KOR-LOK®

SIDE-ACTION SYSTEMS

ZERO CORE MOVEMENT DURING INJECTION

Designed & Made in USA

NOW WITH

SWITCHMAX®

SENSOR CONNECTIVITY

WE TAKE MOVEABLE SLIDES AND CORES TO A NEW LEVEL OF PERFORMANCE

UPGRADE MACHINE PERFORMANCE & PROFITABILITY!

UPGRADE TO PFA!

PFA INCORPORATED

pfa-inc.com

Located just North of Milwaukee, Wisconsin, PFA is a leader in the design and manufacture of Quick Die Change Systems (QDC), Specialty Injection Mold Components, Specialty Industrial Cylinders, Quick Mold Change Systems (QMC), Multi-Slide Die Casting Solutions, and Robotic Automation End-Effectors.

- **SWITCHMAX® Connectivity Components and Electrical Cables** integrate various "on mold" sensors (relay, mechanical, and proximity DC) into a single signal interface common on most injection molding machines. LED indication also assists operators. No more complex wiring – just plug & play.
- **Robotic Automation End Effectors.** Modular products allow the coupling of Grippers, Gripper Pads (GP), Compliance Devices (RCC) and Crash Protection (OPD) into a simple and integrated robotic end-effector solution.
- **Quick Die Change Systems** provide easily customized solutions for stamping die "quick change". Bolster extensions, die rails/lifters, check valve and locking clamps, and electronic 5,000 psi pump controllers are just a few of the options available.
- **Hydra-Jaws™ Quick Mold Change and Hydra-Latch™ Quick Knockout Systems** provide consistent clamping and support rapid mold changes for a wide range of mold sizes in a single machine. Clamps move to fit the mold!
- **Self-Locking and Braking Cylinders** hold large loads many times that of standard cylinders, even with pressure removed, making them ideal for a wide variety of industrial applications, where large load capacity or loss of air scenarios demand greater performance and simplicity.

Our staff is committed to providing you with the best possible products and service. PFA offers a wide array of standard products plus custom solutions for especially challenging applications. Contact us with your needs. We will be glad to serve you!

PFA INCORPORATED

N118 W18251 Bunsen Drive
Germantown, WI 53022
(262) 250-4410 • Fax (262) 250-4409
www.pfa-inc.com

ASK ABOUT OUR OTHER INJECTION MOLDING PRODUCTS:

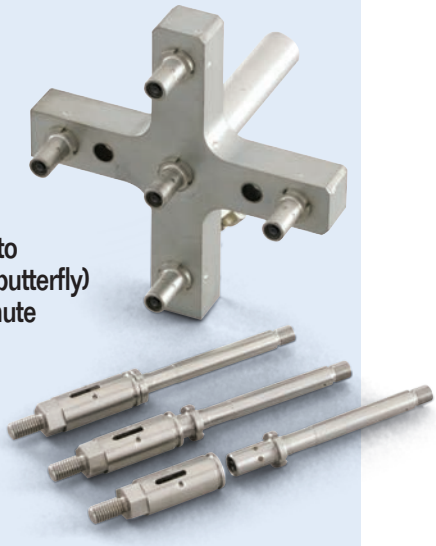
HYDRA-JAWS™ QUICK MOLD CHANGE

EVERY MOLD EVERY MACHINE EVERY TIME!

- Adjusts to Fit Every Mold
- Quick and Secure
- Self Leveling

HYDRA-LATCH™ QUICK KO CONNECTION

FAST, HANDS-FREE CONNECTION



- Connects KO Bars to machine KO plate (butterfly) in less than one minute
- Durable, Compact, and Easy to Install
- Completes the QMC system

CONTENTS

SLIDE CORE COMPRESSION AND THERMAL CHANGES CAUSE "CORE BACKUP"... KOR-LOK® ELIMINATES IT!

WHY KOR-LOK?

Steel Compression: Physics dictates that a pressure force applied to any material will cause compression. Without the ability to easily measure it during loading, it is often "invisible" to practical experience, leading to the false assumption that steel, for example, is incompressible and core dimensions will not change under load.

Thermal Variation: Physics dictates that temperature changes will change the size of an object. Like compression, temperature changes are less likely to be considered and are difficult to measure. Initial reviews often assume that temperature is not an issue.

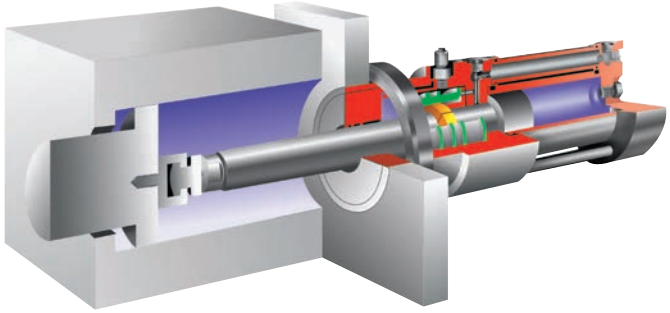
Core Changes look like "Backup": During injection, the resulting changes from pressure and temperature often cause the core length to decrease and the resulting core face position to be "backed up" from the desired position. These changes are "seen" on the part, as if the entire core was "backing up", when in fact the no load room temperature timing was correct. Core face "backup" during injection may be as much as .020" or more depending on mold geometry.

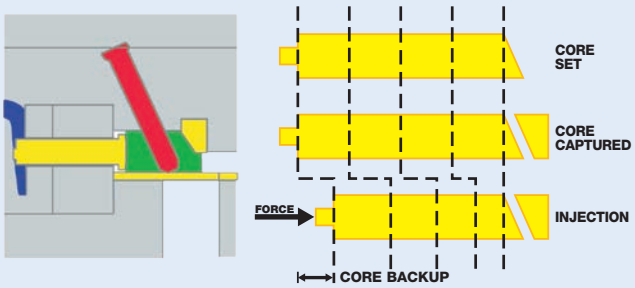
Attempting to compensate for compression and thermal effects with tryouts and "tweaking" can become time intensive, repetitive and very costly.

KOR-LOK® eliminates "core backup" by preloading the core above the force of injection.

KOR-LOK® COMPENSATES FOR:

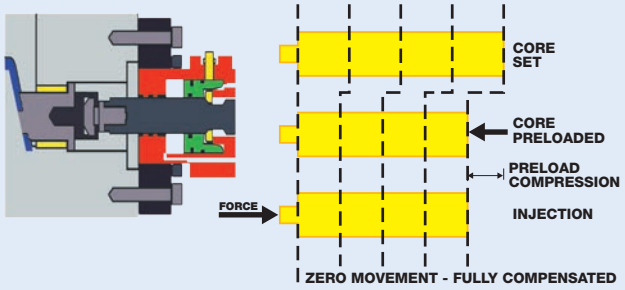
- **CORE COMPRESSION**
- **THERMAL VARIATION**
- **ASSEMBLY TOLERANCES**





CONVENTIONAL "REACTIVE" CORE SLIDE POSITIONING

Above is an example of a conventional side-action system. A cam pin provides the means of movement and the heel block "locks" the slide in the tool. This system "reacts" to the pressure and thermal effects with the result that the core face shows "backup".



NEW "PROACTIVE" (KOR-LOK®) CORE SLIDE POSITIONING

PFA's KOR-LOK® Side-Action Systems are specifically designed to produce 10x the power of standard cylinders at end of stroke to preload the core above the injection force and then lock that force in place.

"Reactive" Method	"Proactive" Method
Cam Pins, Standard Locking Cylinders, Cavity Locks, Heel Blocks, Hydraulic Cylinders	KOR-LOK® Side-Action Systems
In the past, core applications required choosing the best REACTIVE method available, reacting to force but not applying it. If it's not applied force, it's not maintaining position.	KOR-LOK®'s PROACTIVE Technology™ and 100% applied force provides you with the advantages of Zero Flash™, Zero Flex™ performance.

ZERO FLASH™ PERFORMANCE IS JUST THE BEGINNING...

WE'RE SAVING YOU TIME AND MONEY EVERY STEP OF THE WAY.

