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Miniature Cavity Temperature Sensors incl. Flexible Quick Disconnect and Quick Disconnect Cable



- Sensor and disconnect position can be different
- Variable cable lengths
- Beneficial for mold inserts with different sensor position
- 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 produced 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 handling of the sensor cable with a fixed installation point is not suitable for these applications.

The PRIAMUS® quick disconnects for cavity temperature sensors facilitate the mounting and dismounting of mold inserts with a simple plug connection, while the sensors themselves remain in the mold insert. This procedure is mainly a fail-safe, because the sensors do not stay as “pins” in the mold platen and can get damaged, but after dismounting are still safely mounted in the mold insert. Hence sensors can be inserted without mounting problems in interchangeable molds which are changed on the machine.

The essential advantage of this system persists therein, that different mold inserts with different sensor positions can be applied without changing the position of the quick disconnect. In opposition to a sensor, which is installed in the mold platen itself, the sensor position can still be very flexible according to the molded part, at which the dimension of the mold insert doesn't play a role.

The quick disconnects are available for PRIAMUS® cavity temperature sensors as well as for PRIAMUS® cavity pressure sensors with and without sensitivity detection (PRIASED®).

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

Engineering – Suggestion for Sensor Positioning

In most applications the cavity temperature sensors are 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 positions where it is beneficial to have a sensor control the molding functions. By using existing molds, error images of the parts, filling studies, new projects, and filling simulations are great ways to determine the best sensor location.

We gladly offer assistance in determining the best sensor location.

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

Flexible quick disconnects are applied when a compact sensor (see data sheet DS4xxx_089 Compact Sensors for Cavity Temperature) couldn't be used. For example the insert height is too low or the position of the quick disconnect departs from the position of the sensor.

The mounting of the sensors can thereby occur with a mounting nut, PRIAFIT® mounting sleeve or distance sleeve.

The mounting of the quick disconnect always occurs with a mounting nut.

During design you have to keep in mind that the insert-sided cable length is chosen neither too short nor too long so the sensor with quick disconnect can be still mounted.

- The cable should not be longer than needed, so that any extra length can be hidden in the channel or bore hole.
- The shorter the cable, the harder it is to mount it in the bore hole.
- The cable must be long enough to make sure that the sensor and the quick disconnect can be mounted in the respected areas.

The stated minimum lengths refer to the overall length of the component, and not the length of the final installation.

The quick disconnect cable should be displaced in the behind mold platen in a channel, which at the best were 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 to the junction of the mold therewith the connector doesn't get crushed by the mold closing.

4103Ex.x(-H) / 4105Dx.x(-H) / 4107Dx.x(-H) /
4109Cx.x / 4111Dx.x / 4115Bx.x-H / 4117Bx.x-H /
4100Ax.xA2-101



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Handling and Cleaning

Before dismantling the mold insert from the mold, the cooling water must be imperatively evacuated and / or the channels have to be 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 dismantling with the protective caps in the scope of delivery.

The mold inserts can be cleaned in an ultrasonic bath without former dismantling of the flexible quick disconnects. 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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Miniature Cavity Temperature Sensors incl. Flexible 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
Bending radius	mm	min. 12 (4103E / 4105D / 4107D) min. 11 (4109C / 4111D / 4115B / 4117B)

Symbol Explanation

With hardened sensor front

With machinable sensor front

Variants

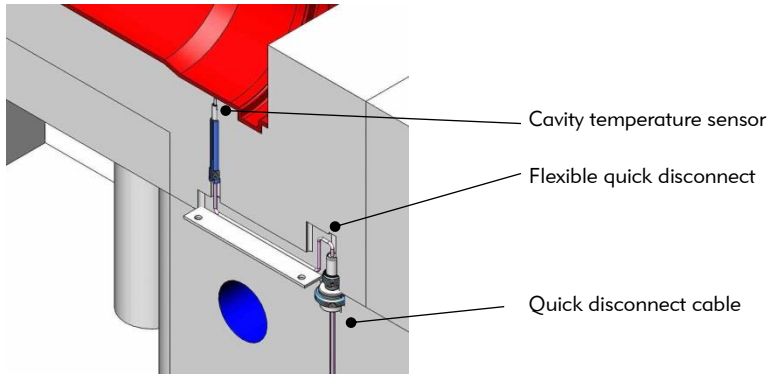
Type	Incl. sensor ...	Bending radius [mm]	Cable length [m]							
4103Ex.x	4003C	5	l = x.x Minimum length: 0.1 m Production tolerance: <table border="1"> <thead> <tr> <th>Cable length in [m]</th> <th>Tolerance +.../-0 mm</th> </tr> </thead> <tbody> <tr> <td><0.5</td> <td>5</td> </tr> <tr> <td>>0.5 ... 1.0</td> <td>10</td> </tr> </tbody> </table>		Cable length in [m]	Tolerance +.../-0 mm	<0.5	5	>0.5 ... 1.0	10
Cable length in [m]	Tolerance +.../-0 mm									
<0.5	5									
>0.5 ... 1.0	10									
4103Ex.x-H	4003C-H									
4105Dx.x	4005B									
4105Dx.x-H	4005B-H									
4107Dx.x	4007B									
4107Dx.x-H	4007B-H									
4109Cx.x	4009B									
4111Dx.x	4011B									
4115Bx.x-H	4015A-H									
4117Bx.x-H	4017A-H									

