/V3.R0

FORBES MARSHALL

KROHNE Marshall Pvt. Ltd.
A-34/35, MIDC,
Industrial Estate,
'H' Block, Pimpri,
Pune - 411 018. India.

Tel.: +91-20-27442020
Fax: +91-20-27442040
E-mail: ksales@krohnemarshall.com
www.krohne.in
www.forbesmarshall.com

KROHNE
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