

## **BLUELINE**

# Compact Sensors for Cavity Temperature with Quick Disconnect and Quick Disconnect Cable



- Very easy, safe and fast mounting
- Variable lengths up to ca. 120 mm
- Easy handling between multiple cavities and interchangeable inserts
- Waterproof

### Description and Application

Along with the cavity pressure sensor, the cavity temperature sensor plays an important role in monitoring and controlling the injection molding process. Thereby the melt front is automatically detected when it reaches the temperature sensor and used for controlling functions. In order to react as quick as possible, the reaction rate of the sensors has been optimized.

Numerous injection molded parts are not directly created in the mold platen, but with the help of mold inserts. This facilitates the manufacture of the cavities and the handling at servicing. The insertion of cavity pressure and cavity temperatures sensors often set boundaries because of lack of space. Furthermore, by mounting and dismounting the mold inserts the use of cables with fixed installation points are not suitable for these types of applications.

A favored solution and an alternative to the flexible quick disconnects with cable, the compact sensors for pressure and temperature measuring in the injection molding process have been developed. Instead of connecting sensors within the mold insert by a sensor cable with a quick disconnect, the compact sensor is connected by a distance piece with the quick disconnect. That way an extremely compact and easily manageable solution is generated. Depending on the application, and available space, available in different sizes. The length of the compact sensors is variable and must be specified when ordering. The cable which is installed in the mold plate is connected to the compact sensor with a quick disconnect and on the other end of the cable is a plug.

Most compact sensors for cavity temperature are available with a hardened sensor front, which increases the durability especially the by usage of abrasive and chemical aggressive melts.

### Engineering – Suggestion for Sensor Positioning Places

In most applications the cavity temperature sensors were mounted in the end of the flow path e.g. for mold filling detection and for automatic hot runner balancing. For special purposes e.g. for cascade controlling they were specifically placed in the positions where it is beneficial to have a sensor to control the molding functions. By using existing molds, error images of parts, filling studies, new projects, filling simulation are a helpful way to determine the best sensor location.

We gladly offer assistance in determining the best sensor location.

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Application	Mounting place suggestion
Automatic, viscosity independent switchover to holding pressure Automatic hot runner balancing and controlling Fill time and balancing time monitoring Automatic venting control Automatic shut-off nozzle control (e.g. LSR)	on the verge of the end of the flow path
Mold filling monitoring („Short Shots“)	in the absolute end of the flow path
Monitoring and controlling of the viscosity	after the cavity pressure sensor
Cavity temperature control	in any order
Core pull control Control of coining, gas-water-injection, etc.	on special position, depending on the application
Melt front depending cascade control	previous to the shut-off nozzles
Monitoring and control of the shrinkage	around the pressure sensor

## Sensor Mounting

The compact sensors are fixed easily over a ringlike mounting nut in the bore hole of the mold insert.

The quick disconnect cable should be displaced in the mold platen in a channel, which is covered by a thin plate to avoid damages. The angles in the mold, around which the cables are placed, must be added with a phase ( $3 \times 45^\circ$ ) or a radius R2), therewith the cable will not be damaged.

A pre-centering of the inserts with two alignment pins is necessary for the quick disconnect. The fitting of the pre-centering should be in the quality H7/g6 and the length minimum 10 mm. Generally aligning pins with bund and two fitting diameters (for easier mounting) are used.

The protecting cap has to be fixed on the mounting plate of the connector and should not be placed too close on the junction of the mold so the connector does not get crushed by the mold closing.

## Handling and Cleaning

Before dismounting the mold insert from the mold, the cooling water must be imperatively evacuated and / or the channels have to steamed out to prevent that the cooling water gets into the quick disconnect.

The contact plug must be kept clean and dry to avoid false signals. The quick disconnects have to be capped directly after dismounting with the protective caps in the scope of delivery.

The mold inserts can be cleaned in an ultrasonic bath without former dismounting of the compact sensors. For this the protective cap included in the scope of delivery must be used. (Cleaning agent: aqueous tenside solution.) The cleaning of the sensor front with dry ice is also possible.

