

CAPACITIVE TARGET FLOWMETER



- TARGET · NO MOVING PARTS · SENSOR NOT IN CONTACT WITH THE MEDIUM
- DN15 ... DN2100 · 0.6 ... 42 MPa · -200 ... +700 °C
- LIQUID, GAS, STEAM · 4 ... 20 mA · HART · RS485 · IP65/IP67 · EX

KEY DATA

Property	Value	Property	Value
Media	Liquid · gas · steam	Nominal size	Flange and wafer 15 ... 500 · insertion 65 ... 5000
Nominal pressure	0.6 ... 42 MPa	Medium temperature	-200 ... +700 °C
Accuracy	± 0.2 · ± 0.5 · ± 1.0 · ± 1.5 %	Repeatability	0.05 ... 0.08 %
Turndown	1:3 · 1:8 · 1:15 · 1:12	Protection grade	IP65 · IP67
Output	4 ... 20 mA · pulse · RS485 · RS232 · HART	Supply voltage	3.6 V lithium battery or 24 Vdc

A target meter: a plate in the stream is pushed by the flow, and the force on it is measured by a capacitive force sensor that does not touch the medium. There are no moving parts and the range is changed by exchanging the target.



MEASUREMENT

Measuring principle	Target · a plate in the stream, its force read by a capacitive force sensor outside the medium
Media	Liquid (including high-viscosity liquid and slurry) · gas · steam
Accuracy	$\pm 0.2\%$ · $\pm 0.5\%$ · $\pm 1.0\%$ · $\pm 1.5\%$
Turndown	1:3 liquid · 1:8 liquid and gas · 1:15 liquid and gas · 1:12 steam
Repeatability	0.05 ... 0.08 %
Lowest velocity	0.08 m/s
Compensation	Temperature and pressure compensation, integrated
Pressure loss	About half the Δp of a standard orifice plate
Range change	By exchanging the choke plate (target)
Calibration	Dry calibration in place, one key

MATERIALS AND PROCESS

Measuring tube	Carbon steel · stainless steel · other materials according to the user's request
Target and wetted parts	Hastelloy C · 304SS · 316L — the seventh field of the order code
Nominal size	Flange 15 ... 500 mm · wafer 15 ... 500 mm · insertion 65 ... 5000 mm
Nominal pressure	0.6 ... 42 MPa
Medium temperature	-200 ... +700 °C, four classes in the order code
Process connection	Flange to the GB/T series · wafer · insertion · on-line removable · tapered pipe thread
Flange standard	GB/T series; special machining according to the user's request
Protection grade	IP65 · IP67
Explosion protection	Ex ia IIC T4 (intrinsic safety) · Ex d IIC T4 (flameproof)

ELECTRICAL PROPERTIES

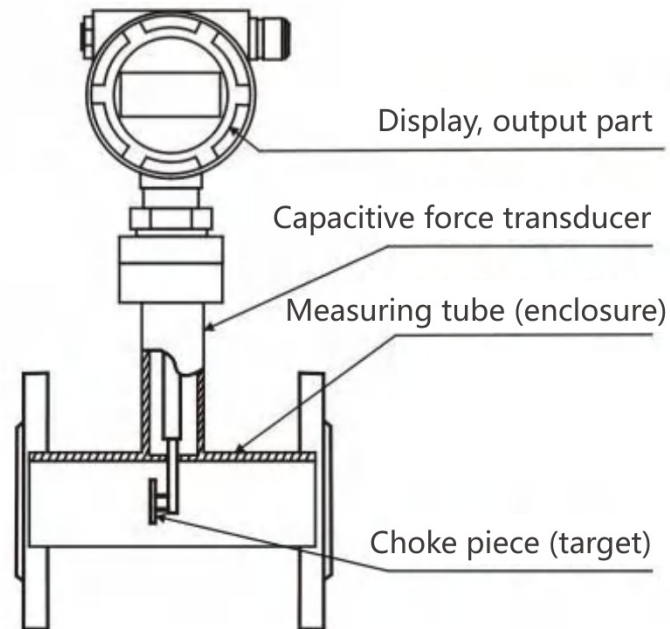
Supply voltage	3.6 V lithium battery · external 24 Vdc
Output	4 ... 20 mA two-wire · pulse 0 ... 5 V RS485 · RS232 · HART · GPRS radio
Display	On site, instantaneous and totalized flow and a percentage bar
Self-check	Built in, with a plain fault indication
Explosion protection	Ex ia IIC T4 · Ex d IIC T4

