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Data Sheet

Compact Cavity Temperature Sensors with Quick Disconnect and Quick Disconnect Cable for Standard Variant and Floating Variant

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1 Product description

1.1 Compact Sensors

In addition to the cavity pressure, the cavity temperature plays an essential role in monitoring and controlling the injection molding process. Here, the melt front is automatically detected when the temperature sensor is reached and used for control and regulation tasks. In order to be able to react to this event as quickly as possible, the response time of the sensors in particular was optimized.

Numerous injection molded parts are not directly produced in the mold platen, but with the help of mold inserts. This facilitates the manufacture of the cavities and the handling at servicing. Furthermore, by mounting and dismounting the mold inserts the handling of the sensor cable with a fixed installation point is not suitable for these applications.

As a preferred solution and alternative to the flexible quick disconnects with cable, so-called compact sensors have been developed for pressure and temperature measurement in the injection mold. Instead of connecting the sensors inside the mold insert to the disconnect via a connecting cable, the compact sensor is firmly connected to the disconnect via a distance piece. This creates an extremely compact and very easy-to-handle solution that is available in different sizes depending on the application and space requirements. The length of the compact sensors is variable and must be specified when ordering. The disconnect counterpart in the mold platen is connected to the connector plug via an integrated cable.

With a few exceptions, cavity temperature compact sensors are available with a hardened sensor front, which significantly increases the service life, especially when using abrasive or chemically aggressive melts.

1.2 Floating Quick Disconnects

Mold inserts are often installed floating to allow standardization when replacing a defective mold insert. This means that they are no longer fitted exactly into the mold plate, but are provided with a generous tolerance. This is also referred to as „floating mold inserts“.

For this installation situation, we have developed a special quick disconnect system that automatically compensates for the lateral displacement of the mold inserts. This is made possible by the fact that the two quick disconnects automatically „find each other“ during installation, which would inevitably lead to a collision in a rigid coupling design.

Floating disconnects simplify the exchange of mold inserts, which is a prerequisite for the standardization of mold components, especially in the global environment.

1.3 Summary

Cavity temperature compact sensor	Quick disconnect
• Simple, safe and fast installation • Variable sensor lengths up to 120 mm maximum • Easy handling when using multiple cavities and exchangeable inserts • Waterproof design	• Simple, safe and fast installation • Variable cable lengths • Floating variant with generous installation tolerance

1.4 Technical Data Compact Sensors

Properties	Specification
Operating temperature range of cable	0 ... 200 °C
Standard operating temperature of sensor front	Max. 600 °C
Operating pressure range	0 ... 2'000 bar
Thermocouple (not ground isolated)	Type N
Class	1
Max. deviation according to IEC 584-3 (-40 °C ... 1000 °C)	dT: ±0.004xT or ±1.5 K
Colors / polarity according to IEC 584-3	pink (NiCrSi): plus white (NiSi): minus
Response time switchover to holding pressure and sequential control with PRIAMUS amplifier	4 ms (type 4013: 20 ms)

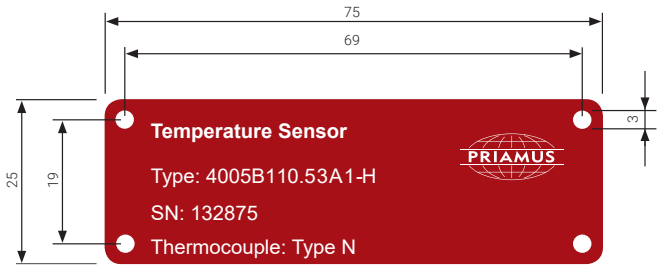
1.5 Marking Example Compact Sensors

The type number of our cavity temperature compact sensors consists of the following elements:

	4005Dxxx.xxA1-H
4005	Sensor type
D	Index
xxx.xx	Sensor length (in mm)
A1	Quick disconnect type
H	Hardened sensor front

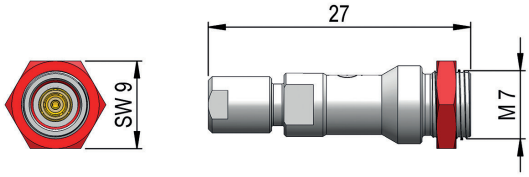
1.6 Identification Plate

All cavity temperature compact sensors are tested and provided with a serial number. This means that all test results and all sensors are traceable. This data is located on the identification plate, which can be attached to the mold.



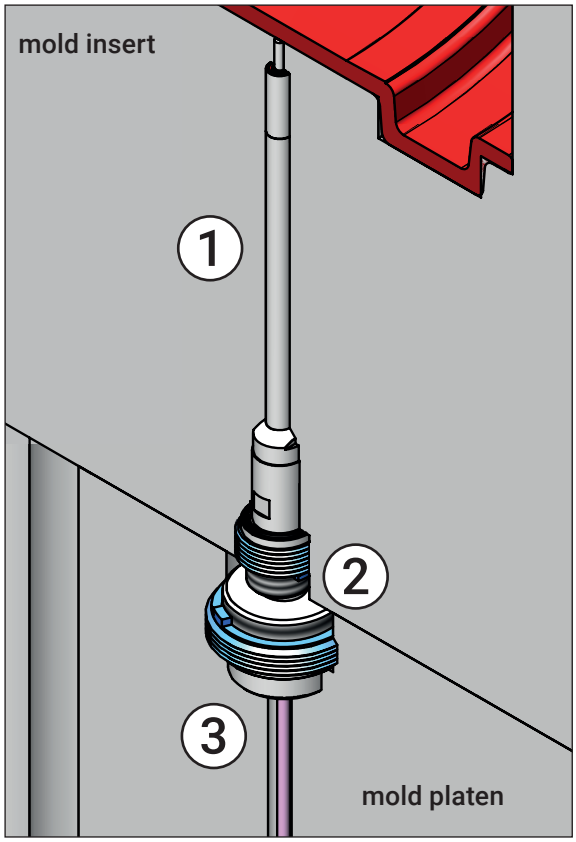
1.7 Connector

All quick disconnect cables have a Fischer connector type KBE 101 negative TRIAX.



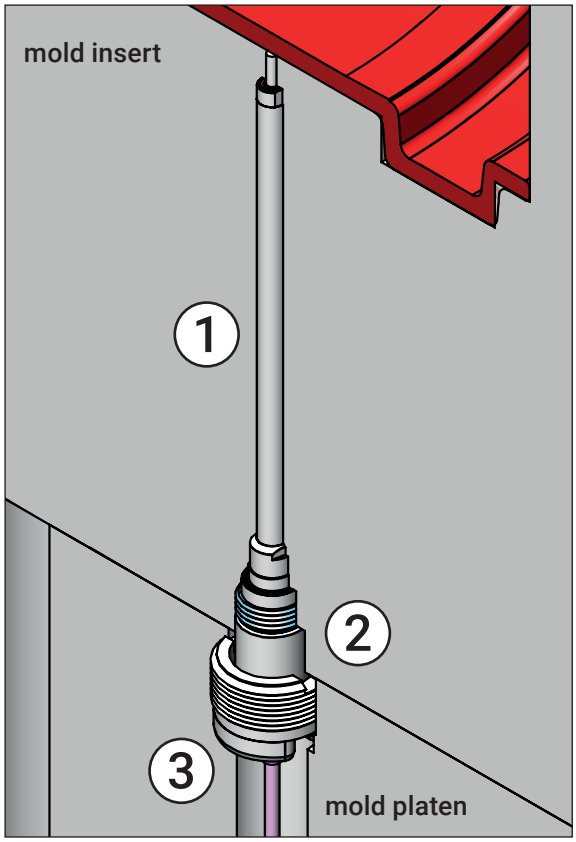
1.8 Mounting Situation Standard Variant

Lower picture shows a compact sensor **1** with quick disconnect **2** (standard variant). The quick disconnect cable **3,** which also has a quick disconnect, is installed in the mold platen.



