Thank you for your interest in Motion Controls LLC. We have been building high quality air and hydraulic cylinders for 50 years in the USA. Motion Controls LLC is a small company in Southeast Wisconsin paying attention to detail and standards for our customers.

This Catalog features our newest product lines. We have integrated two of our most popular air cylinders with our new patented electronic rod position sensing technology. For the first time rod position can be reported with a simple analog voltage all within an NFPA footprint. In addition, the technology uses no magnets, works in high vibration environments with or without ferrous metals and impervious to weld fields.

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A complete list of distributors is on the web, or if you like contact

Customer Service at 262-673-9255

for the one closest to you.

WARRANTY:

ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED IN LIEU OF THIS LIMITED WARRANTY.

Motion Controls LLC. (Seller) warrants that its products are free from defects in material and workmanship for a period of one (1) year from the date of shipment from the factory. "O" RINGS AND SEALS ARE SPECIFICALLY EXEMPTED FROM THIS WARRANTY. Seller does not accept responsibility of any type for, and this warranty shall not apply to, any of its products that have been subjected to improper installation or application, negligence, tampering, abuse, or which have been disassembled and/or repaired or altered by anyone other than the Seller. Seller's liability under this warranty shall extend only to replacement or correction, F.O.B. our factory, of any part or product determined by Seller's inspection as not conforming to this warranty.

SELLER'S LIABILITY FOR ANY DEFECTIVE PRODUCT IS LIMITED TO THE REPAIR OR REPLACEMENT OF THE PRODUCT, AT ITS OWN OPTION, AS SET FORTH HEREIN. UNDER NO CIRCUMSTANCES SHALL SELLER BE LIABLE FOR DAMAGE TO ANY OTHER PROPERTY OR PERSONS CAUSED BY ANY DEFECTS OF THE PRODUCTS, DAMAGES BASED UPON INCONVENIENCE, LOSS OF USE OF THE PRODUCT, LOSS OF TIME, COMMERCIAL LOSS OR ANY OTHER DAMAGES, WHETHER INCIDENTAL, CONSEQUENTIAL OR OTHERWISE.

BUYER IS SOLELY REPONSIBLE FOR DETERMINING THE SUITABILITY OF GOODS SOLD HEREUNDER FOR USE BY BUYER.

- **GOODS NOT MANUFACTURED BY MOTION CONTROLS LLC.:**

Goods furnished subject only to the manufacturer's warranties, if any, and without warranties, expressed or implied, by Motion Controls LLC. Any description of the goods sold hereunder, including any references to Buyer's specifications, or any descriptions in catalogs, circulars and other written material published by seller is for the sole purpose of identifying such goods and shall not create an express warranty that the goods shall conform to such description.

APPLICATION LIMITATIONS:

Motion Controls LLC. products are not recommended, designed, warranted or approved for use in:

- Any product used under the Federal Highway Safety Act; including, but not limited to, steering or braking systems for passenger vehicles or on-highway vehicles.
- Aircraft or space vehicles.
- Ordnance equipment.
- Life support equipment.
- Any product used under U.S. Nuclear Regulatory Commission Rules and Regulations.

Consult factory for details or questions.

PERFORMANCE ASSURANCE:

- All Motion Controls LLC. Components are tested individually at the factory.
- ASSURANCE OF SUITABILITY OF ALL MOTION CONTROLS LLC. PRODUCTS IN THE BUYER'S APPLICATION IS THE RESPONSIBILITY OF THE BUYER. All information provided by Motion Controls LLC. is designed to assist the Buyer in selecting the proper product.
- Actual performance of a Buyer's equipment cannot be reproduced in Motion Controls LLC. facilities. It is recommended a prototype, test, and qualification program be performed by the buyer to assess suitability of Motion Controls LLC. product.

Motion Controls LLC.

STANDARD CYLINDERS

Series	Model	Bore	Rod Dia.	For thread styles (KK): RA1 Full Male	RA2 Reduced Male	RA3 Small Female	Tie-Rod Dia. and Thread.	Port Size NPT.	Single End, No Cushion, 0 Stroke, ZB Dimension.	MAX Pressure Rating
D (RA1 Standard Rod)	D12	1 1/4"	3/8"	3/8-16	1/4-20	1/4-20	1/4-28	1/8	4-17/32	
	D24	1 3/4"	3/4"	3/4-10	1/2-13	1/2-13	5/16-24	1/4	5-35/64	
	D30	2"					1/4-28			
	D49	2 1/2"					5/16-24	3/8		
	D70	3"								
	D96	3 1/2"	1"	1-8	3/4-10	3/4-10	1/2-20	1/2	6-35/64	
	D160	4 1/2"								
K (RA2 Standard Rod) NFPA	K0625150	1 1/2"	5/8"	5/8-18	7/16-20	7/16-20	1/4-28	3/8	4-5/8	
	K1000150		1"	1-14	3/4-16	3/4-16			5	
	K0625200	2"	5/8"	5/8-18	7/16-20	7/16-20	5/16-24		4-5/8	
	K1000200		1"	1-14	3/4-16	3/4-16			5	
	K0625250	2 1/2"	5/8"	5/8-18	7/16-20	7/16-20			4-3/4	
	K1000250		1"	1-14	3/4-16	3/4-16			5-1/8	
	K1000325	3 1/4"					3/8-24	1/2	5-5/8	
	K1375325		1 3/8"	1 3/8-12	1-14	1-14			5-7/8	
	K1000400	4"	1"	1-14	3/4-16	3/4-16			5-5/8	
	K1375400		1 3/8"	1 3/8-12	1-14	1-14			5-7/8	
	K1000500	5"	1"	1-14	3/4-16	3/4-16	1/2-20		5-7/8	
	K1375500		1 3/8"	1 3/8-12	1-14	1-14			6-1/8	
	K1375600	6"						3/4	6-5/8	
	K1750600		1 3/4"	1 3/4-12	1 1/4-12	1 1/4-12			6-7/8	

ELECTRONIC CYLINDERS

QVLA® TECHNOLOGY LED

Programmable iNSiGHT® PPC® with KEYPAD

NSD (RA1 Standard Rod)	NSDS12	1 1/4"	3/8"	3/8-16	1/4-20	1/4-20	1/4-28	1/8	4-17/32	
	NSDS24	1 3/4"	3/4"	3/4-10	1/2-13	1/2-13	5/16-24	1/4	5-35/64	
	NSDS30	2"					1/4-28			
	NSDS49	2 1/2"					**5/16-24**	3/8		
	NSDS70	3"								
NFPA **NSK** (RA2 Standard Rod)	NSK150	1 1/2"	5/8"	5/8-18	7/16-20	7/16-20	1/4-28	1/4	4-5/8	135 psi
	NSK152		1"	1-14	3/4-16	3/4-16			5	
	NSK200	2"	5/8"	5/8-18	7/16-20	7/16-20	5/16-24		4-5/8	
	NSK202		1"	1-14	3/4-16	3/4-16			5	
	NSK250	2 1/2"	5/8"	5/8-18	7/16-20	7/16-20		3/8	4-3/4	
	NSK252		1"	1-14	3/4-16	3/4-16			5-1/8	
	NSK320	3 1/4"					3/8-24	1/2	5-5/8	
	NSK322		1 3/8"	1 3/8-12	1-14	1-14			5-7/8	

iNSiGHT® Analog Reporting .5-9.5 VDC Output

NAD (RA1 Standard Rod)	NAD24	1 3/4"	3/4"	3/4-10	1/2-13	1/2-13	5/16-24	1/4	5-35/64	
	NAD30	2"					1/4-28			
	NAD49	2 1/2"					5/16-24	3/8		
	NAD70	3"								
NFPA **NAK** (RA2 Standard Rod)	NAK150	1 1/2"	5/8"	5/8-18	7/16-20	7/16-20	1/4-28	1/4	4-5/8	135 psi
	NAK152		1"	1-14	3/4-16	3/4-16			5	
	NAK200	2"	5/8"	5/8-18	7/16-20	7/16-20	5/16-24		4-5/8	
	NAK202		1"	1-14	3/4-16	3/4-16			5	
	NAK250	2 1/2"	5/8"	5/8-18	7/16-20	7/16-20		3/8	4-3/4	
	NAK252		1"	1-14	3/4-16	3/4-16			5-1/8	
	NAK320	3 1/4"					3/8-24	1/2	5-5/8	
	NAK322		1 3/8"	1 3/8-12	1-14	1-14			5-7/8	