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

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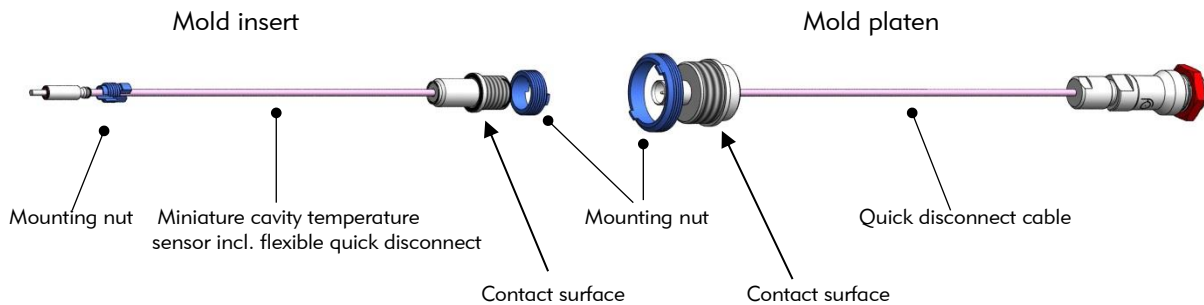
Mounting Example

Mounting of a cavity temperature sensor incl. flexible quick disconnect and quick disconnect cable



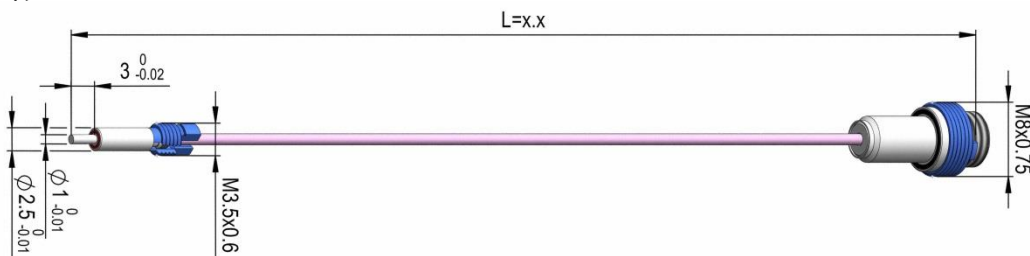
Cavity Temperature Sensor incl. Flexible Quick Disconnect and Quick Disconnect Cable

Mounting in bore hole and cable channel



Dimensions Miniature Cavity Temperature Sensors incl. Flexible Quick Disconnect

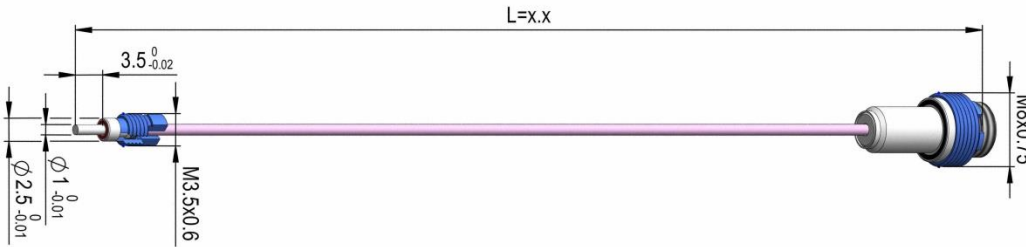
Type 4103Ex.x(-H)



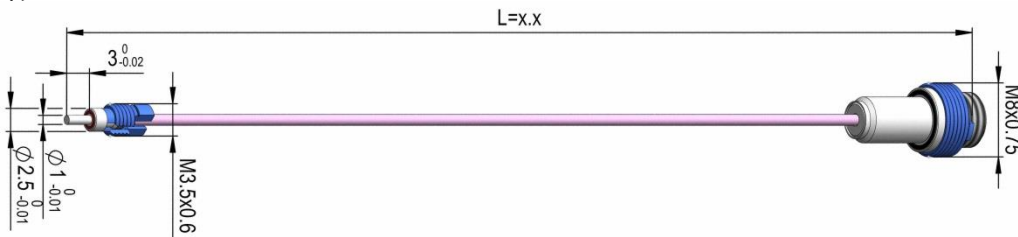
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Type 4105Dx.x(-H) with machinable sensor front