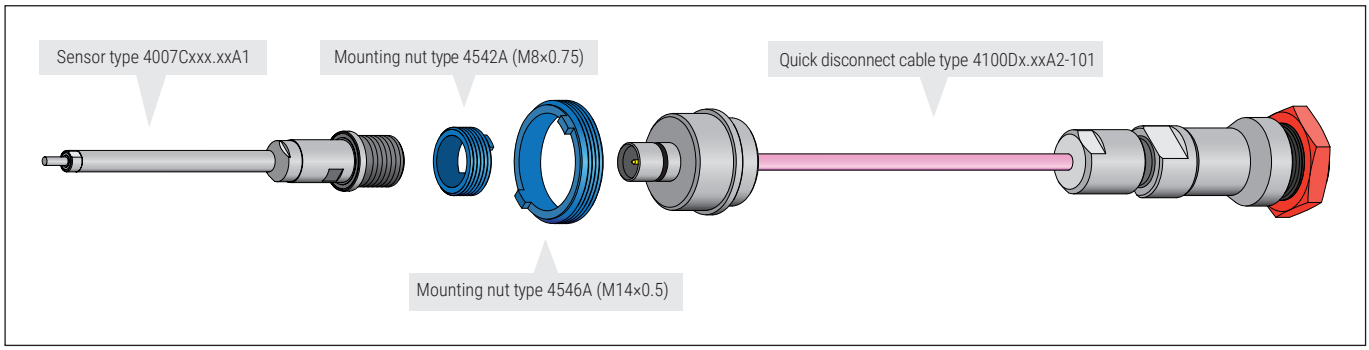
1.9 Mounting Situation Floating Variant

Lower picture shows a compact sensor **1** with quick disconnect **2** (floating variant). The quick disconnect cable **3,** which also has a quick disconnect, is installed in the mold platen.

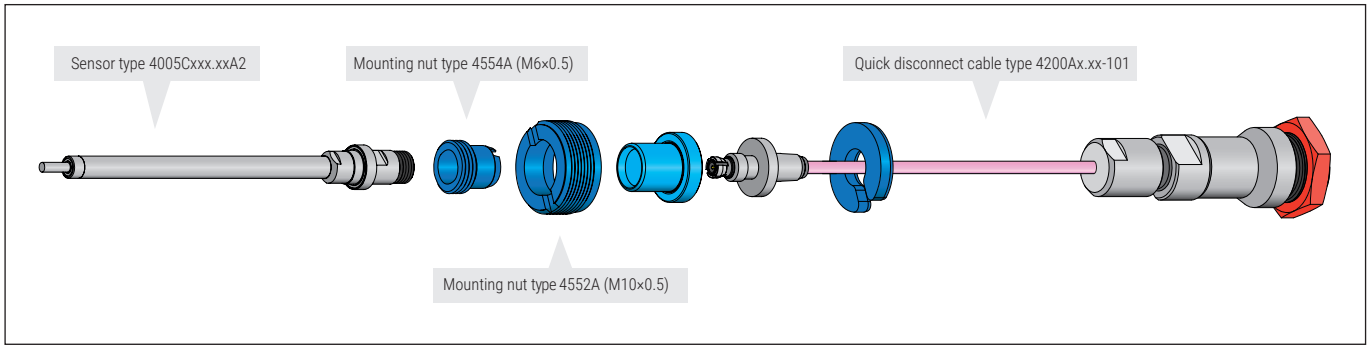


1.10 Measuring Chains

1.10.1 Standard Variant A1



1.10.2 Floating Variant A2



1.11 Type Overview Compact Sensors

This section lists all available versions of our cavity temperature compact sensors with the associated quick disconnect cables. In addition to the standard variants (A1), the floating variants (A2) are also described.

	4005Cxxx.xxA1	4005Bxxx.xxA1-H	4007Cxxx.xxA1	4007Bxxx.xxA1-H	4009Bxxx.xxA1	4011Bxxx.xxA1	4013Axxx.xxA1*	4015Axxx.xxA1-H	4017Axxx.xxA1-H	4005Cxxx.xxA2	4007Cxxx.xxA2	4009Bxxx.xxA2	4011Bxxx.xxA2
Sensorfront:													
Machinable	●	●								●			
Non-machinable			●	●	●	●	●	●	●		●	●	●
Hardened		●		●				●	●				
Stepped front diameter						●			●				●
Possible length (in mm):													
17 ... 120												●	
18 ... 120											●		
18.5 ... 120										●			
20 ... 120													●
22 ... 120							●						
23 ... 120			●	●									
23.5 ... 120	●	●											
24 ... 120					●			●					
27 ... 120						●			●				

* Prisolaris™ for indirect measurement

1.11.1 Length Compact Sensor

xxx.xx designates the total length of the compact sensor in mm. The total length is the distance between the mold contour and the insert base and must be specified when ordering.

The maximum concentricity, i.e. the maximum deviation of the sensors in coaxiality, depends on the length of the compact sensor. The following concentricities apply (see dimensional drawings):

Length compact sensor L	Maximum concentricity K
17 ... 39.99 mm	0.10 mm
40 ... 79.99 mm	0.17 mm
80 ... 99.99 mm	0.30 mm
100 ... 120 mm	0.50 mm

1.11.2 Length of Quick Disconnect Cable

x.xx designates the total length of the quick disconnect in [m] and must be specified when ordering. The following points should be particularly noted with regard to cable length:

- When designing, make sure that the cable length on the mold insert side is not too short and not too long so that the sensor with quick disconnect can still be mounted.
- The cable must be long enough to accommodate the remaining cable length in the bore (keywords: volume and stiffness).
- The shorter the cable, the stiffer it is and the more difficult it is to accommodate in the bore.
- The cable must be long enough so that the sensor can still be mounted. The flexible quick disconnect is located laterally outside the bore.
- When using multi-channel connector boxes, the cables must be long enough to be plugged in when the cover of the connector box is removed.

The following manufacturing tolerances apply to the cables:

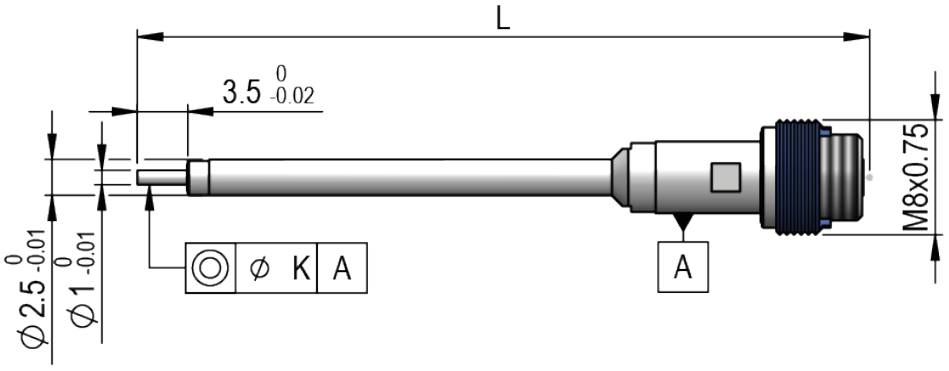
Quick disconnect cable (minimum length: 0.10 m)	
Cable length [m]	Tolerance + / -0mm
< 0.50 m	5 mm
0.51 m ... 1.00 m	10 mm
> 1.01 m ... 5.00 m	20 mm

