RJG
MOLD SMART

PRODUCT MANUAL

Flush-Mount 2.5 mm Piezoelectric Cavity Pressure Sensor

6159

Training and Technology for Injection Molding

PRINT DATE 10.02.2023
REVISION NO. 1

PRODUCT MANUAL

Flush-Mount 2.5 mm Piezoelectric Cavity Pressure Sensor

6159

PRODUCT MANUAL

Flush-Mount 2.5 mm Piezoelectric Cavity Pressure Sensor

6159

INSTALLATION (CONTINUED)

PRODUCT MANUAL

Flush-Mount 2.5 mm Piezoelectric Cavity Pressure Sensor

6159

PRODUCT MANUAL

Flush-Mount 2.5 mm Piezoelectric Cavity Pressure Sensor

6159

RELATED PRODUCTS

INTRODUCTION

Read, understand, and comply with all following instructions. This guide must be kept available for reference at all times.

DISCLAIMER

Inasmuch as RJG, Inc. has no control over the use to which others may put this material, it does not guarantee that the same results as those described herein will be obtained. Nor does RJG, Inc. guarantee the effectiveness or safety of any possible or suggested design for articles of manufacture as illustrated herein by any photographs, technical drawings, and the like. Each user of the material or design or both should make his own tests to determine the suitability of the material or any material for the design as well as the suitability of the material, process, and/or design for his own particular use. Statements concerning possible or suggested uses of the material or designs described herein are not to be construed as constituting a license under any RJG, Inc. patent covering such use or as recommendations for use of such material or designs in the infringement of any patent.

PRIVACY

ALERTS

The following three alert types are used as needed to further clarify or highlight information presented in the manual:

DEFINITION *A definition or clarification of a term or terms used in the text.*

NOTES *A note provides additional information about a discussion topic.*

CAUTION *A caution is used to make the operator aware of conditions that can cause damage to equipment and/or injury to personnel.*

ABBREVIATIONS

DIA	diameter
MIN	minimum
MAX	maximum
R.	radius

NOTES

PRODUCT DESCRIPTION

The flush-mount 2.5 mm piezoelectric cavity pressure sensor 6159 from RJG, Inc. is a single- or multi-channel senor that can withstand forces of up to 29,000 psi (2,000 bar) and a maximum temperature of 392 °F (200 °C).

APPLICATIONS

FLUSH-MOUNT CAVITY PRESSURE SENSORS

The flush-mount sensor is made of stainless steel which can be contoured, angled, and/or textured to match the cavity in which it is installed.

SINGLE-CHANNEL

The 6159 can be utilized in single-channel applications in conjunction with the Lynx™ mold-mount piezoelectric sensor adapter LP/LX1-M or the Lynx surface-mount piezoelectric sensor adapter PZ/LX1-S and the eDART® or CoPilot® system.

MULTI-CHANNEL

The 6159 can be utilized in multi-channel applications which enable either four or eight sensors to be connected outside the mold with a single cable. The Lynx four-channel piezoelectric sensor connector and adapter—PZ-4 and PZ/LX4F-S-ID—allow up to four sensor connections, while the Lynx eight-channel piezoelectric sensor connector and adapter—PZ-8 and PZ/LX8F-S-ID—allow up to eight sensor connections to the eDART or CoPilot system.

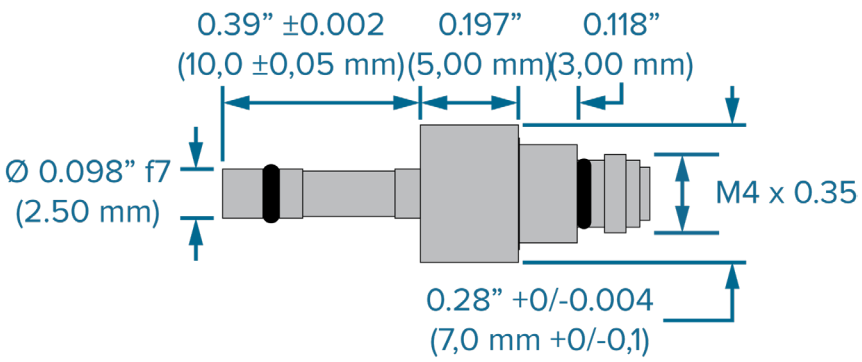
OPERATION

PIEZOELECTRIC SENSORS

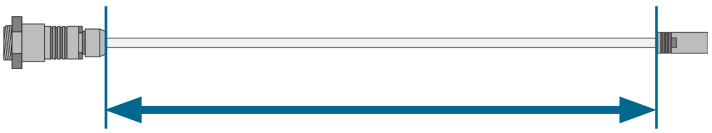
Piezoelectric sensors use quartz crystals to measure the deformation, or change in resistance of the force over the sensor. The measurement is carried through the sensor cable to a sensor adapter mounted on the outside of the mold.

The sensor adapter is connected to the RJG, Inc. eDART or CoPilot system, which record and display the sensor's measurements for operator aid in process monitoring and control.

DIMENSIONS



COMPATIBLE CABLES



1645 CABLE ORDERING LENGTH

C-PZ/1645 CABLE ORDERING LENGTH

CABLE LENGTHS

Length must be longer than needed to facilitate safe installation and removal of connector from tool to prevent tension on the lead wire; generally, 2–3” (50–75 mm) of slack is sufficient. Use good sense to determine the appropriate cable length required for each application.

SINGLE-CHANNEL	MULTI-CHANNEL	LENGTH S.I.	LENGTH ENGLISH
-	C-PZ/1645-0.1	0,1 m	3.9”
-	C-PZ/1645-0.15	0,15 m	5.9”
1645-0.2	C-PZ/1645-0.2	0,2 m	7.90”
-	C-PZ/1645-0.25	0,25 m	9.8”
-	C-PZ/1645-0.3	0,3 m	11.8”
-	C-PZ/1645-0.35	0,35 m	13.8”
1645-0.4	C-PZ/1645-0.4	0,4 m	15.75”
1645-0.6	C-PZ/1645-0.6	0,6 m	23.6”
1645-0.8	C-PZ/1645-0.8	0,8 m	31.5”
1645-1.2	C-PZ/1645-1.2	1,2 m	47.24”
1645-1.6	C-PZ/1645-1.6	1,6 m	63”
1645-2.0	C-PZ/1645-2.0	2,0 m	78.74”

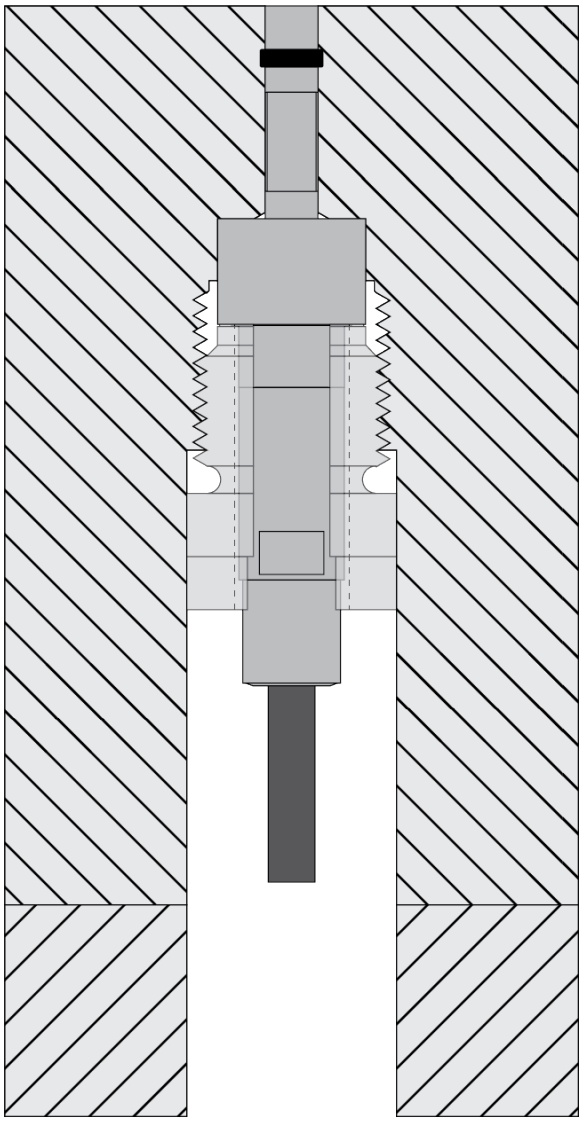
INSTALLATION

The 6159 is retained in a cavity by either a nut or sleeve (purchased separately—part numbers MA-6157-NUT and MA-6157-S20).