In the not connected status the protecting cap for the connector at the quick disconnect cable must be plugged on. In the connected status the connector will be connected with the cap of the connecting cable, therewith defilements in the protection cap will be avoided.

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## Compact Sensor for Cavity Temperature with Quick Disconnect



### Technical Data

Properties	Unit	Specifications
Thermocouple (not insulated)	type	N
Colors / polarity according to IEC 584-3	pink (NiCrSi) white (NiSi)	positive negative
Class		1
Maximum deviations according to IEC 584-3	(-40 ... 1000 °C)	dT = ± 0.004xT or ± 1.5 K
Standard operating temperature (sensor front)	°C	up to 600
Operating temperature range (cable)	°C	0...200
Operating pressure range	bar	0...2'000
Response time switchover to holding pressure and sequential control with PRIAMUS® amplifier (envelope curve procedure resp. absolute measuring procedure)	ms	4 (4005B / 4007B / 4009B / 4015A / 4011B / 4017A) 20 (4013A)

### Symbol Explanation

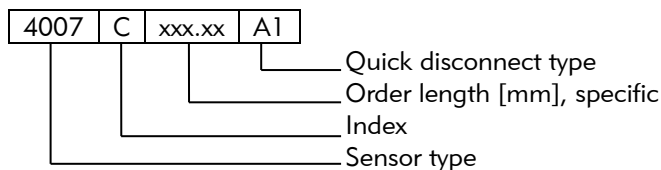
- With hardened sensor front
- With machinable sensor front
- For indirect measuring

### Variants

Type	Possible length in [mm]
4005Bxxx.xxA1	xxx.xx = 23.5 ... 120
4005Bxxx.xxA1-H	
4007Bxxx.xxA1	xxx.xx = 23.5 ... 120
4007Bxxx.xxA1-H	
4009Bxxx.xxA1	xxx.xx = 24 ... 120
4011Bxxx.xxA1	xxx.xx = 27 ... 120
4013Axxx.xxA1	xxx.xx = 22 ... 120
4015Axxx.xxA1-H	xxx.xx = 24 ... 120
4017Axxx.xxA1-H	xxx.xx = 27 ... 120

Specify compact sensor length xxx.xx in [mm] when ordering (length = distance between cavity and insert base).

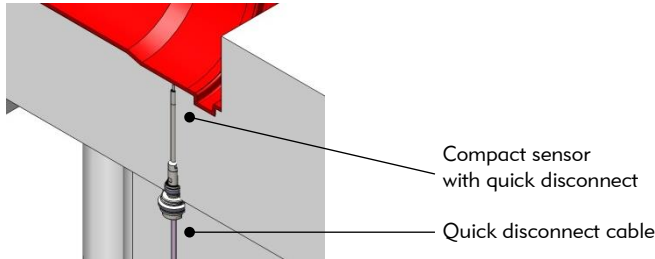
### Type Number Explanation



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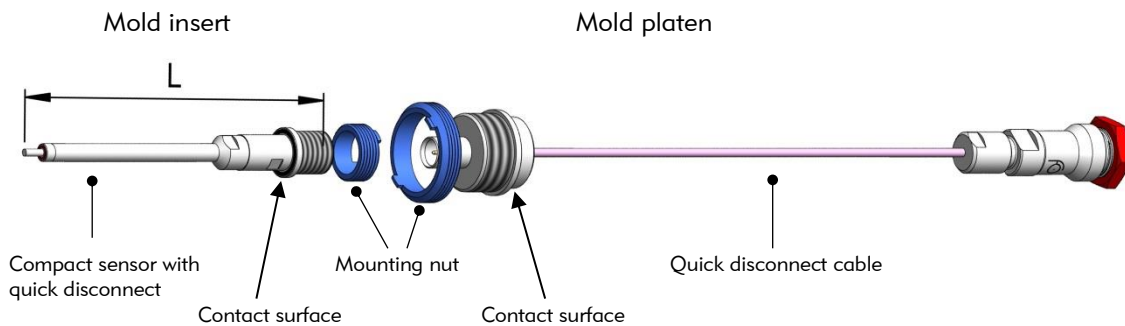
## Mounting Example