DISPLAY

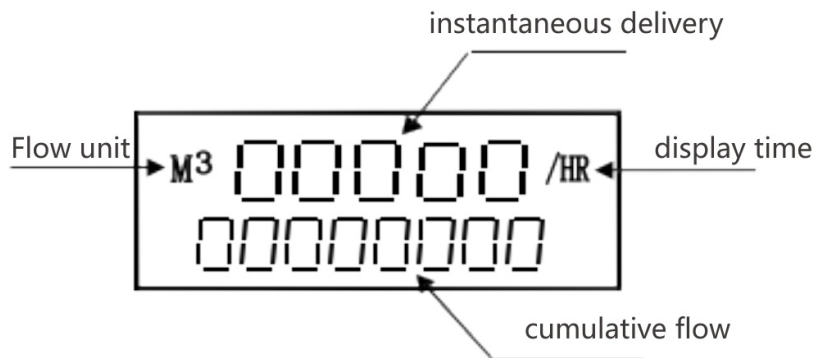
Flow unit	Left of the top line
Instantaneous flow	Five digits, top line
Time base	Right of the top line
Totalized flow	Eight digits, bottom line



STRUCTURE AND DISPLAY



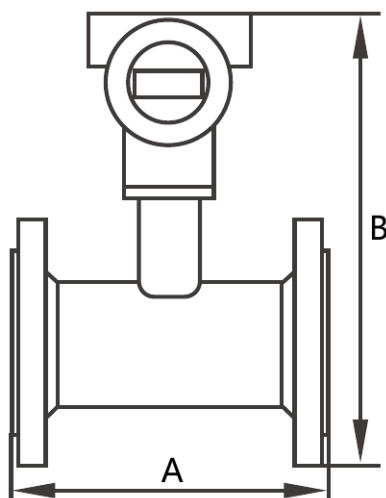
The section: the choke plate (target) sits in the measuring tube, the capacitive force transducer above it outside the medium, and the display and output part on top. Nothing moves and nothing wears.



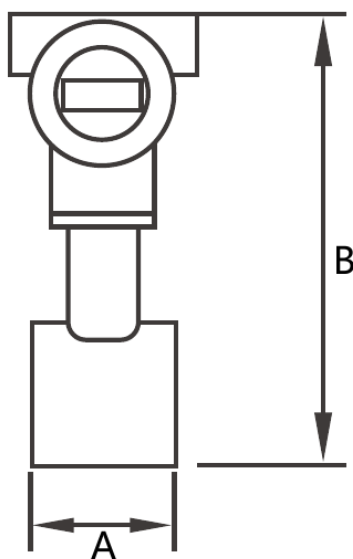
The display: instantaneous flow on the top line with its unit and time base, totalized flow on the bottom line.



DIMENSIONS (mm)



Left the flanged body, below the wafer body. A is the overall width, B the overall height.



A is the overall width, B the overall height. The left half of the table is DN15 to DN100, the right half DN125 to DN500; the wafer B values of the right half are 380, 405, 455, 505, 555, 605, 655, 705 and 755 mm for DN125 ... DN500. The wafer width A is 66 mm for every size.

