KROHNE

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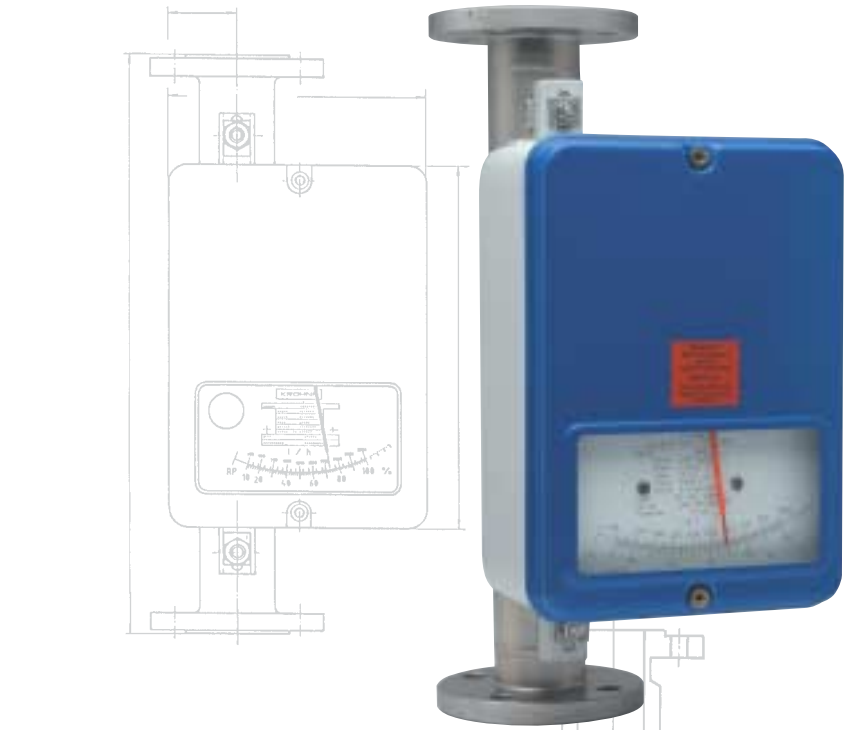
H 54 High-accuracy variable area flowmeter



Variable area flowmeters

Vortex flowmeters

Flow controllers

Electromagnetic flowmeters

Ultrasonic flowmeters

Mass flowmeters

Level measuring instruments

Communications technology

Engineering systems & solutions

Switches, counters, displays and recorders

Heat metering

Pressure and temperature

H 54 High-accuracy variable area flowmeter

with Class 1 accuracy

Description

The H 54 flowmeter for liquids and gases is an all-metal flowmeter which operates on the float principle.

The measuring section features a tapered metal tube (cone) in which an appropriately shaped float is allowed to move freely up and down.

Depending on the flowrate, the float will assume a certain vertical position in the cone. The float position is transmitted by a magnetic data transmitter to the scale on the indicator. The flow value is linearized by a cam disc and transmitted to the scale.

The flowmeter is designed for installation in a vertical pipe run with flow from bottom to top.

The rugged construction of the H 54 flowmeter makes it particularly suitable for difficult application, service and environmental conditions.

Technical features

- Measuring section of rugged all-metal construction
- Suitable for applications under extreme operating conditions
- Linear percentage and flow scale
- Electrical signal output (ESK II)
- Pneumatic signal output (can be retrofitted)
- The measuring section can be equipped with a heating jacket to prevent solidification or crystallization of the process liquid
- Where process temperatures exceed 160°C (320°C) instruments with electrical signal output can additionally be fitted with thermal protection
- Pneumatic oscillation damper for floats for gas measurement
- Magnetic filter for process liquids containing ferromagnetic particles..

ESK II

- Float position sensed by magnetic sensors
- Non-interacting and hysteresis-free conversion of the flow value into a scaled current output (4-20 mA)
- HART® Communication
- Linear current output 0 to 20 mA (with converter) in 3-wire configuration (option)
- Linearization of the current output via electronic memory modul and HART® Communication

Electromagnetic compatibility (EMC)

The variable-are flowmeter
Type **H 54/M4/ESK**

conforms with the requirements of Directive 89/336/EEC and the following European Standards:

EN 50081-1: 1993
EN 50082-2: 1995

and also the requirements of the NAMUR Recommendation NE 21/05/93

The responsibility as to the suitability, intended use and corrosion-resistance of the materials used in their construction rests solely with the operator.

