RJG
MOLD SMART

PRODUCT MANUAL

Single- or Multi-Channel 3.5 mm Piezoelectric Sensor

9210

Training and Technology for Injection Molding

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RELATED PRODUCTS

INTRODUCTION

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

DISCLAIMER

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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 9210 is a single- or multi-channel, indirect (under-pin), 3.5 mm (0.14”) button-style piezoelectric cavity pressure sensor that can withstand forces up to 250 N (56 lb.) and temperatures up to 200 °C (392 °F).

The button-style sensor is ordered with either a single- or multi-channel connection which can be connected to the associated single- or multi-channel plate/adapter (also sold separately). The plate/adapter selected provides not only the sensor’s electronics, but also the connector which enables the interfacing of the sensor with the eDART® or CoPilot® systems; the exclusive Lynx™ digital technology sensors are designed for use with the RJG eDART or CoPilot process control and monitoring systems.

APPLICATIONS

CAVITY PRESSURE SENSORS

Button-style cavity pressure sensors are suitable for injection molding applications in which the following conditions are met:

- Sensor will be installed behind an ejector pin, blade, or core pin.
- Applied plastic pressure is high enough to prevent poor sensor resolution, but low enough to prevent sensor damage.
- Sensor will be kept below 200 °C (392 °F) in the mold; sensor electronics will be kept below 60 °C (140 °F).
- Only one point of contact (single pin) to each sensor.

SINGLE-CHANNEL

The 9210 sensor 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 system.

MULTI-CHANNEL

The 9210 sensor 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—allows up to four sensor connections, while the Lynx eight-channel piezoelectric sensor connector and adapter—PZ-8 and PZ/LX8F-S—allow up to eight sensor connections to the eDART system.

SENSOR AND EJECTOR PIN SIZE SELECTION CHARTS

Locate the pin size that will be used and match it to the location on the part (near the end of fill or near the gate). The recommended sensor is the intersection of the row and column.

RJG® recommends that expected peak force is less than or equal to 75% of the sensor model's full scale. The expected peak force can be determined by multiplying the expected peak plastic pressure at the sensor's pin location by the project surface area of the pin on the cavity wall—this is recommended for each sensor location in an instrumented tool. The expected peak plastic pressure can be found from simulation or similar processes, or estimated from the material tonnage on the material safety data sheet (MSDS).

The charts below are only a guide. In order to assure correct sensor selection for an application, please contact RJG.

1. Imperial Units

Pin Size	END OF FILL AREA BASE PRESSURE >5,000 PSI	POST GATE AREA BASE PRESSURE 10,000 PSI
3/64”	9210	9210
1/16”	9210	9210
5/64”	9210	9210
3/32”	9210	-
7/64”	9210	-
1/8”	-	-

2. Metric Units

Pin Size	END OF FILL AREA BASE PRESSURE >5,000 PSI	POST GATE AREA BASE PRESSURE 10,000 PSI
1.0 mm	9210	9210
1.5 mm	9210	9210
2.0 mm	9210	9210
2.5 mm	9210	-
3.0 mm	-	-

OPERATION

INDIRECT (UNDER-PIN)

The single/multi-channel piezoelectric sensor is placed in a mold behind an ejector pin. As plastic is injected into the cavity, force is applied to the ejector pin. The plastic pressure force is transfered to the sensor.

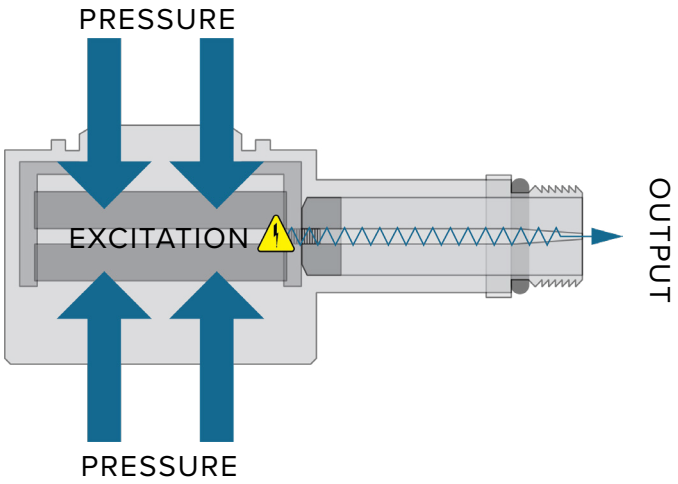
PIEZOELECTRIC SENSORS

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.

Piezoelectric quartz crystals contain balanced negative and positive electrical charges which are not symmetrically arranged. When force is applied to the piezoelectric crystal, the positive and negative atoms are deformed, pushing some of the atoms closer or further apart and causing electrical charges to occur.

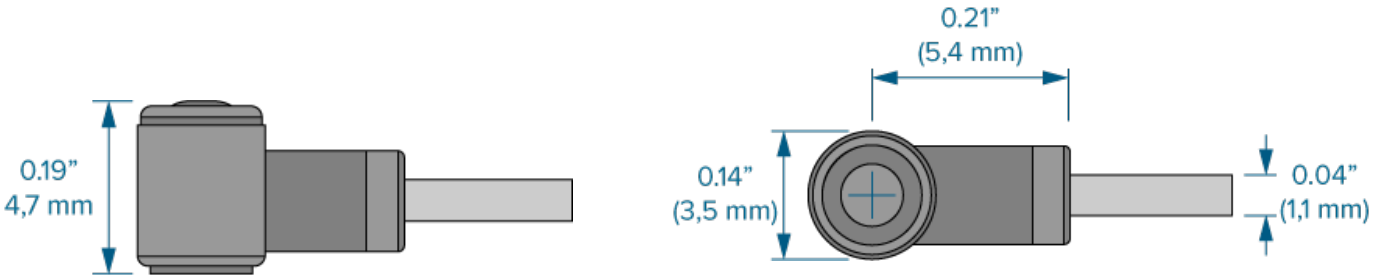
The sensor adapter is connected to the RJG, Inc. eDART system, which records and displays the sensor's measurement for operator aid in process monitoring and control.

PIEZOELECTRIC SENSOR OPERATING PRINCIPLE



DIMENSIONS

SENSOR



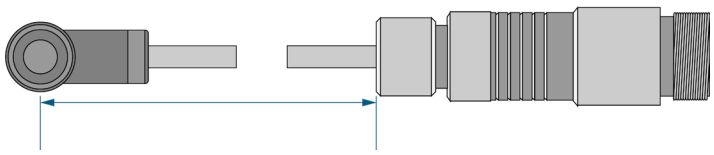
SENSOR LOADING DISC

The sensor loading disc is installed in the sensor pocket below the sensor to provide a smooth sensor support bottom and sharp corner pockets.

CABLE LENGTH

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
9210-0.2	9210-PZ-0.2	0,2 m (7.90”)
9210-0.4	9210-PZ-0.4	0,4 m (15.75”)
9210-0.6	9210-PZ-0.6	0,6 m (23.60”)
9210-0.8	9210-PZ-0.8	0,8 m (31.50”)
9210-1.2	9210-PZ-1.2	1,2 m (47.24”)
9210-1.6	9210-PZ-1.6	1,6 mm (62.99”)
9210-2.0	9210-PZ-2.0	2,0 mm (78.74”)



SINGLE-CHANNEL CABLE LENGTH

MULTI-CHANNEL CABLE LENGTH

INSTALLATION

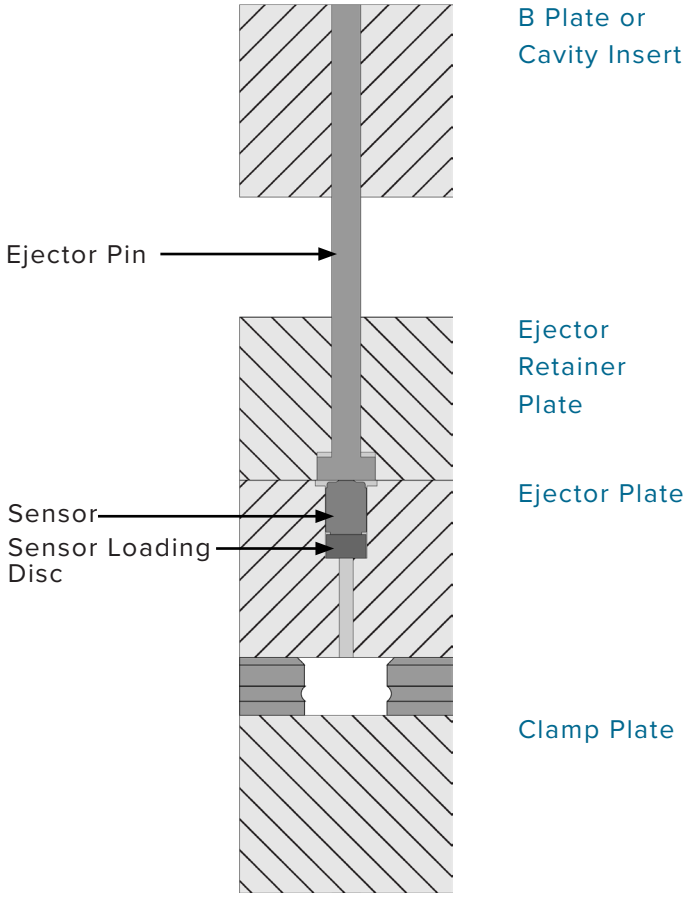
Sensors are placed in the ejector plate behind ejector pins. Ejector pins provide a simple, straightforward method of installation in which sensors may be installed; ejector pin installation requires less machining and less equipment to achieve.