1.11.3 Types with Quick Disconnect A1 (Standard Variants)

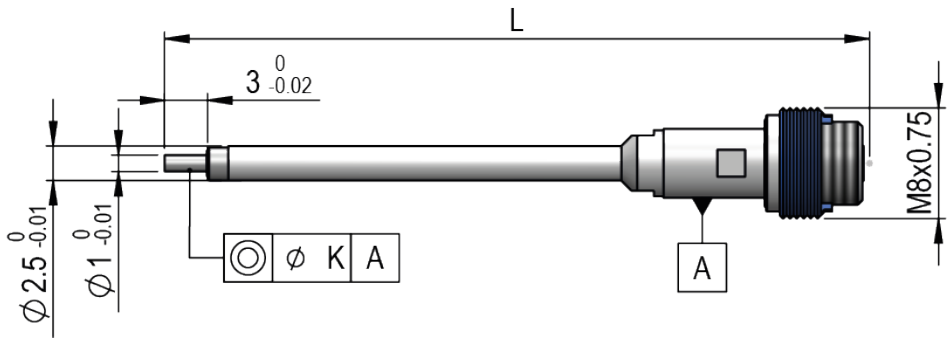
Types 4005Cxxx.xxA1, 4005Bxxx.xxA1-H

Notice

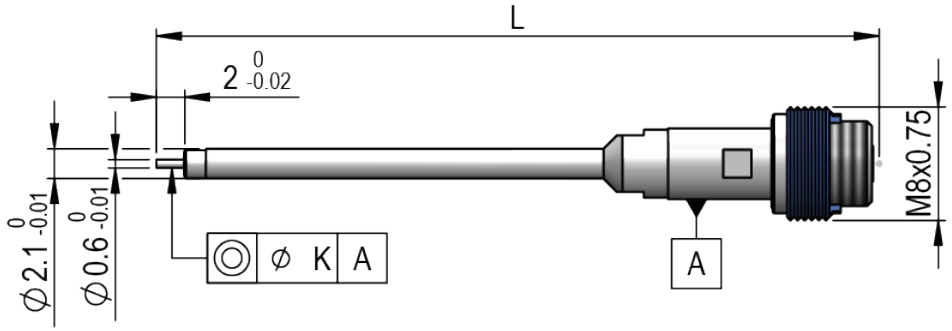
Machining the sensor front: The dimension from the lowest point of manufacturing to the sensor shoulder must imperatively be manufactured 3.1 mm +0.1/-0.



