



MINIMESS®

Sensors

Measuring systems

Service and calibration

58 YEARS

A System for Measurements

We are an innovative mid-sized company that has firmly established itself as one of the leading providers of industrial measuring equipment for high-pressure system diagnostics and condition monitoring – both nationally and internationally. Moreover, we employ over 140 people worldwide as the Hydrotechnik Group and not only operate locations in Germany, but also sales branches in France, Italy, China, Singapore, Japan, India and

the US.

We provide our customers with unbeatable “Made in Germany” product quality, and our products are manufactured exclusively in Germany. In addition, we are known for cultivating long-term relationships with our customers and offering unrivalled service and solutions for everything having to do with measuring equipment.



MINIMESS®

Sensors

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MINIMESS®

Trendsetting details and innovations

Expertise in everything having to do with hydraulic measuring technology is one of the main constants behind the history of Hydrotechnik. In fact, the **MINIMESS®** plug-in coupling featuring a ball check was first launched on the market in 1964, immediately redefining what was possible in the field of pressure measuring technology for hydraulic systems. And it was no surprise, as the advantages behind the novel development were immediately compelling: Instead of having to open the hydraulic circuit and install a pressure gauge for diagnostic or maintenance activities, the innovation had suddenly made it possible to quickly and safely connect pressure sensors and gauges without any downtime.

The name Hydrotechnik has long been considered a standard-bearer in the area of hydraulic measuring equipment, and that is even before the introduction of its new leak-proof test point with a soft seal in 1982.

Previous developments such as the **MINIMESS®** p/T test point, which can be used to measure pressure and temperature at a single measuring point directly in a fluid, and the **MINIMESS®** gas charging valve, with its excellent gas tightness, had already made it clear that Hydrotechnik GmbH was a force of innovation to be reckoned with.

From small-scale handmade batches to series production

From the very moment Hydrotechnik GmbH was

founded, every single product has been made at the company's headquarters in Limburg an der Lahn. A high level of vertical integration and lean processes enable us to quickly respond to our customers' needs – from handmade small-scale production for the most demanding measuring tasks to mass production. Hydrotechnik GmbH always uses the best approach to provide users with safe, high-quality products that are specifically fine-tuned to match their requirements.

The future looks bright

By continuously enhancing and developing its products for applications in an extremely wide variety of industries and combining that with decades of experience, Hydrotechnik GmbH has remained an unrivaled partner for products and services that go far beyond the classic test point.

From the project phase, through prototypes, to the finished product, we actively support our customers worldwide with the implementation of their projects. In fact, we are known for implementing the most extraordinary applications without ever losing focus on the big picture or on detail and utmost meticulousness. An international presence and unrivalled experience with the **MINIMESS®** make us the ideal partner for your needs – today and well into the future.

MINIMESS®

ORIGINAL MINIMESS® TEST POINTS

The go-to system access solution for fluid circuit analyses, sampling, charging, and venting.

The p/T version can be used to measure pressures and temperatures at a single measuring point at the same time.

1620 series – Page 12 - 13



1620 p/T s



ORIGINAL MINIMESS^{XTREME}® TEST POINTS

Pressures of up to 1,000 bar, immersion depths of up to 5,000 m, and temperatures as low as -60 °C are simply a matter of course for these high-performance products. In other words, they are the product of choice for the most demanding measuring tasks out there.

Offshore – Page 20



Deep Sea –



ORIGINAL MINIMESS® GAS CHARGING VALVES AND ACCESSORIES

Designed to make it easy, fast, and safe to fill, monitor, and empty gas accumulators and gas-conveying lines.

Gas charging valves – Page 23



DVGW test



ADAPTERS WITH ORIGINAL MINIMESS® TEST POINTS

Used to retrofit test points on existing systems. New installations? Combining measuring points? Not a problem.

DKO fittings – Pages 28 – 33



DKO combi
Page 34 - 37



MINIMESS® GAUGE AND SENSOR ADAPTERS, HOSE LINES, AND ACCESSORIES

Connect your pressure gauges and sensors directly to your test point or use one of our MINIMESS® hose lines. In addition, this group includes hose materials parts designed for the MINIMESS® Xtreme.

Gauge and sensor adapters – Page 43 - 45



Hose lines –



EXPANDED MINIMESS® PORTFOLIO

Special solutions for your technical fluid applications that are designed to complement our range of traditional MINIMESS® products.

Minivalv throttle check valve
Page 58



FlatFaced
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Series – Page 14



1615 series – Page 15



1215 series – Page 16 - 17



1604 series – Page 19



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Special Fluids – Page 20



Low Temperatures – Page 21



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Gas charging valve with accumulator adapter
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Accumulator charging and testing device
Page 26



Gas charging and testing device with pressure regulator
Page 26



Di fittings / tee adapters



90° swivel fittings – Page 38



Bulkhead versions – Page 39 - 40



Sleeves for ORFS and 37° flared fitting
Page 41 - 42



– Page 47 - 56



Gauge and sensor adapters for bulkheads – Page 57



Diagnostic couplings



Test couplings for air brake systems – Page 59



Original MINIMESS® test points

The benchmark for test couplings

MINIMESS® test points serve as system access points for analyses and tests in fluid circuits, and can be used to make a leak-tight connection under pressure. This makes it possible to connect sensors or pressure gauges or draw samples as necessary without any downtimes. Moreover, the test points can be used to fill, vent, and empty systems.

Original MINIMESS® test points

- | Are an integral part of measuring and testing equipment
- | Can be used to make leak-tight connections under pressure
- | Open and close automatically when a hose or sensor is connected / disconnected
- | Save time and money by making diagnostics and maintenance faster, improving machine availability as a result
- | Save money by ensuring that expensive sensors do not have to be permanently installed for servicing purposes
- | Conform to ISO 15171-2 (MINIMESS® 1620)
- | Have a four-fold safety factor in regard to bursting
- | Are certified with 1,000,000 pressure pulses at 1.3 times the operating pressure
- | Can also be used at low temperatures
- | Are highly resistant to corrosion (salt spray test longer than 1,000 hours)
- | Are suitable, without restrictions, for HL, HLP, HVLP hydraulic fluids in conformity with DIN 51524

The **original MINIMESS® 1620 p/T test point** is a multipurpose test point that can be used to simultaneously measure pressure and temperature at a single measuring point. As a result, the number of required measuring points can be reduced by up to 50%.

The temperature is measured directly in the flowing fluid, resulting in extremely short response times.

For information on compatible HySense® p/T combo sensors, please refer to page 144.

Test point	Screw cap thread	Nominal diameter	Max. operating pressure ¹	Material selection	Seal materials
MINIMESS® 1620	M16x2	DN2	630 bar	1.0718 free cutting steel 1.4571 stainless steel	NBR (Perbunan) FKM (Viton)
MINIMESS® 1620 p/T	M16x2	DN2	630 bar		
MINIMESS® 1615	M16x1,5	DN2	630 bar		
MINIMESS® 1215	Buttress thread 12	DN2	630 bar		
MINIMESS® 1604	Buttress thread 16	DN4	400 bar		

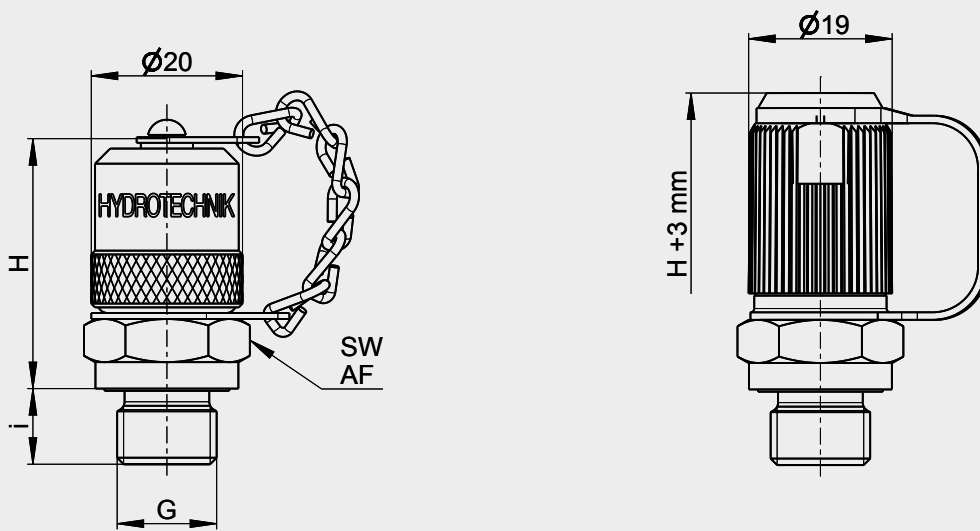
Additional materials and seal materials available upon request.

¹ Depends on the size of the stud end.



Original MINIMESS® 1620 test point

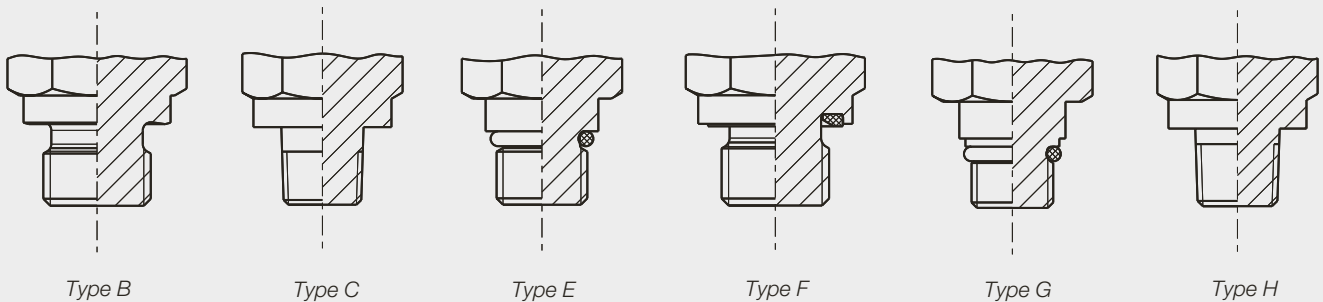
The MINIMESS® 1620 test point with an M16 x 2 thread is the top seller among test couplings and is used for most standard applications. It can be used with operating pressures of up to 630 bar and is available in a wide variety of versions with various international threads and seal types.



Version with metal cap

Version with plastic cap

Seal types



Type B

Type C

Type E

Type F

Type G

Type H

Thread	Seal type ¹	Technical specifications					Material: 1.0718 free cutting steel	Material: 1.4571 Stainless steel
		M ² Nm	p _n ³ bar	H mm	i mm	AF mm	Part No. with metal cap & NBR seals	Part No. with metal cap & FKM seals
Metric ISO thread								
M10 x 1	E	20	630	37.5	9.5	17	2103-01-94.00N	–
M10 x 1	F	20	400	37.6	8	17	2103-01-12.00N	2703-01-12.10
M10 x 1	G	15	630	37.5	8.5	17	2103-01-33.00N	2703-01-33.10
M12 x 1.5	B	45	630	36	10	17	2103-01-48.00N	–
M12 x 1.5	E	35	630	35.1	11	17	2103-01-95.00N	–
M12 x 1.5	F	45	630	36	10	17	2103-01-13.00N	2703-01-13.10
M14 x 1.5	B	60	630	36	10	19	2103-01-49.00N	–
M14 x 1.5	E	45	630	35.5	11	19	2103-01-96.00N	–
M14 x 1.5	F	60	630	36	10	19	2103-01-14.00N	2703-01-14.10
M16 x 1.5	F	80	630	36	10	22	2103-01-15.00N	–
Whitworth thread								
ISO 228-G 1/8	F	20	400	38	8	17	2103-01-17.00N	2703-01-17.10
ISO 228-G 1/4	B	60	630	36	10	19	2103-01-51.00N	2703-01-51.10
ISO 228-G 1/4	F	60	630	36	10	19	2103-01-18.00N	2703-01-18.10
ISO 228-G 3/8	F	90	630	36	10	22	2103-01-16.00N	2703-01-16.10
UNF thread								
7/16-20 UNF	E	20	630	37	11	17	2103-01-B5.00N	2703-01-B5.10
9/16-18 UNF	E	35	630	36	12	17	2103-01-B6.00N	2703-01-B6.10
Tapered thread								
ISO 7/I-R 1/8	C	–	400	33	13	17	2103-01-40.00N	–
ISO 7/I-R 1/4	C	–	630	33	13	17	2103-01-41.00N	2703-01-41.10
NPTF thread								
1/8 NPTF	H	–	400	33	9.5	17	2103-01-46.00N	–
1/4 NPTF	H	–	630	33	16.5	17	2103-01-47.00N	2703-01-47.10
Options								
Part No. with FKM seals							XXXX-XX-XX.10N	–
Part No. with plastic cap							XXXX-30-XX.XXN	XXXX-30-XX.XX
Operating temperature ranges: With NBR seals: -25 °C ... 100 °C / With FKM seals: -20 °C ... 200 °C / With plastic cap: Max. 100 °C								
Additional versions, materials, and seal materials available upon request.								

¹ For detailed specifications regarding the seal types, please refer to pages 62 – 64

² M = Tightening torque for stud end in conformity with the applicable standards. It is the user's own responsibility to determine the appropriate installation torque for their specific installation situation.

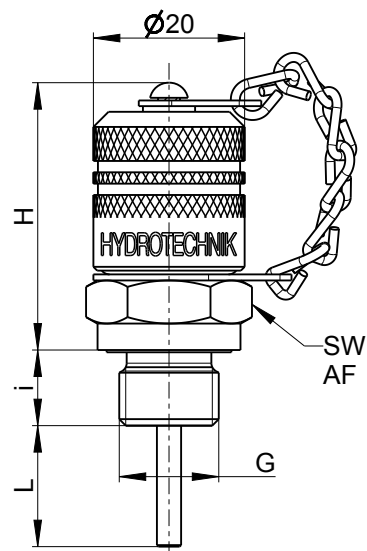
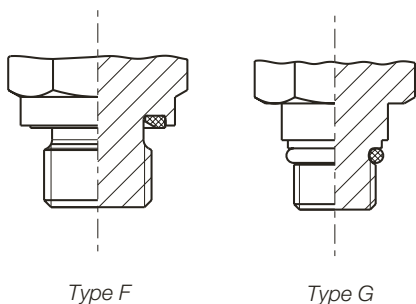
³ p_n = Maximum operating pressure

Original MINIMESS® 1620 p/T test point

The MINIMESS® 1620 p/T test point can be used to simultaneously measure pressure and temperature with only one single test coupling by using a p/T multipurpose sensor. This results in fewer measuring points and sensors being required.

The p/T test point can be used with operating pressures of up to 630 bar.

Seal types



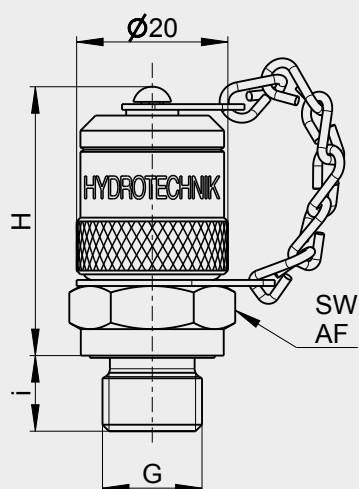
Thread	Seal type ¹	Technical specifications							Material: 1.0718 free cutting steel	Material: 1.4571 Stainless steel
		M ² Nm	p _n ³ bar	H mm	i mm	L mm	AF mm	Part No. with metal cap & NBR seals	Part No. with metal cap & FKM seals	
Metric ISO thread										
M10 x 1	G	15	630	38	8.5	16	17	2149-04-19.13N	2749-04-19.53	
Whitworth thread										
ISO 228-G 1/4	F	60	630	36.5	10	16	19	2149-04-15.13N	2749-04-15.53	
Options										
Part No. with FKM seals								XXXX-XX-XX.53N	–	
Part No. with EPDM seals								XXXX-XX-XX.43N	–	
Operating temperature ranges: With NBR seals: -25 °C ... 100 °C / With FKM seals: -20 °C ... 200 °C / With EPDM seal: -40 °C ... 125 °C										
Additional versions, materials, and seal materials available upon request.										

¹ For detailed specifications regarding the seal types, please refer to pages 62 – 64

² M = Tightening torque for stud end in conformity with the applicable standards. It is the user's own responsibility to determine the appropriate installation torque for their specific installation situation.

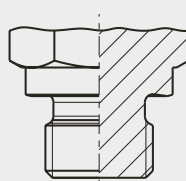
³ p_n = Maximum operating pressure

Original MINIMESS® 1615 test point

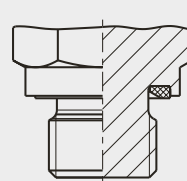


The MINIMESS® 1615 test point was developed primarily for military applications and has an alternative M16 x 1.5 coupling thread available. It can be used with operating pressures of up to 630 bar and is available with various threads.

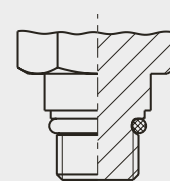
Seal types



Type B



Type F



Type G

Thread	Seal type ¹	Technical specifications					Material: 1.0718 free cutting steel	Material: 1.4571 Stainless steel
		M ² Nm	p _n ³ bar	H mm	i mm	AF mm	Part No. with metal cap & NBR seals	Part No. with metal cap & FKM seals
Metric ISO thread								
M10 x 1	G	15	630	37.5	8.5	17	2102-01-33.00N	2702-01-33.10
M12 x 1.5	F	45	630	36	10	17	2102-01-13.00N	2702-01-13.10
M14 x 1.5	B	60	630	36	10	19	2102-01-49.00N	–
M14 x 1.5	F	60	630	36	10	19	2102-01-14.00N	2702-01-14.10
Whitworth thread								
ISO 228-G 1/8	F	20	400	38	8	17	2102-01-17.00N	–
ISO 228-G 1/4	B	60	630	36	10	19	2102-01-51.00N	–
ISO 228-G 1/4	F	60	630	36	10	19	2102-01-18.00N	2702-01-18.10
Options								
Part No. with FKM seals							XXXX-XX-XX.10N	–
Operating temperature ranges: With NBR seals: -25 °C ... 100 °C / With FKM seals: -20 °C ... 200 °C								
Additional versions, materials, and seal materials available upon request.								

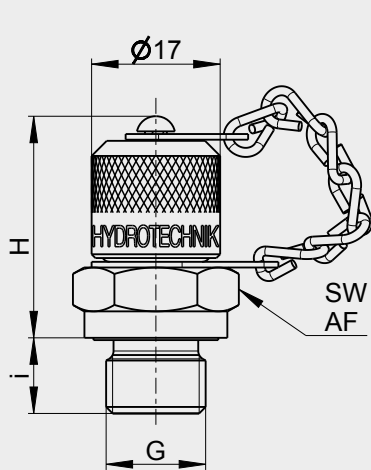
¹ For detailed specifications regarding the seal types, please refer to pages 62 – 64

² M = Tightening torque for stud end in conformity with the applicable standards. It is the user's own responsibility to determine the appropriate installation torque for their specific installation situation.

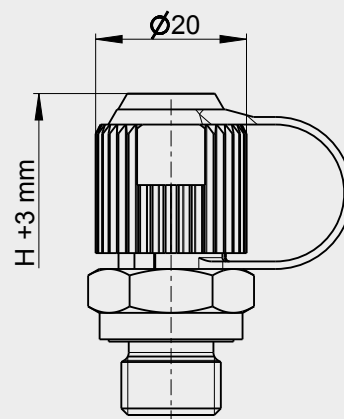
³ p_n = Maximum operating pressure

Original MINIMESS® 1215 test point

The MINIMESS® 1215 test point is characterized by a small coupling thread, resulting in a very compact design. It was originally developed as an alternative test point for metrological applications in places where space is tight. The test point can be used with operating pressures of up to 630 bar and is available with various international threads and seal types.

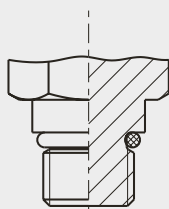


Version with metal cap

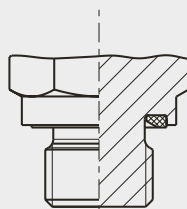


Version with plastic cap

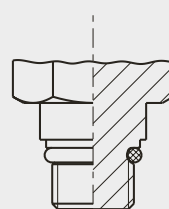
Seal types



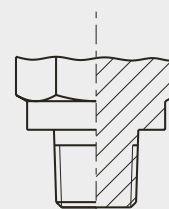
Type E



Type F



Type G



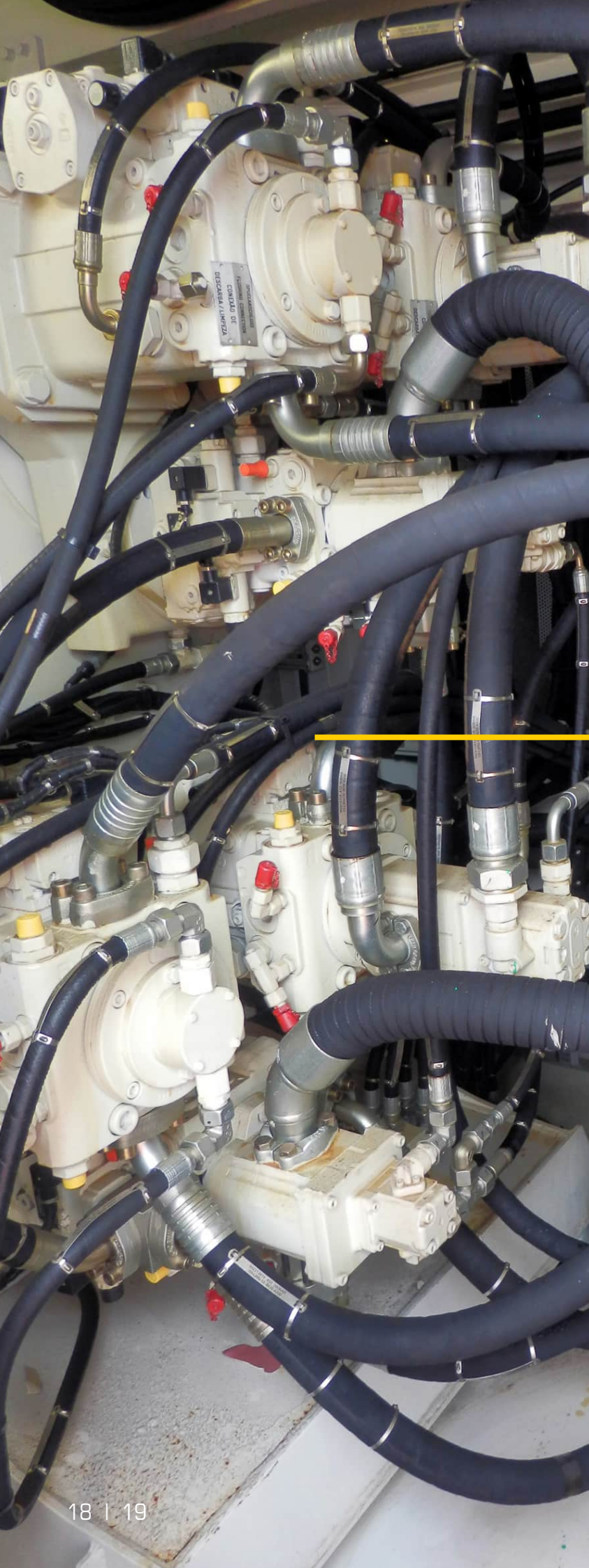
Type H

Thread	Seal type ¹	Technical specifications					Material: 1.0718 free cutting steel	Material: 1.4571 Stainless steel
		M ² Nm	p _n ³ bar	H mm	i mm	AF mm	Part No. with metal cap & NBR seals	Part No. with metal cap & FKM seals
Metric ISO thread								
M10 x 1	G	15	630	30	8.5	14	2101-06-33.00N	2701-06-33.10
M12 x 1.5	E	35	630	29	11	17	2101-06-76.00N	–
M12 x 1.5	F	45	630	29	10	17	2101-06-13.00N	–
M14 x 1.5	E	45	630	29	11	19	2101-06-96.00N	–
M14 x 1.5	F	60	630	29	10	19	2101-06-14.00N	–
Whitworth thread								
ISO 228-G 1/8	F	20	400	30	8	14	2101-06-17.00N	2701-06-17.10
ISO 228-G 1/4	F	60	630	29	10	19	2101-06-18.00N	2701-06-18.10
UNF thread								
7/16-20 UNF	E	20	630	29	11	17	2101-06-B5.00N	2701-06-B5.10
9/16-18 UNF	E	35	630	28	12	17	2101-06-B6.00N	–
Tapered thread								
1/8 NPTF	H	–	400	26	12	14	2101-06-46.00N	2701-06-46.10
1/4 NPTF	H	–	630	26	15	14	2101-06-47.00N	2701-06-47.10
Options								
Part No. with FKM seals						XXXX-XX-XX.10N		–
Part No. with plastic cap						XXXX-01-XX.XXN		XXXX-01-XX.XX
Operating temperature ranges: With NBR seals: -25 °C ... 100 °C / With FKM seals: -20 °C ... 200 °C / With plastic cap: Max. 100 °C								
Additional versions, materials, and seal materials available upon request.								

¹ For detailed specifications regarding the seal types, please refer to pages 62 – 64

² M = Tightening torque for stud end in conformity with the applicable standards. It is the user's own responsibility to determine the appropriate installation torque for their specific installation situation.

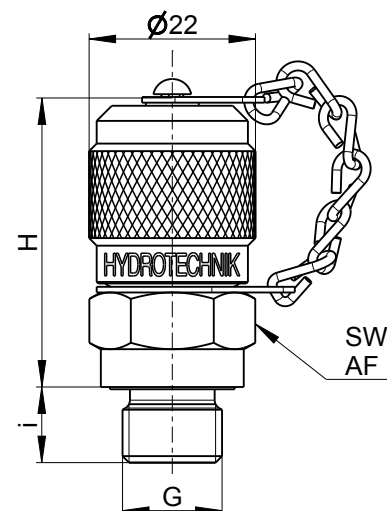
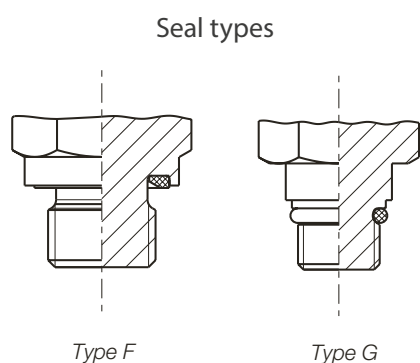
³ p_n = Maximum operating pressure



Original MINIMESS® 1604 test point

The MINIMESS® 1604 test point is particularly suitable for quickly filling or emptying systems as a result of its nominal diameter of DN4.

The test point can be used with operating pressures of up to 400 bar and is available with various threads.



Thread	Seal type ¹	Technical specifications					Material: 1.0718 free cutting steel	Material: 1.4571 Stainless steel
		M ² Nm	p _n ³ bar	H mm	i mm	AF mm	Part No. with metal cap & NBR seals	Part No. with metal cap & FKM seals
Metric ISO thread								
M10 x 1	G	15	400	43	8.5	17	2106-01-33.00N	—
M12 x 1.5	F	45	400	40	10	17	2106-01-13.00N	—
M14 x 1.5	F	60	400	40	10	19	2106-01-14.00N	—
Whitworth thread								
ISO 228-G 1/4	F	60	400	40	10	19	2106-01-18.00N	2706-01-18.10
Options								
Part No. with FKM seals							XXXX-XX-XX.10N	—
Operating temperature ranges: With NBR seals: -25 °C ... 100 °C / With FKM seals: -20 °C ... 200 °C								
Additional versions, materials, and seal materials available upon request.								

¹ For detailed specifications regarding the seal types, please refer to pages 62 – 64

² M = Tightening torque for stud end in conformity with the applicable standards. It is the user's own responsibility to determine the appropriate installation torque for their specific installation situation.

³ p_n = Maximum operating pressure

Original MINIMESS[®]Xtreme[®] test points for liquids and gases

Offshore

MINIMESS[®] Offshore series test points and gas charging valves were developed for direct contact with salt water, and their premium stainless steel construction enables them to withstand the extreme environmental conditions present at sea.

- | Body, internal parts, and cap made of corrosion-resistant 1.4571 stainless steel
- | Can be used with temperatures as low as -40 °C
- | Splash-proof



Deep Sea

MINIMESS[®] Deep Sea series test points and gas charging valves are designed for high ambient pressures of up to 500 bar. Moreover, their special construction makes it possible to use them safely at deep depths by reliably preventing the ingress of salt water.

- | Designed to withstand ambient pressures of up to 500 bar and depths of up to 5,000 meters
- | Body, internal parts, and cap made of corrosion-resistant 1.4571 stainless steel
- | Absolutely no leaks when subjected to internal and ambient pressure



Fluids

MINIMESS[®] test points for special fluids are characterized by high chemical and thermal resistance. This is particularly important for the chemical, aviation, and vehicle manufacture industries, which use fluids that entail special requirements for seal materials. It also means that MINIMESS[®] test points for special media can be used for an extremely wide variety of applications.

- | High chemical resistance against aviation hydraulic fluid (Skydrol[®]), brake fluid (DOT3 to DOT5), etc.
- | High resistance to temperatures of up to more than 300 °C when using special FFKM seals
- | Available with a free cutting steel or stainless steel body



Low Temperature

MINIMESS® low-temperature test points, which are made of stainless steel, can be used at extremely low temperatures. The secret consists of special seal materials that ensure safe and reliable sealing under extreme cold conditions.

- | Can be used with temperatures as low as -60 °C
- | Premium-grade elastomers
- | We also have compatible low-temperature hoses available



Pressure

The new MINIMESS® high-pressure test point combines all the characteristics of our classic MINIMESS® test points with a significantly higher pressure resistance. The test point is tested with four times its maximum operating pressure in order to guarantee the safety of its users.

- | Operating pressures of up to 1,000 bar
- | Burst pressure > 4,000 bar
- | Long service life: > 1,000,000 pressure pulses at 1,330 bar



Original MINIMESS® gas charging valves and accessories

Original MINIMESS® gas charging valves are designed to make it easy and fast to fill, empty, and test hydraulic accumulators. Moreover, they can be used as system access points for maintenance, monitoring, and analysis tasks on gas-conveying systems.

On top of this, extraordinarily low leakage flow rates make MINIMESS® gas charging valves the ideal choice for long-term use in systems with extremely demanding safety requirements as well.

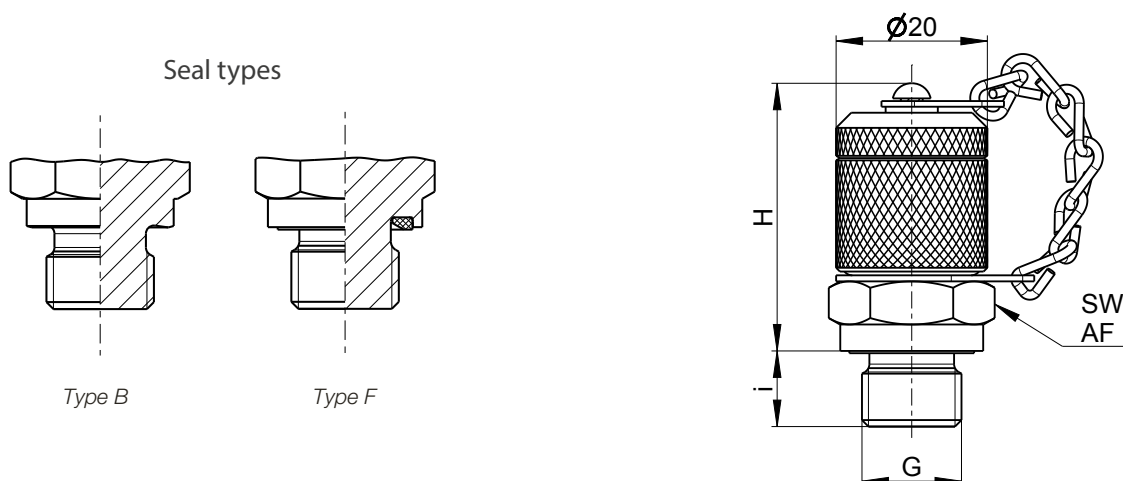
Original MINIMESS® gas charging valves

- | Feature extraordinary gas tightness with a leakage flow rate $< 2 \cdot 10^{-5}$ mbar·l/s (He) within a permissible temperature range of -20 °C to 135 °C
- | Can be used to make connections under pressure
- | Open and close automatically when a charging device or sensor is connected / disconnected
- | Save time and money by making diagnostics and maintenance faster, improving machine availability as a result
- | Save money by ensuring that expensive sensors do not have to be permanently installed for servicing purposes
- | Have a four-fold safety factor in regard to bursting
- | Can also be used at low temperatures
- | Are made of corrosion-resistant stainless steel
- | Are suitable for all inert gases



Original MINIMESS® 1615 gas charging valve

The original MINIMESS® 1615 gas charging valve is designed specifically for use with inert gases and features an extraordinary low gas leakage flow rate of less than $2 \cdot 10^{-5}$ mbar-l/s (He). It can be used with operating pressures of up to 630 bar and is available with various threads.



Thread	Seal type ¹	Technical specifications					Material: 1.4104 Stainless steel	Material: 1.4571 Stainless steel
		M ² Nm	p _n ³ bar	H mm	i mm	AF mm	Part No. with metal cap & FKM seals	Part No. with metal cap & FKM seals
Metric ISO thread								
M12 x 1.5	F	45	630	36	10	17	–	2402-01-13.50
M14 x 1.5	B	60	630	36	10	19	2402-01-49.00*	2402-01-49.30**
M14 x 1.5	F	60	630	36	10	19	2402-01-14.00	–
Whitworth thread								
ISO 228-G 1/4	F	60	630	36	10	19	2402-01-18.00	–
Operating temperature ranges: -20 °C ... 135 °C /* -33 °C ... 135 °C /** -46 °C ... 135 °C								
Additional versions, materials, and seal materials available upon request.								

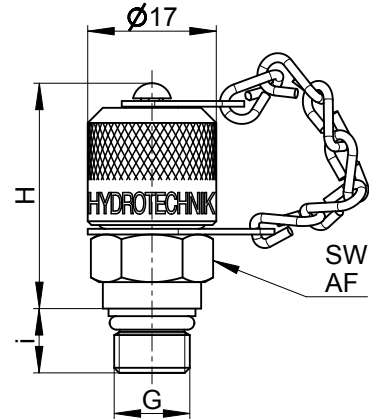
¹ For detailed specifications regarding the seal types, please refer to pages 62 – 64

² M = Tightening torque for stud end in conformity with the applicable standards. It is the user's own responsibility to determine the appropriate installation torque for their specific installation situation.

³ p_n = Maximum operating pressure

Original MINIMESS® 1215 gas charging valve with DVGW certification

The original MINIMESS® 1215 DVGW gas charging valve can be used to establish a system access point for gas pressure regulating stations and connect control measuring devices for pressure measurement and gas sampling as specified in DVGW Code of Practice G 491, Section 5.7.1. It can be used with operating pressures of up to 250 bar and is characterized by a small coupling thread resulting in a very compact design and an extraordinary low gas leakage flow rate of less than $2 \cdot 10^{-5}$ mbar·l/s.



- I DVGW certification for:
Products for gas supply applications
- I Registration number: DG-4513BL0337
Certificate owner and distributor:
Hydrotechnik GmbH



Thread	Seal type ¹	Technical specifications					Material: 2.0371 Brass	Material: 1.4571 Stainless steel
		M ² Nm	p _n ³ bar	H mm	i mm	AF mm	Part No. with metal cap & NBR seals	Part No. with metal cap & NBR seals
G								
M10 x 1	G	15	250	30	8.5	14	2801-66-33.00	2701-66-33.00
Operating temperature range: -20 °C ... 70 °C								
Additional versions available upon request.								

¹ For detailed specifications regarding the seal types, please refer to pages 62 – 64

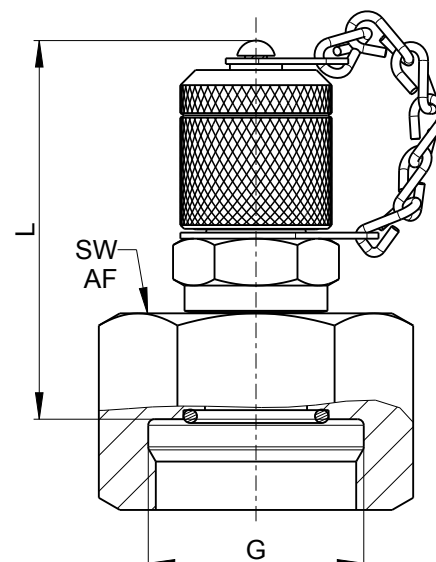
² M = Tightening torque for stud end in conformity with the applicable standards. It is the user's own responsibility to determine the appropriate installation torque for their specific installation situation.

³ p_n = Maximum operating pressure

Original MINIMESS® 1615 gas charging valve with accumulator adapter

The original MINIMESS® 1615 gas charging valve featuring an accumulator adapter can be used to directly install the valve on all popular bladder accumulators and can be used with operating pressures of up to 400 bar.

This gas charging valve makes it possible to safely charge and empty accumulators with an extremely low leakage flow rate.



Female thread	Technical specifications			Material:
	p_n^1 bar	L mm	AF mm	Gas charging valve: 1.4104 stainless steel Accumulator adapter: 1.0718 free cutting steel
G				Part No. FKM seals
7/8-14 UNF	400	59.3	30	2446-16-30.00
M28 x 1.5	400	50.6	36	2446-18-30.00
Operating temperature range: -25 °C ... 100 °C				
Additional versions, materials, and seal materials available upon request.				

¹ p_n = Maximum operating pressure

MINIMESS® accumulator charging and testing device

The MINIMESS® accumulator charging and testing device can be used to charge and test multiple accumulators without having to close the pressure source (usually a nitrogen cylinder).