INSTALLATION OVERVIEW

EJECTOR PLATE INSTALLATION

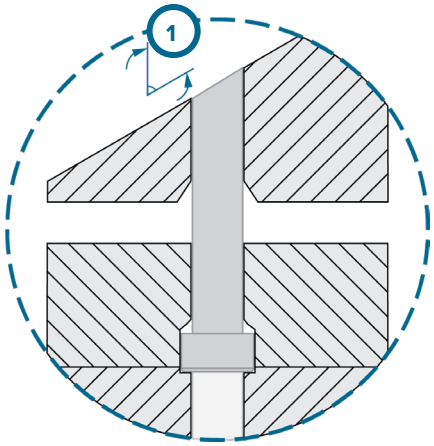
The sensor adapter case or sensor plate is mounted outside of the mold. A channel is machined into the ejector plate for the sensor cable; the sensor head is placed above the sensor loading disc to ensure a smooth pocket surface with sharp corners, and under the ejector pin in the ejector plate. The ejector pin is retained in the ejector retainer plate and reaches through to the B-Plate or cavity insert (refer to figure at right).

EJECTOR PLATE INSTALLATION



ANGLED EJECTOR PINS

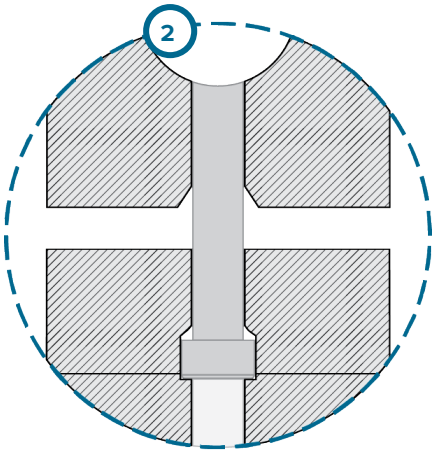
Ejector pins that are located on angled surfaces of a part can utilize sensors depending on the angle of the pin. The maximum pin angle that can be used with sensors is 30° (1 *at right*). Beyond 30°, force is lost to friction as the pin is pushed sideways against the mold steel instead of directly back onto the sensor, which in turn can create errors in sensor readings. If the angle is greater than 30°, contact RJG customer support for assistance in verifying suitability for use with an RJG sensor (refer to "Customer Support" on page 30).



CONTOURED EJECTOR PINS

Ejector pins that are located on contoured surfaces of a part can be used on either concave and convex surfaces (2 *at right*) provided the shape of the contour is symmetric, as this cancels out any sideways forces generated by cavity pressure pushing on the pin.

Do not use an asymmetrically-contoured ejector pin if the net contour is greater than a comparable pin with a 30° angle. If a contour is unique or asymmetrical, contact RJG customer support for assistance in verifying suitability for use with an RJG sensor (refer to "Customer Support" on page 30).



INSTALLATION SPECIFICATIONS

EJECTOR PLATE INSTALLATION

1. Sensor Pocket Machining

Sensor pockets are machined into the ejector plate. The pockets must be centered under the selected ejector pin measuring 0.141”±0.001 (3,58 mm ±0,02 [1 at right]) DIA, and 0.264” +0.0/-0.002 (6,70 mm +0,0/-0,05 [2 at right]) deep.

- Use a “dead sharp” end mill to achieve correct radius—sensor pocket corner radius MAX R 0.004” (0,10 mm [3 at right]).

Machine a knockout hole for the sensor loading disc and sensor measuring 0.05” (1,2 mm [4 at right]) DIA MAX.

CAUTION *DO NOT pull on sensor cable to remove sensor from mold—use knockout hole. Failure to comply will result in damage or destruction of equipment.*

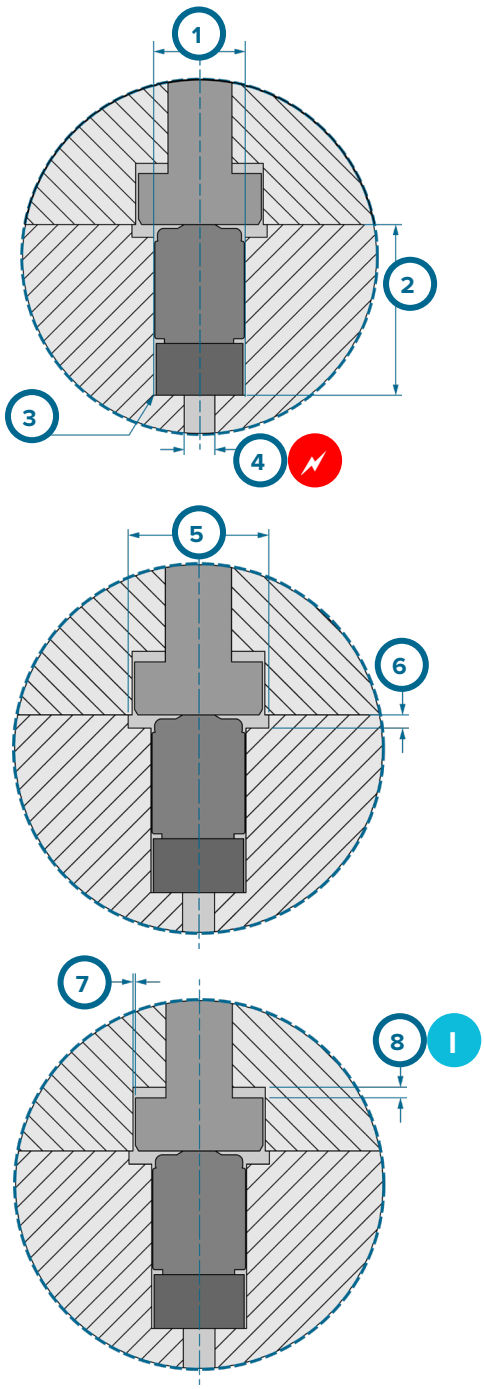
Machine a counterbore into the ejector plate equal to the ejector pin head DIA plus 0.01” (0,3 mm) MIN by 0.02” (0,5 mm) MIN deep to allow the head of the ejector pin to clear the plate and rest only on the sensor when under pressure (5 & 6 at right).

2. Ejector Pin

Choose an ejector pin appropriate for the application (refer to *“Sensor and Ejector Pin Size” on page 2*). Machine a pocket for the ejector pin head in the ejector retainer plate that is equal to the ejector pin head DIA plus 0.010” (0,25 mm [7 at right]) MIN per side by ejector pin height plus 0.01” (0,3 mm [8 at right]) MIN to eliminate potential preload on the sensor when installed.

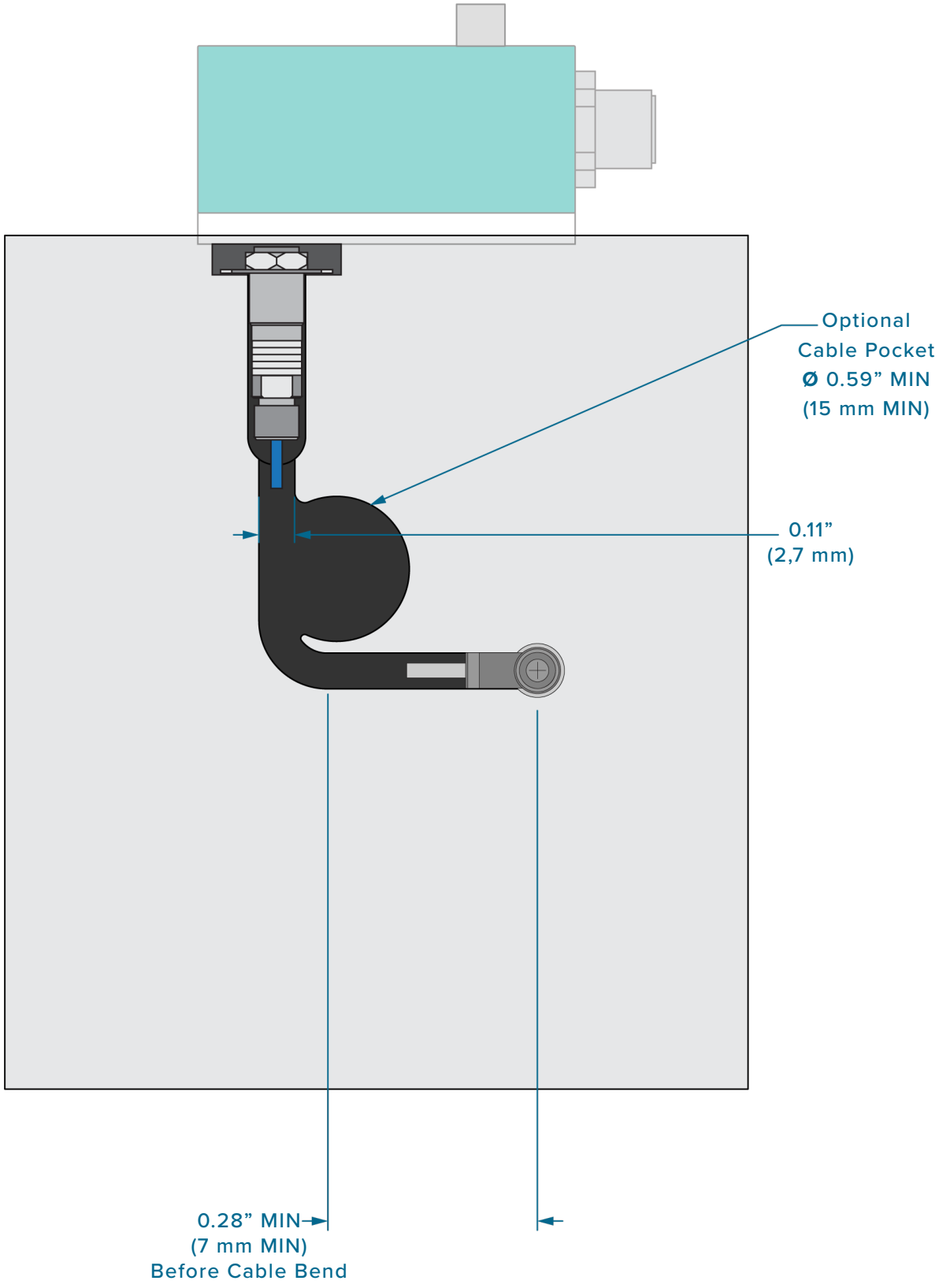
NOTES *Ejector pin head clearance not to exceed 20% (1/5th) of part thickness at point of pin/part convergence.*

Hole basis for ejector pins is ISO standard clearance fit H7g6—H7g6 is a sliding fit suitable for precision location fits.