PART DESIGN–

COMPLEX PARTS MADE EASY.

Core preload means your parts can be made easily with tighter tolerances, perfect match lines, and clean beautiful textures. The all-in-one system means cores can move at any angle any time, eliminating barriers to many complex parts. Specify PFA for design freedom. Indulge yourself.

MOLD DESIGN–

BOLT-ON ACTIONS SIMPLIFY THE MOLD.

PFA 's turn-key system not only makes any side-action easy, it eliminates the "one off" design and manufacture of side actions. Design it right the first time, every time with a proven system that does the job better. Technical help is available 24 hours a day and CAD files are just a click away. Design it better and faster with KOR-LOK®.

MOLD BUILD–

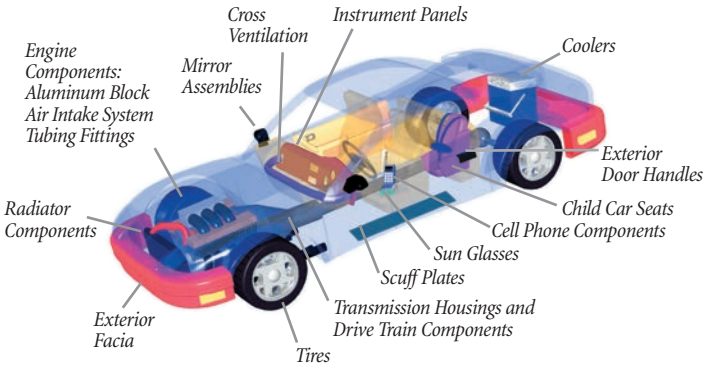
MODULAR MEANS FASTER AND EASIER BUILDS.

Simplified mold geometries, better slide performance, smaller mold bases, and independent slide movement, all mean quicker mold builds and reduced tryout time. Faster build times, fewer tryouts, and excellent part quality make your molds more competitive.

PRODUCTION–

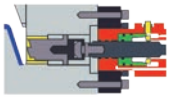
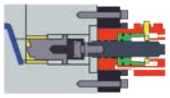
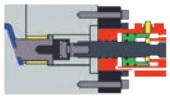
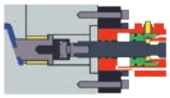
ACHIEVE THE LOWEST COST PER PART.

KOR-LOK® helps you run the best parts possible in the smallest press possible. Ensure you produce the parts you want, when you want them – reduced maintenance means improved up-time, consistent quality means less scrap, and reduced cost per part means more profit.



Some parts manufactured using PFA products

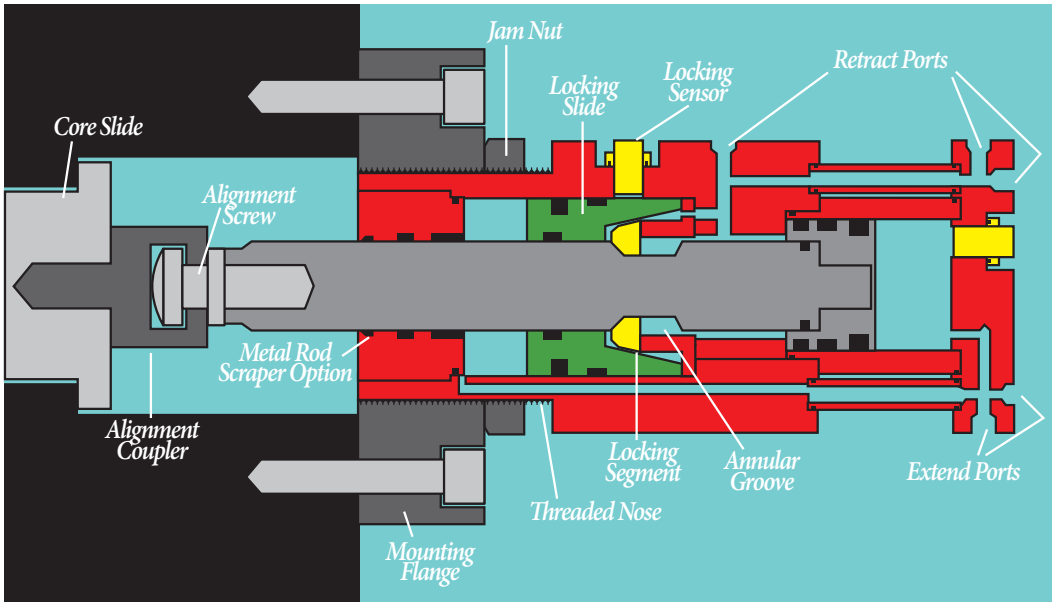
THE ONLY WAY TO ACHIEVE TRUE ZERO FLASH RESULTS, PART AFTER PART, IS WITH – KOR-LOK® SIDE-ACTION SYSTEMS...

KOR-LOK® SIDE-ACTION SYSTEMS	VS.	TRADITIONAL SIDE-ACTION SYSTEMS
	Mold OPEN Core Out	
	Mold CLOSED Core OUT	**CAN'T DO IT!**
	Mold CLOSED Core IN	
	Core PRE-LOADED Against FULL Injection Pressure	**CAN'T DO IT!**

KOR-LOK® GIVES YOU:

- Perfect Match Lines
- Consistent Part Quality
- Lower Mold Costs
- Reduced Cost-Per-Part
- Smaller Mold Bases
- Greatly Reduced Wear
- Reduced Spotting Time
- Quicker Mold Build
- Simplified Part Design
- Simplified Mold Design
- Proven Design Performance
- Unlimited Slide Travel
- Unrestricted Orientation

IT LOOKS A LOT LIKE A CYLINDER BUT IT PERFORMS LIKE A KOR-LOK®!



HOW IT WORKS

KOR-LOK® Side-Action Systems provide large pre-loads and thermal compensation to core slides by use of an internal tapered locking mechanism. The threaded housing provides a base to support the locking mechanism and transfer load between the mold and the core slide, as follows:

SET The rod is extended using extend pressure. As the rod nears end of stroke, the locking segments are forced into the rod groove by hydraulic pressure on the locking slide. As the segments are "squeezed," the rod is forced forward ensuring a positive seal on the core face, while activating the sensor.

PULL Retract pressure releases the locking slide, allowing the segments to disengage as the piston retracts. When fully retracted, the rear sensor is activated, indicating the slide is fully retracted.

Once set using only a minimum of 1,500 psi hydraulics, KOR-LOK® Side-Action Systems provide 100% preload to rated load - 10 times more force than a standard cylinder. KOR-LOK® doesn't just lock, it "super locks" by preloading and locking in the force so hydraulics are no longer needed. The result is 100% preload to rated load at zero pressure.

Series Size	Set Position* Output Force
75	12,000 lbs. (6 tons)
100	26,000 lbs. (13 tons)
112	40,000 lbs. (20 tons)
150	60,000 lbs. (30 tons)
200	110,000 lbs. (55 tons)
300	210,000 lbs. (105 tons)

PFA MEANS REAL SERVICE

With real-time information access, 24-hour technical support and expedited shipping, we can have a KOR-LOK® Side-Action System at your door often before you've had your morning coffee. That's REAL SERVICE™.

NEED IT RIGHT NOW?
Need same day or overnight shipping? We can do it!

HAVE AN EXISTING MOLD PROBLEM?
We work with our customers to solve existing problems, and can design custom solutions, if necessary.

NO DELAYS
With a proven system, your mold works every time. Using a KOR-LOK® Side-Action System results in shorter design and manufacturing time, leading to shorter concept-to-production schedules.

*Force ratings are at end of stroke only, based on assumed mold geometry. Ratings are for reference only. Actual performance will vary with application, setup and operating pressure.

MORE THAN JUST OUTSTANDING PERFORMANCE, KOR-LOK® SIDE-ACTION SYSTEMS HAVE "USER FRIENDLY" FEATURES

- **MULTIPLE PORTS - REAR PORTS STANDARD**
  While only two hydraulic ports are used, we provide 5 SAE ports for maximum flexibility. All ports are machined in every unit. Using the two rear ports is quite popular.