Technical data

Instrument type	**H 54**
Measuring range (100 % values) Water at 20°C (68°F) Air at 1.013 bar abs., 20°C (14.7 psia, 68°F) Select measuring range from flow table	 16 to 150000 l/h (0.07 to 660.44 US GPM) 0.4 to 3000 m³/h (0.25 to 1861 SCFM)
Turn-down ratio	10 : 1
Accuracy class to VDI/VDE code 3513, Sh. 2	1
Measuring cone	Metal tube with tapered measuring section, type R or K
Scale graduation	linear % division or flow units
Float shapes Liquids Gases	 N, C IV B, C IV TF NA, C IV T, D IV BLD
Test pressure for DGRL The max. allowable operating pressure for the flanges is dependent upon the process temperature, and is specified in the relevant standard: for ANSI flanges, Class 150 lbs and 300 lbs, see ASME/ANSI B 16.5 – 1988 Standard, and for DIN flanges see EN 1092-1.	
Meter sizes	DN 15 to DN 150 and 1/2" to 6"
Connection Flanges to EN 1092-1 Flanges to ANSI B 16.5 Flanges for the heating device Pipe for the heating device Pipe for air connection (cooling) Special versions	 DN 15, DN 25, DN 40, DN 50, DN 80 / PN 40 DN 80, DN 100, DN 125, DN 150 / PN 16 1/2" to 6" Class 150 lbs / RF or 300 lbs / RF DN 15, DN 25 / PN 40 or 1/2", 1" Class 150 lbs / RF Ermeto 12 Ermeto 6, 8, 10 or 12 Information on other versions supplied on request
Overall height (excl. gaskets)	500 mm (19.68")
Protection category to EN 60529/IEC 529	IP 65, equivalent to NEMA 12 and 13
Max. process temperature (54 / RR) **without** options ESK II, K, KD	 – 80°C to +400°C (–112°F to +752°F)
Ambient temperature with options ESK II, K, KD	– 25°C to +60°C (–13°F to +140°F) dependent on process temperature
Max. process temperature with options ESK II, K, KD H 54 / M4 / ESK II H 54 / M4 / K (KD) Other temperatures on request	 160°C (320°F) (DN 15, 1/2" : 80°C (176°F)) 180°C (356°F) (DN 15, 1/2" : 100°C (212°F))

Instrument versions

Version	**Material**				
	Measuring tube	**Flanges**	**Measuring cone**	**Internals Seal strip**	**Float**
H 54 / RR	stainless steel 1.4571 (316 Ti)	stainless steel 1.4571 (316 Ti)	stainless steel 1.4571 (316 Ti)	stainless steel 1.4571 (316 Ti)	stainless steel 1.4571 (316 Ti)
H 54 R / PTFE *	stainless steel 1.4571 (316 Ti) with PTFE liner	stainless steel 1.4571	PTFE **	PTFE	PTFE
H 54 / Hastelloy	Hastelloy B3 or C4	stainless steel HT plated 1.4571 (316 Ti)	Hastelloy B3 or C4	Hastelloy B3 or C4	Hastelloy B3 or C4

* With this liner, flanges are those of the next meter size up, e.g. cone 20.12 with flange DN 40 (1 1/2") instead of DN 25 (1")
** alternatively: DN 15 (1/2") cones of glass, gaskets of PTFE

Flow table

Float material stainless steel 1.4571 (316 Ti)

Float shape

Water	N, C IV B, CIV TF
Air	NA, C IV T, DIV BLD
100% flow value, turn-down ratio	10 : 1

Reference conditions

Water at 20°C (68°F)
Air at 20°C, 1.013 bar abs. (68°F, 14.7 psia)