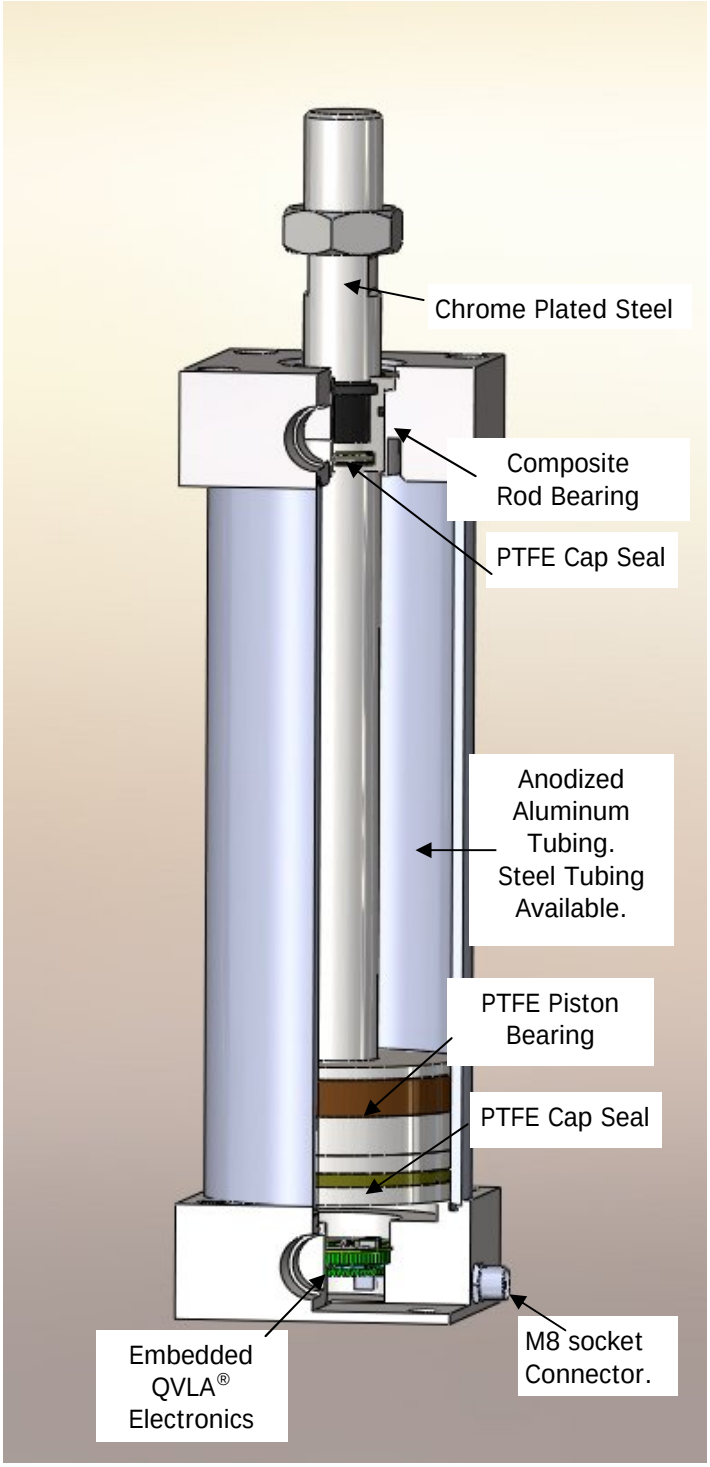
iNSiGHT® Analog Reporting

Motion Controls LLC now offers our patented QVLA® sensing technology embedded within our air cylinders. Upgrade and update equipment with old reed switches, expensive bulky transducers or external potentiometers with iNSiGHT® Analog. Now for the first time repeatable proportional to rod position voltage signal is available in an NFPA footprint and in our popular non-NFPA footprint "D" Series. No additional electronics needed. Position reported with analog voltage via a three wire M8 IP67 cable carrying power, ground and signal. Voltage output is .5 to 9.5 VDC proportional to stroke.

"NAK" Series is equal to our "K" Series with iNSiGHT® Analog.
"NAD" Series is equal to our "D" Series with iNSiGHT® Analog.

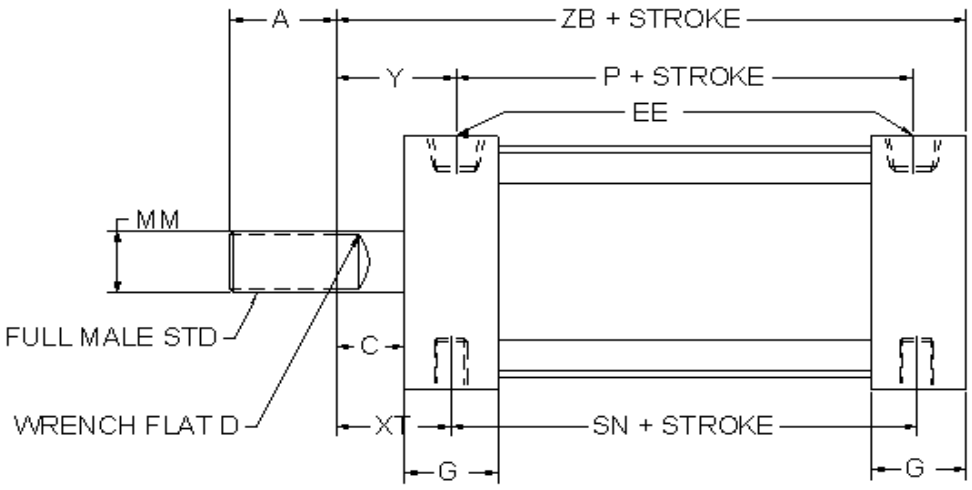
Following this section is a matching proportional valve from Enfield Technologies to compliment your cylinder and your control methods. See more on the S2 valve at www.enfieldtech.com

ELECTRONIC FEATURES AND SPECIFICATIONS
FAST 4,000 HZ
Non-Contact
Weld Field Immune
Temperature Compensated
LED Life Over 50 Years
Repeatability 1% of stroke
No Ferrous Materials
OUTPUT
.5 - 9.5 VDC proportional to stroke (Custom available on request)
MECHANICAL FEATURES
Piston Rod Chrome Plated Steel
Composite Rod Bearing
PTFE Cap Seals for Piston Rod
PTFE Cap Seals for Piston
PTFE Solid Piston Bearing
Hard Coated Anodized Aluminum Tube
Non-Lubrication
Machined Solid Aluminum End Caps
SYSTEM REQUIREMENTS
Pneumatic Operation Only
Clean Dry Air 0.3 micron fine grade coalescing filter with 5 micron pre-filter.
135 PSI Max
Operating Temperature -20° to 170°F

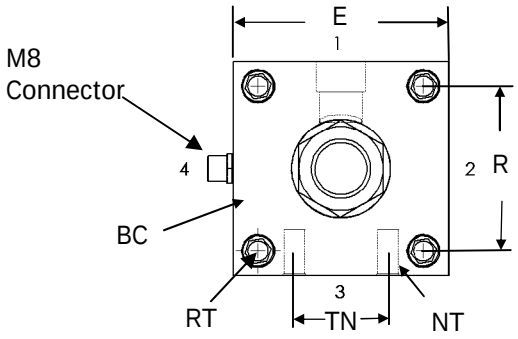


QVLA® TECHNOLOGY LED

NAD Dimensions = (“D” Series SENC)



NAD Series										FM RA1	NPT	ROD DIA.
MODEL	A	D	G	C	P	Y	SN	XT	ZB	CC	EE	MM
24	1-1/2	5/8	1-3/16	3/4	2-3/8	1-15/32	2-39/64	1-11/32	4-35/64	3/4-10	1/4	3/4
30	1-1/2	5/8	1-3/16	3/4	2-3/8	1-15/32	2-39/64	1-11/32	4-35/64	3/4-10	1/4	3/4
49	1-1/2	5/8	1-3/16	3/4	2-7/16	1-27/64	2-39/64	1-11/32	4-35/64	3/4-10	3/8	3/4
70	1-1/2	5/8	1-3/16	3/4	2-13/32	1-7/16	2-39/64	1-11/32	4-35/64	3/4-10	3/8	3/4



ALL MODELS						
MODEL	E	TN	BC	RT	R	NT
24	2-3/8	25/32	2.429	5/16-24X9/16	1.718	5/16-24X9/32
30	2-3/8	25/32	2.625	1/4-28X3/8	1.875	5/16-24X9/32
49	2-7/8	1-1/4	3.119	5/16-24X9/16	2.206	5/16-24X1/2
70	3-3/8	1-1/4	3.712	5/16-24X9/16	2.625	5/16-24X9/16