- **MULTIPLE SENSOR LOCATIONS AND GUARDS STANDARD.**
  As sensor location may vary with adjusted preload position, multiple front and rear sensor locations are machined in every unit. Sensor guards are included to protect your investment.*

- **DIRECT WIRE RELAY OR PROXIMITY SENSORS**
  Embedded dry contact sensors (XLT & XHT) verify "set" and "pull" positions without a voltage drop, making wiring multiple sensors simple and easy.** Low Profile Proximity Sensors (PNP) are also available.

- **LARGE BORE CYLINDER OPTION**
  For deeply penetrating cores in high shrinkage materials, we are pleased to recommend our "LB" option. By adding a larger cylinder section to the standard fronts, pull force is greatly increased for improved core pull. Die casting materials and thermosets are typical material applications.

- **HIGH TEMPERATURE COMPONENTS/ METAL WIPERS**
  Flourocarbon seals (VI), Metal Wipers (MW), and High Temperature Sensors (XHT) provide the enhanced operating range for demanding environments to near 400˚F.

* Due to its small size, the 75 series does not have guards.

** For crash condition cores, we recommend an additional redundant sensor on the core itself to verify core retraction in the event of core to KOR-LOK® separation or false sensor reading if damaged or contaminated.

MULTIPLE SENSOR INTEGRATION WITH SWITCHMAX® SENSOR CONNECTIVITY

Eliminate wiring schematics and troubleshooting problems on all molds.

SWITCHMAX® WITH PFA KOR-LOK® SIDE-ACTION SYSTEMS:

PFA's new SWITCHMAX® components integrate multiple KOR-LOK® unit sensors and other slide sensors into single set and pull inputs to the press. When used with KOR-LOK® XLT or XHT sensors and other Single Pole Double Throw (SPDT) switches, the system provides cross checking of proper sensor position, as well.

SWITCHMAX® WITH OTHER MECHANICAL SWITCHES:

Integrate almost ANY mechanical relay/dry contact switches (plunger, rocker, PFA mechanical, relay) from multiple cores to an operator side interface for simple one input connection to the press. Full "plug and play" basic operation - NO programming or dip switching required.

SWITCHMAX® WITH 3 WIRE DC PROXIMITY SENSORS AND AC POWER CONTROLS:

SWITCHMAX® is also available in versions to integrate PFA's new Low Profile Sensor (PNP) and other 3 wire PNP style switch sensors. For AC applications, the addition of the SWITCHMAX® AC Power Adaptor allows connection to machine controls operating with AC inputs. Power Adaptors are also available for Ø Volt Input Injection Molding machines.

HOW TO SIZE

APPLICATION IDEAS & RECOMMENDATIONS

PERFORMANCE RATINGS

KOR-LOK® load ratings are empirically derived from a range of typical application geometries and mold behaviors. Ratings should be used only with calculations using maximum pressure and projected core area, as they already take into account some limits on preload adjustment and mold geometry, as well as cavity pressure drops, action geometry, typical core lengths, etc.

Preload ratings apply to a well secured stiff mold geometry with a core stroke of 5" or less, core lengths 5" or less, and core areas equal to or greater than core projected area. Basically, the load ratings apply to typical applications where mounting is relatively close to the part. For longer cores, or poor mounting support, it is highly recommended that the next larger unit be considered.

PFA application specialists are available to discuss recommendations, based on your particular application and their experience. While form, fit, and function for any particular application is the responsibility of the customer, following PFA recommended sizing has shown to be the best way to ensure optimal success.

SELECTING SERIES SIZE

Injection pressure (P) for sizing calculations is the peak pressure at the nozzle during the injection cycle, and is a function of the injection screw piston area and ram pressure. Typical Injection nozzle pressures are approximately 10 times the hydraulic ram pressure shown on the molding machine. Easy flow plastics typically run at 800 psi hydraulic x 10 = 8,000 psi, while high temperature plastics or glass fill plastic applications may require 20,000 psi or more. Part geometries and minimum wall thickness strongly affect the required processing pressures and thus have a major impact on the series selection.

Projected core area (A) is the projected area along the axis of movement wetted by plastic, including internal shutoff areas. It may be most closely thought of as the area of a slice through the core perpendicular to the core axis. Calculation of the necessary Preload force becomes:

Minimum Preload Fore Rating (lbs) = A (sq. in.) X P (psi).

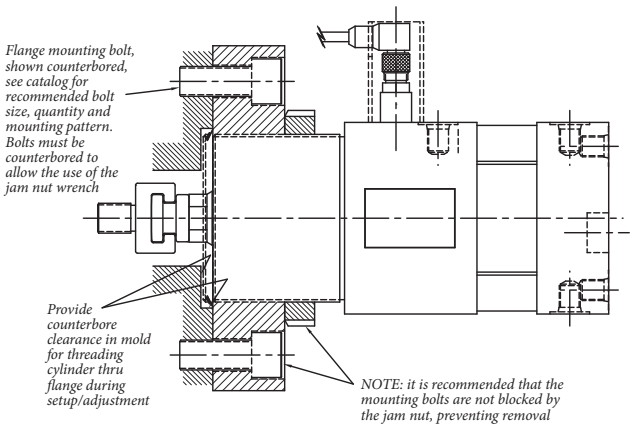
The KOR-LOK® Side-Action System is typically chosen with a rating above this force by some margin. For a free application review please contact PFA, providing complete details, such as Core Projected Area, Core Diameter, Core Length, Stroke, Maximum Injection Pressure, Hydraulic Pressure, Material Type, and 3D Drawings of the core/mold arrangement, if possible.

STROKE TO INCLUDE ADJUSTMENT

Stroke is primarily determined by the need to clear the core from the part, but practical efforts should be made to simplify overall product selection, mounting, and adjustment. Detailed information on a specific size can be downloaded with the CAD file image on our website under KOR-LOK® > CAD Files.

Note that for non-integer strokes, we employ a "Variable E" dimension (see dimensional data), such that a standard rod of the next longer integer stroke is combined with the piston tubes to match the desired stroke. The result is a change in the chart "E" dimension.

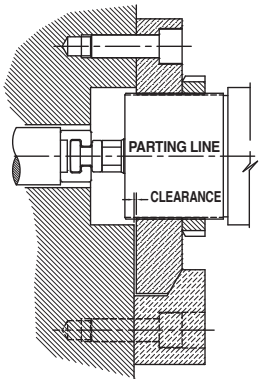
During setup, the cylinder is advanced causing cylinder stroke to be reduced by approximately .100". Therefore, approximately 1/8" should be added to the retract amount needed to clear the part. Also ensure the cylinder is allowed to stroke fully for proper sensor operation.



MOUNTING OPTIONS – BOLT C'BORE & PARTING LINE

Use of a mounting flange (RFC/SFC), jam nut (JN), alignment screw (AS), and alignment coupler (AC) [or T-Slot in the core] is standard on nearly every application to allow for proper alignment and preload adjustment of the main unit cylinder.

Mounting distance from the core must account for the variable E dimension for non-integer stroke units. Use of integer stroke units is recommended for ease of design and off the shelf delivery. Flanges can be mounted with counter bored mounting bolts in locations desired by the customer, as long as there is equal coverage around the KOR-LOK®. It is recommended that bolts be located outside the diameter of the jam nut for ease of removal and that flanges be spaced off from the mold to allow KL unit to thread through the flange past the flange face approximately 1/8" (or the mold relieved to allow for preload adjustment).



If mounting the unit on the parting line, use a block to capture one side of the flange in place of the mounting bolts. Call PFA for mounting ideas and information regarding proper mold sequencing for flange capture applications.

HIGH TEMPERATURE SEALS, WIPERS, AND SENSOR OPTIONS

Front (set-locked-preloaded) and rear (pull) sensors (switches) and cables are included with each KOR-LOK® main unit. Use of the sensors during setup and adjustment assists in verification of proper operation (see pages 14-15). The SWITCHMAX® junction box and cabling is recommended for multiple core applications, crash condition cores, or when cross checking of sensor positions or LED indication is desirable.