1	0.141” ±0.001 (3,58 mm ±0,02)
2	0.264” +0.0/-0.002 (6,70 mm +0,0/-0,05)
3	R. 0.004” (0,10 mm) MAX
4	Ø 0.05” (1,2 mm) MAX Knockout Hole
5	Ejector Pin Ø + 0.01” (0,3 mm) MIN
6	0.02 (0,5 mm) MIN
7	Ejector Pin Head Ø + 0.01” (0,25 mm) MIN Per Side
8	20% part thickness if < 0.05” (1,5 mm), 0.01” (0,3 mm) if part thickness > 0.05” (1,5 mm)

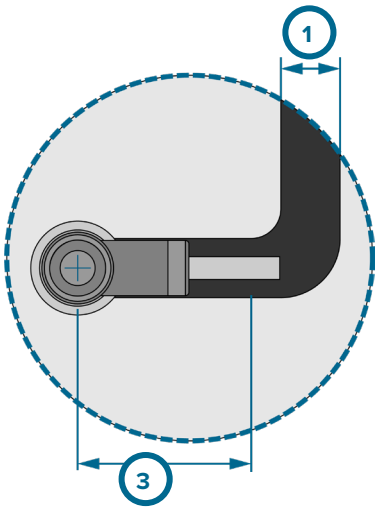
SENSOR STEM AND CABLE CHANNELS



INSTALLATION SPECIFICATIONS (*continued*)

1. Sensor Stem and Cable Channels

- Machine a pocket for the sensor stem, and cable channels, 0.11” (2,7 mm [1 *at right*]) wide by 0.19” (4,7 mm [2 *not shown*]) deep.

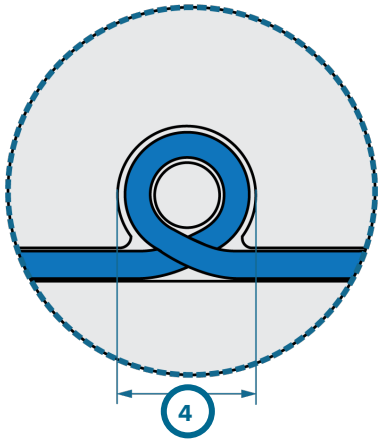


2. Sensor Cable Bend

The sensor cable must not be bent within 7,0 mm (0.28” [3 at right]) MIN of sensor cable head.

3. Excess Cable Pocket

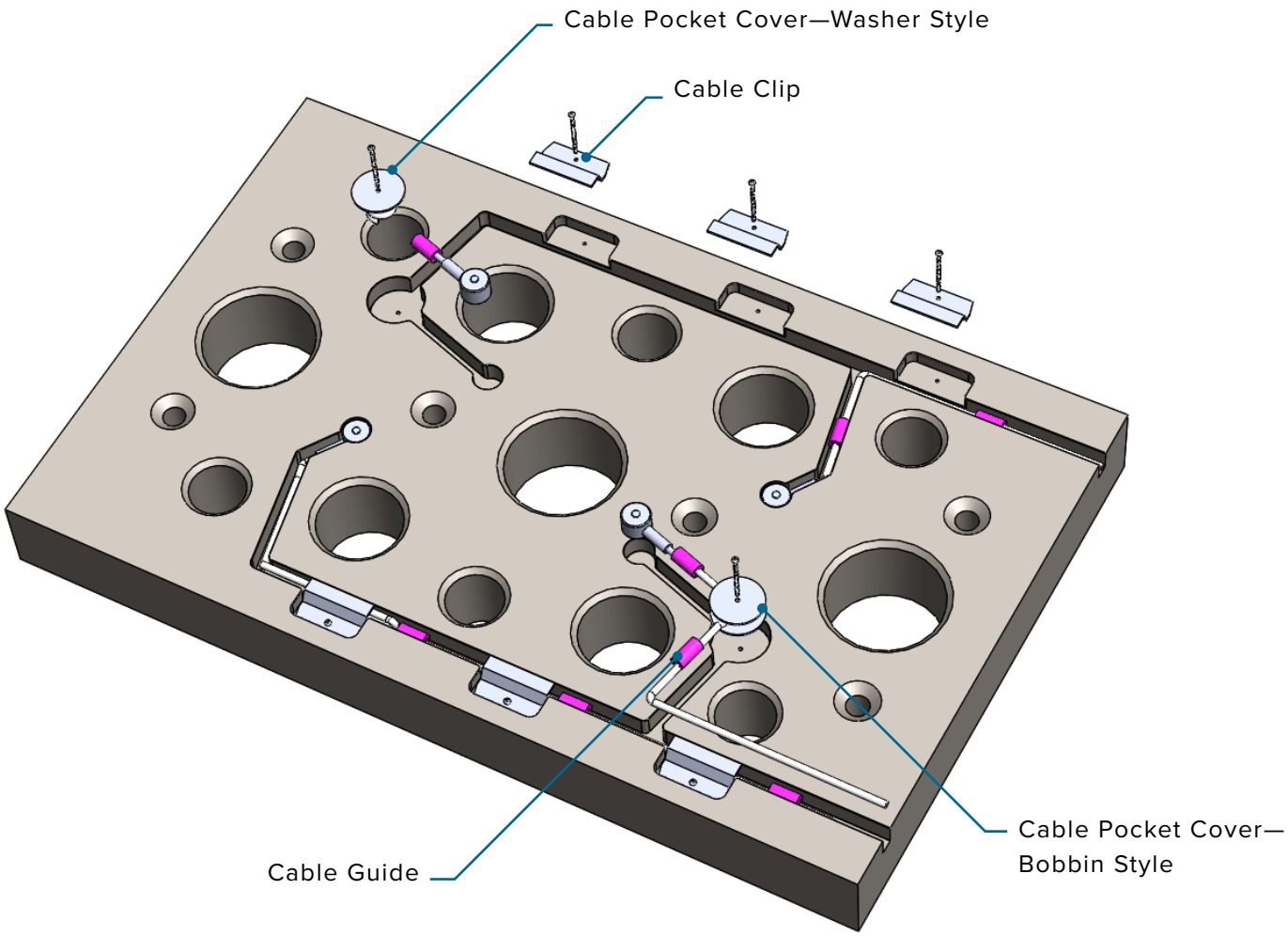
If necessary, a cable pocket may be machined to store excess cable 0.59” (15 mm [4 at right]) for the cable to coil; the cable has a 0.197” (5 mm) MIN internal bend radius.



1	0.11” (0,27 mm)
2	0.19” mm (0,47)
3	0.28” (7 mm) MIN
4	0.59” (15 mm)

SENSOR CABLE RETENTION

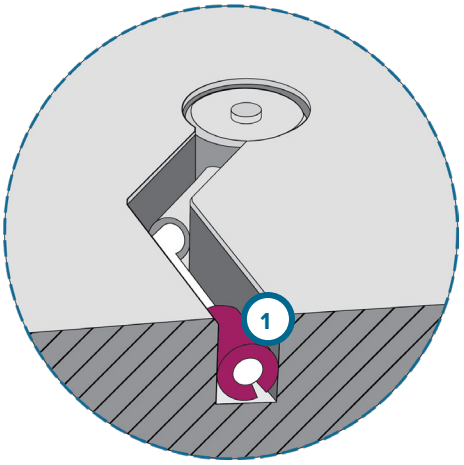
Sensor cable retention strategies must be considered during the mold design phase. Cables are often not the exact size needed, or do not easily remain in the cable channels during assembly and must be retained using one or more of the following methods.



INSTALLATION SPECIFICATIONS (*continued*)

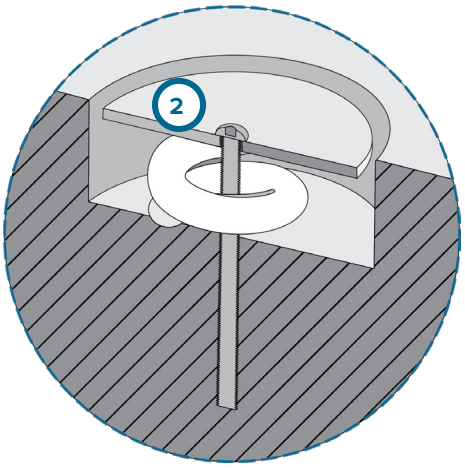
1. Cable Guides

Use self-locking cable guides (**1 AT RIGHT**) in cable channels to retain the sensor cable. Cable guides are silicone rubber tubes with a slot in them to accommodate the sensor cable; the cable guides fit snugly within the cable channel dimensions provided.



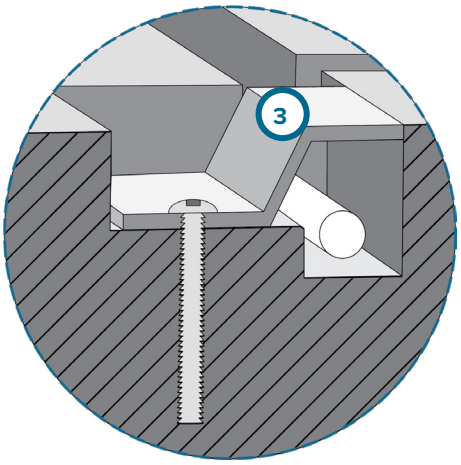
2. Cable Pocket Covers

If excess cable pockets are present, it may be useful to provide a cover (**2 AT RIGHT**) for the cable pocket with which to retain extra cable. Though RJG does not currently provide a solution specifically for this application, plastic or metal discs with a centrally-located hole, retained by a single bolt through the center, can be used to easily retain cable within the pocket. Alternatively, a bobbin-style device can be used similarly to retain cable within a pocket.



