



Turbine volume flow sensor



Precise and proven measuring turbine with inside thread connection acc. to DIN ISO 228, available with digital (frequency, rectangle signal) or analog (4 ... 20 mA) output signal.

The turbines have a factory calibration for mineral oil at 30 cSt, other calibration viscosities are available. You can also order versions with flow measuring in both directions, but detection of the flow direction is not possible.

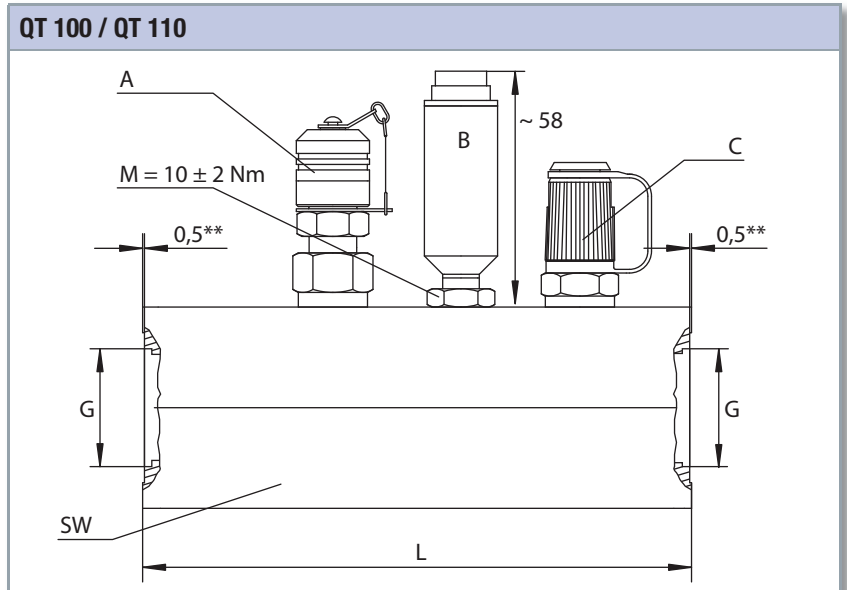
Qualities	
Measuring principle	volume flow
Viscosity range	see order data
Medium temperature	max. +120 °C
Environmental temperature	-20 ... +85 °C
Storage temperature	-20 ... +85 °C
Output signal	frequency (rectangle) / 4 ... 20 mA
Supply voltage U_b	12 ... 24 VDC
Electrical measuring connector	5 pole device connector, M16 x 0.75
Protection type (EN 60529 / IEC 529)	IP 40
Tightening torque	10 Nm (\pm 2 Nm)
Calibration viscosity	30 mm ² /s (cSt)
Material turbine casing	Aluminium AlZnMgCu 1,5
Material turbine wheel	1.4122 (for measuring range 1.0 ... 10 l/min) 1.0718 (for all other measuring ranges)
Material sealings	FKM
Material sensor casing	1.4301
Suitable measuring cable	MK 01

Pin assignment	QT 100 (frequency)	QT 110 (4 ... 20 mA)
	Pin 1 = signal +	Pin 1 = signal +
	Pin 2 = - U_b / signal - / GND	Pin 2 = signal - / GND
	Pin 3 = + U_b	Pin 3 = + U_b
	Pin 4 = free	Pin 4 = free
	Pin 5 = free	Pin 5 = free

Measuring range	Allowed working pressure		Viscosity range	Error limit*	Order number / weight			
	l/min	bar			MPa	mm ² /s (cSt)	of current value	QT 100 (frequency)
1.0 ... 10.0	420	42	1 ... 30	\pm 2.5 %	31V7-01-35.030	631	31G7-01-35.030	681
7.5 ... 75.0			1 ... 100	\pm 2.5 %	31V7-70-35.030	785	31G7-70-35.030	869
15 ... 300			1 ... 100	\pm 2.5 %	31V7-71-35.030	1,125	31G7-71-35.030	1,206
25 ... 600	350		1 ... 100	\pm 2.0 %	31V7-72-35.030	1,378	31G7-72-35.030	1,498

*: for QT 100 and factory calibrated viscosity;
for QT 110 additional \pm 0.2 % of final value (error f/l-converter)

*: former product name RE4



Measuring range	L	SW	G
l/min	mm		
1.0 ... 10.0	120	41	ISO 228-G $\frac{1}{4}$
7.5 ... 75.0	130	46	ISO 228-G $\frac{3}{4}$
15 ... 300	150	55	ISO 228-G1
25 ... 600	174	60	ISO 228-G1 $\frac{1}{4}$

- A MINIMESS® p/T test point for pressure and temperature, series 1620
- B max. tightening torque $M = 10 \pm 2$ Nm
- C inductive sensor / amplifier
- D MINIMESS® test point, series 1620
- H height is appr. 58 mm (for QT 100) or appr. 108 mm (for QT 110)
- ** depth of the spot face



CAN turbine volume flow sensor



A version has been adapted for the CAN bus based on our precise and proven measuring turbine with inside thread connection according to DIN ISO 228.

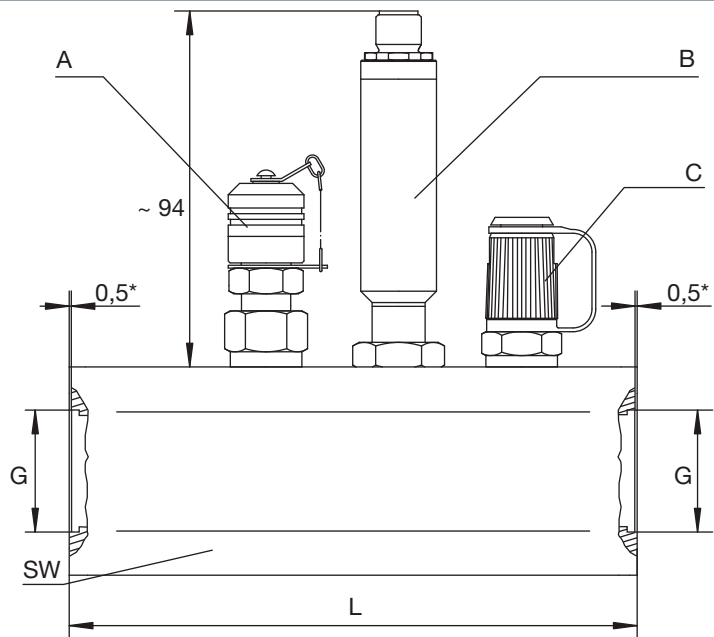
The turbines are factory calibrated for mineral oil at 30 cSt. Other calibration viscosities are available.