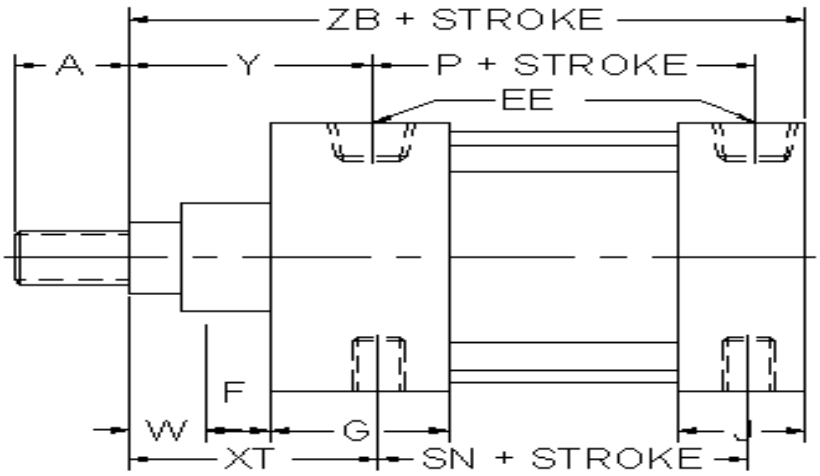
NFPA

QVLA® TECHNOLOGY

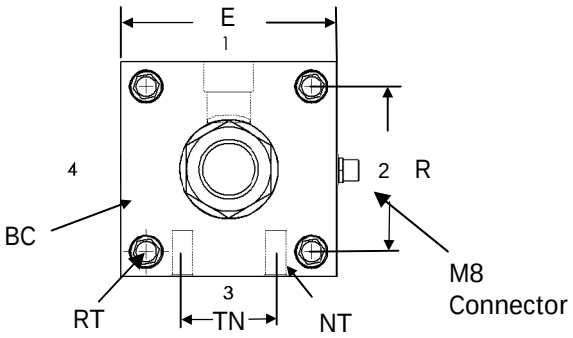
Motion Controls LLC.

Analog Reporting

NAK Dimensions = ("K" Series SE)



BASIC SINGLE END CYLINDER DIMENSIONS													
BORE	ROD DIAM.	P	G	J	F	SN	NT	NPTF EE	A	W	Y	XT	ZB
1-1/2	5/8	2-1/8	1-1/2	1	3/8	2-1/4	1/4-20 X 17/64	1/4	3/4	5/8	2	1-15/16	4-5/8
	1								1-1/8	1	2-3/8	2-5/16	5
2	5/8	2-1/8	1-1/2	1	3/8	2-1/4	5/16-18 X 3/8	1/4	3/4	5/8	2	1-15/16	4-5/8
	1								1-1/8	1	2-3/8	2-5/16	5
2-1/2	5/8	2-1/4	1-1/2	1	3/8	2-3/8	3/8-16 X 1/2	3/8	3/4	5/8	2	1-15/16	4-3/4
	1								1-1/8	1	2-3/8	2-5/16	5-1/8
3-1/4	1	2-1/2	1-3/4	1-1/4	5/8	2-5/8	1/2-13 X 3/4	1/2	1-1/8	3/4	2-1/2	2-7/16	5-5/8
	1-3/8								1-5/8	1	2-3/4	2-11/16	5-7/8



END CAP DIMENSIONS					
BORE	E	TN	TH	RT	R
1-1/2	2	5/8	1	1/4-28 X 5/16	1-7/16
2	2-1/2	7/8	1-1/4	5/16-24 X 3/8	1-27/32
2-1/2	3	1-1/4	1-1/2	5/16-24 X 7/16	2-3/16
3-1/4	3-3/4	1-1/2	1-7/8	3/8-24 X 12	2-49/64

iNSiGHT® ANALOG REPORTING

"NAD" SERIES (NON-NFPA) ORDERING INFORMATION

	SPECIFIC INFORMATION	CODE	NA	D24	SL15	RA1	Options
SERIES	iNSiGHT SERIES ANALOG CYLINDER	NA					
NON-NFPA	1 1/4" BORE - 3/8" ROD RA1 STANDARD	D12					
	1 3/4" BORE - 3/4" ROD RA1 STANDARD	D24					
	2" BORE - 3/4" ROD RA1 STANDARD	D30					
	2 1/2" BORE - 3/4" ROD RA1 STANDARD	D49					
	3" BORE - 3/4" ROD RA1 STANDARD	D70					
STROKE	SPECIFY STROKE LENGTH IN DECIMALS	SL	(Maximum Stroke 15 inches)				
ROD END	FULL MALE THREAD	RA1					
	REDUCED MALE THREAD	RA2					
	FEMALE THREAD	RA3					
Options	STAINLESS STEEL ROD	SS					
	REAR (CAP) CLEVIS DETACHABLE	MG					
	EYE BRACKET	MH					
	ROD CLEVIS	MF					
	CLEVIS PIN AND RETAINERS	MZ					
	FRONT FLANGE	MJ					
	REAR FLANGE	MK					
	METALLIC ROD WIPER	MW					
	ROD MODIFICATION (DRAWING PREFERRED	RM					

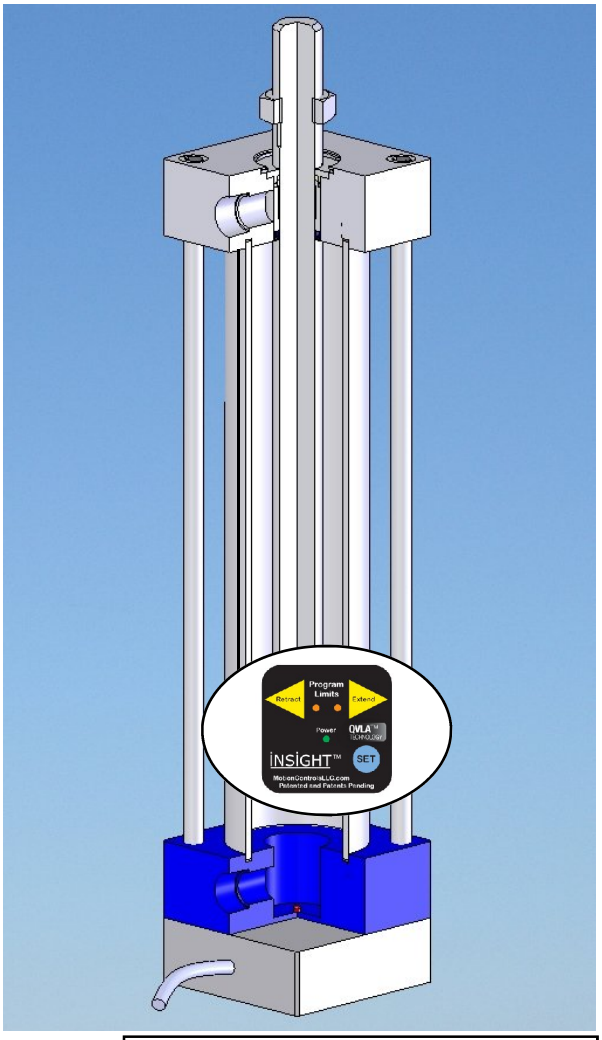
"NAK" SERIES (NFPA) ORDERING INFORMATION

	SPECIFIC INFORMATION	CODE	NA	K150	SL15	RA2	Options
SERIES	iNSiGHT SERIES ANALOG CYLINDER	NA					
STANDARD ROD	1 1/2" BORE - 5/8" ROD RA2 STANDARD	K150					
	2" BORE - 5/8" ROD RA2 STANDARD	K200					
	2 1/2" BORE - 5/8" ROD RA2 STANDARD	K250					
	3 1/4" BORE - 1" ROD RA2 STANDARD	K320					
OVERSIZED ROD	1 1/2" BORE - 1" ROD RA2 STANDARD	K152					
	2" BORE - 1" ROD RA2 STANDARD	K202					
	2 1/2" BORE - 1" ROD RA2 STANDARD	K252					
	3 1/4" BORE - 1 3/8" ROD RA2 STANDARD	K322					
STROKE	SPECIFY STROKE LENGTH IN DECIMALS	SL	(Maximum Stroke 15 inches)				
ROD END	FULL MALE THREAD	RA1					
	REDUCED MALE THREAD	RA2					
	FEMALE THREAD	RA3					
Options	STAINLESS STEEL ROD	SS					
	REAR (CAP) CLEVIS DETACHABLE	MG					
	EYE BRACKET	MH					
	ROD CLEVIS	MF					
	CLEVIS PIN AND RETAINERS	MZ					
	FRONT FLANGE	MJ					
	REAR FLANGE	MK					
	METALLIC ROD WIPER	MW					
	ROD MODIFICATION (DRAWING PREFERRED	RM					

PPC®

Programmable Position Cylinder

An Industry First: A repairable tie-rod air cylinder with embedded electronics providing two discrete user programmable stop points. This cylinder design features both NFPA and Non-NFPA configurations. Time to throw your reed switches out!



PROGRAMMABLE ELECTRONICS

The iNSiGHT® Series Cylinder is a new design featuring embedded electronics, external keypad and wired outputs for a pneumatic cylinder. Precise repeatable position is easily programmed with the use of the external keypad. See illustration below right.