High Temperature Seals (VI), Metal Rod Wiper (MW) and High Temperature Relay Sensor (XHT) options are available for very high temperature plastic and die casting environments. For some applications, insulation between the flange and the mold (or flange cooling) may be needed.

DRIVING WEDGES AND RACKS

Because the KOR-LOK® generates preload though an internal wedge style force intensifier, wedge applications and rack and pinion designs often limit the ability for the main unit to preload the core face.

For wedge applications, preloading the prime mover is often enough to hold the core in position for successful part production, however the core face itself is often not substantially preloaded. As these applications are often difficult in concept, use of the KOR-LOK® system can provide substantial advantages, however, we recommend careful PFA staff review.

Rack and Pinion applications typically have special challenges with a large preload force applied to the gear teeth. Typically the racks are not sized large enough to handle the forces needed to transmit the preload to the core. Careful review is recommended to determine feasibility.

PFA APPLICATION REVIEW

Making the difficult easy and successful is one of the great advantages of the KOR-LOK® Side-Action System and we are proud to back that up with the best in service and support. For best results, please have a PFA application specialist review your selection criteria to help ensure nothing was missed. When it looks like a challenge, our application specialists are on your side to find a way to make the difficult easier. For the most detailed sizing information, product specifications, design suggestions, CAD files, and new product updates, call your application specialist or visit us at www.pfa-inc.com.

DIMENSIONAL INFORMATION

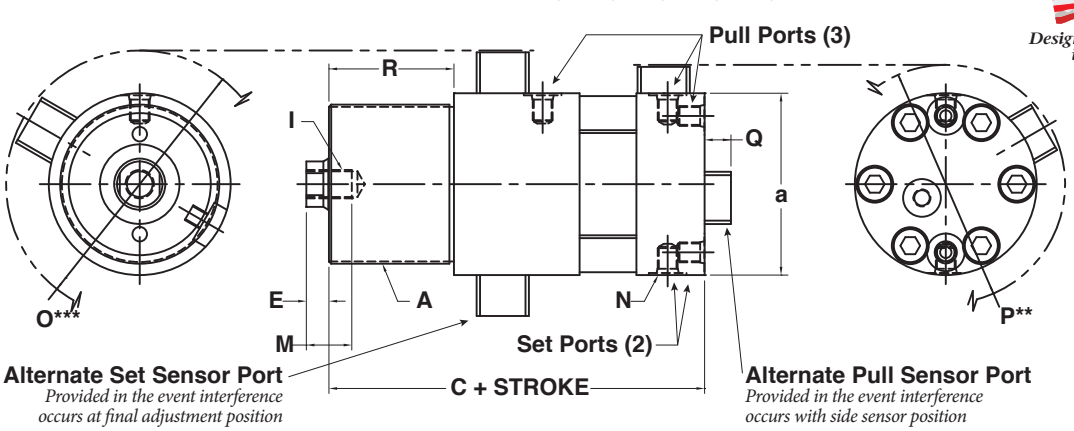
(All Dimensions nominal and in inches)

NEW! 3D Models and CAD files available in 150+ formats

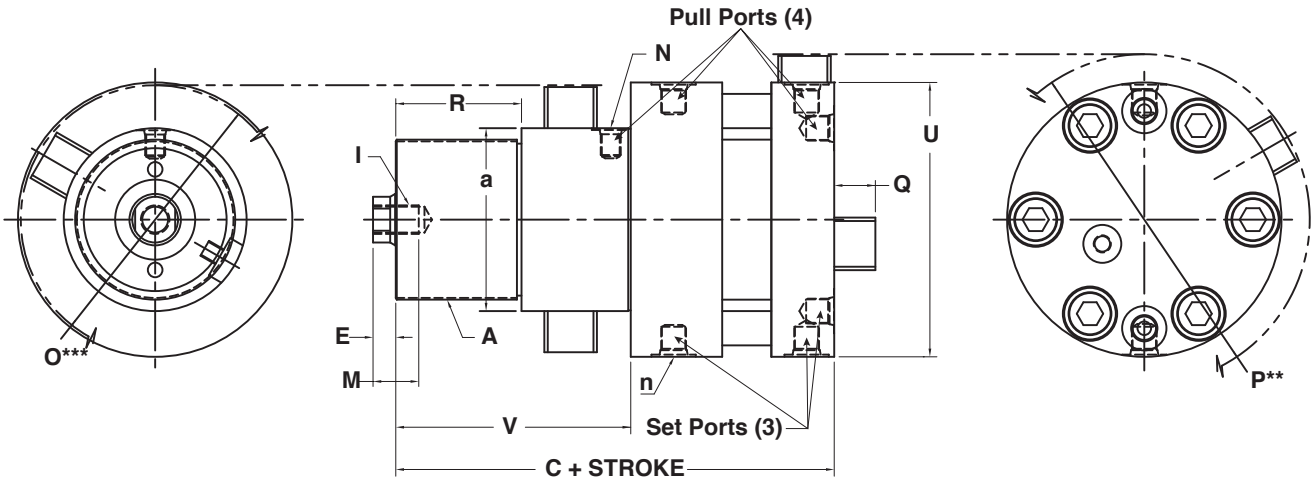
- **Calculate Preload**: Core Area x Max Injection Pressure = Force
  Select Output Intensifier Force (Preload) > Force
- **Adjust chosen stroke for Preload**: Add .125" to stroke needed to clear part. Cylinder Stroke = Stroke to Clear + .125"
- **Part Penetration and Shrink**: Choose LB (Large Bore) option for extra pull as needed.
- **Seal Selection**: Choose High Temperature Seals VI if slide/mold exceeds 175°F/80°C.
- **Sensor Selection Options**: Relay Low Temp XLT, Relay High Temp XHT, **Low Profile** PNP (see pgs 16-17 for specification).
- **High Temperature Sensors**: Consider XHT option if temperature exceeds 175°F/80°C.
- **Rotational Adjustment Clearance**: Consider **Low Profile** PNP sensors with **SWITCHMAX®** for an easy alternative to XLT sensors.
- **Multiple Cores/Slides**: Consider **SWITCHMAX®** connectivity solution for single press input (easy interface) of set and pull.
- **Crash Condition Cores**: Consider -XLT or -XHT with **SWITCHMAX®** (cross check sensors) - sensor on core recommended.

Designed & Made in USA

KOR-LOK® SERIES SIZE: 75, 100, 112, 150, 200, 300



KOR-LOK® SERIES SIZE: 112-LB, 150-LB, 200-LB



CADENAS PART SOLUTIONS

See the PFA website for CAD MODELS by PARTsolutions. CAD Models are available in over 150 native and neutral CAD and graphic formats, versions and revisions. That means no matter what system your using, you can download KOR-LOK Models in your native format, which can be easily imported with all geometric integrity and meta data intact. "No other catalog provider offers as many CAD and graphic formats as PARTsolutions. Guaranteed."