Qualities	
Measuring principle	volume flow
Viscosity range	see order data
Medium temperature	max. +120 °C
Environmental temperature	-20 ... +85 °C
Storage temperature	-20 ... +85 °C
Output signal	CANopen
Supply voltage U_b	8.5 ... 30 VDC
Electrical measuring connector	5 pole device connector, M12 x 1
Protection type (EN 60529 / IEC 529)	IP 67 (screwed)
Tightening torque	10 Nm (\pm 2 Nm)
Calibration viscosity	30 mm ² /s (cSt)
Material turbine casing	Aluminium AlZnMgCu 1,5
Material turbine wheel	1.4122 (for measuring range 1,0 ... 10 l/min) 1.0718 (for all other measuring ranges)
Material sealings	FKM
Material sensor casing	3.1645
Current consumption	max. 50 mA @ 24 VDC
Interface	CANopen (CIA-DS-301)
CAN standard	2.0A (opt. 2.0B)
Transmission rate	20 ... 1.000 kBit/s
Measured frequency (Hz)	bytes 0 ... 3
Measured volume flow (l/min)	bytes 4 ... 7
Resolution	three decimal places
Suitable measuring cable	CAN cable

Pin assignment	CANopen 2.0A
	Pin 1 = CAN_SHLD
	Pin 2 = CAN_V+
	Pin 3 = CAN_GND
	Pin 4 = CAN_H
	Pin 5 = CAN_L

*: former product name RE4

Measuring range	Max. working pressure		Viscosity range	Error limit	Weight	Order number
	l/min	bar				
1 ... 10	420	42	1 ... 30	± 1.0 %	671	31C7-01-35.030
2 ... 75	420	42	1 ... 100	± 0.5 %	859	31C7-70-35.030
9 ... 300	420	42	1 ... 100	± 0.5 %	1,190	31C7-71-35.030
16 ... 600	350	35	1 ... 100	± 0.5 %	1,488	31C7-72-35.030

QT 106


- A MINIMESS® p/T test point for pressure and temperature, series 1620
- B inductive sensor / amplifier
- C MINIMESS® test point, series 1620
- * depth of spot face

Measuring range	SW	L	G
l/min		mm	
1 ... 10	41	120	ISO 228-G ¹ / ₄
2 ... 75	46	130	ISO 228-G ³ / ₄
9 ... 300	55	150	ISO 228-G ¹
16 ... 600	60	174	ISO 228-G ¹ / ₄

HySense QT 118*

Turbine volume flow sensor with increased IP protection

NEW



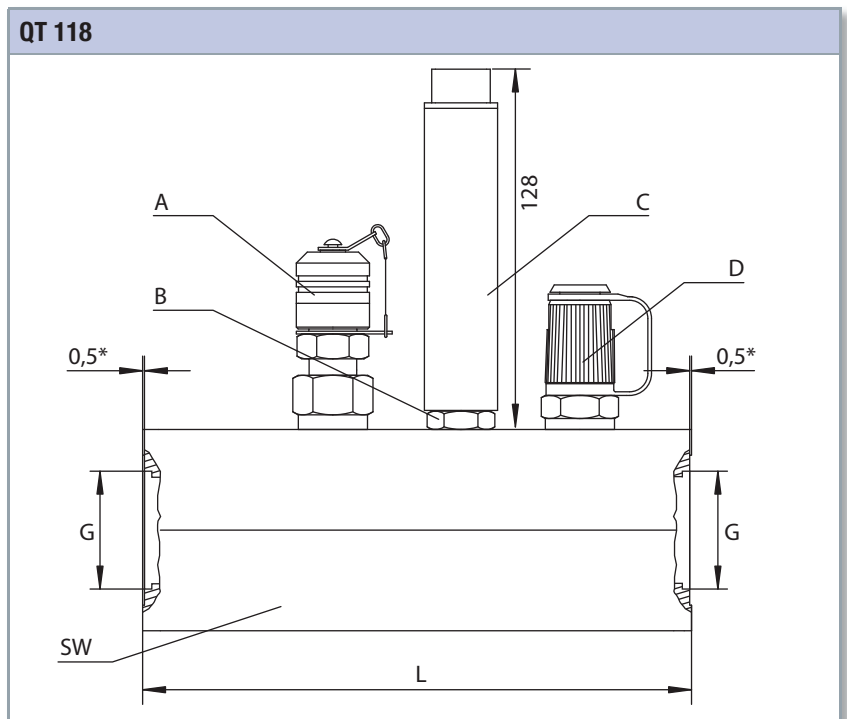
The turbines are factory calibrated for mineral oil at 30 cSt. Other calibration viscosities are available on request.

Qualities	
Measuring principle	volume flow
Viscosity range	see order data
Medium temperature	max. +120 °C
Environmental temperature	-20 ... +85 °C
Storage temperature	-20 ... +85 °C
Output signal	4 ... 20 mA
Supply voltage U_b	12 ... 24 VDC
Electrical measuring connector	device connector 3 pole AMP, acc. to DIN 72585
Protection type (EN 60529 / IEC 529)	IP 69
Tightening torque	10 Nm (\pm 2 Nm)
Calibration viscosity	30 mm ² /s (cSt)
Material turbine casing	Aluminium AlZnMgCu 1,5
Material turbine wheel	1.4122 (for measuring range 1.0 ... 10 l/min) 1.0718 (for all other measuring ranges)
Material sealings	FKM
Material sensor casing	1.4571
Suitable measuring cable	customer-specific

Pin assignment	4 ... 20 mA
	Pin 1 = signal +
	Pin 2 = signal - / GND
	Pin 3 = + U_b

Measuring range	Max. working pressure		Viscosity range	Error limit	Weight	Order number
	l/min	bar				
1.0 ... 10.0	420	42	1 ... 30	\pm 2.5 %	681	31N7-01-35.030
7.5 ... 75.0	420	42	1 ... 100	\pm 2.5 %	869	31N7-70-35.030
15 ... 300	420	42	1 ... 100	\pm 2.5 %	1,206	31N7-71-35.030
25 ... 600	350	35	1 ... 100	\pm 2.0 %	1,498	31N7-72-35.030

*: former product name RE4



Measuring range	L	SW	G	Error limit*
l/min	mm			%
1.0 ... 10.0	120	41	ISO 228-G¼	± 2.5
7.5 ... 75.0	130	46	ISO 228-G¾	
15 ... 300	150	55	ISO 228-G1	± 2.0
25 ... 600	174	60	ISO 228-G1¼	