Position sensing is accomplished using a new patented technology called: QVLA®. This technology is LED light based and measures interior light intensity changes within a cylinder. As the piston moves the volume between the end cap and the piston varies. QVLA® technology illuminates and measures this contained volume. The brighter the light, the less the rod extension. The dimmer the light the greater the rod extension. The patented emitting LED has a life estimated in decades and is self regulating providing constant illumination regardless of operating temperature or lifetime.

ELECTRONIC FEATURES AND SPECIFICATIONS	
FAST 1,500 HZ Non-Contact Weld field immune Cylinder life > 5 Million cycles. Electronics tested over 30 Million cycles! Temperature Compensated	LED life estimated over 100 Years Steel Tubes Available Infinite Resolution Repeatability .030 inch. No Magnets to wear out! LED Indicators
Outputs 2 Normally closed ouputs Opto-isolated outputs ESD Protected Isolation: 1500VRMS Switching voltage 100 Volts Switching current 150 mA	**Inputs** Supply voltage 6-12 volts Supply current ~50ma 9 foot wire standard Easy set-up and calibration. No tools required.
MECHANICAL DESIGN FEATURES	
Piston Rod: High Strength Chrome Plated Steel. Tubing: Hard Coat Anodized Aluminum. Steel Tube Option: Chrome Plated and Honed ID. Seals: PTFE Piston and Rod Cap Seals with Anti-extrusion, Low Friction and Low Wear. Non-Lube Operation Machined Solid Aluminumn End Caps and Piston 130 Max. PSI Air, 5 Micron Filtered Dry Air Required Operating Temperature 25°F to 150°F One Year Warranty	

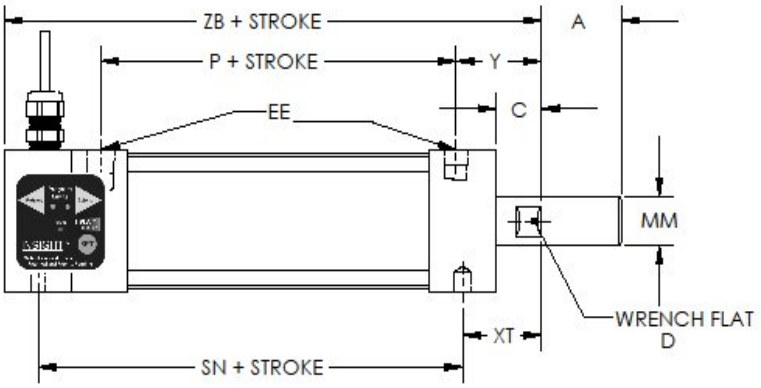
Actual keypad size

Set-up directions

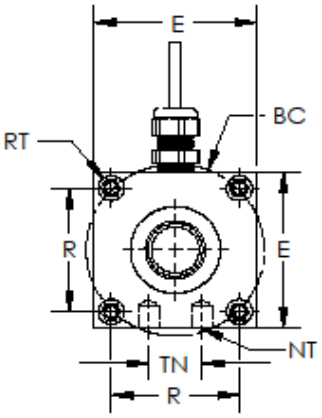
1) Press and Hold for 2 seconds the yellow button corresponding to the position desired, either:
"Extend" or "Retract."

2) When the corresponding orange LED blinks, physically set rod at desired position.

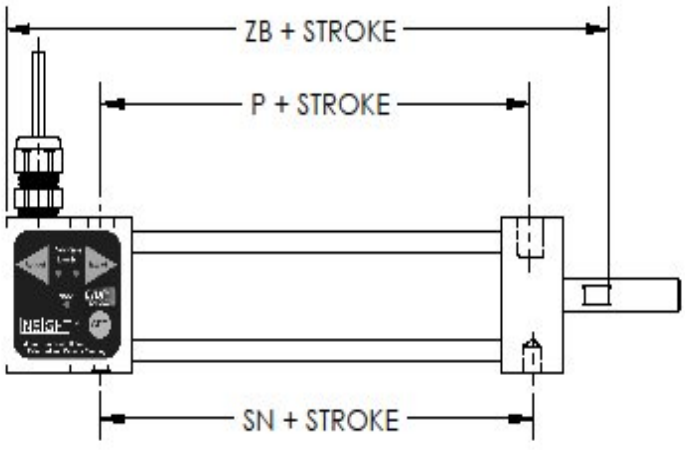
3) To finish, depress the blue "SET" button.
Complete!



iNSiGHT® NSD									FM RA1	NPT	ROD DIA.
MODEL	A	D	C	P	Y	SN	XT	ZB	CC	EE	MM
NSD12	1	5/16	5/8	2	1-3/32	2-1/32	1-1/16	4-17/32	3/8-16	1/8	3/8
NSD24	1-1/2	5/8	3/4	2-3/8	1-15/32	2-39/64	1-11/32	5-35/64	3/4-10	1/4	3/4
NSD30	1-1/2	5/8	3/4	2-3/8	1-15/32	2-39/64	1-11/32	5-35/64	3/4-10	1/4	3/4
NSD49	1-1/2	5/8	3/4	2-7/16	1-27/64	2-39/64	1-11/32	5-35/64	3/4-10	3/8	3/4
NSD70	1-1/2	5/8	3/4	2-13/32	1-7/16	2-39/64	1-11/32	5-35/64	3/4-10	3/8	3/4



iNSiGHT® NSD						
MODEL	E	TN	BC	RT	R	NT
NSD12	1-13/16	|	1.811	1/4-28X3/8	1.281	1/4-28X1/4
NSD24	2-3/8	25/32	2.429	5/16-24X9/16	1.718	5/16-24X9/32
NSD30	2-3/8	25/32	2.625	1/4-28X3/8	1.875	5/16-24X9/32
NSD49	2-7/8	1-1/4	3.119	5/16-24X9/16	2.206	5/16-24X1/2
NSD70	3-3/8	1-1/4	3.712	5/16-24X9/16	2.625	5/16-24X9/16



Side Tapped Mount Dimensions
NSD12 ONLY

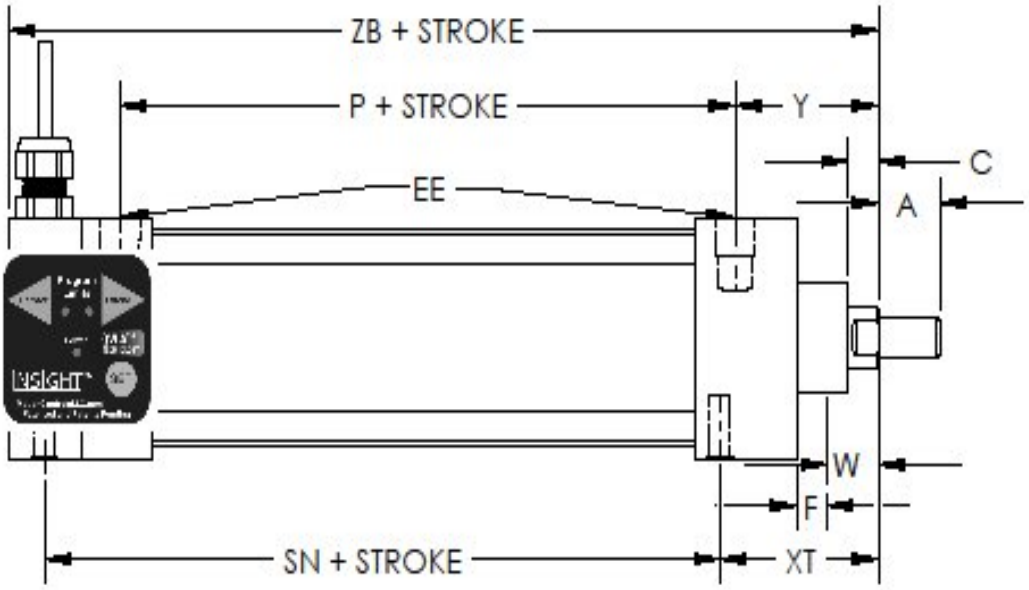
NFPA

"NSK"

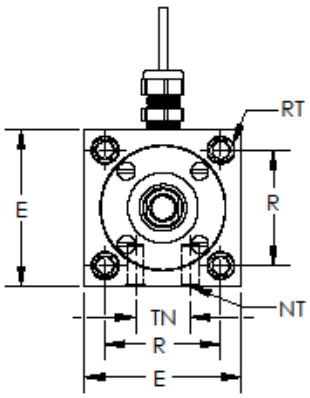
QVLA® TECHNOLOGY

Motion Controls LLC.