3. Cable Clips

Cables may also be retained in channels using cable clips (**3 AT RIGHT**) ; RJG does not currently provide this solution. Clips can be formed from sheet or plate metal and retained by machine screws. The clips can supplement or replace the use of silicone rubber cable guides, enabling an easier assembly of the tool.



4. Cable Retention Putty

Use cable retention putty to retain sensors where self-locking cable guides will not be effective, such as multiple sensor cable channels.

NON-STANDARD INSTALLATIONS

STATIC (NON-MOVING) EJECTOR PINS

While cavity pressure sensor installation with moving, or “working” ejector pins is recommended, in some situations a non-moving or “static” pin must be utilized. In most cases, static pins are installed directly into the cavity plate, or into a cavity insert. In some cases, static pins will extend through multiple plates, such as applications that extend back to the clamp plate. Read and follow all instructions, and refer to the provided figures to properly install sensors with static ejector pins.

1. Static Ejector Pins Overview

Static ejector pins are non-moving pins which sit on top of button-style sensors to transfer plastic pressure in the cavity to the sensor in a mold plate. Unlike moving ejector pins which self-clean during each ejection cycle, static pins can allow build-up of material around the pin over time. Static pins should have an O-ring on the end of the pin to prevent contamination build-up that contributes to measurement errors, allowing the sensors to read accurately over time.

Successful static pin installation provides lower sensor and installation costs; easier sensor maintenance; flexibility in sensor and pin sizing; and freedom in sensor location.

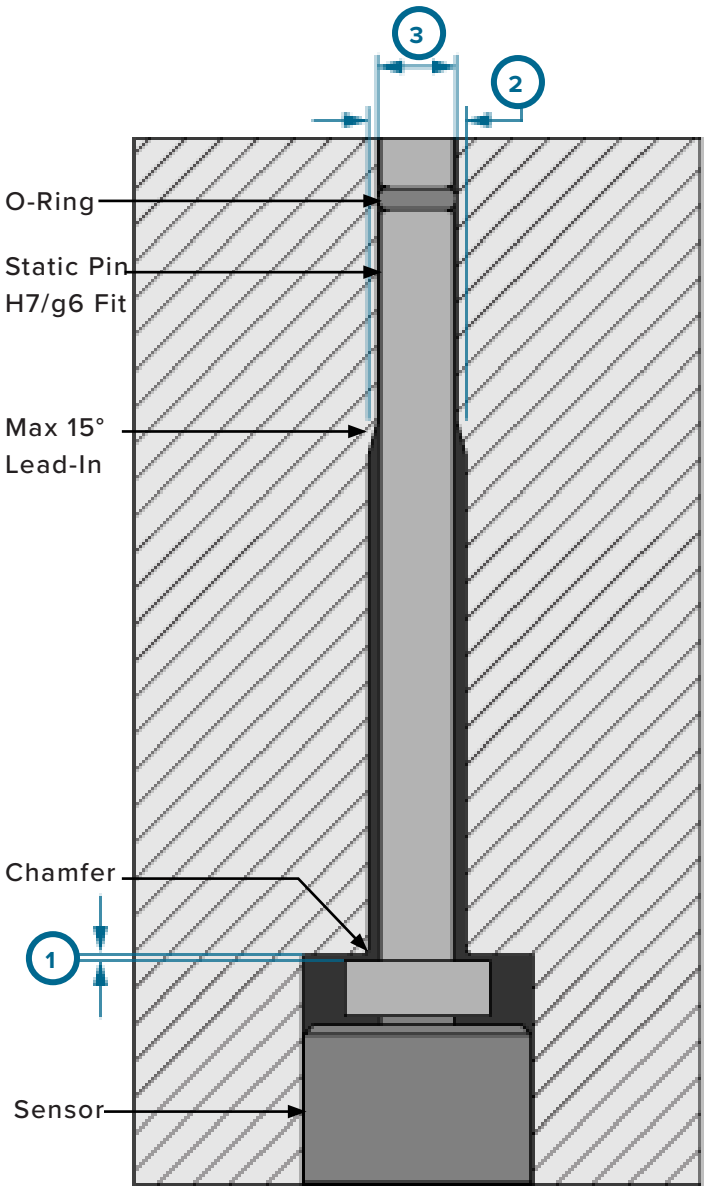
2. Ejector Pin Bore and Lead-In

Provide space in the sensor pocket for the sensor and static pin allowing for clearance above the pin head equal to 1/5th of the part thickness at pin location (1 **AT RIGHT**) if part thickness is less than or equal to 0.06” (1,5 mm), or 0.012” (0,3 mm [1 **AT RIGHT**]) if the part thickness at pin location is greater than 0.06” (1,5 mm).

From the sensor and pin head pocket, provide a clearance of the pin diameter plus 0.06” (1,5 mm [2 **AT RIGHT**]).

Step down the bore to a standard ejector pin bore of H7/g6 (3 **ABOVE**) (in which the ejector pin is able to freely move) before the cavity to provide a sealing surface for the O-ring at the end of the static pin. Chamfer the transition between the sensor and pin head pocket and the pin bore, and also the transition between the pin bore and standard fitment at the end of the pin (no more than 30°/15° per side).

STATIC PIN INSTALLATION



CAUTION *These guidelines are for pins 3/32” (2,5 mm) diameter or larger. Please contact RJG Customer Support for installation of static pins smaller than 3/32” (2,5 mm) in diameter*

NON-STANDARD INSTALLATIONS (*continued*)

3. O-ring Sizing

O-ring sizes are designated by inside diameter (ID [1 **AT RIGHT**]) and cross section (CS [2 **AT RIGHT**]), usually in inches. A 0.072 X 0.036 O-ring would have an ID of 0.072" and a CS of 0.036".

The O-ring is installed in the ejector pin's groove. The groove is measured by diameter (3 **AT RIGHT**) and width (4 **AT RIGHT**). The diameter is cut to ensure O-ring stretch of 0–10%. The depth is cut to ensure O-ring compression of 20–35%. Ensure the pin end before O-Ring groove is 0.030" (0,76 mm [5 **AT RIGHT]) MIN FOR STEELSAFE.** Contact RJG® for assistance in sizing and tolerancing O-rings and installation requirements. Refer to the table below for RJG recommended, in-stock O-rings.

4. O-Ring Installation

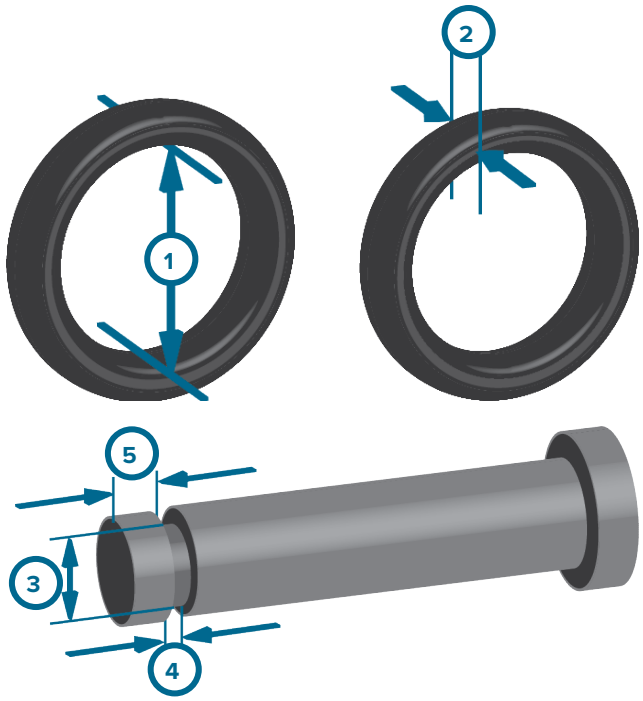
Improper O-ring installation can cause tears if it is pulled over the sharp ejector pin edge. Use an installation tool constructed of the same diameter as the ejector pin, with a tapered end.

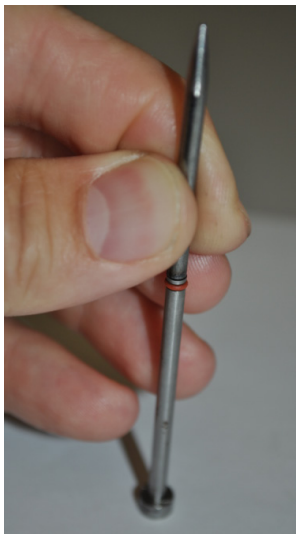
The end can be ground, usually by a grinding wheel, and buffed by a wire wheel to remove any burrs. Slide the O-ring onto the tapered end of the installation tool, and then slide onto the end of the static pin. (Refer to figures at right.)

5. Pin and O-Ring Bore Installation

Use an O-ring lubricant to help prevent damage when inserting the pin into the bore. Many silicone-based lubricants can damage silicone O-rings. RJG, Inc. recommends P-80 THIX lubricant from International Products Corporation (http://www.ipcol.com/shopexd.asp?id=31). Rotate the pin as it is being inserted to ease installation and limit potential O-ring damage.

