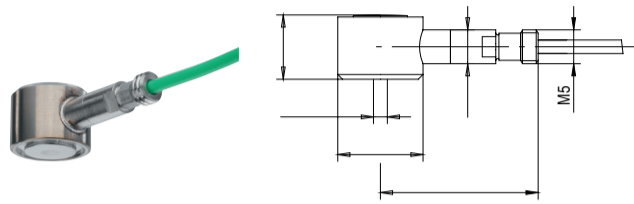


## Quick Start Installation

### 12,6 mm Force Sensor for Indirect Cavity Pressure Measurement

Type 9204B... (-1,6 pC/N, 10 kN for up to 3 000 bar, 200 °C)



9204B\_002-449e-11.15

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#### Foreword

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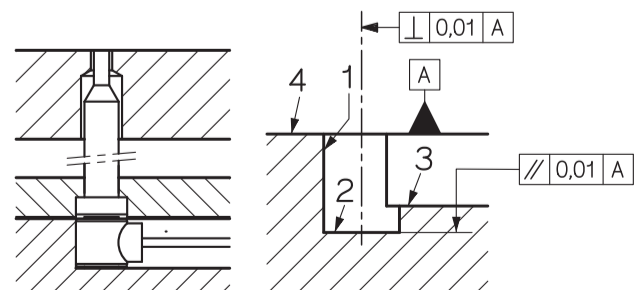
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### 1. General Notes

- Sensor  $\varnothing 12,6$  mm and end faces may not be machined
- Front of sensor must be clean and without notches
- Do not use cable to pull sensor out of hole

### 2. Important Areas of Sensor Hole

Note the following critical installation criteria:



1. Hole with H7 tolerance to center sensor
2. Sensor contact surface blind hole shown must be flat and perpendicular
3. Sensor must clear this surface
4. Surface higher than or level with sensor end face

### 3. Hole

The force sensor measures the cavity pressure via an ejector pin. The sensor is installed in a hole with a thrust washer as described in Chapter 3.1.1.

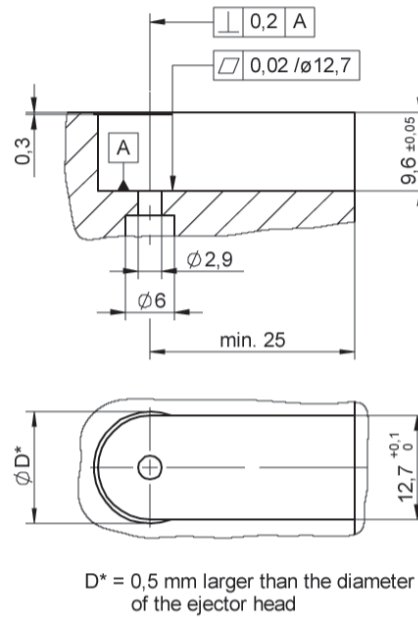
In a multi-cavity application where the sensor layout is symmetrical, sensors are held within in a machined spacer plate. This allows for an easier and very accurate installation. Description in Chapter 3.1.2.

- Hole and channel free of debris and shavings

#### 3.1 Sensor Seating

##### 3.1.1 Sensor in Ejector Base Plate

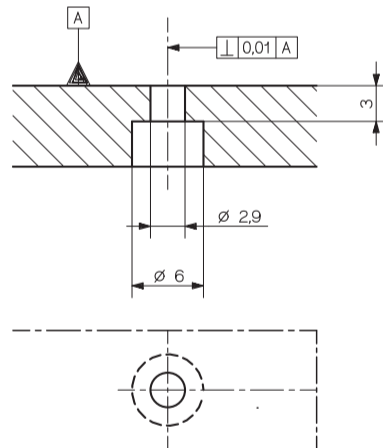
Machine H7 hole and channel in ejector base plate. Sensor shoulder must lie clear of channel. Check centering and alignment. Centerline of ejector pin must be at right-angles to contact surface.



- Hole  $\varnothing 2,9$  mm for M2,5 screw optional

##### 3.1.2 Sensor in Spacer Plate

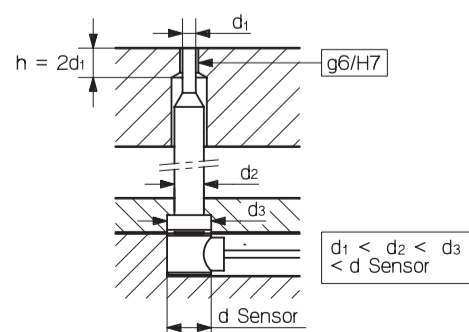
Spacer plate and base plate must be machined flat. Centerline of ejector pin must be at right-angles to contact surface.