OVERALL DIMENSIONS (mm)

DN	Flange A	Flange B	Wafer A	Wafer B	DN	Flange A	Flange B	Wafer A
15	150	345	66	270	125	200	455	66
20	150	350	66	275	150	200	480	66
25	150	355	66	280	200	250	530	66
32	150	362	66	287	250	250	580	66
40	150	370	66	295	300	250	630	66
50	150	380	66	305	350	250	680	66
65	200	395	66	310	400	250	730	66
80	200	410	66	335	450	250	780	66
100	200	430	66	355	500	250	830	66



COMPLIANCE AND CERTIFICATION

Protection grade	IP65 and IP67
Explosion protection	Ex ia IIC T4 and Ex d IIC T4
Measuring principle	Target with a capacitive force sensor
Accuracy	$\pm 0.2 \% \cdot \pm 0.5 \% \cdot \pm 1.0 \% \cdot \pm 1.5 \%$
Repeatability	0.05 ... 0.08 %
Wetted materials	Hastelloy C, 304SS or 316L for the target; carbon steel or stainless steel for the tube
Pressure rating	0.6 ... 42 MPa
Temperature	-200 ... +700 °C in four classes

The measuring range in cubic metres per hour, the range of the target-to-bore diameter ratio and the greatest pressure drop at full scale. The actual pressure drop is $(\text{actual flow} / \text{full-scale flow})^2 \times$ the value in the last column. For other media the standard flow is the actual flow times the square root of the density ratio, with 999.8 kg/m³ for water and 1.293 kg/m³ for air at 101.325 kPa and 20 °C.

FLOW RANGE (m³/h)

DN	Flow range (m ³ /h)	Target ratio	Δp max (kPa)
15	0.1 ... 3	0.8 ... 0.5	75.53
20	0.17 ... 5	0.8 ... 0.5	55.12
25	0.3 ... 9	0.8 ... 0.4	34.45
32	0.5 ... 14	0.8 ... 0.3	24.12
40	1.0 ... 24	0.8 ... 0.3	17.23
50	1.5 ... 40	0.8 ... 0.3	6.89
65	2.5 ... 60	0.7 ... 0.35	5.51
80	3.5 ... 90	0.7 ... 0.35	4.31
100	5 ... 140	0.7 ... 0.3	2.76
125	6 ... 200	0.7 ... 0.3	2.07
150	10 ... 300	0.6 ... 0.25	1.38
200	18 ... 560	0.6 ... 0.25	0.89
250	25 ... 800	0.5 ... 0.25	0.56
300	40 ... 1200	0.5 ... 0.2	0.35
350	50 ... 1500	0.5 ... 0.2	0.1
400	65 ... 2000	0.5 ... 0.2	0.07
450	90 ... 2600	0.4 ... 0.2	0.06
500	110 ... 3300	0.4 ... 0.2	0.05



FLOW RANGE (m³/h) · CONTINUED

DN	Flow range (m³/h)	Target ratio	Δp max (kPa)
550	140 ... 4100	0.35 ... 0.2	0.04
600	170 ... 5000	0.3 ... 0.15	0.03
700	230 ... 6800	0.3 ... 0.15	0.011
800	300 ... 9000	0.3 ... 0.15	0.0083
900	370 ... 11000	0.3 ... 0.15	0.0062
1000	470 ... 14000	0.2 ... 0.1	0.0055
1100	560 ... 16000	0.2 ... 0.1	0.0041
1200	670 ... 20000	0.2 ... 0.1	0.0034
1300	780 ... 23000	0.2 ... 0.1	0.0028
1400	900 ... 27000	0.2 ... 0.1	0.0018
1500	1050 ... 31000	0.2 ... 0.1	0.0016
1600	1200 ... 32500	0.2 ... 0.1	0.0014
1700	1350 ... 36500	0.2 ... 0.1	0.0012
1800	1510 ... 40800	0.2 ... 0.1	0.0011
1900	1680 ... 45500	0.2 ... 0.1	0.001
2000	1850 ... 50000	0.2 ... 0.1	0.0009
2100	1980 ... 55800	0.2 ... 0.1	0.0008

Saturated steam in tonnes per hour, by gauge pressure. The first table carries the pressures 0.1 to 0.6 MPa, the second 0.8 to 2.0 MPa; both cover DN15 to DN500. Steam is the medium with the narrowest turndown of the four, 1:12.