The pressure in the charging and testing device can be relieved after closing the nitrogen cylinder by opening the relief valve.

In contrast to devices for which the pressure source needs to be closed after every charging operation, the MINIMESS® accumulator charging and testing device can be used to charge or test multiple accumulators, saving time and cutting costs as a result.



Gas charging and testing device with pressure regulator

Premium quality. Made in Germany. For charging, adjusting, and monitoring gas pressures in nitrogen hydraulic accumulators and featuring pressure gauges with a diameter of 63 mm and accuracy class 1.6.



Secondary pressure setting bar	Primary pressure setting bar	Cylinder connection thread	Secondary connection	AF mm	Part No.
10 – 235	0 – 250	W 24.32 x 1/14"	MINIMESS® 1615	28	5401-02-00.00
10 – 235	0 – 250	W 21.8 x 1/14"	MINIMESS® 1615	28	5401-02-02.00
0 – 1.3	0 – 1.6	W 24.32 x 1/14"	MINIMESS® 1615	28	5401-07-00.00

Adapter options with original MINIMESS® test points

Special installation situations, grouping together multiple measuring points at a central location, or retrofitting into existing systems – all child's play with the various fitting and adapter options for MINIMESS® test points.

Adapter option examples:

- I Combi fitting tees make it possible to retrofit or install MINIMESS® test points on hydraulic system pipes and hose lines. They have a 360° swivel range, meaning that they can adapt optimally to an extremely broad range of installation conditions.
Combi fitting tees are available with 24° sealing cone and O-ring (DKO) connections in conformity with ISO 8434-1 as standard.
Upon request, versions with a 37° flared fitting in conformity with ISO 8434-2, with an ORFS connector as per ISO 8434-3, or with a 60° cone as per ISO 8434-6 are available.
- I MINIMESS® bulkhead test points can be used, for example, to group together multiple test points at an easily accessible location, making maintenance easier as a result.



Original MINIMESS® 1620 test point with DKO fitting

MINIMESS® test points with fittings for 24° sealing cone fittings with an O-ring make it possible to easily use the test points in systems with sealing cone connections that conform to DIN 2353 / ISO 8434-1.

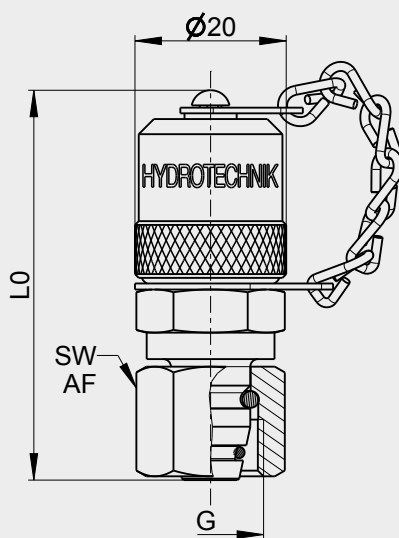


Figure 1

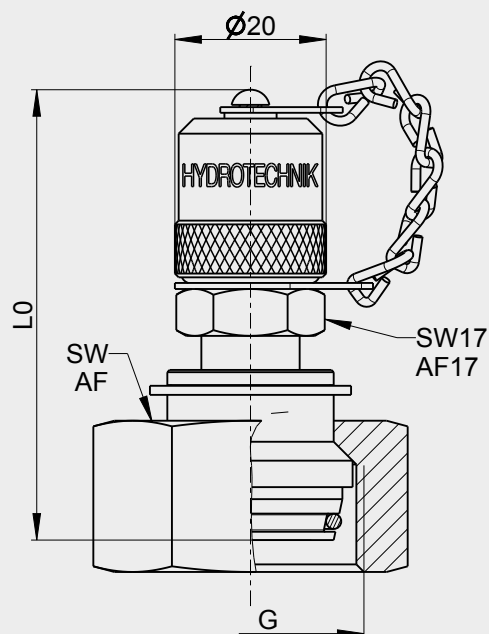
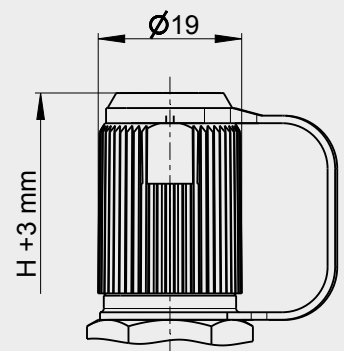


Figure 2



Version with plastic cap

Series	Thread	Technical specifications			Material: 1.0718	Material: 1.4571
		p_n^1 bar	L0 mm	AF mm	free cutting steel Part No. with metal cap & NBR seals ²	Stainless steel Part No. with metal cap & FKM seals
Light series, designed in conformity with					Figure 1	Figure 2
L 6	M12 x 1.5	315	52	14	2103-93-06.00N	2703-40-06.10
L 8	M14 x 1.5	315	52	17	2103-93-08.00N	2703-40-08.10
L 10	M16 x 1.5	315	52	19	2103-93-10.00N	2703-40-10.10
L 12	M18 x 1.5	315	52	22	2103-93-12.00N	2703-40-12.10
L 15	M22 x 1.5	315	52	27	2103-93-15.00N	2703-40-15.10
L 18	M26 x 1.5	315	52	32	2103-93-18.00N	2703-40-18.10
Light series, designed in conformity with					Figure 2	
L 22	M30 x 2	160	60	36	2103-40-22.00N	–
L 28	M36 x 2	160	61	41	2103-40-28.00N	–
L 35	M45 x 2	160	63	50	2103-40-35.00N	–
L 42	M52 x 2	160	63	60	2103-40-42.00N	–
Heavy series, designed in conformity with					Figure 1	Figure 2
S 6	M14 x 1.5	630	52	17	2103-94-06.00N	–
S 8	M16 x 1.5	630	52	19	2103-94-08.00N	2703-41-08.10
S 10	M18 x 1.5	630	52	22	2103-94-10.00N	2703-41-10.10
S 12	M20 x 1.5	630	52	24	2103-94-12.00N	2703-41-12.10
S 16	M24 x 1.5	400	52	30	2103-94-16.00N	2703-41-16.10
Heavy series, designed in conformity with					Figure 2	
S 14	M22 x 1.5	630	63	27	2103-41-14.00N	–
S 20	M30 x 2	400	63	36	2103-41-20.00N	2703-41-20.10
S 25	M36 x 2	400	64.5	46	2103-41-25.00N	2703-41-20.10
S 30	M42 x 2	400	66	50	2103-41-30.00N	–
S 38	M52 x 2	400	69	60	2103-41-38.00N	2703-41-38.10
Options						
Part No. with FKM seals					XXXX-XX-XX.10N	–
Part No. with plastic cap					XXXX-XX-XX.90N	–
Part No. with plastic cap & FKM seals					XXXX-XX-XX.95N	XXXX-XX-XX.95

¹ p_n = Maximum operating pressure

² Seal on DKO fitting made of FKM

Operating temperature ranges: With NBR seals: -25 °C ... 100 °C / With FKM seals: -20 °C ... 200 °C / With plastic cap: Max. 100 °C

Additional versions, materials, and seal materials available upon request.

Original MINIMESS® 1615 test point with DKO fitting

MINIMESS® test points with fittings for 24° sealing cone fittings with an O-ring make it possible to easily use the test points in systems with sealing cone connections that conform to DIN 2353 / ISO 8434-1.

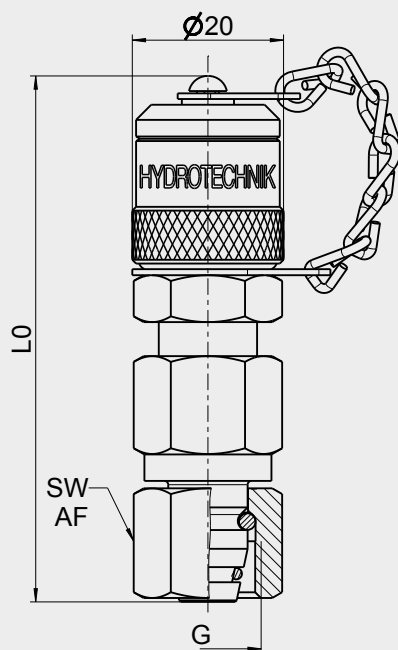


Figure 1

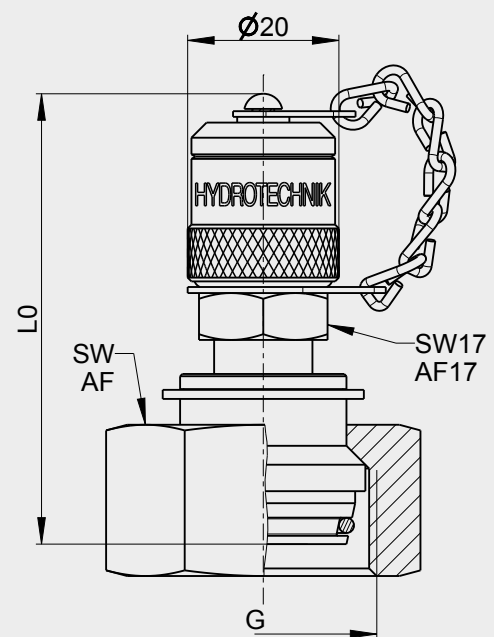


Figure 2

Series	Thread	Technical specifications			Material: 1.0718 free cutting steel Part No. with metal cap & NBR seals ²	
		Ø D	G	p _n ¹ bar		L0 mm
Light series, designed in conformity with figure 1						
L 6	M12 x 1.5		315	69.5	14	2102-40-06.00N
L 8	M14 x 1.5		315	69.5	17	2102-40-08.00N
L 10	M16 x 1.5		315	69.5	19	2102-40-10.00N
L 12	M18 x 1.5		315	69.5	22	2102-40-12.00N
Light series, designed in conformity with figure 2						
L 15	M22 x 1.5		315	59	27	2102-40-15.00N
Heavy series, designed in conformity with figure 1						
S 8	M16 x 1.5		630	69.5	19	2102-41-08.00N
S 12	M20 x 1.5		630	69.5	24	2102-41-12.00N
Heavy series, designed in conformity with figure 2						
S 14	M22 x 1.5		630	62.5	27	2102-41-14.00N
S 16	M24 x 1.5		400	62.5	30	2102-41-16.00N
S 20	M30 x 2		400	63	36	2102-41-20.00N
S 25	M36 x 2		400	64.5	46	2102-41-25.00N
Options						
Part No. with FKM seals						XXXX-XX-XX.10N

¹ p_n = Maximum operating pressure

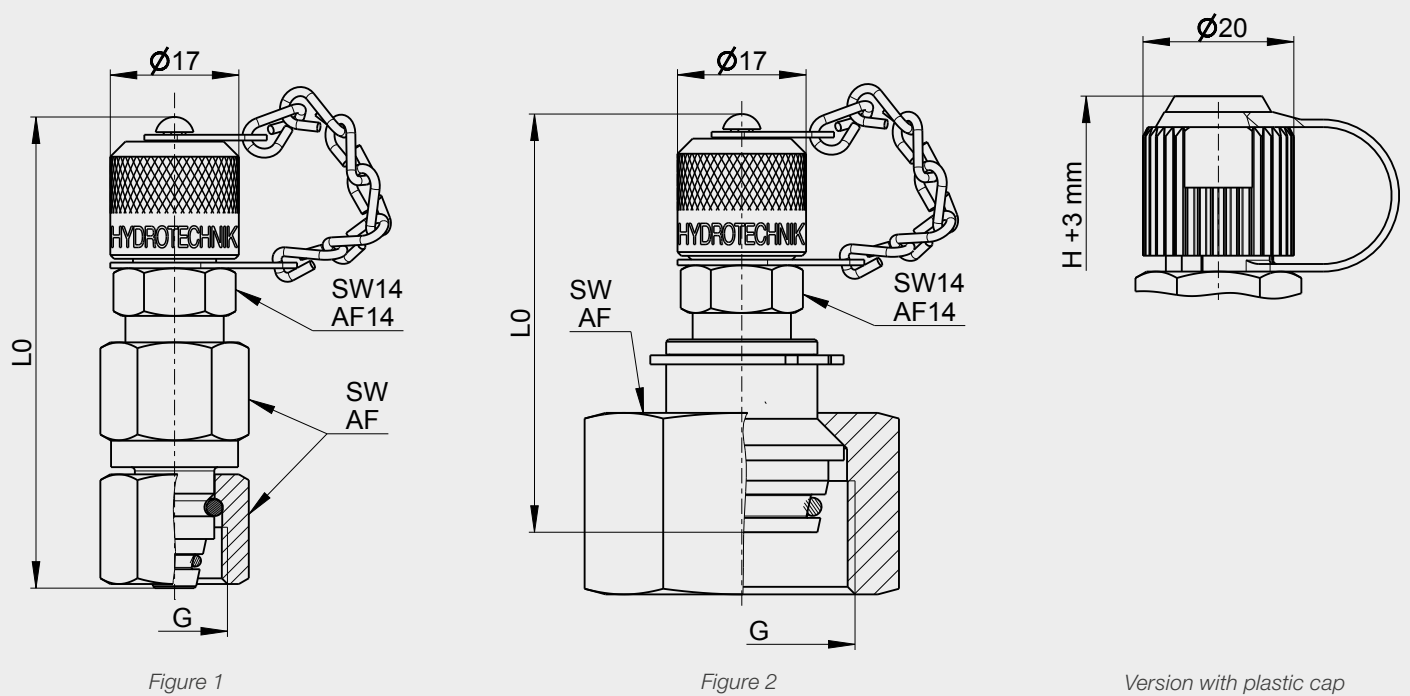
² Seal on DKO fitting made of FKM

Operating temperature ranges: With NBR seals: -25 °C ... 100 °C / With FKM seals: -20 °C ... 200 °C

Additional versions, materials, and seal materials available upon request.

Original MINIMESS® 1215 test point with DKO fitting

MINIMESS® test points with fittings for 24° sealing cone fittings with an O-ring make it possible to easily use the test points in systems with sealing cone connections that conform to DIN 2353 / ISO 8434-1.



Series	Thread	Technical specifications			Material: 1.0718 free cutting steel
Ø D	G	p _n ¹ bar	L0 mm	AF mm	Part No. with metal cap & NBR seals ²
Light series, designed in conformity with figure 1					
L 6	M12 x 1.5	315	62	17	2101-40-06.90N
L 8	M14 x 1.5	315	51.5	19	2101-93-08.90N
L 10	M16 x 1.5	315	51.5	19	2101-93-10.90N
L 12	M18 x 1.5	315	62	22	2101-40-12.90N
Light series, designed in conformity with figure 2					
L 15	M22 x 1.5	315	51.5	27	2101-93-15.90N
L 18	M26 x 1.5	315	52.5	32	2101-40-18.90N
Heavy series, designed in conformity with figure 1					
S 6	M14 x 1.5	630	62	17	2101-41-06.90N
S 8	M16 x 1.5	630	51.5	19	2101-94-08.90N
S 10	M18 x 1.5	630	51.5	22	2101-94-10.90N
S 12	M20 x 1.5	630	58	24	2101-94-12.90N
Heavy series, designed in conformity with figure 2					
S 14	M22 x 1.5	630	55	27	2101-41-14.90N
S 16	M24 x 1.5	400	55	30	2101-41-16.90N
S 20	M30 x 2	400	55.5	36	2101-41-20.90N
Options					
Part No. with plastic cap and FKM seals					XXXX-XX-XX.10N
Part No. with plastic cap and NBR seals					XXXX-XX-XX.00N

¹ p_n = Maximum operating pressure

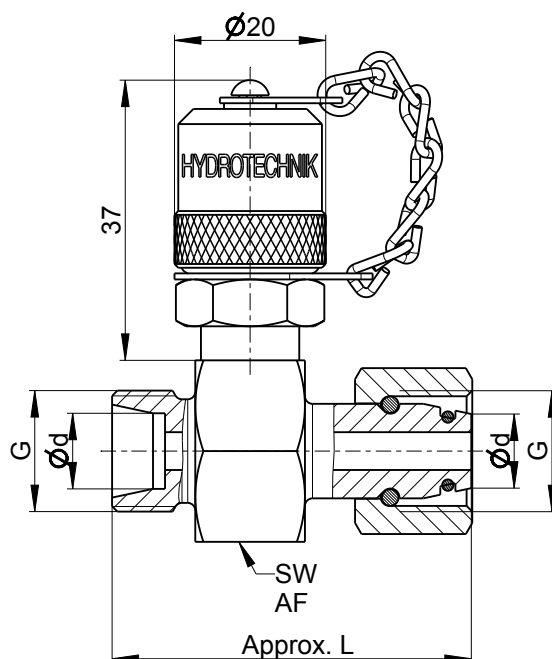
² Seal on DKO fitting made of FKM

Operating temperature ranges: With NBR seals: -25 °C ... 100 °C / With FKM seals: -20 °C ... 200 °C / With plastic cap: Max. 100 °C

Additional versions, materials, and seal materials available upon request.

Original MINIMESS® 1620 test point with DKO combi fitting tee

MINIMESS® test points with 24° sealing cone and O-ring combi fitting tees can be easily retrofitted and used on existing systems with sealing cone connections that conform to DIN 2353 / ISO 8434-1.



Series	Thread	Technical specifications				Material: 1.0718 free cutting steel Part No. with metal cap & NBR seals ²
Ø D	G	p _n ¹ bar	L ₀ mm	L mm	AF mm	
Light series version						
L 6	M12 x 1.5	315	49	44.5	24	2103-KL-10.06N
L 8	M14 x 1.5	315	49	44.5	24	2103-KL-08.00N
L 10	M16 x 1.5	315	49	47.5	24	2103-KL-10.00N
L 12	M18 x 1.5	315	49	48.5	24	2103-KL-12.00N
L 15	M22 x 1.5	315	52	51.5	30	2103-KL-15.00N
L 18	M26 x 1.5	315	53	55.5	32	2103-KL-18.00N
L 22	M30 x 2	160	22	58.5	36	2103-KL-22.00N
Heavy series version						
S 8	M16 x 1.5	630	49	48.5	24	2103-KS-08.00N
S 10	M18 x 1.5	630	49	49.5	24	2103-KS-10.00N
S 12	M20 x 1.5	630	50.5	50.5	27	2103-KS-12.00N
S 14	M22 x 1.5	630	51	53.5	27	2103-KS-14.00N
S 16	M24 x 1.5	400	52	56.5	30	2103-KS-16.00N
S 20	M30 x 2	400	55	64.5	36	2103-KS-20.00N
S 25	M36 x 2	400	57.5	66	41	2103-KS-25.00N

¹ p_n = Maximum operating pressure

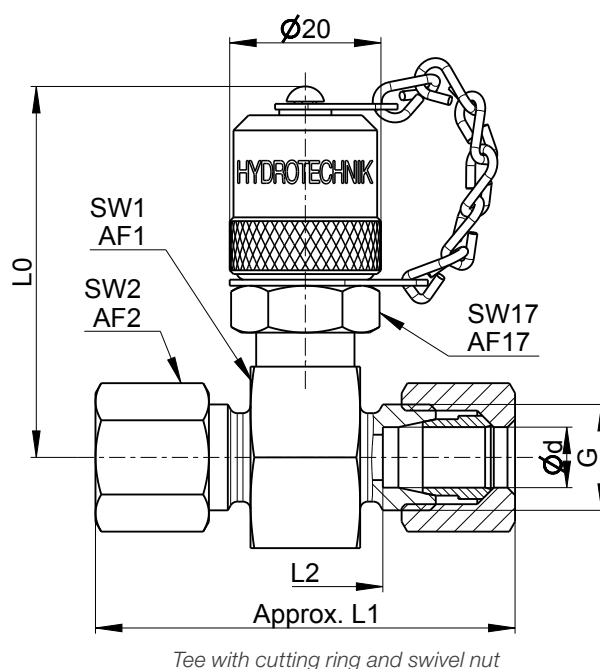
² Seal on DKO fitting made of FKM

Operating temperature range: -25 °C ... 100 °C

Additional versions, materials, and seal materials available upon request. DKO combination fitting with test points from the 1615 or 1604 series available upon request.

Original MINIMESS® 1620 test point with tee adapter

MINIMESS® test points with a tee adapter can be easily retrofitted and used on existing piping systems as a result of a cutting ring fitting that conforms to DIN 2353 / ISO 8434-1.



Series	Thread	Technical specifications						Material: 1.0718 free cutting steel Version: With metal cap & NBR seals	
		p_n^1 bar	L0 mm	L1 mm	L2 mm	SW1 mm	SW2 mm	Part No. with cutting ring and swivel nut	Part No. without cutting ring and swivel nut
Light series version									
L 6	M12 x 1.5	315	49.5	50.5	20.5	24	14	2103-11-06.00N	2103-11-06.05N
L 8	M14 x 1.5	315	49.5	50.5	20.5	24	17	2103-11-08.00N	2103-11-08.05N
L 10	M16 x 1.5	315	49.5	52.5	22.5	24	19	2103-11-10.00N	2103-11-10.05N
L 12	M18 x 1.5	315	49.5	52.5	22.5	24	22	2103-11-12.00N	2103-11-12.05N
L 15	M22 x 1.5	315	52.5	54.5	24.5	30	27	2103-11-15.00N	2103-11-15.05N
L 18	M26 x 1.5	315	53.5	56.5	23.5	32	32	2103-11-18.00N	2103-11-18.05N
L 22	M30 x 2	160	55.5	60.5	27.5	36	36	2103-11-22.00N	2103-11-22.05N
L 28	M30 x 2	160	58	60.5	27.5	41	41	2103-11-28.00N	2103-11-28.05N
Heavy series version									
S 6	M14 x 1.5	630	49.5	54.5	24.5	24	17	2103-12-06.00N	2103-12-06.05N
S 8	M16 x 1.5	630	49.5	54.5	24.5	24	19	2103-12-08.00N	2103-12-08.05N
S 10	M18 x 1.5	630	49.5	56.5	23.5	24	22	2103-12-10.00N	2103-12-10.05N
S 12	M20 x 1.5	630	49.5	56.5	23.5	24	24	2103-12-12.00N	2103-12-12.05N
S 14	M22 x 1.5	630	51	62.5	26.5	27	27	2103-12-14.00N	2103-12-14.05N
S 16	M24 x 1.5	400	52.5	62.5	25.5	30	30	2103-12-16.00N	2103-12-16.05N
S 20	M30 x 2	400	55.5	68.5	25.5	36	36	2103-12-20.00N	2103-12-20.05N
S 25	M36 x 2	400	58	74.5	26.5	41	46	2103-12-25.00N	2103-12-25.05N

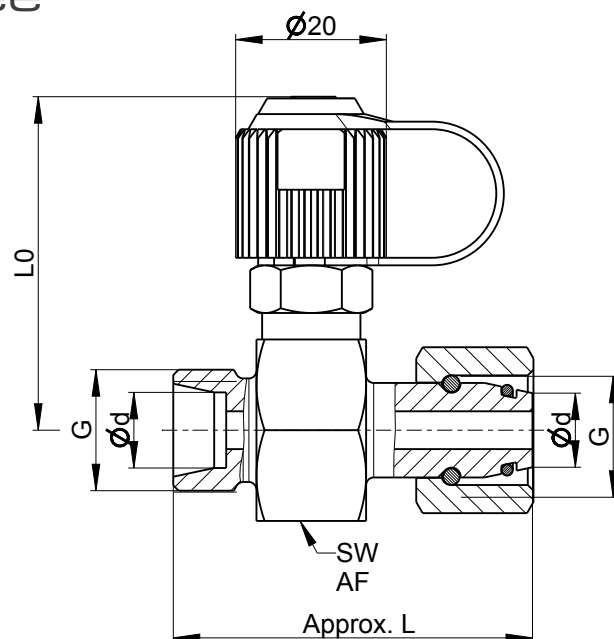
¹ p_n = Maximum operating pressure

Operating temperature range: -25 °C ... 100 °C

Additional versions, materials, and seal materials available upon request. Tees with test points from the 1615 or 1604 series available upon request.

Original MINIMESS® 1215 test point with DKO combi fitting tee

MINIMESS® test points with 24° sealing cone and O-ring combi fitting tees can be easily retrofitted and used on existing systems with sealing cone connections that conform to DIN 2353 / ISO 8434-1.



Series	Thread	Technical specifications				Material: 1.0718 free cutting steel Part No. with plastic cap & NBR seals ²
Ø D	G	p _n ¹ bar	L0 mm	L mm	AF mm	
Light series version						
L 6	M12 x 1.5	315	45	44.5	24	2101-KL-06.00N
L 8	M14 x 1.5	315	45	44.5	24	2101-KL-08.00N
L 10	M16 x 1.5	315	45	47.5	24	2101-KL-10.00N
L 12	M18 x 1.5	315	45	48.5	24	2101-KL-12.00N
L 15	M22 x 1.5	315	48	51.5	30	2101-KL-15.00N
L 18	M26 x 1.5	315	49	55.5	32	2101-KL-18.00N
L 22	M30 x 2	160	51	58.5	36	2101-KL-22.00N

¹ p_n = Maximum operating pressure

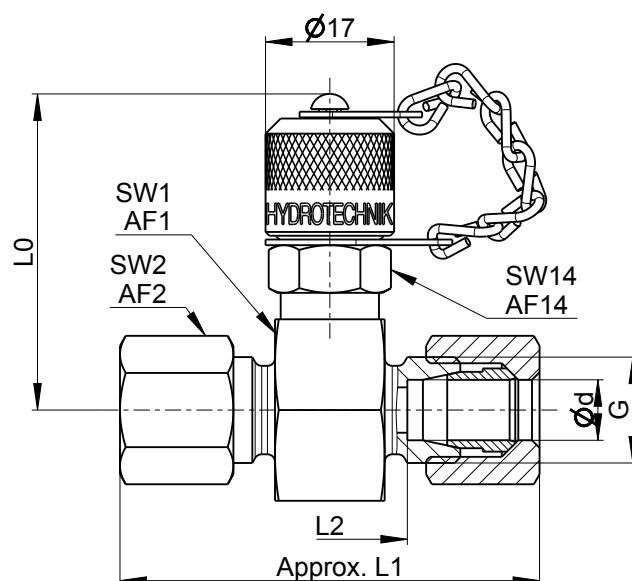
² Seal on DKO fitting made of FKM

Operating temperature range: -25 °C ... 100 °C

Additional versions, materials, and seal materials available upon request. DKO combination fitting with test points from the 1615 or 1604 series available upon request.

Original MINIMESS® 1215 test point with tee adapter

MINIMESS® test points with a tee adapter can be easily retrofitted and used on existing piping systems as a result of a cutting ring fitting that conforms to DIN 2353 / ISO 8434-1.



Series	Thread	Technical specifications						Material: 1.0718 free cutting steel
Ø D	G	p _n ¹ bar	L0 mm	L1 mm	L2 mm	SW1 mm	SW2 mm	Part No. with metal cap & NBR seals
Light series version								
L 6	M12 x 1.5	315	42	50.5	20.5	24	14	2101-11-06.90N
L 8	M14 x 1.5	315	42	50.5	20.5	24	17	2101-11-08.90N
L 10	M16 x 1.5	315	42	52.5	22.5	24	19	2101-11-10.90N
L 12	M18 x 1.5	315	42	52.5	22.5	24	22	2101-11-12.90N
L 15	M22 x 1.5	315	45	54.5	24.5	30	27	2101-11-15.90N
L 18	M26 x 1.5	315	46	56.5	23.5	32	32	2101-11-18.90N
L 22	M30 x 2	160	48	60.5	27.5	36	36	2101-11-22.90N
L 28	M36 x 2	160	50.5	60.5	27.5	41	41	2101-11-28.90N
Heavy series version								
S 6	M14 x 1.5	630	42	54.5	24.5	24	17	2101-12-06.90N
S 8	M16 x 1.5	630	42	54.5	24.5	24	19	2101-12-08.90N
S 10	M18 x 1.5	630	42	56.5	23.5	24	22	2101-12-10.90N
S 12	M20 x 1.5	630	42	56.5	23.5	24	24	2101-12-12.90N
S 14	M22 x 1.5	630	43.5	62.5	26.5	27	27	2101-12-14.90N
S 16	M24 x 1.5	400	45	62.5	25.5	30	30	2101-12-16.90N
S 20	M30 x 2	400	48	68.5	25.5	36	36	2101-12-20.90N
S 25	M36 x 2	400	50.5	74.5	26.5	41	46	2101-12-25.90N

¹ p_n = Maximum operating pressure

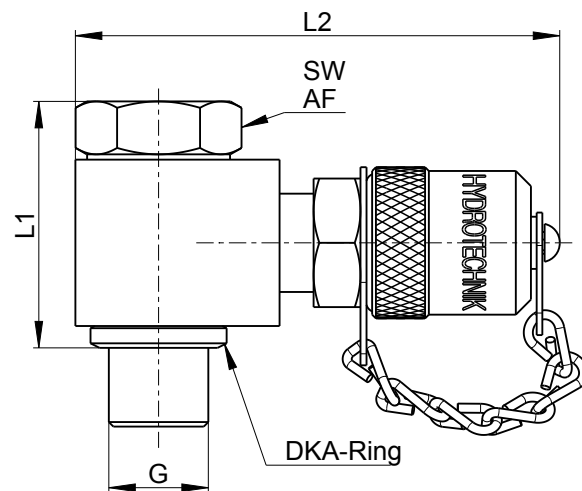
Operating temperature range: -25 °C ... 100 °C

Additional versions, materials, and seal materials available upon request. Tees with test points from the 1615 or 1604 series available upon request.

Original MINIMESS® test point with 90° swivel fitting.

The swivel fitting makes it possible to adjust the test point position exactly as required for installation. In fact, the MINIMESS® can swivel 360° about the hole axis, making it easy to position it optimally.

A DKA sealing ring is used for sealing at the thread (banjo bolt).



Thread		Technical specifications			Material: 1.0718 free cutting steel
G	p_n^1 bar	L1 mm	L2 mm	AF mm	Part No. with metal cap & NBR seals
MINIMESS® 1620					
ISO 228-G 1/4	630	34.5	64.5	19	2115-22-34.00N
MINIMESS® 1615					
ISO 228-G 1/4	630	34.5	69.5	19	2115-22-24.00N
MINIMESS® 1215					
ISO 228-G 1/4	630	34.5	46	19	2115-22-14.00N
Options					
Part No. with FKM seals					XXXX-XX-XX.10N

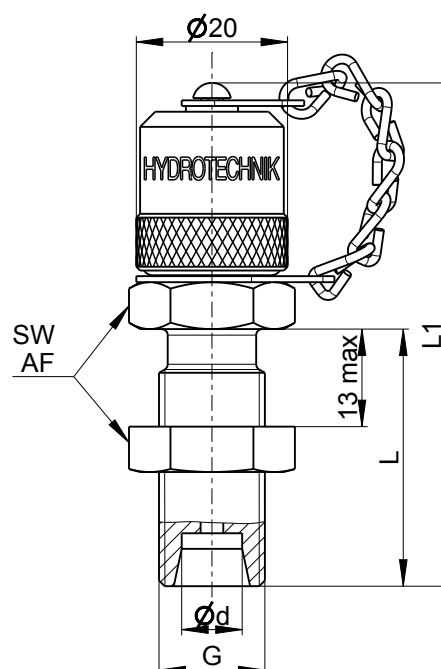
¹ p_n = Maximum operating pressure

Operating temperature ranges: With NBR seals: -25 °C ... 100 °C / With FKM seals: -20 °C ... 200 °C

Additional versions, materials, and seal materials available upon request.

Original MINIMESS® 1620 bulkhead test point

MINIMESS® bulkhead test points can be used to group together multiple measuring points at a central system servicing point. This results in significantly easier maintenance when used to replace a large number of test points that are difficult to access.



Series	Thread	Technical specifications				Material: 1.0718 free cutting steel Part No. with metal cap & NBR seals
Ø D	G	p _n ¹ bar	L mm	L1 mm	AF	
Light series version						
L 6	M12 x 1.5	315	34	67	17	2103-04-22.00N
L 8	M14 x 1.5	315	34	67	19	2103-04-23.00N
L 10	M16 x 1.5	315	33.5	66.5	22	2103-04-18.00N
Heavy series version						
S 6	M14 x 1.5	630	36	69	19	2103-04-24.00N
S 8	M16 x 1.5	630	33.5	66.5	22	2103-04-25.00N
S 10	M18 x 1.5	630	37	70	24	2103-04-26.00N

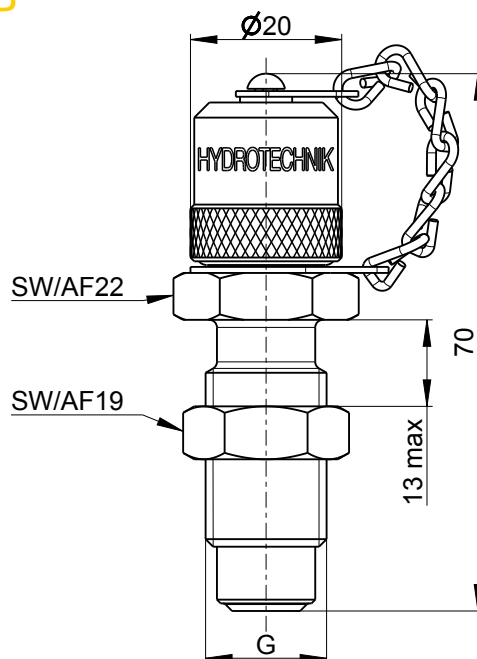
¹ p_n = Maximum operating pressure

Operating temperature range: -25 °C ... 100 °C

Additional versions, materials, and seal materials available upon request. 1215, 1615, and 1604 series bulkhead test points available upon request.

Original MINIMESS® bulkhead test points with MINIMESS® connection on both sides.

Bulkhead test points with a MINIMESS® connection on both sides can be used to group together multiple measuring points at a central system servicing point by using MINIMESS® hose lines.



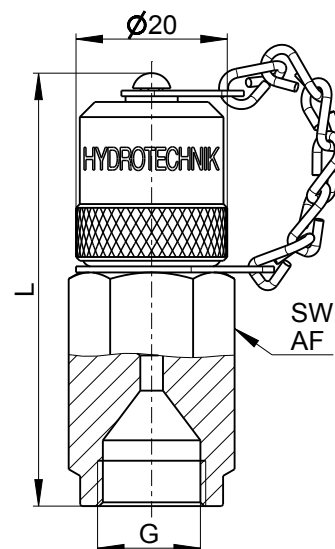
Connection	Thread		Material: 1.0718 free cutting steel Part No. with metal cap & NBR seals
MINIMESS® 1620 on both sides	M16 x 2	p_n^1 bar	2103-04-16.00N
MINIMESS® 1615 on both sides	M16 x 1.5	630	2102-04-01.00N

¹ p_n = Maximum operating pressure

Operating temperature range: -25 °C ... 100 °C

Original MINIMESS® 1620 test point with 37° flared fitting

MINIMESS® test points with a connection for a 37° flared fitting in conformity with SAE J514 can be used for direct connections to compatible pipes.



Thread		Technical specifications				Material: 1.0718 free cutting steel		
G	p_n^1 bar	Pipe diameter mm	Pipe diameter Inches	L mm	AF mm	Part No. with metal cap & NBR seals		
7/16-20 UNF	630	6	1/4	55	17	2103-85-21.00N		
9/16-18 UNF	315	10	3/8	57.5	19	2103-85-23.00N		
Options								
Part No. with FKM seals							XXXX-XX-XX.10N	

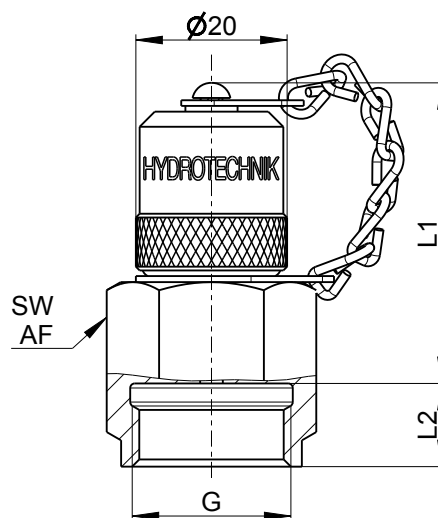
¹ p_n = Maximum operating pressure

Operating temperature ranges: With NBR seals: -25 °C ... 100 °C / With FKM seals: -20 °C ... 200 °C

Additional versions, materials, and seal materials available upon request.

Original MINIMESS® 1620 test point with ORFS fitting

MINIMESS® test points with a connection for ORFS fittings in conformity with ISO 8434-3 / SAE J1453-1 can be used for direct connections to compatible ORFS fittings.



Thread	Technical specifications				Material: 1.0718 free cutting steel Part No. with metal cap & NBR seals
G	p_n^1 bar	L1 mm	L2 mm	AF mm	
9/16-18 UNF	630	40	8	17	2103-56-10.00N
11/16-16 UN	630	40	9	22	2103-56-12.00N
13/16-16 UN	630	40	11	24	2103-56-14.00N
Options					
Part No. with FKM seals					XXXX-XX-XX.10N

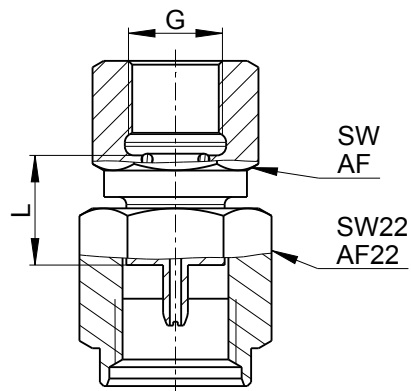
¹ p_n = Maximum operating pressure

Operating temperature range: With NBR seals: -25 °C ... 100 °C / With FKM seals: -20 °C ... 200 °C

Additional versions, materials, and seal materials available upon request.

MINIMESS® direct pressure gauge and sensor adapter

The MINIMESS® direct pressure gauge and sensor adapter can be used to connect pressure sensors or gauges with various threads directly to the MINIMESS® test point.