Mounting of a compact sensor with quick disconnect and quick disconnect cable



## Compact Sensor with Quick Disconnect and Quick Disconnect Cable

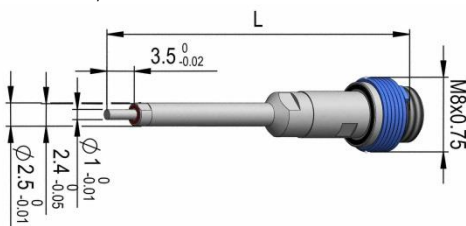
Mounting in bore hole and cable channel



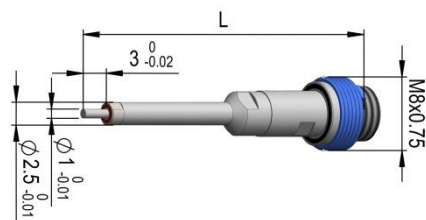
## Dimensions Compact Sensors with Quick Disconnect Type "A1"

Type 4005Bxxx.xxA1(-H) with machinable sensor front

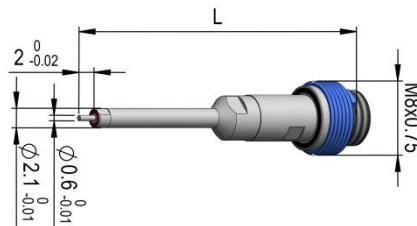
The dimension from the lowest point of manufacturing to the sensor shoulder must imperatively be manufactured 3.1 mm +0.1/-0.



Type 4007Bxxx.xxA1(-H)

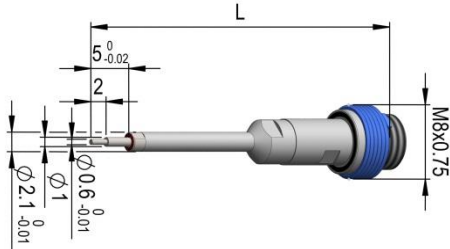


Type 4009Bxxx.xxA1



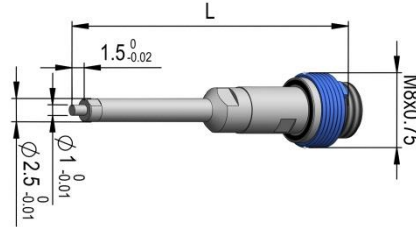
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Type 4011Bxxx.xxA1

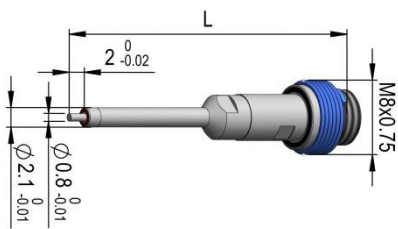


Type 4013Axxx.xxA1

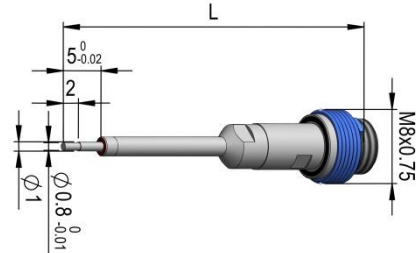
Prisolaris™ – Sensor for indirect measuring