- Always use included M2,5x6 screw and spring washer

#### 3.2 Ejector Pin and Guide Hole

Use ejector pin with tolerance class g6 and machine H7 hole. Pin guide-length h as per drawing. Reduce friction with a tribological finish or DLC (diamond-like coating). Keep edges of rectangular ejector pin sharp and use radii in hole. Do not engrave or mark the bearing surface of the ejector head.



- Use guide length of twice pin diameter  $d_1$
- Do not engrave or mark the ejector pin bearing surface
- Pin diameter  $\varnothing d_1 \geq 1,6$  mm
- Treat pin with tribological finish or DLC
- Ejector pin head  $d_3$  smaller or same size as sensor  $\varnothing 12,6$  mm

### 4. Cable Channeling and Connector

- Fixed cable reduces mounting
- Chamfer all sharp edges
- Cover open channels/slots

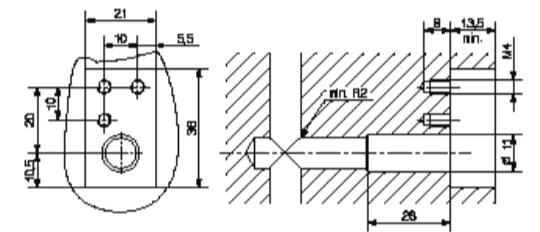
#### 4.1 Single-wire technique

The single-wire technique uses the tool steel of which the mold is made to ensure an electrical shielding of the sensor signal. Thus the wiring is run through drilled holes.

- Single-wire cable must be completely enclosed in the mold
- Single-wire cable must not be run together with power cables
- Refer to Chapter 4.2 for machining of channels

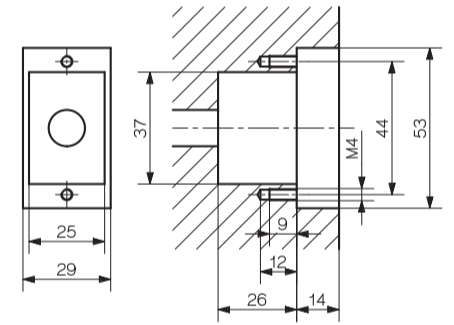
##### 4.1.1 Single-Wire Cut and Grip Connector Type 1839

Machine cable channel and recess for mounting plate. Example shown: Drilled hole

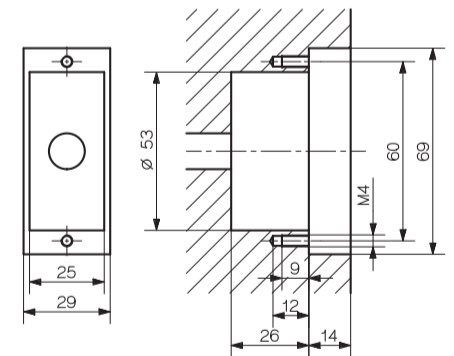


##### 4.1.2 Multichannel Single-Wire Connectors

Recess for 4-channel connector Type 1708...

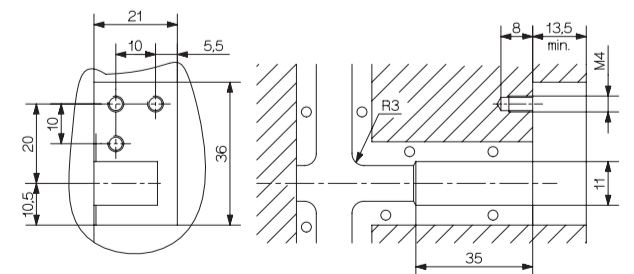


Recess for 8-channel connector Type 1710...



#### 4.2 Coaxial Cable


Machine cable channel and recess for mounting plate.