INSTALLATION OVERVIEW

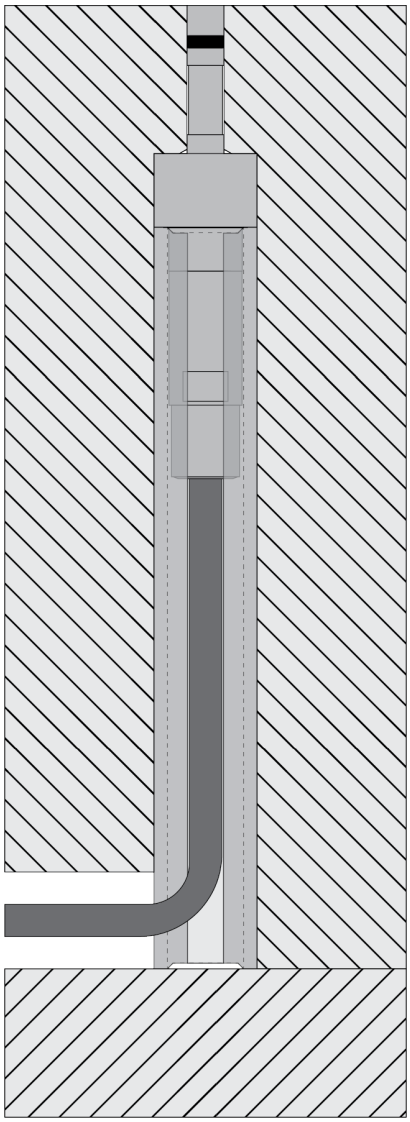
RETAINING NUT INSTALLATION

The sensor is inserted into and retained in the mold by a retaining nut. The retaining nut is threaded into the mold. The sensor tip reaches through to the mold cavity surface. The tip may be machined to match the cavity's surface and/or contour prior to installation.

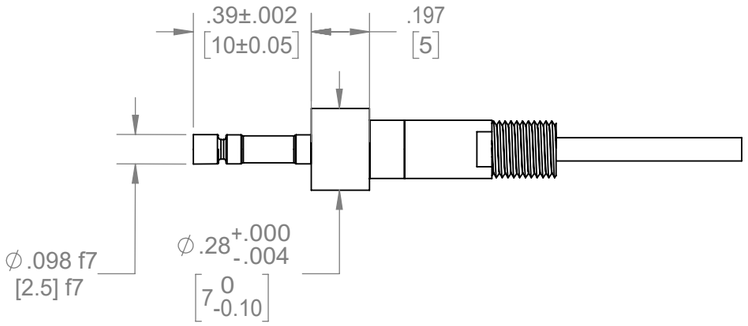


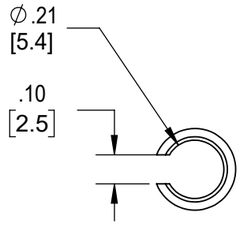
RETAINING SLEEVE INSTALLATION

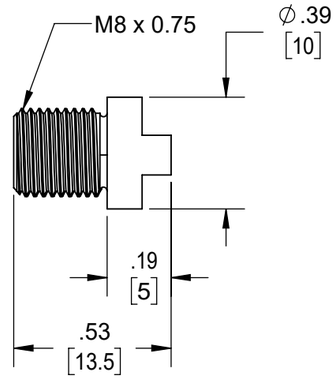
The sensor is retained in the mold by a retaining sleeve. The retaining sleeve is fixed in the mold by a backing plate. The sensor tip reaches through to the mold cavity surface. The tip may be machined to match the cavity's surface and/or contour prior to installation.

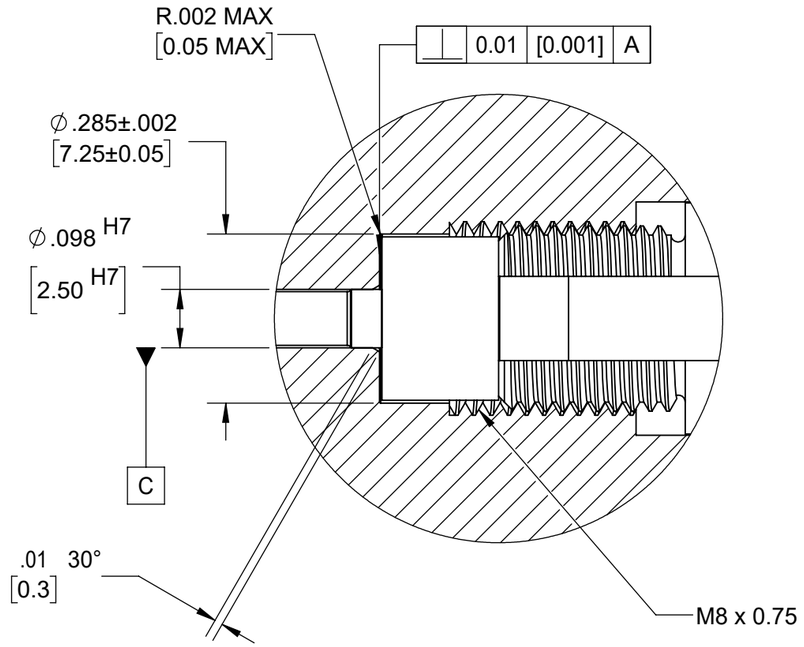


INSTALLATION SPECIFICATIONS—RETAINING NUT

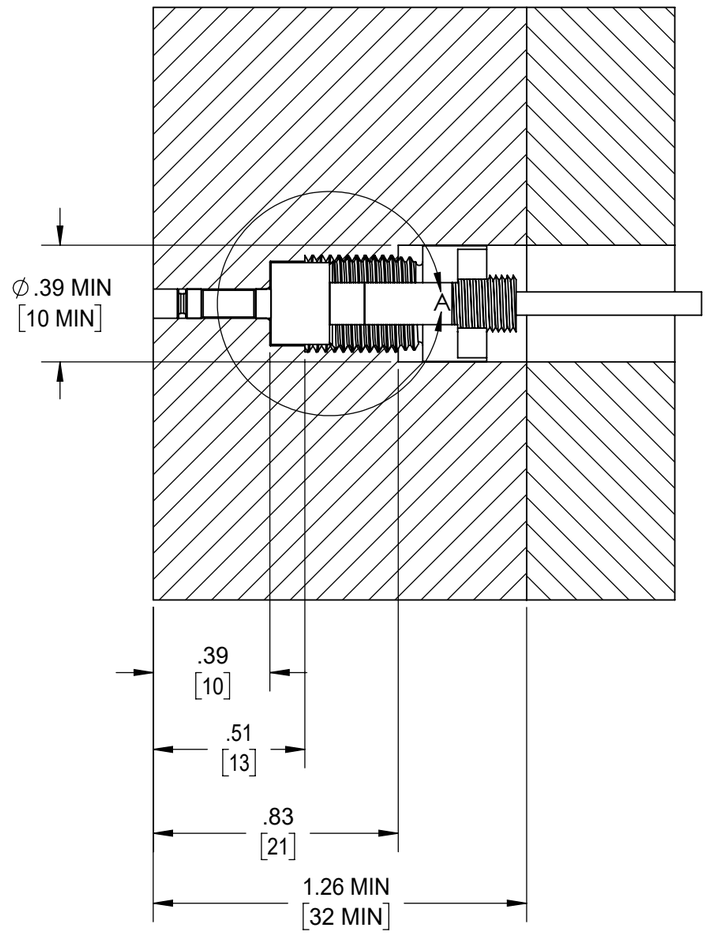








DETAIL A
SCALE 4 : 1



INSTALLATION SPECIFICATIONS—RETAINING NUT (*continued*)

PLATE THICKNESS

Plate thickness must be 1.26” (32,0 mm [1 at right]) MIN.

SENSOR TIP POCKET

Machine a pocket for the sensor tip with hole basis ISO standard fit H7h6—H7h6 is a locational clearance suitable for precision location fits. The sensor should fit without binding. The sensor tip should have a surface finish of √32 or better.

- Sensor tip ø 0.098” H7 (2,50 mm [2 at right]).
- Sensor tip length of 0.39” (10,0 mm [3 at right]).