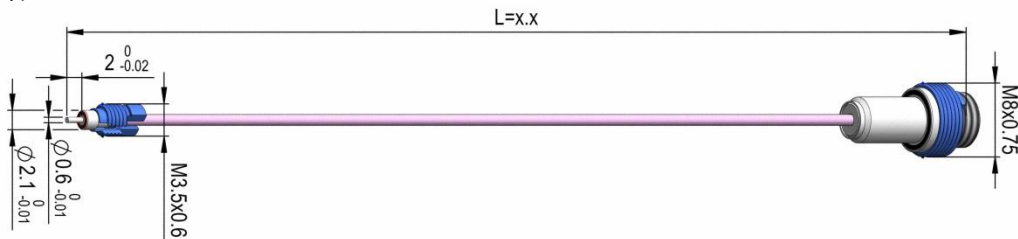
The dimension from the lowest point of manufacturing to the sensor shoulder must imperatively be manufactured 3.1 mm +0.1/-0.



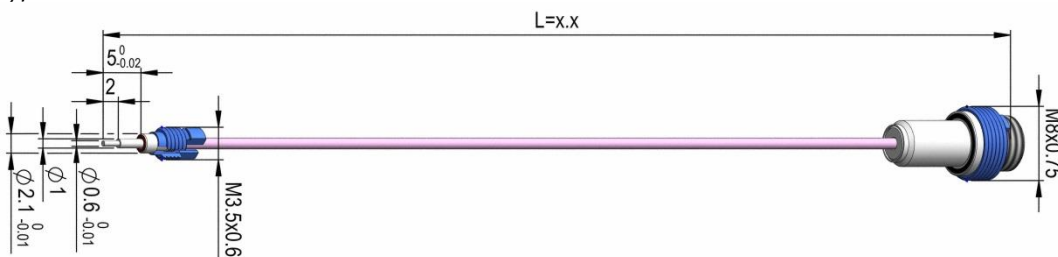
Type 4107Dx.x(-H)



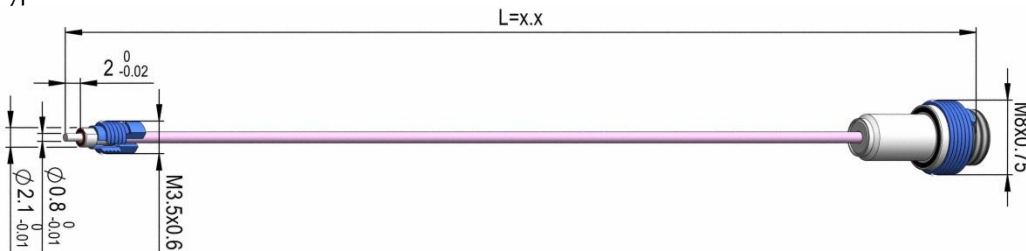
Type 4109Cx.x



Type 4111Dx.x

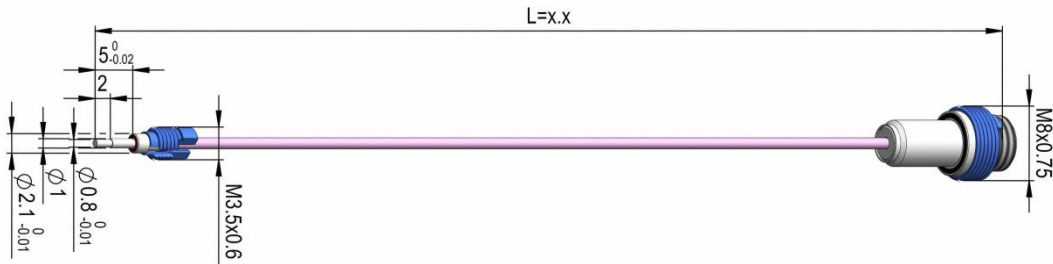


Type 4115Bx.x-H



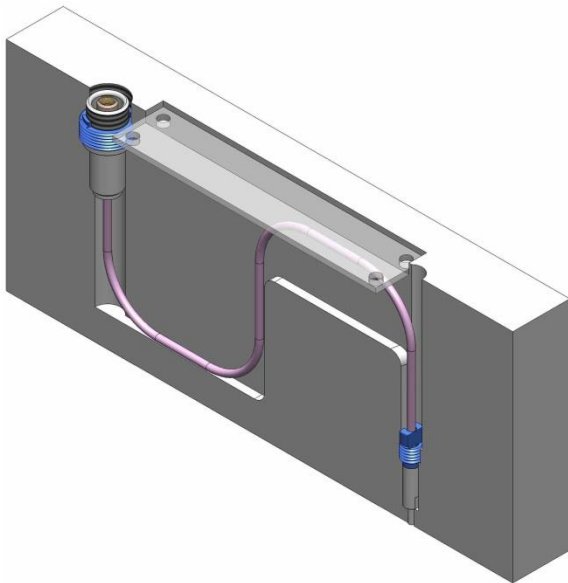
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Type 4117Bx.x-H