Programmable



iNSiGHT® NSK											
BORE	ROD DIA.	NPTF EE	CYLINDER DIMENSIONS								
			P	F	SN	NT	A	W	Y	XT	ZB
1-1/2	5/8	1/4	2-1/8	3/8	2-1/4	1/4-20 X 17/64	3/4	5/8	1-3/4	1-15/16	4-5/8
	1	1/4					1-1/8	1	2-1/8	2-5/16	5
2	5/8	1/4	2-1/8	3/8	2-1/4	5/16-18 X 3/8	3/4	5/8	1-3/4	1-15/16	4-5/8
	1	1/4					1-1/8	1	2-1/8	2-5/16	5
2-1/2	5/8	1/4	2-1/4	3/8	2-3/8	3/8-16 X 1/2	3/4	5/8	1-3/4	1-15/16	4-3/4
	1	1/4					1-1/8	1	2-1/8	2-5/16	5-1/8
3 1/4	1	3/8	2-1/2	5/8	2-5/8	1/2-13 x 3/4	1-1/8	3/4	2-1/4	2-7/16	5-5/8
	1-3/8	3/8					1-5/8	1	2-1/2	2-11/16	5-7/8



iNSiGHT® NSK				
END CAP DIMENSIONS				
BORE	E	TN	RT	R
1-1/2	2	5/8	1/4-28 X 5/16	1-7/16
2	2-1/2	7/8	5/16-24 X 3/8	1-27/32
2-1/2	3	1-1/4	5/16-24 X 7/16	2-3/16
3-1/4	3-3/4	1-1/2	5/16-24 X 7/16	2-49/64

PPC® ORDERING

"NSD" SERIES (NON-NFPA) ORDERING INFORMATION

	SPECIFIC INFORMATION	CODE	NS	D24	SL15	RA2	Options
SERIES	iNSiGHT SERIES PPC® CYLINDER	NS					
NON-NFPA	1 1/4" BORE - 3/8" ROD RA1 STANDARD	D12					
	1 3/4" BORE - 3/4" ROD RA1 STANDARD	D24					
	2" BORE - 3/4" ROD RA1 STANDARD	D30					
	2 1/2" BORE - 3/4" ROD RA1 STANDARD	D49					
	3" BORE - 3/4" ROD RA1 STANDARD	D70					
STROKE	SPECIFY STROKE LENGTH IN DECIMALS	SL	(Maximum Stroke 15 inches)				
ROD END	FULL MALE THREAD	RA1					
	REDUCED MALE THREAD	RA2					
	FEMALE THREAD	RA3					
Options	STAINLESS STEEL ROD	SS					
	REAR (CAP) CLEVIS DETACHABLE	MG					
	EYE BRACKET	MH					
	ROD CLEVIS	MF					
	CLEVIS PIN AND RETAINERS	MZ					
	FRONT FLANGE	MJ					
	REAR FLANGE	MK					
	METALLIC ROD WIPER	MW					
	ROD MODIFICATION (DRAWING PREFERRED)	RM					

"NSK" SERIES (NFPA) ORDERING INFORMATION

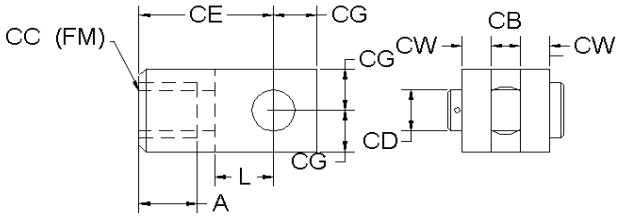
	SPECIFIC INFORMATION	CODE	NS	K150	SL15	RA2	Options
SERIES	iNSiGHT SERIES PPC® CYLINDER	NS					
STANDARD ROD	1 1/2" BORE - 5/8" ROD RA2 STANDARD	K150					
	2" BORE - 5/8" ROD RA2 STANDARD	K200					
	2 1/2" BORE - 5/8" ROD RA2 STANDARD	K250					
	3 1/4" BORE - 1" ROD RA2 STANDARD	K320					
OVERSIZED ROD	1 1/2" BORE - 1" ROD RA2 STANDARD	K152					
	2" BORE - 1" ROD RA2 STANDARD	K202					
	2 1/2" BORE - 1" ROD RA2 STANDARD	K252					
	3 1/4" BORE - 1 3/8" ROD RA2 STANDARD	K322					
STROKE	SPECIFY STROKE LENGTH IN DECIMALS	SL	(Maximum Stroke 15 inches)				
ROD END	FULL MALE THREAD	RA1					
	REDUCED MALE THREAD	RA2					
	FEMALE THREAD	RA3					
Options	STAINLESS STEEL ROD	SS					
	REAR (CAP) CLEVIS DETACHABLE	MG					
	EYE BRACKET	MH					
	ROD CLEVIS	MF					
	CLEVIS PIN AND RETAINERS	MZ					
	FRONT FLANGE	MJ					
	REAR FLANGE	MK					
	METALLIC ROD WIPER	MW					
	ROD MODIFICATION (DRAWING PREFERRED)	RM					

QVLA® TECHNOLOGY

Motion Controls LLC.

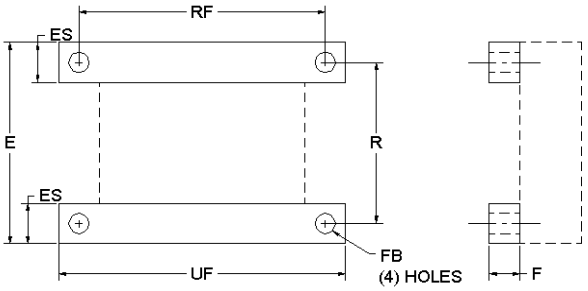
"NAD" & "NSD" Mounting

Rod Clevis and Pin (Code MF)



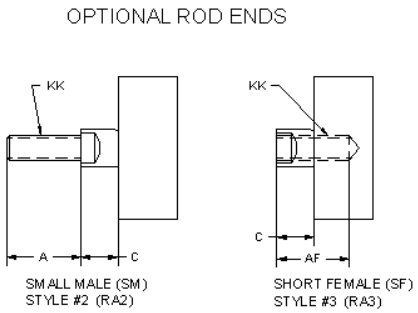
ROD CLEVIS & PIN *(Code: MF)*										CC
MODEL	PART NO.	A	CB	CD	CE	CG	CW	ER	L	(FM)
12	7000	3/4	1/4	3/8	1-11/32	3/8	1/4	17/32	15/32	3/8-16
24-30 49-70	7010	1	1/2	5/8	2-5/64	9/16	5/16	51/64	27/32	3/4-10

Flange Mount



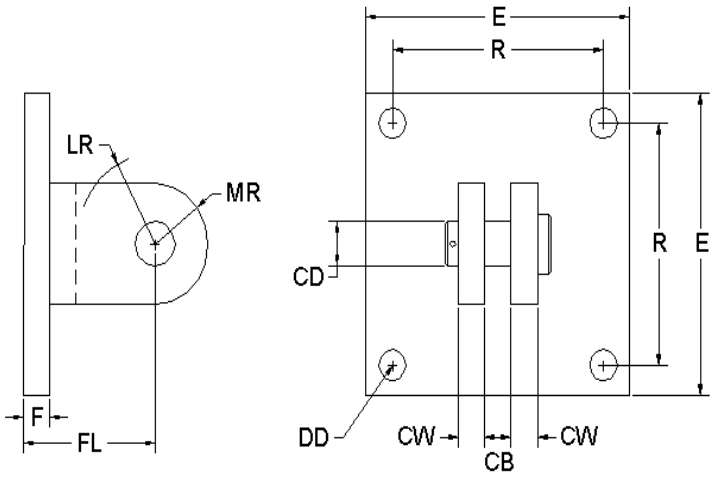
FLANGE MOUNT *(Code: MJ (front) MK (rear))*								
MODEL	PART NO.	E	F	R	ES	FB	RF	UF
12	7004	1-29/32	3/8	1.281	5/8	1/4	2-5/16	2-3/4
24	7009	2-15/32	7/16	1.718	3/4	5/16	3-1/32	3-19/32
30	7025	2-15/32	7/16	1.875	3/4	5/16	3-1/32	3-19/32
49	7013	2 15/16	7/16	2.206	3/4	5/16	3 7/16	4
70	7026	3 3/8	7/16	2.625	3/4	5/16	3 31/32	4 1/2

Optional Rod Ends



OPTIONAL ROD ENDS						SM RA2 & SF RA3
	ROD	A**	C**		CC	
BORE	DIA.	AD	CD	AF	(FM)	KK
1-1/4	3/8	1	5/8	5/8	3/8-16	1/4-20
1-3/4	3/4	1-1/2	3/4	3/4	3/4-10	1/2-13
2	3/4	1-1/2	3/4	3/4	3/4-10	1/2-13
2-1/2	3/4	1-1/2	3/4	3/4	3/4-10	1/2-13
3	3/4	1-1/2	3/4	3/4	3/4-10	1/2-13