- A MINIMESS® p/T test point for pressure and temperature, series 1620
- B max. tightening torque $M = 10 \pm 2$ Nm
- C inductive sensor / amplifier
- D MINIMESS® test point, series 1620
- * depth of spot face

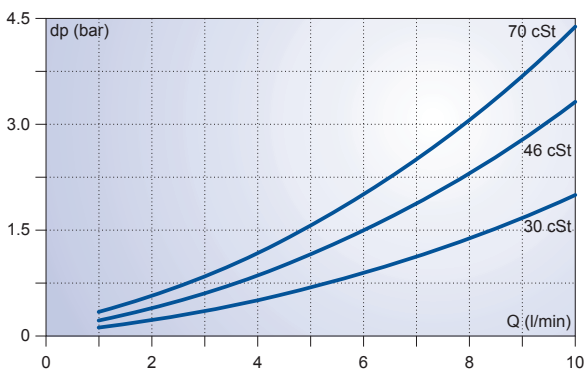
HySense QT 1xx

delta-P curves

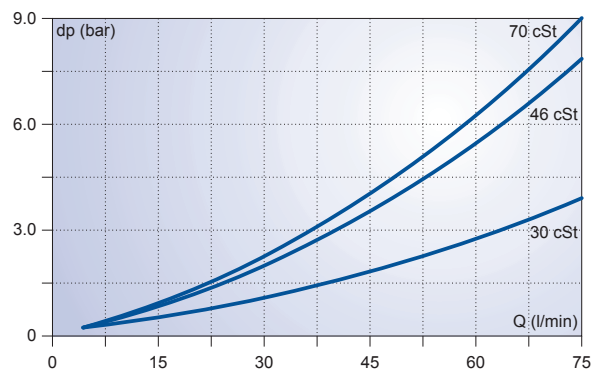
The delta-P curves shown here are valid for the volume flow sensors of the HySense® QT 1xx range, shown on the previous pages:

- QT 100
- QT 106
- QT 110
- QT 118

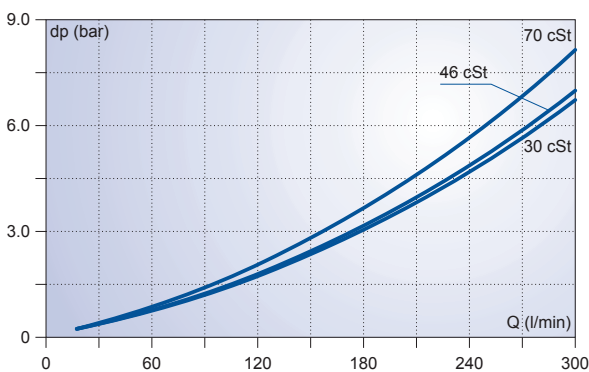
Q = 1.0 ... 10 l/min



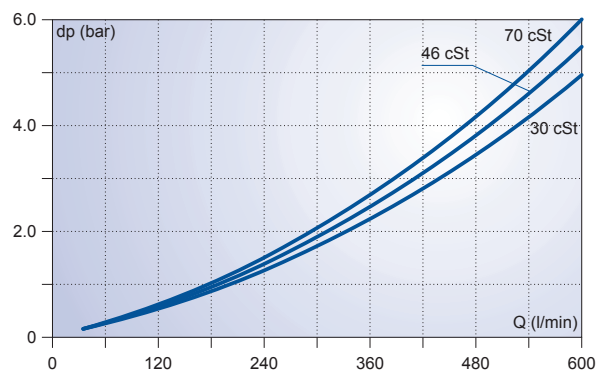
Q = 7.5 ... 75 l/min



Q = 15 ... 300 l/min



Q = 25 ... 600 l/min





Turbine volume flow sensor



Turbine volume flow sensor with high precision and inside thread connector acc. to DIN ISO 228 for use with water and similar media, preferably.

The turbines are equipped with floating bearings and factory calibrated for water at 1 cSt. Other calibration viscosities are available on request.

Qualities	
Measuring principle	volume flow
Viscosity range	1 ... 10 mm ² /s (cSt)
Medium temperature	max. +120 °C
Environmental temperature	-20 ... +85 °C
Storage temperature	-20 ... +85 °C
Output signal	frequency (rectangle) / 4 ... 20 mA
Supply voltage U _b	12 ... 24 VDC
Error limit*	± 2.5 %
Electrical measuring connector	5 pole device connector, M16 x 0,75
Protection type (EN 60529 / IEC 529)	IP 40
Tightening torque	10 Nm (± 2 Nm)
Calibration viscosity	1 mm ² /s (cSt)
Material turbine casing	Edelstahl X12CrNiS18 8 (passiviert)
Material turbine wheel	1.4122 (for measuring range 1.0 ... 10 l/min) 1.0718 (for all other measuring ranges)
Material sealings	FKM
Material sensor casing	1.4301
Suitable measuring cable	MK 01

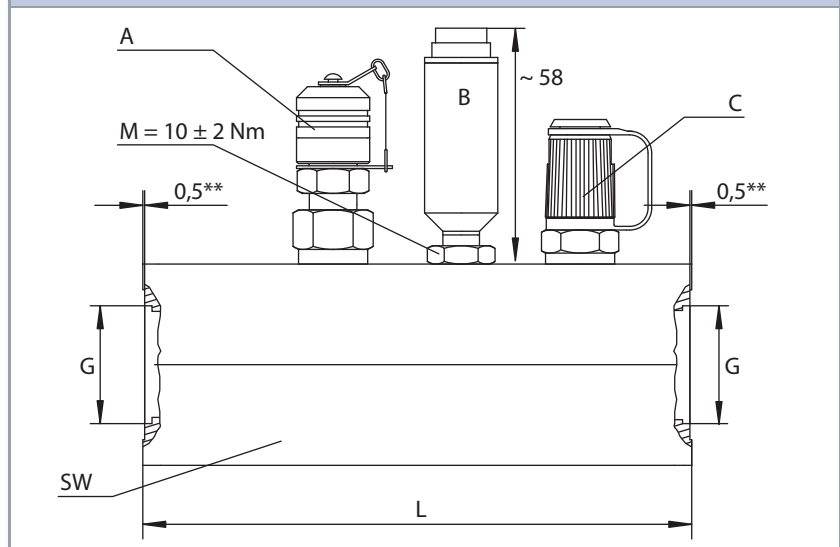
Pin assignment	QT 200 (frequency)	QT 210 (4 ... 20 mA)
	Pin 1 = signal +	Pin 1 = signal +
	Pin 2 = - U _b / signal - / GND	Pin 2 = signal - / GND
	Pin 3 = + U _b	Pin 3 = + U _b
	Pin 4 = free	Pin 4 = free
	Pin 5 = free	Pin 5 = free