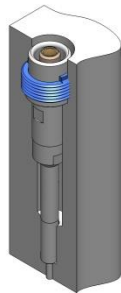
Type 4015Axxx.xxA1-H



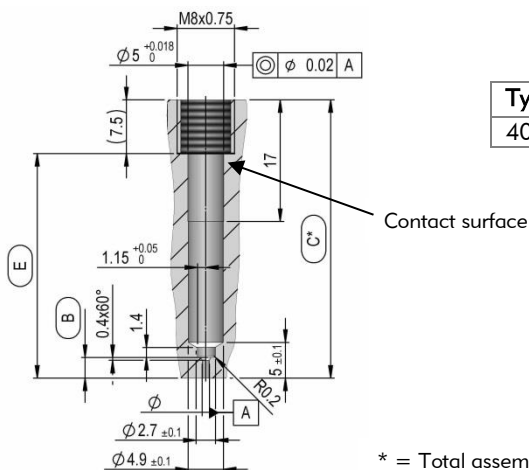
Type 4017Axxx.xxA1-H



## Example for Installation Situation



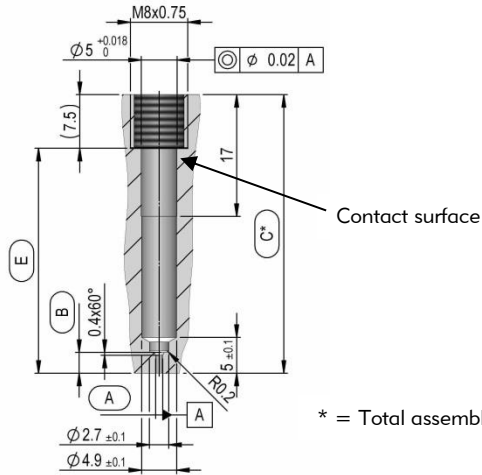
## Mounting Holes for Mounting Nut Mounting



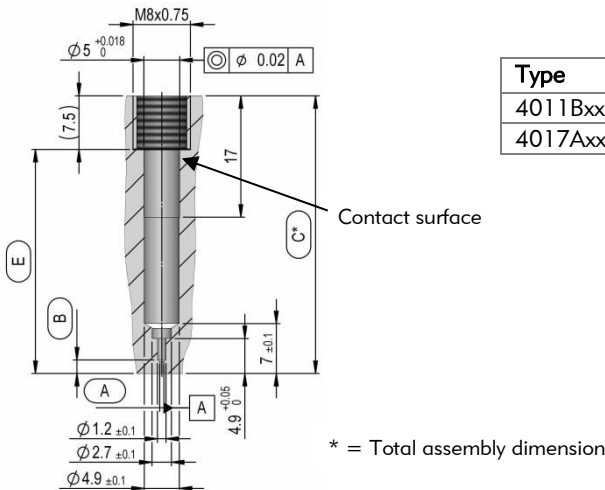
Type	A <sup>0.01/0</sup>	B <sup>0/-0.05</sup>	C*	E <sup>0.01/-0.01</sup> min.
4005Bxxx.xxA1(-H)	1	3.4	23.5 - 120	16

\* = Total assembly dimension

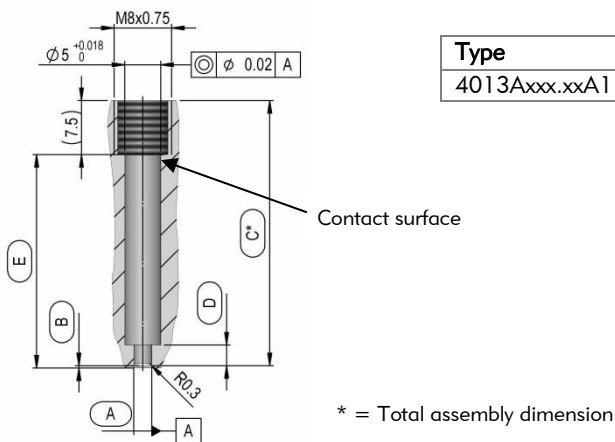
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Type	A <sup>0.01/0</sup>	B <sup>0/-0.05</sup>	C*	E <sup>0.01/-0.01 min.</sup>
4007Bxxx.xxA1(-H)	1	2.9	23.5 - 120	16
4009Bxxx.xxA1	0.6	1.9	24 - 120	16.5
4015Axxx.xxA1-H	0.8	1.9	24 - 120	16.5



Type	A <sup>0.01/0</sup>	B <sup>0/-0.05</sup>	C*	E <sup>0.01/-0.01 min.</sup>
4011Bxxx.xxA1	0.6	1.9	27 - 120	16.5
4017Axxx.xxA1-H	0.8	1.9	27 - 120	16.5