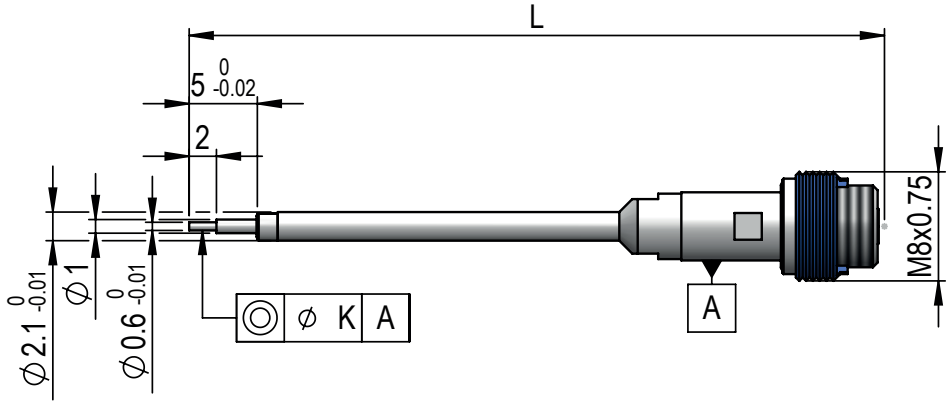
Types 4007Cxxx.xxA1, 4007Bxxx.xxA1-H



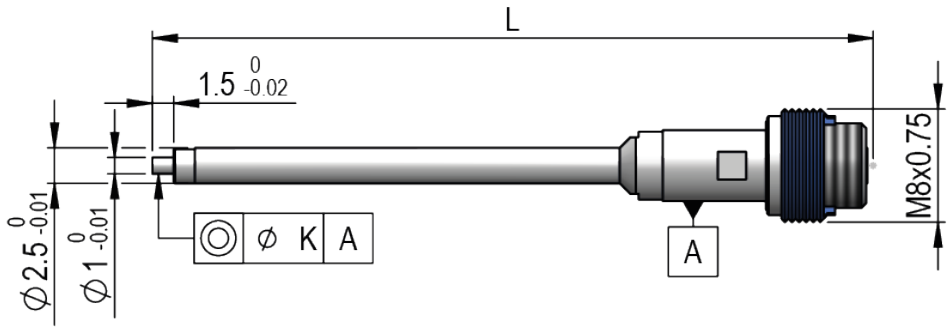
Type 4009Bxxx.xxA1



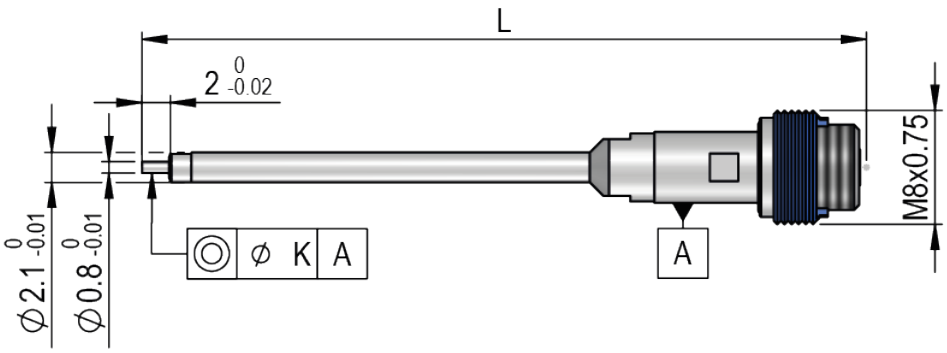
Type 4011Bxxx.xxA1



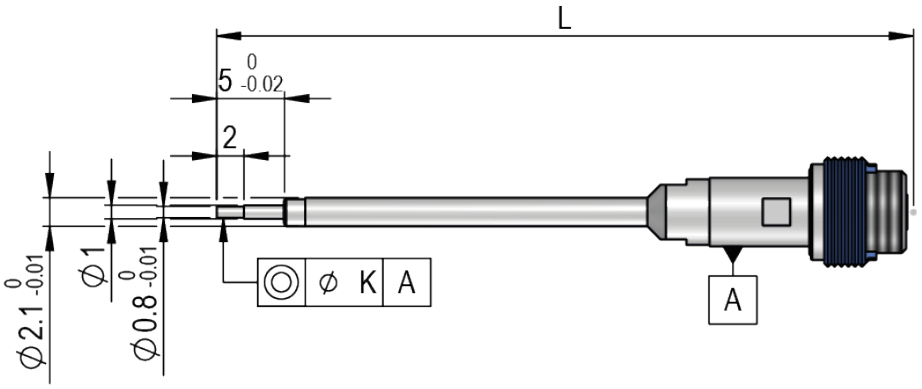
Type 4013Axxx.xxA1



Type 4015Axxx.xxA1-H

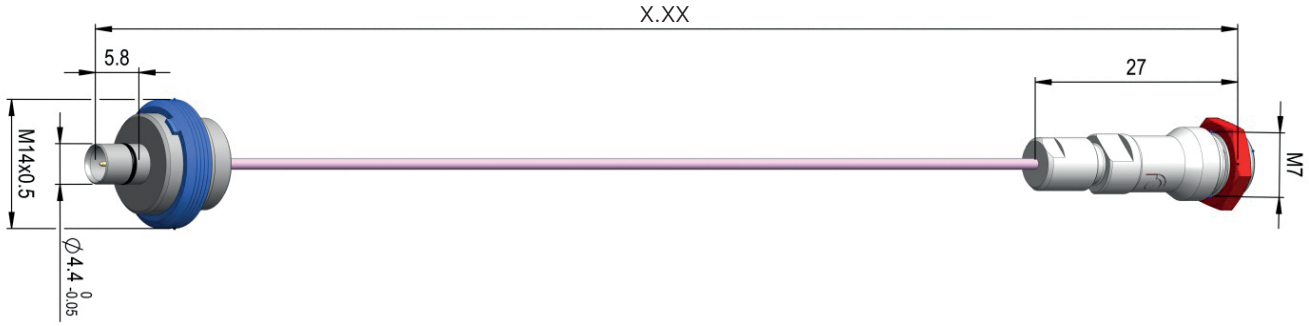


Type 4017Axxx.xxA1-H



1.11.3.1 Quick Disconnect Cable Type 4100Dx.xxA2-101 for Standard Variants

Smallest bending radius: 5 mm

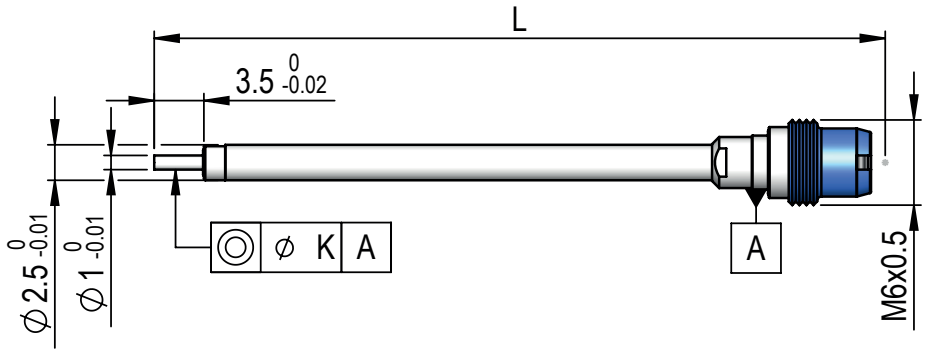


1.11.4 Types with Quick Disconnect A2 Floating Variants

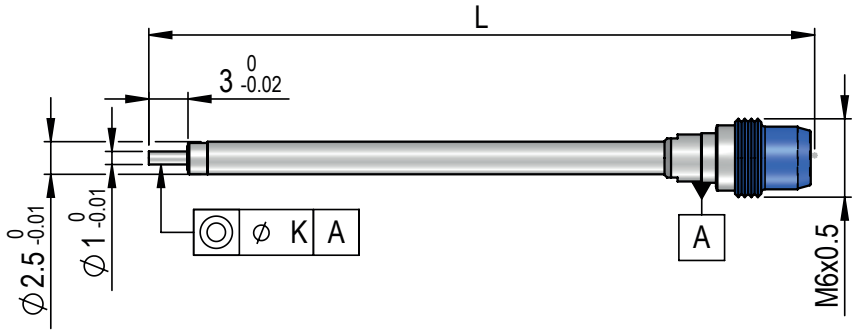
Type 4005Cxxx.xxA2

Notice

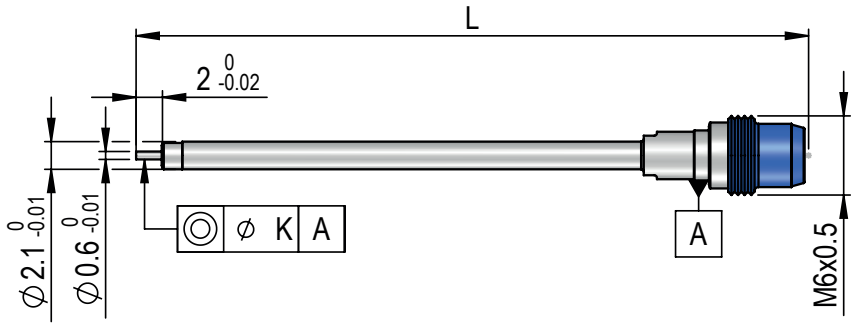
Machining the sensor front: The dimension from the lowest point of manufacturing to the sensor shoulder must imperatively be manufactured 3.1 mm +0.1/-0.



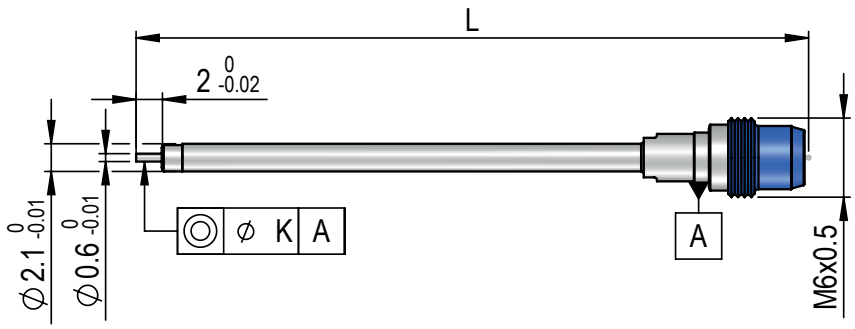
Type 4007Cxxx.xxA2



Type 4009Bxxx.xxA2

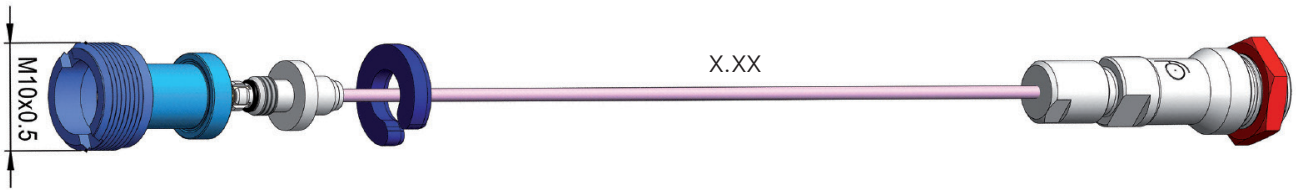


Type 4011Bxxx.xxA2



1.11.4.1 Quick Disconnect Type 4200Ax.xx-101 for Floating Variants

Smallest bending radius: 5 mm



2 Mounting

2.1 Mounting Places

Cavity temperature sensors are installed at the flow path end in most applications, for example for mold filling detection and automatic hot runner balancing.

For special applications such as sequential control, cavity temperature sensors are also placed at the points where corresponding functions are to be triggered by the measurement signal. In order to place the sensors in the best possible way, defect images of the parts and filling studies are used for existing molds, while filling simulations are helpful for new projects.The list shows applications and recommendations for installation location. We will be happy to advise you on the selection and placement of the sensors in your specific application.

Application	Recommended mounting place
Automatic, viscosity-independent switchover to holding pressure	just before the end of the flow path
Automatic hot runner balancing and controlling	
Fill time and balancing time monitoring	
Automatic venting control	just before the venting mechanism
Automatic valve gate nozzle control and balancing (e. g. LSR)	shortly before the switch event
Mold filling monitoring („Short Shots“)	at the absolute end of the flow path at particularly thin-walled transitions
Monitoring and controlling of the viscosity	after the cavity pressure sensor
Cavity temperature control	in any order
Core pull control	shortly before the switch event
Control of coining, gas-water-injection etc.	
Melt front depending cascade control	before the valve gate nozzles
Monitoring and control of the shrinkage	near the pressure sensor

2.2 Preparations

The basic prerequisite for accurate and problem-free measurement is a perfectly manufactured sensor bore. If the specified tolerances are not observed, large measuring errors, discontinuities in the measuring signal, extreme imprints on the molded part and defective sensors are possible as a result. To obtain a correspondingly fast temperature signal, the sensor front must be installed flush with the cavity wall.

It is therefore essential to observe both the dimensions and the shape and position tolerances described in this chapter. The cable channel respectively the bore must also be sufficiently dimensioned so that the cable can be inserted with a loop. Please note in general that the function of the sensor can no longer be guaranteed if the sensor cables andconnectors are damaged or contaminated.