- Observe radii
- Cover open channels/slots

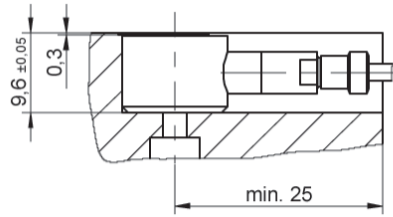
## 5. Installing Sensor

-  • Ensure all sensor hole and threads are clean

-  • A chamfered cable channel or cable hole prevents damaged cables

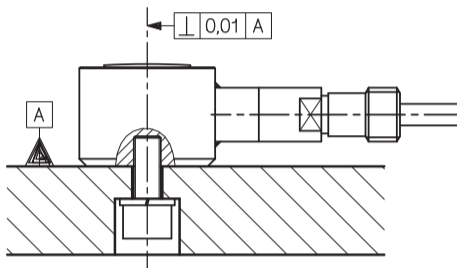
### 5.1 Sensor Installation in Ejector Plate


Install sensor on top. Sensor face should not stand proud. Installed sensor must be at right angles and lie flat. Sensor can be secured from below using a M2,5 screw and spring washer.



### 5.2 Sensor Installation in Spacer Plate

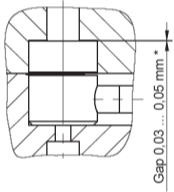
Secure sensor from below using a M2,5 screw and spring washer. Installed sensor must be at right angles and lie flat.





-  • Always use M2,5 screw and spring washer


### 5.3 Ejector Pin Clearance

The ejector pin is used to record the force transmitted during molding. The ejector plate assembly must not preload the sensor. Check that the sensor has a clearance of 0,03 ... 0,05 mm. Test by lifting the ejector pin; it should turn smoothly.




-  • Do not preload sensor
-  • For multi-cavity installations only mark the side of the pin heads

## 6. Installing Cable and Connector

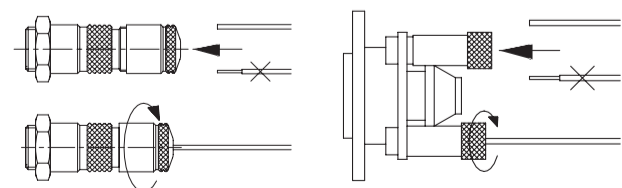
-  • Check again that edges of cable channel and hole are chamfered
- Use a metal plate to cover open channels/slots
- Attach cap and place on connector

### 6.1 Single-Wire Technology

-  • Ensure electrical shielding; Enclose Single-wire cable completely in mold
- Single-wire cable may not be run with power cables
- Ensure that all contact surfaces and threads are clean and dry

#### 6.1.1 Cut & Grip Connection

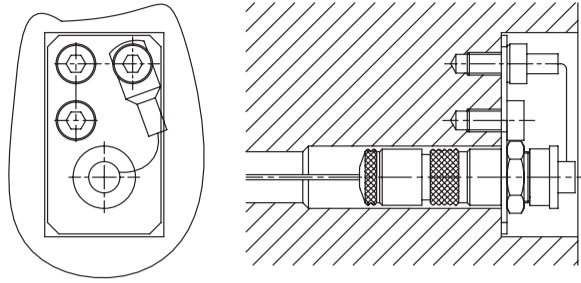
Cut the single-wire cable to length and do **not** strip the insulation. Loosen the knurled connector by hand without removing the rear section.



### 6.1.2 Installing Single-Wire Connector

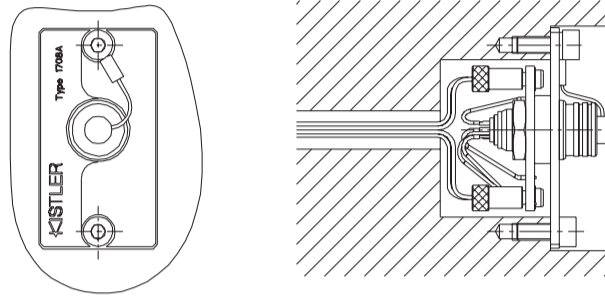
Install connector and mounting plate in recess. Attach cap using one of the screws. Place cap on open connector.