SATURATED STEAM (t/h) · 0.1 ... 0.6 MPa

DN	0.1 MPa	0.2 MPa	0.3 MPa	0.4 MPa	0.5 MPa	0.6 MPa
15	0.002 ... 0.02	0.003 ... 0.03	0.005 ... 0.05	0.007 ... 0.07	0.008 ... 0.08	0.009 ... 0.09
20	0.003 ... 0.03	0.006 ... 0.06	0.009 ... 0.09	0.012 ... 0.12	0.015 ... 0.15	0.017 ... 0.17
25	0.005 ... 0.05	0.009 ... 0.09	0.014 ... 0.14	0.019 ... 0.19	0.02 ... 0.2	0.027 ... 0.27
32	0.008 ... 0.08	0.016 ... 0.16	0.023 ... 0.23	0.032 ... 0.32	0.036 ... 0.36	0.044 ... 0.44
40	0.012 ... 0.12	0.025 ... 0.25	0.036 ... 0.36	0.045 ... 0.45	0.058 ... 0.58	0.069 ... 0.69
50	0.02 ... 0.2	0.038 ... 0.38	0.057 ... 0.57	0.075 ... 0.75	0.09 ... 0.9	0.1 ... 1.0
65	0.035 ... 0.35	0.065 ... 0.65	0.1 ... 1.0	0.13 ... 1.3	0.15 ... 1.5	0.18 ... 1.8
80	0.05 ... 0.5	0.1 ... 1.0	0.15 ... 1.5	0.18 ... 1.8	0.23 ... 2.3	0.27 ... 2.7
100	0.08 ... 0.8	0.15 ... 1.5	0.23 ... 2.3	0.28 ... 2.8	0.36 ... 3.6	0.42 ... 4.2
125	0.12 ... 1.2	0.24 ... 2.4	0.35 ... 3.5	0.48 ... 4.8	0.56 ... 5.6	0.68 ... 6.8
150	0.18 ... 1.8	0.35 ... 3.5	0.5 ... 5.0	0.7 ... 7.0	0.82 ... 8.2	0.96 ... 9.6
200	0.32 ... 3.2	0.6 ... 6.0	0.9 ... 9.0	1.2 ... 12	1.4 ... 14	1.7 ... 17
250	0.5 ... 5.0	1.0 ... 10	1.4 ... 14	1.9 ... 19	2.2 ... 22	2.7 ... 27
300	0.7 ... 7.0	1.4 ... 14	2.0 ... 20	2.5 ... 25	3.3 ... 33	3.9 ... 39
350	1.0 ... 10	1.9 ... 19	2.8 ... 28	3.5 ... 35	4.4 ... 44	5.2 ... 52
400	1.3 ... 13	2.5 ... 25	3.6 ... 36	4.7 ... 47	5.8 ... 58	6.8 ... 68
450	1.6 ... 16	3.1 ... 31	4.6 ... 46	6.0 ... 60	7.4 ... 74	8.6 ... 86
500	2.0 ... 20	3.8 ... 38	5.6 ... 56	7.0 ... 70	9.1 ... 91	10 ... 100