STATIC (NON-MOVING) EJECTOR PINS





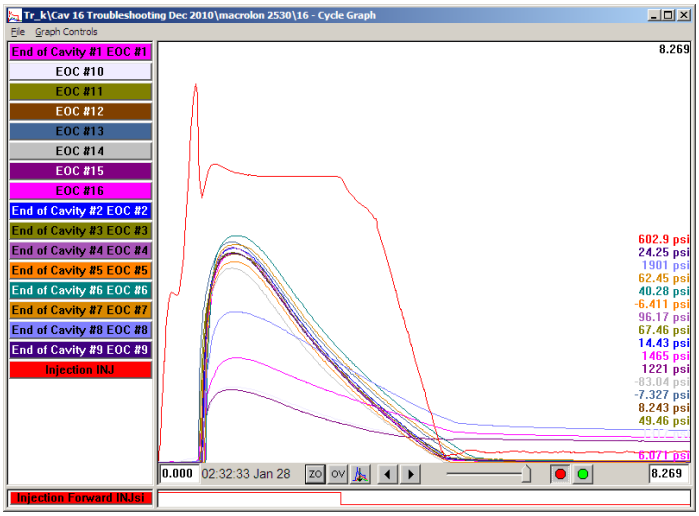
O-RING					GROOVE SPEC.				BORE SPEC.	
Nominal Pin Size	Material	Size (Metric)	RJG Part #	Units	Width (4, above)	Width Tol (+/-)	Groove DIA (3, above)	DIA Tol (+/-)	Bore DIA	Bore Tol (+ Tol, -0)
4,0 mm	Silicone	2,7 x 0,65	85-6157-000	inches	0.038	0.003	0.1137	0.0019	0.1575	0.0005
2,5 mm		1,4 x 0,6	85-6159-000		0.032	0.003	0.0667	0.0010	0.0984	0.0005
4,0 mm		2,7 x 0,65	85-6157-000	mm	1,00	0,08	2,888	0,048	4,0	0,012
2,5 mm		1,4 x 0,6	85-6159-000		0,80	0,08	1,695	0,025	2,5	0,012

NON-STANDARD INSTALLATIONS (*continued*)

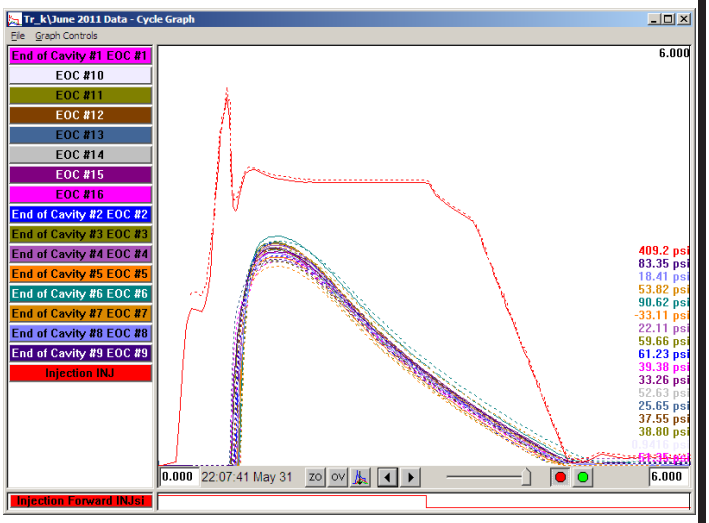
6. Sensor Readings

Data from the same mold is pictured below (typical results—not guaranteed).

Without O-Ring Installation



With O-Ring Installation



Above Left: Three sensors are reading too low due to contamination—without O-rings installed.

Above Right: The template and solid lines after four months of continuous production; the sensors continue to read consistently with O-rings installed.

Proper installation will provide a long service life of O-rings inside the mold. Only in the event of the following two instances will O-rings require replacement:

7. Flashing

If material flashes around the pin, it is necessary to pull the pin and remove the flashed material during regular preventative maintenance cycles. The O-ring must be replaced.

8. O-Ring Damage

When a pin is removed for inspection and/or cleaning during mold maintenance, inspect the O-ring for damage. Repeated installation and removal can cause nicks, cuts, or other damage to O-rings. Damaged O-rings must be replaced.

MULTIPLE EJECTOR PINS

Ejector pins are often grouped in small areas that do not allow for traditional cavity pressure senor installation. Read and follow all instructions, and refer to the provided figures to properly install sensors with multiple ejector pins.

1. Multiple Ejector Pin and Sensor Placement

When multiple ejector pins are located too closely together to permit cavity pressure sensor placement under a single pin, a cover plate can be utilized to allow a selected pin to contact the sensor and prevent other pins from interfering.

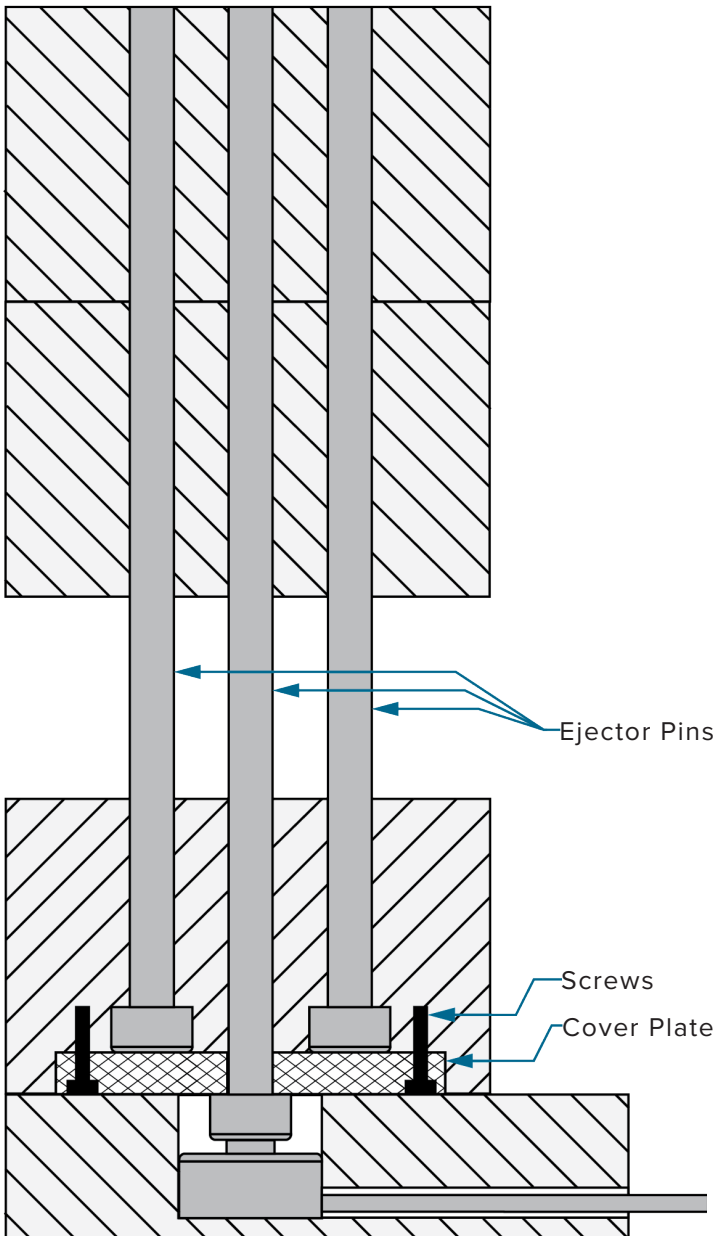
The ejector pin retainer plate is modified to fit the cover plate so that it is recessed and flush with the ejector plate, and covers the area of the sensor body and unused ejector pins. The cover plate is mounted with four screws.

The cover plate mounting screws must be flush with the ejector plate and must not be in contact with the ejector pins, since constant pressure on the screws will cause them to fail.

2. Ejector Pin and Counter-Bore Clearance

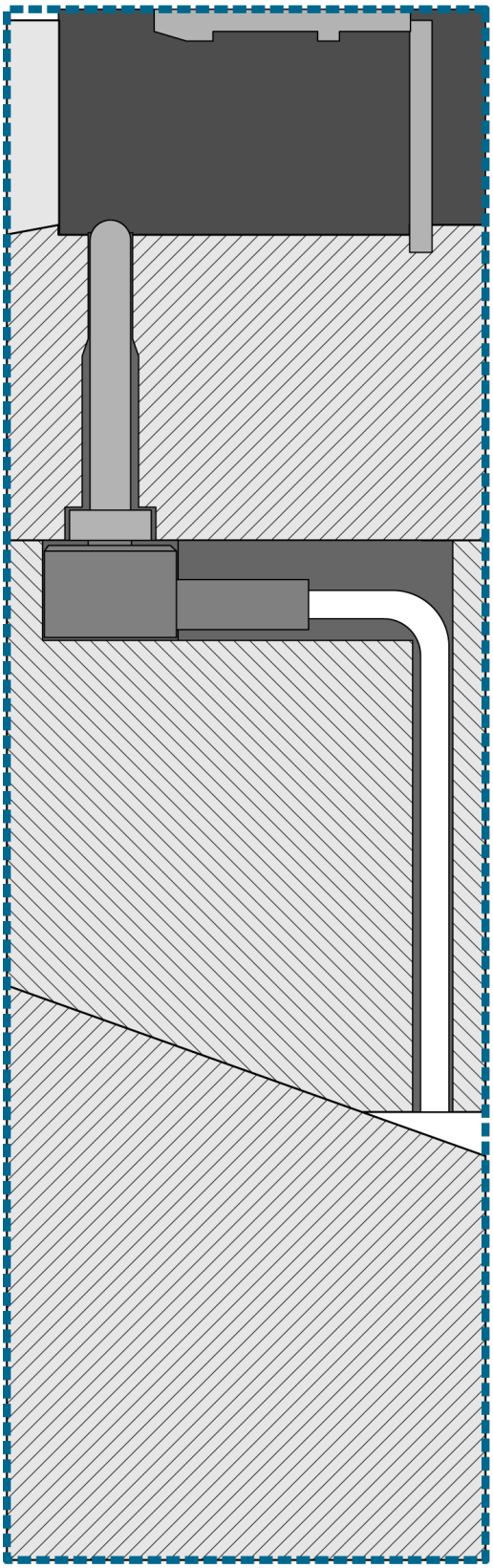
Always use standard ejector pin clearances when installing cavity pressure sensors under ejector pins to prevent damage or destruction of the pins, sensors, and mold. Proper ejector pin head and counter-bore clearance will allow the static pin to move freely in the ejector pin bore.