SENSOR BODY POCKET

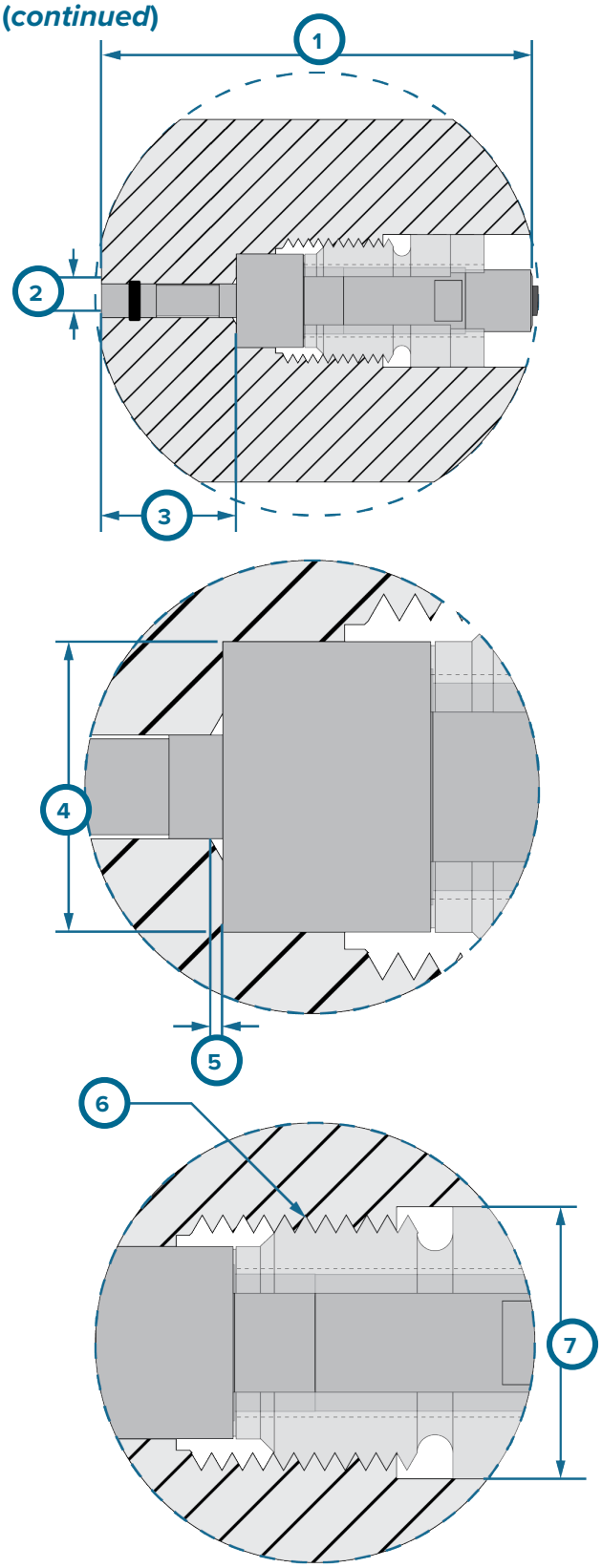
Machine a pocket for the sensor body with hole basis H7h6. The sensor body should fit without binding.

- Sensor body pocket ø 0.285” ±0.002 (7,25 mm ±0,05 [4 at right]).
- Chamfer 30° MIN/MAX 0.01/0.02” (0,3/0,4 mm [5 at right]) where sensor tip and sensor body meet for ease of installation.

RETAINING NUT POCKET

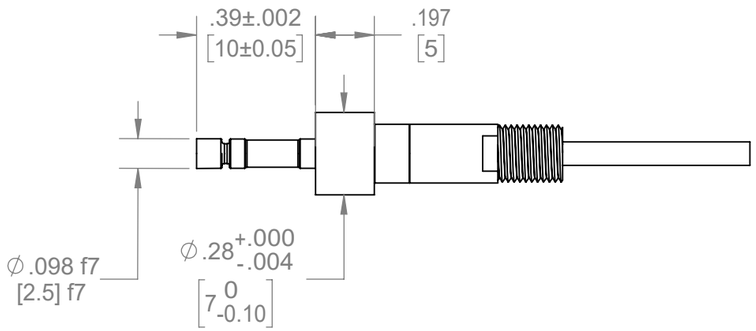
Drill and tap a pocket for the retaining nut:

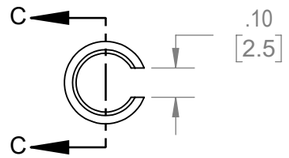
- To sensor retaining nut pocket ø 0.39” MIN (10,0 mm [6 at right]).
- Sensor retaining nut pocket M8 x 0.75 [7 at right]).

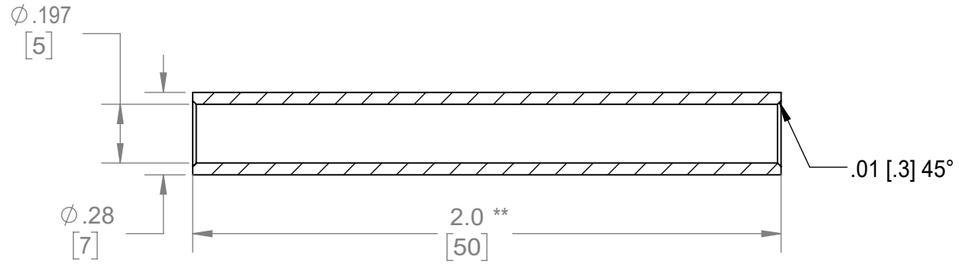


1	1.26” (32,0 mm)	5	Chamfer 30° 0.01/0.02” (0,3/0,4 mm) MIN/MAX
2	ø 0.098” H7 (2,50 mm H7) MIN	6	ø 0.39” (10,0 mm) MIN
3	0.39” (10,0 mm)	7	M8 x 0.75
4	ø 0.285” ±0.002 (7,25 mm ±0,05)		