Thread	Technical specifications			Material: 1.0718	Material: 1.0718
	p_n^1 bar	L mm	AF mm	free cutting steel Part No. with pressure gauge adapter ²	free cutting steel Part No. with pressure sensor adapter
MINIMESS® 1620					
ISO 228-G 1/4	630	14.5	19	2103-07-11.62N	2103-07-18.62N
ISO 228-G 1/2	630	17	27	2103-07-12.62N	–
1/4 NPT	630	–	19	2103-07-23.62N	–
MINIMESS® 1615					
ISO 228-G 1/4	630	14.5	19	2102-07-11.62N	2102-07-18.62N
ISO 228-G 1/2	630	17	27	2102-07-12.62N	–
1/4 NPT	630	–	19	2102-07-23.62N	–
MINIMESS® 1215					
ISO 228-G 1/4	630	14.5	19	2101-07-11.62N	2101-07-18.62N
ISO 228-G 1/2	630	17	27	2101-07-12.62N	–
1/4 NPT	630	–	19	2101-07-23.62N	–
MINIMESS® 1604					
ISO 228-G 1/4	630	16.5	19	2106-07-11.62N	2106-07-18.62N

¹ p_n = Maximum operating pressure

² For connecting pressure gauges, a nozzle is additionally installed in the body and a sealing ring is enclosed.

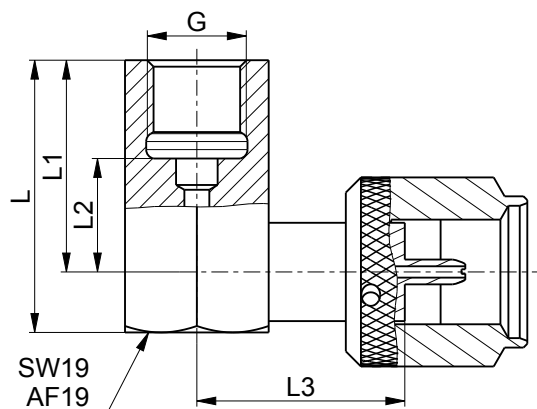
Operating temperature range: -25 °C ... 100 °C

Additional versions and materials available upon request.

MINIMESS®

90° direct pressure gauge and sensor adapter

The MINIMESS® direct pressure gauge and sensor adapter featuring a 90° elbow connection can be used to directly connect pressure sensors or gauges even in challenging installation situations.



Thread		Technical specifications				Material: 1.0718 free cutting steel	
G	p_n^1 bar	L mm	L1 mm	L2 mm	L3 mm	Part No.	
MINIMESS® 1620							
ISO 228-G 1/4	630	36	28	15	27.5	2146-13-05.00N ²	
MINIMESS® 1215							
ISO 228-G 1/4	630	36	28	15	22.5	2146-14-02.00N ²	

¹ p_n = Maximum operating pressure

² Part number for use with pressure sensors. For connecting pressure gauges, a nozzle is additionally installed in the body and a sealing ring is enclosed. Part number available upon request.

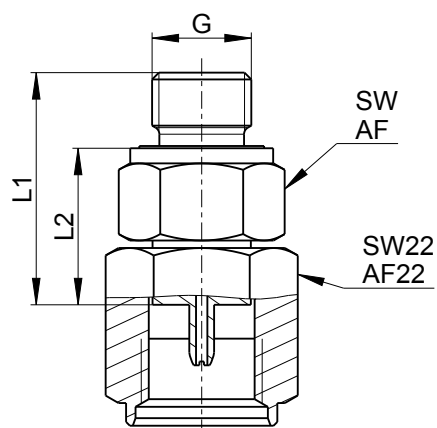
Operating temperature range: -25 °C ... 200 °C

Additional versions and materials available upon request.

MINIMESS®

Direct pressure sensor adapter

The MINIMESS® direct pressure sensor adapter can be used to connect pressure sensors with a G 1/4 female thread to a MINIMESS® test point.

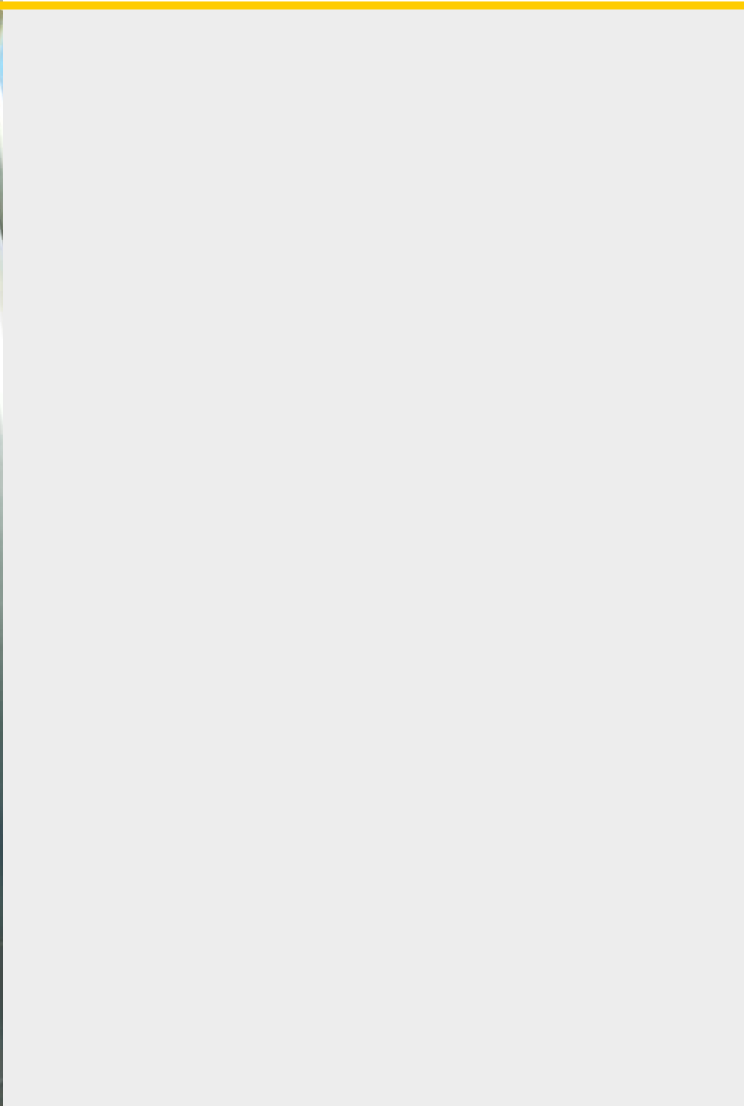


Thread	Technical specifications				Material: 1.0718 free cutting steel	
	p_n^1 bar	L1 mm	L2 mm	AF mm	Part No. with NBR seal	
MINIMESS® 1620						
ISO 228-G 1/4	630	30.7	20.7	19	2103-07-41.62N	
MINIMESS® 1615						
ISO 228-G 1/4	630	30.7	20.7	19	2102-07-41.62N	
MINIMESS® 1215						
ISO 228-G 1/4	630	33.5	23.5	19	2101-07-41.62N	

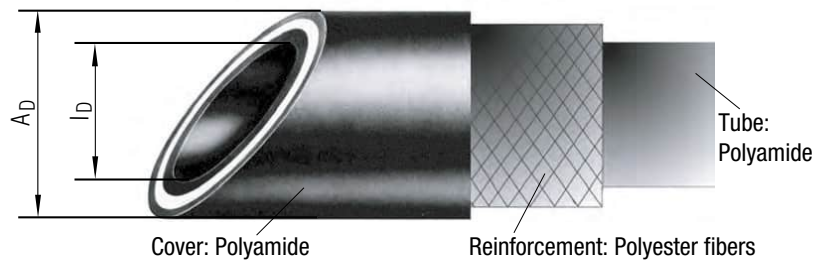
¹ p_n = Maximum operating pressure

Operating temperature range: -25 °C ... 100 °C

Additional versions and materials available upon request.



MINIMESS® Hose lines



MINIMESS® hose lines make up an essential part of the MINIMESS® family of products. These hose lines have been developed specifically for high-pressure applications with pressures of up to 630 bar and are characterized by their resistance to aggressive fluids and a versatility that makes them ideal for use as control, diagnostic, and measuring hoses.

These hose lines can be used to conveniently group measuring points and route them to an easily accessible location in order to make maintenance and diagnostic activities easier.

They can then be combined with MINIMESS® bulkhead test points or pressure gauge connections for bulkheads so as to easily and quickly connect sensors or pressure gauges.

In addition to hose lines for standard hydraulic applications, we offer a variety of additional alternatives, e.g., for low-temperature and gas applications.

MINIMESS® hose lines are crimped and tested at Hydrotechnik and make an undeniably compelling case with their high quality and long service life.

Nominal diameter	Version	p_n^* bar	p_{dyn}^* bar	dp/dt bar/s	I_D mm	A_D mm	r_{min} mm	t_n °C
DN2	Standard 400, pin-pricked	400	300	3,900	2	4.9	20	-20 ... 100
DN2	Standard 630, pin-pricked	630	500	6,300	2	4.9	20	-20 ... 100
DN2	Low temperature, pin-pricked	630	500	6,300	2	4.9	20	-54 ... 100
DN4	Standard 315, pin-pricked	315	240	3,120	4	8	40	-20 ... 100
DN4	Standard 450, pin-pricked	450	340	4,420	4	8	40	-20 ... 100

- p_n = Maximum operating pressure
- p_{dyn} = Maximum operating pressure for dynamic applications
- dp/dt = Maximum permissible pressure rise time
- I_D = Inside diameter
- O_D = Outside diameter
- r_{min} = Smallest bend radius ($r_{min} \times 1.5$ at temperatures lower than -20 °C)
- t_n = Maximum operating temperature (briefly up to 120 °C)

* The hose line's maximum permissible operating pressure always corresponds to the pressure of the individual component with the lowest permissible operating pressure.

Part No. key for MINIMESS® hose lines

Fitting material	Position in Part No. S <u>XXX</u> – XX – XX – XXXXN
Code <u>1</u>	1.0718 free cutting steel
Code <u>2</u>	1.0718 free cutting steel EPDM seals for use with brake fluid
Code <u>7</u>	1.4571 stainless steel (the N ending in the part No. should be omitted in this case)

Hose version	Position in Part No. S <u>XXX</u> – XX – XX – XXXXN		
	Nominal diameter	p _n ¹	Version
Code <u>0</u>	DN2	400 bar	Standard hose, pin-pricked
Code <u>1</u>	DN2	630 bar	Standard hose, pin-pricked
Code <u>2</u>	DN2	630 bar	Low-temperature hose, pin-pricked
Code <u>5</u>	DN4	315 bar	Standard hose, pin-pricked
Code <u>6</u>	DN4	450 bar	Standard hose, pin-pricked

¹ p_n = Maximum operating pressure for measuring tasks

Important: The hose line's maximum permissible operating pressure always corresponds to the pressure of the individual component with the lowest permissible operating pressure.

Options	Position in Part No. S <u>XXX</u> – XX – XX – XXXXN
Code <u>0</u>	Standard version
Code <u>1</u>	Spring guard on left side
Code <u>2</u>	Spring guard on right side
Code <u>3</u>	Spring guards on both ends
Code <u>4</u>	Aluminum armor ²

Minimum hose length:
40 cm

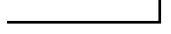
² Aluminum armor cannot be combined with a spring guard.

Fitting version³ **Position in Part No.**
 S XXX – XX – XX – XXXXN

Left fitting

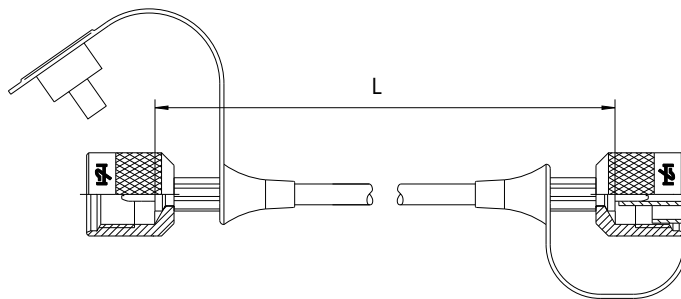


Right fitting



³For the fitting code, please refer to pages 50 – 57. The fitting code must be specified alphanumerically from left to right.

Hose length **Position in Part No.**
 S XXX – XX – XX – XXXXN



The hose length is the distance between the two fittings.

Specify the hose length in cm from left to right. Example: 50 cm = 0050

Part No. addition when specifying the fitting orientation:

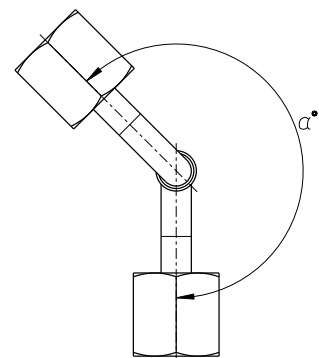
Hoses with 90° fittings are usually assembled in such a way that the fittings will be pointing in the same direction and be aligned with each other.

If customers want a different fitting orientation, they must specify it explicitly.

Fitting orientation **Position in Part No.**
 S XXX XX XXX XX XXXXN

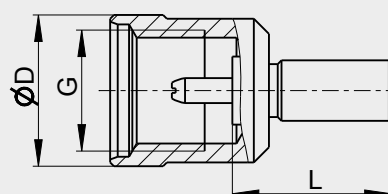
The angle is always measured counterclockwise and must be specified between the two fitting codes (in this case, hyphens should be completely omitted from the Part No.).

Order example for a hose line with DA fittings and a fitting orientation of 120°:
 S100DA120DA0100N



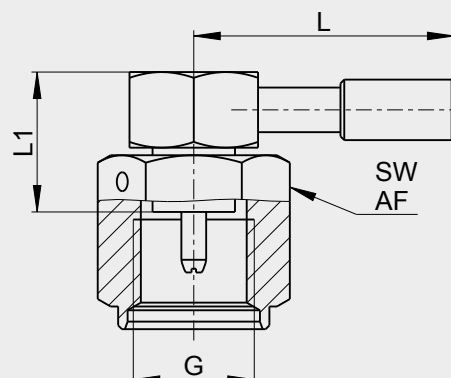
Fittings for MINIMESS® hose lines

MINIMESS® fitting



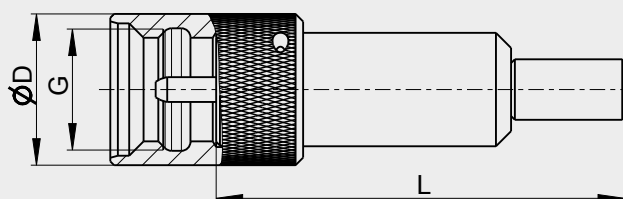
Nominal diameter	MINIMESS® fitting G	Technical specifications			Fitting code
		p _{n1} bar	Ø D mm	L mm	
DN2	1215	630	20	22	AA
	1615	630	20	20	AB
	1620	630	20	20	AC
DN4	1215	630	20	35	AA
	1615	630	20	35	AB
	1620	630	20	35	AC
	1604	400	22	35	AD

MINIMESS® 90° fitting

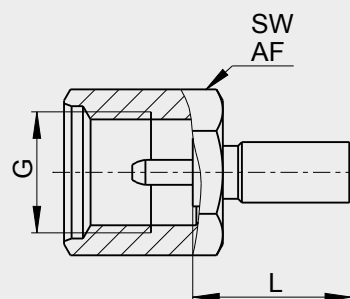


Nominal diameter	MINIMESS® fitting G	Technical specifications				Fitting code
		p _{n1} bar	AF mm	L mm	L1 mm	
DN2	1215	630	22	35.5	17.5	AJ
	1615	630	22	35.5	17.5	AK
	1620	630	22	35.5	17.5	AL

MINIMESS® fitting with check valve



Nominal diameter	MINIMESS® fitting G	Technical specifications			Fitting code
		p_{n1} bar	$\varnothing D$ mm	L mm	
DN2	1620	630	20	50	AR
DN4	1604	400	24	70	AY



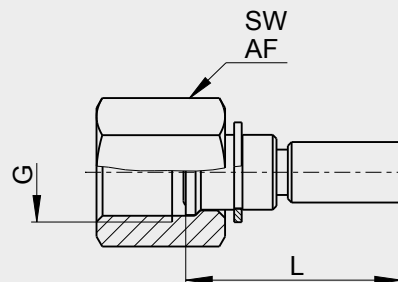
MINIMESS® fitting with hex swivel nut

Nominal diameter	MINIMESS® fitting G	Technical specifications				Fitting code
		p_{n1} bar	AF mm	L mm	L1 mm	
DN2	1215	630	19	38	22	AM
	1615	630	19	38	20	AN
	1620	630	19	38	20	A0

¹ p_n = Maximum operating pressure

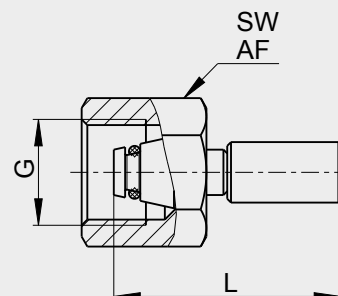
Fittings for MINIMESS® hose lines

Pressure gauge fitting as specified in DIN 16288 with O-ring seal

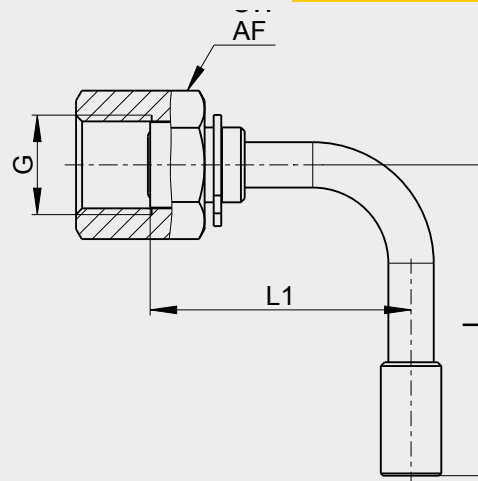


Nominal diameter	Thread G	Technical specifications			Fitting code
		p_n^1 bar	AF mm	L mm	
DN2	ISO 228-G 1/4	630	17	28.5	FG
	ISO 228-G 1/2	630	27	31.5	FH

DKO fitting – 24° sealing cone with O-ring in conformity with ISO 8434-1

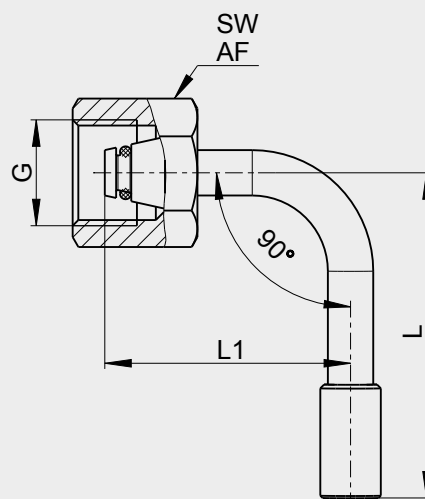


Nominal diameter	Series Ø D	Thread G	Technical specifications			Fitting code
			p_n^1 bar	AF mm	L mm	
Light series						
DN2/DN4	L 6	M12 x 1.5	315	14	30	CQ
	L 8	M14 x 1.5	315	17	34	CR
	L 10	M16 x 1.5	315	19	33.5	CS
	L 12	M18 x 1.5	315	22	33.5	CT
Heavy series						
DN2/DN4	S 6	M14 x 1.5	630	17	30	CU
	S 8	M16 x 1.5	630	19	34	CV
	S 10	M18 x 1.5	630	22	33.5	CW
	S 12	M20 x 1.5	630	24	33.5	CX



90° pressure gauge fitting as specified in DIN 16288
with O-ring seal

Nominal diameter	Thread G	Technical specifications				Fitting code
		p_n^1 bar	AF mm	L mm	L1 mm	
DN2	ISO 228-G 1/4	630	17	43.5	32	FI
	ISO 228-G 1/2	630	27	43	43	FJ



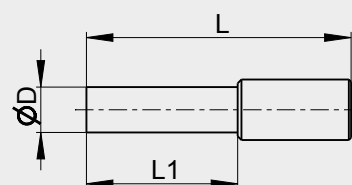
90° DKO fitting – 24° sealing cone with O-ring in
conformity with ISO 8434-1

Nominal diameter	Series Ø D	Thread G	Technical specifications				Fitting code
			p_n^1 bar	AF mm	L mm	L1 mm	
Light series							
DN2/DN4	L 6	M12 x 1.5	315	14	30	32.5	DA
	L 8	M14 x 1.5	315	17	34	32.5	DB
	L 10	M16 x 1.5	315	19	33.5	37.5	DC
	L 12	M18 x 1.5	315	22	33.5	37.5	DD
Heavy series							
DN2/DN4	S 6	M14 x 1.5	630	17	30	32.5	DE
	S 8	M16 x 1.5	630	19	34	32.5	DF
	S 10	M18 x 1.5	630	22	33.5	37.5	DG
	S 12	M20 x 1.5	630	24	33.5	37.5	DH

¹ p_n = Maximum operating pressure

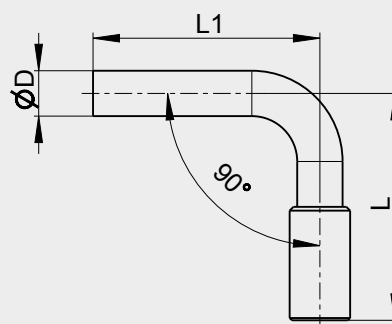
Fittings for MINIMESS® hose lines

Tube stub for tube fitting in conformity with DIN 2353



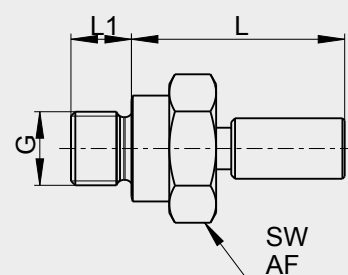
Nominal diameter	Technical specifications				Fitting code
	p_n^1 bar	$\emptyset D$ mm	L mm	L1 mm	
DN2	100	4	35	20	BA
	630	6	35	20	BB
	630	8	35	21	BC
	630	6.35	35	20	BD
DN4	630	6	48	20	BB
	630	8	47	21	BC

90° tube stub for tube fitting in conformity with DIN 2353



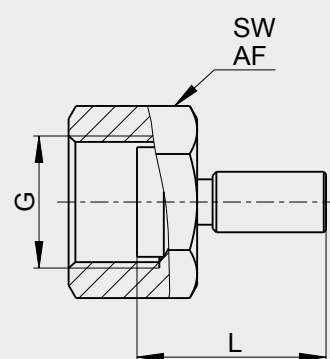
Nominal diameter	Technical specifications				Fitting code
	p_n^1 bar	$\emptyset D$ mm	L mm	L1 mm	
DN2	630	6	30	28	BG
DN4	630	6	48	25	BG

Nipple with male thread



Nominal diameter	Thread	Technical specifications				Fitting code
		p_n^1 bar	AF mm	L mm	L1 mm	
DN2	ISO 228-G 1/8	400	14	26.5	8	GA

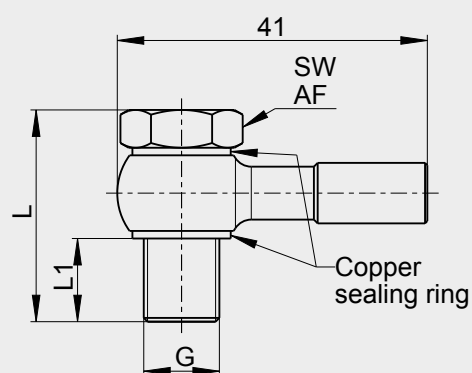
ORFS fitting



Nominal diameter	Thread	Technical specifications			Fitting code
		p_n^1 bar	AF mm	L mm	
DN2	11/16-16 UN	400	22	26.5	HC

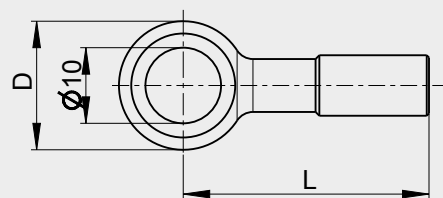
¹ p_n = Maximum operating pressure

Fittings for MINIMESS® hose lines



Banjo eye fitting with banjo bolt

Nominal diameter	Thread G	Technical specifications				Fitting code
		p_n^1 bar	AF mm	L mm	L1 mm	
DN2	M10 x 1	200	14	28	10	IA



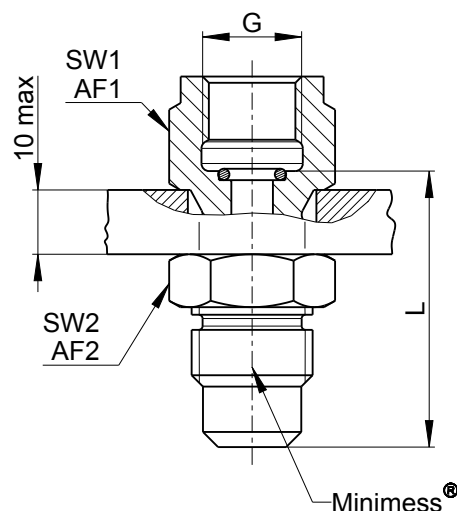
Banjo eye fitting as specified in DIN 7642 for M10 x 1 banjo bolt

Nominal diameter	Technical specifications			Fitting code
	p_n^1 bar	L mm	L1 mm	
DN2	200	41	17	IB
DN4	200	43.5	17	IB

¹ p_n = Maximum operating pressure

MINIMESS® pressure gauge and sensor adapter for bulkheads

The MINIMESS® direct pressure gauge and sensor adapter can be used to connect pressure sensors or gauges with MINIMESS® hose lines to a central system servicing point. This results in significantly easier monitoring and maintenance when used to replace a large number of test points or test points that are difficult to access.



Thread		Technical specifications			Material: 1.0718 free cutting steel
G	p_n^1 bar	L mm	AF1 mm	AF2 mm	Part No. with NBR seal
MINIMESS® 1620					
ISO 228-G 1/4	630	38	19	19	2103-05-11.00N
ISO 228-G 1/2	630	42.5	27	19	2103-05-12.00N
1/4 NPT	630	–	19	19	2103-05-23.00N
MINIMESS® 1615					
ISO 228-G 1/4	630	38	19	19	2102-05-11.00N
ISO 228-G 1/2	630	42.5	27	19	2102-05-12.00N
MINIMESS® 1215					
ISO 228-G 1/4	630	29.5	19	19	2101-05-11.00N
ISO 228-G 1/2	630	42	27	19	2101-05-12.00N
1/4 NPT	630	–	22	24	2101-05-23.00N
MINIMESS® 1604					
ISO 228-G 1/4	630	40.5	22	24	2106-05-11.00N
ISO 228-G 1/2	630	44.5	27	24	2106-05-12.00N
Options					
Part No. with FKM seals					XXXX-XX-XX.10N

¹ p_n = Maximum operating pressure

Operating temperature ranges: With NBR seals: -25 °C ... 100 °C / With FKM seals: -20 °C ... 200 °C

Additional versions and materials available upon request.

Original MINIMESS® Minivalv

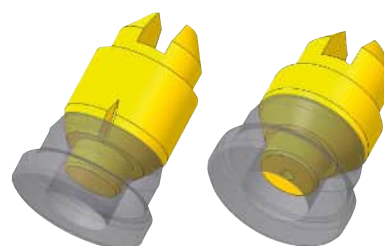
Maximum Damping. Minimum size.

The MINIMESS® Minivalv is an extremely compact throttle check valve that is typically installed in the hydraulic pilot line so as to restrict the flow at the directional control valve's outlet.

Its purpose is to make sure that poppet motion from or to the neutral position will always be damped so that the corresponding actuator will start up softly and in a controlled manner.

In contrast to a simple restrictor, the way in which this throttle check valve is built ensures that a vacuum cannot be produced at the intake. Moreover, the throttle check valve reduces the volumetric flow rate in one direction of flow and allows it to flow freely in the other. Depending on the desired flow rate, either a hole or a notch is used on the poppet in order to implement the reduced cross section.

Notched poppets are the preferred option for very small reduced cross sections, as they have a special advantage: Impurities that settle inside the notch can be easily flushed out when the direction of flow is reversed. For larger reduced cross sections, poppets with a hole are used instead, as they are more cost-effective.



The MINIMESS® Minivalv throttle check valve

- | Is an effective and cost-effective solution that can be easily integrated and makes it possible to start actuators softly
- | Is ideal for places where space is tight, as it is no bigger than a standard nipple fitting
- | Is available with various orifice sizes and threads
- | Is highly resistant to corrosion (salt spray test longer than 1,000 hours)

Technical specifications

Operating pressure	– Up to max. 400 bar
Versions	– Restrictor hole diameter of 0.5 mm to 1.0 mm – Restrictor notch, equivalent to a restrictor hole diameter of 0.3 mm to 0.5 mm
Stud end	– 9/16-18 UNF, ISO 11927-2 – ISO 228-G 1/4, ISO 9974-2
Connector end	– 9/16-18 UNF, ISO 8434-3 – 11/16-16 UN, ISO 8434-3 – M14 x 1.5 8L, DIN 2353

Flat Face diagnostic coupling

The Flat Face system has won endless converts as a result of its compact design and the fact that the absence of a thread makes it easy to clean.

The diagnostic coupling is used in applications with hydraulic oils as operating medium, the coupling side conforms to ISO 15171-1, and the maximum operating pressure is 400 bar.

The Flat Face diagnostic coupling is highly resistant to corrosion and successfully passes a 1,000-hour salt spray test.



Test coupling for air brake systems

Coupling for testing initial delay times and pressures in air brake systems for road vehicles in conformity with ISO 3583.



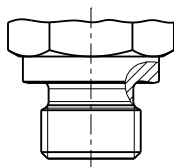


Technical notes

- | Seal types and recommended threaded ports for MINIMESS® test points and gas charging valves
- | Pressure loss curves for MINIMESS® hose and hose lines
- | Installation notes for MINIMESS® hose lines
- | General technical notes for MINIMESS® products
- | Resistance specifications

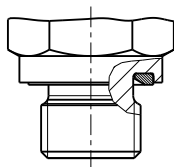
Seal types and recommended threaded ports for **MINIMESS**® test points and gas charging valves

Hydrotechnik type B
ISO 9974-3, ISO 1179-4



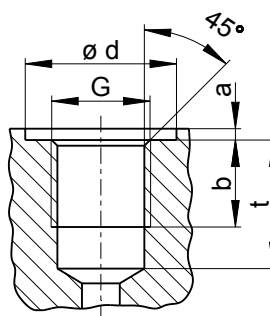
Seal achieved with sealing edge

Hydrotechnik type F
ISO 9974-2, ISO 1179-2



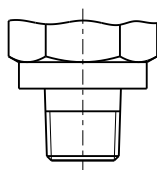
Seal achieved with ED seal

ISO 9974-1, ISO 1179-1



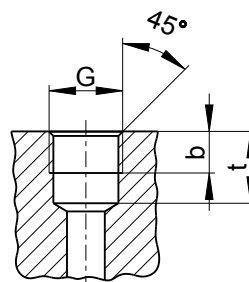
G	d	a	b	t
M10 x 1	15.0	1.0	8.0	13.0
M12 x 1.5	18.0	1.5	12.0	18.5
M14 x 1.5	20.0	1.5	12.0	18.5
M16 x 1.5	22.0	1.5	12.0	18.5
ISO 228-G 1/8	15.0	1.0	8.0	13.0
ISO 228-G 1/4	20.0	1.5	12.0	18.5
ISO 228-G 3/8	23.0	2.0	12.0	18.5
ISO 228-G 1/2	27.0	2.5	14.0	22.0

Hydrotechnik type C
ISO 3852-2 type C



Seal achieved with suitable sealant

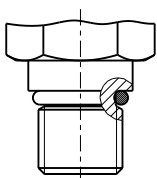
ISO 3852-2 type Z



G	b	t
ISO7-1 – R1/8	5.5	9.5
ISO7-1 – R1/4	8.5	13.5

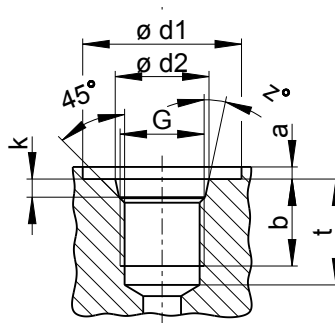
Hydrotechnik type E

ISO 6149-2, ISO 11926-2, SAE J514



Seal achieved with O-ring

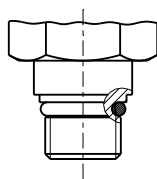
ISO 6149-1, ISO 11926-1, SAE 14026-1



G	d_1	d_2	b	k	t	a	z
M10 x 1	19.0	11.1	10.0	1.6	11.5	1.0	12.0
M12 x 1.5	19.0	13.8	11.5	2.4	14.0	1.5	15.0
M14 x 1.5	21.0	15.8	11.5	2.4	14.0	1.5	15.0
M16 x 1.5	24.0	17.8	13.0	2.4	15.5	1.5	15.0
7/16-20 UNF	21.0	12.4	11.5	2.4	14.0	1.6	12.0
1/2-20 UNF	23.0	14.0	11.5	2.4	14.0	1.6	12.0
9/16-18 UNF	25.0	15.6	12.7	2.5	15.5	1.6	12.0
3/4-16 UNF	30.0	20.6	14.3	2.5	17.5	2.4	15.0

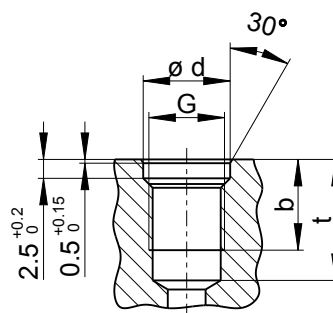
Hydrotechnik type G

HTS 0221



Seal achieved with O-ring

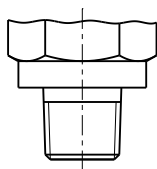
Hydrotechnik in-house standard - HTS 0221



G	d	b	t
M8 x 1	9.5	9.0	13.0
M10 x 1	11.5	9.0	13.0

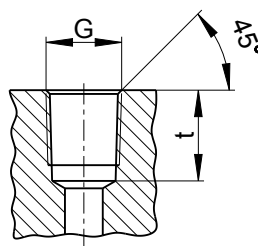
Seal types and recommended threaded ports for MINIMESS[®] test points and gas charging valves

Hydrotechnik type H
ANSI/ASME B1.20.2 type H



Self-sealing thread

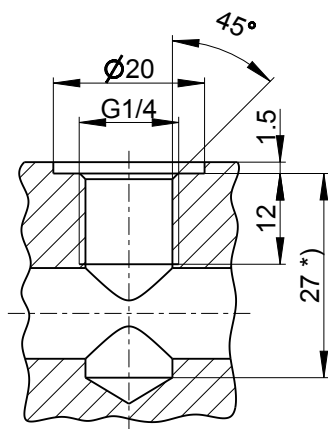
ANSI / ASME B1.20.2 type H



G	t
1/8 NPTF	12.0
1/4 NPTF	17.5

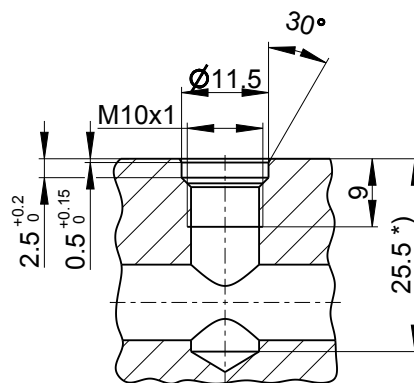
Recommended threaded ports for MINIMESS[®] p/T test points

Hydrotechnik type F



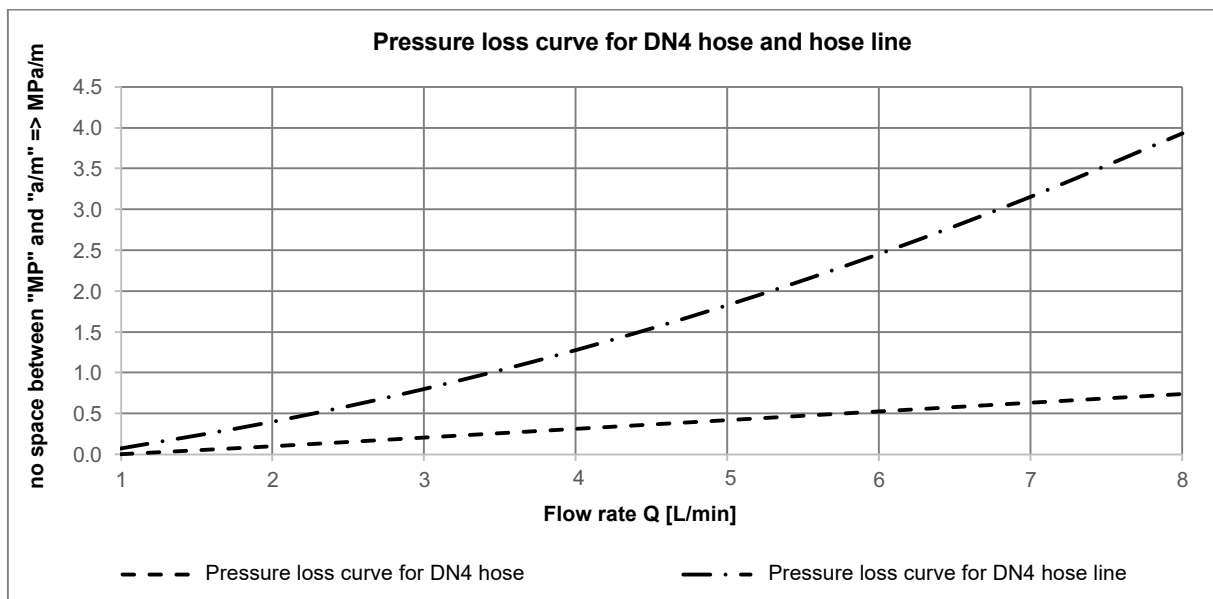
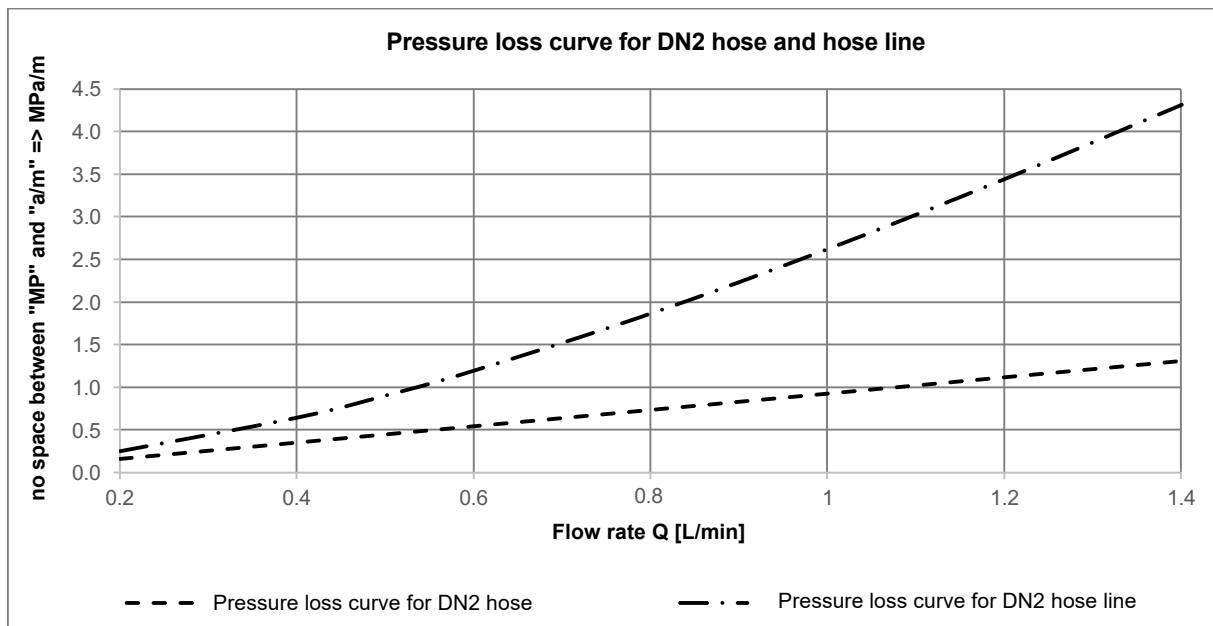
*) Recommended minimum drilled depth

Hydrotechnik type G



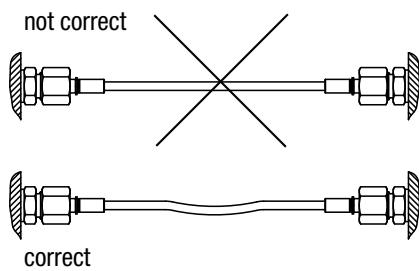
*) Recommended minimum drilled depth

Pressure loss curves for MINIMESS® hoses and hose lines

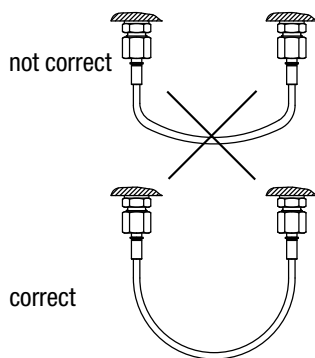


In both diagrams, curve 1 shows the pressure loss of the hose without fittings. Meanwhile, curve 2 shows the pressure loss of the hose line with MINIMESS® fittings on both ends. The oil viscosity is $30 \text{ mm}^2\text{-s}^{-1}$ in both.