#### Installation of Connector Type 1839 and Mounting Plate



#### Installation of Multichannel Connector

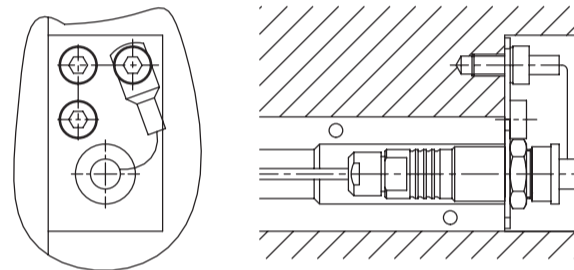
Example: Type 1708



## 6.2 Coaxial Cable

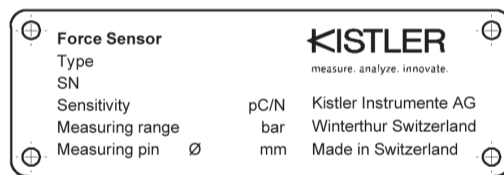
### 6.2.1 Installation of Coaxial Connector

Install connector and mounting plate in recess. Attach cap using one of the screws. Place cap on open connector.




## 7. Installing Identification Plate


Rivet plate to mold or secure with four M2,5 screws.



## 8. Functional Test

Check sensor insulation and functionality after mold assembly is complete.

-  • Ensure that connector is dry

-  • Use cleaning spray Type 1003

### 8.1 Insulation Test

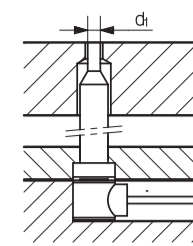
Use insulation tester Type 5495 to check sensor insulation. Resistance  $>10^{13} \Omega$ .

### 8.2 Sensor Functional Test


Determine or calculate the effective pressure sensitivity by referring to actual front ejector pin diameter. Do trial run on molding machine to obtain actual measurement data.

Diameter [mm]	Sensitivity [pC/bar]	Max. Pressure [bar]
1,6	-0,32	>3 000
2	-0,50	
2,5	-0,78	
3	-1,13	
4	-2,01	
5	-3,14	
6	-4,52	2 000
8	-8,04	
10	-12,56	1 300
12	-18,09	900
14	-24,62	650

$$S_P = A \times S_F \times 0,1$$

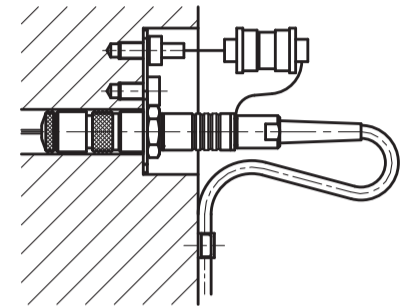



- $S_P$  Pressure sensitivity [pC/bar]
- $A$  Area of ejector pin  $d_1$   
 $A = (d_1/2)^2 \times \pi$  [mm<sup>2</sup>]
- $S_F$  Force sensitivity [pC/N], as per identification plate

-  • Do not exceed maximum pressure

### 8.3 Securing Extension Cable


Cable must be restrained to prevent measurement errors. Attach cable to ejector plate or moving platen.




-  • Ensure strain relief of extension cable

## 9. Service and Repair

Piezoelectric sensors are maintenance-free. Insulation and function of installed sensor should, however, be checked before each molding run.

-  • Ensure that connector is dry
- Cover sensor hole during cleaning

-  • Use cleaning spray Type 1003

### 9.1 Insulation Test


Use insulation tester Type 5495 to check sensor insulation. Resistance  $>10^{13} \Omega$ .


### 9.2 Sensor Functional Check

Sensor is tested in its measuring position on the molding machine. Use the effective sensitivity as described in Chapter 8.2 above.

### 9.3 Removing Sensor

Carefully disassemble ejector plate and use a magnet to lift sensor from hole.

-  • Do not use penetrating spray before sensor is removed
- Do not remove sensor by pulling on cable

-  • Use magnet to lift sensor out of hole

### 9.4 Cable Installation

Fix Sensor and unscrew cable with fork wrench AF 4/AF 5 Type 5.210.164.

### 9.5 Single-Wire Repair

Slightly damaged cables can be repaired using the Repair Kit Type 1207. Solder severed single-wire cables, slide over Teflon tube and cover with shrink tube.

-  • Do not overheat sensor and cable with hot air blower

### 9.6 Repairs at Kistler

Factory repairs at Kistler are arranged by the local sales office

Info [www.kistler.com](http://www.kistler.com)

### 9.7 Disposal Instructions for Electrical and Electronic Equipment



Do not discard old electronic instruments in municipal trash. For disposal at end of life, please return this product to an authorized local electronic waste disposal service or contact the nearest Kistler Instrument sales office for return instructions.