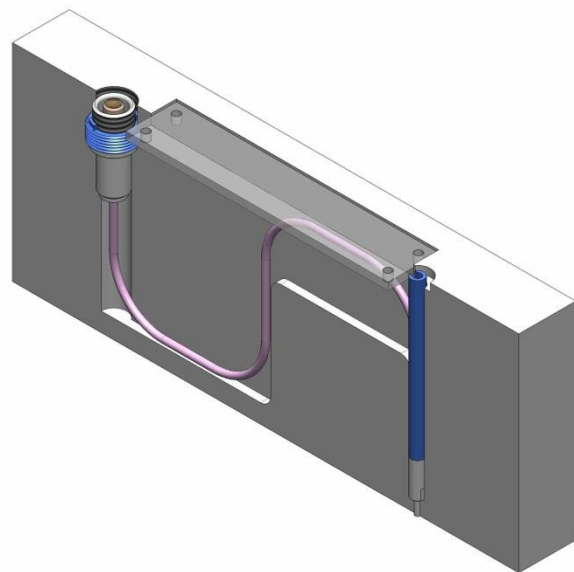
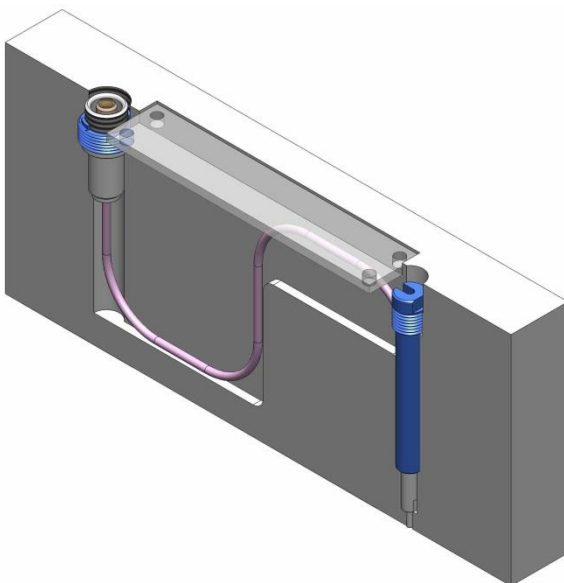


Examples for Installation Situation

Standard Mounting Nut



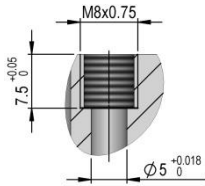
Alternative 1 PRIAFIT® Mounting Sleeve Alternative 2 Distance Sleeve



DS41xx_090e Ed. 12.16
 Subject to technical amendments
 Projection method: First Angle Projection

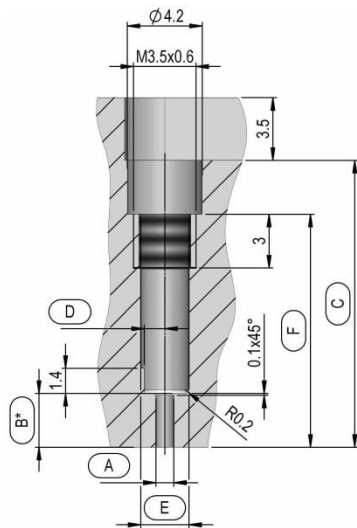
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Mounting hole – Quick Disconnect Side in the Mold Insert



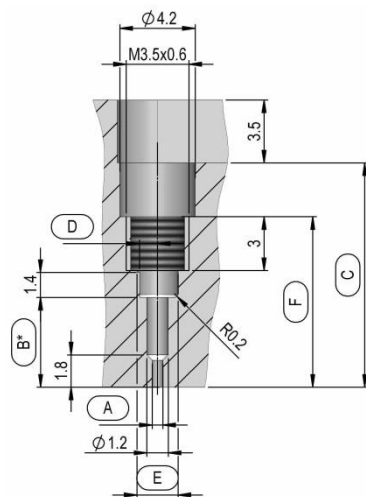
Mounting holes – Sensors Side in the Mold Insert

Standard with mounting nut



* = Adjust dimension

Type	A ^{0.01/0}	B*	C min.	D ^{0.05/0}	E	F
4103Ex.x(-H)	1	3	16	1.15	2.7	13
4105Dx.x(-H)	1	3.1-3.5	11	1.15	2.7	8
4107Dx.x(-H)	1	3	10.5	1.15	2.7	7.5
4109Cx.x	0.6	2	9.5	1	2.3	6.5
4115Bx.x-H	0.8	2	9.5	1	2.3	6.5