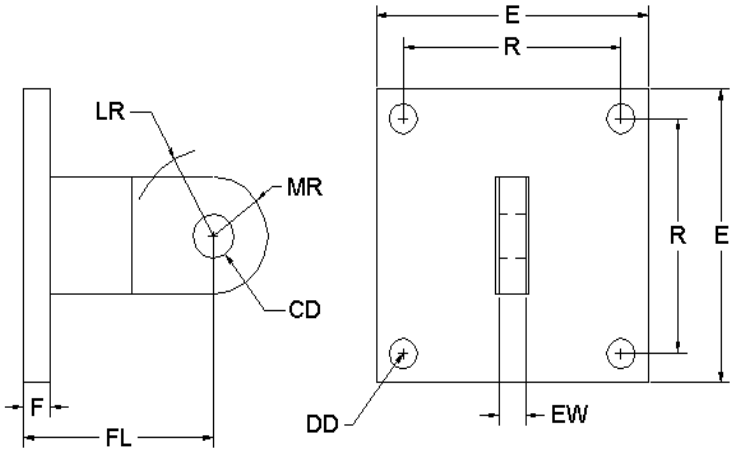
Clevis Bracket and Pin (Code MG)



CLEVIS BRACKET & PIN *(Code: MG)*											
MODEL	PART NO.	E	F	FL	R	CW	CB	CD	DD	LR	MR
12	7001	1-13/16	1/4	1	1.281	3/16	1/4	3/8	1/4	9/16	7/16
24	7006	2-3/8	3/8	1-3/8	1.718	9/32	1/2	1/2	5/16	7/8	5/8
30	7023	2-3/8	3/8	1-3/8	1.875	9/32	1/2	1/2	1/4	7/8	5/8
49	7011	2-7/8	3/8	1-1/2	2.206	3/8	1/2	5/8	5/16	1-1/16	13/16
70	7014	3-3/8	3/8	2-1/8	2.625	3/8	1/2	5/8	5/16	1-11/16	13/16

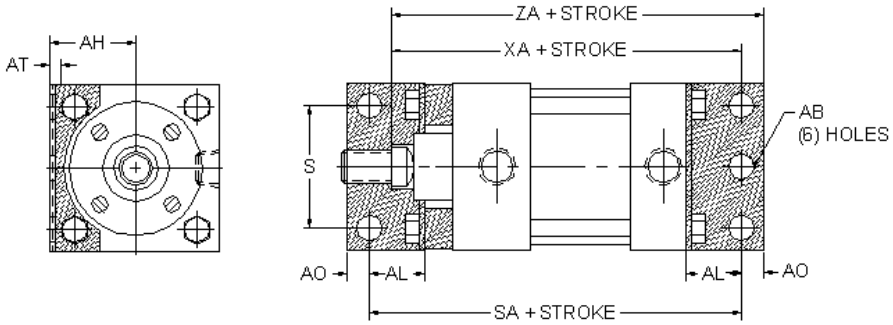
Eye Bracket (Code MH)

Note: Eye bracket not available on the NAD-70.



EYE BRACKET *(Code: MH)*										
MODEL	PART NO.	E	F	FL	R	CD	DD	EW	LR	MR
12	7002	1-13/16	1/4	1-1/2	1.281	3/8	1/4	1/4	9/16	7/16
24	7007	2-3/8	3/8	1-7/8	1.718	1/2	5/16	1/2	7/8	5/8
30	7024	2-3/8	3/8	1-7/8	1.875	1/2	5/16	1/2	7/8	5/8
49	7012	2-7/8	3/8	2-1/8	2.206	5/8	5/16	1/2	1-1/16	13/16

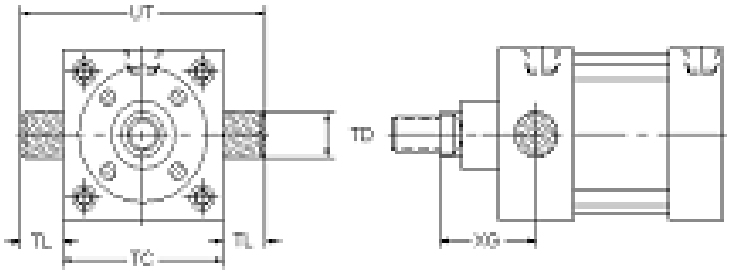
Mount MS1



SINGLE END ANGLE MOUNTING MS1 *(Code: S1)*										
BORE	**AB**	**S**	**AH**	**AL**	**AO**	**AT**	**SA**	**XA**	**ZA**	******
1-1/2	7/16	1-1/4	1-3/16	1	3/8	1/8	6	5-5/8	6	7/8
								6	6-3/8	
2	7/16	1-3/4	1-7/16	1	3/8	1/8	6	5-5/8	6	7/8
								6	6-3/8	
2-1/2	7/16	2-1/4	1-5/8	1	3/8	1/8	6-1/8	5-3/4	6-1/8	7/8
								6-1/8	6-1/2	
3-1/4	9/16	2-3/4	1-15/16	1-1/4	1/2	1/8	7-3/8	6-7/8	7-3/8	1-1/8
								7-1/8	7-5/8	

Conforms to NFPA Type MS1 mount cylinders. Also available as a separate modular mounting kit, complete with two angle brackets, two short screws for attachment to cap end, two long screws and bushing for attachment to head end.

MT1 Front (Code MA, Cushioned MB)



TRUNNION MOUNTING						
BORE	**TC**	**TD ±.001**	**TL**	**UT**	**XG**	**XJ**
1-1/2	2	1.000	1	4	1-3/4	4-1/8
					2-1/8	4-1/2
2	2-1/2	1.000	1	4-1/2	1-3/4	4-1/8
					2-1/8	4-1/2
2-1/2	3	1.000	1	5	1-3/4	4-1/8
					2-1/8	4-1/2
3-1/4	3-3/4	1.000	1	5-3/4	2-1/4	5
					2-1/2	5-1/4

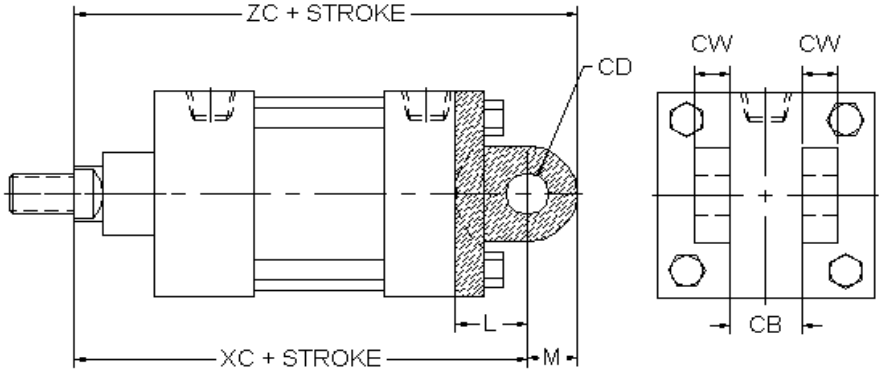
"NSK" & "NAK" Mounting

Clevis Bracket (Code MG)

MP2 ADDERS:

Add 3/8 inch for 1-1/2,2,2-1/2 bore.

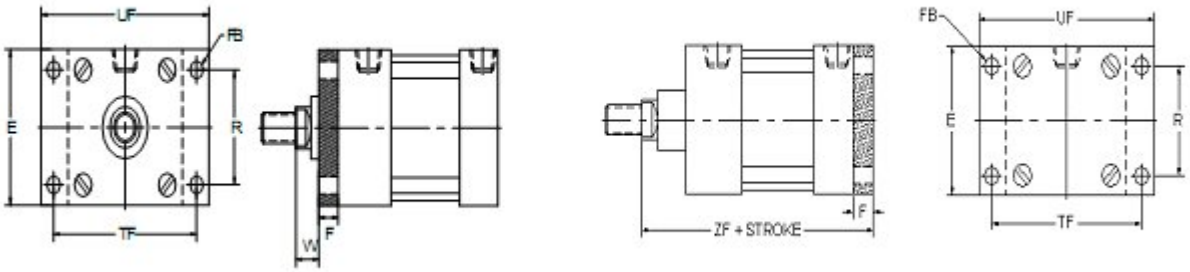
Add 5/8 inch for 3-1/4, bore.



Conforms to NFPA Type MP1 & MP2 mount cylinders. Also available as a separate modular mounting kit, complete with clevis bracket, four mounting screw, pin and two snap-rings.