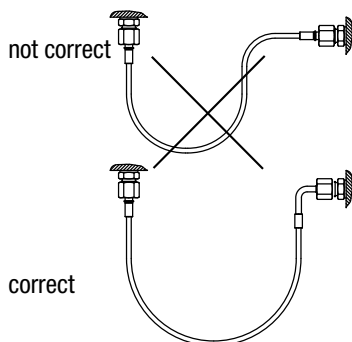
Installation notes for MINIMESS® hose lines



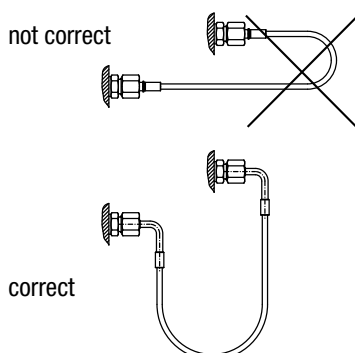
The length of a hose line can change when the latter is subjected to loads, with a reduction in length entailing a greater tensile load on the hose and the connections. Accordingly, it is important to ensure that the hose line sags a little when depressurized. Please do not tighten the swivel nuts beyond the point where the connection becomes tight, as overtightening them will not improve leak-tightness, but will damage the connection instead.



If using curved routing, make sure to observe the permissible bend radius and avoid sharp bends. When calculating the length of a hose line that is routed with a curve, keep in mind that the fittings are not flexible. Accordingly, correctly sizing the free hose length between the fittings is essential.



There are 90° fittings available for when installation situations warrant their use. These fittings have such a small radius that they make it possible to ensure that the corresponding hose will be routed properly even when there is little space available.



90° fittings should be used when the connections' position does not allow for a "hanging arch" and there is always a risk of kinks close to the connections in the case of a "horizontal arch."

Please make sure to use appropriately sized retainers (e.g., clamps). The hose must not rub against the retainer or be squeezed by it. Moreover, the retainer must preferably go around the hose.

General technical notes for MINIMESS® products

Intended use

MINIMESS® products are intended for use with group 2 fluids as defined in Pressure Equipment Directive 2014/68/EU (non-hazardous fluids).

Chemical compatibility

MINIMESS® test points:

- Are suitable, without restrictions, for HL, HLP, HVLP hydraulic fluids in conformity with DIN 51524.
- Are only resistant to fire-resistant and environmentally acceptable hydraulic fluids to a limited extent:
HEES, HEPR, HEPG; HFDM, HFDR, HFC in conformity with ISO 12922 and ISO15380.

Using fire-resistant or environmentally acceptable hydraulic fluids may affect the test points' technical characteristics (temperature range, pressure range, service life, etc.)

MINIMESS® gas charging valves:

- Are suitable, without restrictions, for all inert gases.
- Are also suitable for HL, HLP, HVLP hydraulic fluids in conformity with DIN 51524.

MINIMESS® hose lines:

- Are suitable, without restrictions, for HL, HLP, HVLP hydraulic fluids in conformity with DIN 51524.

For information regarding compatibility with other fluids, please refer to the resistance specifications on page 69. The use of other fluids must be checked on a case-by-case basis.

Certification criteria

MINIMESS® products are tested and certified in conformity with the relevant standards. Moreover, when there are no standards for specific characteristics, we define our own test criteria for those characteristics based on standards for related products, ensuring that we can stand 100 percent behind our products.

Testing is carried out on build samples for the corresponding item or on parts that are identical in terms of the characteristics being tested.

Resistance to corrosion

MINIMESS® products made of free cutting steel are protected against corrosion with a zinc-nickel coating. A corrosion resistance > 1,000 h has been verified with a salt spray test in conformity with DIN EN ISO 9227.

Pressure Equipment Directive 2014/68/EU

MINIMESS® test points, gas charging valves, and hose lines are designed and manufactured in conformity with the sound engineering practice of Germany as required by Article 4 of the Pressure Equipment Directive 2014/68/EU. This guarantees the safety of our products. These products should not bear the CE marking.

Packaging

Packing unit in cardboard box or in polyethylene bag and outer packaging. Alternatives available upon request.

Storage recommendations

MINIMESS® products with elastomeric seals:

Shelf lives vary by elastomer type in conformity with DIN 7716.

The storage period until installation and commissioning should not exceed 2 years.

MINIMESS® hose lines:

Storage and transportation instructions in conformity with DIN EN ISO 8331

- Store in a cool and dry place. Avoid direct exposure to sunlight and UV rays.
- Avoid sources of radiant heat.
- Avoid ozone-generating lamps and electrical equipment that produces sparks in the immediate vicinity.
- The ideal storage conditions are temperatures between +15 °C and +25 °C, a relative humidity of 65%, and UV-blocking film in order to shield from UV radiation.

A storage time of 2 years should not be exceeded for hoses.

REACH Regulation (EU) No.1907/2006, Art. 33

As a manufacturer of products, HYDROTECHNIK GmbH is a downstream user of low quantities and accordingly is not subject to mandatory registration. In accordance with Article 33 of the REACH Regulation, we are hereby informing you that the free machining steel products we supply may contain a lead concentration of up to 0.35% weight by weight and that the brass products we supply may contain a lead concentration of up to 3.5% weight by weight.

Other than this, our products do not contain any other substances found in the 2019 Candidate List of Substances of Very High Concern (SVHC).

Safety notes

Products must be assembled and installed exclusively by qualified personnel. It is recommended to always keep the protective cap on MINIMESS® test points and gas charging valves in place when they are not being used directly as system access points.

General notes

The products must be used exclusively as intended. The purchaser is responsible for making sure that the products are suitable for the intended application and for use under the corresponding operating conditions, and Hydrotechnik GmbH hereby disclaims all liability within this context.

We reserve the right to make changes to products and documentation, as a result of technological progress and continuous improvement, without notice. The specifications applicable after these changes may be different from the specifications in this catalog.



Resistance specifications

- | Seal materials: NBR (Perbunan), FKM (Viton)
- | 1.0718 free cutting steel (11SMnPb30+C), zinc-nickel-electroplated surface
- | 1.4104 stainless steel (X12CrMoS17)
- | 1.4571 stainless steel (X6CrNiMoTi17-12-2)
- | Hoses: Polyamide

Fluid	Seal materials		Fitting material			Hoses			
	NBR	FKM	1.0718	1.4104	1.4571	20 °C	40 °C	60 °C	90 °C
Acetone	3	3	1	2	1	1/5	1/6	2	3
Ethanol, pure	1	1-2	1	1	1	1/6	2	3	
Ammonia, concentrated		3 *)	1	1	1	1	1	1	1
Ammonia, liquid	2	3 *)	1	1	1	1	1		
Formic acid	3	3 *)	3	2	1	3	3	3	
Gasoline, pure	1	1	1	1	1	1	1	1/6	
Benzene	3	1-2	1	1	1	1	1/6	2	2
Brake fluid	3	3 *)	1	1	1	1	1	1	2
Butane	1	1	2	1	1	1	1	1	
Cyclohexane	1	1	1	1	1	1	1	2	
Diesel fuel	1	1	1	1	1	1	1	1	1
Freon, R12	2	1-2	1	1	1	1	1	1	1
Glycerol, pure	2	1-2	1	1	1	1	1	1	1
Glycol	1	1-2	1	1	1	1	1	2	3
Heating oil	1	1	1	1	1	1	1	1	1
Hydraulic fluid (mineral-based)	1	1	1	1	1	1	1	1	1
Kerosene	2	1	1	1	1	1	1	1/6	
Carbonic acid	1	1	3	1	1	1/4	1/4	1/4	
Methane	1	1	2	1	1	1/4	1/4	1/4	
Methyl alcohol, pure	1	3 *)	1	1	1	1/6	2	3	
Mineral oils	1	1	1	1	1	1	1	1	1
Petroleum	1	1	1	1	1	1	1	1/6	
Polyalkylene glycols (HEPG)		2 (<100 °C)	2	1	1	1	1	2/4	3/4
Propane	1	1	2	1	1	1/4	1/4	1/4	
Oxygen	2	1	3	1	1	1/4	1/4	2/4	3/4
Lubricating oils and greases	1	1	1	1	1	1	1	1	1
Soap suds	1	1	3	1	1	1	1	1	1
Nitrogen	1	1	1	1	1	1/4	1/4	1/4	
Synthetic esters (HEES)		2 (<100 °C)	1	1	1	1	1	2/4	3/4
Turpentine	2	1	2	1	1	1	1	1/6	
Carbon tetrachloride	3	1	2	1	1	1	3		
Toluene	3	1-2	2	1	1	1	1/6	2	2
Trichloroethylene	3	1-2	1	1	1	2	3		
Triglycerides (vegetable oil) HETG	1	2 (<80 °C)	1	1	1	1	1	2/4	3/4
Water	1	1	3	1	1	1	1	1	1
Seawater	1	1	3	3	2	1	1	1	1

Key:

1 = Good; absolute resistance without any changes

2 = Limited; resistance depends on length of use and operating conditions

3 = Not recommended; the material will be attacked and the mechanical properties will degrade

4 = Light diffusion in the cases of gases; use only as a testing and filling hose. For continuous use, we recommend our stainless steel pipes instead

5 = Slight transparent material discoloration

6 = Light swelling but no changes to mechanical properties

*) Suitable seal materials available upon request



HySense®

Hydrotechnik Sensors

HySense® family

The Greek philosopher Heraclitus said it over 2,500 years ago: “Panta rhei.” This saying, which can be translated as “everything flows,” still holds true today, when success in the cutting-edge plant and production worlds of Industry 4.0 depends significantly on data quality and system precision. Needless to say, this also means that the success of an industrial measurement depends on the reliability of the corresponding data acquisition. That is where Hydrotechnik sensors come in with their extraordinary quality and reliability.

Technicians, engineers, and skilled workers who commission, operate, maintain, and repair systems and machines need valid data from sound measurements. In fact, this is the only way for them to be able to take the right actions and meet their customers' expectations. And R&D specialists, such as development and applications engineers in the plant and machine design engineering fields, also benefit from the know-how that goes into our products, which is

why they and the aforementioned professionals all appreciate our “Made by Hydrotechnik” high-precision sensors. These sensors are optimized for use in high-pressure fluid systems and hydraulic systems in particular, but they are also in use in many other areas. And this should come as no surprise, as the products combine a robustness and long life that meet all the requirements involved in continuous use with a solid price–performance ratio. Moreover, our in-house DAkkS-accredited calibration laboratory guarantees maximum accuracy and consistent quality for every single one of our sensors.

HySense® Sensors

FLOW RATE

- QT – Turbine flow meters
- QG – Gear flow meters
- QL – Turbine flow meters
with integrated throttle valve
- QO – Oval gear flow meters

QT series – Pages 80 – 93



QG series

PRESSURE

- PR – Pressure sensors
- PS / MultiEPC – Pressure switches

PR 1xx –
Pages 112 – 121



PR 126 – Page 116



PR 400 –
Pages 122 – 123



TEMPERATURE

- TE – Temperature sensors
- TP – Temperature and pressure sensors

TE 200 – Page 138



TE 3xx – Pages 140 – 141



OIL CONDITION

- CL – Level sensors
- CM – Moisture sensors
- CV – Viscosity sensors
- CX – Service measuring kit
- CW – Wear sensors

CL 1xx – Pages 148 – 149



CM 100 – Pages 150 – 151



FORCE AND TORQUE

- FO – Force sensors
- TQ – Torque sensors

FO 200 – Pages 158 – 159



FO 300 – Pages 160 – 161



SPEED, POSITION, VIBRATION, TRANSDUCERS

- RS – Speed sensors
- PO – Position sensors
- VB – Vibration sensors
- SC – Signal converter

RS 100 – Pages 164 – 165



RS 3xx – Page 166



– Pages 94 – 99



QL series – Pages 100 – 105



QO series – Pages 106 – 107



3
PR 509 –
Pages 124 – 125



MultiEPC
Pages 126 – 127



PS 280 – Pages 128 – 129



Analog pressure
gauges Pages 130 – 132



Digital pressure gauges
Pages 133 – 134



2
TE 400 – Page 143



TP 180 – Pages 144 – 145



51
CV 100 – Pages 152 – 153



CX 197 – Pages 154 – 155



CW 100 – Pages 156 – 157



61
TQ 100 – Pages 162 – 163



RS 5xx – Pages 167 – 168



PO 180 – Pages 169 – 170



VB 110 – Pages 171 – 172



SC 100 – Page 173





Hydrotechnik HySense® Sensor intelligence

ISDS (Intelligent Sensor Detection System) functionality

The ISDS functionality developed by Hydrotechnik makes it much easier to operate Hydrotechnik measuring equipment while also improving measurement accuracy. This functionality consists of two main functions:

Automatic sensor detection in the Hydrotechnik measuring device

After a sensor is connected to the measuring device, the corresponding channels (sensor signal, measurement variable, measuring range, etc.) are configured in the measuring device automatically. This means that users do not need to configure the sensors in the device, effectively making the sensors plug-and-play devices, preventing input mistakes, and making life easier for users in general.

Reading linearization in the measuring device

In order to improve performance, the sensor characteristic curve determined during calibration is stored in a table in the sensor. Then, as soon as the sensor is connected to the measuring device, the device reads the table and starts using it to linearize the sensor readings. The result? Significantly higher measuring accuracy.

Smart sensors

The term “smart sensors” refers to sensors that, in contrast to conventional ones, not only measure properties, but also take care of processing the corresponding signal completely and process and interpret their readings based on stored algorithms. These sensors contain a microcontroller with sufficient computing power, and are accordingly also referred to as “intelligent sensors.” All our smart sensors come with our ISDS functionality, but the difference is that the linearization is carried out in the sensor itself rather than externally by the measuring device. The Hydrotechnik portfolio features a large number of smart sensors, such as the HySense® QT 510, RS 510, CX 197, SC 100, etc.

HySense® Q Flow meters

HySense® Q family

The flow meters in the HySense® Q family are the result of decades of experience developing and manufacturing flow meters. Combined with the tools of the trade, such as our in-house DAkkS calibration laboratory, our production operations, etc., this experience enables Hydrotechnik to consistently deliver extraordinarily reliable quality and cost-effectiveness.

Both the global move towards renewables and the accompanying concern with energy efficiency have made flow metering absolutely crucial, as it is an indispensable part of development activities, diagnostic work, condition monitoring, and predictive maintenance for fluid systems. And as a solution provider in the field, Hydrotechnik has four different product families that cover virtually every application thanks to their versatility and that have specific advantages and characteristics each.

HySense® QT

Turbine flow meters: HySense® QT

Characteristics

- | High measuring accuracy and reproducibility
- | Flow measurements with a high dynamic range
- | Compact and lightweight
- | Heavy-duty construction for high operating pressures and resistance up to 420 bar
- | Low pressure losses

Applications

- | Stationary and mobile flow measurements
- | Testing pump units
- | Adjusting the flow rate for hydraulic attachments on heavy equipment
- | Heating and cooling circuit condition monitoring
- | Lubricant monitoring in manufacturing systems
- | Systems with dynamic and bidirectional flow rates
- | Diagnostic tasks



HySense® QG

Gear flow meters: HySense® QG

Characteristics

- | Wide measuring range combined with extremely high measuring accuracy and reproducibility
- | Wide viscosity range; performance virtually unaffected by different viscosities
- | Heavy-duty construction for high operating pressures and resistance up to 630 bar
- | Integrated flow direction detection

Applications

- | Volume and flow rate measurements
- | Cylinder travel or speed measurements
- | Filling and metering an extremely wide variety of fluids
- | Ensuring correct mixing ratios
- | Leakage measurement and rupture monitoring
- | Measuring tasks for control purposes in test stands
- | Fuel consumption measurements



HySense® QL

Turbine flow meters with integrated throttle valve: HySense® QL

Characteristics

- | Integrated proportional valve for load simulations
- | High measuring accuracy and reproducibility
- | Flow measurements with a high dynamic range
- | Body made of high-strength aluminum; lightweight
- | Heavy-duty construction for high operating pressures and resistance up to 420 bar

Applications

- | Stationary and mobile flow measurements
- | Testing the operation and performance of pump units
- | Adjusting pump controllers and pressure control valves
- | Diagnostic tasks



HySense® QO

Oval gear flow meters: HySense® QO

Characteristics

- | High measuring accuracy and reproducibility
- | No straight pipe runs required for the inlet and outlet
- | Wide viscosity range
- | Can be disassembled for cleaning
- | High resistance to aggressive fluids
- | High temperature resistance

Applications

- | Volume and flow rate measurements
- | Filling and metering
- | Fuel consumption measurements
- | Measuring tasks for control purposes in test stands
- | Measurements in aggressive fluids



HySense® QT

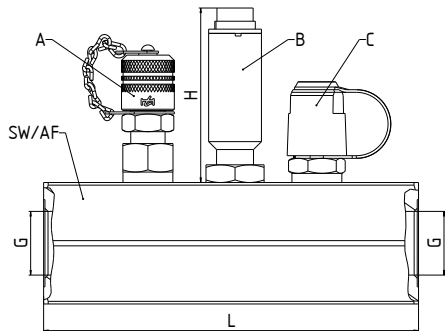
	Series	Measuring range L/min	Output signal / Measuring accuracy
<p>QT 2xx Pages 82 – 83 Product discontinued</p>		<p>1 ... 10 5 ... 100 15 ... 300 25 ... 600</p>	<p>Frequency (Hz) ±0.5% of reading^{1,2}</p> <p>CANopen ±0.5% of reading²</p> <p>Analog 4 ... 20 mA ±0.5% of reading² plus ±0.1% of full scale</p>
<p>QT 3xx Pages 84 – 85</p>		<p>45 ... 1000</p>	<p>Frequency (Hz) ±0.5% of reading^{1,2}</p> <p>CANopen ±0.5% of reading²</p> <p>Analog 4 ... 20 mA ±0.5% of reading² plus ±0.1% of full scale</p>
<p>QT 4xx Pages 86 – 87</p>		<p>16 ... 600</p>	<p>Frequency (Hz) ±0.5% of reading^{1,2}</p> <p>CANopen ±0.5% of reading²</p> <p>Analog 4 ... 20 mA ±0.5% of reading² plus ±0.1% of full scale</p>
<p>QT 5xx Pages 88 – 90</p>		<p>1 ... 20 2 ... 75 5 ... 150 9 ... 300 16 ... 600</p>	<p>Frequency (Hz) ±0.5% of reading^{1,2}</p> <p>CANopen ±0.5% of reading²</p> <p>Analog 4 ... 20 mA ±0.5% of reading² plus ±0.1% of full scale</p>
<p>QT 600 Pages 91 – 93</p>		<p>9 ... 300</p>	<p>Frequency (Hz) / ±2.5% of reading for 5 ... 100 mm²/s</p>

¹ Different if a constant calibration value is used; please refer to the technical data sheet

² With calibration viscosity

Mechanical connection	Fluid	Special characteristics
ISO 228 G 1/4, G 3/4, G 1 1/4, G 1 1/2	Water, oil-in-water emulsion, water and glycol mixtures, liquids containing water such as HFA / HFC	Stainless steel body for harsh ambient conditions A wide variety of sizes Carbide plain bearing
SAE 2" code 62	Fuels, water, hydraulic fluids, transmission fluids, oil-in-water emulsions, water and glycol mixtures, brake fluid, Skydrol	Low pressure differential Flow rate measurements up to 1000 L/min SAE flange connection Stainless steel body
ISO 228 G 1 1/4	Fuels, hydraulic fluids, transmission fluids, brake fluid, Skydrol	Reinforced construction for especially harsh operating conditions
ISO 228 G 1/4, G 3/4, G 1, G 1 1/4 ANSI B1.1 7/16-20 UN, 1 1/16-12 UN, 1 5/16-12 UN, 1 5/8-12 UN	Fuels, water, hydraulic fluids, transmission fluids, oil-in-water emulsions, water and glycol mixtures, brake fluid, Skydrol	Hydrotechnik standard A wide variety of sizes Stainless steel and aluminum body
ISO 228 G 1	Hydraulic fluids, transmission fluids, and other mineral-based oils	Flow measurements for a wide viscosity range with extremely high measuring accuracy Integrated temperature measurement Aluminum body

HySense® QT 2xx



Product discontinued

A	MINIMESS® 1620 series p/T test point
B	HySense® RS series inductive sensor
C	MINIMESS® 1620 series test point

General characteristics	
Fluid	Water, oil-in-water emulsion, water and glycol mixtures, and liquids containing water such as HFA / HFC*
Flow range	1 ... 600 L/min*
Output signal	Frequency, CANopen, 4 ... 20 mA
Response time	< 0.05 s
Viscosity range	1 ... 10 mm ² /s (cSt)* Calibration viscosity: 2.5 mm ² /s*
Measuring accuracy	Up ... ±0.5% of reading
Fluid temperature	-20 °C ... 100 °C*
Ambient temperature	-20 ... 85 °C
Turbine housing material	Stainless steel
Seal material	FKM*
IP degree of protection	IP67 (DIN EN 60529)

* More available upon request

Flow rate	Measuringrange L/min	G ISO 228	AF mm	L mm	Weight g	H	
						QT 200	QT 206 QT 210
10 L/min	1 ... 10	G 1/4	27	120	Approx. 795	62 mm	98 mm
100 L/min	5 ... 100	G 3/4	46	142	Approx. 2040		
300 L/min	15 ... 300	G 1 1/4	60	181	Approx. 3400		
600 L/min	25 ... 600	G 1 1/2	65	185	Approx. 4100		

Flow rate	Max. operating pressure bar	Measuring accuracy		
		QT 200 ¹	QT 206	QT 210 ²
10 L/min	420	±0.5% of reading		
100 L/min				
300 L/min				
600 L/min	350			

¹ Different if a constant calibration value is used; please refer to the technical data sheet

² Additionally ±0.1% of full scale

Part No. 33XC-YY-35.V012G PRODUCT DISCONTINUED

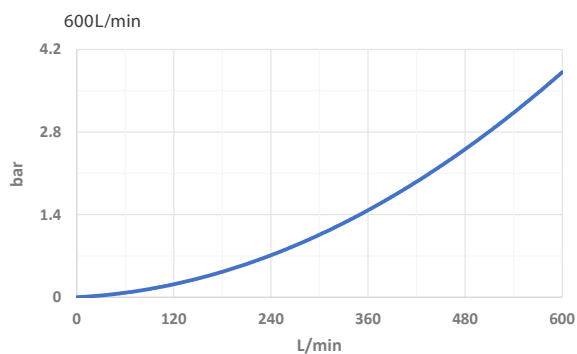
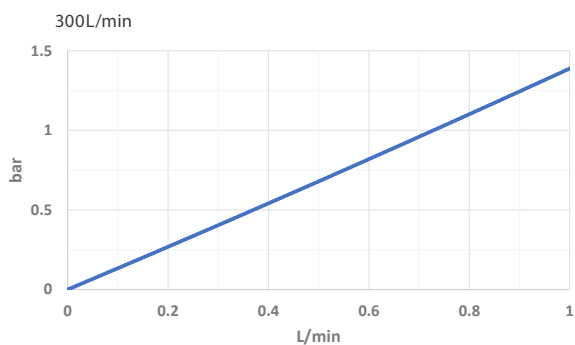
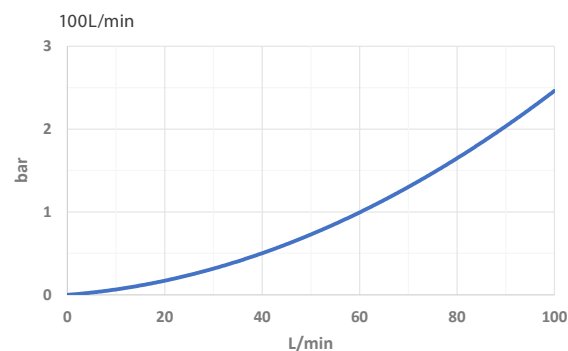
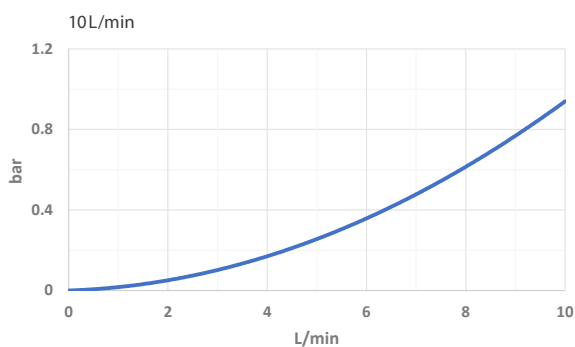
Sensor

X =	C	QT 206 CANopen, M12 electrical connector, 5-pin, ISDS
	I	QT 210 analog 4 ... 20 mA, M12 electrical connector, 4-pin, ISDS
	J	QT 210 analog 4 ... 20 mA, M16 electrical connector, 6-pin, ISDS
	K	QT 200 frequency, M12 electrical connector, 4-pin, ISDS
	V	QT 200 frequency, M16 electrical connector, 6-pin, ISDS

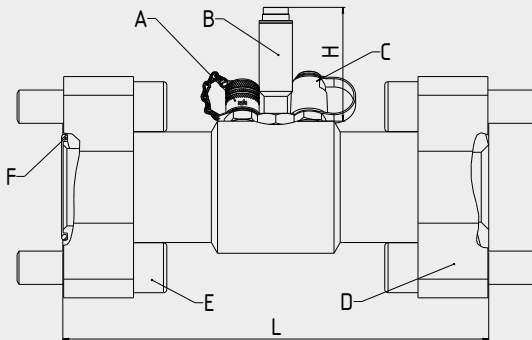
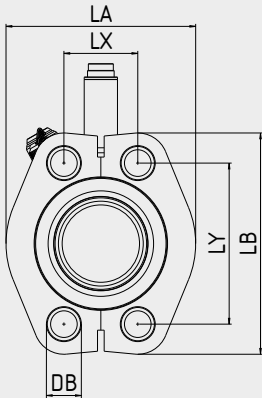
Thread / Flow range

YY =	01	ISO 228-G 1/4	1 ... 10 L/min
	77	ISO 228-G3/4	5 ... 100 L/min
	78	ISO 228-G 1 1/4	15 ... 300 L/min
	79	ISO 228-G1 1/2	25 ... 600 L/min

Pressure differential at 2.5 mm²/s*



HySense® QT 3xx



A	MINIMESS® 1620 series p/T test point
B	HySense® RS series inductive sensor
C	MINIMESS® 1620 series test point
D	SAE flange halves
E	Socket cap screws
F	SAE seal (O-ring) ID 56.74 x 3.53 90 Shore A, NBR

General characteristics

Fluid	Fuels, water, hydraulic fluids, transmission fluids, oil-in-water emulsions, water and glycol mixtures, brake fluid, Skydrol*
Flow range	45 ... 1000 L/min*
Output signal	Frequency, CANopen, 4 ... 20 mA
Response time	< 0.05 s
Viscosity range	1 ... 150 mm ² /s (cSt)*
Measuring accuracy	Up to ±0.5% of reading
Fluid temperature	-20 °C ... 100 °C*
Ambient temperature	-20 ... 85 °C
Turbine housing material	Stainless steel
Seal material	FKM*
IP degree of protection	IP67 (DIN EN 60529)

* More available upon request

Flow rate	Measuring range	Connection	L	LA	LB	Weight without flange g	H		
	L/min						SAE J518	mm	mm
1000 L/min	45 ... 1000	2" flange	256	113.8	133	Approx. 5400	62 mm	98 mm	

Flow rate	Max. operating pressure bar	Measuring accuracy		
		QT 300 ¹	QT 306	QT 310 ²
1000 L/min	420	±0.5% of reading		

¹ Different if a constant calibration value is used; please refer to the technical data sheet

² Additionally ±0.1% of full scale

Part No. **3WXF-88-35.ZZZZ**

Chemical compatibility

- W =** 1 Hydraulic fluids, transmission fluids
- 3 Water, oil-in-water emulsion, water and glycol mixtures, liquids containing water such as HFA / HFC (available starting mid-2020)
- A Skydrol (available starting mid-2020)

Sensor

- X =** C QT 306 CANopen, M12 electrical connector, 5-pin, ISDS
- I QT 310 analog 4 ... 20 mA, M12 electrical connector, 4-pin, ISDS
- J QT 310 analog 4 ... 20 mA, M16 electrical connector, 6-pin, ISDS
- K QT 300 frequency, M12 electrical connector, 4-pin, ISDS
- V QT 300 frequency, M16 electrical connector, 6-pin, ISDS

Calibration viscosity

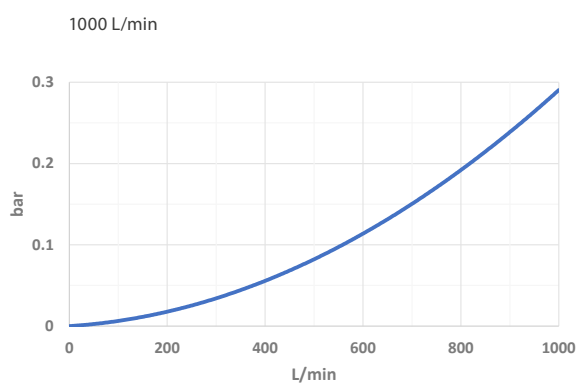
- W =** 1 → 30 mm²/s: **ZZZZ =** 030
- W =** 3 → 2,5 mm²/s: **ZZZZ =** V012
- W =** A → 11 mm²/s: **ZZZZ =** 011

Included:

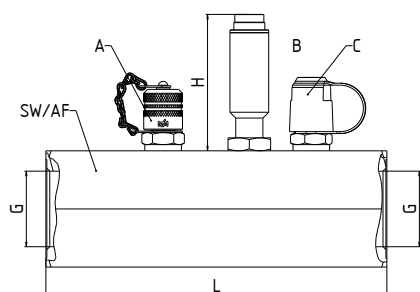
- Four 2" SAE flange halves, straight
- One SAE seal
- Eight DIN 912 socket cap screws

Additional
flow ranges of up to
1500 L/min available
upon request

Pressure differential at 30 mm²/s



HySense® QT 4xx



A	MINIMESS® 1620 series p/T test point
B	HySense® RS series inductive sensor
C	MINIMESS® 1620 series test point

General characteristics	
Fluid	Fuels, hydraulic fluids, transmission fluids, brake fluid, Skydrol*
Flow range	16 ... 600 L/min*
Output signal	Frequency, CANopen, 4 ... 20 mA
Response time	< 0.05 s
Viscosity range	1 ... 150 mm ² /s (cSt)*
Measuring accuracy	Up to ±0.5% of reading
Fluid temperature	-20 °C ... 100 °C*
Ambient temperature	-20 ... 85 °C
Turbine housing material	Stainless steel
Seal material	FKM*
IP degree of protection	IP67 (DIN EN 60529)

* More available upon request

Flow rate	Measuringrange L/min	G ISO 228	AF mm	L mm	Weight g	QT 400	H QT 406	QT 410
600 L/min	16 ... 600	G 1 1/4	60	176	Approx. 3600	62 mm	98 mm	

Flow rate	Max. operating pressure bar	Measuring accuracy
		QT 400 ¹ QT 406 QT 410 ²
600 L/min	420	±0.5% of reading

¹ Different if a constant calibration value is used; please refer to the technical data sheet

² Additionally ±0.1% of full scale

Part No. **3WYG-72-35.ZZZ**

Chemical compatibility

W = R Hydraulic fluids, transmission fluids

A Skydrol (available starting mid-2020)

Sensor

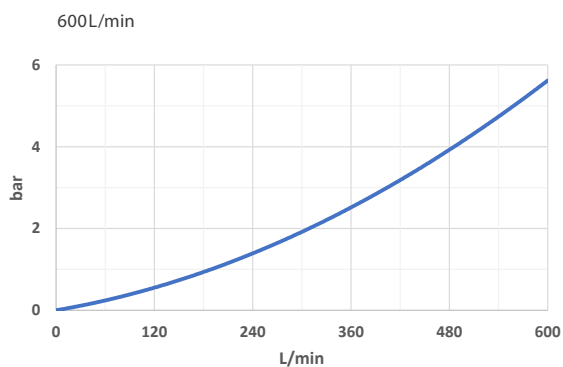
Y = C QT 406 CANopen, M12 electrical connector, 5-pin, ISDS
I QT 410 analog 4 ... 20 mA, M12 electrical connector, 4-pin, ISDS
J QT 410 analog 4 ... 20 mA, M16 electrical connector, 6-pin, ISDS
K QT 400 frequency, M12 electrical connector, 4-pin, ISDS
V QT 400 frequency, M16 electrical connector, 6-pin, ISDS

Calibration viscosity

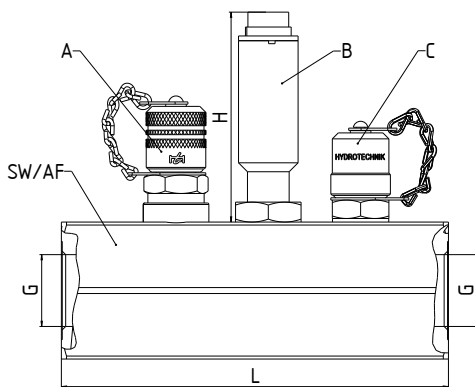
W = R → 30 mm²/s: **ZZZ =** 030

W = A → 11 mm²/s: **ZZZ =** 011

Pressure differential at 30 mm²/s



HySense® QT 5xx



A	MINIMESS® 1620 series p/T test point
B	HySense® RS series inductive sensor
C	MINIMESS® 1620 series test point

General characteristics

Fluid	Fuels, water, hydraulic fluids, transmission fluids, oil-in-water emulsions, water and glycol mixtures, brake fluid, Skydrol*
Flow range	1 ... 600 L/min*
Output signal	Frequency, CANopen, 4 ... 20 mA
Response time	< 0.05 s
Viscosity range	1 ... 150 mm ² /s (cSt)*
Measuring accuracy	Up to ±0.5% of reading
Fluid temperature	-20 °C ... 100 °C*
Ambient temperature	-20 ... 85 °C
Turbine housing material	Stainless steel / aluminum
Seal material	FKM*
IP degree of protection	IP67 (DIN EN 60529)