Measuring range	Maximum working pressure		Order number / Weight				
	l/min	bar	MPa	QT 200 (frequency)	Weight (g)	QT 210 (4 ... 20 mA)	Weight (g)
1.0 ... 10.0	420	42		33V7-01-35.001	686	33G7-01-35.001	736
7.5 ... 75.0	420	42		33V7-77-35.001G	1,926	33G7-77-35.001G	1,980
15 ... 300	420	42		33V7-78-35.001G	3,304	33G7-78-35.001G	3,574
25 ... 600	350	35		33V7-79-35.001G	4,033	33G7-79-35.001G	4,033

*: former product name RE6

Dimensions

QT 200 / QT 210



Measuring range	L	SW	G
l/min	mm		
1.0 ... 10.0	120	41	ISO 228-G¼
7.5 ... 75.0	130	46	ISO 228-G¾
15 ... 300	150	55	ISO 228-G1
25 ... 600	174	60	ISO 228-G1¼

- A MINIMESS® p/T test point for pressure and temperature, series 1620
- B max. tightening torque $M = 10 \pm 2 \text{ Nm}$
- C inductive sensor / amplifier
- D MINIMESS® test point, series 1620
- H height is appr. 58 mm (for QT 200) and appr. 108 mm (for QT 210)
- * of current value for QT 200 and factory calibrated viscosity;
for QT 210 additional $\pm 0.2 \%$ of final value (error f/l-converter)
- ** depth of spot face



CAN turbine volume flow sensor



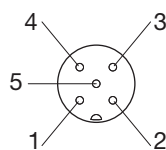
A version for CAN bus has been adapted from our high-precision turbine volume flow sensors with inside thread connector according to DIN ISO 228 for water and watery media.

The turbines are equipped with floating bearings and factory calibrated for water at 1 cSt. Other calibration viscosities are available on request.

Qualities

Measuring principle	volume flow
Viscosity range	1 ... 10 mm ² /s (cSt)
Medium temperature	max. +120 °C
Environmental temperature	-20 ... +85 °C
Storage temperature	-20 ... +85 °C
Output signal	CANopen
Supply voltage U _b	8.5 ... 30 VDC
Electrical measuring connector	5 pole device connector, M12 x 1
Protection type (EN 60529 / IEC 529)	IP 67 (screwed)
Tightening torque	10 Nm (± 2 Nm)
Calibration viscosity	30 mm ² /s (cSt)
Material turbine casing	high-grade steel, passivated (X12CrNiS18 8)
Material turbine wheel	1.4122 (for measuring range 1.0 ... 10 l/min) 1.0718 (for all other measuring ranges)
Material sealings	FKM
Material sensor casing	3.1645
Current consumption	max. 50 mA @ 24 VDC
Interface	CANopen (CIA-DS-301)
CAN standard	2.0A (opt. 2.0B)
Transmission rate	20 ... 1,000 kBit/s
Measured frequency (Hz)	bytes 0 ... 3
Measured volume flow (l/min)	bytes 4 ... 7
Resolution	three decimal places
Suitable measuring cable	CAN cable

Pin assignment

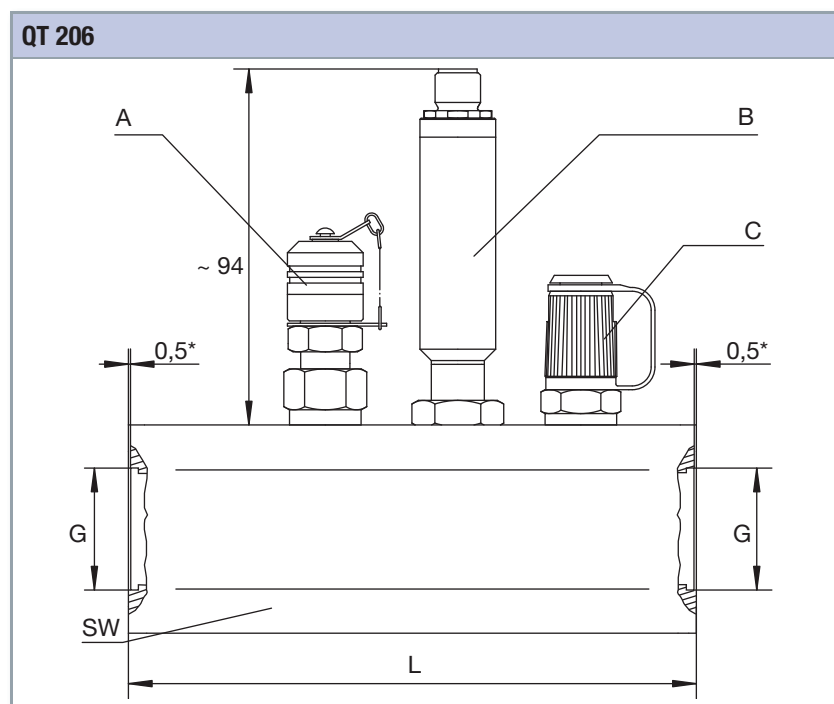


CANopen

- Pin 1 = CAN_SHLD
- Pin 2 = CAN_V+
- Pin 3 = CAN_GND
- Pin 4 = CAN_H
- Pin 5 = CAN_L

*: former product name RE6

Measuring range	Max. working pressure		Error limit of current value	Weight g	Order number
	l/min	bar			
1.0 ... 10.0	420	42	± 1.0 %	746	33C7-01-35.001
2.0 ... 75.0	420	42	± 0.5 %	1,990	33C7-70-35.001G
9 ... 300	420	42	± 0.5 %	3,590	33C7-71-35.001G
16 ... 600	350	35	± 0.5 %	4,043	33C7-72-35.001G



Measuring range	SW	L	G
l/min		mm	
1.0 ... 10.0	27	120	ISO 228-G ¹ / ₄
2.0 ... 75.0	46	130	ISO 228-G ³ / ₄
9 ... 300	55	150	ISO 228-G1
16 ... 600	60	174	ISO 228-G1 ¹ / ₄

- A MINIMESS® p/T-test point for pressure and temperature, series 1620
- B inductive sensor / amplifier
- C MINIMESS® test point, series 1620
- * depth of spot face

HySense QT 218*

Turbine volume flow sensor with increased IP protection



High-precision turbine volume flow sensor with inside thread connector in accordance to DIN ISO 228 and increased IP protection for use with water and watery media, preferably.