FIXED CLEVIS MOUNTING MP1 *(Code: MG)*								
BORE	**ROD DIA.**	**L***	**M**	**CB**	**CD ±.001**	**CW**	**XC***	**ZC***
1-1/2	**5/8**	3/4	1/2	3/4	.500	1/2	5-3/8	5-7/8
	1						5-3/4	6-1/4
2	**5/8**	3/4	1/2	3/4	.500	1/2	5-3/8	5-7/8
	1						5-3/4	6-1/4
2-1/2	**5/8**	3/4	1/2	3/4	.500	1/2	5-1/2	6
	1						5-7/8	6-3/8
3-1/4	**1**	1-1/4	3/4	1-1/4	.750	5/8	6-7/8	7-5/8
	1 3/8						7-1/8	7-7/8

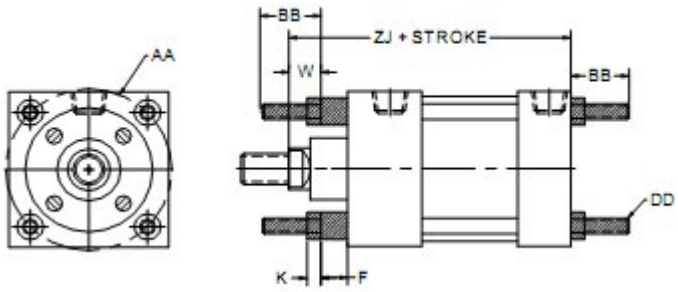
Front Flange Mount MF1 (Code MJ) Rear Flange Mount MF2 (Code MK)



Conforms to NFPA Type MF1 or MF2 mount cylinders. Also available as a separate modular mounting kit, complete with flange and four mounting screws to attach to head end for MF1 front flange mount or cap end for MF2 mount.

FLANGE MOUNTING								
BORE	E	F	R	W	FB	TF	UF	ZF
1-1/2	2	3/8	1-7/16	5/8	5/16	2-3/4	3-3/8	5
				1				5-3/8
2	2-1/2	3/8	1-27/32	5/8	3/8	3-3/8	4-1/8	5
				1				5-3/8
2-1/2	3	3/8	2-3/16	5/8	3/8	3-7/8	4-5/8	5-1/8
				1				5-1/2
3-1/4	3-3/4	5/8	2-49/64	3/4	7/16	4-11/16	5-1/2	6-1/4
				1				6-1/2

Extended Tie-Rod (Codes X1, X2, X3, X4)

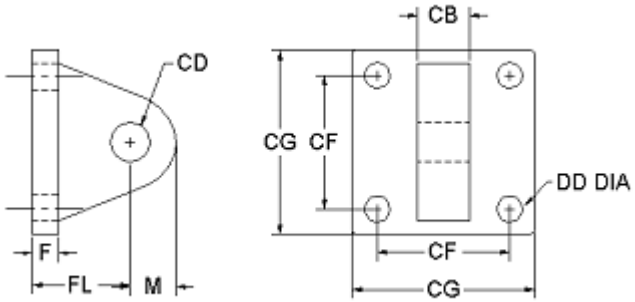


Conforms to NFPA Extended Tie-Rod mount.
Also available as a separate modular mounting kit with four tie rod extension studs. Two kits should be ordered for X1 mounting.

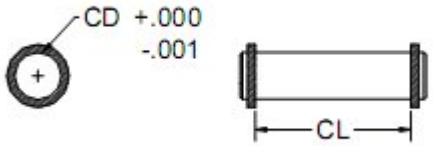
X1 - All extended *(CODE MN)*
X2 - Rear extended *(CODE MO)*
X3 - Front extended *(CODE MP)*
X4 - Two each end extended *(CODE MR)*

EXTENDED TIE ROD MOUNTING							
BORE	**W**	**AA**	**BB**	**DD**	**ZJ**	**K**	**F**
1-1/2	5/8	2.032	1	1/4-28	4-5/8	7/32	3/8
2	5/8	2.598	1-1/8	5/16-24	4-5/8	17/64	3/8
2-1/2	5/8	3.092	1-1/8	5/16-24	4-3/4	17/64	3/8
3-1/4	3/4	3.911	1-3/8	3/8-24	5-5/8	21/64	5/8

Eye Bracket (Code MH) (NOT MP4)



Pin (Code MZ)

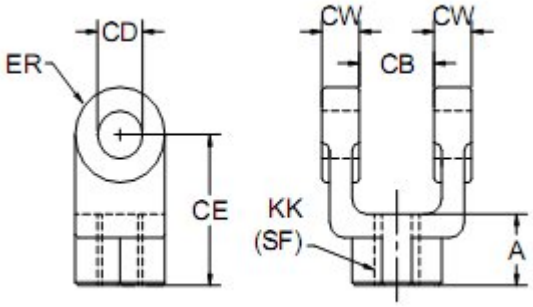


CYLINDER BORE	ROD DIA.	ACCESSORY DIMENSIONS													
		A	F	M	CA	CB	CD	CE	CF	CG	CL	CW	DD	ER	FL
1-1/2,2,2-1/2	5/8	3/4	3/8	1/2	1-1/2	3/4	1/2	1-1/2	1-5/8	2-1/2	1-3/4	1/2	3/8	9/16	1-1/8
3-1/4	1	1-1/8	5/8	3/4	2-1/16	1-1/4	3/4	2-3/8	2-35/64	3-1/2	2-1/2	5/8	1/2	13/16	1-7/8

		KK(SF)	ACCESSORY DIMENSIONS			
		ROD &	EYE	ROD	ROD	
CYLINDER BORE	ROD DIA.	EYE THREAD	BRACKET P/N	EYE P/N	CLEVIS P/N	PIN P/N
1-1/2,2,2-1/2	5/8	7/16-20	6830	6799	8402	6843
3-1/4	1	3/4-16	6996	6995	8403	6994

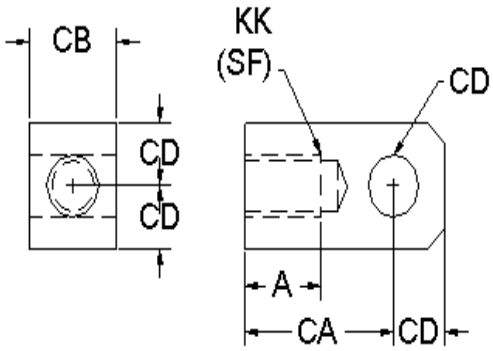
"NSK" & "NAK" Mounting

Rod Clevis (Code MF)



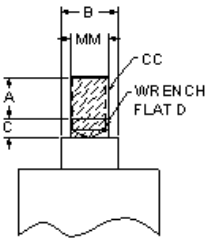
Rod Clevis available only in KK (SF) threading shown.
Select Style 2 (SM) rod thread to match.

Rod Eye (Code MX)

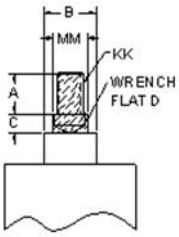


Rod eye available only in KK (SF) threading shown. Select Style 2 (SM) rod thread to match.