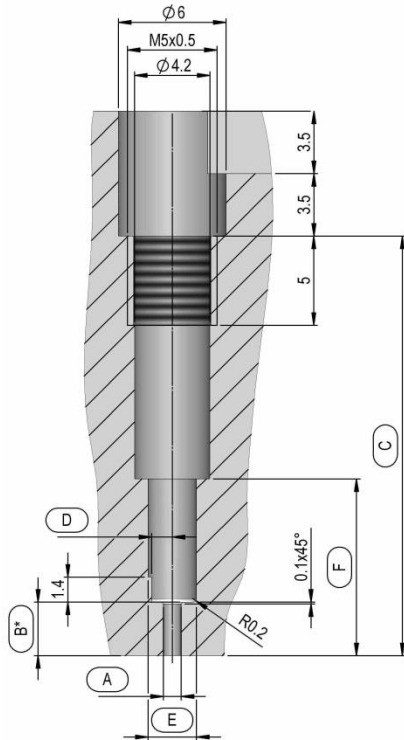


* = Adjust dimension

Type	A ^{0.01/0}	B*	C min.	D ^{0.05/0.05}	E	F
4111Dx.x	0.6	5	12.5	1	2.3	9.5
4117Bx.x-H	0.8	5	12.5	1	2.3	9.5

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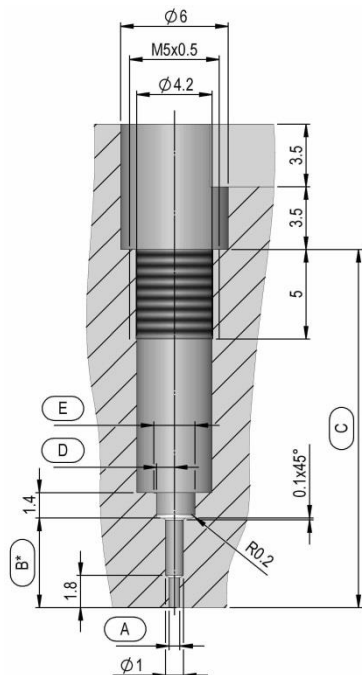
Alternative 1 with PRIAFIT® mounting sleeve



* = Adjust dimension

Type	A ^{0.01/0}	B*	C for 4530A	C for 4530A0.08	C for 4530A0.12	C for 4530A0.16	D ^{0.05/0}	E	F
4103Ex.x(-H)	1	3	23.5 – 48	23.5 – 88	23.5 – 128	23.5 – 168	1.15	2.7	9.9
4105Dx.x(-H)	1	3.1-3.5	18.5 – 43	18.5 – 83	18.5 – 123	18.5 – 163	1.15	2.7	4.9
4107Dx.x(-H)	1	3	18 – 42.5	18 – 82.5	18 – 122.5	18 – 162.5	1.15	2.7	4.4
4109Cx.x	0.6	2	17 – 41.5	17 – 81.5	17 – 121.5	17 – 161.5	1	2.3	3.4
4115Bx.x-H	0.8	2	17 – 41.5	17 – 81.5	17 – 121.5	17 – 161.5	1	2.3	3.4

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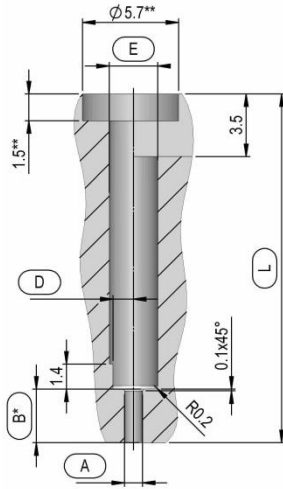


* = Adjust dimension

Type	A ^{0.01/0}	B*	C for 4530A	C for 4530A0.08	C for 4530A0.12	C for 4530A0.16	D ^{0.05/0}	E
4111Dx.x	0.6	5	17 - 44	17 - 84	17 - 124	17 - 164	1	2.3
4117Bx.x-H	0.8	5	17 - 44	17 - 84	17 - 124	17 - 164	1	2.3

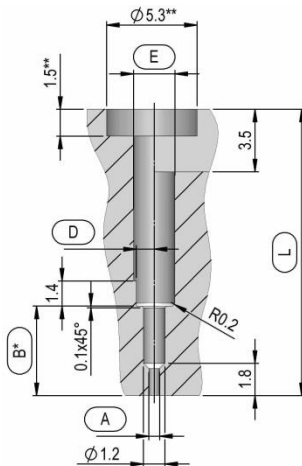
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Alternative 2 with distance sleeve



* = Adjust dimension
 ** = We recommend creating a recessed hole around the distance sleeve so that it is possible to remove the distance sleeve after it is installed.

Type	A ^{0.01/0}	B*	L with 4521A	L with 4521A0.08	L with 4521A0.12	L with 4521A0.16	D ^{0.05/0}	E
4004Cx.x-101(-H)	1	3	16 – 50	16 – 90	16 – 130	16 – 170	1.15	2.7
4006Bx.x-101(-H)	1	3.5	11 – 45	11 – 85	11 – 125	11 – 165	1.15	2.7
4008Bx.x-101(-H)	1	3	10.5 – 44.5	10.5 – 84.5	10.5 – 124.5	10.5 – 164.5	1.15	2.7
Type	A ^{0.01/0}	B*	L with 4522A	L with 4522A0.08	L with 4522A0.12	L with 4522A0.16	D ^{0.05/0}	E
4010Bx.x-101	0.6	2	9.5 – 43.5	9.5 – 83.5	9.5 – 123.5	9.5 – 163.5	1	2.3
4016Ax.x-101-H	0.8	2	9.5 – 43.5	9.5 – 83.5	9.5 – 123.5	9.5 – 163.5	1	2.3



* = Adjust dimension
 ** = We recommend creating a recessed hole around the distance sleeve so that it is possible to remove the distance sleeve after it is installed.