Meter size DIN DN	Meter size ANSI inches	Cone No.	Float No.	Water N l/h	Water N US GPM	Air NA l/h	Air NA US GPM	Air NA m^3/h	Air NA SCFM	m^3/h	SCFM	Max. pressure loss N mbar	N psig	Na mbar	Na psig	mbar	psig	mbar	psig
15	1 1/2	R 10.03	10	16	0.07			0.4	0.25			60	0.87	60	0.87				
		R 10.04	11	25	0.11			0.9	0.56			60	0.87	60	0.87				
		R 10.06	11	40	0.18			1.2	0.74			60	0.87	60	0.87				
		R 10.08	11	63	0.28			1.8	1.12			60	0.87	60	0.87				
		R 11.07	31	100	0.44			2.8	1.74			65	0.94	65	0.94				
		R 11.10	32	160	0.70			5	3.10			65	0.94	65	0.94				
		R 11.17	33	250	1.10			8.5	5.27			70	1.02	70	1.02				
		R 11.27	34	400	1.76			11.5	7.13			80	1.16	80	1.16				
		R 12.21	42	630	2.77			20	12.41			100	1.45	100	1.45				
		R 12.32	43	1000	4.40			26	16.13			140	2.03	140	2.03				
				C IV B		**C IV TF**		**C IV T**		**D IV BLD**		**C IV B**		**C IV TF**		**C IV T**		**C IV BLD**	
25	1	K 20.12	21	800	3.52	500	2.20	12	7.44	20	12.41	46	0.67	19	0.28	13	0.19	21	0.30
		K 20.16		1000	4.40	600	2.64	15	9.31	25	15.51	48	0.70	19	0.28	14	0.20	24	0.35
		K 20.23		1600	7.04	1000	4.40	24	14.89	40	24.81	50	0.73	21	0.30	16	0.23	30	0.44
		K 20.33		2500	11.01	1600	7.04	35	21.71	60	37.22	60	0.87	26	0.38	19	0.28	38	0.55
		K 20.49		4000	17.61	2500	11.01	55	34.12	100	62.03	90	1.31	36	0.52	25	0.36	60	0.87
		K 20.55		5000	22.01	3000	13.21	70	43.42	130	80.65	110	1.60	48	0.70	32	0.46	80	1.16
40	1 1/2	K 40.37	41	6300	27.74	4000	17.61	85	52.73	200	124.07	60	0.87	31	0.45	19	0.28	75	1.09
		K 40.50		10000	44.03	6000	26.42	125	77.54	280	173.70	90	1.31	41	0.59	25	0.36	100	1.45
		K 40.54		12500	55.04	7500	33.02	150	93.05	350	217.12	110	1.60	51	0.74	30	0.44	110	1.60
50	2	K 50.34	51	12500	55.04	7000	30.82	160	99.26	450	279.16	65	0.94	30	0.44	11	0.16	90	1.31
		K 50.57		16000	70.45	9000	39.63	180	111.66	650	403.23	75	1.09	32	0.46	11	0.16	120	1.74
		K 50.60		20000	88.06	12000	52.84	200	124.07	750	465.26	100	1.45	44	0.64	12	0.17	140	2.03
80	3	K 80.23	81	20000	88.06	12000	52.84	250	155.09	520	322.58	60	0.87	25	0.36	14	0.20	50	0.73
		K 80.37		25000	110.07	14000	61.64	300	186.10	620	384.62	70	1.02	26	0.38	14	0.20	52	0.75
		K 80.40		30000	132.09	16000	70.45	350	217.12	700	434.24	80	1.16	27	0.39	14	0.20	54	0.78
		K 80.50		40000	176.12	20000	88.06	400	248.14	900	558.31	90	1.31	29	0.42	15	0.22	56	0.81
100	4	K 102.35	CIV 102	50000	220.15							120	1.74						
		K 102.41		63000	277.39							135	1.96						
125	5	K 122.39	TR 122	80000	352.24							130	1.89						
		K 122.42		90000	396.27							140	2.03						
150	6	K 152.45	TR 152	150000	660.44							150	2.18						

The damper cannot be fitted in cones of the R 10 series.

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.

Indication and long-distance data transmission

Limit switches
One or two limit switches can be built into the indicator.

Limit switches in 2-wire circuitry are connected in conformity with DIN EN 50227 (NAMUR). The switching point is visible on the scale. An isolation switching amplifier is required for operation of one limit switch in 2-wire circuitry.

To order, the **type designation** of the instrument is extended by the following symbols:

Grenzwertsignalwertgeber	
SC 3.5-N0	K1 (1 contact), K2 (2 contacts)
SJ 3.5-SN (safety-oriented)	KD1 (1 contact), KD2 (2 contacts)
SJ 3.5-S1N (safety-oriented)	KD1 (1 contact), KD2 (2 contacts)
Electrical signal output For example: H 54/RR/M4/K2	ESK II

Electrical signal output
The ESK non-interacting and hysteresis-free signal output can be installed in the indicators as an option.
This supplies a load-independent current of 4 to 20 mA in two-wire connection that is proportional to the instantaneous flowrate.
Optionally, a converter in combination with the ESK supplies a linear current output in 3-wire configuration 0 to 20 mA (but not designed for hazardous locations).
Given an intrinsically safe feed unit, the transmitter ESK II may also be used in hazardous areas.