Before you start with the sensor installation, the following instructions must be followed:

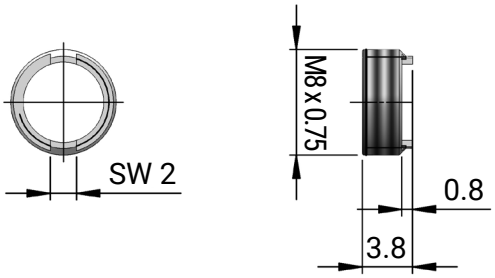
- Only use mounting and extracting tools from PRIAMUS.
- The dimensions and tolerances specified in the bore drawings must be observed.
- All channels and bores must be cleaned free of chips & burrs.
- All contact surfaces must be flat and level.
- The angles in the mold, around which the cables are placed, must be added with a chamfer (3 x 45˚) or a radius (R2), therewith the cable will not be damaged.
- All open cable ducts must be covered.
- Do not pull on the quick disconnect cable.
- The quick disconnect must not be contaminated. Therefore, if possible, do not position the quick disconnect in the immediate vicinity of a riser.
- For the standard variants, pre-centering of the inserts with two alignment pins for the quick disconnect is necessary. The fit of the pre-centering should be H7/g6 quality and the length should be at least 10 mm. Usually alignment pins with collar and two fitting diameters are used for this purpose for easy assembly.
- With the floating variant, an eccentricity or deviation of max. 0.2 mm can be absorbed by the floating disconnects.
- Pay attention to the appropriate cable length: The cable should be able to be accommodated in the bore or cable channel without any problems.
- When installing floating disconnects, ensure that the mold platens meet parallel to each other to guarantee the functionality of the disconnects.
- The protecting cap has to be fixed on the mounting plate of the connector and should not be placed too close to the junction of the mold therewith the connector doesn’t get crushed by the mold closing.

2.3 Mounting Compact Sensors

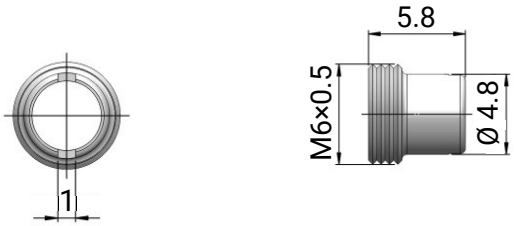
Mounting nuts and tightening torques are assigned to quick disconnects types A1 and A2 as follows:

Quick disconnect type	Mounting / extracting tool for sensor	Assembly tool for mounting nut	Mounting nut	Tightening torque
A1	Type 4573A	Type 4563B	Type 4542A	1.5 Nm
A2	Type 4571A	Type 1320A & 1331A	Type 4554A	

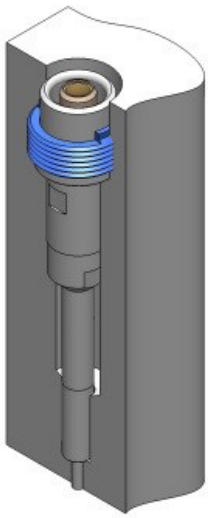
Mounting nut type 4542A



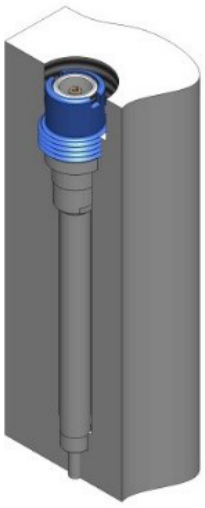
Mounting nut type 4554A



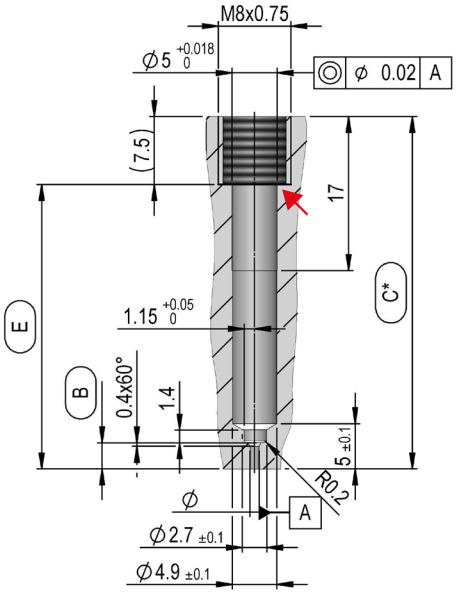
Compact sensor with quick disconnect type A1



Compact sensor with quick disconnect type A2

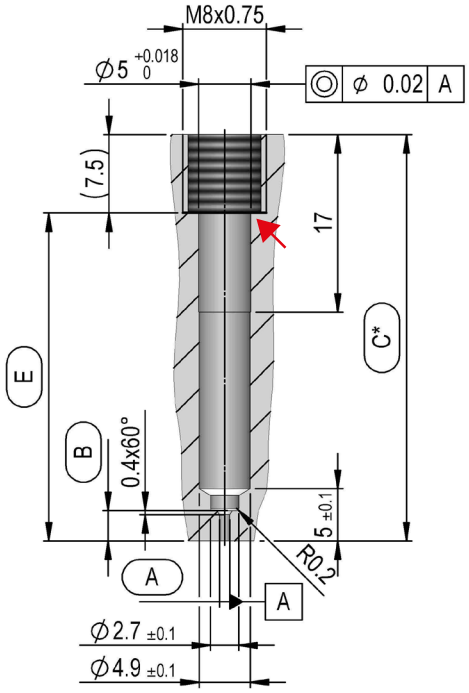


2.3.1 Bore Drawings Compact Sensors with Quick Disconnects Types A1



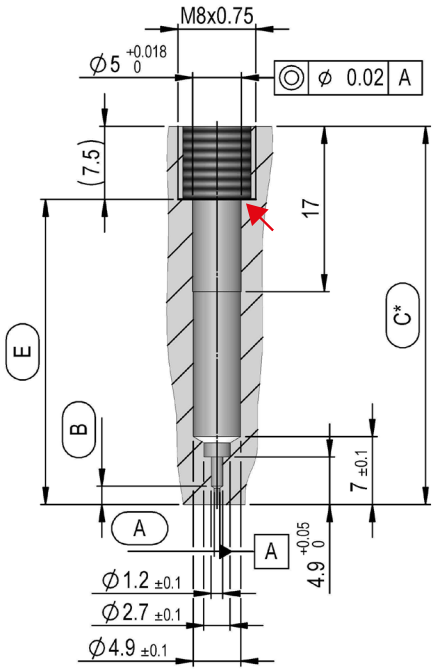
Type	A+0.005/+0.01	B0/-0.05	C*	E0.01/-0.01 min.
4005Cxxx.xxA1	1	3.0	23.5 ... 120	16
4005Bxxx.xxA1-H				

* Total assembly dimension
→ Contact surface



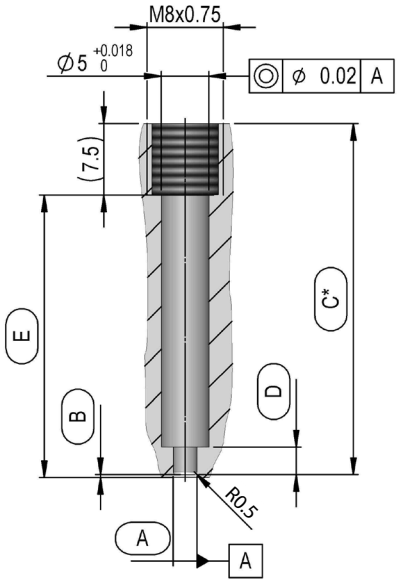
Type	A+0.005/+0.01	B0/-0.05	C*	E0.01/-0.01 min.
4007Cxxx.xxA1	1	2.9	23.5 ... 120	16
4007Bxxx.xxA1-H				
4009Bxxx.xxA1	0.6	1.9	24 ... 120	16.5
4015Axxx.xxA1-H	0.8			

* Total assembly dimension
→ Contact surface



Type	A$^{+0.005/+0.01}$	B$^{0/-0.05}$	C*	E$^{0.01/-0.01}$ min.
4011Bxxx.xxA1	0.6	1.9	27 ... 120	16.5
4017Axxx.xxA1-H	0.8			