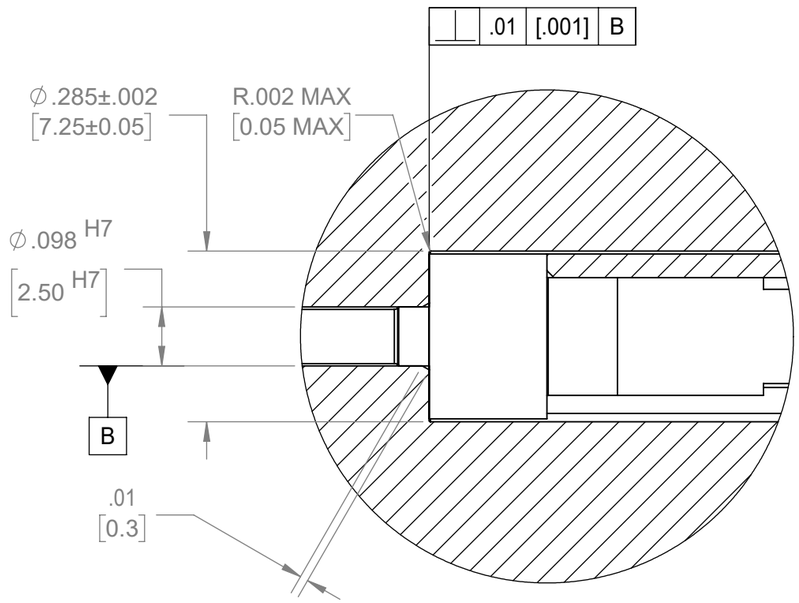
INSTALLATION SPECIFICATIONS—RETAINING SLEEVE







SECTION C-C
SCALE 2 : 1



DETAIL B
SCALE 4 : 1

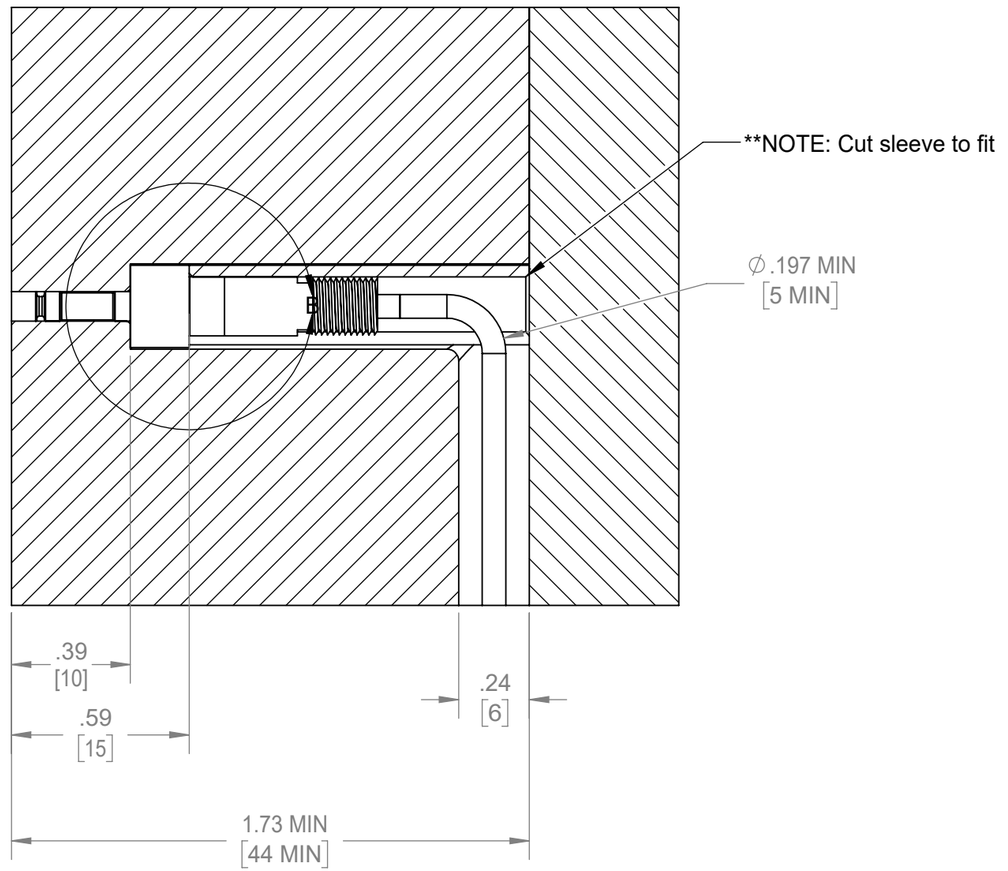


PLATE THICKNESS FOR CABLE CLEARANCE

Plate thickness 1.73” (44,0 mm [1 at right]) MIN for cable clearance.

SENSOR TIP POCKET

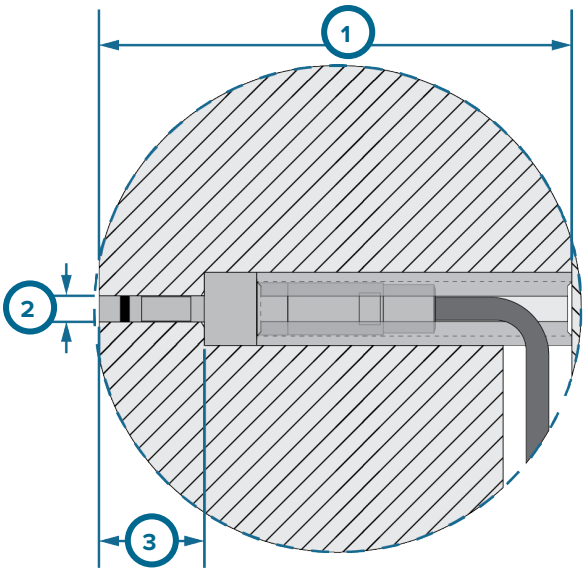
Machine a pocket for the sensor tip with hole basis ISO standard fit H7h6—H7h6 is a locational clearance suitable for precision location fits. The sensor should fit without binding. The sensor tip should have a surface finish of 32 or better.

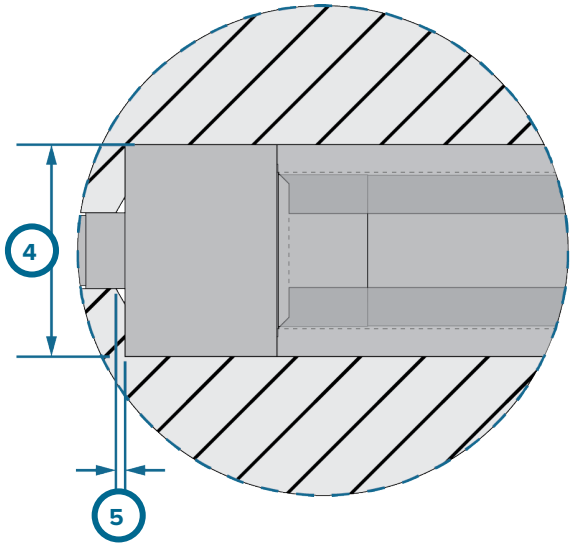
- Sensor tip diameter ø 0.098” H7 (2,50 mm [2 at right]).
- Sensor tip length of 0.39” (10,0 mm [3 at right]).

SENSOR BODY AND RETAINING SLEEVE POCKET

Machine a pocket for the sensor body and retaining sleeve with hole basis H7h6. The sleeve should fit without binding.

- Sensor body and retaining sleeve pocket ø 0.285” ±0.002 (7,25 mm ±0,05 [4 at right]).
- Chamfer 30° MIN/MAX 0.01/0.02” (0,3/0,4 mm [5 at right]) where sensor tip and sensor body meet for ease of installation.



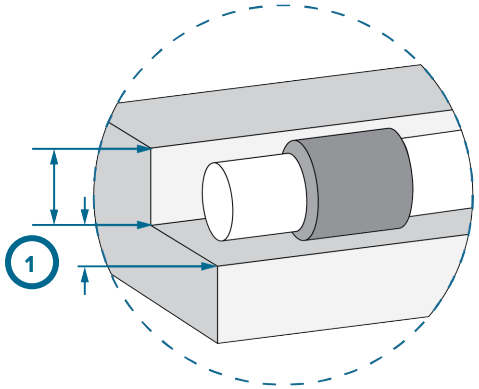


1	1.73” (44,0 mm) MIN
2	ø 0.098” (2,50 mm)
3	0.39” (10,0 mm)
4	ø 0.285” ±0.002 (7,25 mm ±0,05) MIN
5	Chamfer 30° 0.01/0.02” (0,3/0,4 mm) MIN/MAX

SENSOR CABLE

CABLE CHANNEL

Mill cable channel of 0.25 x 0.25” (6,4 x 6,4 mm [1 at right]) to mold surface. Break all corners to avoid cable damage.

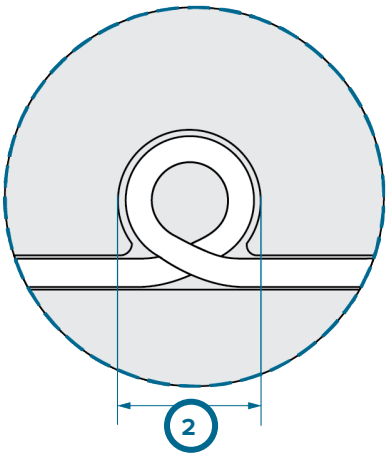


EXCESS CABLE POCKET

If necessary, a cable pocket 1.00” (25,4 mm [2 at right]) may be machined to store excess cable.

SENSOR CABLE BEND

The sensor cable internal turn radius for the cable to coil is 0.197” (5 mm) MIN.



1	0.25 x 0.25” (6,4 x 6,4 mm)
2	1.00” (25,4 mm)

SENSOR POCKET CHECK

The 4 mm Install Kit from RJG (purchased separately [3 at right]) includes tools to form and verify sensor pocket dimensions for both the 4 mm piezoelectric flush mount cavity pressure sensor 6157 and the 6159.

RJG recommends the use of the 4 mm Install Kit for all 6157 and 6159 sensor installations. Read and follow all instructions provided with the kit to easily and correctly install and test the flush mount sensors.

SENSOR TIP MACHINING OVERVIEW

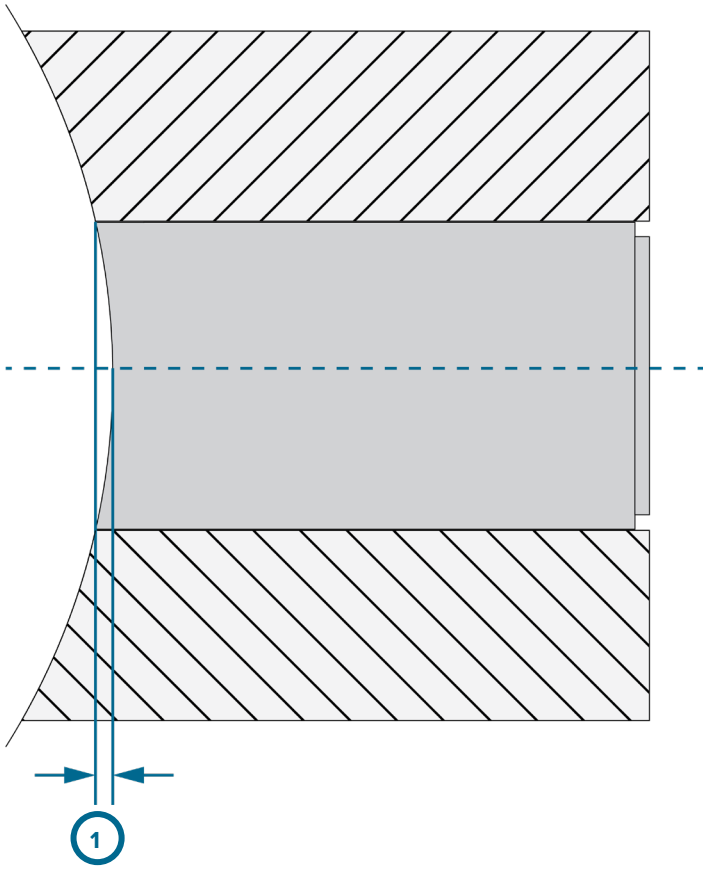
Only grind the sensor if necessary to accurately fit the surface of the cavity; once a flush-mount sensor tip has been modified it cannot be re-calibrated. Read and follow all instructions, and refer to the provided figures to properly machine flush-mount sensors.