* More available upon request

Flow rate	Measuring range L/min	G ISO 228	AF mm	L mm	Weight g	H		
						QT 500	QT 506	QT 510
20 L/min	1 ... 20	G 1/4	41	100	Approx. 685	62 mm	98 mm	
75 L/min	2 ... 75	G 3/4	46	130	Approx. 900			
150 L/min	5 ... 150	G 3/4	55	140	Approx. 1150			
300 L/min	9 ... 300	G 1	55	150	Approx. 1230			
600 L/min	16 ... 600	G 1 1/4	60	174	Approx. 1520			

Flow rate	Max. operating pressure bar	Measuring accuracy		
		QT 500 ¹	QT 506	QT 510 ²
20 L/min	420	±0.5% of reading		
75 L/min				
150 L/min				
300 L/min				
600 L/min	350			

¹ Different if a constant calibration value is used; please refer to the technical data sheet

² Additionally ±0.1% of full scale

Part No. **3WXH-YY-35.ZZZZ**

Chemical compatibility

W =	1	Hydraulic fluids, transmission fluids
	3	Water, oil-in-water emulsion, water and glycol mixtures, liquids containing water such as HFA / HFC (available starting mid-2020)
	A	Skydrol (available starting mid-2020)

Sensor

X =	C	QT 506 CANopen, M12 electrical connector, 5-pin, ISDS
	I	QT 510 analog 4 ... 20 mA, M12 electrical connector, 4-pin, ISDS
	J	QT 510 analog 4 ... 20 mA, M16 electrical connector, 6-pin, ISDS
	K	QT 500 frequency, M12 electrical connector, 4-pin, ISDS
	V	QT 500 frequency, M16 electrical connector, 6-pin, ISDS

Thread / Flow range

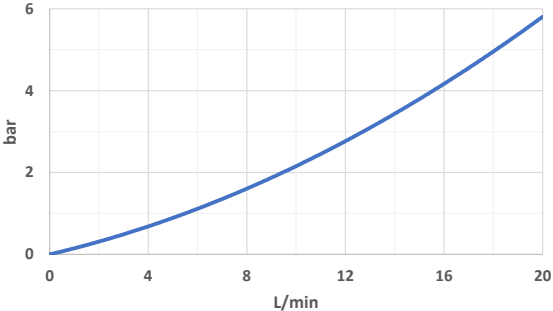
YY =	02	ISO 228-G 1/4	1 ... 20 L/min
	70	ISO 228-G 3/4	2 ... 75 L/min
	71	ISO 228-G 1	9 ... 300 L/min
	72	ISO 228-G 1 1/4	16 ... 600 L/min
	73	ISO 228-G 3/4	5 ... 150 L/min
	12	7/16-20 UN	0.26 ... 5.3 GPM
	80	1 1/16-12 UN	0.6 ... 20 GPM
	81	1 5/16-12 UN	2.4 ... 80 GPM
	82	1 5/8-12 UN	4.2 ... 160 GPM
	83	1 5/16-12 UN	1.3 ... 40 GPM

Calibration viscosity

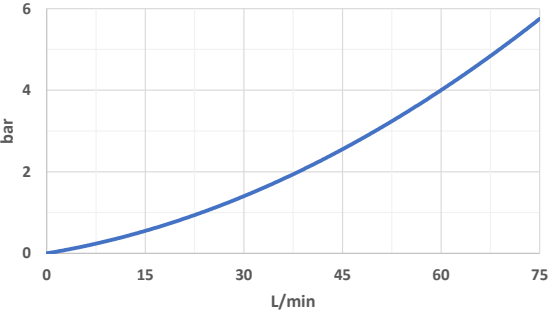
W =	1	→	30 mm ² /s: ZZZZ =	030
	3	→	2,5 mm ² /s: ZZZZ =	V012
	A	→	11 mm ² /s: ZZZZ =	011

Pressure differential at 30 mm²/s

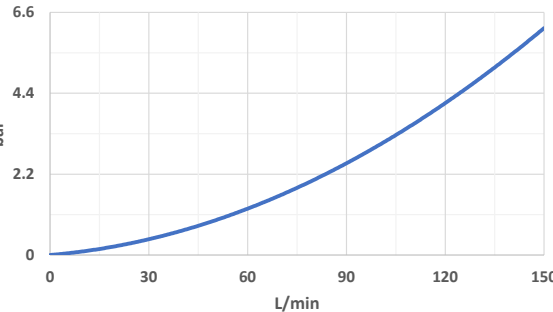
20 L/min



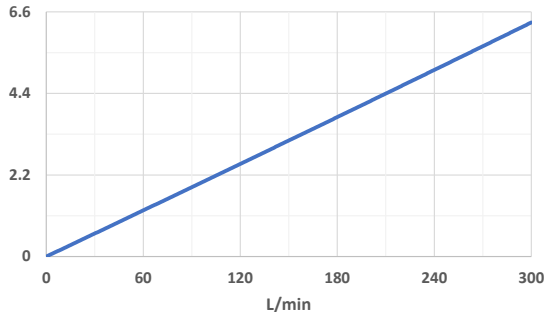
75 L/min



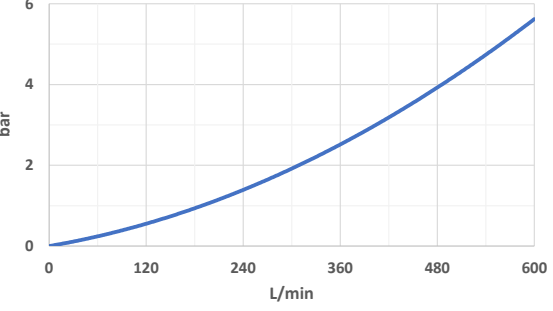
150 L/min



300 L/min



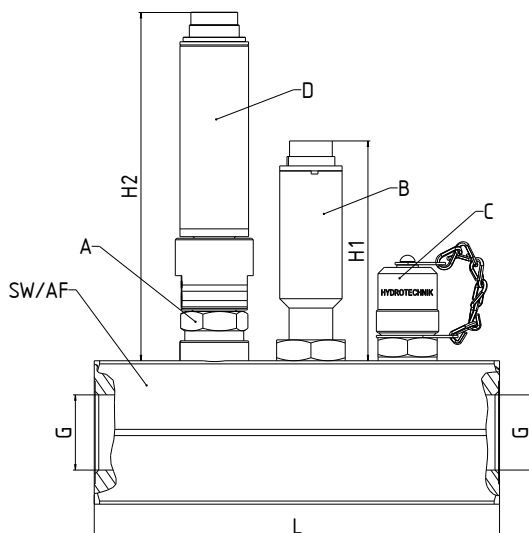
600 L/min



HySense® QT 600

In combination with the measuring devices in the MultiSystem series, the new Hydrotechnik HySense® QT 600 turbine meter generation makes it possible to measure volumetric flow rates accurately with various hydraulic fluids and varying temperatures.

The technology not only combines high flexibility with user friendliness and ease of use, but also saves users a significant amount of time.



A	MINIMESS® 1620 series p/T test point
B	HySense® RS series inductive sensor
C	MINIMESS® 1620 series test point
D	HySense® TE series temperature sensor

General characteristics

Fluid	Hydraulic fluids, transmission fluids
Flow range	9 ... 300 L/min*
Output signal	Frequency
Response time	< 0.05 s
Viscosity range	5 ... 100 mm ² /s (cSt)*
Fluid temperature	-20 °C ... 100 °C*
Ambient temperature	-20 ... 85 °C
Turbine housing material	Aluminum
Seal material	FKM*
IP degree of protection	IP67 (DIN EN 60529)

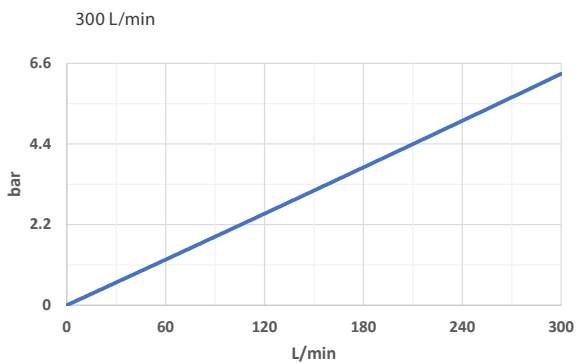
* More available upon request

Flow rate	Measuring range L/min	G ISO 228	AF mm	L mm	Weight g	H1	H2
300 L/min	9 ... 300	G 1	55	150	Approx. 1230	62 mm	98 mm

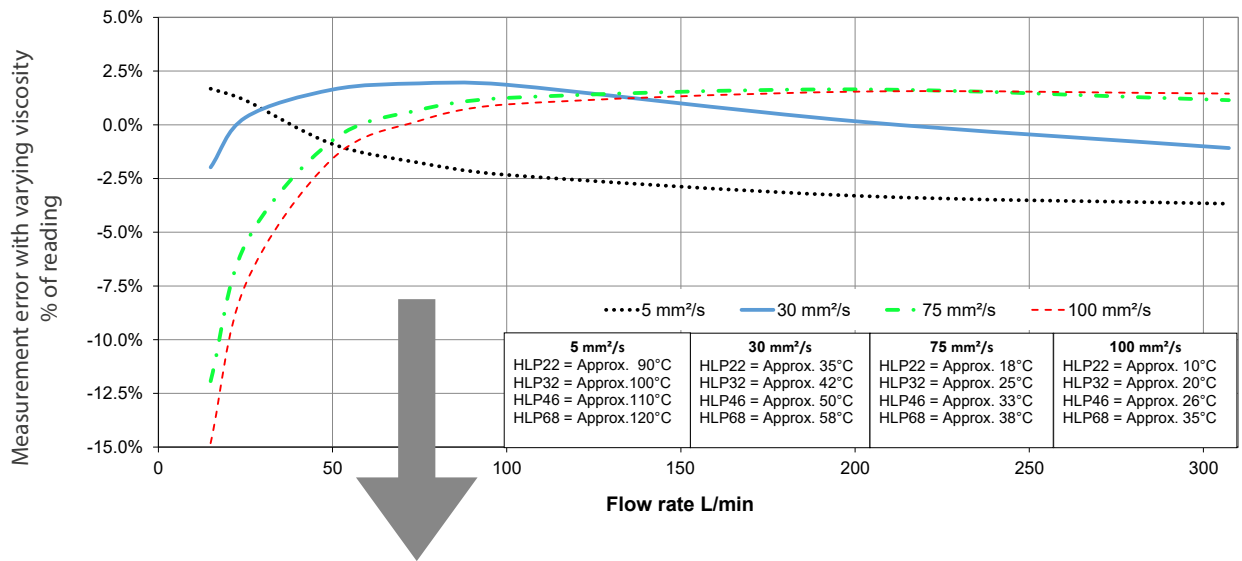
Flow rate	Max. operating pressure bar	Measuring accuracy QT 600
300 L/min	420	±2.5% of reading

Part No. 31VU-71-35.V036

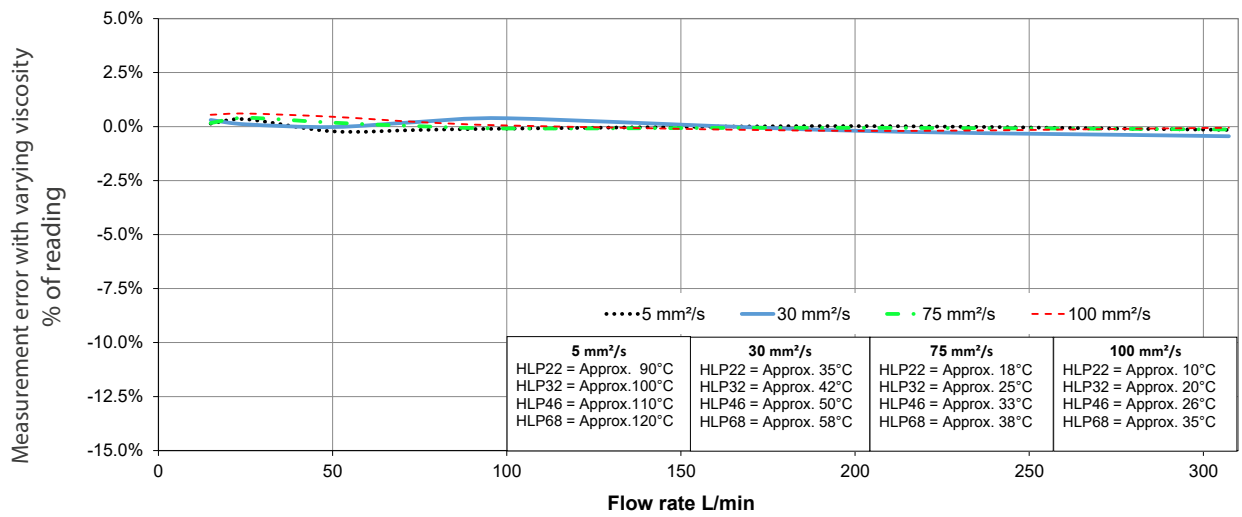
Pressure differential at 30 mm²/s



Characteristic curve for standard turbine meters, calibrated at 30 mm²/s, used with varying viscosity



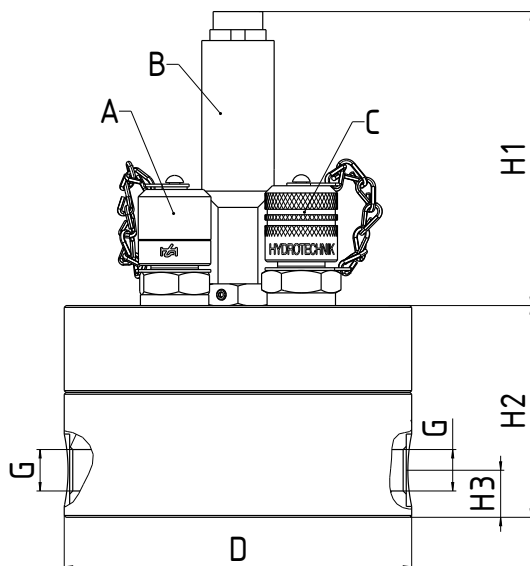
Characteristic curve for the HySense[®] QT 600, used with varying viscosity



HySense® QG 100

The gear flow meters in the HySense® QG family are the result of decades of experience developing and manufacturing flow meters. Gear flow meters are positive displacement meters and use one of the most accurate methods available for measuring flow.

HySense® QG 100 is part of the standard series in the Hydrotechnik portfolio. As a result of its tooth geometry, the various bearing solutions, and premium-grade materials, the HySense® QG 100 is a true all-rounder when it comes to volume and flow measurement.



A	MINIMESS® 1620 series test point
B	HySense® RS series inductive sensor
C	MINIMESS® 1620 series p/T test point

General characteristics

Fluid	Fuels, hydraulic fluids, transmission fluids, brake fluid, Skydrol*
Flow range	0.005 ... 300 L/min*
Output signal	Frequency / 4 ... 20 mA**
Viscosity range	1 ... 120,000 mm ² /s (cSt)*
Measuring accuracy	Up to $\pm 0.4\%$ of reading
Fluid temperature	-20 °C ... 100 °C***
Ambient temperature	-20 °C ... 85 °C***
Top material	Stainless steel*
Center / base material	GJS*
Seal material	FKM / EPDM*
Electrical measuring connector	5-pin / 6-pin M16 x 0.75* circular connector
IP degree of protection	IP67 (DIN EN 60529)

* More available upon request

** For 4 ... 20 mA, HySense® SC 100 required (please refer to page 173)

*** High-temperature version for up to 160 °C available upon request

Flow rate	Measuring range L/min	G	D mm	Weight g	H1	H2	H3
1 L/min	0.005 ... 1	ISO 228-G 1/4	84	Approx. 1600	67	50	12
5 L/min	0.05 ... 5	ISO 228-G 1/4	96	Approx. 2700	66	59	13
30 L/min	0.2 ... 30	ISO 228-G 3/8	106	Approx. 3600	66	67	15
70 L/min	0.7 ... 70	ISO 228-G 3/4	136	Approx. 8500	60	93	20
300 L/min	3.0 ... 300	SAE 1-1/4	210	Approx. 32000	45	145	42

Flow rate	Max. operating pressure bar	Measuring accuracy
1 L/min	420	$\pm 0.5\%$ of reading
5 L/min	420	$\pm 0.5\%$ of reading
30 L/min	420	$\pm 0.5\%$ of reading
70 L/min	420	$\pm 0.4\%$ of reading
300 L/min	420	$\pm 0.5\%$ of reading

Part No. 3W43-XX-Y-35.ZZZ

Chemical compatibility

W = 1 Hydraulic fluids, transmission fluids

A Skydrol (available starting mid-2020)

Thread / Flow range

XX = 01	ISO 228-G 1/4	0.005 ... 1 L/min
02	ISO 228-G 1/4	0.05 ... 5 L/min
03	ISO 228-G 3/8	0.2 ... 30 L/min
04	ISO 228-G 3/4	0.7 ... 70 L/min
05	1 1/4 SAE flange	3 ... 300 L/min

Electrical connector

Y = S 6-pin M16 x 0.75 circular connector, ISDS

- 5-pin M16 x 0.75 circular connector, not compatible with HySense® SC 100 (Omit "Y" from the Part No. when choosing this version)

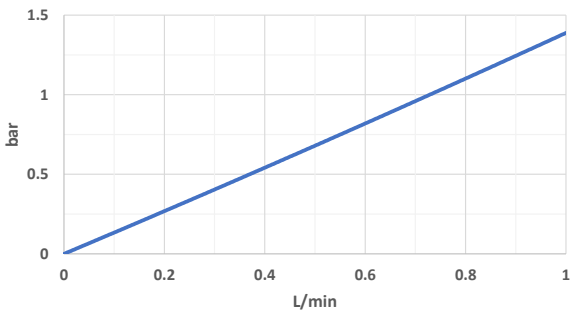
Calibration viscosity

W = 1 → 30 mm²/s ZZZ = 030

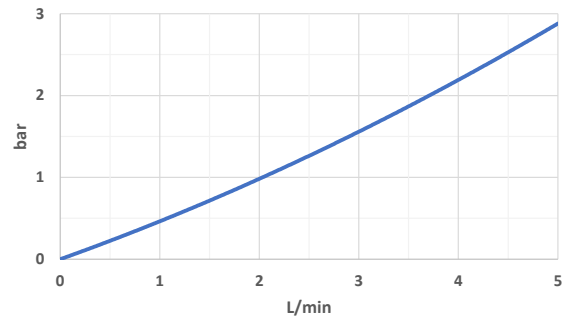
W = A → 11 mm²/s ZZZ = 011

Pressure differential at 30 mm²/s

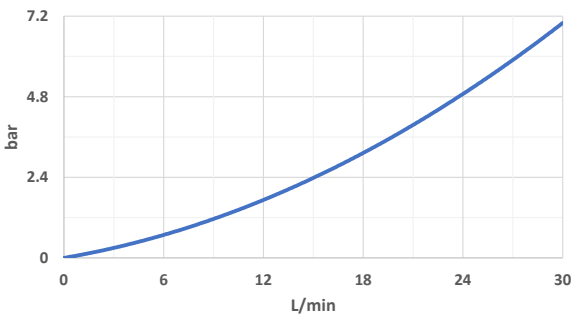
1 L/min



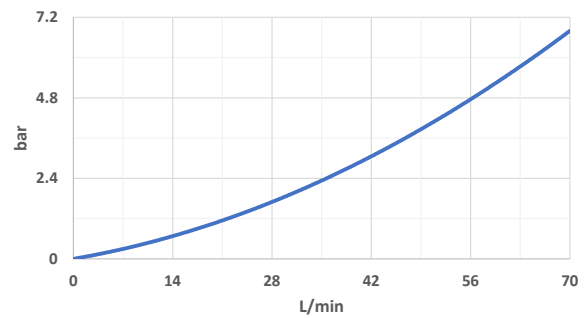
5 L/min



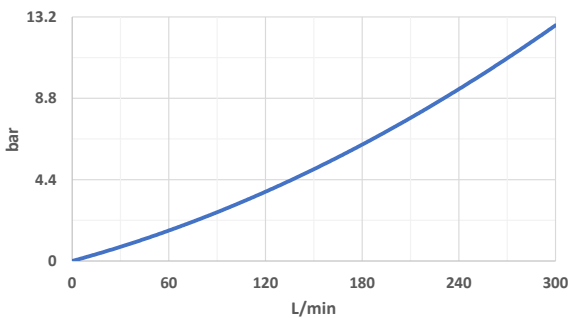
30 L/min



70 L/min



300 L/min

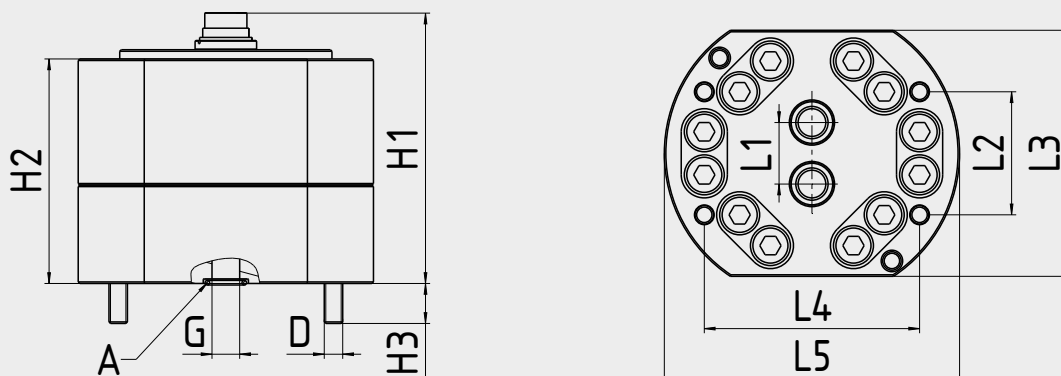


HySense® QG 200

HySense® QG 200 is our high-end solution in the area of gear flow meters. The series as a whole makes an undeniably compelling case with its high measuring accuracy, heavy-duty durability, an extremely wide measuring range, and flow direction detection. Moreover, the option to use manifold mounting or threaded connections on the side allows for flexible system integration.



Threaded connections on the side available upon request



General characteristics

Fluid	Fuels, hydraulic fluids, transmission fluids, brake fluid, Skydrol*
Flow range	0.005 ... 120 L/min*
Output signal	Frequency / 4 ... 20 mA**
Viscosity range	1 ... 120,000 mm ² /s (cSt)*
Measuring accuracy	Up to ±0.3% of reading
Fluid temperature	-20 ... 100 °C
Ambient temperature	-20 ... 85 °C
Top material	Stainless steel*
Center / base material	Stainless steel*
Seal material	FKM / EPDM*
Electrical measuring connector	6-pin M16 x 0.75* circular connector
IP degree of protection	IP67 (DIN EN 60529)
Mechanical connection	Manifold mounting / threaded connection on the side

* More available upon request

** For 4 ... 20 mA, HySense® SC 100 required

Flow rate	Measuring range L/min	Max. Operating pressure bar	D DIN 13-1	H1 mm	H3 mm	L1 mm	L2 mm	L3 mm	L4 mm	L5 mm	Weight g
2 L/min	0.005 ... 2	450	M6	89	15	20	40	80	70	96	Approx. 3180
10 L/min	0.01 ... 10		M6	89	15	20	40	80	70	96	Approx. 3180
40 L/min	0.03 ... 40		M8	90	24	34	38	90	80	110	Approx. 4235
120 L/min	0.2 ... 120		M8	119	22	34	72	100	84	142	Approx. 9223

Part No. 3WUX-YY-PV.ZZZ

Chemical compatibility

W = 1 Hydraulic fluids, transmission fluids

A Skydrol (available starting mid-2020)

Measuring accuracy

X = 0 Measuring accuracy: $\pm 0.5\%$ of readingA Measuring accuracy: $\pm 0.3\%$ of reading

Measuring accuracy / Flow range

YY = 01 (0.5%) 0.005 ... 2 L/min / (0.3%) 0.02 ... 2 L/min

03 (0.5%) 0.01 ... 10 L/min / (0.3%) 0.1 ... 10 L/min

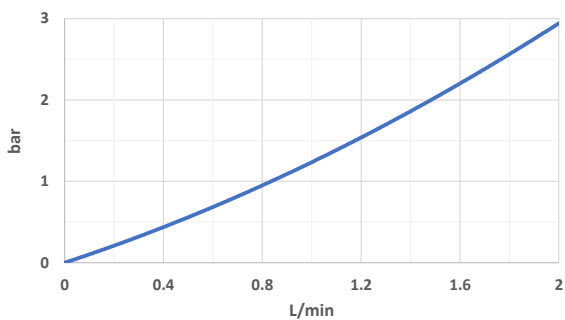
05 (0.5%) 0.03 ... 40 L/min / (0.3%) 0.2 ... 40 L/min

07 (0.5%) 0.2 ... 120 L/min / (0.3%) 1 ... 120 L/min

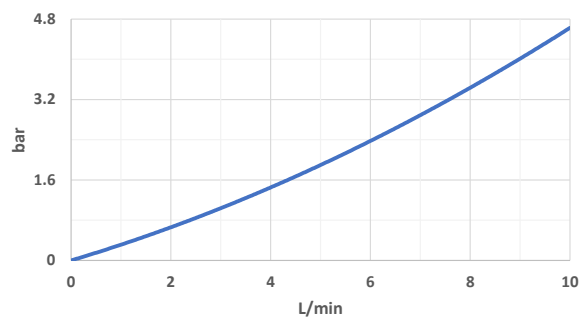
Calibration viscosity

W = 1 \rightarrow 30 mm²/s: ZZZ = 030W = A \rightarrow 11 mm²/s: ZZZ = 011Pressure differential at 30 mm²/s

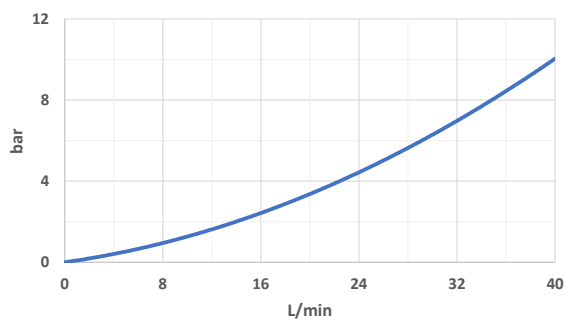
2 L/min



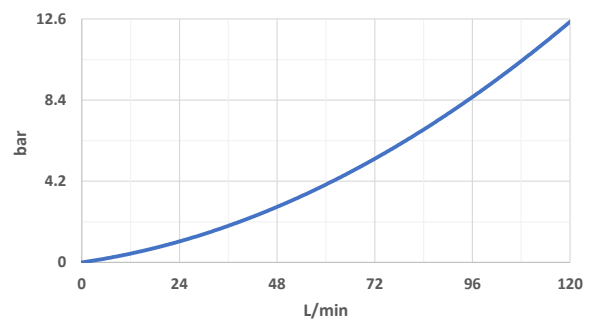
10 L/min



40 L/min



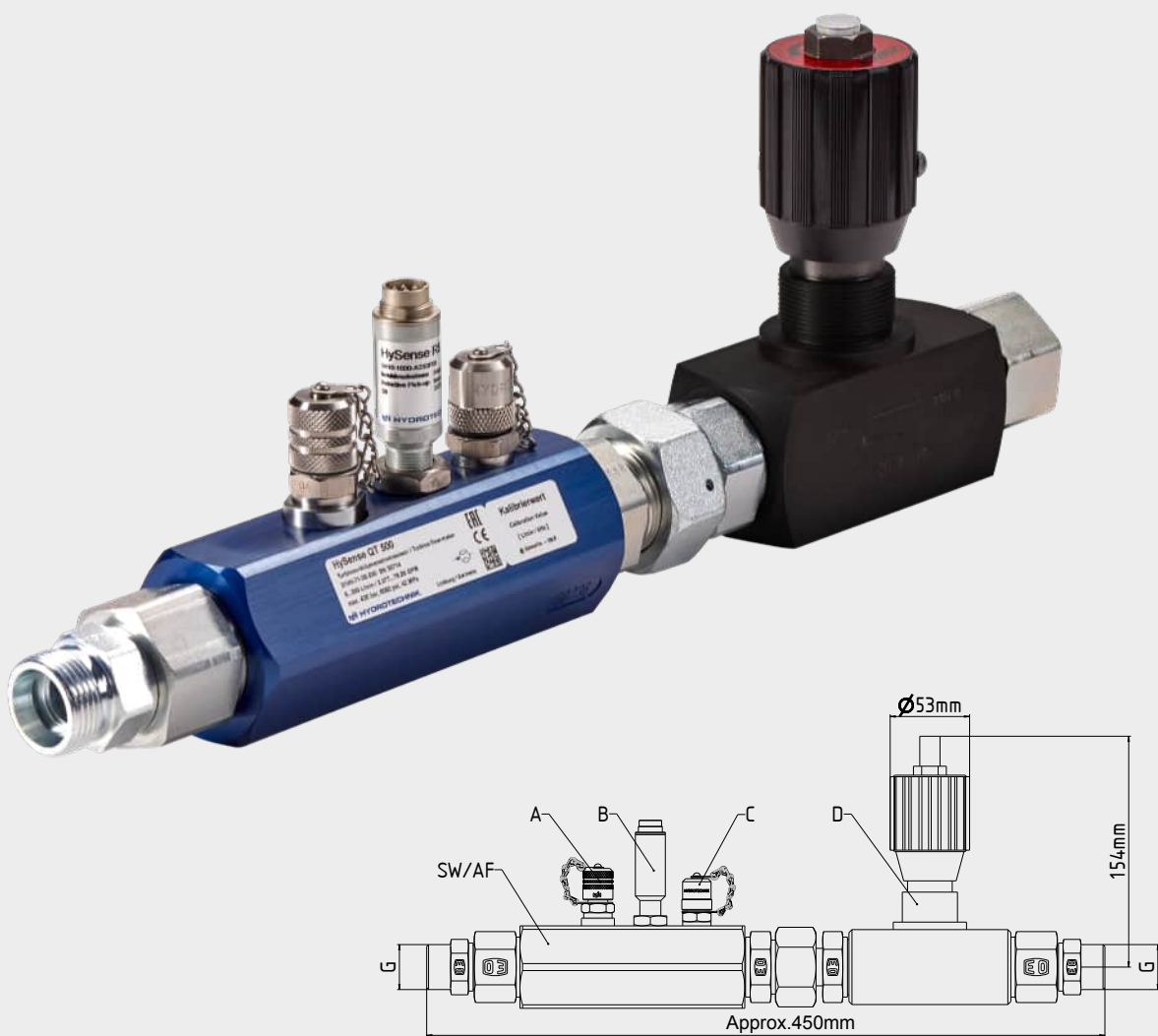
120 L/min



HySense® QL 1xx

The HySense® QL series was designed for development and diagnostic activities, and in particular to test the performance of pump units and determine pump characteristic curves. The series combines a turbine flow meter with an adjustable load valve, making it possible to conduct a defined load simulation in hydraulic systems.

The HySense® QL 1xx is sized for use with flow rates of up to 300 L/min and features a large hand valve that makes it possible to conveniently and precisely control the throttle valve.



A	MINIMESS® 1620 series p/T test point
B	HySense® RS series inductive sensor
C	MINIMESS® 1620 series test point
D	NG 20 throttle valve

General characteristics

Fluid	Fuels, hydraulic fluids, transmission fluids, brake fluid, Skydrol*
Flow range	9 ... 300 L/min*
Output signal	Frequency, CANopen, 4 ... 20 mA
Response time	< 0.05 s
Viscosity range	1 ... 150 mm ² /s (cSt)*
Measuring accuracy	±0.5% of reading
Fluid temperature	-20 °C ... 100 °C*
Ambient temperature	-20 ... 85 °C
Turbine housing material	Aluminum
Seal material	FKM*
IP degree of protection	IP67 (DIN EN 60529)

* More available upon request

Flow rate	Measuring range L/min	G DIN 13-7	Max. operating pressure bar	AF mm	Weight g	Measuring accuracy		
						QL 100 ¹	QL 106	QL 110 ²
300 L/min	9 ... 300	M30 × 2.0	350	55	Approx. 4300	±0.5% of reading		

¹ Different if a constant calibration value is used; please refer to the technical data sheet

² Additionally ±0.1% of full scale

Part No. **3WXT-71-35.ZZZ**

Chemical compatibility

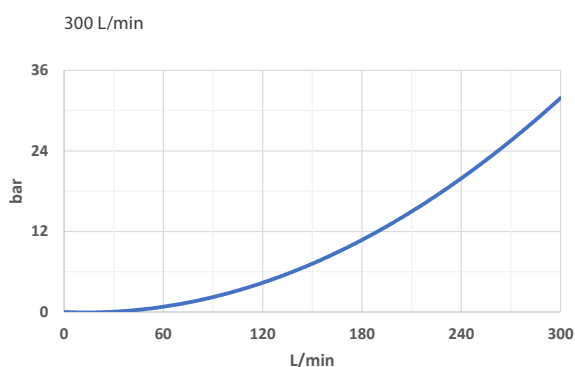
W =	1	Hydraulic fluids, transmission fluids
	A	Skydrol (available starting mid-2020)

Sensor

X =	C	QL 106 CAN, M12 electrical connector, 5-pin, ISDS
	I	QL 110 analog 4 ... 20 mA, M12 electrical connector, 4-pin, ISDS
	J	QL 110 analog 4 ... 20 mA, M16 electrical connector, 6-pin, ISDS
	K	QL 100 frequency, M12 electrical connector, 4-pin, ISDS
	V	QL 100 frequency, M16 electrical connector, 6-pin, ISDS

Calibration viscosity

W =	1	→	30 mm ² /s: ZZZ = 030
	A	→	11 mm ² /s: ZZZ = 011

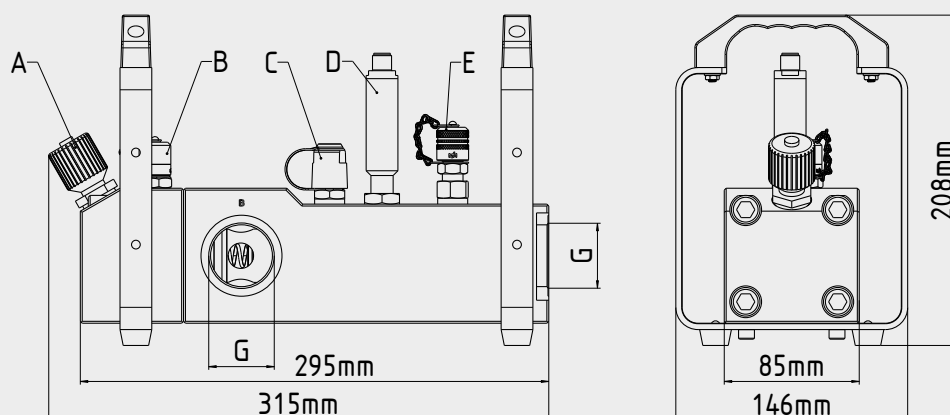
Pressure differential at 30 mm²/s

HySense® QL 2xx

The HySense® QL 2xx series is characterized by a compact and heavy-duty design, making it the ideal choice for portable applications. Moreover, it features a wide measuring range of up to 600 L/min.