The turbines are equipped with flow bearings and factory calibrated for water at 1 cSt. Other calibration viscosities are available on request.

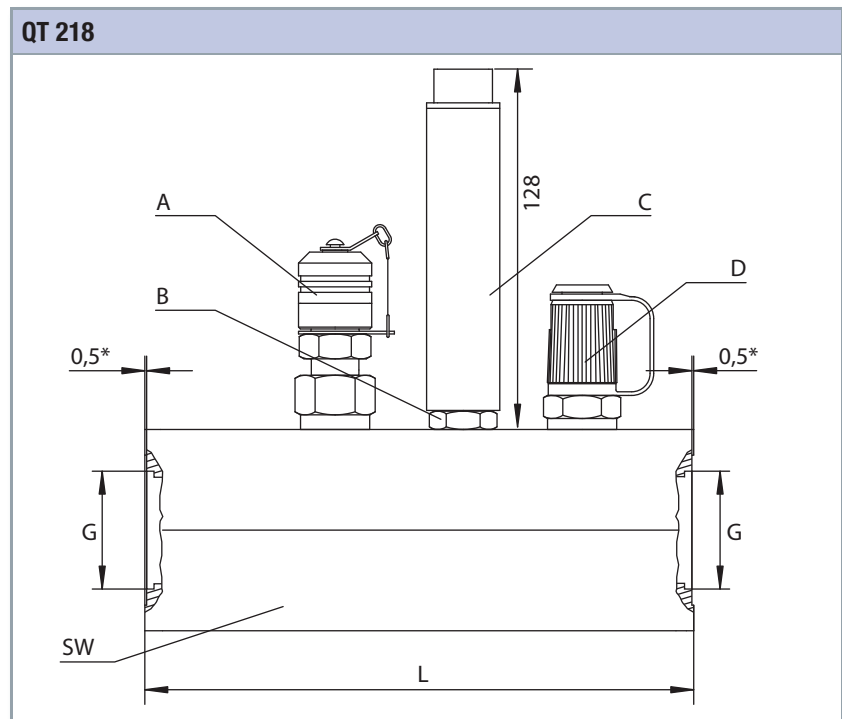
Qualities	
Measuring principle	volume flow
Viscosity range	1 ... 10 mm ² /s (cSt)
Medium temperature	max. +120 °C
Environmental temperature	-20 ... +85 °C
Storage temperature	-20 ... +85 °C
Output signal	4 ... 20 mA
Supply voltage U _b	12 ... 24 VDC
Electrical measuring connector	device connector AMP 3 pole, acc. to DIN 72585
Protection type (EN 60529 / IEC 529)	IP 69
Tightening torque	10 Nm (± 2 Nm)
Calibration viscosity	1 mm ² /s (cSt)
Material turbine casing	high-grade steel, passivated X12CrNiS18 8
Material turbine wheel	1.4122 (for measuring range 1.0 ... 10 l/min) 1.0718 (for all other measuring ranges)
Material sealings	FKM
Material sensor casing	1.4571
Suitable measuring cable	customer-specific

Pin assignment	4 ... 20 mA
	Pin 1 = signal +
	Pin 2 = signal - / GND
	Pin 3 = + U _b

Measuring range	Max. working pressure		Error limit	Weight	Order number
	l/min	bar			
1.0 ... 10.0	420	42	± 2.5 %	736	33N7-01-35.001
2.0 ... 75.0	420	42	± 2.5 %	1,980	33N7-70-35.001G
15 ... 300	420	42	± 2.5 %	3,574	33N7-71-35.001G
25 ... 600	350	35	± 2.0 %	4,033	33N7-72-35.001G

*: former product name RE6

Dimensions



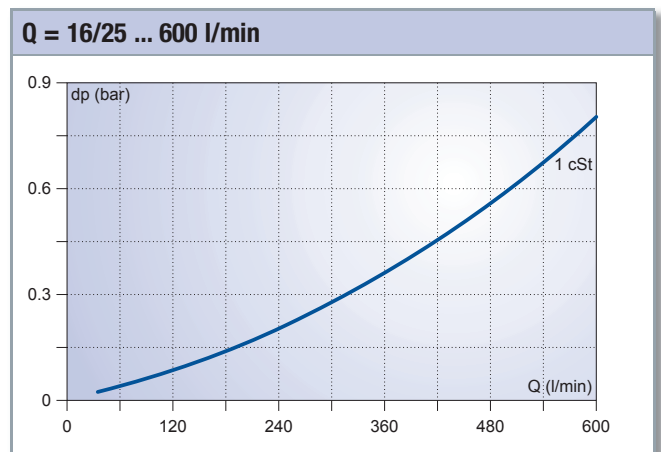
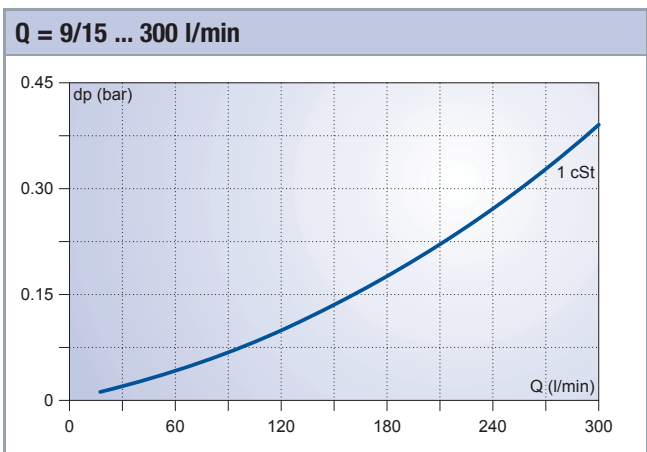
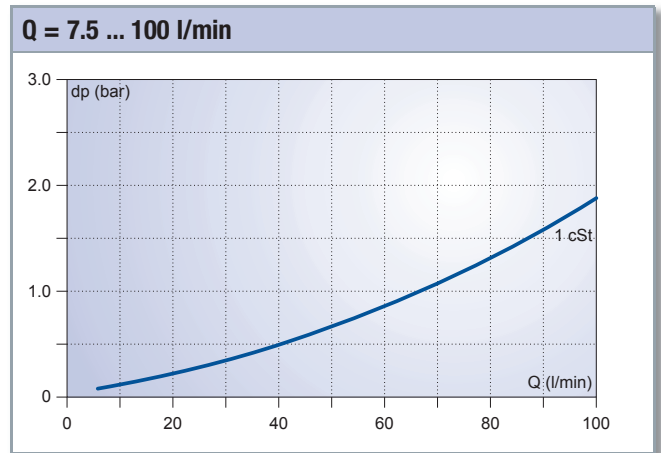
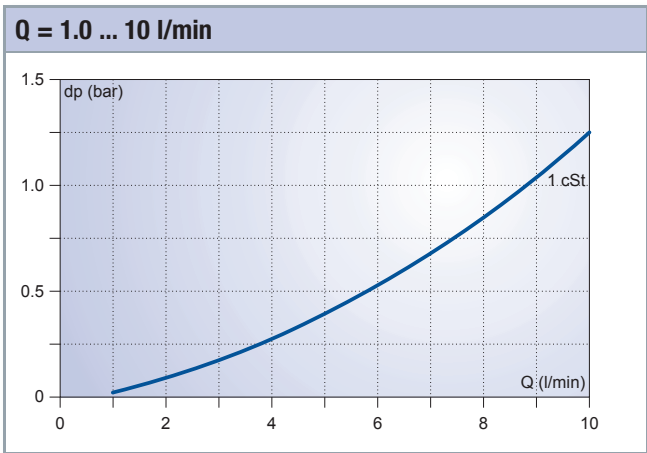
Measuring range	L	SW	G
l/min	mm		
1.0 ... 10.0	120	41	ISO 228-G ¹ / ₄
7.5 ... 75.0	130	46	ISO 228-G ³ / ₄
15 ... 300	150	55	ISO 228-G ¹
25 ... 600	174	60	ISO 228-G ¹ / ₄