Type	A <sup>0.01/0.05</sup>	B <sup>0/-0.05</sup>	C*	D	E <sup>0.01/-0.01 min.</sup>
4013Axxx.xxA1	2.5	0.3	22 - 120	2.9	14.5

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## Mounting of Compact Sensors with Mounting Nut

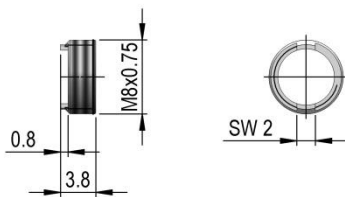
By mounting with mounting nut the compact sensors were put on with the following tightening torques.

Compact sensor	Tightening torques
All compact sensors for cavity temperature	1.5 Nm (with mounting nut type 4542A)

## Scope of Delivery

Article	Type	Article	Type
Mounting nut	4542A	Identification plate	-
Protective cap	1301A		

Mounting nut type 4542A



## Accessories (Optional)

Article	Type	Article	Type
Mounting / extraction tool for compact sensors with quick disconnect	4573A	Assembly tool for mounting nut	4563B
Quick disconnect cable for mounting in bore hole and cable channel	4100Dx.xA2-101	Multi channel connecting box	1194A-8T
BlueLine amplifier	5080A-xT	BlueLine amplifier	5070A-2p2T
Dummy for			
- 4005Bxxx.xxA1(-H)	4505Bxxx.xxA1		
- 4007Bxxx.xxA1(-H)	4507Bxxx.xxA1		
- 4009Bxxx.xxA1	4509Bxxx.xxA1		
- 4011Bxxx.xxA1	4511Bxxx.xxA1		
- 4013Axxx.xxA1	4513Axxx.xxA1		
- 4015Axxx.xxA1-H	4515Axxx.xxA1		
- 4017Axxx.xxA1-H	4517Axxx.xxA1		



## Connecting and extension cables

Type	Coat	Bending radius [mm] (* bundled)	Connector ( <sup>1</sup> )TRIAx / ( <sup>2</sup> )Code 2)	Number of channels
<b>Connecting cables:</b>				
1141A	Plastic	11	Fischer Type S 101 male <sup>1)</sup> – Fischer Type S 101 male <sup>1)</sup>	1
1149B	Metal hose	20	Fischer Type S 101 male <sup>1)</sup> – Fischer Type S 101 male <sup>1)</sup>	1
<b>Multi pin connecting cables:</b>				
1144A	Plastic	50	Fischer Type S 104 fem. 19-pin <sup>2)</sup> – Fischer Type S 104 fem. 19-pin <sup>2)</sup>	8
1145A	Plastic	11	Fischer Type S 104 fem. 19-pin <sup>2)</sup> – 1 x Fischer Type S 101 male <sup>1)</sup>	1
1146B	Plastic	11 (20*)	Fischer Type S 104 fem. 19-pin <sup>2)</sup> – 2 x Fischer Type S 101 male <sup>1)</sup>	2
1147B	Plastic	11 (25*)	Fischer Type S 104 fem. 19-pin <sup>2)</sup> – 4 x Fischer Type S 101 male <sup>1)</sup>	4
1159B	Metal shield	8 (35*)	Fischer Type S 104 fem. 19-pin <sup>2)</sup> – 8 x Fischer Type S 101 male <sup>1)</sup>	8
<b>Extension cable:</b>				
1142B	Metal hose	20	Fischer Type S 101 male <sup>1)</sup> – Fischer Type KBE 101 fem <sup>1)</sup>	1





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## Quick Disconnect Cable



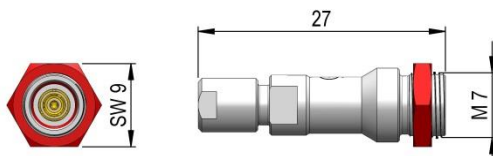
### Overview

Type	For:	Mounting in:	Cable length in [m]	
Quick disconnect cable 4100Dx.xA2-101, male	Compact sensors with quick disconnect type "A1", female	Bore hole and cable channel	l = x.x Minimum length: 0.1 m	
 Front view of the particular quick disconnect side			Production tolerance:	
			Cable length in [m]	Tolerance +.../-0 mm
			<0.5	5
>0.5 ... 1.0	10			
>1.0 ... 5.0	20			

Specify cable length x.x in [m] when ordering (length over all, incl. quick disconnect and connector).