- Rob Zesch, President CADENAS PARTsolutions

MAIN UNIT [KLH-_____-(STROKE) - OPTIONS]

Series Size	Output Intensifier Force**** (Preload)	Min. Pressure for Full Preload	Pressure to Maintain Preload	Bore Dia. / Rod Dia.	Extend Force @1500psi	Retract Force @1500psi	A	M	E***	R / V	I	C
75	**12,000 lbs.**	1,500 psi	0 psi	1.25" / 0.75"	1,825 lbs	1,125 lbf	2 3/4"-16	0.75"	0.50"	2.25" / ---	3/8"-24	6.22"
100	**26,000 lbs.**	1,500 psi	0 psi	1.75" / 1.00"	3,600 lbs	2,425 lbf	3 1/2"-16	1.00"	0.50"	2.75" / ---	1/2"-20	7.26"
112	**40,000 lbs.**	1,500 psi	0 psi	1.75" / 1.125"	3,600 lbs	2,100 lbf	3 1/2"-16	1.00"	0.50"	2.75" / ---	5/8"-18	7.26"
112-LB*	**40,000 lbs.**	1,500 psi	0 psi	3.00" / 1.125"	10,600 lbs	9,100 lbf	3 1/2"-16	1.00"	0.50"	2.75" / 5.14"	5/8"-18	8.59"
150	**60,000 lbs.**	1,500 psi	0 psi	2.00" / 1.50"	4,700 lbs	2,050 lbf	4"-16	1.25"	0.75"	3.38" / ---	7/8"-16	8.93"
150-LB*	**60,000 lbs.**	1,500 psi	0 psi	4.00" / 1.50"	18,800 lbs	16,175 lbf	4"-16	1.25"	0.75"	3.38" / 7.04"	7/8"-16	10.75"
200	**110,000 lbs.**	1,500 psi	0 psi	3.00" / 2.00"	10,600 lbs	5,850 lbf	5"-12	1.75"	1.00"	3.75" / ---	1 1/4"-12	9.98"
200-LB*	**110,000 lbs.**	1,500 psi	0 psi	5.50" / 2.00"	35,600 lbs	30,900 lbf	5"-12	1.75"	1.00"	3.75" / 8.03"	1 1/4"-12	12.49"
300	**210,000 lbs.**	1,500 psi	0 psi	4.00" / 3.00"	18,800 lbs	8,225 lbf	6 3/4"-8	2.00"	1.25"	5.00" / ---	1 3/4"-12	12.08"

OUTER DIMENSIONS, PORTS AND SENSOR OPTIONS

Series Size	Output Intensifier Force**** (Preload)	Body Dia. a	Body Dia. u	N / n (SAE)	PNP Low Profile Prox NEW! O**	PNP Low Profile Prox P**	PNP Low Profile Prox Q**	Original XLT Relay Low Temp O**	Original XLT Relay Low Temp P**	Original XLT Relay Low Temp Q**	XHT Relay High Temp NEW! O**	XHT Relay High Temp P**	XHT Relay High Temp Q**
75	**12,000 lbs.**	3.00	---	#4 / ---	4.8"	4.0"	0.5"	7.8"	7.1"	1.9"	9.3"	7.9"	2.7"
100	**26,000 lbs.**	4.00	---	#4 / ---	5.6"	5.1"	0.6"	8.4"	7.7"	2.1"	9.9"	9.2"	2.9"
112	**40,000 lbs.**	4.00	---	#4 / ---	5.6"	5.1"	0.6"	8.4"	7.7"	2.1"	9.9"	9.2"	2.9"
112-LB*	**40,000 lbs.**	4.00	6.00	#4 / #6	5.6"	6.9"	0.9"	8.4"	8.9"	2.3"	9.9"	10.4"	3.1"
150	**60,000 lbs.**	4.50	---	#6 / ---	6.1"	5.3"	0.9"	8.9"	7.9"	2.3"	10.4"	9.4"	3.1"
150-LB*	**60,000 lbs.**	4.50	7.50	#6 / #8	6.1"	8.1"	0.9"	8.9"	10.1"	2.3"	10.4"	11.6"	3.1"
200	**110,000 lbs.**	6.00	---	#6 / ---	7.0"	6.9"	0.9"	9.9"	8.9"	2.3"	11.4"	10.4"	3.1"
200-LB*	**110,000 lbs.**	6.00	9.00	#6 / #8	7.0"	9.5"	0.9"	9.9"	11.5"	2.3"	11.4"	13.0"	3.1"
300	**210,000 lbs.**	7.50	---	#8 / ---	8.4"	8.1"	0.9"	11.3"	10.1"	2.3"	12.8"	11.6"	3.1"

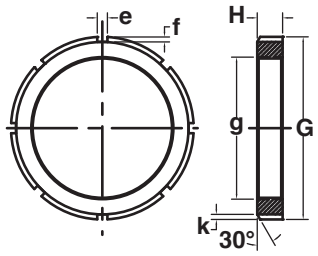
*LB Option - Large Bore units have all the same accessories as standard units. Use -LB in the main unit order code only.

**Sensor Guard dimensions (for 75 series this is actual sensor height - no guards). O and P show swing arc clearance diameter during adjustment. Alternate front location included in the event that interference occurs at final adjustment position. Q is for alternate rear sensor position, if used in place of the rear side location (P).

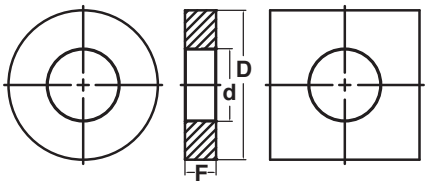
***KL units use a "Variable E" dimension. Integer stroke lengths (1", 2", 3", 4", 5" standard) are available with E shown in chart. For non-integer fractional strokes, the E will vary from chart - longer by unused fraction of stroke.

****Output Mechanical Intensifier Ratings are for end of stroke (general reference only). Actual performance is dependent upon application geometry, setup and adjustment. Mid stroke and pull forces are less. Minimum operating pressure is 1,500psi to set with full rated preload. After locking, preload is maintained with 0 psi, hydraulics are NOT required to maintain lock.

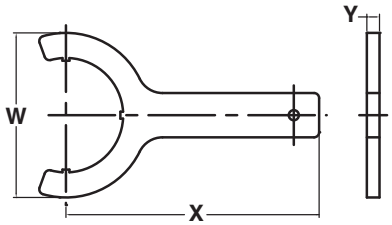
JAM NUT (JN)



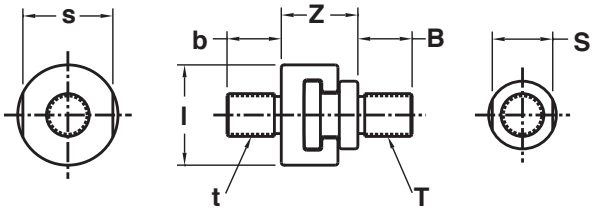
FLANGES
ROUND (RFC) OR SQUARE (SFC)

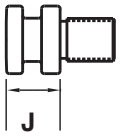


WRENCH (SWJ)



ALIGNMENT COUPLERS (AC)
ALIGNMENT SCREWS (AS)





Alignment Screw with Round Face

For custom interfaces, contact PFA for recommended T-Slot and AS dimensions.

JAM NUT [KL-_____-JN]
ALIGNMENT COUPLER [KL-_____-AC] ALIGNMENT SCREW [KL-_____-AS]

Series Size	T/t	B/b	S	s	l	Z (set)	Z (pull)	J**	g	G	H	e	f/k
75	3/8"-24	0.57"	.56"	1.00"	1.13"	0.91"	0.93"	0.690"	2 3/4"-16	3.50"	0.50"	0.31"	0.13"
100	1/2"-20	0.75"	0.81"	1.25"	1.375"	1.10"	1.13"	0.785"	3 1/2"-16	4.50"	0.63"	0.31"	0.13"
112	5/8"-18	0.79"	0.88"	1.31"	1.46"	1.12"	1.14"	0.785"	3 1/2"-16	4.50"	0.63"	0.31"	0.13"
150	7/8"-16	1.10"	1.00"	1.70"	1.85"	1.72"	1.74"	1.300"	4"-16	5.25"	0.75"	0.38"	0.19"
200	1 1/4"-12	1.38"	1.50"	2.75"	3.00"	2.90"	2.92"	2.125"	5"-12	6.50"	0.88"	0.50"	0.25"
300	1 3/4"-12	1.58"	2.13"	3.37"	3.63"	4.16"	4.18"	2.995"	6 3/4"-8"	8.75"	1.00"	0.63"	0.31"

FLANGE (ROUND OR SQUARE)
[KL-_____-RFC OR -SFC]

WRENCH
[KL-_____-SWJ]