DRY GRIND SPECIFICATIONS

Dry-grind the sensor head no more than 0.0005” (0,013 mm) per pass. Do not submerse the sensor head in fluids. Sensors are not watertight; keep all connectors clean and dry.

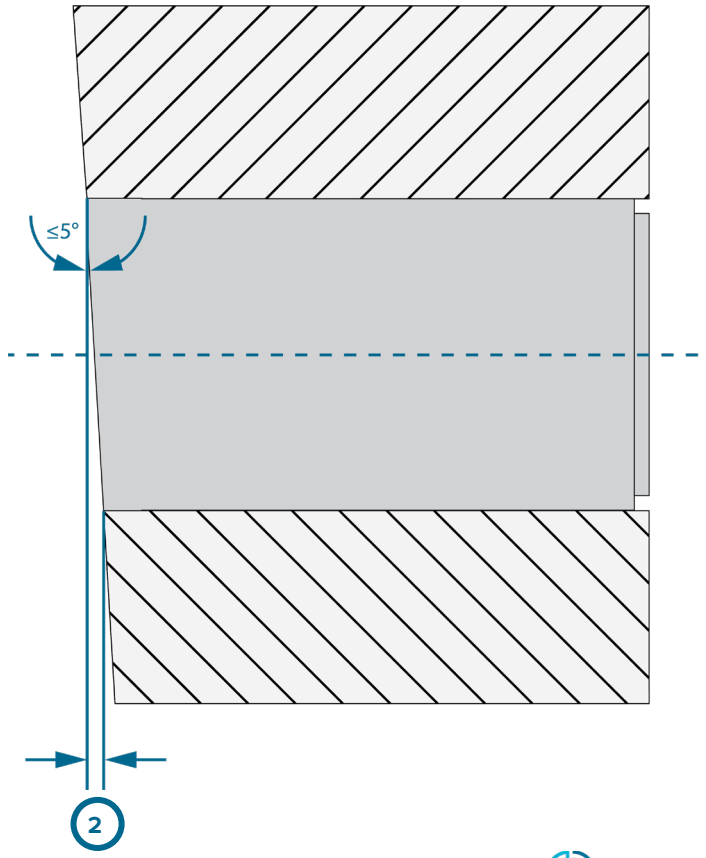
CONTOURING SPECIFICATIONS

The sensor tip may be ground (dry) into a contour in order to match the cavity surface. Do not dry-grind the sensor head more than 0.0005” (0,013 mm) per pass. The sensor head may be contoured up to 0.02” (0,5 mm (1 at right]) from the top.



ANGLE SPECIFICATIONS

The sensor tip may be ground (dry) into an angle in order to match the cavity surface. Do not dry grind the sensor head more than 0.0005” (0,013 mm) per pass. The sensor head may be ground to an angle of no more than 5°, and no more than 0.02” (0,5 mm (2 at right).



MACHINING SPECIFICATIONS

Dry-Grind (per pass)	0,013 mm	0.0005”
Contour	0,5 mm	0.02”
Angle 5°	0,5 mm	0.02”

Once a sensor is contoured or angled it can be installed into the tool in the proper orientation. Sensor alterations are not typically symmetrical, and ensuring that the sensor is correctly installed in the tool and that it remains in the proper orientation is critical.

ADDITIONAL MACHINING

FLUSH MOUNT SENSOR KEYING

Keying of a sensor can prevent the unwanted rotation of installed sensors. The 6159 sensor can be keyed to a depth of up to 0.01” (0,3 mm) MAX, and at the length beginning from the from of the sensor back of 0.15” (3,7 mm) MAX. Read and follow all instructions to key a sensor—either for a previously-machined sensor pocket, or a new installation.

SENSOR KEYING A NEW INSTALLATION

A new sensor installation can be keyed by grinding down a flat onto one side of the sensor and using a mill to machine the sensor pocket to match. When the sensor is installed in the sensor pocket, the contact of the flat, or keyed, surfaces will prevent sensor rotation (refer to figure at top right).

MACHINING SPECIFICATIONS

Dry Grind (per pass)	0,013 mm	0.0005”
Sensor Slot	0,3 mm	0.01”
Sensor Pocket Slot	0,3 mm	0.01”

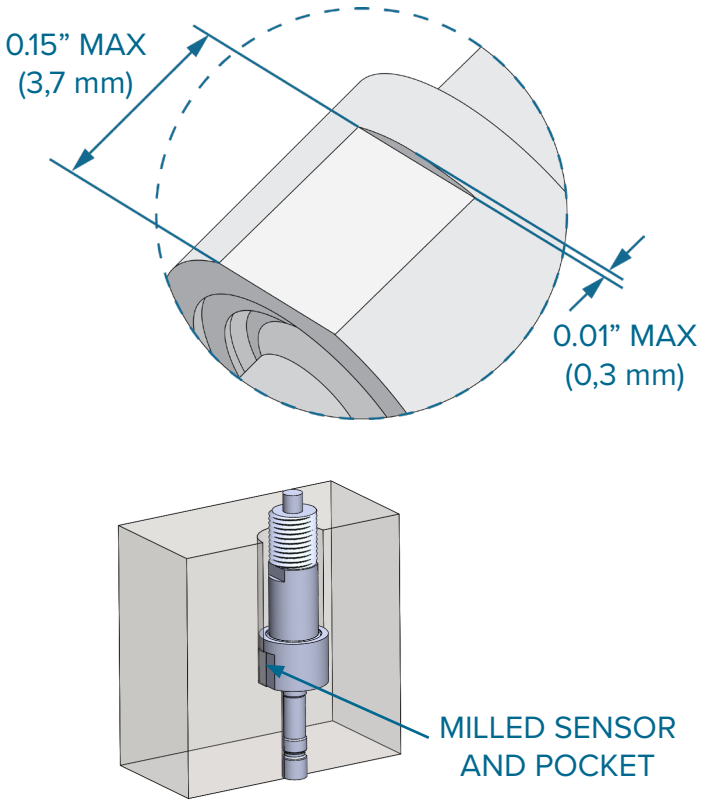
SENSOR KEYING A PREVIOUS POCKET

When a sensor pocket has previously been machined into a tool, a slot can be made on the sensor body and sensor pocket using a ball-nose end mill to create a keyway. A dowel is installed into the keyway created during milling to prevent sensor rotation (refer to figure at bottom right).

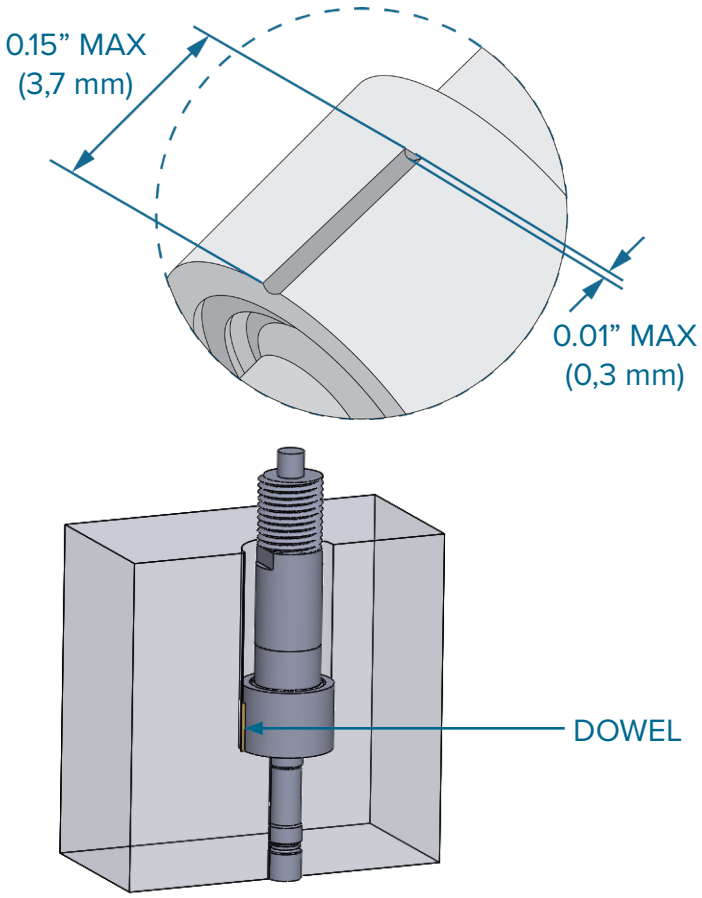
MACHINING SPECIFICATIONS

Milling (per pass)	0,013 mm	0.0005”
Sensor Slot	0,5 mm	0.02”
Sensor Pocket Slot	0,5 mm	0.02”

SENSOR KEYING—NEW INSTALLATION



SENSOR KEYING—PREVIOUS POCKET



MAINTENANCE

CLEANING & DRIFT

REGULAR CLEANING

Pull sensors from the mold and clean out the pockets and channels when a mold is pulled for preventative maintenance. Sensors, connectors, and cables must be installed in areas free from oil, dirt, grime, and grease.