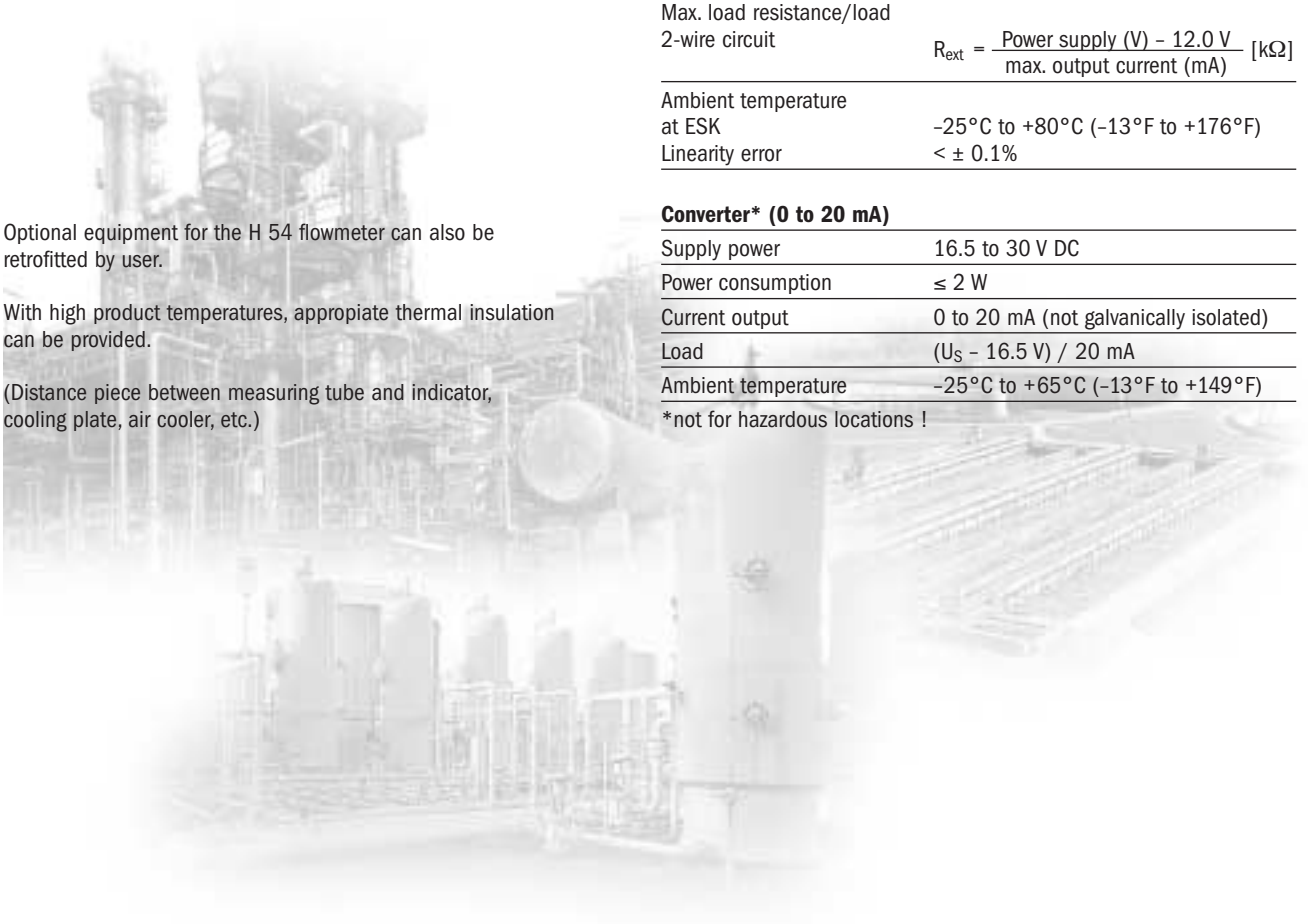
Technical data, limit switches

Technical data	2-wire SC3,5-N0-Y NAMUR	2-wire SJ3,5-SN NAMUR	2-wire SJ3,5-S1N NAMUR
Function of switching element	N/C contact	N/C contact	N/O contact
Nominal voltage U_0	8 V	8 V	8 V
Current consumption: Pointer vane not sensed Pointer vane sensed	 ≥ 3 mA ≤ 1 mA	 ≥ 3 mA ≤ 1 mA	 ≤ 1 mA ≥ 3 mA