SATURATED STEAM (t/h) · 0.8 ... 2.0 MPa

DN	0.8 MPa	1.0 MPa	1.5 MPa	2.0 MPa
15	0.012 ... 0.12	0.015 ... 0.15	0.023 ... 0.23	0.03 ... 0.3
20	0.022 ... 0.22	0.028 ... 0.28	0.04 ... 0.4	0.055 ... 0.55
25	0.035 ... 0.35	0.044 ... 0.44	0.065 ... 0.65	0.085 ... 0.85
32	0.056 ... 0.56	0.072 ... 0.72	0.1 ... 1.0	0.14 ... 1.4
40	0.09 ... 0.9	0.11 ... 1.1	0.16 ... 1.6	0.22 ... 2.2
50	0.14 ... 1.4	0.17 ... 1.7	0.26 ... 2.6	0.34 ... 3.4
65	0.24 ... 2.4	0.29 ... 2.9	0.44 ... 4.4	0.58 ... 5.8
80	0.36 ... 3.6	0.45 ... 4.5	0.66 ... 6.6	0.88 ... 8.8
100	0.56 ... 5.6	0.7 ... 7.0	1.0 ... 10	1.3 ... 13
125	0.89 ... 8.9	1.1 ... 11	1.6 ... 16	2.1 ... 21
150	1.2 ... 12	1.5 ... 15	2.3 ... 23	3.1 ... 31
200	2.2 ... 22	2.8 ... 28	4.1 ... 41	5.5 ... 55
250	3.5 ... 35	4.4 ... 44	6.5 ... 65	8.6 ... 86
300	5 ... 50	6.2 ... 62	9.2 ... 92	12 ... 120
350	7 ... 70	8.5 ... 85	12 ... 120	16-160
400	9 ... 90	11 ... 110	16 ... 160	22 ... 220
450	11 ... 110	14 ... 140	21 ... 210	27 ... 270
500	14 ... 140	17 ... 170	26 ... 260	34 ... 340



Standard dry air in normal cubic metres per hour, by gauge pressure, DN15 to DN1000.

STANDARD DRY AIR (Nm³/h) · 0.01 ... 0.4 MPa

DN	0.01 MPa	0.1 MPa	0.2 MPa	0.3 MPa	0.4 MPa
15	2 ... 20	4 ... 40	6 ... 60	8 ... 80	10 ... 100
20	3 ... 30	6 ... 60	9 ... 90	12 ... 120	15 ... 150
25	5 ... 50	10 ... 100	15 ... 150	20 ... 200	25 ... 250
32	8 ... 80	16 ... 160	24 ... 240	32 ... 320	40 ... 400
40	13 ... 130	26 ... 260	39 ... 390	—	65 ... 650
50	20 ... 200	40 ... 400	60 ... 600	80 ... 800	100 ... 1000
65	35 ... 350	70 ... 700	105 ... 1050	140 ... 1400	175 ... 1750
80	50 ... 500	100 ... 1000	150 ... 1500	200 ... 2000	250 ... 2500
100	80 ... 800	160 ... 1600	240 ... 2400	320 ... 3200	400 ... 4000
125	130 ... 1300	260 ... 2600	390 ... 3900	—	650 ... 6500
150	180 ... 1800	360 ... 3600	540 ... 5400	720 ... 7200	900 ... 9000
200	300 ... 3000	600 ... 6000	900 ... 9000	1200 ... 12000	1500 ... 15000
250	500 ... 5000	1000 ... 10000	1500 ... 15000	2000 ... 20000	2500 ... 25000
300	750 ... 7500	1500 ... 15000	2250 ... 22500	3000 ... 30000	3750 ... 37500
350	1000 ... 10000	2000 ... 20000	3000 ... 30000	4000 ... 40000	5000 ... 50000
400	1300 ... 13000	2600 ... 26000	3900 ... 39000	—	6500 ... 65000
450	1700 ... 17000	3400 ... 34000	5100 ... 51000	6800 ... 68000	8500 ... 85000
500	2000 ... 20000	4000 ... 40000	6000 ... 60000	8000 ... 80000	10000 ... 100000
550	2500 ... 25000	5000 ... 50000	7500 ... 75000	10000 ... 100000	12500 ... 125000
600	3000 ... 30000	6000 ... 60000	9000 ... 90000	12000 ... 120000	15000 ... 150000
700	4000 ... 40000	8000 ... 80000	12000 ... 120000	16000 ... 160000	20000 ... 200000
800	5000 ... 50000	10000 ... 100000	15000 ... 150000	20000 ... 200000	25000 ... 250000
900	6500 ... 65000	13000 ... 130000	19500 ... 195000	26000 ... 260000	32500 ... 325000
1000	8000 ... 80000	16000 ... 160000	24000 ... 240000	32000 ... 320000	40000 ... 400000