A	Throttle valve for continuous pressure adjustments
B	MINIMESS® 1620 series test point
C	MINIMESS® 1620 series test point, plastic cap
D	HySense® RS series inductive sensor
E	MINIMESS® 1620 series p/T test point



General characteristics

Fluid	Fuels, hydraulic fluids, transmission fluids, brake fluid, Skydrol*
Flow range	12 ... 600 L/min*
Output signal	Frequency, CANopen, 4 ... 20 mA
Response time	< 0.05 s
Viscosity range	1 ... 150 mm ² /s (cSt)*
Measuring accuracy	Up to ±0.5% of reading
Fluid temperature	-20 °C ... 100 °C*
Ambient temperature	-20 ... 85 °C
Turbine housing material	Aluminum
Seal material	FKM*
IP degree of protection	IP67 (DIN EN 60529)

* More available upon request

Flow rate	Measuring range L/min	G ISO 228	Max. operating pressure bar	Weight g	Measuring accuracy		
					QL 200 ¹	QL 206	QL 210 ²
600 L/min	12 ... 600	G 1 1/4	350	Approx. 6520	±0.5% of reading		

¹ Different if a constant calibration value is used; please refer to the technical data sheet

² Additionally ±0.1% of full scale

Part No. **3WXQ-72-35.ZZZ**

Chemical compatibility

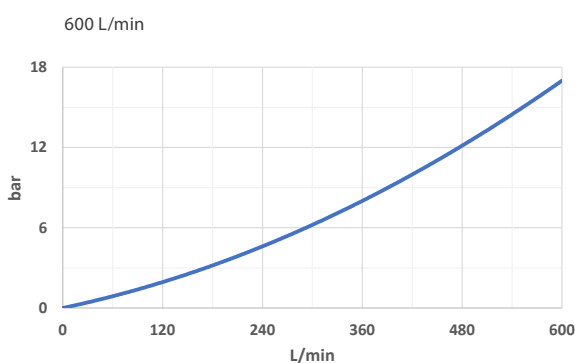
W = 1 Hydraulic fluids, transmission fluids
A Skydrol (available starting mid-2020)

Sensor

X = C QL 206 CAN, M12 electrical connector, 5-pin, ISDS
I QL 210 analog 4 ... 20 mA, M12 electrical connector, 4-pin, ISDS
J QL 210 analog 4 ... 20 mA, M16 electrical connector, 6-pin, ISDS
K QL 200 frequency, M12 electrical connector, 4-pin, ISDS
V QL 200 frequency, M16 electrical connector, 6-pin, ISDS

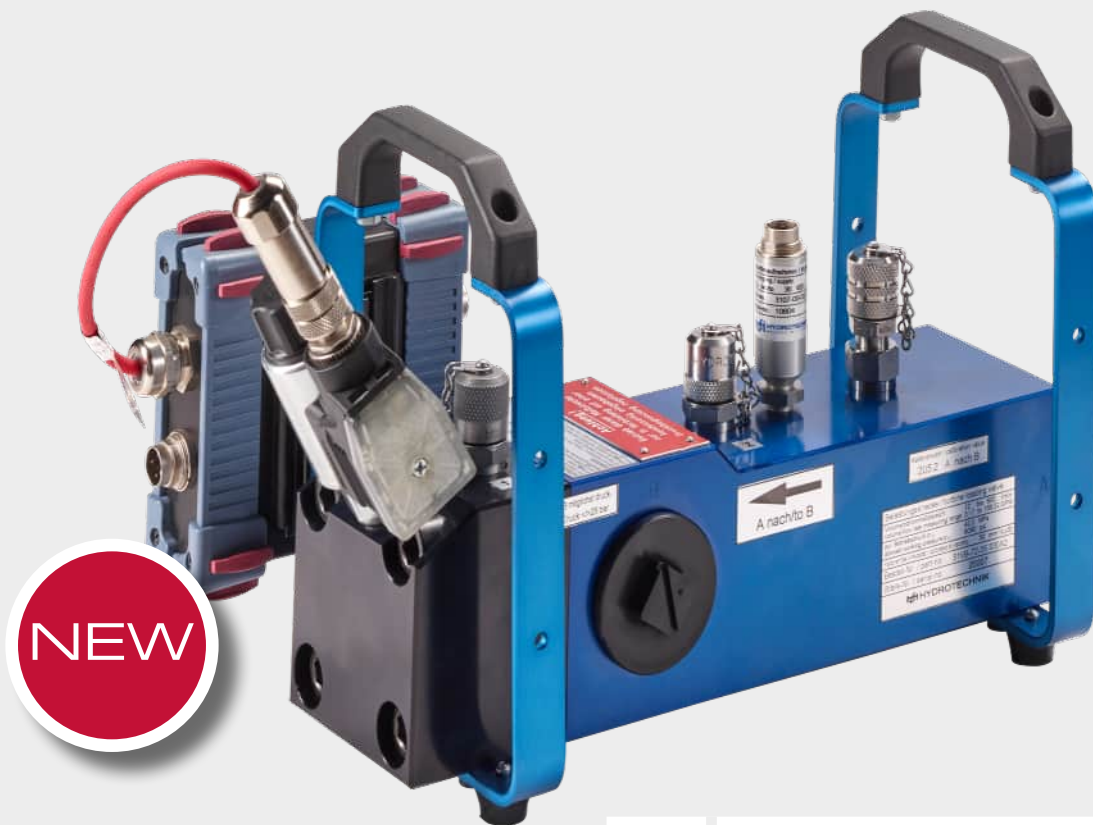
Calibration viscosity

W = 1 → 30 mm²/s: **ZZZ** = 030
A → 11 mm²/s: **ZZZ** = 011

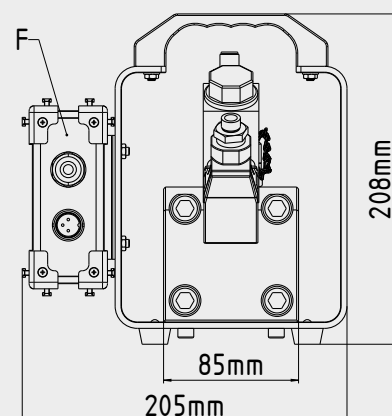
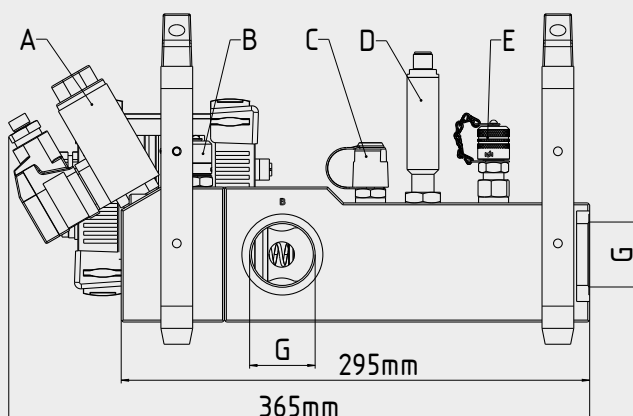
Pressure differential at 30 mm²/s

HySense® QL 326

The HySense® QL 326 is our high-end product for load simulations. It not only features a compact heavy-duty design, but the load section also comes with a fully integrated proportional valve. When combined with the corresponding control unit, this product can be used to run predefined test sequences, such as a sine or ramp function, fully automatically.



A	Electrically actuated throttle valve
B	MINIMESS® 1620 series test point
C	MINIMESS® 1620 series test point, plastic cap
D	HySense® RS series inductive sensor
E	MINIMESS® 1620 series p/T test point
F	Control unit



General characteristics

Fluid	Fuels, hydraulic fluids, transmission fluids, brake fluid, Skydrol*
Flow range	12 ... 600 L/min*
Control	Electric
Output signal	CANopen
Response time	< 0.05 s
Viscosity range	1 ... 150 mm ² /s (cSt)*
Fluid temperature	-20 °C ... 100 °C*
Ambient temperature	-20 ... 85 °C
Turbine housing material	Aluminum
Seal material	FKM*
IP degree of protection	IP54 (DIN EN 60529)

* More available upon request

Flow rate	Measuring range L/min	G ISO 228	Max. operating pressure bar	Weight g	Measuring accuracy
600 L/min	12 ... 600	G1 1/4	350	Approx. 7800	±0.5% of reading

Part No. 3WVR-72-P5.ZZZ

Chemical compatibility

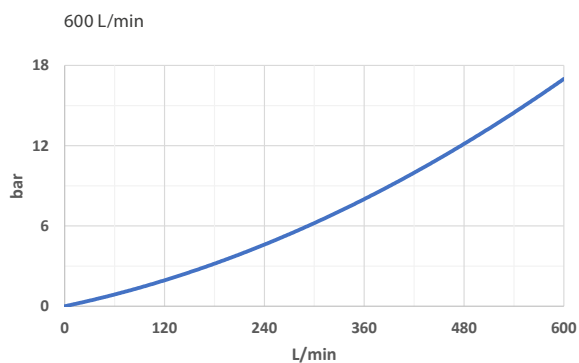
W =	1	Hydraulic fluids, transmission fluids
	A	Skydrol (available starting mid-2020)

Calibration viscosity

W =	1	→	30 mm ² /s: ZZZ = 030
	A	→	11 mm ² /s: ZZZ = 011

Scope of delivery

HySense® QL 326 included HySense® PR 126 pressure sensor

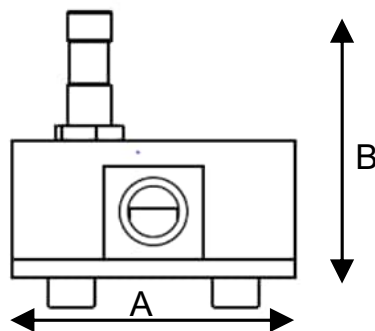
Pressure differential at 30 mm²/s

HySense® QO 400

The HySense® QO 400 is a versatile oval gear flow meter that can be used to measure both volume and flow rate in machine building, plant automation, and process instrumentation applications. Its design and materials make it a perfect fit for use with corrosive fluids, acids, bases, solvents, and dyes. Moreover, its excellent chemical compatibility, combined with resistance to temperatures of up to 125 °C, make it the very definition of a high-end oval gear flow meter.



Actual product similar to picture



General characteristics	
Fluid	Acids, bases, corrosive fluids, cleaning agents, coolant*
Flow range	0.03 ... 660 L/min
Output signal	PNP
Viscosity range	max. 3000 mPa·s
Measuring accuracy	±0.5% of reading
Fluid temperature	-40 °C ... 125 °C*
Ambient temperature	-40 °C ... 125 °C*
Max. operating pressure	68 bar
Housing material	Stainless steel*
Oval gear material	Stainless steel*
Seal material	FKM / EPDM*
Electrical measuring connector	Open cable end
IP degree of protection	IP67 (DIN EN 60529)

* More available upon request

Flow rate	Measuring range L/min	G ISO 228	A mm	Bmax mm	Part No.
1 L/min	0.03 ... 1	G 1/4	78	96	32EV-1A-10.00
5 L/min	0.2 ... 5	G 1/2	78	101	32EV-2B-10.00
30 L/min	1 ... 30	G 3/4	99	120	32EV-4C-10.00
100 L/min	4 ... 100	G 1	112	152	32EV-6D-10.00
300 L/min	3.0 ... 300	G 2	220	213	32EV-7E-10.00
660 L/min	35 ... 660	G 2	260	271	32EV-8E-10.00

The HySense® QO 400 will be available starting in mid-2020

Available in various versions upon request:

- | Additional output signals
- | Other flow ranges
- | Higher measuring accuracy
- | Other materials
- | Other calibration viscosities
- | With multi-function electronics (implemented display and output signal)



HySense® Q accessories

Sensors compatible with the HySense® Q family			
Model	Output signal	Electrical connector	Part No.
HySense® RS 310	Frequency	M16, 5-pin	3107-00-49.00
HySense® RS 300	Frequency, ISDS	M16, 6-pin	3107-00-S-49.00
HySense® RS 500	Frequency, ISDS	M16, 6-pin	3410-1600-A233F03
HySense® RS 500	Frequency, ISDS	M12, 4-pin	3410-1600-A211F07
HySense® RS 506	CANopen, ISDS	M12, 5-pin	3410-1400-A213C11
HySense® RS 510	4 ... 20 mA, ISDS	M16, 6-pin	3410-1400-A233Z1S
HySense® RS 510	4 ... 20 mA, ISDS	M12, 4-pin	3410-1400-A211Z13
HySense® SC 100	4 ... 20 mA, ISDS	M16, 6-pin	3410-6600-3433D1V

Cables compatible with the HySense® Q family			
Compatible with HySense®	Measuring device connection	Length m	Part No.
(M16 6-pol.) QT 200, 300, 400, 500, 600 QT 210, 310, 410, 510 QG 100, 200 QL 100, 200, 110, 210	M16, 6-pin	5	8824-S1-05.00S
	M16, 6-pin (high-end)	5	8824-S1-05.00H
	Unterminated cable end	5	8824-S6-05.00S
(M12 4-pol.) QT 200, 300, 400, 500, 600 QT 210, 310, 410, 510 QL 100, 200, 110, 210	M16, 6-pin	2.5	8824-V3-02.50S
	M12, 4-pin	2.5	8824-V2-02.50
	Unterminated cable end	2.5	8824-V1-02.50
QT 206, 306, 406, 506 QL 106, 206, 326	M12, 5-pin	5	8824-N3-05.00
	M12, 8-pin	5	8824-R7-05.00
	Unterminated cable end	5	8824-M8-05.00
QO 400	M12, 4-pin	2.5	8824-V2-02.50
	Unterminated cable end	2.5	8824-V1-02.50

For additional lengths and versions, please refer to page 226.

HySense® P

Pressure sensors, pressure switches, and pressure gauges

HySense® P family

Needless to say, pressure is an extremely important and central consideration when it comes to fluid engineering and technology. Accordingly, pressure measurements are carried out for a broad variety of purposes, including adjusting systems and plants and carrying out fault diagnostics, maintenance and service work, and monitoring and development tasks. And with the **HySense® P family**, Hydrotechnik has just the right pressure sensor, pressure switch, or pressure gauge for each of these needs.



Model	PR 1xx Pages 112 – 121	PR 126 Page 116	PR 400 Pages 122 – 123
Measuring range bar	-1 ... 6 0 ... 60 0 ... 250 0 ... 400 0 ... 600 0 ... 1000	0 ... 25 0 ... 50 0 ... 60 0 ... 400 0 ... 600	0 ... 60 0 ... 250 0 ... 400 0 ... 600
Output signal More available upon request	4 ... 20 mA 0 ... 10 VDC	CANopen	4 ... 20 mA
Electrical connector	M16 x 0.75, 6-pin M16 x 0.75, 5-pin M12 x 1, 5-pin M12 x 1, 4-pin Unterminated cable end Type A valve connector, 3-pin Type C valve connector, 3-pin	M12 x 1, 5-pin	M16 x 0.75, 6-pin
Special characteristics	Hyrotechnik standard A wide variety of versions ISDS functionality Color coded	CANopen communications Heavy-duty design	High dynamic range, 10 kHz sampling rate High measuring accuracy ISDS functionality Color coded



PR 509
Pages 124 – 125



MultiEPC
Pages 126 – 127



PS 280
Pages 128 – 129



Analog pressure
gauges
Pages 130 – 132



Digital pressure
gauges
Pages 133 – 134

0 ... 60
0 ... 250
0 ... 400
0 ... 600

0 ... 25
0 ... 100
0 ... 250
0 ... 400

0 ... 1000

0 ... 10
0 ... 16
0 ... 25
0 ... 40
0 ... 60
0 ... 100
0 ... 160
0 ... 250
0 ... 400
0 ... 600

0 ... 60
0 ... 250
0 ... 600

4 ... 20 mA

4 ... 20 mA
0 ... 20 mA

PNP
NPN

–

–

M16 x 0.75, 6-pin

M12 x 1, 5-pin

Can be freely chosen

–

–

Integrated measuring cable
Extraordinary price-
performance ratio
Compact design

Freely adjustable switching
values
Integrated display
Heavy-duty housing
Switchable output signal

A wide variety of connector
versions
Integrated measuring cable

A wide variety of versions
Large analog indicator
Flush-mounted version also
available
Wide measuring range
Available in kit

Large digital display
Axially rotating display
Available in kit

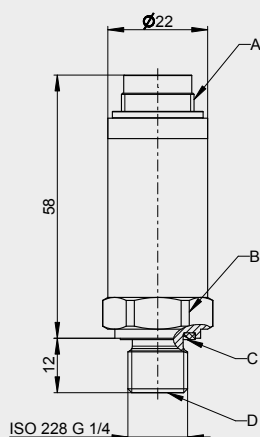
HySense® PR 1xx

HySense® PR 1xx is the Hydrotechnik standard in the area of pressure measurement. These pressure sensors are perfect for both temporary diagnostic tasks and for stationary measuring tasks such as condition monitoring and predictive maintenance. Excellent strength, a wide measuring range of -1 to 2500 bar, and a wide variety of available versions make these pressure sensors all-rounders in every sense of the word.

General HySense® PR 1xx characteristics	
Sensor principle	Piezoresistivity
Pressure type	Relative pressure*
Measuring accuracy with ISDS @ 25 °C	±0.2% of full scale
Measuring accuracy without ISDS @ 25 °C	±0.5% of full scale
Overload range	2 x rated pressure (≤ 200 bar) 1.5 x rated pressure (> 200 ... 500 bar) 1.2 x rated pressure (> 500 ... 2000 bar)
Burst pressure	3 x rated pressure (≤ 200 bar) 2 x rated pressure (> 200 ... 500 bar) 1.5 x rated pressure (> 500 ... 2000 bar)
Body material	Stainless steel
Diaphragm material	Stainless steel or silicon
Sampling rate	1 kHz
Fluid temperature	-40 ... 125 °C
Ambient temperature	-40 ... 105 °C
Installation position	Any

* More available upon request

HySense® PR 100



Dimensions in mm



A	M16 x 0.75, 6-pin
B	AF 22
C	ED seal in conformity with DIN 3869, FKM

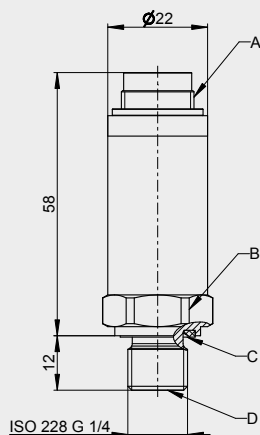
Characteristics

Output signal	4 ... 20 mA, ISDS
Electrical connector	M16 x 0.75, 6-pin
Mechanical connection	ISO 228-G 1/4
IP degree of protection	IP67 (DIN EN 60529)
Weight	80 ... 100 g (depending on the version)

Measuring range* bar	Color coding	Part No.
-1 ... 6	Red	3403-32-S-E5.37
0 ... 60	Orange	3403-21-S-E5.37
0 ... 250	Yellow	3403-17-S-E5.37
0 ... 400	Blue	3403-15-S-E5.37
0 ... 600	Green	3403-18-S-E5.37
0 ... 1000	—	3403-29-S-E5.37

* More available upon request

HySense® PR 110



Dimensions in mm



A	M16 x 0.75, 5-pin
B	AF 22
C	ED seal in conformity with DIN 3869, FKM

Characteristics

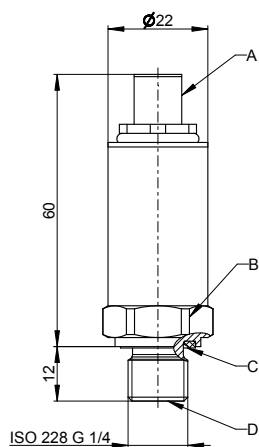
Output signal	4 ... 20 mA, 0 ... 10 VDC
Electrical connector	M16 x 0.75, 5-pin
Mechanical connection	ISO 228-G 1/4
IP degree of protection	IP67 (DIN EN 60529)
Weight	80 ... 100 g (depending on the version)

Part No.

Measuring range* bar	Color coding	Part No.	
		4 ... 20 mA	0 ... 10 VDC
-1 ... 6	Red	3403-32-C3.37	—
0 ... 60	Orange	3403-21-C3.37	—
0 ... 250	Yellow	3403-17-C3.37	3403-17-C3.39
0 ... 400	Blue	3403-15-C3.37	3403-15-C3.39
0 ... 600	Green	3403-18-C3.37	3403-18-C3.39
0 ... 1000	—	3403-29-C3.37	—

* More available upon request

HySense® PR 120



Dimensions in mm



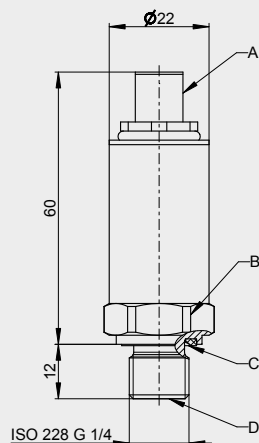
A	M12 x 1, 5-pin
B	AF 22
C	ED seal in conformity with DIN 3869, FKM

Characteristics	
Output signal	4 ... 20 mA, 0 ... 10 VDC
Electrical connector	M12 x 1, 5-pin
Mechanical connection	ISO 228-G 1/4
IP degree of protection	IP67 (DIN EN 60529)
Weight	80 ... 100 g (depending on the version)

Part No.		
Measuring range* bar	4 ... 20 mA	0 ... 10 VDC
0 ... 250	3403-17-D2.37	—
0 ... 400	—	3403-15-D2.39
0 ... 1000	3403-29-D2.37	—

* More available upon request

HySense® PR 126



Dimensions in mm



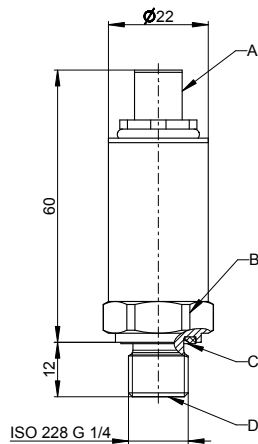
A	M12 x 1, 5-pin
B	AF 22
C	ED seal in conformity with DIN 3869, FKM

Characteristics	
Output signal	CANopen
Connector	M12 x 1, 5-pin
Sampling rate	ISO 228-G 1/4
IP degree of protection	IP67 (DIN EN 60529)
Weight	90 g

Measuring range* bar	Part No.
0 ... 25	3403-40-T1.60
0 ... 50	3403-33-T1.60
0 ... 60	3403-21-T1.60
0 ... 400	3403-15-T1.60
0 ... 600	3403-18-T1.60

* More available upon request

HySense® PR 130 I5



Dimensions in mm



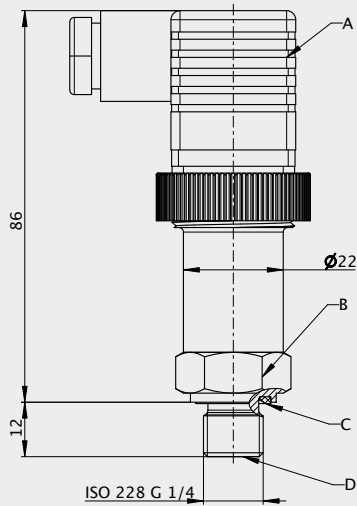
A	M12 x 1, 4-pin
B	AF 22
C	ED seal in conformity with DIN 3869, FKM

Characteristics	
Output signal	4 ... 20 mA, 0 ... 10 VDC
Electrical connector	M12 x 1, 4-pin
Mechanical connection	ISO 228-G 1/4
IP degree of protection	IP67 (DIN EN 60529)
Weight	80 ... 100 g (depending on the version)

Measuring range* bar	Part No.	
	4 ... 20 mA	0 ... 10 VDC
-1 ... 6	3403-32-15.37S	3403-32-15.39S
0 ... 60	3403-21-15.37S	3403-21-15.39S
0 ... 250	3403-17-15.37S	3403-17-15.39S
0 ... 400	3403-15-15.37S	3403-15-15.39S
0 ... 600	3403-18-15.37S	3403-18-15.39S
0 ... 1000	3403-29-15.37S	3403-29-15.39S

* More available upon request

HySense® PR 140



Dimensions in mm



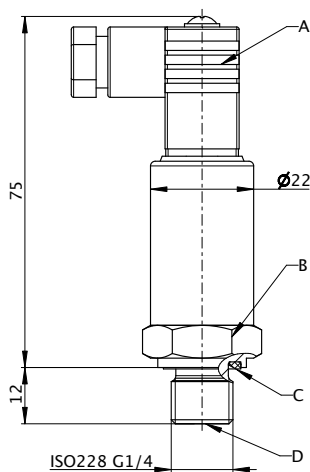
A	Type A valve connector, 3-pin
B	AF 22
C	ED seal in conformity with DIN 3869, FKM

Characteristics	
Output signal	4 ... 20 mA, 0 ... 10 VDC
Electrical connector	Type A valve connector, 3-pin
Mechanical connection	ISO 228-G 1/4
IP degree of protection	IP67 (DIN EN 60529)
Weight	170 g (depending on the version)

Measuring range* bar	Part No.	
	4 ... 20 mA	0 ... 10 VDC
-1 ... 6	3403-32-D1.37S	3403-32-D1.39S
0 ... 60	3403-21-D1.37S	3403-21-D1.39S
0 ... 250	3403-17-D1.37S	3403-17-D1.39S
0 ... 400	3403-15-D1.37S	3403-15-D1.39S
0 ... 600	3403-18-D1.37S	3403-18-D1.39S
0 ... 1000	3403-29-D1.37S	—

* More available upon request

HySense® PR 150



Dimensions in mm



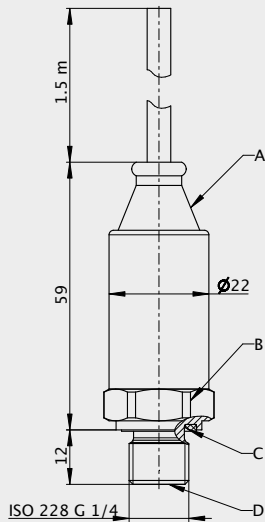
A	Type C valve connector, 3-pin
B	AF 22
C	ED seal in conformity with DIN 3869, FKM

Characteristics	
Output signal	4 ... 20 mA, 0 ... 10 VDC
Electrical connector	Type C valve connector, 3-pin
Mechanical connection	ISO 228-G 1/4
IP degree of protection	IP65 (DIN EN 60529)
Weight	170 g (depending on the version)

Measuring range* bar	Part No.	
	4 ... 20 mA	0 ... 10 VDC
-1 ... 6	3403-32-D5.37S	—
0 ... 60	3403-21-D5.37S	—
0 ... 250	3403-17-D5.37S	3403-17-D5.39S
0 ... 400	3403-15-D5.37S	3403-15-D5.39S
0 ... 600	3403-18-D5.37S	3403-18-D5.39S
0 ... 1000	3403-29-D5.37S	3403-29-D5.39S

* More available upon request

HySense® PR 190



Dimensions in mm



A	Unterminated cable end
B	AF 22
C	ED seal in conformity with DIN 3869, FKM

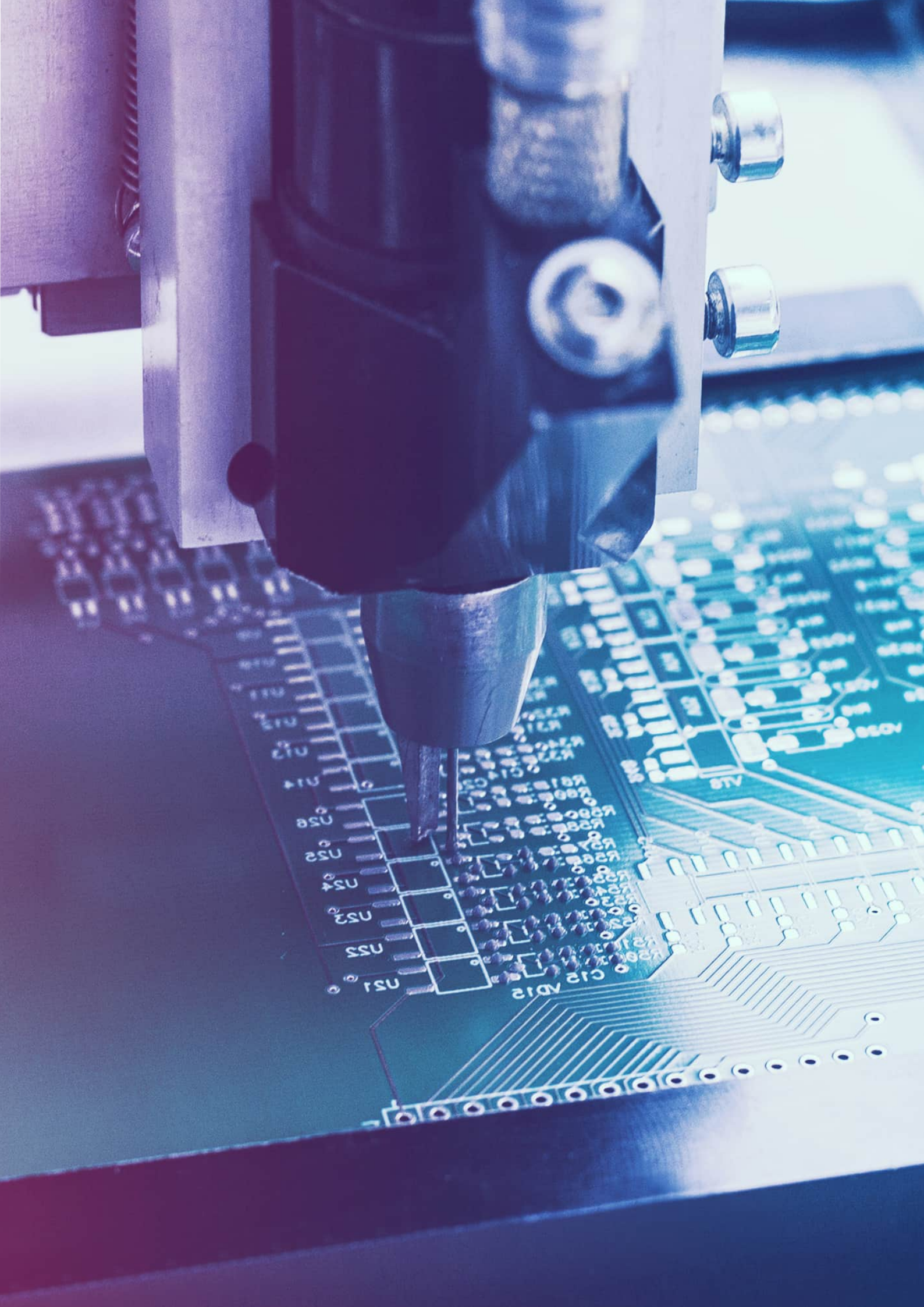
Characteristics

Output signal	4 ... 20 mA, 0 ... 10 VDC
Electrical connector	Unterminated cable end
Mechanical connection	ISO 228-G 1/4
IP degree of protection	IP65 (DIN EN 60529)
Weight	170 g (depending on the version)

Part No.

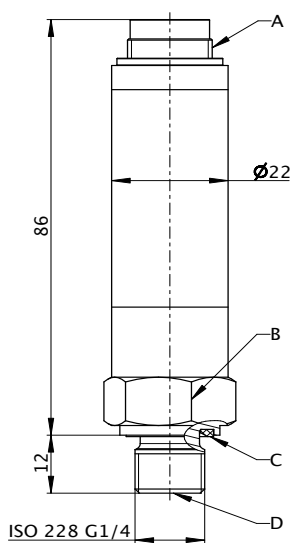
Measuring range* bar	Color coding	Part No.	
		4 ... 20 mA	0 ... 10 VDC
-1 ... 6	Red	3403-32-D6.37S	3403-32-D6.39S
0 ... 60	Orange	3403-21-D6.37S	3403-21-D6.39S
0 ... 250	Yellow	3403-17-D6.37S	3403-17-D6.39S
0 ... 400	Blue	3403-15-D6.37S	—
0 ... 600	Green	3403-18-D6.37S	3403-18-D6.39S

* More available upon request



HySense® PR 400

The HySense® PR 400 is a high-precision pressure sensor with a high dynamic range that was developed specifically for demanding and sophisticated measuring tasks in R&D, calibration laboratory, and high-precision measuring system applications. It is even able to measure dynamic shock at a high resolution thanks to a sampling rate of over 10 kHz.



Dimensions in mm

A	M16 x 0.75, 6-pin
B	AF 22
C	ED seal in conformity with DIN 3869, FKM

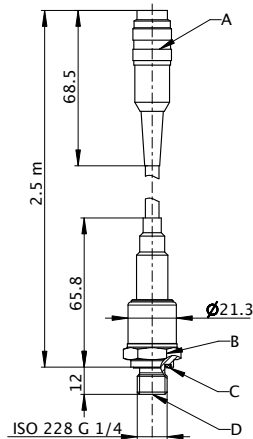
General characteristics	
Sensor principle	Piezoresistivity
Pressure type	Relative pressure
Measuring accuracy @ 25°C	±0.25% of full scale
Output signal	4 ... 20 mA, ISDS
Overload range	1.5 x rated pressure
Burst pressure	2.5 x rated pressure
Body material	Stainless steel
Diaphragm material	Stainless steel
Sampling rate	Up to 10 kHz
Fluid temperature	-40 ... 125 °C
Ambient temperature	-20 ... 80 °C
IP degree of protection	IP67 (DIN EN 60529)
Weight	140 g
Installation position	Any

Measuring range* bar	Color coding	Part No.
0 ... 60	Orange	34P3-21-S-01.37A2
0 ... 250	Yellow	34P3-17-S-01.37A2
0 ... 400	Blue	34P3-15-S-01.37A2
0 ... 600	Green	34P3-18-S-01.37A2

* More available upon request

HySense® PR 509

The HySense® PR 509 is a heavy-duty, compact pressure sensor with an unbeatable price–performance ratio. In addition, its integrated measuring cable makes it easy to quickly connect the sensor to an evaluation unit.



Dimensions in mm



A	M16 x 0.75, 6-pin
B	AF 22
C	ED seal in conformity with DIN 3869, FKM

General characteristics

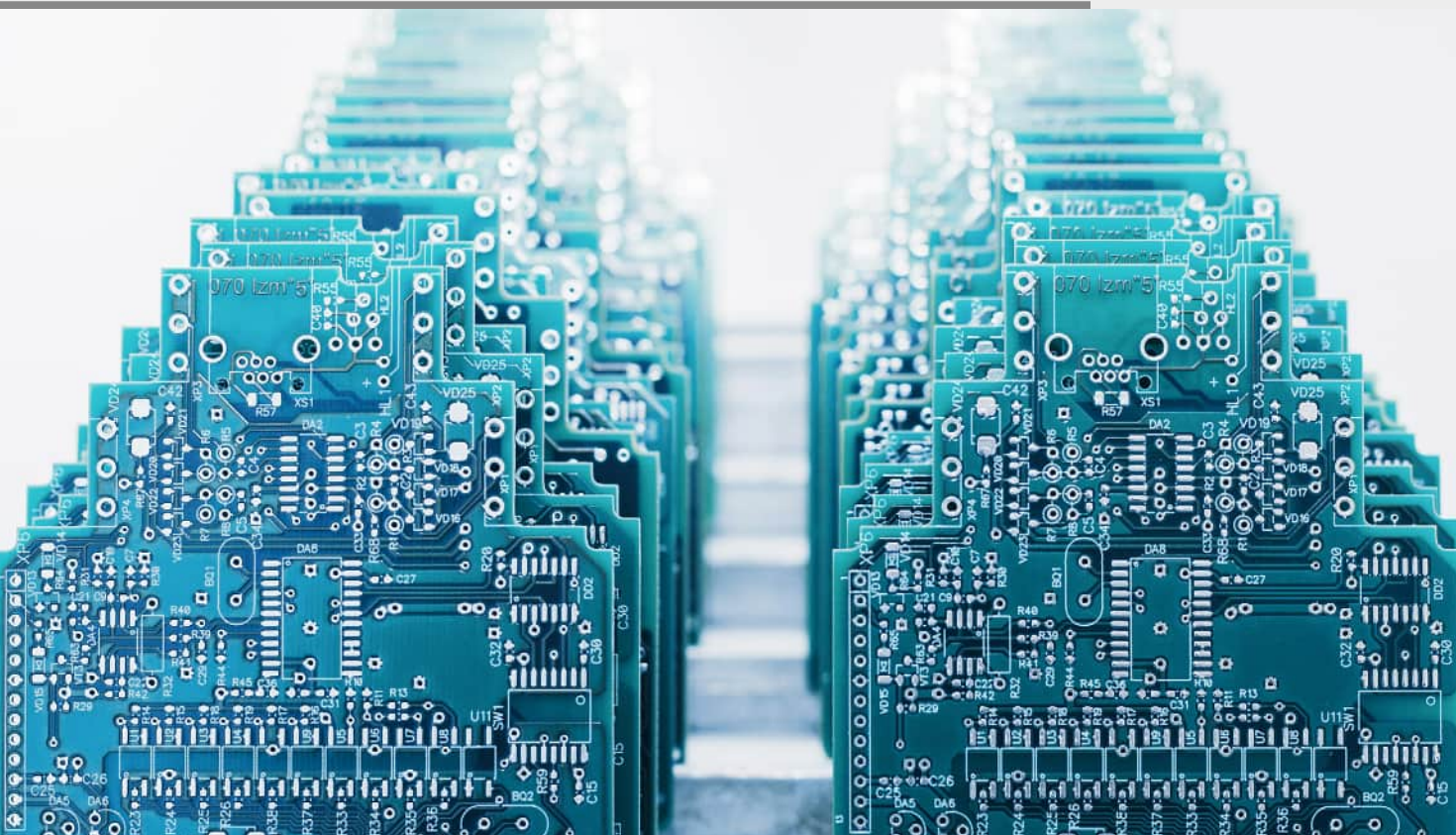
Sensor principle	Piezoresistivity
Pressure type	Relative pressure
Measuring accuracy @ 25°C	±0.5% of full scale
Output signal	4 ... 20 mA, ISDS only with MultiHandy MH2025
Overload range	1.5 x rated pressure
Burst pressure	3 x rated pressure
Body material	Stainless steel
Diaphragm material	Stainless steel
Sampling rate	1 kHz

General characteristics

Fluid temperature	-40 ... 150 °C
Ambient temperature	-25 ... 85 °C
IP degree of protection	IP67 (DIN EN 60529)
Weight	160 g, incl. cable
Installation position	Any

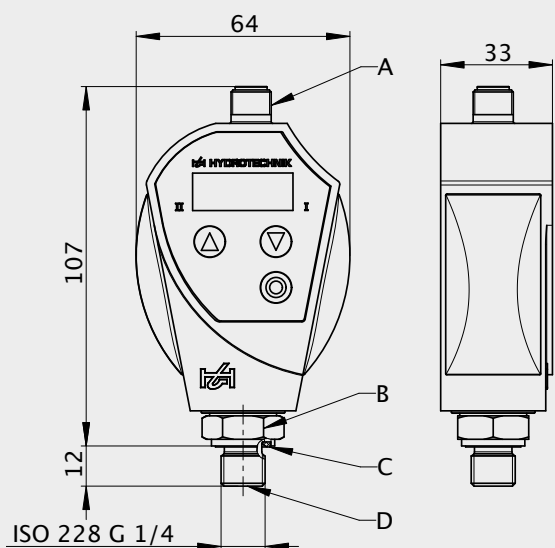
Measuring range* bar	Color coding	Part No.
0 ... 60	Orange	3403-21-S-A1.37
0 ... 250	Yellow	3403-17-S-A1.37
0 ... 400	Blue	3403-15-S-A1.37
0 ... 600	Green	3403-18-S-A1.37

* More available upon request



HySense® MultiEPC

The HySense® MultiEPC is an electronic pressure switch with an extraordinary level of functionality. It is available in standard and DESINA versions with one or two independently programmable limit switches. And to top it all off, the heavy-duty housing, which can rotate axially, features an integrated display.