RJG, Inc. recommends the following cleaners:

- MicroCare MCC-CCC Contact Cleaner C
- MicroCare MCC-SPR SuprClean™
- Miller-Stephenson MS-730L Contact Re-Nu®

DRIFT

Piezoelectric sensors can drift negative (-) or positive (+). The acceptable drift specification for RJG piezoelectric sensors is 20 pC/minute. The easiest place to monitor this is the eDART "Sensor Locations" screen. Drift of ±20 pC in sixty seconds indicates abnormal drift. The cause of "drift" is dirty/contaminated connections. This could be any of the connections from the sensor to the eDART.

Properly clean all connection points with an electronics grade contact cleaner. Allow the sensors and cables to air-dry before reconnecting them. Do not blow them out with a "shop" air line as this air usually contains oil and other contaminants.

If drift continues, clean the sensors out again with electronics grade cleaner then bake them in an oven to remove the contaminants (same method used at RJG). It is recommended to bake the sensors/cables at 100 °C for sixty minutes.

If continuing to experience drift after this, please contact RJG Sales for pricing and lead time on replacement items.

TESTING & CALIBRATION

Follow all instructions and recommendations for individual sensor testing and calibration for optimal operation.

SENSOR TESTING

1. Sensor PreCheck

The Sensor PreCheck provides diagnostics on typical sensor problems such as sensor drift, preload, and zero shift, and can also detect sensor installation errors caused by improper pocket dimensions, damaged wires, and damaged sensor heads. A test report with sensor configuration can be emailed or printed from the device. This device allows testing of up to thirty-two sensors at one time and can verify that a force was applied to the sensor.

2. eDART Software—Raw Data Viewer

The eDART Raw Data Viewer displays the status of the sensor, either Valid, No Reply, Stale, or Invalid.

- A Valid sensor has raw counts that change when force is applied to the sensor; this indicates a properly working sensor.
- A No Reply sensor is not communicating with the eDART; the sensor may be unplugged.
- A Stale sensor indicates a sensor that is unused.
- An Invalid sensor will indicate a Failure of either Over-range (Ovrng) or Under-range (Undrng). The Ovrng indicates the sensor's calibration has changed too far in a positive direction, outside of the upper specification. The Undrng indicates that the sensor's calibration has changed too far in a negative direction, and the sensor may report a number below zero when load is applied.

WARRANTY

RJG, INC. STANDARD THREE-YEAR WARRANTY

RJG, Inc. is confident in the quality and robustness of the 6519 sensors, and so are offering a three-year warranty on all RJG cavity pressure sensors. RJG's cavity pressure sensors are guaranteed against defects in material and workmanship for three years from the ship date. The warranty is void if it is determined that the sensor was subjected to abuse or neglect beyond the normal wear and tear of field use, or in the event the sensor has been opened by the customer. This new warranty policy is the most generous offered in the cavity pressure sensor industry, with one year being the most common.

PRODUCT DISCLAIMER

RJG, Inc. is not responsible for the improper installation of this equipment, or any other equipment RJG manufactures.

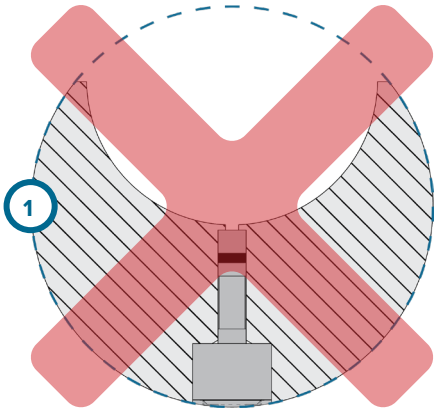
Proper RJG equipment installation does not interfere with original equipment safety features of the machine. Safety mechanisms on all machines should never be removed.

TROUBLESHOOTING

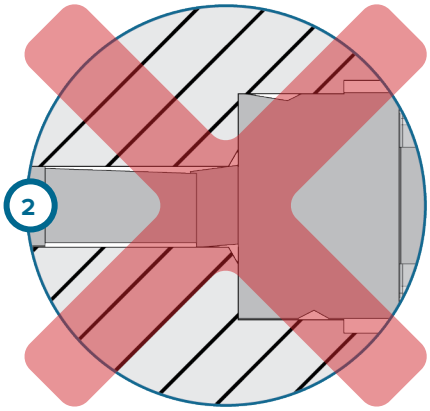
COMMON ERRORS

SENSOR HEAD ISSUES

Sensor head is placed under a steel shut-off (1 at right). The sensor must not be placed in a steel shut-off area; failure to comply will result in failure of sensor to produce the desired data outcomes.

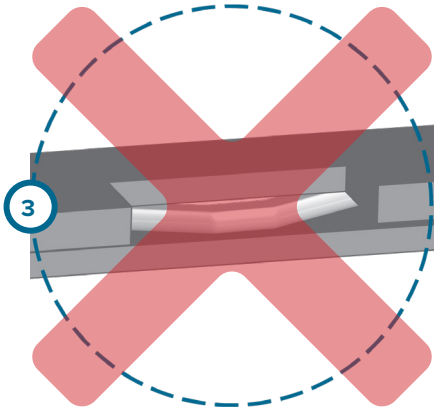


The sensor retaining nut is over-tightened, crushing the sensor (2 at right). Do not over tighten the retaining nut when installing the sensor; failure to comply will result in destruction of sensor.



CABLE ISSUES

Sensor cable is pinched during mold assembly (3 at right). The sensor cable(s) must never be pinched in the mold assembly; failure to comply will result in failure of sensor to produce the desired data outcomes, and damage or destruction of cable.



SENSOR DRIFT

Piezoelectric sensors may experience drift if connections are dirty/contaminated, or have a sensor cable that is damanged. There are three types of drift that the sensors may produce.

3. Slow sensor drift reading.

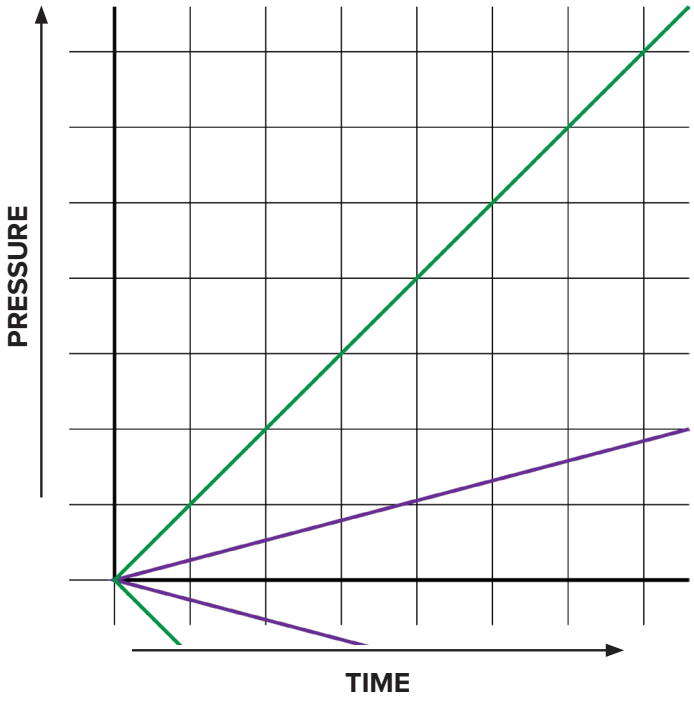
A sensor reading that slowly rises or falls (positive or negative) from the set zero value.

4. Fast sensor drift/invalid reading.

A sensor reading that quickly or rises or falls (positive or negative) from the set zero value, possibly so much that the reading becomes invalid.

5. No sensor/eDART/CoPilot communication.

The sensor reading cannot be obtained by the eDART/CoPilot.