PIN, SENSOR, & PLATE INSTALLATION



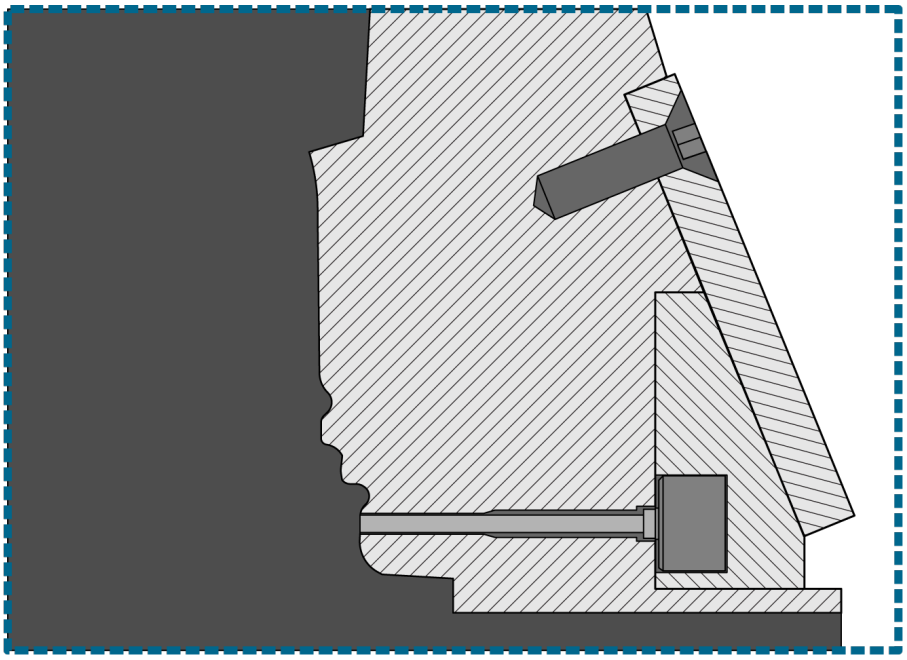
NON-STANDARD INSTALLATIONS (*continued*)

STATIC PIN EXAMPLE



NON-STANDARD INSTALLATIONS (*continued*)

STATIC TRANSFER PIN EXAMPLE



NOTES

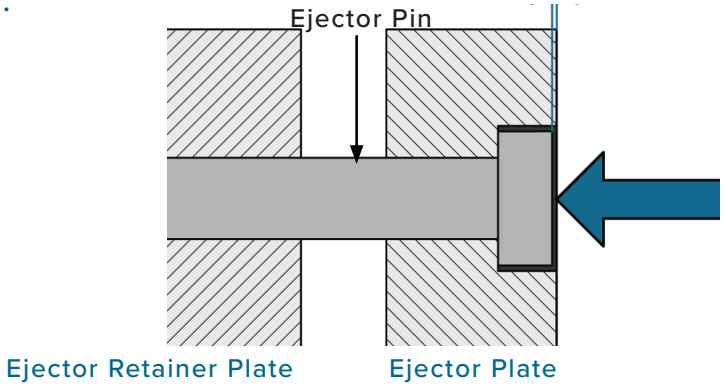
SENSOR INSTALLATION CHECK—EJECTOR PLATE INSTALLATIONS

Verify that the each sensor, transfer pin, and ejector pin pocket is machined correctly.

PRE-ASSEMBLY CHECKS

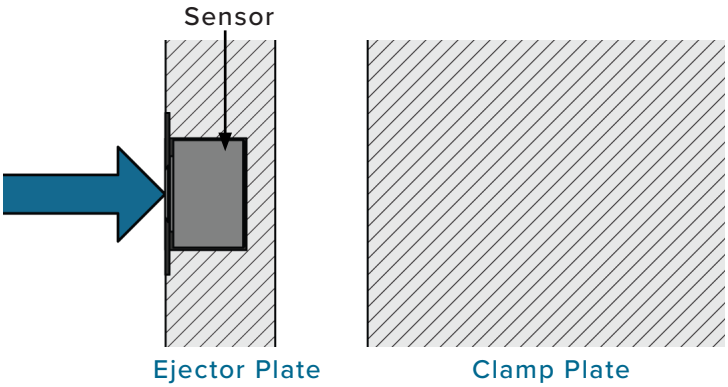
1. Indentation Test (with Ejector Pin)

With the ejector pin installed, push on the ejector pin; verify the clearance of 0.012” (0,3 mm (or 1/5 part thickness)) exists between the bottom of the ejector pin head and the ejector plate surface.



2. Flush Test (with Sensor)

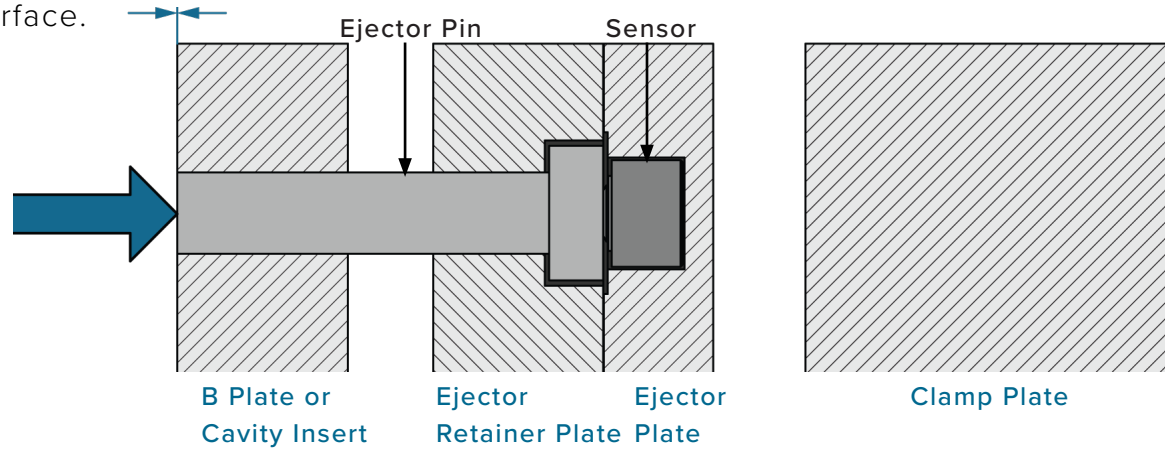
With the sensor installed in the ejector retainer plate, verify that the counterbore depth equals (0,5mm) (if needed) and the counterbore diameter is larger than the ejector pin head. The sensor head should be flush with the ejector retainer plate.



POST-ASSEMBLY CHECK

1. Flush Test (Full Stack)

With the sensor and ejector pin installed, and the ejector plate in the injection position, fixed towards clamp plate, the ejector pin should be flush with the ejector plate/cavity surface.

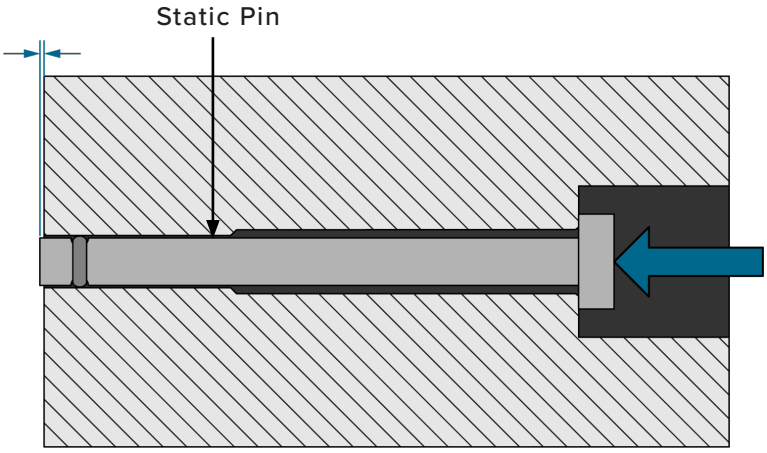


SENSOR INSTALLATION CHECK—STATIC PIN INSTALLATIONS

Verify that the each sensor and static pin pocket is machined correctly.

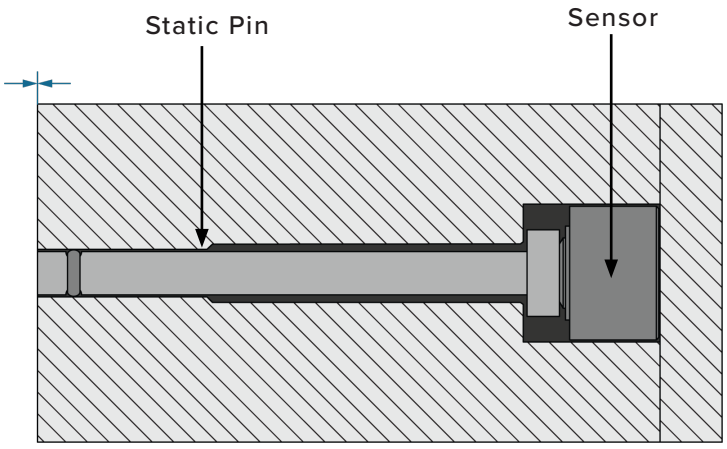
1. Protrusion Test (without sensor)

With only the static pin installed, push on the static pin; verify the pin protrudes clearance above the pin head equal to 1/5th of the part thickness at pin location if part thickness is less than or equal to 0.06” (1,5 mm), or 0.012” (0,3 mm) if the part thickness at pin location is greater than 0.06” (1,5 mm).



2. Flush Test (with sensor)

With the plates disassembled, sensor and pin in place, and cover plate removed, the end of the static pin should be flush with the plate surface.



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 9210 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 original ship date of purchase. 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

INSTALLATION ERRORS

EJECTOR PIN ISSUES

1. Pin size, expected pressure,and/or expected temperature not appropriate for selected sensor.

   - Refer to”Sensor and Ejector Pin Size” on page 2.