Dimensions in mm



A	M12 x 1, 5-pin
B	AF 22
C	ED seal in conformity with DIN 3869, FKM
D	ISO 228-G 1/4 A

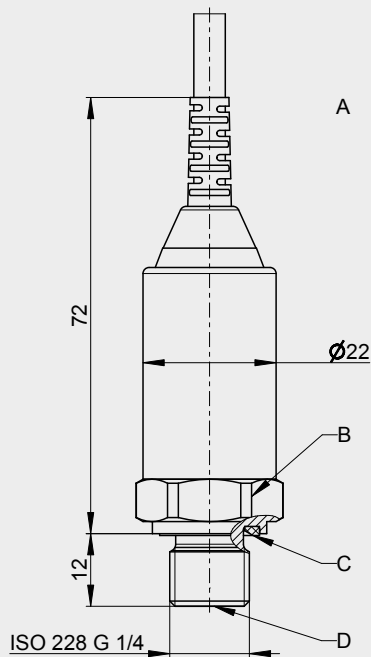
General characteristics	
Sensor principle	Piezoresistivity
Pressure type	Relative pressure
Measuring accuracy @ 25°C	±0.5% of full scale
Output signal	0 / 4 ... 20 mA
Switching output	Two high-side switching MOSFETs
Switching current	Max. 0.7 A
Body material	Die casting
Diaphragm material	Stainless steel
Sampling rate	100 Hz
Fluid temperature	-20 ... 85 °C
Ambient temperature	-20 ... 85 °C
IP degree of protection	IP67 (DIN EN 60529)
Weight	350 g
Installation position	Any

Measuring range bar	Part No.*
0 ... 25	3160-10-40.01
0 ... 100	3160-10-16.01
0 ... 250	3160-10-17.01
0 ... 400	3160-10-15.01
0 ... 700	3160-10-39.01

* DESINA version available upon request

HySense® PS 280

The high-precision HySense® PS 280 pressure switch makes a compelling case with its compact design and a wide variety of configuration options. Various parameters, such as the pressure range, mechanical and electrical connections, cable length, pinout, signal output, function type, and switching value can be chosen freely, enabling customers to get the perfect solution for their specific measuring application.



Dimensions in mm



A	Variable
B	AF 22
C	Depends on mechanical connection
D	Variable

General characteristics	
Sensor principle	Piezoresistivity
Pressure type	Relative pressure
Measuring accuracy @ 25°C	±0.5% of full scale
Body material	Stainless steel
Diaphragm material	Stainless steel
Fluid temperature	-40 ... 125 °C
Ambient temperature	-40 ... 105 °C
IP degree of protection	IP67 (DIN EN 60529)
Weight	Depends on the version
Installation position	Any

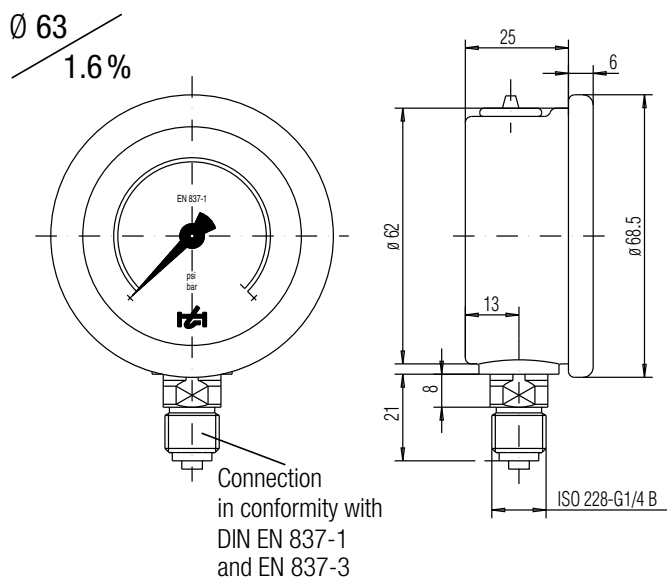
Variable parameters	
Pressure range	0 ... 1000 bar
Mechanical connection	Variable
Electrical connector	Variable
Seal type and material	Variable
Cable length	Variable
Number of switching outputs	1 or 2
Signal output	PNP or NPN
Function	NC or NO
Switching value	Variable, separate for rising and falling edges
Switching delay	Variable, 0 ... 7000 ms

HySense® analog pressure gauges

Analog pressure gauges are the simple and most cost-effective solution for a variety of pressure monitoring applications. Reliability and mechanical strength make these pressure gauges true all-rounders, and the fact that they combine an axially rotating indicator with a MINIMESS® gauge adapter ensures that readings can be conveniently read.



Dimensions in mm



General characteristics

Case diameter	63 mm
Unit	bar & psi
Measuring accuracy	1.6% of full scale
Liquid filling	Silicone oil
Body material	Stainless steel
Connection direction	Down

Individual pressure gauges

Measuring range	Part No.
0 ... 10 bar (0 ... 145 psi)	9802-01-00.10
0 ... 16 bar (0 ... 230 psi)	9802-01-00.16
0 ... 25 bar (0 ... 360 psi)	9802-01-00.25
0 ... 40 bar (0 ... 580 psi)	9802-01-00.40
0 ... 60 bar (0 ... 870 psi)	9802-01-00.60
0 ... 100 bar (0 ... 1450 psi)	9802-01-01.00
0 ... 160 bar (0 ... 2300 psi)	9802-01-01.60
0 ... 250 bar (0 ... 3600 psi)	9802-01-02.50
0 ... 400 bar (0 ... 5800 psi)	9802-01-04.00
0 ... 600 bar (0 ... 8700 psi)	9802-01-06.00

Measuring box with one analog pressure gauge

Measuring range	Part No.
0 ... 10 bar (0 ... 145 psi)	3101-13-00.50
0 ... 16 bar (0 ... 230 psi)	3101-13-01.50
0 ... 25 bar (0 ... 360 psi)	3101-13-02.50
0 ... 40 bar (0 ... 580 psi)	3101-13-03.50
0 ... 60 bar (0 ... 870 psi)	3101-13-04.50
0 ... 100 bar (0 ... 1450 psi)	3101-13-05.50
0 ... 160 bar (0 ... 2300 psi)	3101-13-06.50
0 ... 250 bar (0 ... 3600 psi)	3101-13-07.50
0 ... 400 bar (0 ... 5800 psi)	3101-13-08.50
0 ... 600 bar (0 ... 8700 psi)	3101-13-09.50

Measuring box with two analog pressure gauges

Measuring range for pressure gauge 1	Measuring range for pressure gauge 2	Part No.
0 ... 10 bar (0 ... 145 psi)	0 ... 16 bar (0 ... 230 psi)	3101-14-01.50
0 ... 10 bar (0 ... 145 psi)	0 ... 25 bar (0 ... 360 psi)	3101-14-02.50
0 ... 10 bar (0 ... 145 psi)	0 ... 160 bar (0 ... 2300 psi)	3101-14-06.50
0 ... 10 bar (0 ... 145 psi)	0 ... 250 bar (0 ... 3600 psi)	3101-14-07.50
0 ... 16 bar (0 ... 230 psi)	0 ... 100 bar (0 ... 1450 psi)	3101-14-15.50
0 ... 16 bar (0 ... 230 psi)	0 ... 400 bar (0 ... 5800 psi)	3101-14-18.50
0 ... 25 bar (0 ... 360 psi)	0 ... 250 bar (0 ... 3600 psi)	3101-14-27.50
0 ... 25 bar (0 ... 360 psi)	0 ... 400 bar (0 ... 5800 psi)	3101-14-28.50
0 ... 40 bar (0 ... 580 psi)	0 ... 400 bar (0 ... 5800 psi)	3101-14-38.50
0 ... 60 bar (0 ... 870 psi)	0 ... 250 bar (0 ... 3600 psi)	3101-14-47.50
0 ... 60 bar (0 ... 870 psi)	0 ... 400 bar (0 ... 5800 psi)	3101-14-48.50
0 ... 100 bar (0 ... 1450 psi)	0 ... 250 bar (0 ... 3600 psi)	3101-14-57.50
0 ... 100 bar (0 ... 1450 psi)	0 ... 400 bar (0 ... 5800 psi)	3101-14-58.50
0 ... 160 bar (0 ... 2300 psi)	0 ... 250 bar (0 ... 3600 psi)	3101-14-67.50
0 ... 160 bar (0 ... 2300 psi)	0 ... 400 bar (0 ... 5800 psi)	3101-14-68.50
0 ... 250 bar (0 ... 3600 psi)	0 ... 400 bar (0 ... 5800 psi)	3101-14-78.50
0 ... 400 bar (0 ... 5800 psi)	0 ... 400 bar (0 ... 5800 psi)	3101-14-88.50
0 ... 600 bar (0 ... 8700 psi)	0 ... 600 bar (0 ... 8700 psi)	3101-14-99.50

Pressure gauge box without pressure gauges for MINIMESS® 1620 series	3101-1A-00.51
Pressure gauge box for MINIMESS® 1215 series	Available upon request
Pressure gauge box for MINIMESS® 1615 series	Available upon request
MINIMESS® 1620 series gauge adapter	2103-07-11.62N
MINIMESS® 1615 series gauge adapter	2102-07-11.62N

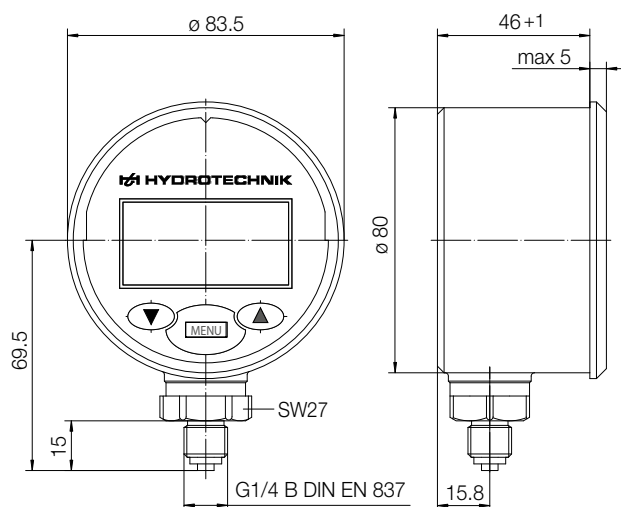
Flush-mount pressure gauges with a connector on the back are available upon request for various pressure ranges.

HySense® digital pressure gauges

Digital pressure gauges are the ideal solution when it comes to taking on-site pressure measurements without having to connect to a power source. Accuracy, reliability, and mechanical strength make these pressure gauges true all-rounders. Moreover, they feature a min/max hold function and can be rotated axially as necessary in order to make it easier to read the display.



Dimensions in mm



Can rotate axially

General characteristics	
Case diameter	70 mm
Unit	bar / psi / MPa
Measuring accuracy	0.5% of full scale, ± 1 digit
Liquid filling	Silicone oil
Body material	Stainless steel
Conversion rate	5/s
Display	Four-digit seven-segment LCD display, 11 mm, plus bargraph display with 10 segments
Hold function	Min/max
IP degree of protection	IP67 (DIN EN 60529)
Weight	Approx. 400 g

Individual pressure gauges	
Measuring range	Part No.
0 ... 60 bar (0 ... 870 psi)	9801-99-00.60
0 ... 250 bar (0 ... 3600 psi)	9801-99-02.50
0 ... 600 bar (0 ... 8700 psi)	9801-99-06.00

Measuring box with one digital pressure gauge	
Measuring range	Part No.
0 ... 60 bar (0 ... 870 psi)	3101-86-04.50
0 ... 250 bar (0 ... 3600 psi)	3101-86-06.50
0 ... 600 bar (0 ... 8700 psi)	3101-86-09.50

Measuring box with two digital pressure gauges		
Measuring range for pressure gauge 1	Measuring range for pressure gauge 2	Part No.
0 ... 60 bar (0 ... 870 psi)	0 ... 60 bar (0 ... 870 psi)	3101-87-44.50
0 ... 250 bar (0 ... 3600 psi)	0 ... 250 bar (0 ... 3600 psi)	3101-87-66.50
0 ... 600 bar (0 ... 8700 psi)	0 ... 600 bar (0 ... 8700 psi)	3101-87-99.50

Pressure gauge box without pressure gauges for MINIMESS® 1620 series	3101-1D-00.51
Pressure gauge shock protection	9800-00-00.10

HySense® custom solutions

Both highly complex measuring tasks and highly specific measuring tasks require the use of custom solutions that often go beyond what a standard product portfolio has to offer. This is why we at Hydrotechnik have made it one of our core focuses to implement custom solutions with unparalleled quality in order to meet our customers' specific needs. Following are a couple of examples:

HySense® PR 130 - J5

High-pressure version with an M16 x 1.5 female thread for pressures of up to 2000 bar



HySense® PR 180 - G6

Custom version with an AMP bayonet circular connector (3-pin) and a 1 ... 5 V output signal



HySense® PR 280

Special miniature sensor, perfect for use in places where space is extremely tight, such as directional control valves



Available electrical connectors	
M16 x 0.75, 7-pin	Type A valve connector, 3-pin
M16 x 0.75, 6-pin	Type C valve connector, 3-pin
M16 x 0.75, 5-pin	Hirschmann G Series valve connector, 4-pin
M12 x 1, 5-pin	Bayonet circular connector, keying 1, 3-pin
M12 x 1, 4-pin	More available upon request
Unterminated cable end	

Available output signals	
4 ... 20 mA	1 ... 5 VDC
0 ... 20 mA	1 ... 6 VDC
0 ... 10 mA	0 ... 10 VDC
0.5 ... 4.5 VDC (ratiometric)	0.2 ... 1.6 kHz
0 ... 5 VDC	CANopen

Available pressure ranges	
-1 ... 6	0 ... 400
0 ... 1	0 ... 600
0 ... 10	0 ... 1000
0 ... 25	0 ... 2000
0 ... 60	0 ... 2500
0 ... 100	0 ... 4000
0 ... 250	

Available mechanical connections	
ISO 228-G 1/4 A	M16 x 1.5 female thread
ISO 228-G 1/2	M18 x 1.5
M8 x 1	

HySense® P accessories

Cables compatible with the HySense® P family			
Compatible with HySense®	Measuring device connection	Length m	Part No.
PR 100	M16, 6-pin	5	8824-S1-05.00S
PR 400	M16, 6-pin (high-end)	5	8824-S1-05.00H
PR 509	Unterminated cable end	5	8824-S6-05.00S
PR 126	M12, 5-pin	5	8824-N3-05.00
	M12, 8-pin	5	8824-R7-05.00
	Unterminated cable end	5	8824-M8-05.00
PR 130 (4 ... 20 mA)	M16, 6-pin	2.5	8824-V3-02.50S
	M12, 4-pin	2.5	8824-V2-02.50
	Unterminated cable end	2.5	8824-V1-02.50
MultiEPC	Unterminated cable end	5	8824-L0-05.00

For additional lengths and versions, please refer to page 226.

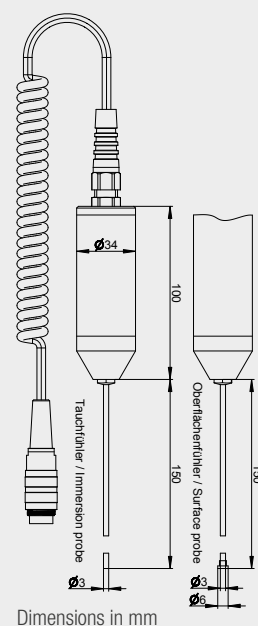
HySense® T Temperature sensors

HySense® T family

With the HySense® T family, Hydrotechnik offers high-quality sensors for temperature measurements in liquids, gases, and solids. The products in this family are based on a modular system, meaning that custom solutions can be implemented quickly and easily. In fact, decades of experience have resulted in Hydrotechnik having a patented solution for temporary temperature measurements in closed systems. A MINIMESS® p/T test point can be used to install temperature sensors in a system under pressure without any leaks.

HySense® TE 200

The HySense® TE 200 is an all-purpose handheld temperature sensor that can be used for an extremely wide range of measuring tasks, such as measuring temperatures in fluids and powders, as well as on surfaces. The long probe and the flexible coil cord make it easy to quickly measure temperatures even at locations that are difficult to access.



General characteristics

Sensor principle	Pt100
Measuring range	-50 ... 400 °C
Output signal	4 ... 20 mA, ISDS
Mechanical measuring connection	Immersion and surface probe
Electrical measuring connector	M16 x 0.75, 6-pin*
Measuring accuracy	1% of full scale
Ambient temperature	-40 ... 70 °C
Body material	Plastic
Probe tip material	Stainless steel
Weight	207 g
IP degree of protection	IP40 (DIN EN 60529)

* More available upon request

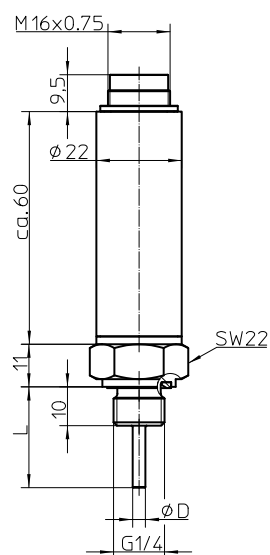
Sensor	Model	Temperature range	Part No.
HySense® TE 200	Surface probe	-50 ... 200 °C	3170-01-S-03.00
		-50 ... 400 °C	3170-01-S-07.00
	Immersion probe	-50 ... 200 °C	3170-02-S-06.00
		-50 ... 400 °C	3170-02-S-08.00

HySense® TE 3xx

The HySense® TE 3xx series is perfect for carrying out temperature measurements on liquids and gases in closed systems. It features a wide variety of available electrical and mechanical connections, making it easy to quickly integrate the devices into systems – a characteristic that is further enhanced by the fact that both the probe length and the probe diameter can be individually configured. The main characteristic behind these temperature sensors, however, is their superior durability and strength – a million pressure changes at up to 600 bar are no problem. All this makes the HySense® TE 3xx the perfect temperature sensors for any hydraulic application.



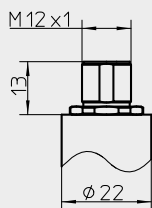
HySense® TE 300



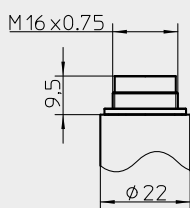
Dimensions in mm

Electrical connectors

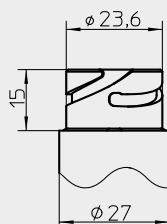
M12 x 1, 4-pin



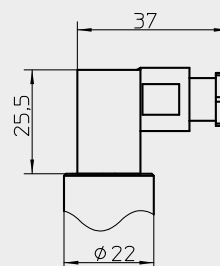
M16 x 0.75, 6-pin



AMP DIN 72585, 3-pin

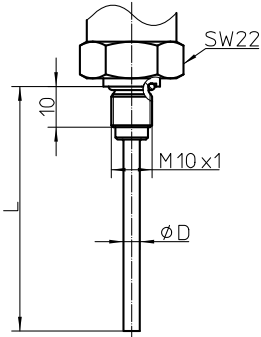
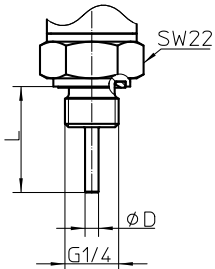
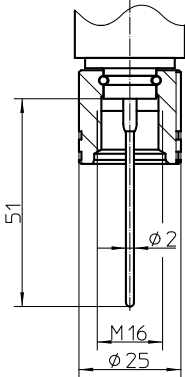
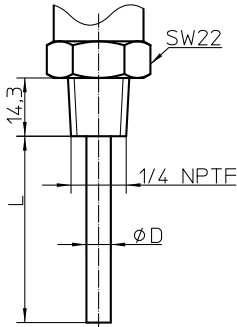


Type C valve connector, 3-pin Pg9



Dimensions in mm

Mechanical connections

M10 x 1	ISO 228-G 1/4	MINIMESS® p/T direct sensor adapter	NPTF 1/4
			

Dimensions in mm

General characteristics

Sensor principle	Pt100
Measuring range	-50 ... 200 °C
Output signal	4 ... 20 mA, ISDS, 0 ... 10 VDC*
Mechanical measuring connection	M10 x 1 ISO 228-G 1/4 NPTF 1/4 MINIMESS® 1620 & 1615* p/T test point direct sensor adapter
Electrical measuring connector	M12 x 1, 4-pin M16 x 0.75, 6-pin Type C valve connector, 3-pin Pg9 AMP DIN 72585, 3-pin*
Probe length	20 ... 400 mm*
Probe diameter	2 ... 6 mm*
Measuring accuracy	0.3 +0.005*T °C
Transducer nonlinearity	±0.2% of full scale
Ambient temperature	-40 ... 85 °C
Weight	Approx. 140 g (depends on the version)
IP degree of protection	IP67 and IP69 (DIN EN 60529)

* More available upon request

Sensor	Measuring range C°	Electrical connector	Output signal	Mechanical connection	Probe length mm	Probe diameter mm	Part No.
TE 300	-50 ... 200	M16 x 0.75 6-pin	4 ... 20 mA, ISDS	MINIMESS® 1620 p/T test point direct sensor adapter	–	2	3408-22D0-D631Z1S
				MINIMESS® 1615 p/T test point direct sensor adapter	–	2	3408-22D0-D731Z1S
				ISO 228-G 1/4	26	3.3	3408-23C0-G231Z1S
				M10 x 1	20	4	3408-2410-M331Z1S

Sensor	Measuring range C°	Electrical connector	Output signal	Mechanical connection	Probe length mm	Probe diameter mm	Part No.
TE 330	-50 ... 200	M12 x 1, 4-pin	0 ... 10 VDC	MINIMESS® 1620 p/T test point direct sensor adapter	–	2	3408-22D0-D611D47
			4 ... 20 mA	MINIMESS® 1620 p/T test point direct sensor adapter	–	2	3408-22D0-D611Z13
			0 ... 10 VDC	ISO 228-G 1/4*	26	3.3	3408-23C0-G211D47
			4 ... 20 mA	ISO 228-G 1/4*	26	3.3	3408-23C0-G211Z13
			0 ... 10 VDC	ISO 228-G 1/4	20	4	3408-2410-G211D47
			4 ... 20 mA	ISO 228-G 1/4	40	4	3408-2420-G211Z13
			0 ... 10 VDC	M10 x 1	60	4	3408-2430-M311D47
			4 ... 20 mA	ISO 228-G 1/4	250	4	3408-2470-G211Z13
4 ... 20 mA	ISO 228-G 1/4	200	6	3408-2660-G211Z13			

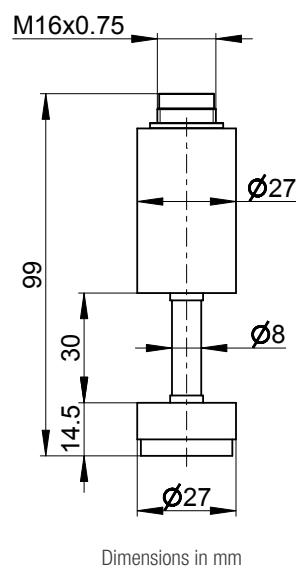
* Substitute for MINIMESS® p/T test point

Sensor	Measuring range C°	Electrical connector	Output signal	Mechanical connection	Probe length mm	Probe diameter mm	Part No.
TE 350	-50 ... 200	Type C valve connector, 3-pin Pg9	4 ... 20 mA	ISO 228-G 1/4	26	3.3	3408-23C0-G2C3Z11

Sensor	Measuring range C°	Electrical connector	Output signal	Mechanical connection	Probe length mm	Probe diameter mm	Part No.
TE 380	-50 ... 200	AMP DIN 72585, 3-pin	4 ... 20 mA	MINIMESS® 1620 p/T test point direct sensor adapter	–	2	3408-22D0-D6R1Z12

HySense® TE 400

The HySense® TE 400 is a high-precision surface thermometer that can be attached to metal surfaces quickly and easily with the help of its integrated permanent magnet.



General characteristics

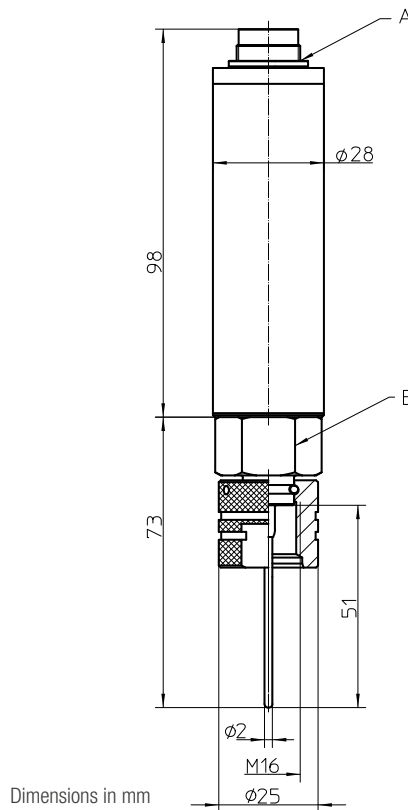
Sensor principle	Pt100
Measuring range	-30 ... 70 °C
Output signal	4 ... 20 mA, ISDS
Mechanical measuring connection	Permanent magnet
Electrical measuring connector	M16 x 0.75, 6-pin*
Measuring accuracy @ 25°C	1% of full scale
Ambient temperature	-40 ... 85 °C
Body material	Stainless steel
Weight	145 g
IP degree of protection	IP67 (DIN EN 60529)

* More available upon request

Sensor	Temperature range	Part No.
HySense® TE 400	-30 ... 70 °C	3408-C6H0-0131Z1S

HySense® TP 180

The HySense® TP 180 is a high-precision dual sensor that measures both temperature and pressure at the same measuring point simultaneously. When combined with a MINIMESS® p/T test point, a fast and simple connection to the fluid can be established without any system downtimes. Moreover, direct contact with the fluid ensures that high-precision, dynamic temperature and pressure measurements can be carried out.



Dimensions in mm

General characteristics	
Sensor principle	Temperature: Pt100, pressure: Piezoresistive effect
Measuring range	-50 ... 200 °C, 0 ... 600 bar
Output signal	4 ... 20 mA
Mechanical measuring connection	For MINIMESS® 1620 p/T test point
Electrical measuring connector	M16 x 0.75, 8-pin
Measuring accuracy @ 25°C	Temperature: 0.5% of full scale; pressure: ±0.5% of full scale
Ambient temperature	-35 ... 100 °C
Body material	Stainless steel
Probe tip material	Stainless steel
Weight	260 g
IP degree of protection	IP65 (DIN EN 60529)

* More available upon request

Sensor	Temperature range	Pressure range	Part No.
HySense® TP 180	-50 ... 200 °C	0 ... 10 bar	3763-08-34.00
		0 ... 60 bar	3763-04-34.00
		0 ... 600 bar	3763-03-34.00

HySense® T accessories

Cables compatible with the HySense® T family			
Compatible with HySense®	Measuring device connection	Length (m)	Part No.
TE 200	M16, 6-pin	5	8824-S1-05.00S
TE 300	M16, 6-pin (high-end)	5	8824-S1-05.00H
TE 400	Unterminated cable end	5	8824-S6-05.00S
TE 330 (4 ... 20 mA)	M16, 6-pin	2.5	8824-V3-02.50S
	M12, 4-pin	2.5	8824-V2-02.50
	Unterminated cable end	2.5	8824-V1-02.50
TP 180	M16, 5-pin 2x	5	8824-D6-05.00

For additional lengths and versions, please refer to page 226



HySense® C Oil condition sensors






HySense® C family

Needless to say, one thing that users want to avoid at all costs are system failures and downtimes, which is why it is crucial to be one step ahead and use preventive measures instead. Moreover, an additional trend is the change from interval-based maintenance, which is often unnecessary and costly, to condition-based maintenance instead. So what does this mean? Among other things, that being aware of the condition of the oil in hydraulic systems is absolutely vital. That is precisely the type of diagnostic and monitoring tasks for which the HySense® C family was developed. These high intelligence sensors are able not only to measure oil condition parameters, but also to evaluate them based on condition algorithms. The result? Users can get easy-to-understand information regarding condition changes over time and, for example, the oil's remaining life.

In addition to this, Hydrotechnik has implemented an analysis application in MultiSystem measuring devices that is designed to help the user with data acquisition, through the visualization and evaluation of measured results, all the way to generating reports.

By combining the condition sensors in the HySense® C family with the measuring devices in the MultiSystem series, users can get the perfect all-in-one solution for precise and simple oil condition monitoring.

Oil condition sensor overview

HySense®					
	CL 1xx	CM 100	CV 100	CX 197	CW 100
Contamination (number of particles)				X	
Viscosity			X	X	
Rel. humidity	X	X		X	
Rel. permittivity	X	X	X	X	
Conductivity	X	X		X	
Temperature	X	X	X	X	
Fill level	X				
Wear (ferromagnetic particles)					X
			 Product discontinued		

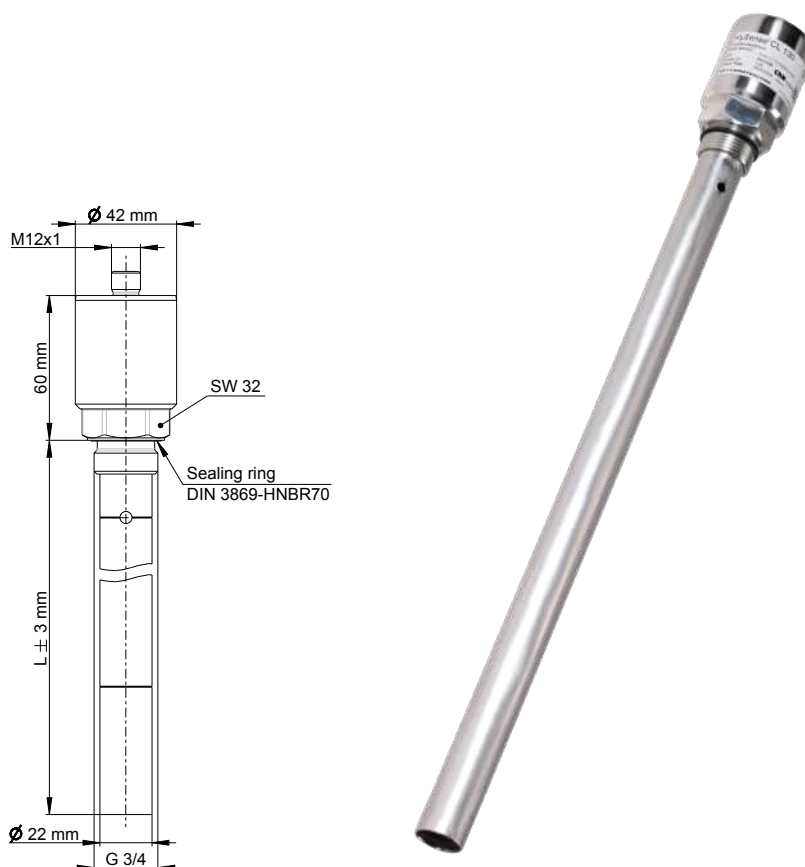
NEW

HySense® CL 1xx

The HySense® CL 1xx is a high intelligence sensor that not only determines oil level precisely, but also measures the following oil condition parameters: relative humidity, relative permittivity, conductivity, and temperature. After a calibration phase, this sensor can evaluate an oil's condition and output it based on implemented condition algorithms. Moreover, the corresponding analysis application that is implemented in MultiSystem measuring devices makes it enormously easier to operate and use the sensors. Finally, the intuitive menu navigation and the stored oil database both make it easy to quickly acquire, visualize, evaluate, and store oil condition parameters.

Advantages when combined with MultiSystem measuring devices.

- | Database for storing data for specific systems and measuring points
- | Access to an integrated oil database
- | The ability to define limits
- | The ability to visualize conditions with a traffic light pattern
- | The ability to store readings
- | The ability to display histories
- | The ability to export readings via USB
- | Report template



Sensor	L mm	Part No.
HySense® CL 120	200	3402-CL12-G926C0-000
HySense® CL 130	375	3402-CL13-G926C0-000
HySense® CL 160	615	3402-CL16-G926C0-000

General characteristics	
Fluid	Mineral oils (H, HL, HLP, HLPD, HVLP), synthetic esters (HETG, HEPG, HEES, HEPR), polyalkylene glycols (PAG), zinc-free ash-free fluids (ZAF), polyalphaolefins (PAO)*
Measured variables	Level, rel. humidity, rel. permittivity, conductivity, temperature
Immersion length	200 mm / 375 mm / 615 mm
Interfaces	RS-232, CANopen, 4 ... 20 mA
Electrical connector	M12 A 8p m
Max. operating pressure	50 bar
IP degree of protection	IP67 (DIN EN 60529)
Operating temperature	-20 ... 85 °C
Seal material	HNBR

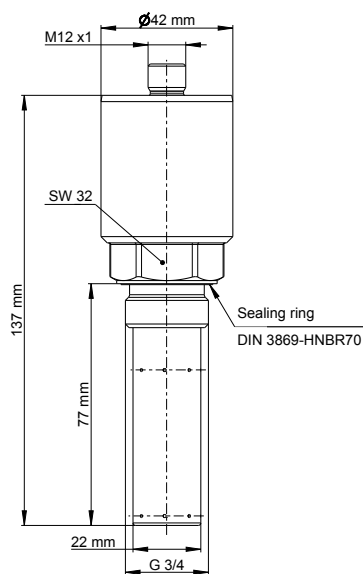
Measured variable	Measuring range	Measuring accuracy
Rel. permittivity	1 ... 7	±0.015
Rel. humidity	0 ... 100% r.H.	±3% r.H. @ (10 ... 90%) ±5% r.H. @ (< 10%, > 90%)
Conductivity	100 ... 800,000 pS/m	< ±10% @ (2000 ... 800,000 pS/m) ±200 pS/m @ (100 ... 2000 pS/m)
Fill level	115 mm / 288 mm / 515 mm	±5%
Temperature	-20 ... 85 °C	±2 °C

HySense® CM 100

The HySense® CM100 is a high intelligence sensor that measures the following oil condition parameters: relative humidity, relative permittivity, conductivity, and temperature. After a calibration phase, this sensor can evaluate an oil's condition and output it based on implemented condition algorithms. Moreover, the corresponding analysis application that is implemented in MultiSystem measuring devices makes it enormously easier to operate and use the sensors. Finally, the intuitive menu navigation and the stored oil database both make it easy to quickly acquire, visualize, evaluate, and store oil condition parameters.

Advantages when combined with MultiSystem measuring devices.

- | Database for storing data for specific systems and measuring points
- | Access to an integrated oil database
- | The ability to define limits
- | The ability to visualize conditions with a traffic light pattern
- | The ability to store readings
- | The ability to display histories
- | The ability to export readings via USB
- | Report template



Sensor	Part No.
HySense® CM 100	3402-CM10-G926C0-000
Screw-in block	3109-20-05.01

General characteristics

Fluid	Mineral oils (H, HL, HLP, HLPD, HVLP), synthetic esters (HETG, HEPG, HEES, HEPR), polyalkylene glycols (PAG), zinc-free ash-free fluids (ZAF), polyalphaolefins (PAO)*
Measured variables	Rel. humidity, rel. permittivity, conductivity, temperature
Interfaces	RS-232, CANopen, 4 ... 20 mA
Electrical connector	M12 A 8p m
Max. operating pressure	50 bar
IP degree of protection	IP67 (DIN EN 60529)
Operating temperature	-20 ... 85 °C
Seal material	HNBR

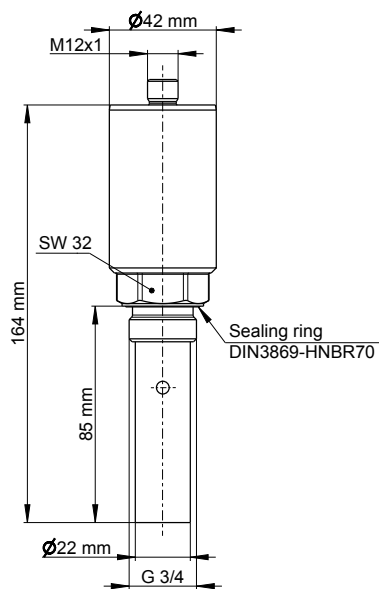
Measured variable	Measuring range	Measuring accuracy
Rel. permittivity	1 ... 7	±0.015
Rel. humidity	0 ... 100% r.H.	±3% r.H. @ (10 ... 90%) ±5% r.H. @ (< 10%, > 90%)
Conductivity	100 ... 800,000 pS/m	< ±10% @ (2000 ... 800,000 pS/m) ±200 pS/m @ (100 ... 2000 pS/m)
Temperature	-20 ... 85 °C	±2 °C

HySense® CV 100

The HySense® CV 100 is a high intelligence sensor that measures the following oil condition parameters: viscosity, relative permittivity, and temperature. After a calibration phase, this sensor can evaluate an oil's condition and output it based on implemented condition algorithms. Moreover, the corresponding analysis application that is implemented in MultiSystem measuring devices makes it enormously easier to operate and use the sensors. Finally, the intuitive menu navigation and the stored oil database both make it easy to quickly acquire, visualize, evaluate, and store oil condition parameters.

Advantages when combined with MultiSystem measuring devices.