Piezoelectric Sensor Drift Type Graph	
	Fast Drift/Invalid
	Slow Drift

COMMON ERRORS (*continued*)

SLOW SENSOR DRIFT READING

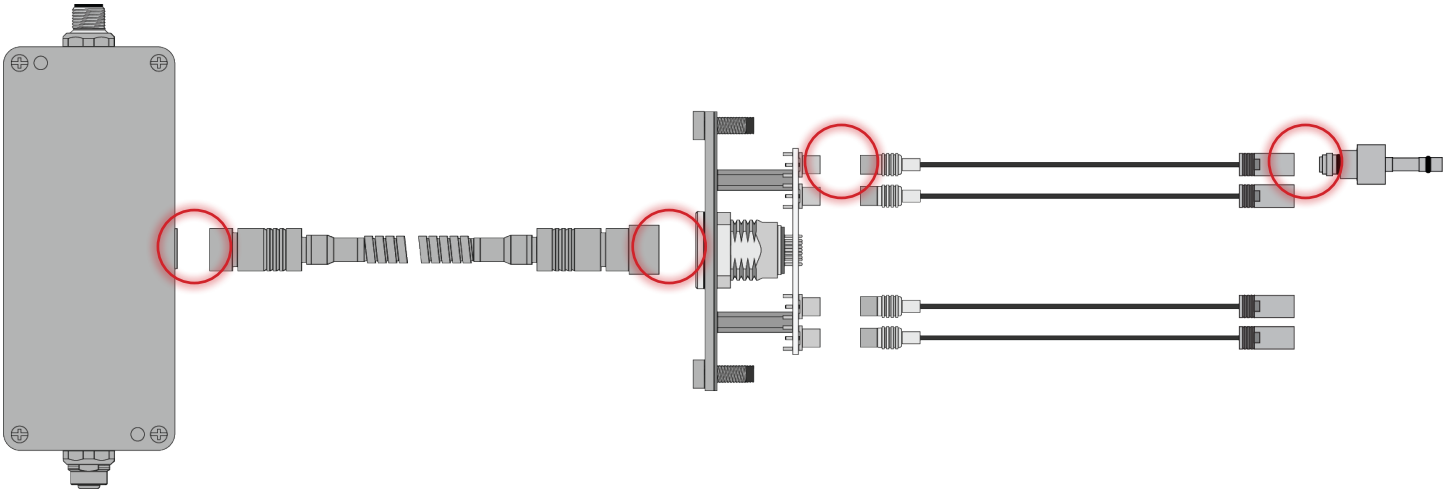
If the sensor reading will not remain steady and drifts positive or negative, the sensor, cables, or adapter connectors may be contaminated. To identify the connector(s) with contamination, perform the following:

1. Disconnect sensor from 1645 or C-PZ/1645 cable and clean ends; if reading continues to drift, continue to next step.
2. Disconnect the 1645 or C-PZ/1645 from the sensor connector or adapter and clean ends; if the reading continues to drift, continue to next step.
3. If applicable, disconnect cable from the sensor connector and clean end and connector; if the reading continues to drift, continue to next step.
4. If applicable, disconnect cable from adapter and clean end and connector; if the reading continues to drift, continue to next step.

If the sensor reading continues to drift after the above troubleshooting steps are completed, either the sensor, cables, connector, or adapter must be replaced.

SINGLE-CHANNEL

MULTI-CHANNEL



COMMON ERRORS (*continued*)

FAST SENSOR DRIFT/INVALID READING

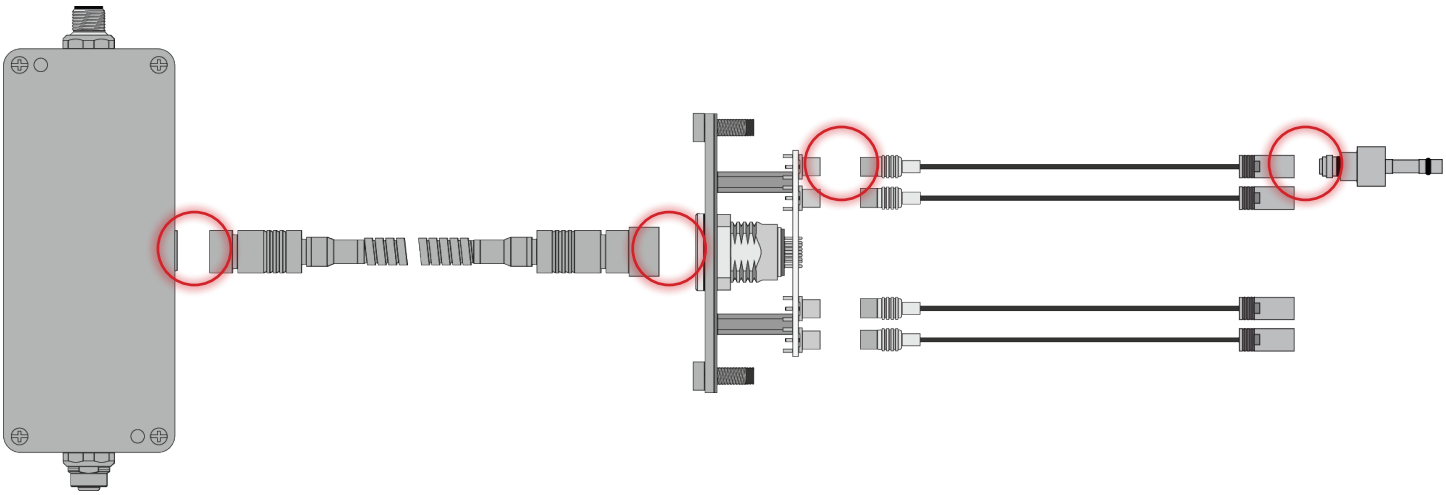
If the sensor reading drifts quickly and becomes invalid, the sensor, cables, or adapter connectors may be heavily contaminated, or the adapter may have failed. To identify the connector(s) with contamination, perform the following:

1. Disconnect sensor from 1645 or C-PZ/1645 cable and clean ends; if reading continues to drift, continue to next step.
2. Disconnect the 1645 or C-PZ/1645 from connector or adapter and clean ends; if the reading continues to drift, continue to next step.
3. If applicable, disconnect cable from the sensor connector and clean end and connector; if the reading continues to drift, continue to next step.
4. If applicable, disconnect cable from the adapter and clean end and connector; if the reading continues to drift, continue to next step.

If the sensor reading continues to drift or remains invalid after the above troubleshooting steps are completed the adapter must be replaced.

SINGLE-CHANNEL

MULTI-CHANNEL



COMMON ERRORS (*continued*)

SENSOR DOES NOT COMMUNICATE WITH eDART/COPILOT

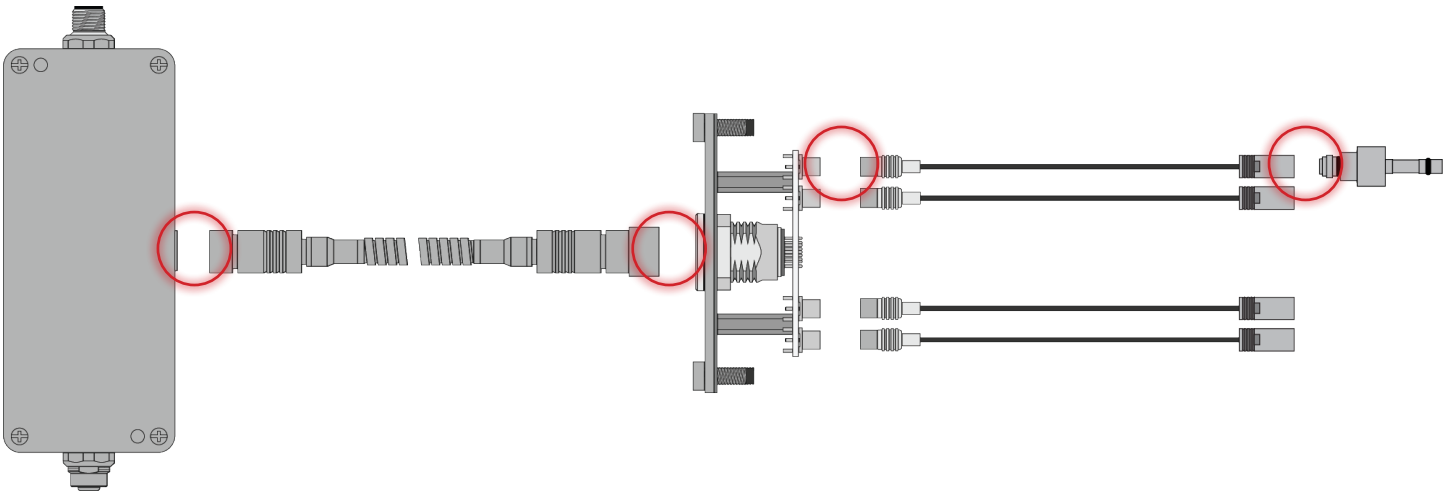
If the eDART/CoPilot system is unable to establish communication with the sensor, the cables or adapter may have failed. To identify the failed component, perform the following;

1. Replace the 1645 or C-PZ/1645 sensor cable with working cable; test sensor operation. If communication remains non-existent, continue to next step.
2. Replace the sensor connector cable with working cable; test sensor operation. If communication remains non-existent, continue to next step.
3. If applicable, replace the sensor adapter cable with working cable; test sensor operation. If communication remains non-existent, continue to next step.
4. Replace the CE-LX5 Lynx cable with working cable; test the sensor operation.