- A MINIMESS® p/T test point for pressure and temperature, series 1620
- B max. tightening torque $M = 10 \pm 2$ Nm
- C inductive sensor, amplifier
- D MINIMESS® test point, series 1620
- * depth of spot face

delta-P curves

The delta-P curves shown here relate to the volume flow sensors of the HySense® QT 2xx range shown on the previous pages:

- QT 200
- QT 206
- QT 210
- QT 218



QT

HySense® QT 300



Turbine volume flow sensor

1000
l/min

QT



NEW

The completely new HySense® QT 300 measures volume flow rates up to 1,000 l/min and is capable of a pressure load up to 420 bar.

Two MINIMESS® test points serially enable problem-free collection of further measurands (pressure, temperature) simultaneously.

Safe integration into existing pressure systems is possible with the 2" SAE flange connectors delivered with the turbines.

Contained in delivery:

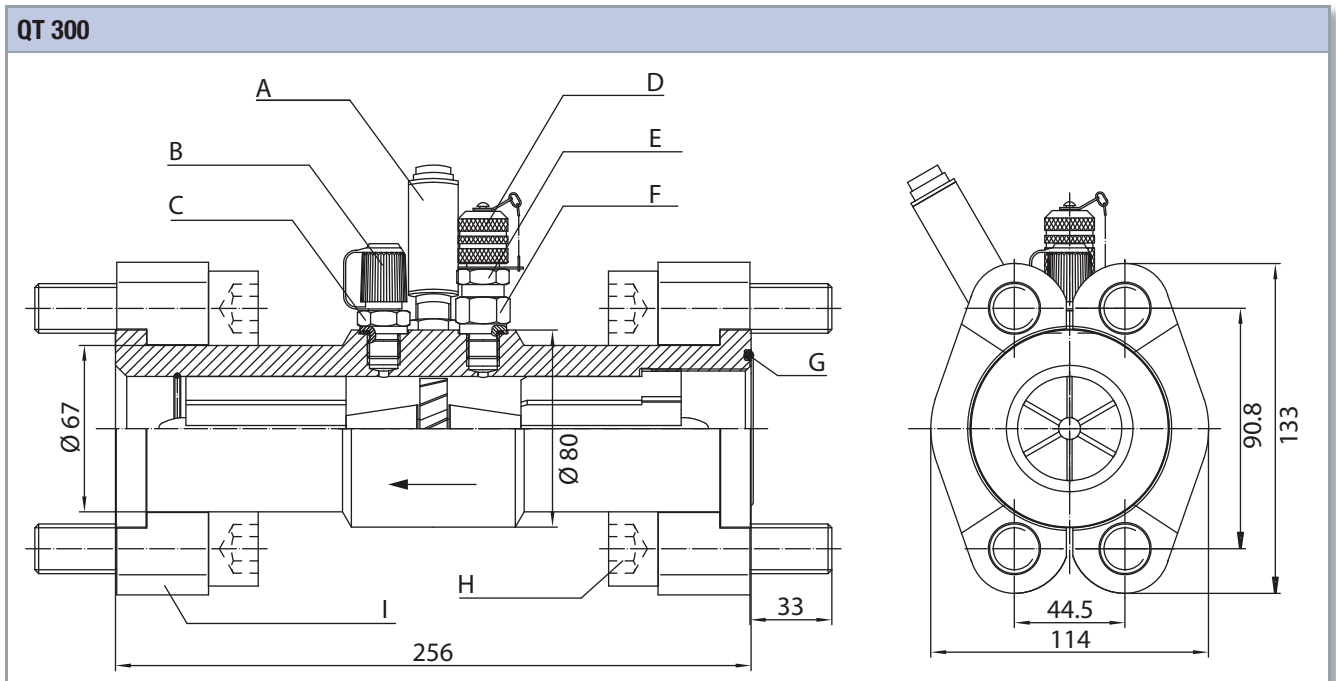
- 4 pc. SAE-flange halves 2", straight (420 bar)
- 1 pc. SAE-sealing (O ring) ID 56.74x3.53 90 shore A, NBR
- 8 pc. cylinder screws DIN 912 (ISO 4762) M20 x 70 – 8.8

Qualities	
Measuring principle	volume flow
Viscosity range	1 ... 100 mm ² /s (cSt)
Medium temperature	max. +120 °C
Environmental temperature	-20 ... +85 °C
Storage temperature	-20 ... +85 °C
Output signal	frequency (rectangular signal)
Supply voltage U _b	6.5 ... 30 VDC
Error limit	± 3.0 % of current value
Electrical measuring connector	5 pole device connector, M16 x 0.75
Protection type (EN 60529 / IEC 529)	IP 40
Tightening torque	10 Nm (± 2 Nm)
Calibration viscosity	30 mm ² /s (cSt)
Material turbine casing	high-grade steel X10CrNiS189 (1.4305)
Material turbine wheel	1.4104
Material sealings	FKM
Material sensor casing	3.1645
Suitable measuring cable	MK 01