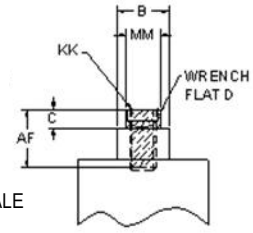
Optional Rod Ends



FULL MALE
(FM)
Code: RA1



SMALL MALE
(SM)
Code: RA2



SHORT FEMALE
(SF)
Code: RA3

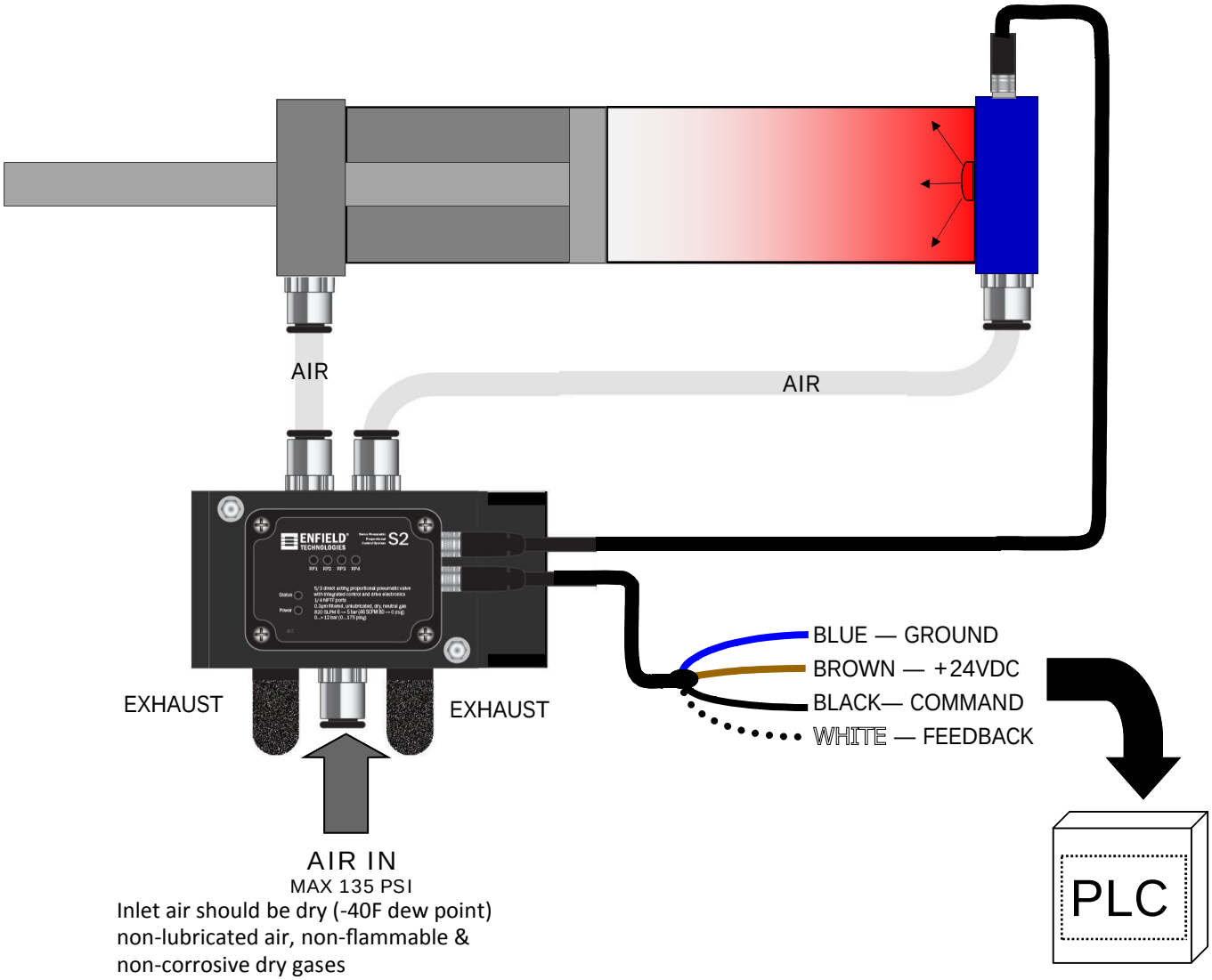
BORE	ROD DIAM. MM	ROD DIA. CODE	A AD AF	-.001 -.003 B	ROD ENDS C CD	D	KK (FM)	CC (SM & SF)
1-1/2	5/8	1	3/4	1.125	3/8	1/2	5/8-18	7/16- 20
	1	2	1-1/8	1.500	1/2	7/8	1-14	3/4-16
2	5/8	1	3/4	1.125	3/8	1/2	5/8-18	7/16- 20
	1	2	1-1/8	1.500	1/2	7/8	1-14	3/4-16
2-1/2	5/8	1	3/4	1.125	3/8	1/2	5/8-18	7/16- 20
	1	2	1-1/8	1.500	1/2	7/8	1-14	3/4-16
3-1/4	1	1	1-1/8	1.500	1/2	7/8	1-14	3/4-16
	1-3/8	2	1-5/8	2.000	5/8	1-1/8	1 3/8-12	1-14

QVLA® TECHNOLOGY

Motion Controls LLC.

Proportional Control

Electrical and pneumatic connections between Motion Controls LLC QVLA® and Enfield Technologies ZS-V-12003 S2 Valve.



AIR IN
MAX 135 PSI
Inlet air should be dry (-40F dew point) non-lubricated air, non-flammable & non-corrosive dry gases (0.3micron fine grade coalescing filter with 5 micron pre-filter) at 0-135psig

This combination of QVLA® position reporting technology incorporated into our air cylinder and Enfield S2 proportional air valve will results in exciting new possibilities for accurate, repeatable position sensing and control otherwise not obtainable with currently available sensing systems.

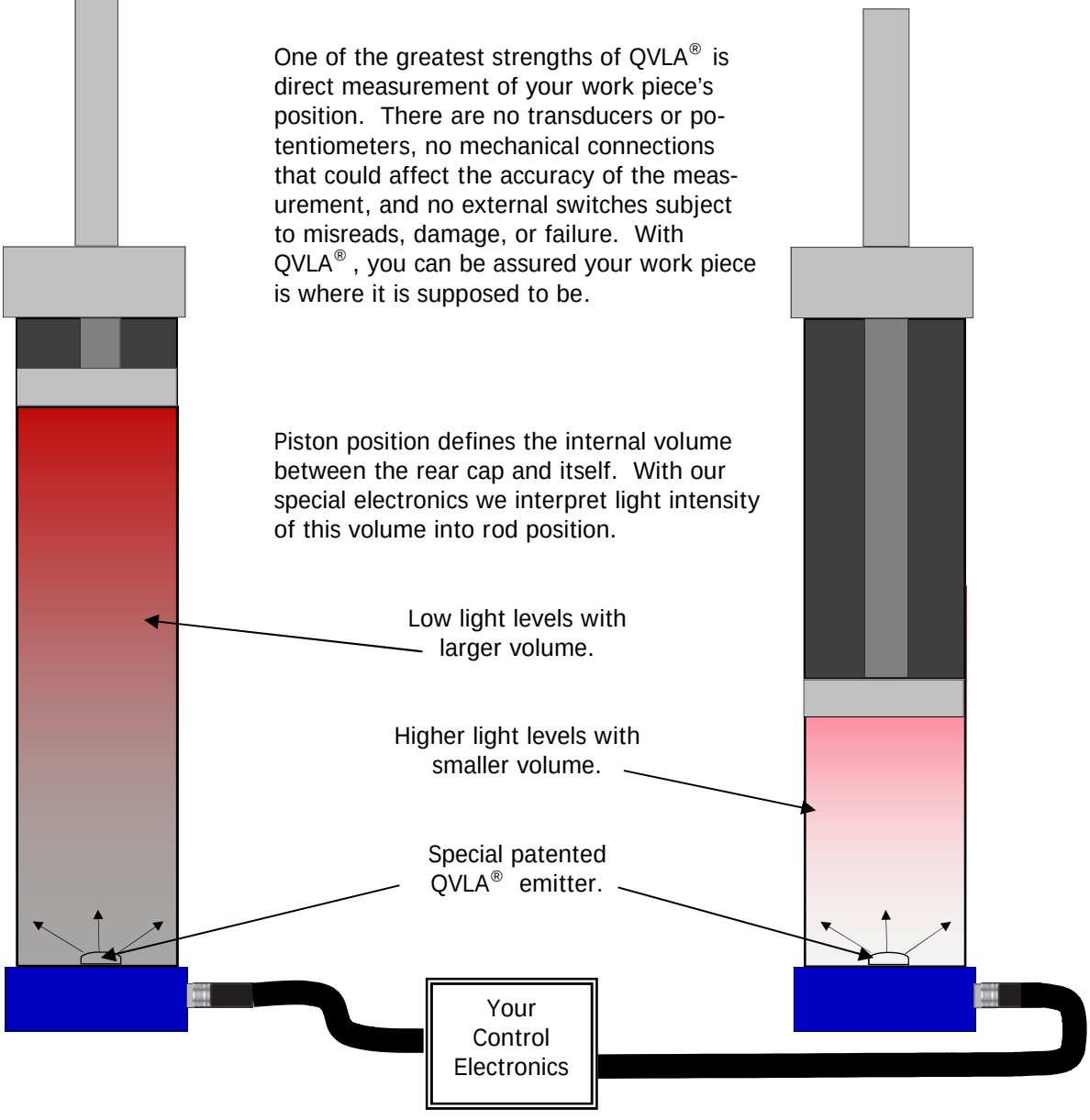
WARNING: Installation and operation of electronic and high pressure systems (fluids and compressed gas) involves risk including property damage and personal injury or death. Users should be properly trained or certified and take safety precautions.

What is QVLA®?

QVLA® is a patented sensing technology. It is based on light intensity to measure volumes. Different or changing light intensities within a dynamic volume indicate volume changes. Light flooding the interior of a chamber is reflected and absorbed differently as the volume changes shape or size. With an LED mounted in the end cap, light intensity changes as the piston moves. We interpret the light intensity into rod position.

One of the greatest strengths of QVLA® is direct measurement of your work piece's position. There are no transducers or potentiometers, no mechanical connections that could affect the accuracy of the measurement, and no external switches subject to misreads, damage, or failure. With QVLA® , you can be assured your work piece is where it is supposed to be.

Piston position defines the internal volume between the rear cap and itself. With our special electronics we interpret light intensity of this volume into rod position.



QVLA® TECHNOLOGY

Motion Controls LLC.

See our new iNSiGHT® products. Both Analog (page 4) and PPC® (page 8) solve these problems.

50 Years of Cylinders!
Thank you for your business, we enjoy making product for your needs.
Made in Wisconsin.