Electrical signal output ESK II	
Power supply	12.0 to 30 V DC
Current consumption	4 to 21.6 mA for 0 % to 110 % of measured value
Repeatability	< 0.1% *
Power influence	< 0.1% *
Load resistance dependence	< 0.1% *
Max. load resistance/load 2-wire circuit	$R_{ext} = \frac{\text{Power supply (V)} - 12.0\ \text{V}}{\text{max. output current (mA)}}$ [kΩ]
Ambient temperature at ESK	–25°C to +80°C (–13°F to +176°F)
Linearity error	< ± 0.1%

Converter* (0 to 20 mA)	
Supply power	16.5 to 30 V DC
Power consumption	≤ 2 W
Current output	0 to 20 mA (not galvanically isolated)
Load	(U_S – 16.5 V) / 20 mA
Ambient temperature	–25°C to +65°C (–13°F to +149°F)

*not for hazardous locations !



Optional equipment for the H 54 flowmeter can also be retrofitted by user.

With high product temperatures, appropiate thermal insulation can be provided.

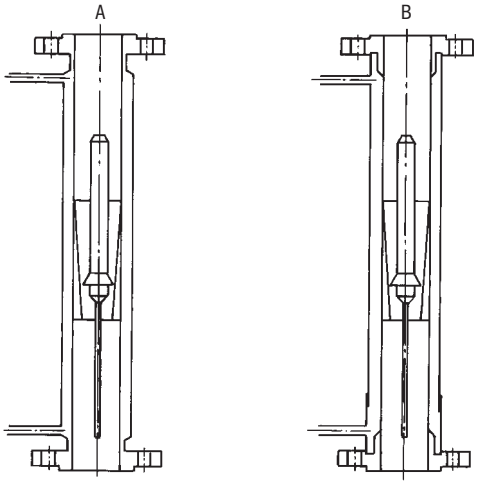
(Distance piece between measuring tube and indicator, cooling plate, air cooler, etc.)

Special versions

Hard glass measuring cones

For particularly aggressive process liquids, DN 15 to 50 (1/2" to 2") flowmeters can be supplied with glass measuring cones and floats made of glass or PTFE.

Connection QVF, PNG: one meter size larger than the cone.



Heating jacket A

For heating purposes, the measuring section can be fitted with a tubular jacket made of non-magnetic stainless steel.
Connection: Ermeto 12 or flanges DN 15 PN 40 (1/2", Class 150 lbs/RF).

Flange heating unit B

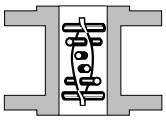
For extreme conditions, indirect flange heating by way of the measuring tube is available in addition to the tube heating jacket.

Connection: Ermeto 12 or flanges DN 15 PN 40 (1/2", Class 150 lbs/RF).

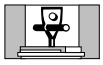
Magnetic filter

Should the fluid contain ferromagnetic particles, a magnetic filter must be installed upstream of the flowmeter. The filter contains bar magnets in helical arrangement for optimum efficiency at minimal pressure losses. All magnets are coated with PTFE as protection against corrosion.

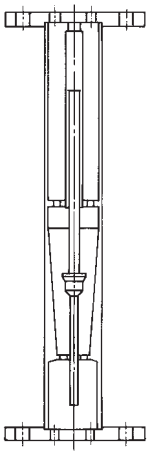
Two types are available:



Type F – Flange adapter,
for all meter sizes
overall length 100 mm (3.94")
material 1.4571 (316 Ti)



Type FS – Adapter without flange
for all meter sizes
overall length 50 mm (1.97")
material 1.4571 (316 Ti