### One Pin TRIAX Connector

Easy connection by TRIAX format

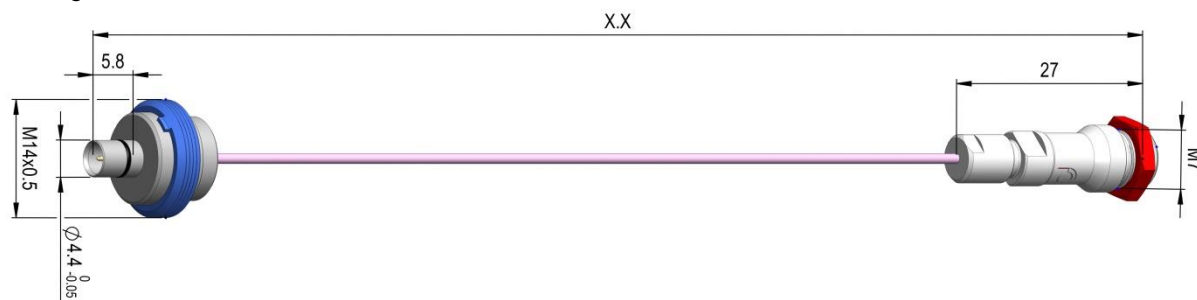


Fischer Typ KBE 101 female TRIAX

### Dimensions

Type 4100Dx.xA2-101

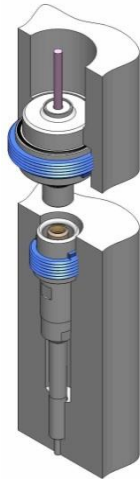
Bending radius = 6 mm



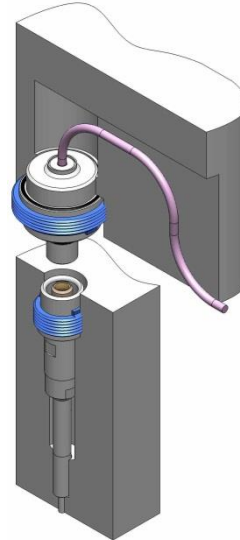
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## Examples for Installation Situation with Mounting Nut