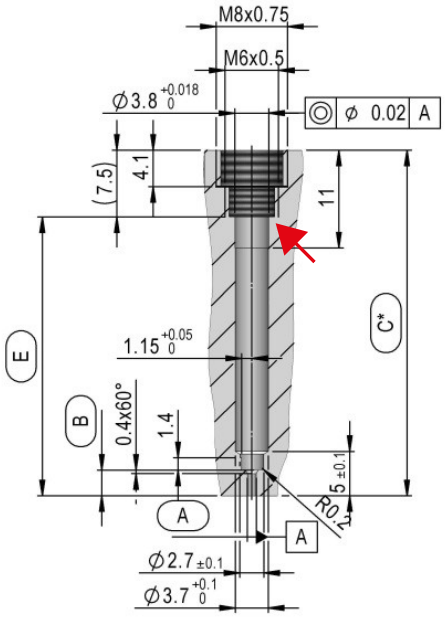
* Total assembly dimensions
→ Contact surface



Type	A$^{+0.005/+0.01}$	B$^{0/-0.05}$	C*	D	E$^{0.01/-0.01}$ min.
4013Axxx.xxA1	2.5	0.3	22 ... 120	2.9	14.5

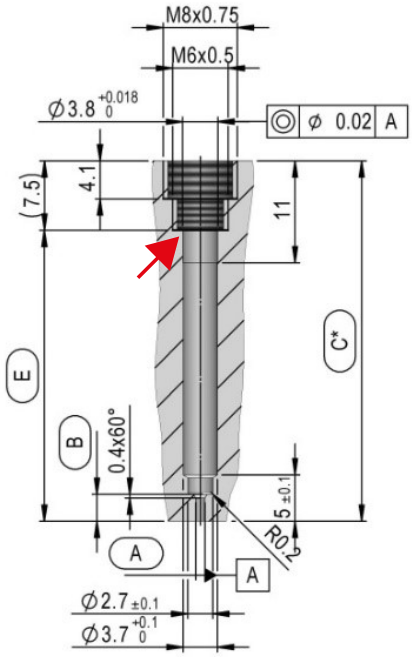
* Total assembly dimensions
→ Contact surface

2.3.2 Bore Drawings Compact Sensors with Quick Disconnects Types A2



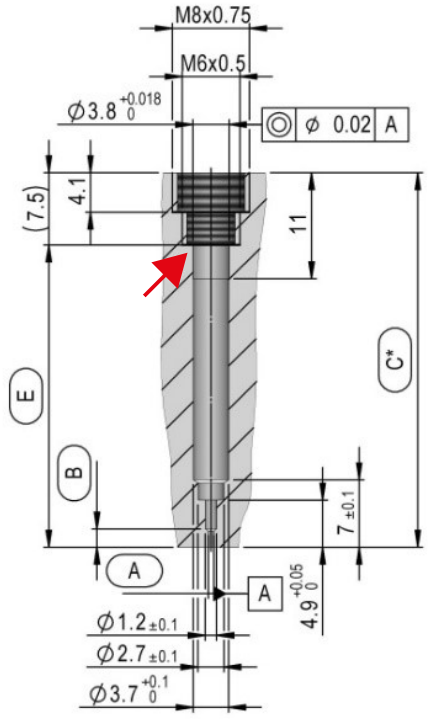
Type	A+0.005/+0.01	B0/-0.05	C*	E0.01/-0.01 min.
4005Cxxx.xxA2	1	3.0	18.5 ... 120	11

* Total assembly dimensions
→ Contact surface



Type	A+0.005/+0.01	B0/-0.05	C*	E0.01/-0.01 min.
4007Cxxx.xxA2	1	2.9	18.0 ... 120	10.5
4009Bxxx.xxA2	0.6	1.9	17 ... 120	9.5

* Total assembly dimensions
→ Contact surface



Type	A +0.005/+0.01	B 0/-0.05	C*	E 0.01/-0.01 min.
4011Bxxx.xxA2	0.6	1.9	27 ...120	16.5

* Total assembly dimensions
→ Contact surface

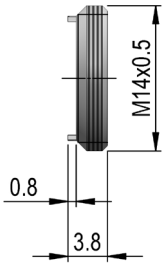
2.4 Mounting Quick Disconnect

Quick disconnects are available for the standard variant and the floating variant. Different mounting nuts are used when installing the sensor in the mold insert.

2.4.1 Mounting Quick Disconnects Standard Variant A1

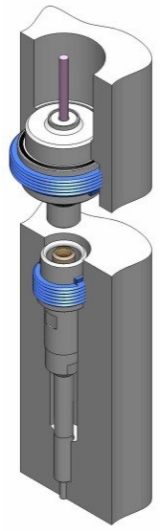
The quick disconnects of the quick disconnect cables are installed with mounting nut type 4546A. Mounting is done with the mounting tool type 4577B and a tightening torque of 3.5 Nm.