2. Ejector pin is located behind mold surface with angle greater than 30° (1 at right).

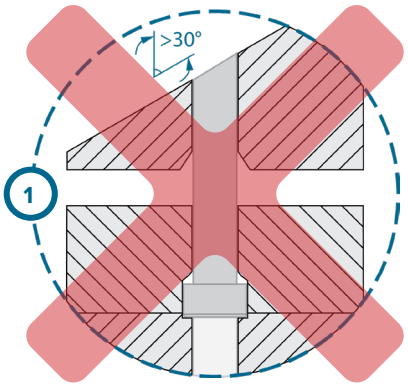
   - Angles greater than 30° cause excessive side-load friction and influence sensor accuracy.

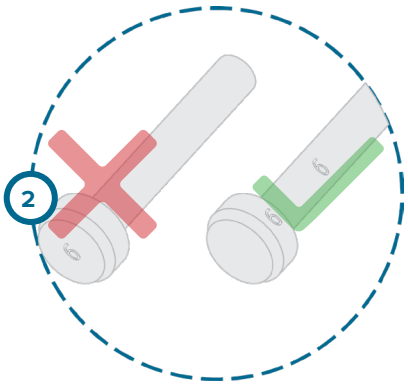
3. Pin is engraved on head (2 at right).

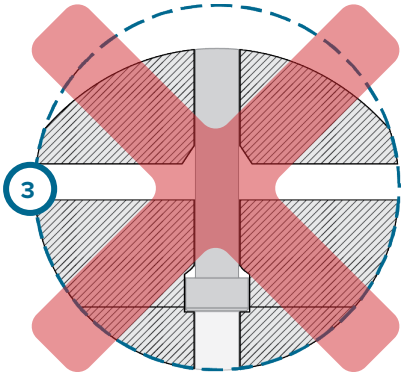
   - Pin heads must remain flat. Engrave pins on the side if necessary.

4. Ejector pin is contoured convexly (3 at right).

   - The ejector pin must not but contoured convexly. The convex shape deflects pressure off of the pin similar to a +30° angle, preventing the pin from properly transferring cavity pressure to the sensor head, thus creating an inaccurate reading. Beyond 30°, force is lost to friction as the pin is directed sideways into the mold steel instead of directly back onto the sensor. This effect will be magnified by smaller pins that are subjected to lower forces.





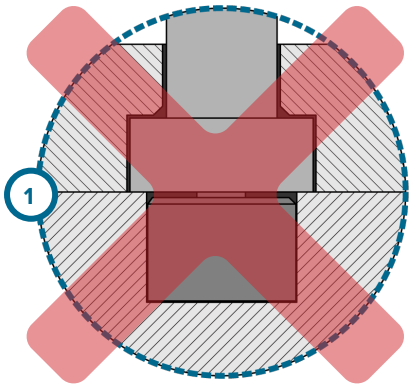


INSTALLATION ERRORS (*continued*)

SENSOR HEAD ISSUES

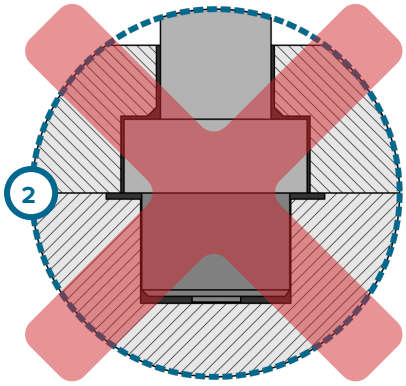
1. Ejector Pin head diameter is larger than sensor pocket diameter (1 at right).

   - Counterbore the ejector plate, or chamfer the pin head to ensure that the pin rests only on the sensor nub.



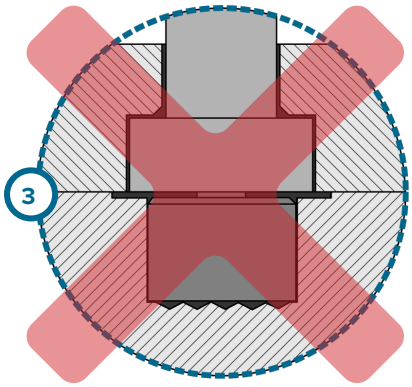
2. Sensor head is installed incorrectly (2 at right).

   - The sensor nub must face the ejector pin. DO NOT install the sensor head upside-down.



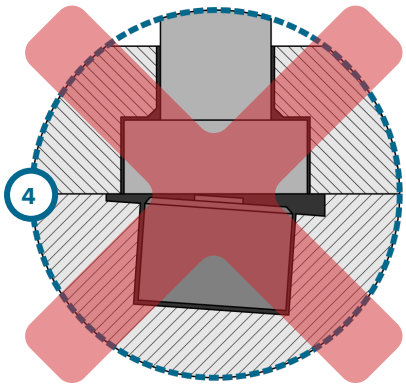
3. Sensor pocket surface is not smooth (3 at right).

   - The mold surface must have a finish of $\sqrt{32}$ or better; the sensor pocket must have a smooth surface.



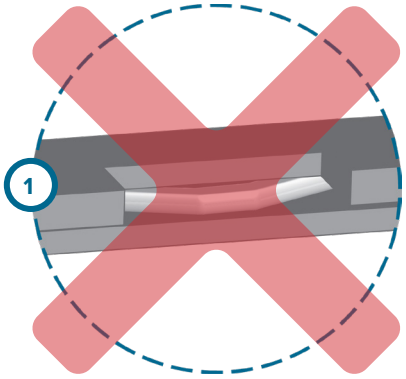
4. Sensor and ejector pin are not perpendicular (4 at right).

   - The sensor and ejector pin must be perpendicular.



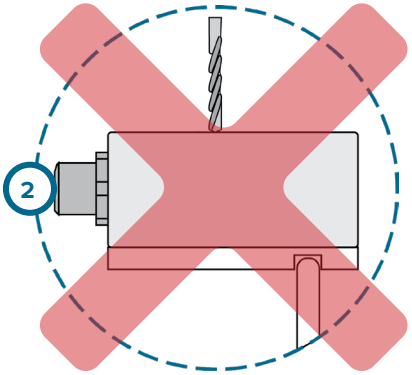
CASE AND CABLE ISSUES

1. Sensor cable is pinched during mold assembly (1 at right).



2. Sensor case or adapter is mounted on surface that exceeds temperature rating.

- Do not mount the Lynx case or adapter on surface that exceeds the recommended temperature rating. Contact RJG, Inc. Customer support for high-temperature applications.

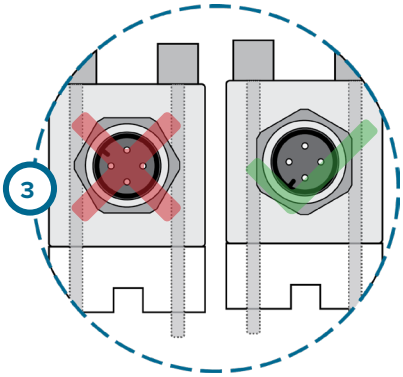


3. Lynx case or adapter is drilled to accommodate alternate mounting (2 at right).

- NEVER drill the Lynx case or adapter. Failure to comply will result in damage or destruction to equipment and void of warranty.

4. Orientation of Lynx connector on Lynx case or adapter is altered from OEM (3 at right).

- The Lynx connector on the Lynx case/adapter is keyed. DO NOT attempt to change key orientation by loosening or tightening the Lynx connector on the Lynx case or adapter. Failure to comply will result in damage to equipment and void of warranty.



COMMON ERRORS

1. Slow sensor drift reading.

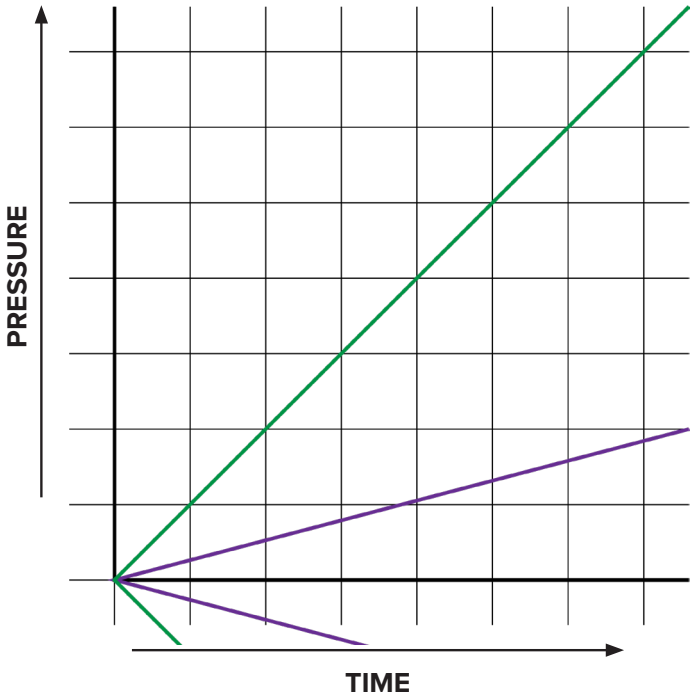
A sensor reading that slowly rises or falls (positive or negative) from the set zero value.

2. 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.