STANDARD DRY AIR (Nm³/h) · 0.6 ... 2.0 MPa

DN	0.6 MPa	0.8 MPa	1.0 MPa	2.0 MPa
15	14 ... 140	18 ... 180	22 ... 220	42 ... 420
20	21 ... 210	27 ... 270	33 ... 330	63 ... 630
25	35 ... 350	45 ... 450	55 ... 550	105 ... 1050
32	56 ... 560	72 ... 720	88 ... 880	168 ... 1680
40	91 ... 910	117 ... 1170	143 ... 1430	273 ... 2730
50	140 ... 1400	180 ... 1800	220 ... 2200	420 ... 4200
65	245 ... 2450	315 ... 3150	385 ... 3850	735 ... 7350
80	350 ... 3500	450 ... 4500	550 ... 5500	1050 ... 10500
100	560 ... 5600	720 ... 7200	880 ... 8800	1680 ... 16800
125	910 ... 9100	1170 ... 11700	1430 ... 14300	2730 ... 27300
150	1260 ... 12600	1620 ... 16200	1980 ... 19800	3780 ... 37800
200	2100 ... 21000	2700 ... 27000	3300 ... 33000	6300 ... 63000
250	3500 ... 35000	4500 ... 45000	5500 ... 55000	10500 ... 105000
300	5250 ... 52500	6750 ... 67500	8250 ... 82500	15750 ... 157500



STANDARD DRY AIR (Nm³/h) · 0.6 ... 2.0 MPa ·

CONTINUED

DN	0.6 MPa	0.8 MPa	1.0 MPa	2.0 MPa
350	7000 ... 70000	9000 ... 90000	11000 ... 110000	21000 ... 210000
400	9100 ... 91000	—	14300 ... 143000	27300 ... 273000
450	—	15300 ... 153000	18700 ... 187000	35700 ... 357000
500	14000 ... 140000	18000 ... 180000	22000 ... 220000	42000 ... 420000
550	17500 ... 175000	22500 ... 225000	27500 ... 275000	52500 ... 525000
600	21000 ... 210000	25000 ... 250000	33000 ... 330000	63000 ... 630000
700	28000 ... 280000	36000 ... 360000	44000 ... 440000	84000 ... 840000
800	35000 ... 350000	45000 ... 450000	55000 ... 550000	105000 ... 1050000
900	45500 ... 455000	58500 ... 585000	71500 ... 715000	136500 ... 1365000
1000	56000 ... 560000	72000 ... 720000	88000 ... 880000	168000 ... 1680000

Example: QKKA-025-F-L-06-C1-F-H-S.

ORDER CODE

Field	Code	Meaning
1 Series	QKKA	QKKA capacitive target flowmeter
2 Size	015 ... 500	Nominal size in mm, three digits — 025 means DN25
3 Body	F · C	Flange · insertion
	D · U	Wafer · on-line removable
	L	Tapered pipe thread
4 Medium	L · G · S	Liquid · gas · steam
5 Pressure	06 · 10 · ...	Nominal pressure in units of 0.1 MPa — 06 is 0.6 MPa, 10 is 1 MPa
6 Temperature	C1 · C2	-40 ... +80 °C · +80 ... +200 °C
	C3 · C4	+200 ... +700 °C · -200 ... -40 °C
7 Output	F · A	Pulse · 4 ... 20 mA
	AH	4 ... 20 mA with HART
8 Material	H · S4 · S6	Hastelloy C · 304SS · 316L
9 Ex	S · E · G	No explosion protection · explosion-proof · flameproof