Mounting nut type 4546A

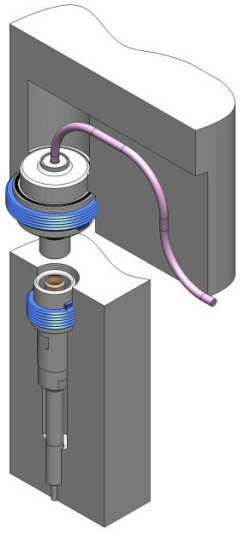


2.4.2 Bore Drawings Quick Disconnects Standard Variant A1

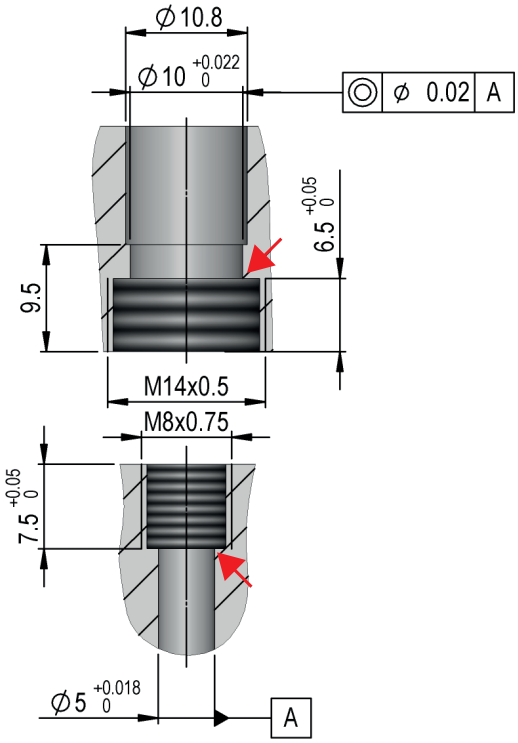
Mounting in bore



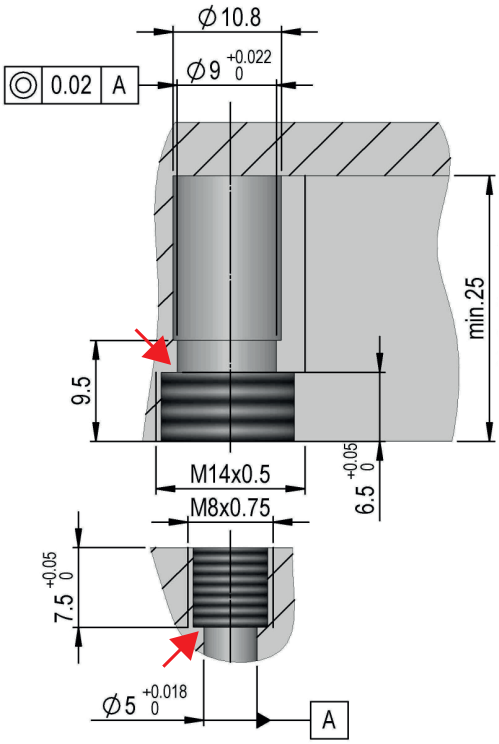
Mounting in cable channel



Mounting in bore



Mounting in cable channel



Mold platen

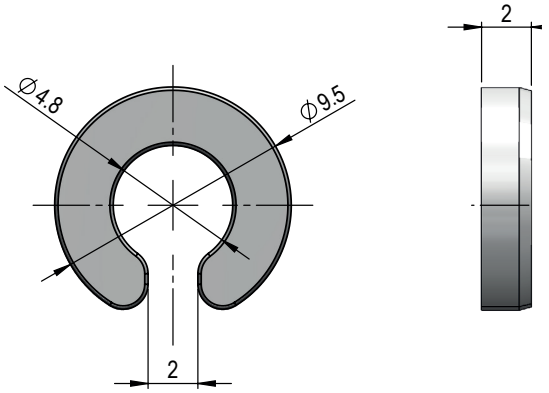
Mold insert

Contact surface

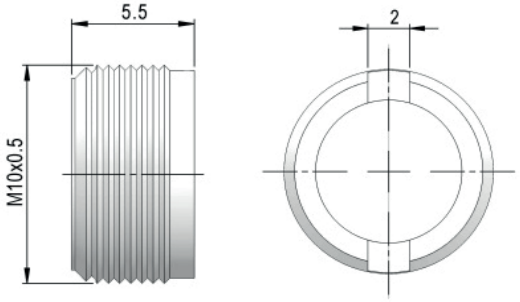
2.4.3 Mounting Quick Disconnects Floating Variant A2

The quick disconnects of the quick disconnect cables are installed with mounting nut type 4552A. Mounting is done with the assembly tool type 1320A + 1330A and a tightening torque of 1 Nm.

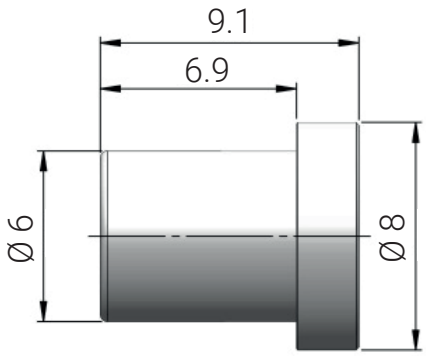
Support ring type 4551A



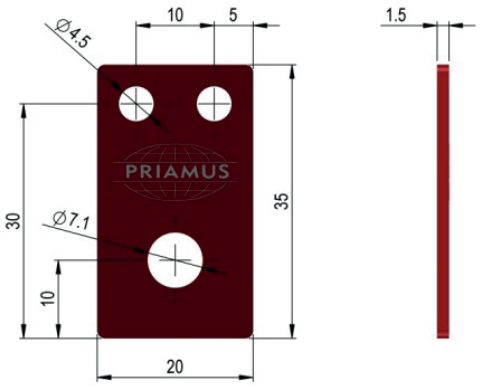
Mounting nut type 4552A



Guiding sleeve type 4553A

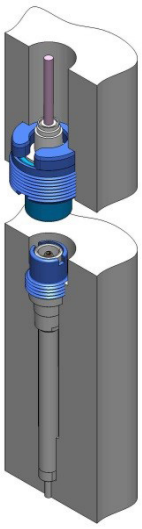


Mounting plate type 4584A

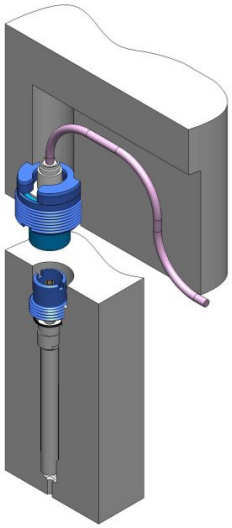


2.4.4 Bore Drawings Quick Disconnects Floating Variant A2

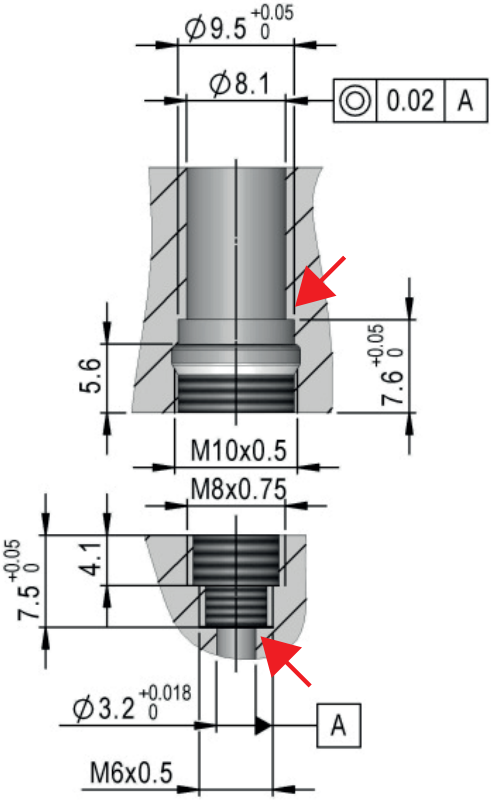
Mounting in bore



Mounting in cable channel



Mounting in bore

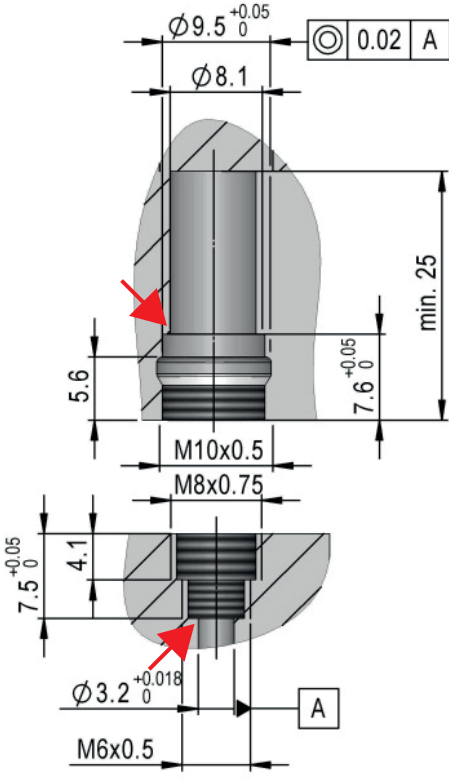


Mold platen

Mold insert

Contact surface

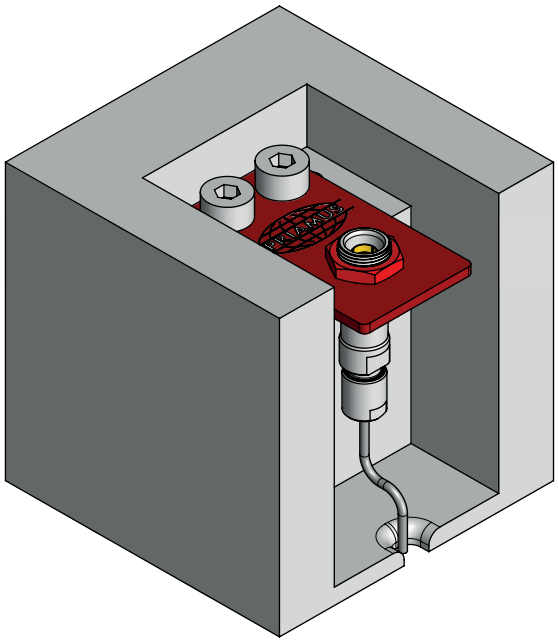
Mounting in cable channel

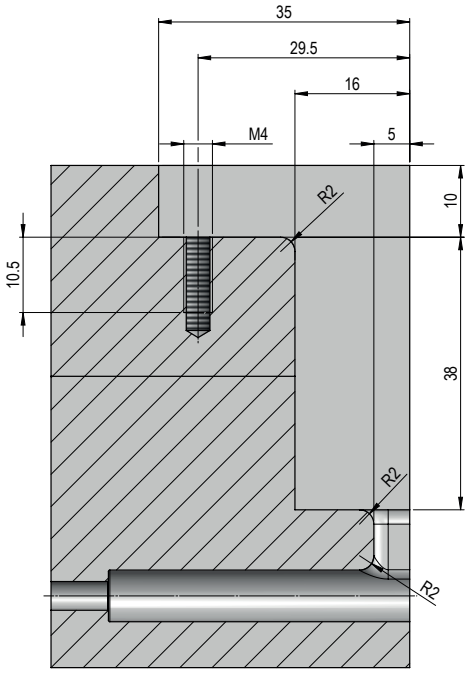


2.5 Mounting Connector on Mounting Plate

Notice

The protective cover is attached to the mounting plate of the connector and should not be placed too close to the parting line of the mold so that it does not get between the mold halves when the mold is closed.