Type	A ^{0.01/0}	B*	L with 4522A	L with 4522A0.08	L with 4522A0.12	L with 4522A0.16	D ^{0.05/0}	E
4012Bx.x-101(-H)	0.6	5	12.5 – 46.5	12.5 – 86.5	12.5 – 126.5	12.5 – 166.5	1	2.3
4018Ax.x-101(-H)	0.8	5	12.5 – 46.5	12.5 – 86.5	12.5 – 126.5	12.5 – 166.5	1	2.3

Mounting of Miniature Cavity Temperature Sensors incl. Flexible Quick Disconnect with Mounting Nut or PRIAFIT® Mounting Sleeve

By mounting with mounting nut or PRIAFIT® mounting sleeve the miniature cavity temperature sensors incl. flexible quick disconnect were put on with the following tightening torques.

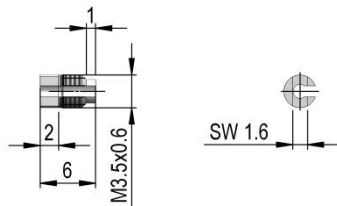
Miniature cavity temperature sensors incl. flexible quick disconnect	Tightening torques
4103Ex.x(-H) 4105Dx.x(-H) 4107Dx.x(-H)	1.0 Nm (sensor side with mounting nut type 4541A and PRIAFIT® mounting sleeve type 4530A) 1.5 Nm (disconnect side with mounting nut type 4542A)
4109Cx.x 4111Dx.x 4115Bx.x-H 4117Bx.x-H	1.0 Nm (sensor side with mounting nut type 4543A and PRIAFIT® mounting sleeve type 4530A) 1.5 Nm (disconnect side with mounting nut type 4542A)

Scope of Delivery

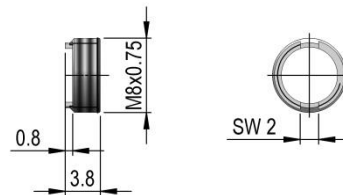
4103Ex.x(-H) / 4105Dx.x(-H) / 4107Dx.x(-H)

Article	Type	Article	Type
Mounting nut for sensor	4541A	Mounting nut for quick disconnect	4542A
Protective cap	1301A	Identification plate	-

Mounting nut for sensor type 4541A



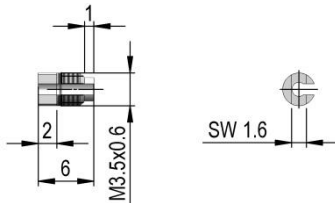
Mounting nut for quick disconnect type 4542A



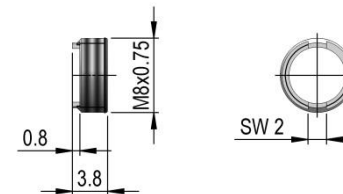
4109Cx.x / 4111Dx.x / 4115Bx.x-H / 4117Bx.x-H

Article	Type	Article	Type
Mounting nut for sensor	4543A	Mounting nut for quick disconnect	4542A
Protective cap	1301A	Identification plate	-

Mounting nut for sensor type 4543A



Mounting nut for quick disconnect type 4542A



Accessories (optional)

Connecting and extension cables

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

4103Ex.x(-H) / 4105Dx.x(-H) / 4107Dx.x(-H)

Article	Type	Article	Type
PRIAFIT® mounting sleeve l = 0.04 m	4530A	Distance sleeve l = 0.04 m	4521A
l = 0.08 m	4530A0.08	l = 0.08 m	4521A0.08
l = 0.12 m	4530A0.12	l = 0.12 m	4521A0.12
l = 0.16 m	4530A0.16	l = 0.16 m	4521A0.16
Mounting / extraction tool for sensor	4561A	Mounting / extraction tool for quick disconnect	4573A
Assembly tool for mounting nut type 4541A	4562A	Assembly tool for mounting nut type 4542A	4563B
Assembly tool for mounting sleeve	4575B	Quick disconnect cable for mounting in bore hole and cable channel	4100Dx.xA2-101
Multi channel connecting box	1194A-8T	BlueLine amplifier	5070A-2p2T
BlueLine amplifier	5080A-xT		