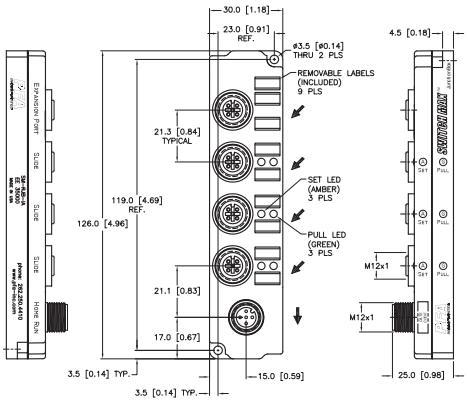
Series Size	d	D*	F*	Recommended Bolt Size/ Quantity	Recommended Bolt Circle with C'Bore SHCS C'Bore Bolt Circle	Depth	Dia.	Bolt Circle No C'Bore	X	W	Y
75	2 3/4"-16	6.0"	1.00"	1/2" x 6	3.75"-5.00"	.56"	.81"	4.5 Ø-5.25"	9.0	5.0	.5
100	3 1/2"-16	7.2"	1.50"	5/8" x 6	4.75"-6.00"	.69"	1.00"	5.75"-6.25"	10.0	6.5	.5
112	3 1/2"-16	7.2"	1.50"	5/8" x 6	4.75"-6.00"	.69"	1.00"	5.75"-6.25"	10.0	6.5	.5
150	4"-16	8.0"	1.50"	5/8" x 6	5.25"-6.75"	.69"	1.00"	6.50"-7.00"	11.0	7.5	.5
200	5"-12	10.0"	2.00"	3/4" x 6	6.50"-8.50"	.81"	1.19"	8.00"-8.75"	12.0	9.0	.5
300	6 3/4"-8	14.0"	2.50"	1" x 12	8.75"-12.25	1.06"	1.56"	10.50"-12.50"	15.0	12.0	.5

*Flanges have no pre-drilled bolt holes for maximum design flexibility. Grade 8 bolts recommended. Since flange edges are flame cut and faces are machined flat, allow +.200/-.000" for edges and +.000/-.300" for faces (pilot off center thread only).

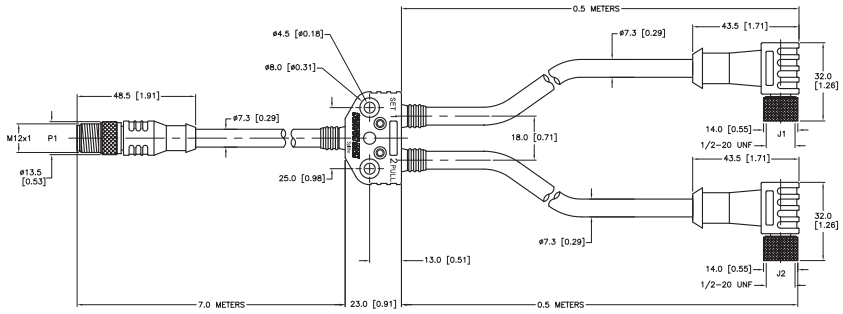
**Alignment screw has a convex face to promote proper centering of the axial load, and is designed to create a loose fit, with the mating coupler or appropriately designed T-Slot, to help accommodate misalignment.

SWITCHMAX® (OPTIONAL)

JUNCTION BOX



GENERAL SPLITTER CABLE LAYOUT



Example: KOR-LOK® Main Unit

	Series Size	Stroke (inches)	Sensor	Options (only if needed)	
	75, 100, 112, 112-LB, 150, 150-LB, 200, 200-LB, 300	*Choose stroke to allow for preload adjustment.*	*Standard Relay (Low Temp) = XLT Relay High Temp = XHT Low Profile PNP = PNP*	*Metal Wiper = MW*	*High Temp Seals = VI*
KLH	150-LB	3.00	XLT	MW	VI

Main Unit Part No: **KLH-150-LB-3.00-XLT-MW-VI**

Example: KOR-LOK® Accessories

	Series Size	Accessories
	75, 100, 112, 150, 200, 300	*Round Mounting Flange = RFC Square Mounting Flange = SFC Jam Nut = JN Alignment Screw (Rod Interface) = AS Alignment Coupler (Core Interface) = AC Spanner Wrench for Jam Nut = SWJ*
KL	150	JN

KOR-LOK® Accessory Part No: **KL-150-JN**

Example: **SWITCHMAX®**

	Sensor	Wattage	No. of Cylinders
	XLT or XHT = KL PNP = PNP	*110/115/AC = ACPKG 24VDC = DCPKG*	*1 = 1S; 2 = 2S, etc*
SM	KL	DCPKG	XX

SWITCHMAX® Part No: **SM-KL-DCPKG-1S**

EXAMPLE:

Main unit and mounting accessory example for a large bore 150 series. Note that LB is only used for the main unit as 150-LB and 150 units have common accessories:

QUANTITY	PART NUMBER	
1	KLH-150-LB-XLT-3.00	Main Unit
1	KL-150-SFC	Square Flange
1	KL-150-JN	Jam Nut
1	KL-150-AS	Alignment Screw
1	KL-150-AC	Alignment Coupler
1	KL-150-SWJ	Spanner Wrench
1	SM-KL-DCPKG-1S	SWITCHMAX® Wiring

To test sensors of complete installations a SWITCHMAX® test box is available.
Part No. SM-RTB-1A

INSTALLATION & ADJUSTMENT PROCEDURES FOR KOR-LOK® SIDE-ACTION SYSTEMS

INSTALLATION GUIDE

Read the following instructions carefully, paying close attention to the sections that pertain to the model you have purchased. If you have any questions or need technical assistance, please visit www.pfa-inc.com or call our support staff at (262) 250-4410.

ADJUSTMENT PROCEDURE FOR CURRENTLY INSTALLED UNIT

NEW Online Video

1. Retract cylinder and loosen Jam Nut.
2. Unscrew cylinder from flange a few turns (counter-clockwise) – allows slide to travel fully without touching stops or shutoff.
3. Connect hydraulics and power the cylinder forward to the extended/locked position – core should not seal off or hit stops at this time.
4. **Critical Step!!!** Disconnect hydraulics and **VENT the cylinder** to atmosphere by removing one (1) extend and one (1) retract port plug.
5. Thread the cylinder into the flange (clockwise), until the core seats and the cylinder physically stops turning. NOTE: you should not be able to turn the cylinder any further by hand – it should be solidly stopped.
6. Reinstall the port plugs, reconnect the hydraulics, and retract the cylinder.
7. **Critical Step!!!** Rotate the cylinder further into the flange (clockwise) the additional amount shown on the chart below to **set the preload**:

Series	Pre-load
75	1/6 turn
100	1/6 turn
112	1/6 turn
150	1/3 turn
200	1/4 turn
300	1/8 turn

8. Tighten the Jam Nut.
9. Setup is now complete. Unit will make good parts for most applications. If more output force is required (core is flashing slightly), rotate the cylinder into the flange further (clockwise) in small increments (approximately 1/16 turn) until the flash goes away.

PROCEDURE FOR INSTALLING A NEW UNIT

NEW Online Video

TIPS REGARDING ACCESSORIES

ALIGNMENT SCREW (AS) AND COUPLER (AC)

If you require Alignment Screws and/or Couplers install these first. Install the Alignment Coupler (T slot) in the core and the Alignment Screw (knob) into the piston rod until fully seated. A thread locking compound may be utilized if desired.

MOUNTING FLANGES (SFC OR RFC)

The Mounting Flange is provided without pre-drilled mounting holes. (See recommendations) Ensure threaded hole is centered relative to the core attachment point and torque flange bolts to appropriate specifications.

JAM NUT (JN)

Install the Jam Nut onto the KOR-LOK® unit with the beveled edge toward mold. Thread the Jam Nut most of the way on.

SPANNER WRENCH (SWJ)

A wrench can be purchased for easier tightening and loosening of the Jam Nut. Many customers use a brass rod and hammer, but this method typically causes damage to the Jam Nut slots over time.