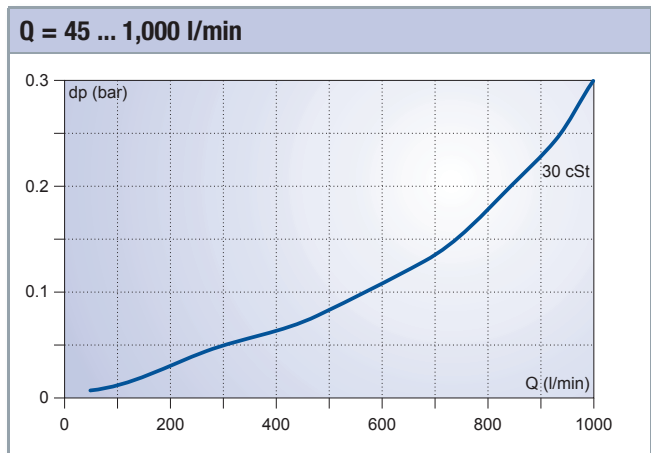
Pin assignment	Frequency (rectangular signal)
	Pin 1 = signal +
	Pin 2 = - U _b / signal - / GND
	Pin 3 = + U _b
	Pin 4 = free
	Pin 5 = free

Measuring range	Max. working pressure		Error limit	Weight	Order number
	l/min	bar			
45 ... 1,000	420	42	± 3.0 %	11,440*	31WD-88-35.030

*: with flanges and cylinder screws



- A Inductive sensor with amplifier, screw-in thread M14 x 1
- B MINIMESS® test point, series 1620
- C max. tightening torque $M_{Amax} = 40 \text{ Nm}$
- D MINIMESS® p/T-test point for pressure and temperature, series 1620
- E max. tightening torque $M_{Amax} = 16 \text{ Nm}$
- F max. tightening torque $M_{Amax} = 40 \text{ Nm}$
- G SAE sealing (O ring) ID 56.74 x 3.53 90 shore A, NBR
- H 8 pc. hexagon cylinder screws, ISO 4762-M20 x 70 – 8.8
- I 4 pc. SAE flange halves 2", high-pressure version 42 MPa (6,000 PSI)



Turbine volume flow sensors with load valve**Volume flow measuring under load**

Testing of pumps, e.g. the recording of a characteristic curve in dependency of the pressure is simplified significantly by using the HySense QL sensors, as a nonexistent load can be simulated.

Volume flow sensor (turbine), load valve and test points for pressure and temperature are combined in a single unit. The mechanical connection (inlet and outlet) are designed as inside thread 150 228-G 1¼".

The required pressure protection must be provided by the customer, e.g. by mounting a pressure limiting valve in front of the HySense QL, or with the upstream hydraulic system.

Application examples

- Hydraulic load simulations
- Hydraulic performance test and efficiency measurements
- Component tests
- Load setting of hydraulic components
- Pump tests

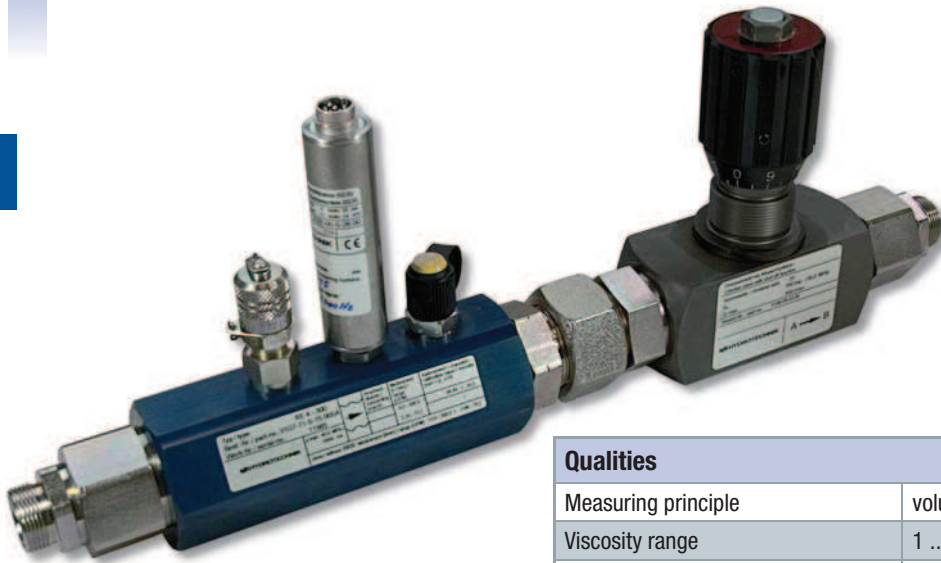
Special advantages of HySense QL

- measuring of pressure and temperature with separate sensors
- sensitive pressure adjustment
- all controls are easy to operate
- versions for 0 ... 300 and 0 ... 600 l/min available

Please ensure that the hydraulic system has an adequate pressure protection when using HySense QL load valves!