3 Scope of Delivery and Accessories

3.1 Scope of Delivery Compact Sensors

	4005Cxxx.xxA1	4005Bxxx.xxA1-H	4007Cxxx.xxA1	4007Bxxx.xxA1-H	4009Bxxx.xxA1	4011Bxxx.xxA1	4013Axxx.xxA1	4015Axxx.xxA1-H	4017Axxx.xxA1-H	4005Cxxx.xxA2	4007Cxxx.xxA2	4009Bxxx.xxA2	4011Bxxx.xxA2
Protection type 1301A	●	●	●	●	●	●	●	●	●				
Protection type 1317A										●	●	●	●
Mounting nut type 4542A	●	●	●	●	●	●	●	●	●				
Mounting nut type 4554A										●	●	●	●
Identification plate	●	●	●	●	●	●	●	●	●	●	●	●	●

3.2 Accessories Compact Sensors

	4005Cxxx.xxA1	4005Bxxx.xxA1-H	4007Cxxx.xxA1	4007Bxxx.xxA1-H	4009Bxxx.xxA1	4011Bxxx.xxA1	4013Axxx.xxA1	4015Axxx.xxA1-H	4017Axxx.xxA1-H	4005Cxxx.xxA2	4007Cxxx.xxA2	4009Bxxx.xxA2	4011Bxxx.xxA2
Mounting and extracting tool for compact sensor type 4571A										●	●	●	●
Mounting and extracting tool for compact sensor type 4573A	●	●	●	●	●	●	●	●	●				
Assembly tool for mounting nut type 4563B	●	●	●	●	●	●	●	●	●				
Assembly tool for mounting nut type 4554A consists of: torque wrench type 1320A and bit type 1331A										●	●	●	●
Quick disconnect cable type 4100Dx.xxA2-101	●	●	●	●	●	●	●	●	●				
Quick disconnect cable type 4200Ax.xx-101										●	●	●	●
Dummies:													
Type 4505Bxxx.xxA1	●	●											
Type 4507Bxxx.xxA1			●	●									
Type 4509Bxxx.xxA1					●								
Type 4511Bxxx.xxA1						●							
Type 4513Axxx.xxA1							●						
Type 4515Axxx.xxA1								●					
Type 4517Axxx.xxA1									●				
Type 4505Cxxx.xxA2										●			
Type 4507Cxxx.xxA2											●		
Type 4509Bxxx.xxA2												●	
Type 4511Bxxx.xxA2													●

3.3 Scope of Delivery Quick Disconnect Cable

	4100Dx.xxA2-101	4200Ax.xx-101
Protection cap type 1308A	●	
Mounting nut type 4546A	●	
Support ring type 4551A		●
Mounting nut type 4552A		●
Guiding support type 4553A		●
Mounting plate type 4584A	●	●

3.4 Accessories Quick Disconnect Cable

	4100Dx.xxA2-101	4200Ax.xx-101
Mounting and extracting tool for quick disconnect cable type 4571A		●
Mounting and extracting tool for quick disconnect cable type 4574A	●	
Assembly tool for mounting nut type 4577B	●	
Assembly tool for mounting nut (4552A) consists of: torque wrench type 1320A and bit typy 1330A		●
BlueLine pressure and temperature amplifier type 5070A-2p2T	●	●
BlueLine temperature amplifier 5080A-4T	●	●
BlueLine temperature amplifier type 5080A-16T	●	●
BlueLine multi channel connector box type 1194A-8T	●	●
Cables		
Connection cable type 1141Ax, single-channel, plastic coat Both sides: Fischer connector type S 101 pos. TRIAX	◎	◎
Connection cable type 1144Ax, multi-channel, with plastic coat Both sides: Fischer connector type S 104 neg. 19-pin (Code 2)	◎	◎
Connection cable type 1145Ax, multi-channel, with plastic coat Side 1: Fischer connector type S 104 neg. 19-pin (Code 2) Side 2: Fischer connector type S 101 pos. TRIAX	◎	◎
Connection cable type 1147Bx, multi-channel, with plastic coat Side 1: Fischer connector type S 104 neg. 19-pin (Code 2) Side 2: 4 × Fischer connector type S 101 pos. TRIAX	◎	◎
Connection cable type 1149Bx, single-channel, with metal coat Both sides: Fischer connector type S 101 pos. TRIAX	◎	◎
Extension cable 1142Bx, single-channel, with metal coat Side 1: Fischer connector type S 101 pos. TRIAX Side 2: Fischer connector type KBE 101 neg. TRIAX	◎	◎

4 Services

4.1 General Terms and Conditions

The following general terms of service apply:

- A delivery for test purposes is declined.
- The customer is responsible for installing and interfacing. Installation for any of the above directly by PRIAMUS will be charged separately.
- Information on interfaces must be provided to PRIAMUS minimum 2 weeks before installation. If this information is not available, PRIAMUS has the right to refuse installation on the agreed date.
- PRIAMUS requires presence of the process/ project manager and plant electrician on the day of installation. Refusal of this support will cause additional cost and will be charged separately, as this could cause unnecessary delays for the start up.
- Waiting times caused by the customer on site will be charged separately.
- Prices for training, installation and other expenditures will be quoted and confirmed in writing.
- Unless otherwise agreed upon, brochures and catalogues are not binding. Data provided for in documentation are only binding in so far as having been expressly stipulated as such. We reserve the right to modify any specification without notice.
- Information and drawings, delivered in addition to the sales documentation, may not be transmitted to any third party. The Customer may not transmit or make use of any information regarding the design or the functionality of PRIAMUS products in any form whatsoever. Any product schematics, drawings or supplemental information are the property of PRIAMUS and considered company confidential for use by direct customer only. In the event of infringement of this clause we retain the right for claiming damages.

4.2 Warranty and Guarantee

Our warranty covers all defects within the agreed warranty period from the date of delivery. The warranty applies to all occurring defects that are proven to have their cause in material defects or faulty manufacturing.

The warranty is limited to replacement or repair of the defective products or components or to reimbursement of the invoice value of the products or components not replaced. Any further warranty is hereby expressly excluded. Replaced products are property of PRIAMUS. The customer is responsible for the replacement costs (i.e. removal, transportation and assembly) of defective parts.

Excluded from our guarantee and liability are all deficiencies of the goods delivered by us, which cannot be proved to have their origin in bad material, faulty design or poor workmanship, those resulting from normal wear (e.g. current consumption, recuperation, weather condition, air pollution, electromagnetic effects in excess of what is considered acceptable, improper maintenance, failure to observe the operating instructions, excessive loading, testing, use of any unsuitable material, influence of chemical or electrolytic action, or resulting from other reasons beyond the supplier's control.

All claims on the part of the Customer, irrespective on what ground they are based, which are not allowed under these general conditions, in particular any claim not expressly mentioned, such as for damages, reduction of price or withdrawal from the contract are excluded.

In no case whatsoever shall the Customer be entitled to claim damages, in particular but not be limited, to loss of production, loss of use, loss of orders, loss of profit and other direct or indirect consequential damage. This exclusion of liability, however, does not apply to unlawful intent or gross negligence on our part, but apply to unlawful intent or gross negligence of persons employed or appointed by us to perform any of his obligations. The Customer is responsible to arrange for and pay for the return shipment to us or to our local representative.