All PFA KOR-LOK®, DIE-LOK™ and SWITCHMAX® application and use recommendations are advisory only. *KL/DL preload force ratings are geometry dependent and based on PFA recommended sizing methods. Process variations may affect actual performance.* ***PFA recommends use of PFA's SWITCHMAX® cross connected sensor checking and independent 2nd pull sensor (redundant) "core pulled" sensing on molds where opening with cores set could damage the mold.*** *False readings in the event of single sensor failure, cylinder contamination, core to cylinder separation, attachment failure, etc. may occur. PFA is not responsible for situations arising from false sensor readings, product failure, misuse, or abuse - proper form, fit and function are the responsibility of the customer. PFA "Terms of Sale" apply.*

PREPARATION FOR INSTALLATION OF THE MAIN UNIT – ON THE BENCH

1. Remove port plugs from one extend and retract port. There are three options for the retract port (A, B and C) and two options for the extend port (D and E) as shown in Figure 1.

> *CAUTION!*
> *Fluid may eject from retract port as rod extends.*
> *Observe proper safety precautions.*

2. Apply a pressure source (minimum of 80 psi pneumatic or hydraulic) to the open extend port (D or E) until the unit is fully extended/locked.

INSTALLATION OF MAIN UNIT.

1. With the unit extended/locked, and vented (port plugs removed on one (1) extend and one (1) retract port), connect the core slide to the rod and thread unit into the flange a few turns.

> *NOTE:*
> *For long term ease of adjustment, application of anti-seize or other thread lubricant may be desired.*

2. Thread unit inward (clockwise) until the core is fully seated and cannot be turned in by hand – solidly stopped.
3. Ensure proper thread engagement of the cylinder and flange - equivalent to the thickness of the flange.
4. Ensure that there is space beyond flange for unit to thread through for adjustment. See required flange thickness for your model size (refer to "Recommended Accessories" section of catalog).
5. Place mark on flange and unit body to mark position location for reference.
6. Reinstall the port plugs, reconnect the hydraulics, and retract the cylinder.
7. Thread the unit **Inward (clockwise)** the recommended pre-load amount in the chart below.

Series	Pre-load
75	1/6 turn
100	1/6 turn
112	1/6 turn
150	1/3 turn
200	1/4 turn
300	1/8 turn

8. Tighten Jam Nut.
9. Connect sensors using appropriate procedures for the style utilized in your application. Documentation is provided separately.
10. Extend unit HYDRAULICALLY (1500 psi minimum) and verify lock sensor activates (turns on) ensuring unit locks as expected. Failure to lock is one indication of an adjustment problem.
11. After extending and locking, the preload stretches the large threads which may cause loosening of the Jam Nut. Re-tighten the jam nut, if desired.
    (NOTE: If the jam nut is tightened while the unit is preloaded, future loosening of the jam nut will require extending and preloading the unit).
12. Cycle unit hydraulically several times and verify complete operation.
13. Test Mold during injection and note part quality. If flash occurs, additional preload adjustments (1/16 turn increments clockwise) may be needed at normal operating temperature to achieve the desired final adjustment. If unit does not operate as intended, call PFA for assistance. Applications vary widely and this procedure may not exactly cover all geometries. 24/7 technical phone assistance is generally available.

These procedures have been written in an effort to address as many configurations as possible. If your particular application requires set up procedures that are not covered in the preceding documentation, please contact PFA at (262) 250-4410 for assistance.

XLT AND XHT PFA DRY CONTACT/RELAY SENSORS

SENSOR WIRING AND REPLACEMENT INSTRUCTIONS
Standard EE 70194/CT70300 (assembly) and High Temperature EE70199/CT705XX (Assemblies)

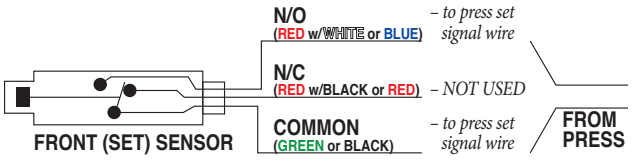


Fig. 1 - Single Sensor Wiring

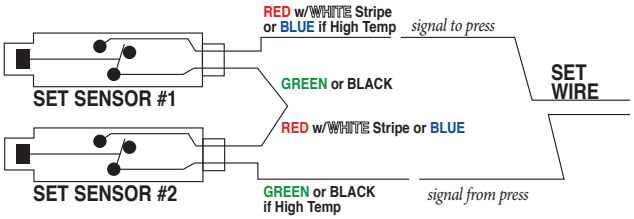


Fig. 2 - Multiple Sensor Wiring (Series)

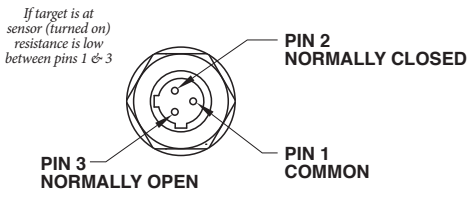
PFA Relay-style sensors (CT70300 assembly CT70520/21/22... High Temperature Assembly) function as a true dry contact switch. In normal usage, when the target comes "in range" of the sensor, the magnet inside the switch closes a contact to complete the circuit.

CT70300 ASSEMBLY SPECIFICATIONS

Part No. on Sensor:	EE70194
Cylinder Designation:	-XLT
Contact Type:	SPDT (Single-Pole, Double Throw)
Contact Rating:	2 Amps @ 120VAC 1 Amp @ 240VAC 1 Amp @ 24VDC
Temperature:	-40°F (-40°C) to 257°F (125°C)
Pressure:	3000 psi max.
Install Torque Max.:	50 in-lbs. max.

CT70520/21/22... ASSEMBLY SPECIFICATIONS

Part No. on Sensor:	72-16222-F4
Cylinder Designation:	-XHT
Contact Type:	SPDT (Single-Pole, Double Throw)
Contact Rating:	4 Amps @ 120VAC 2 Amp @ 240VAC 3 Amp @ 24VDC
Temperature:	-40°F (-40°C) to 400°F (204°C)
Pressure:	3000 psi max.
Install Torque Max.:	50 in-lbs. max.



Relay-style switches offer many benefits to the user. They have no voltage drop when closed nor do they have leakage current when open. In most applications the Normally Open (N/O) connection is used so that when the cores reach set or pull, the relay contacts close to give that indication to the press. In most cases, the Normally Closed (N/C) connection is not used, but is available for use as part of PFA's **SWITCHMAX**® Mold Wiring solution.

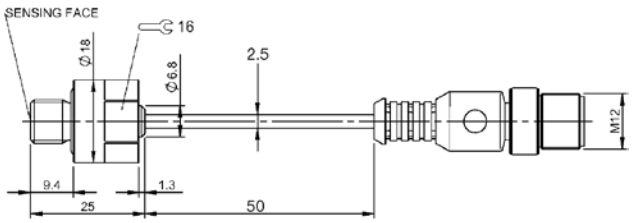
Connection between the KOR-LOK® Side-Action System and the press, is as simple as connecting two set sensor wires and two pull sensor wires to the two pair of machine control wires. The order of connection for each pair is not important.

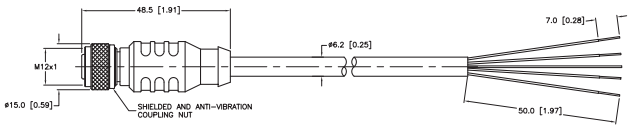
Multiple set sensors may be wired in series to provide a single set indication to the press. Similarly, the pull wires may be connected in series. For situations where a core or other part of the mold may be damaged if opened with cores set, it is recommended that a redundant sensor be placed on the core itself and wired in series with the main unit sensors to ensure the core is retracted prior to mold opening.

PFA's **SWITCHMAX**® Mold Wiring solution is also available to provide cross checking of sensors to verify proper sequencing and provide operator side LED light indication. For additional information on **SWITCHMAX**®, please view the information online at www.pfa-inc.com.

PNP LOW PROFILE PFA PROXIMITY SENSORS

SENSOR WIRING AND REPLACEMENT INSTRUCTIONS
EE70600/CT70600 Assembly



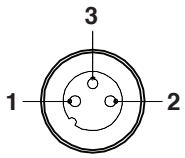


Example: Front (Set) Sensor

PFA Low Profile -PNP sensors (EE 70600/CT 70600 assembly with seal) function as typical high pressure proximity sensor, with a solid state device that senses the metal target of the lock or piston and outputs the input voltage (24VDC) to the machine control.