If the eDART/CoPilot system cannot establish communication after these steps, the connector has failed and must be replaced.

SINGLE-CHANNEL

MULTI-CHANNEL



CUSTOMER SUPPORT

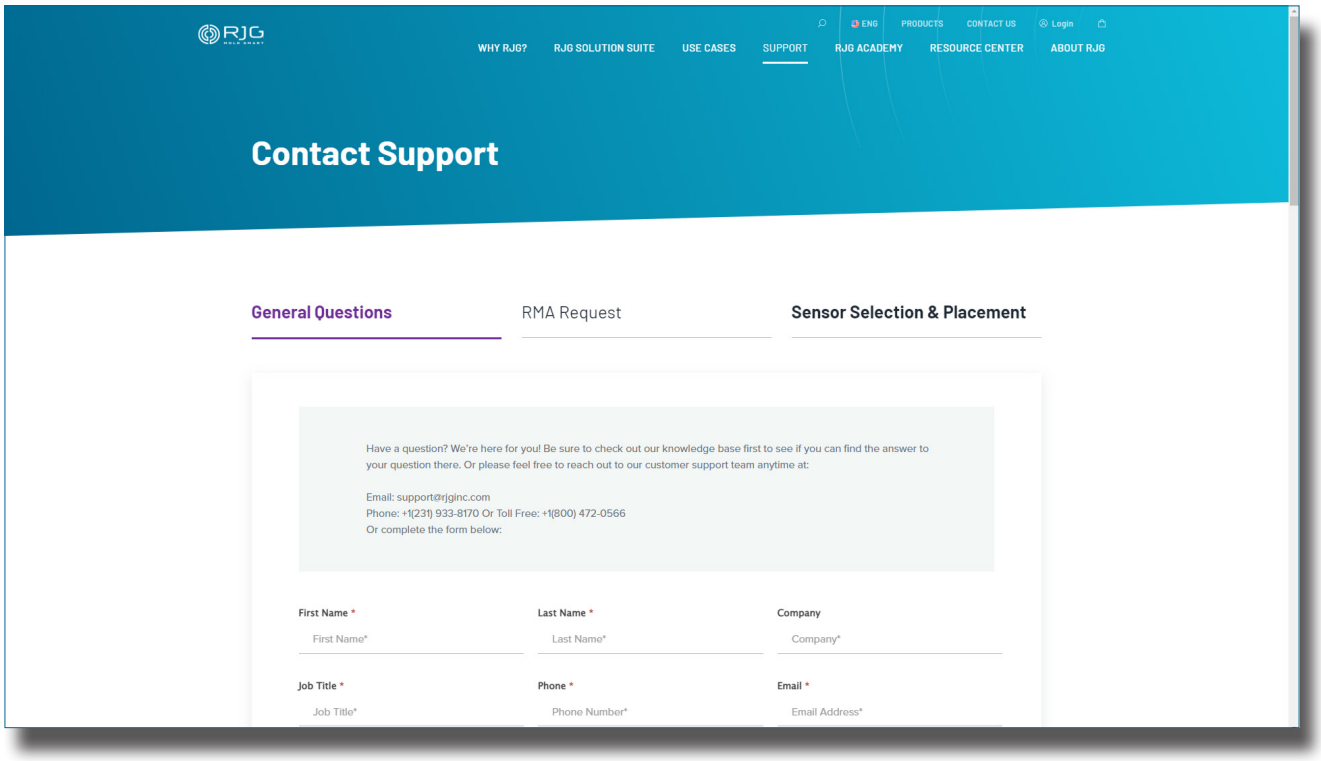
Contact RJG's Customer Support team by phone or email.

RJG, Inc. Customer Support

P: 800.472.0566 (Toll Free)

P: +1.231.933.8170

www.rjginc.com/support



RELATED PRODUCTS

The 6159 is compatible with other RJG, Inc. products for use with the eDART or CoPilot process control and monitoring system.

COMPATIBLE PRODUCTS

LYNX CABLES CE-LX5

The Lynx sensor cable (1 at right) is a polypropylene-coated cable suited for the heat and stress found in injection molding environments. The cable is available in lengths from 12–472” (0,3–12 m), and can be ordered with straight or 90° fittings. One CE-LX5 is required to interface the single-channel sensor adapters LP/LX1-M or PZ/LX1-S with the eDART or CoPilot system.

SINGLE-CHANNEL PIEZOELECTRIC SENSOR CABLE 1645

The single-channel piezoelectric sensor cable 1645 (2 at right) is a PTFE/FEP coaxial cable suited for the injection molding environment. The cable is available in several lengths from 0.2–2.0 m (7.9–78.7”). One 1645 is required to interface the 9204 with a Lynx single-channel piezoelectric sensor adapter and the eDART or CoPilot system.

MULTI-CHANNEL PIEZOELECTRIC SENSOR CABLE C-PZ/1645

The multi-channel piezoelectric sensor cable C-PZ/1645 (3 at right) is a PTFE/FEP coaxial cable suited for the injection molding environment. The cable is available in several lengths from 0.2–2.0 m (7.9–78.7”). One C-PZ/1645 is required to interface each 9204 with a Lynx multi-channel piezoelectric sensor connector and the eDART or CoPilot system.

SIMILAR PRODUCTS

RJG, Inc. offers a wide array of cavity pressure sensors for each application—piezoelectric, strain gage, single-channel, multi-channel, and digital.

FLUSH-MOUNT 4 MM PIEZOELECTRIC CAVITY PRESSURE SENSOR 6157

The 6157 (1 at right) flush-mount piezoelectric sensor from RJG, Inc. is a single- or multi-channel, 4 mm sensor that can withstand forces of up to 29,000 psi (2,000 bar) and maximum temperatures of 392 °F (200 °C).

1

SINGLE/MULTI-CHANNEL 3.5 MM PIEZOELECTRIC SENSOR 9210

The 9210 (2 at right) single- or multi-channel 3.5 mm piezoelectric sensor is a button-style cavity pressure sensor that can withstand forces up to 56 lb (250 N) and temperatures up to 392 °F (200 °C).

2

SINGLE/MULTI-CHANNEL 6 MM PIEZOELECTRIC SENSOR 9211

The 9211 (3 at right) single- or multi-channel 6 mm piezoelectric sensor is a button-style cavity pressure sensor that can withstand forces up to 562 lb (2.5 kN) and temperatures up to 392 °F (200 °C).

3

LOCATIONS / OFFICES

USA

RJG USA (HEADQUARTERS)
3111 Park Drive
Traverse City, MI 49686
P +01 231 947-3111
F +01 231 947-6403
sales@rjginc.com
www.rjginc.com

MEXICO

RJG MEXICO
Chihuahua, Mexico
P +52 614 4242281
sales@es.rjginc.com
es.rjginc.com

FRANCE

RJG FRANCE
Arnithod, France
P +33 384 442 992
sales@fr.rjginc.com
fr.rjginc.com

GERMANY

RJG GERMANY
Karlstein, Germany
P +49 (0) 6188 44696 11
sales@de.rjginc.com
de.rjginc.com

IRELAND/UK

RJG TECHNOLOGIES, LTD.
Peterborough, England
P +44(0)1733-232211
info@rjginc.co.uk
www.rjginc.co.uk

ITALY

NEXT INNOVATION SRL
Milano, Italy
P +39 335 178 4035
sales@it.rjginc.com
it.rjginc.com

SINGAPORE

RJG (S.E.A.) PTE LTD
Singapore, Republic of Singapore
P +65 6846 1518
sales@swg.rjginc.com
en.rjginc.com

CHINA

RJG CHINA
Chengdu, China
P +86 28 6201 6816
sales@cn.rjginc.com
zh.rjginc.com

KOREA

CAEPRO
Seoul, Korea
P +82 02-2113-1870
sales@ko.rjginc.com
www.caepro.co.kr