Mounting in bore hole

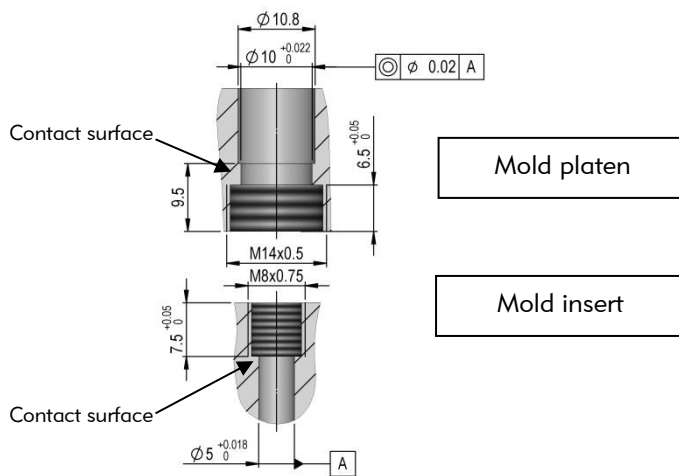


Mounting in cable channel

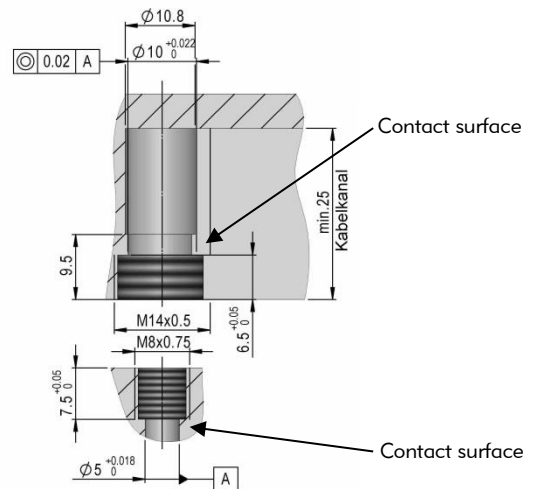


## Mounting Holes with Mounting Nut

Mounting in bore hole



Mounting in cable channel

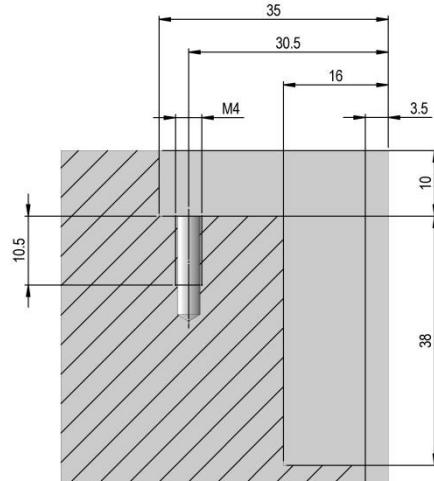
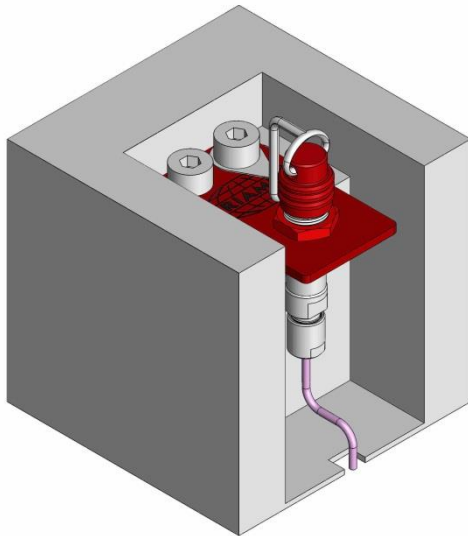


## Mounting of Quick Disconnect Cables with Mounting Nut

By mounting with mounting nut the quick disconnect cables were put on with the following tightening torques.

Quick disconnect cable	Tightening torques
4100Dx.xA2-101	2.5 Nm (with mounting nut type 4546A)

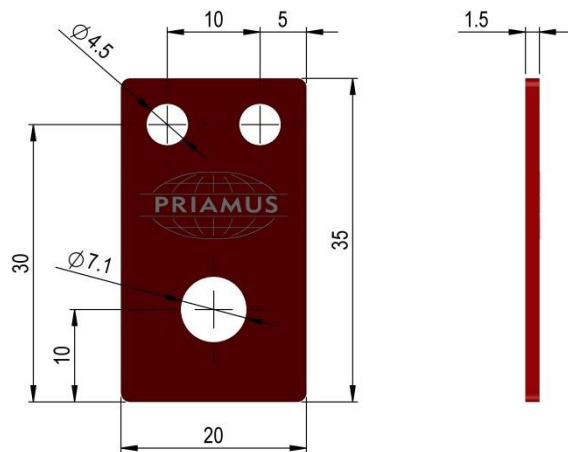
## Installation Situation – Connector with Mounting Plate



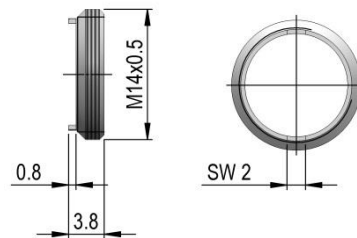
### Scope of Delivery

Article	Type	Article	Typ
Mounting nut	4546A	Mounting plate	4584A
Protective cap	1308A		

Mounting plate type 4584A



Mounting nut type 4546A



### Accessories (Optional)

Article	Type	Article	Type
Mounting / extraction tool for quick disconnect cable	4574A	Assembly tool for mounting nut	4577B