CT70600 ASSEMBLY SPECIFICATIONS

Part No. on Sensor:	PFA-EE70600
Cylinder Designation:	-PNP
Contact Type:	Solid State PNP/NO
Contact Rating:	100 mAmps @ 24VDC
Supply Voltage:	10-30 VDC
Voltage Drop:	≤2.5 VDC
Temperature:	-13˚F (-25˚C) to 175˚F (80˚C)
Install Torque Max.:	50 in-lbs. max.



1 = Brown (Power + 24 VDC)
2 = Blue (Neutral 0 VDC)
3 = Black (Signal)

Low Profile PNP sensors offer benefits to the user when fitting The KOR-LOK unit into demandingly small applications or when Integrating with other actuators using similar PNP sensor logic. PFA's PNP option has a low voltage drop, typically allowing multiple sensors to be connected together to facilitate a single input to the machine control. Sensor integration is easily accomplished with PFA's **SWITCHMAX®** connectivity solution with PNP designated splitter cables.

In a generic application the Normally Open Sensor is paired with an individual cable to provide power and route the signal. To use the sensors individually, Power +24VDC (Brown wire) and Neutral 0 VDC (Blue wire) is required, as well as some method of integrating the sensor signal (Black wire) to the press. Various schemes are used to accomplish this task for molds with multiple cylinders, however, PFA recommends **SWITCHMAX®** to provide a plug and play serial connection of sensors into single inputs for set and pull, while also providing operator side indication and troubleshooting capability.

While proper indication is expected, PFA cautions that for situations where a core or other part of the mold may be damaged if opened with cores set, it is recommended that a redundant sensor be placed on the core itself and wired in series with the main unit sensors to ensure the core is retracted prior to mold opening.

For details on **SWITCHMAX®** options, please view the information online at www.pfa-inc.com.

SENSOR REPLACEMENT

Read instructions completely before beginning work. If you have questions or need technical assistance, please contact PFA for support.

WARNING!
The sensor is not solid metal! Torque values are very low - in-lb not ft-lb!

The XLT Relay Sensor Assembly consists of the Sensor Body (EE70194), O-Ring Seal (2-013), and purple Loctite® (#545) thread compound. The Loctite® is provided to give the sensor resistance to loosening/leakage under normal use.

The XHT (High Temperature) Relay Sensor Assembly consists of the Sensor Body (EE70199), High Temp (VI) O-Ring Seals, Adaptor Body (LR08100) and purple Loctite® thread compound.

The PNP (Low Profile) Solid State Sensor Assembly consists of the Sensor Body (EE70600), O-Ring Seal (2-013) and purple Loctite® thread compound.

PREPARATION FOR SENSOR REPLACEMENT

Ensure all hydraulic pressure is removed from the unit. Hoses may then be disconnected or the associated hydraulic system vented and secured to prevent pressurization of the KOR-LOK® Side-Action System Main Unit.

CAUTION!
Fluid may eject from the sensor hole or ports under pressure or rod movement. Sensor is capable of handling Large Voltage and Current levels. Observe proper safety precautions.

Ensure the main unit is in a safe orientation so that the rod cannot move or apply a load on the cylinder, which might result in applied pressure to fluid still inside the unit.

Disconnect or secure power to the sensor from associated equipment.

All PFA KOR-LOK®, DIE-LOK™ and SWITCHMAX® application and use recommendations are advisory only. *KL/DL preload force ratings are geometry dependent and based on PFA recommended sizing methods. Process variations may affect actual performance.* ***PFA recommends use of PFA's SWITCHMAX® cross connected sensor checking and independent 2nd pull sensor (redundant) "core pulled" sensing on molds where opening with cores set could damage the mold.*** *False readings in the event of single sensor failure, cylinder contamination, core to cylinder separation, attachment failure, etc. may occur. PFA is not responsible for situations arising from false sensor readings, product failure, misuse, or abuse - proper form, fit and function are the responsibility of the customer. PFA "Terms of Sale" apply.*

REMOVAL OF OLD SENSOR

With pressure removed and vented and electrical power secured to the sensors, locate the front or rear sensor, as appropriate. Remove the cable from the sensor by unscrewing the retaining ring in a counterclockwise direction and unplugging the cable. For direct wire -XHT sensors, disconnect from power or controls.

Remove the sensor by rotating or unscrewing with a counterclockwise rotation on the hex nut connector (a 5/8" deep wall socket is recommended to avoid damage to the connector plug for XLT sensors). For PNP sensors, use a 5/8" or 16mm socket with cutout for cable.

INSTALLATION OF NEW SENSOR

(RECOMMENDED PREFERRED METHOD)

Inspect the sensor hole and surrounding sealing surface. Remove any debris from the surface, degrease threads, and ensure the surface is not damaged.

CAUTION!
Sensor is designed to seal finger tight.
Do not exceed 50 in-lbs (inch-pounds) of torque.

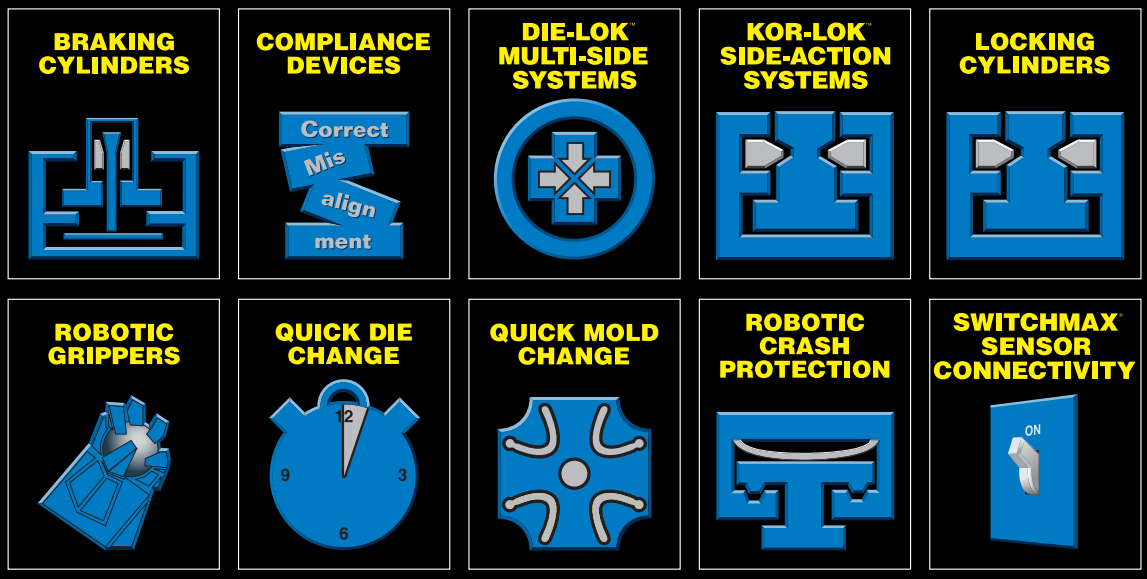
Degrease threads in housing and sensor. Ensure threads are clean and dry. If available, apply Loctite® Locquic® Primer T (7471) or equivalent to threads and wait until dry.

Add a small drop of purple Loctite® (#545) to the sensor threads and insert the new sensor in the hole turning clockwise. (Turn the sensor using fingers only until resistance of the o-ring seal is encountered - continue turning sensor clockwise against the seal resistance until the sensor seats on the sealing surface). The o-ring will seat with minimal torque and is fully seated by 30 in-lbs. At this level the sensor no longer turns freely.

Torque to 45 in-lbs (a 5/8" deep wall socket is recommended to avoid damage to the connector plug). EXCESSIVE TORQUE WILL DAMAGE THE SENSOR.

Connect cable and turn the connector retaining ring clockwise until play is removed or reconnect wiper as appropriate.

Allow Loctite® to set for 5 minutes and reinstall KOR-LOK® unit in mold.



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