Turbine volume flow sensor with load valve



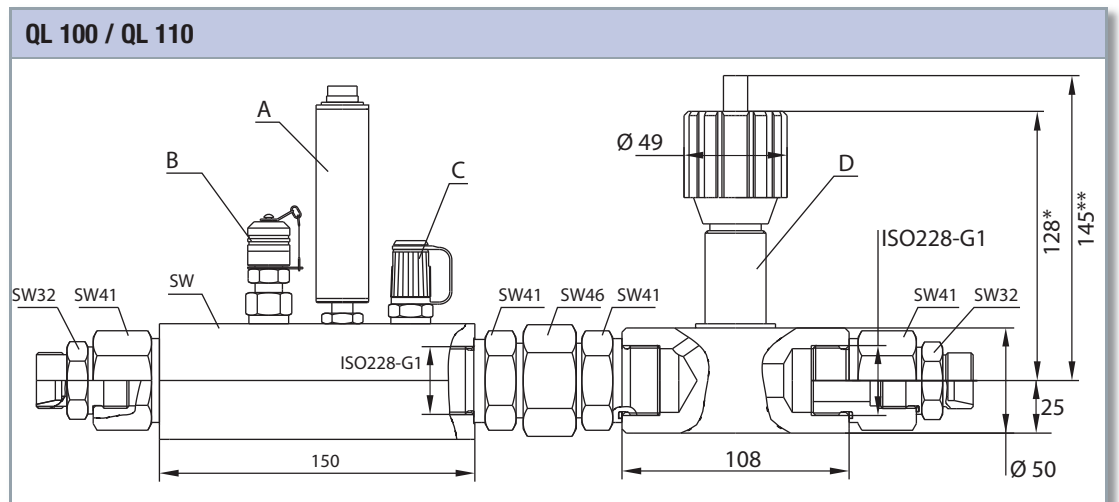
Qualities

Measuring principle	volume flow
Viscosity range	1 ... 100 mm ² /s (cSt)
Medium temperature	max. +120 °C
Environmental temperature	-20 ... +85 °C (short-term up to +100 °C)
Storage temperature	-20 ... +85 °C
Output signal	frequency (rectangular signal) / 4 ... 20 mA
Supply voltage U _b	12 ... 24 VDC
Error limit	± 2.5 % of current value
Electrical measuring connector	5 pole device connector, M16 x 0.75
Protection type (EN 60529 / IEC 529)	IP 40
Tightening torque (sensor)	10 Nm (± 2 Nm)
Calibration viscosity	30 mm ² /s (cSt)
Material turbine casing	Aluminium (AlZnMgCu 1,5)
Material turbine wheel	1.0718
Material sealings	FKM
Material sensor casing	3.1645 (QL 100) / 1.4301 (QL 110)
Suitable measuring cable	MK 01

Pin assignment

Pin assignment	QL 100 (frequency)	QL 110 (4 ... 20 mA)
	Pin 1 = signal +	Pin 1 = signal +
	Pin 2 = - U _b / signal - / GND	Pin 2 = signal - / GND
	Pin 3 = + U _b	Pin 3 = + U _b
	Pin 4 = free	Pin 4 = free
	Pin 5 = free	Pin 5 = free

Version	Measuring range	Max. working pressure		Weight	Order number
		l/min	bar		
QL 100	15 ... 300	350	35	4,324	31VB-71-35.030
QL 110	15 ... 300	350	35	4,461	31GB-71-35.030



Decoding „L“ and „G“ see order data

A f/l-converter 4 ... 20 mA

B MINIMESS® p/T-test point for pressure and temperature, series 1620

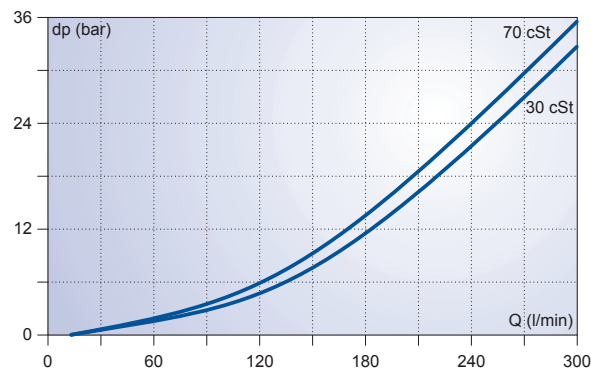
C MINIMESS® test point, series 1620

D throttle valve NG 20

* closed

** opened

Q = 15 ... 300 l/min





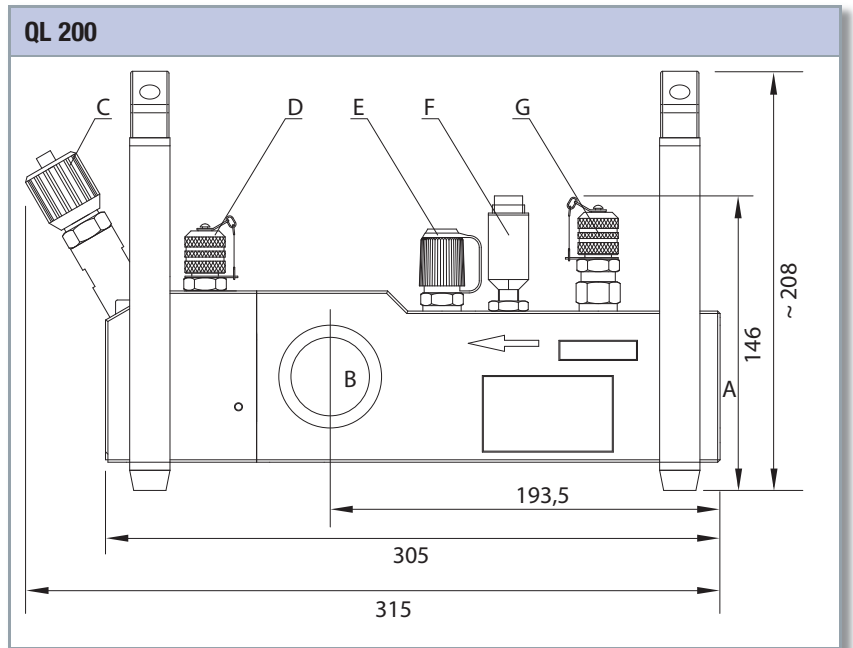
Turbine volume flow sensor with load valve



Qualities	
Measuring principle	volume flow
Viscosity range	1 ... 100 mm ² /s (cSt)
Medium temperature	max. +120 °C
Environmental temperature	-20 ... +85 °C (short-term up to +100 °C)
Storage temperature	-20 ... +85 °C
Output signal	frequency (rectangular signal)
Supply voltage U _b	6.5 ... 30 VDC
Error limit	± 2.5 % of current value
Electrical measuring connector	5 pole device connector, M16 x 0.75
Mechanical measuring connector	ISO228-G1¼
Protection type (EN 60529 / IEC 529)	IP 40
Tightening torque (sensor)	10 Nm (± 2 Nm)
Calibration viscosity	30 mm ² /s (cSt)
Material turbine casing	Aluminium (3.4365)
Material turbine wheel	1.0718
Material sealings	FKM
Material sensor casing	3.1645
Suitable measuring cable	MK 01

Pin assignment	Frequency (rectangular signal)
	Pin 1 = signal +
	Pin 2 = - U _b / signal - / GND
	Pin 3 = + U _b
	Pin 4 = free
	Pin 5 = free

Measuring range	Max. working pressure		Weight	Order number
	bar	MPa		
l/min	bar	MPa	g	
16 ... 600	420	42	6,516	31VB-72-35.030A2



- A Inlet connector
- B Outlet connector
- C Throttle valve for continuous pressure adjustment
- D MINIMESS® test point for ventilation, series 1620
- E MINIMESS® test point, series 1620
- F Inductive sensor
- G MINIMESS® p/T-test point for pressure and temperature, series 1620

Q = 12 ... 600 l/min