4109Cx.x / 4111Dx.x / 4115Bx.x-H / 4117Bx.x-H

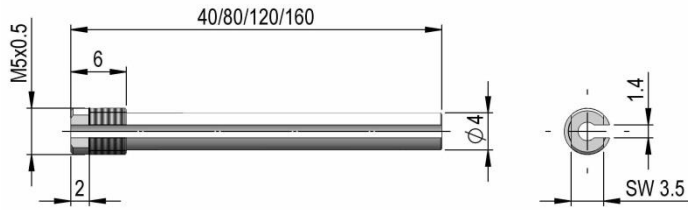
Article	Type	Article	Type
PRIAFIT® mounting sleeve l = 0.04 m	4530A	Distance sleeve l = 0.04 m	4522A
l = 0.08 m	4530A0.08	l = 0.08 m	4522A0.08
l = 0.12 m	4530A0.12	l = 0.12 m	4522A0.12
l = 0.16 m	4530A0.16	l = 0.16 m	4522A0.16
Mounting / extraction tool for sensor	4567A	Mounting / extraction tool for quick disconnect	4573A
Assembly tool for mounting nut type 4542A	4563B	Assembly tool for mounting nut type 4543A	4562A
Assembly tool for mounting sleeve	4575B	Quick disconnect cable for mounting in bore hole and cable channel	4100Dx.xA2-101
Multi channel connecting box	1194A-8T	BlueLine amplifier	5070A-2p2T
BlueLine amplifier	5080A-xT		

4103Ex.x(-H) / 4105Dx.x(-H) / 4107Dx.x(-H) /
 4109Cx.x / 4111Dx.x / 4115Bx.x-H / 4117Bx.x-H /
 4100Ax.xA2-101

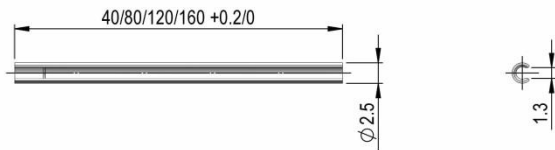


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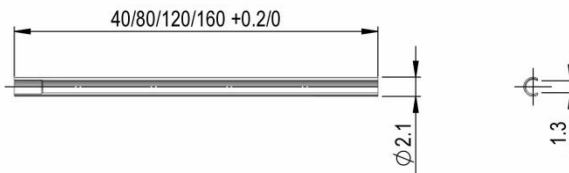
PRIAFIT® mounting sleeve type 4530A / 4530A0.08 / 4530A0.12 / 4530A0.16



Distance sleeve type 4521A / 4521A0.08 / 4521A0.12 / 4521A0.16



Distance sleeve type 4522A / 4522A0.08 / 4522A0.12 / 4522A0.16





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Quick Disconnect Cable



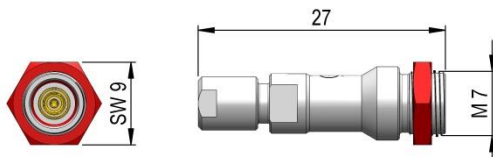
Overview

Type	For:	Mounting in:	Cable length in [m]	
Quick disconnect cable 4100Dx.xA2-101, male	Flexible quick disconnect 410x, 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