Float damper

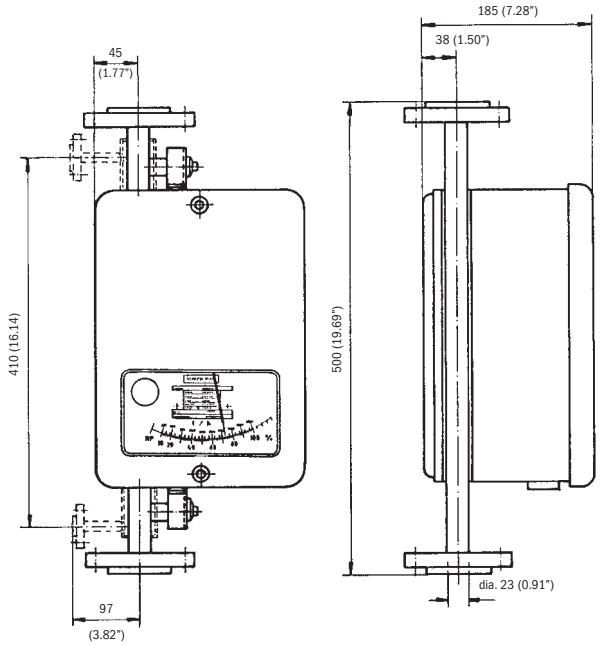
To prevent compression oscillations, the flowmeters used for gases are fitted with a pneumatic float damper (except for cones R 10.03 to R 10.08).

Dimensions and weights

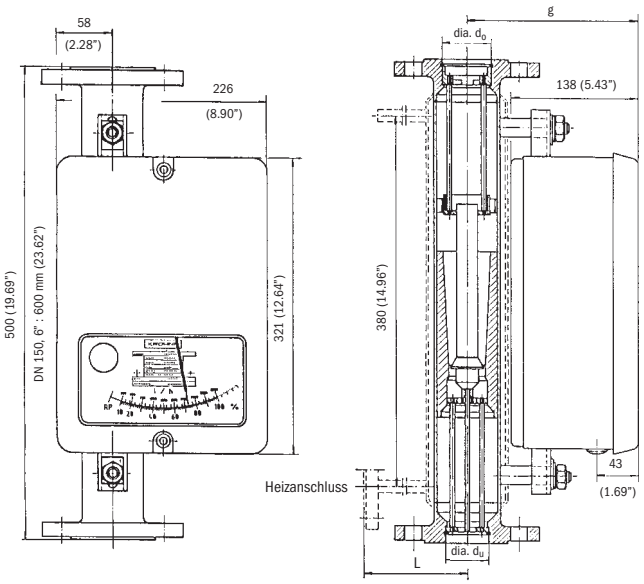
Dimensions in mm and (inches)

Flange connection for the measuring tube		Connection for the heating jacket	
... EN 1092-1 (= BS 4504)	DN 15, DN 25, DN 40, DN 50, DN 80/ PN 40 DN 80, DN 100, DN 125, DN 150 / PN 16	Flanges to EN 1092-1 (= BS 4504)	DN 15, DN 25 / PN 40
... ANSI B 16.5	1/2“ to 6“ 150 lbs / RF or 300 lbs / RF	Flanges to ANSI B 16.5	1/2“ 150 lbs / RF
		Pipe for	Ermeto 12

H 54 / M4 DN 15



H 54 / M4 ≥ DN 25



Nominal size to ... DIN		ANSI		Dimensions in mm and inches dia. d_u		dia. d_o		g		L (Heating)		Approx. weight *		with heating** DN 15	
DN mm	PN	inches	lbs	mm	inches	mm	inches	mm	inches	mm	inches	kg	lbs	kg	lbs
15	40	1/2	150/300	23	0.91	23	0.91	125	4.92	97	3.82	8	17.6	10.2	22.5
25	40	1	150/300	34.5	1.36	34.5	1.36	165	6.50	109	4.29	10	22.0	12.8	28.2
40	40	1 1/2	150/300	45	1.77	50	1.97	175	6.89	120	4.72	12	26.5	15.3	33.7
50	40	2	150/300	57	2.24	67	2.64	185	7.28	128	5.04	15	33.1	19.1	42.1
80	40	3	150/300	89	3.50	89	3.50	190	1.78	147	5.79	28	61.7	35.0	77.2
80	16	3	150/300	89	3.50	89	3.50	190	7.48	147	5.79	30	66.1	37.0	81.6
100	16	4	150/300	93	3.66	106	4.17	205	8.07	164	6.46	32	70.5	39.4	86.9
125	16	5	150/300	115	4.53	148	5.83	225	8.86	175	6.89	38	83.8	50.3	110.9
150	16	6	150/300	127	5.00	175	6.89	240	9.45	190	7.48	45	99.2	59.0	130.1

* Weight of instruments with DIN flanges
** Connection DN 25 (1”) plus 1 kg (2.24 lbs)
** Connection Ermeto 12 minus 1.6 kg (3.58 lbs)