- I Database for storing data for specific systems and measuring points
- I Access to an integrated oil database
- I The ability to define limits
- I The ability to visualize conditions with a traffic light pattern
- I The ability to store readings
- I The ability to display histories
- I The ability to export readings via USB
- I Report template



Sensor	Part No.
HySense® CV 100	3402-CV10-G926C0-000 Product discontinued
Screw-in block	3109-20-05.01

General characteristics

Fluid	Mineral oils (H, HL, HLP, HLPD, HVLP), synthetic esters (HETG, HEPG, HEES, HEPR), polyalkylene glycols (PAG), zinc-free ash-free fluids (ZAF), polyalphaolefins (PAO)*
Measured variables	Viscosity, rel. permittivity, temperature
Interfaces	RS-232, CANopen, 4 ... 20 mA
Electrical connector	M12 A 8p m
Max. operating pressure	50 bar
IP degree of protection	IP67 (DIN EN 60529)
Operating temperature	-20 ... 85 °C
Seal material	HNBR

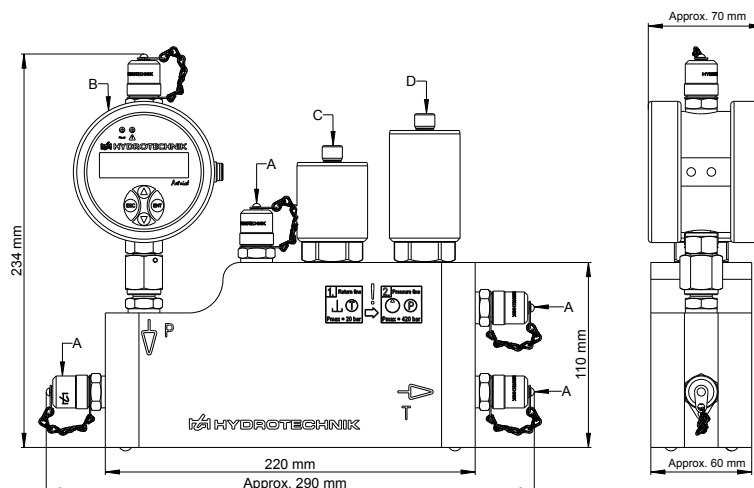
Measured variable	Measuring range	Measuring accuracy
Rel. permittivity	1 ... 7	±0.02
Viscosity	8 ... 400 mm ² /s	±5 mm ² /s @ (8 ... 100 mm ² /s) ±5% @ (100 ... 400 mm ² /s)
Temperature	-20 ... 85 °C	±0.5 °C

HySense® CX 197

The HySense® CX 197 service measuring kit combines all the oil condition sensors needed for a professional and fast oil condition analysis. As a result of its heavy-duty construction and compact design, combined with MINIMESS® adapters that make setup an absolute breeze, this kit is a perfect fit for mobile use. Moreover, the corresponding analysis application that is implemented in MultiSystem measuring devices makes it enormously easier to operate and use the sensors. Finally, the intuitive menu navigation and the stored oil database both make it easy to quickly acquire, visualize, evaluate, and store oil condition parameters.



A	MINIMESS® 1620 series test point
B	HySense® Patrick
C	HySense® CM 100
D	HySense® CV 100



General characteristics

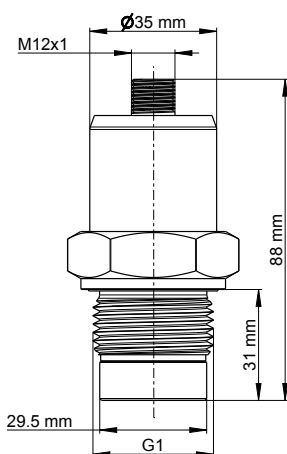
Fluid	Mineral oils (H, HL, HLP, HLPD, HVLP), synthetic esters (HETG, HEPG, HEES, HEPR), polyalkylene glycols (PAG), zinc-free ash-free fluids (ZAF), polyalphaolefins (PAO)*
Measured variables	Number of particles, viscosity, rel. humidity, rel. permittivity, conductivity, temperature
Interfaces	RS-232, CANopen, 4 ... 20 mA
Electrical connector	M12 A 8p m
Max. operating pressure	45 bar
IP degree of protection	IP67 (DIN EN 60529)
Operating temperature	-20 ... 85 °C
Seal material	HNBR

Measured variable	Measuring range	Measuring accuracy
Viscosity	8 ... 400 mm ² /s	±5 mm ² /s @ (8 ... 100 mm ² /s) ±5% @ (100 ... 400 mm ² /s)
Rel. permittivity	1 ... 7	±0.02
Rel. humidity	0 ... 100% r.H.	±3% r.H. @ (10 ... 90%) ±5% r.H. @ (< 10%, > 90%)
Conductivity	100 ... 800,000 pS/m	< ±10% @ (2000 ... 800,000 pS/m) ±200 pS/m @ (100 ... 2000 pS/m)
Temperature	-20 ... 85 °C	±0.5 °C
ISO 4406:99 particle code	6 ... 24 10 ... 22 (calibrated)	±1 (ordinal number)

Sensor	Part No.
HySense® CX 197	3402-CX10-D100-000

HySense® CW 100

The HySense® CW 100 is a high intelligence sensor that detects wear in the form of ferromagnetic particles. In addition, it is able to determine whether the particles are fine particles in the micrometer range or coarse particles in the millimeter range. Finally, this sensor has a fully automatic particle release function that eliminates the need to clean or maintain it.



Sensor	Part No.
HySense® CW 100	3402-CW10-G326C0-000

General characteristics	
Fluid	Mineral oils (H, HL, HLP, HLPD, HVLP), synthetic esters (HETG, HEPG, HEES, HEPR), polyalkylene glycols (PAG), zinc-free ash-free fluids (ZAF), polyalphaolefins (PAO)*
Measured variables	Ferromagnetic particles – Fine particles (µm range) – Coarse particles (mm range)
Interfaces	RS-232, CANopen, 4 ... 20 mA
Electrical connector	M12 A 8p m
Max. operating pressure	20 bar
IP degree of protection	IP67 (DIN EN 60529)
Operating temperature	-20 ... 85 °C
Seal material	HNBR

Measured variable	Measuring range	Measuring accuracy
Fine particles (µm range)	0 ... 100%	0.1%
Coarse particles (mm range)	1 ... 10	1

HySense® C accessories

Cables compatible with the HySense® C family			
Compatible with HySense®	Measuring device connection	Length m	Part No.
CL 120, 130, 160 CM 100 CV 100 CW 100	M12, 8-pin	5	8824-T6-05.00
CX 197	Unterminated cable end	2.5	8824-T1-05.00
	M12, 8-pin	1.5	8824-TB-00.00

For additional lengths and versions, please refer to page 226

HySense® FO | TQ | RS | PO | VB | SC

FORCE | TORQUE | SPEED | POSITION | VIBRATION | TRANSDUCERS

HySense® FO 200

The HySense® FO 200 is an all-purpose strain gauge tension load cell that detects longitudinal and transverse strain and uses it to determine the corresponding forces. The threaded rod design makes it easy to quickly integrate the load cell into systems, and the compact and lightweight construction are important advantages in comparison to other standard tension load cells.

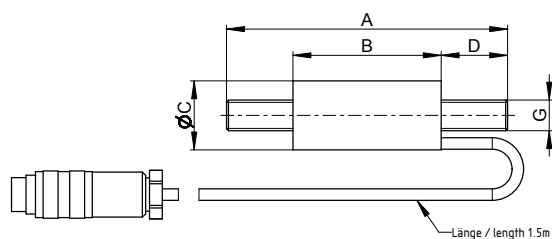
Typical applications:

- | Maximum construction machinery and harvester tensile forces
- | Forces in belt tensioners and Bowden cables
- | Tensile forces in universal testing machines
- | Wire rope and spring force measurements
- | Production process monitoring and documentation
- | Tensile forces on cranes, cable cars, elevators

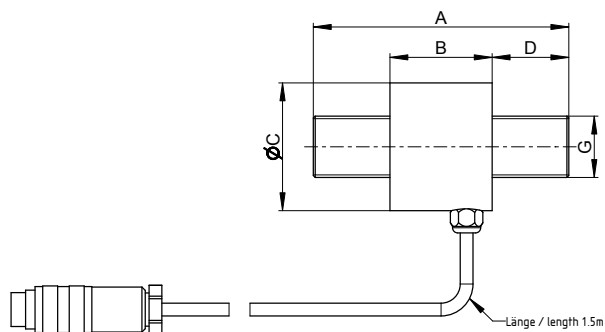


Actual product similar to picture

Measuring range: 0 ... 20 kN



Measuring range: 50 ... 250 kN



General characteristics

Sensor principle	Strain gauge
Measured variable	Tensile force
Output signal	4 ... 20 mA, ISDS
Nonlinearity	< 0.25% of full scale
Hysteresis	< 0.15% of full scale
Electrical connector	M16 x 0.75, 6-pin
Body material	Steel
Ambient temperature	-15 ... 85 °C
IP degree of protection	IP65 (DIN EN 60529)

Measuring range kN	A mm	B mm	ØC mm	D mm	G mm	Weight g	Part No.
0 ... 5	110	58	27	26	M12	170	34G8-1508-33Z1S
0 ... 10							34G8-2108-33Z1S
0 ... 20							34G8-2208-33Z1S
0 ... 50	100	40	40	30	M16 x 1.5	310	34G8-2508-33Z1S
0 ... 100							34G8-3108-33Z1S
0 ... 150	130	60	50	35	M30 x 2	1000	34G8-3158-33Z1S
0 ... 250	140	56	60	40	M36 x 2	1380	34G8-3258-33Z1S

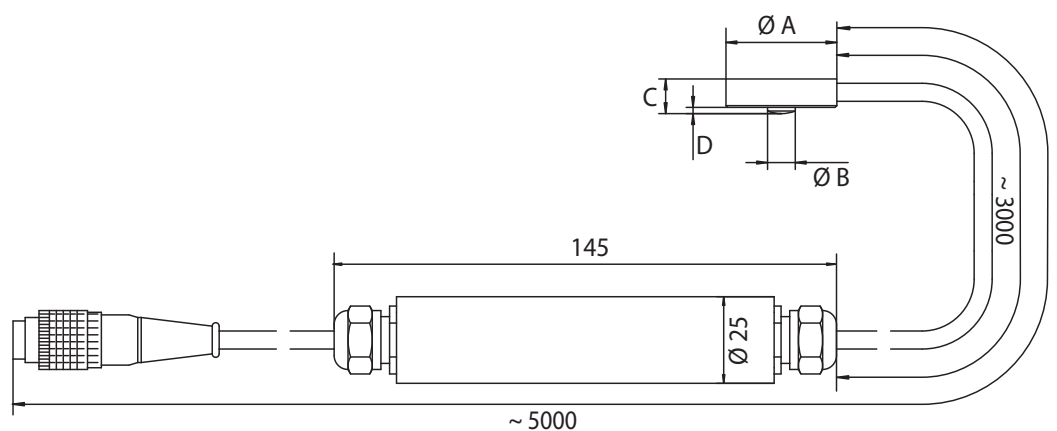
Matching eye bolts available upon request

HySense® FO 300

As a result of its small and extremely slim design, the HySense® FO 300 load cell is an ideal choice for applications where there is barely any room to work with. Moreover, its special housing geometry and stainless steel housing material mean that it can be used in harsh environments.

Typical applications:

- | Fully automated production centers
- | Measuring and monitoring systems
- | Production process monitoring
- | Toolmaking
- | Universal testing machines

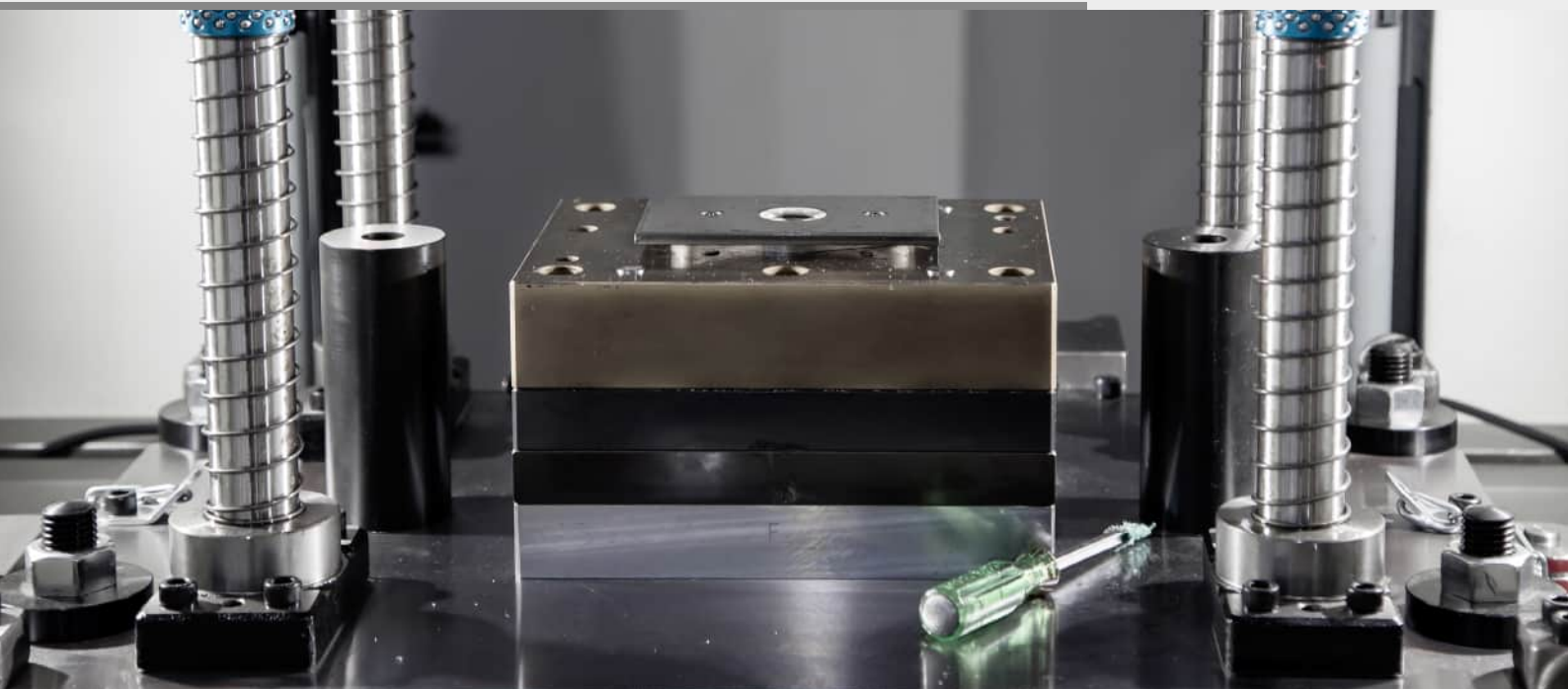


Dimensions in mm

General characteristics

Sensor principle	Strain gauge
Measured variable	Compressive force
Measuring range	1 ... 100 kN
Output signal	4 ... 20 mA, ISDS
Measuring accuracy @ 23 °C	±0.5% of full scale
Electrical connector	M16 x 0.75, 6-pin
Body material	Stainless steel
Ambient temperature	-30 ... 80 °C
IP degree of protection	IP65 (DIN EN 60529)
Max. displacement	≤ 0.15 mm

Measuring range kN	Ø A mm	Ø B mm	C mm	D mm	Weight g	Part No.
0 ... 1	32	8	10	1.5	Approx. 380	34D8-1108-33Z1S
0 ... 2						34D8-1208-33Z1S
0 ... 5						34D8-1508-33Z1S
0 ... 10						34D8-2108-33Z1S
0 ... 20	39	11	16	2	Approx. 450	34D8-2208-33Z1S
0 ... 50	52	15	25	3	Approx. 750	34D8-2508-33Z1S
0 ... 100	79	20	39	5	Approx. 1500	34D8-3108-33Z1S



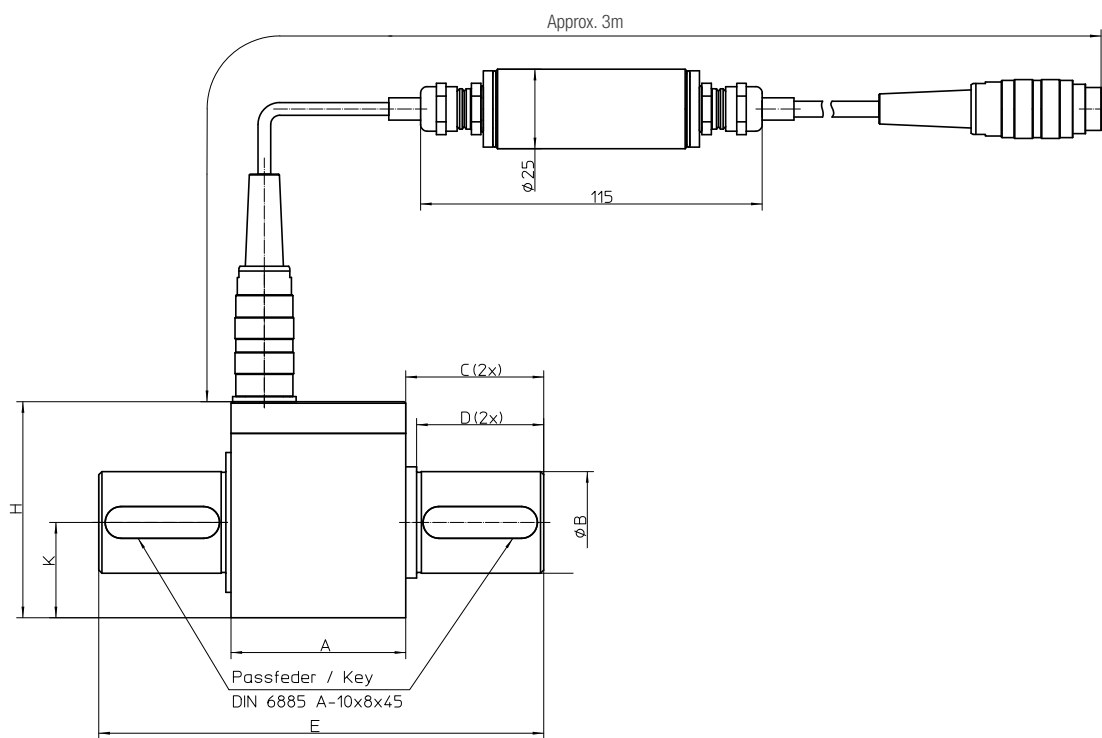
HySense® TQ 100

The HySense® TQ 100 is a rotating torque sensor with integrated direction detection that was developed both for temporary and permanent use. It features high-quality, low-wear slip rings that make it possible to achieve precise and stable signal transmission. In addition, the feather keys on both sides and the housing design make direct mounting fast and easy.

Typical applications:

- | Measuring constant and varying torques
- | Friction torque in gearing and bearings
- | Measurements on rotating shafts
- | Production process monitoring and documentation
- | Testing and adjusting screw/nut drivers
- | A wide variety of adjustment devices in the industry





Dimensions in mm

General characteristics

Sensor principle	Strain gauge, slip ring
Measured variable	Torque
Measuring range	1 ... 500 Nm
Output signal	12 ±8 mA ISDS
Measuring accuracy	0.1% of full scale
Electrical connector	M16 x 0.75, 6-pin
Ambient temperature	-10 ... 60 °C
IP degree of protection	IP50 (DIN EN 60529)

Measuring range Nm	Ø B mm	C mm	D mm	E mm	K mm	H mm	Weight g	Part No.
±1	8	19.7	18	85	12	39	200	3417-1102-33R1S
±5								3417-1502-33R1S
±50	15	21	20	90	21	54	400	3417-2502-33R1S
±100	18	24.1	22	95	21	54	500	3417-3102-33R1S
±200	32	41.6	40	140	30	68	1300	3417-3202-33R1S
±500								3417-3502-33R1S

HySense® RS 100

The HySense® RS 110 is an optical speed sensor that uses reflective mark detection. This method makes it possible to obtain particularly accurate and reliable measurements, since the measured results are not affected or distorted by the rotor's material or shape. Moreover, the available mounting base ensures that the sensor can be installed on metal surfaces easily and quickly.

How it works

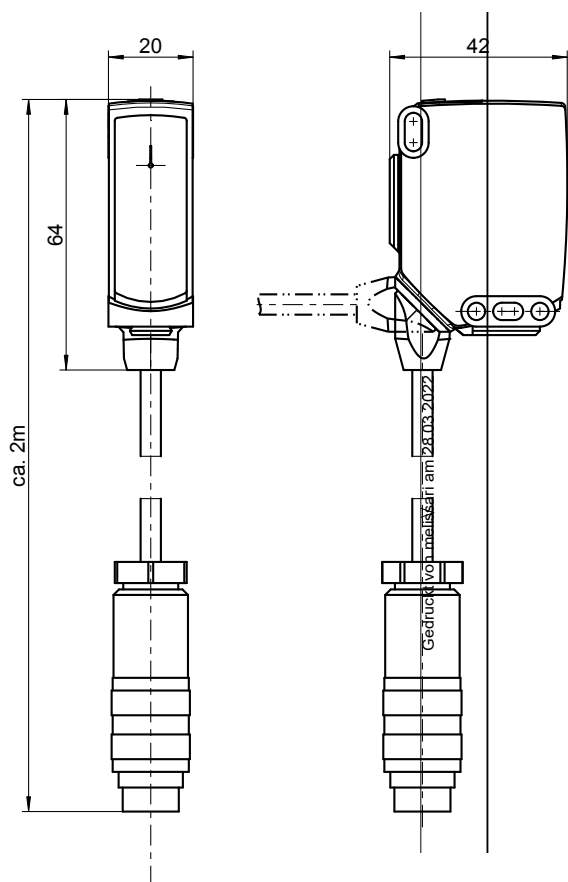
This sensor works with a pulsing red light (LED) that is reflected by a special mark on the rotating part. A polarizing filter makes sure that only reflected light pulses will be evaluated and that disruptive reflections (e.g., unevenness on the surface, shiny metal parts, keyways, and high-contrast areas) will not be detected.

Typical applications:

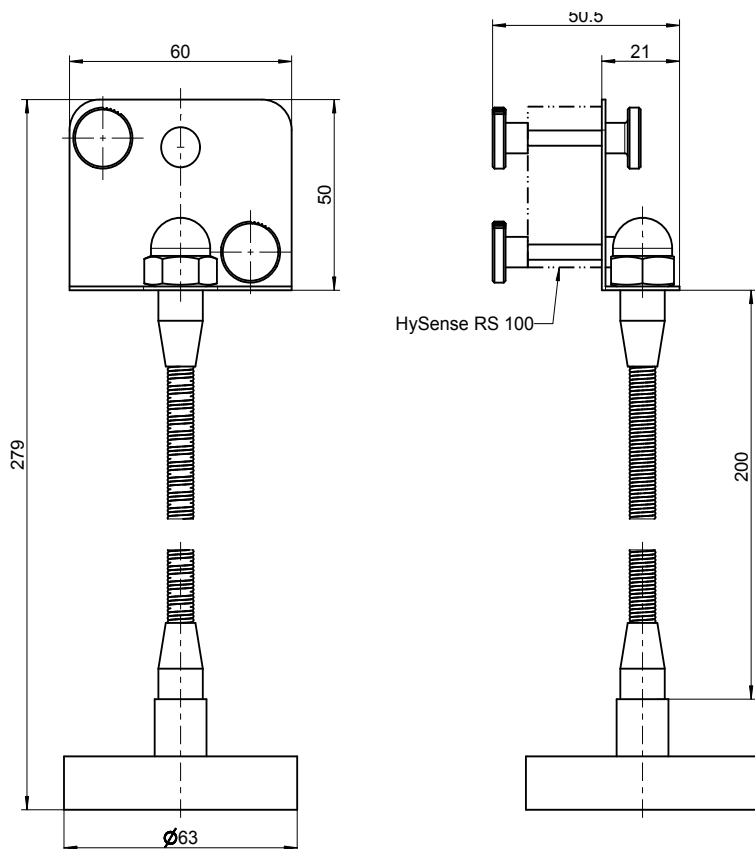
- | Determining the hydraulic efficiency of pumps
- | Speed measurements on fans for hydraulic cooling units



Sensor, dimensions in mm



Magnet base, dimensions in mm



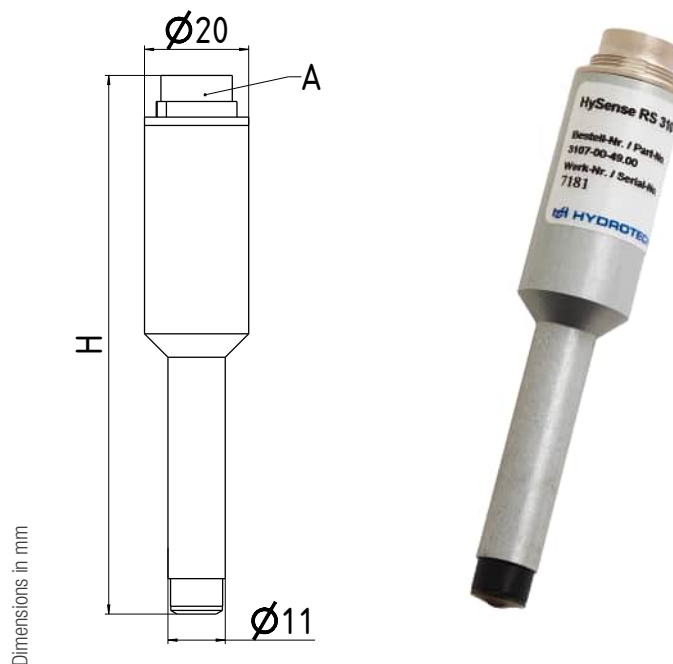
General characteristics

Sensor principle	Autocollimation
Light source	Power LED with visible red light
Response time	500 μ s
Range	0 ... 500 mm (standard reflectors)
Pulsing frequency	500 Hz / 30000 min-1
Signal repetition rate	Max. 500 Hz
Electrical connector	M16 x 0.75, 5-pin
Body material	Glass fiber reinforced
Ambient temperature	-40 ... 60 °C

Model	Output signal	Weight	Part No.
HySense® RS 100	Frequency / ISDS	140 g	3130-08-01.01
Magnetic base	-	-	3130-03-03.00
Reflective film (50 pieces)	-	-	8840-02-01.01

HySense® RS 3xx

The HySense® RS 3xx is a high-precision frequency sensor that converts the motion of diamagnetic materials into pulses using the GMR effect. The use of this effect makes precise frequency measurements possible even with very small gears and low rotational speeds.



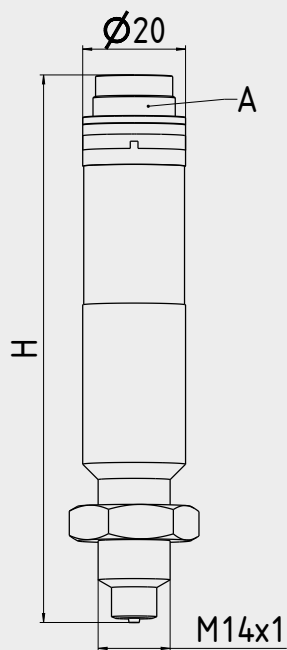
General characteristics	
Sensor principle	GMR effect
Frequency range	0.5 ... 1800 Hz
Measuring accuracy	±1 pulse
Electrical connector	M16 x 0.75, 5-pin / M16 x 0.75, 6-pin
Body material	Aluminum
Ambient temperature	-20 ... 85 °C
IP degree of protection	IP65 (DIN EN 60529)
Weight	60 g

Model	Output signal	H	Part No.
HySense® RS 300	Frequency, ISDS	104 mm	3107-00-S-49.00
HySense® RS 310	Frequency		3107-00-49.00

HySense® RS 5xx

HySense® RS 5xx is Hydrotechnik's revolutionary inductive sensor series, which detects the frequency of rotating components with extremely high accuracy and stability. These sensors contain a microcontroller with sufficient computing power, and are accordingly also referred to as "intelligent sensors." In turn, this sensor intelligence makes it possible to modify a signal on the basis of linearization tables in the sensor itself so that a compensated output signal can be output (RS 506, RS 510).

A heavy-duty and compact design makes easy and fast installation possible and means that these sensors can be used in harsh environments. This sensor series was developed specifically for Hydrotechnik turbine flow meters, but can also be used for a broad range of measuring tasks.



Dimensions in mm



General characteristics	
Sensor principle	Electromagnetic induction
Measuring range	1 ... 10000 Hz (RS 500 & RS 506) 1 ... 5000 Hz (RS 510)
Measuring accuracy	±1 pulse (RS 500) ±0.1% of full scale (RS 506 & RS 510)
Electrical connector	M16 x 0.75, 6-pin / M12, 4-pin*
Mechanical connection	M14 x 1
Body material	Aluminum
Ambient temperature	-25 ... 85 °C (RS 500 & RS 510) -20 ... 70 °C (RS 506)
IP degree of protection	IP67 (DIN EN 60529)

* More available upon request

Model	Output signal	Function	Electrical connector	H	Part No.
HySense® RS 500	Frequency	ISDS	M16 x 0.75, 6-pin	73 mm	3410-1600-A233F03
HySense® RS 500	Frequency	ISDS	M12, 4-pin	87 mm	3410-1600-A211F07
HySense® RS 506	CANopen	Smart sensor with ISDS	M12, 4-pin	113 mm	3410-1400-A213C11
HySense® RS 510	4 ... 20 mA	Smart sensor with ISDS	M16 x 0.75, 6-pin	106 mm	3410-1400-A233Z1S
HySense® RS 510	4 ... 20 mA	Smart sensor with ISDS	M12, 4-pin	113 mm	3410-1400-A211Z13

HySense® PO 180

The HySense® PO 180 is a high-resolution draw-wire position sensor. Its compact and heavy-duty design makes it impervious to environmental conditions, which is why it is an ideal choice for use with cranes, hydraulic presses, and a broad range of equipment for which travel or position changes need to be measured.

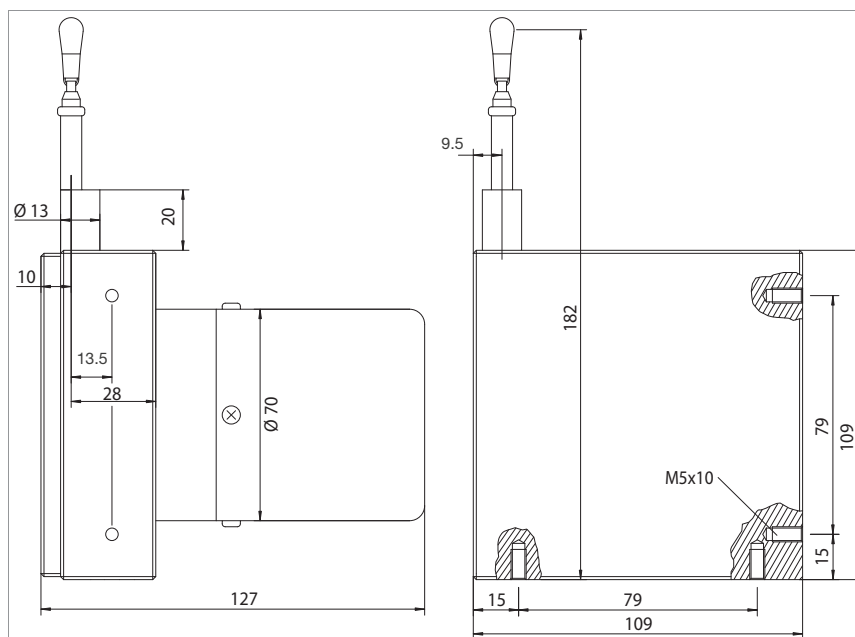


General characteristics

Sensor principle	Draw wire
Output signal	4 ... 20 mA
Nonlinearity	<±0.1% of full scale
Temperature coefficient	±0.01% / K
Electrical connector	8-pin connector DIN 45326
Housing / draw wire material	Aluminum and stainless steel / stainless steel
Ambient temperature	-20 ... 85 °C
IP degree of protection	IP65 (DIN EN 61076-2-106)

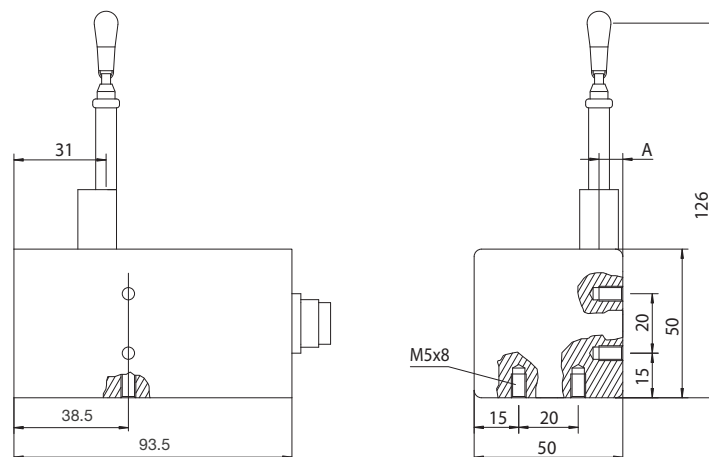
Measuring range	Max. extension force	Max. retraction force	A	Weight	Part No.
mm	N	N	mm	g	
0 ... 100	4.7	3	8	800	3183-13-03.37
0 ... 375	7.4	3.9	12.5		3183-13-05.37
0 ... 1000	5.3	2.9	8		3183-13-02.37
0 ... 3000	6.2	3	10	1550	3183-12-02.37

Measuring range of 0 ... 3000 mm



Dimensions in mm

Other measuring ranges

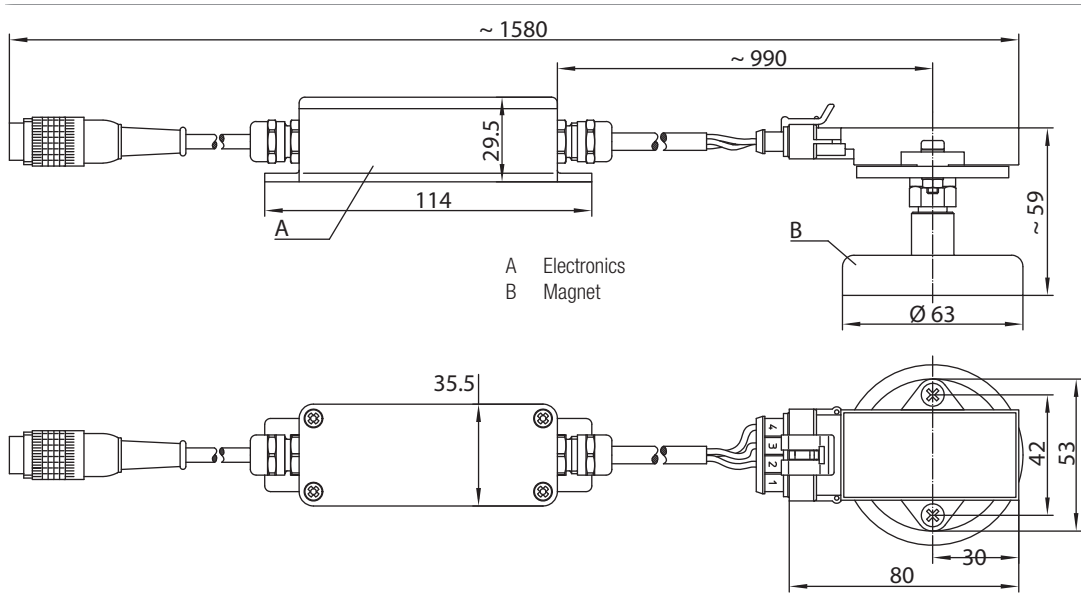


HySense® VB 110

The HySense® VB 110 is a capacitive vibration sensor that was engineered specifically for low-lag data acquisition in difficult ambient conditions. The permanent magnets integrated into the base ensure that the sensor can be installed on metal surfaces easily and quickly.



General characteristics	
Sensor principle	Capacitive acceleration sensor
Frequency range	1 ... 100 Hz
Measuring range	±50 G
Output signal	Frequency (square wave signal)
Nonlinearity	< ±2%
Measuring accuracy	< ±2%
Electrical connector	M16 x 0.75, 5-pin
Mechanical connection	Magnetic base
Body material	Plastic; resistant to fuels, oils, salts, and specific chemicals
Ambient temperature	-20 ... 85 °C
IP degree of protection	IP66 (sensor element)
Weight	547 g
Part No.	3183-71-01.00



Dimensions in mm



HySense® SC 100

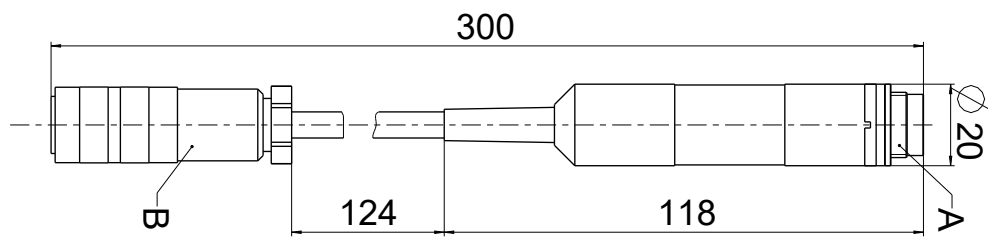
The HySense® SC 100 is an intelligent, multi-functional transducer that not only converts frequencies to an analog 4 to 20 mA signal, but is also able to determine the phase relationship between two input frequencies and output it via a switching output. This makes it possible, for example, to detect and output the flow direction for a gear flow meter (two input frequencies).

This sensor intelligence makes internal sensor signal compensation and phase evaluation on the basis of stored linearization tables possible.



General characteristics	
Measured variable	Frequency (optionally two frequencies)
Measuring range	0 ... 5000 Hz
Output signal	4 ... 20 mA, ISDS (optional switching output Ub+)
Measuring accuracy	±0.1% of full scale
Electrical connector 1	M16 x 0.75, 6-pin
Electrical connector 2	M16 x 0.75, 6-pin
Body material	Aluminum
Ambient temperature	-25 ... 85 °C
IP degree of protection	IP67 (DIN EN 61076-2-106)
Weight	75 g
Part No.	3410-6600-3433D1V

* More available upon request



Dimensions in mm

HySense® RS | PO | SC accessories

Cables compatible with HySense® RS | PO | SC

Compatible with HySense®	Measuring device connection	Length (m)	Part No.
(M16 6-pol.) RS 300, 310 RS 500, 510 SC 100	M16, 6-pin	5	8824-S1-05.00S
	M16, 6-pin (high-end)	5	8824-S1-05.00H
	Unterminated cable end	5	8824-S6-05.00S
RS 506	M12, 5-pin	5	8824-N3-05.00
	M12, 8-pin	5	8824-R7-05.00
	Unterminated cable end	5	8824-M8-05.00
(M12 4-pol.) RS 500, 510	M16, 6-pin	2.5	8824-V3-02.50S
	M12, 4-pin	2.5	8824-V2-02.50
	Unterminated cable end	2.5	8824-V1-02.50
PO 180	M16, 5-pin	2.5	8824-GA-02.50S

For additional lengths and versions, please refer to page 226

HySense®
The synonym of
uncompromising quality and
precision!