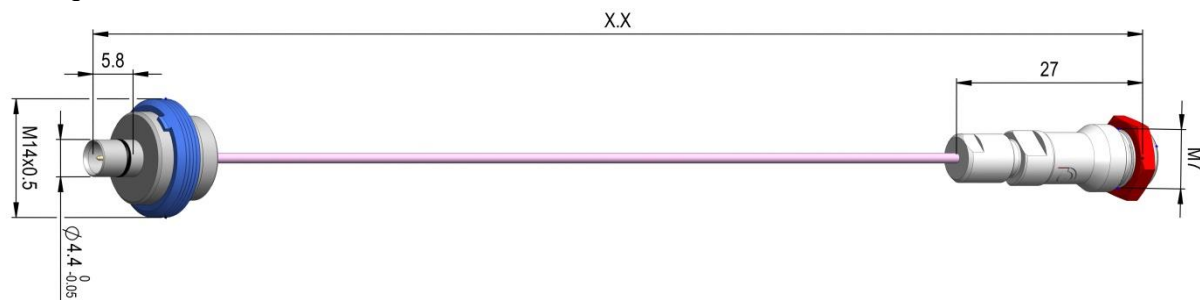


Fischer Typ KBE 101 female TRIAX

Dimensions

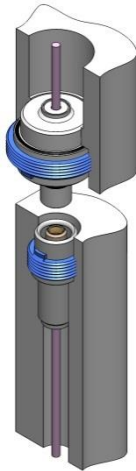
Type 4100Dx.xA2-101

Bending radius = 6 mm

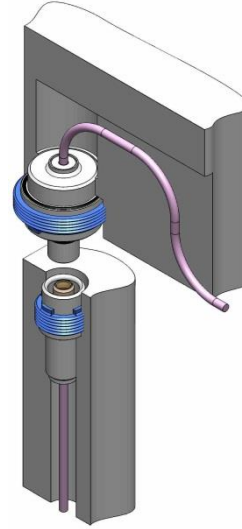


Examples for Installation Situation with Mounting Nut

Mounting in bore hole

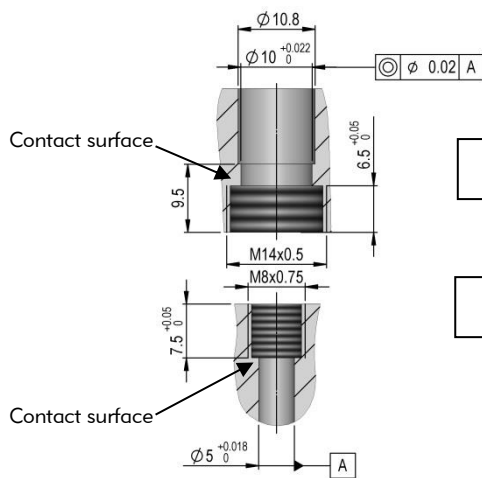


Mounting in cable channel

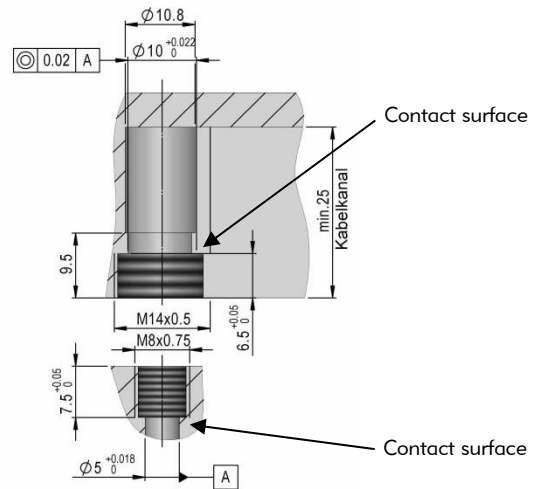


Mounting Holes with Mounting Nut

Mounting in bore hole



Mounting in cable channel

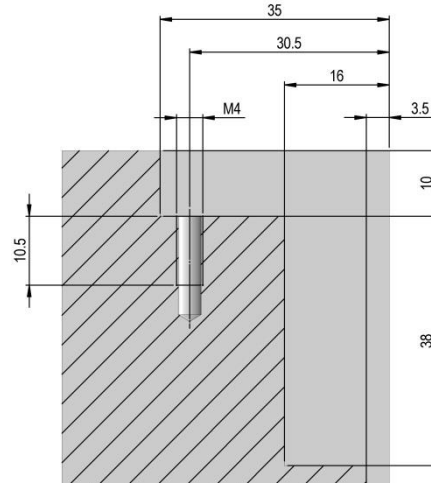
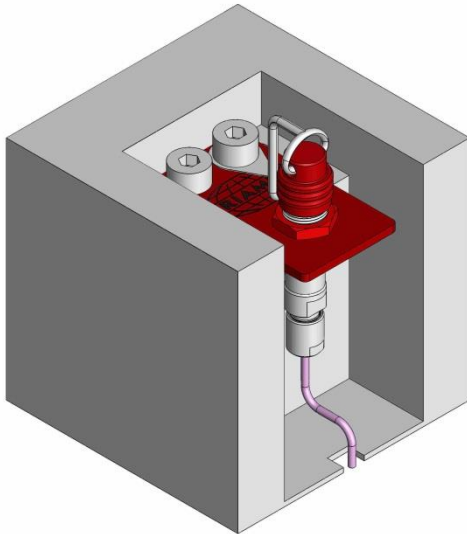


Mounting of Quick Disconnect Cables with Mounting Nut

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

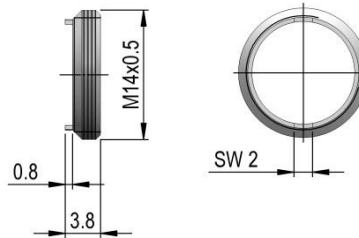
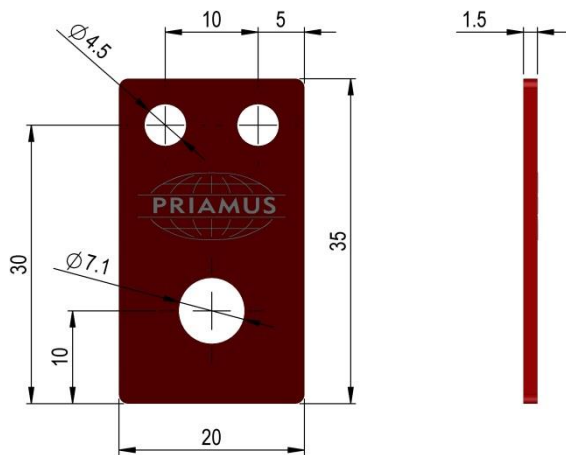


Scope of Delivery

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