3. No sensor to eDART/CoPilot communication.

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



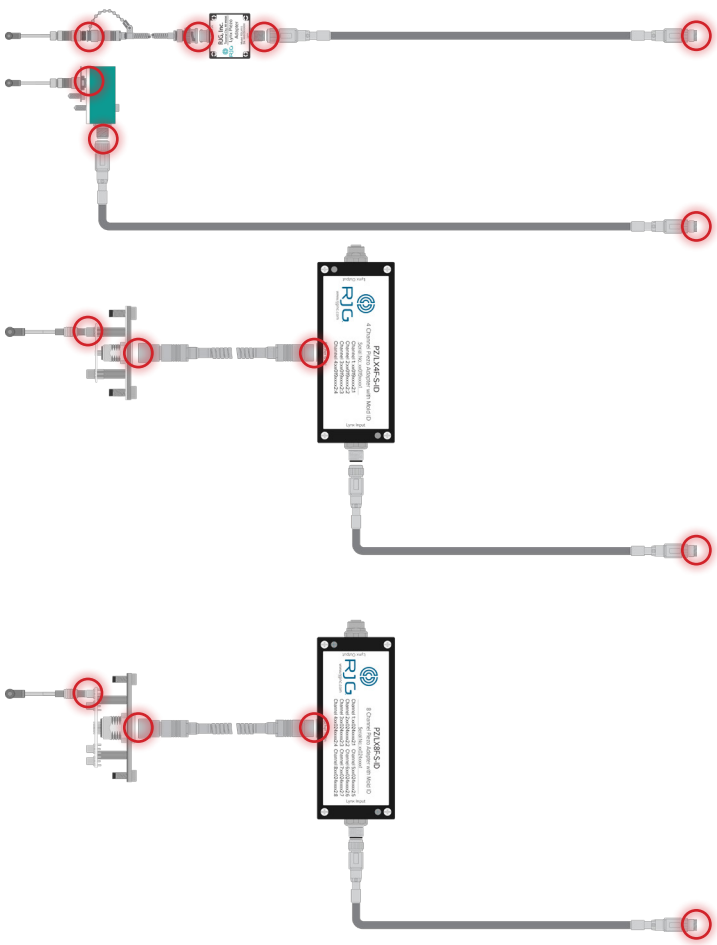
Piezoelectric Sensor Drift Type Graph	
	Fast Drift/Invalid
	Slow Drift

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 cable from adapter cable, adapter, or plate and clean ends; if reading continues to drift, continue to next step.
2. If applicable, disconnect the plate or adapter cable and clean connectors; if the reading continues to drift, continue to next step.
3. Disconnect the Lynx CE-LX5 cable from plate or adapter and clean ends; if reading continues to drift refer to following instructions.

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

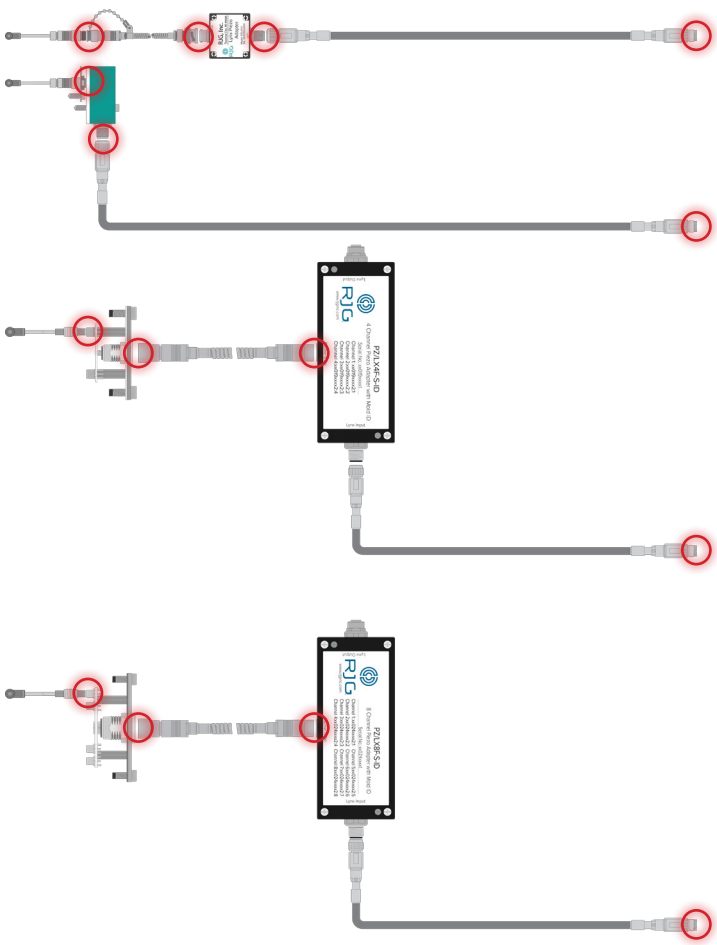


FAST SENSOR DRIFT/INVALID READING

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 cable from adapter cable, adapter, or plate and clean ends; if reading continues to drift, continue to next step.
2. If applicable, disconnect the plate or adapter cable and clean connectors; if the reading continues to drift, continue to next step.
3. Disconnect the Lynx CE-LX5 cable from plate or adapter and clean ends; if reading continues to drift refer to following instructions.

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



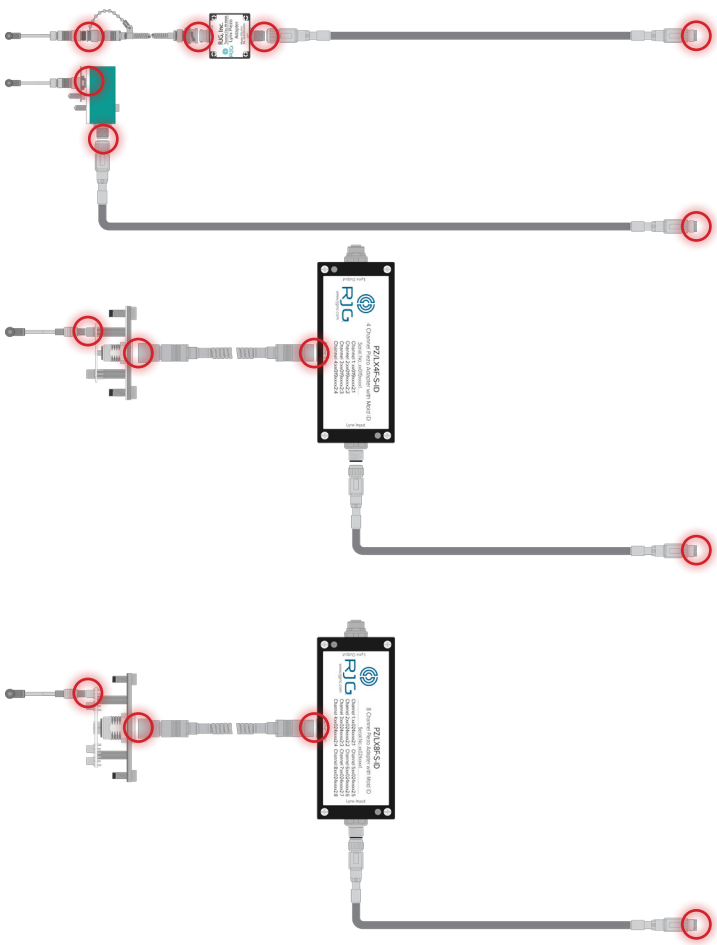
COMMON ERRORS (*continued*)

SENSOR DOES NOT COMMUNICATE WITH EDART

If the eDART/CoPilot 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 sensor with working sensor; test sensor operation. If communication remains non-existent, continue to next step.
2. If applicable, replace the sensor adapter cable with working cable; test sensor operation. If communication remains non-existent, continue to next step.
3. Replace the sensor plate or 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 cannot establish communication after these steps, the connector has failed and must be replaced.



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

email: globalcustomersupport@rjginc.com

www.rjginc.com/support

RELATED PRODUCTS

The 9210 is compatible with other RJG, Inc. products for use with the eDART or CoPilot process control and monitoring systems.

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 12–473” (0,3–12,0 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.

LYNX MOLD-MOUNT PIEZOELECTRIC SENSOR ADAPTER LP/LX1-M

The Lynx mold-mount piezoelectric sensor adapter (2 at right) provides cavity pressure sensor users with a convenient, simple interface between a single piezoelectric sensor and the RJG, Inc. eDART or CoPilot Systems.

LYNX SURFACE-MOUNT PIEZOELECTRIC SENSOR ADAPTER PZ/LX1-S

The Lynx surface-mount piezoelectric sensor adapter (3 at right) provides cavity pressure sensor users with a convenient, simple interface between a single piezoelectric sensor and the RJG, Inc. eDART or CoPilot Systems.

COMPATIBLE PRODUCTS (*continued*)

FOUR-CHANNEL PIEZOELECTRIC SENSOR CONNECTOR AND ADAPTER PZ-4 & PZ/LX4F-S-ID

The Four-Channel Piezoelectric Connector PZ-4 and Four-Channel Piezoelectric Adapter PZ/LX4F-S (1 at right) interface up to four piezoelectric sensors to the eDART or Copilot systems with a single connection.

FOUR-CHANNEL PIEZOELECTRIC SENSOR CONNECTOR AND ADAPTER PZ-4 & PZ/LX4F-S-ID

The Eight-Channel Piezoelectric Connector PZ-8 and Eight-Channel Piezoelectric Adapter PZ/LX4F-S (2 at right) interface up to eight piezoelectric sensors to the eDART or CoPilot systems with a single connection.

SIMILAR PRODUCTS

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

SINGLE- OR MULTI-CHANNEL 6 MM PIEZOELECTRIC SENSOR 9211

The 9211 single- or multi-channel 0.24” (6,0 mm) piezoelectric sensor (1 at right) 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).

SINGLE- OR MULTI-CHANNEL 12.6 MM PIEZOELECTRIC SENSOR 9204

The 9204 single- or multi-channel sensor is a 12,60 mm (0.496”) digital, indirect (under-pin), button-style, piezoelectric cavity pressure sensor (2 at right) that can withstand forces up to 2,248 lb. (10,0 kN) with a sensitivity rating of 9.80 pC/lb. (2,2 pC/kN) and a maximum temperature rating of 392 °F (200 °C).

LYNX SINGLE-CHANNEL STRAIN GAGE BUTTON SENSOR LS-B-127-50/125/500/2000

The LS-B-127-50/125/500/2000 line of sensors (3 at right) from RJG, Inc. are single-channel, digital strain gage, indirect (under-pin), 0.50” (12,7 mm) button-style cavity pressure sensors that can withstand forces up to 50 lb. (0.22 kN), 125 lb. (0.56 kN), 500 lb. (2.22 kN), and 2,000 lb. (8.90 kN) and temperatures up to 250 °F (120 °C—standard sensors) or 425 °F (220 °C—high-temperature sensors).

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