Motion Controls LLC.

Air Cylinders & iNSiGHT Actuators & QVLA® Sensors

QVLA

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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	3-17/32	250 psi
	D24	1 3/4"	3/4"	3/4-10	1/2-13	1/2-13	5/16-24	1/4	4-35/64	
	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	5-35/64	
	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 ACTUATORS

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QVLA®

iNSiGHT® Analog Reporting with 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	135 psi
	NAD30	2"					1/4-28			
	NAD49	2 1/2"					5/16-24	3/8		
	NAD70	3"								
	NSD96	3 1/2"	1"	1-8	3/4-10	3/4-10	1/2-20	1/2	5-35/64	
	NSD160	4 1/2"								
	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	
	NAK400	4	1"	1-14	3/4-16	3/4-16			5-5/8	
	NAK402		1 3/8"	1 3/8-12	1-14	1-14			5-7/8	
	NAK500	5	1"	1-14	3/4-16	3/4-16	1/2 -20		5-7/8	
	NAK502		1 3/8"	1 3/8-12	1-14	1-14			6-1/8	
	NAK600	6						3/4	6-5/8	
	NAK602		1 3/4"	1 3/4-12	1 1/4-12	1 1/4-12			6-7/8	

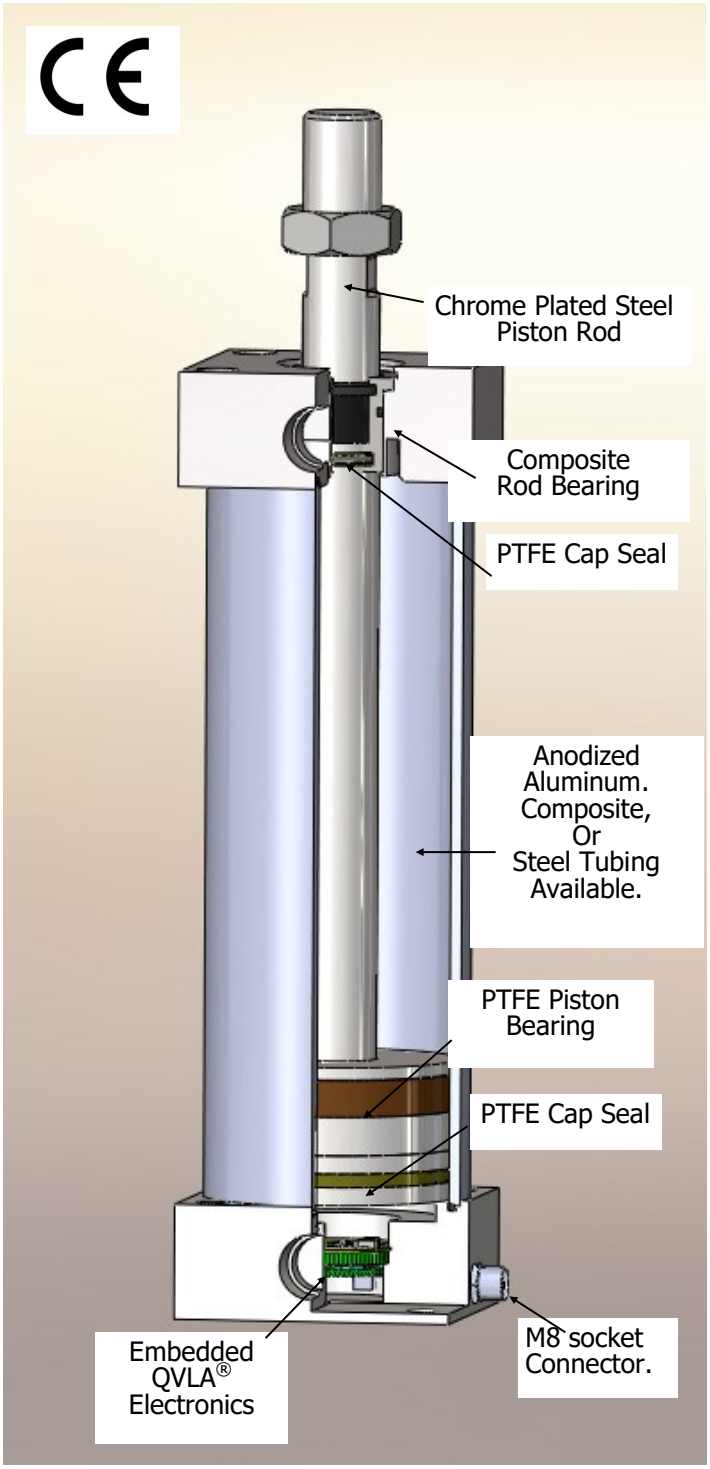
iNSiGHT® Analog Actuator

Motion Controls LLC now offers our patented QVLA® sensing technology embedded within our air cylinders. Upgrade and update equipment with old reed switches, expensive, fragile and bulky transducers or external potentiometers with iNSiGHT® Analog Actuator. Now for the first time repeatable proportional to rod position voltage signal is available in an NFPA footprint and our popular non-NFPA "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 and page 19 in this catalog.

ELECTRONIC FEATURES AND SPECIFICATIONS
FAST 4,000 HZ
Non-Contact
Weld Field Immune
Temperature Compensated
LED Life Over 50 Years
Repeatability 1% of stroke.
Call for longer stroke specifications.
No Ferrous Materials
OUTPUT
.5 - 9.5 VDC proportional to stroke (Custom available on request)
MECHANICAL FEATURES
Chrome Plated Steel Piston Rod
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



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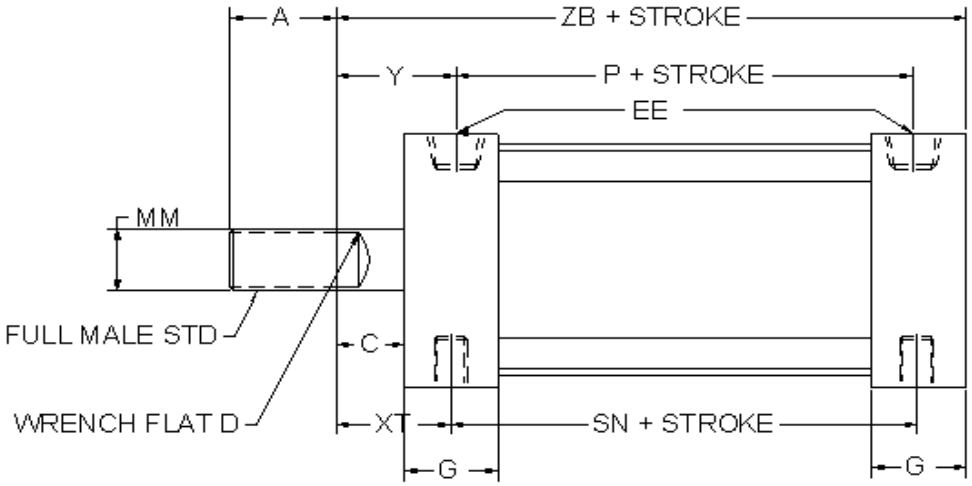
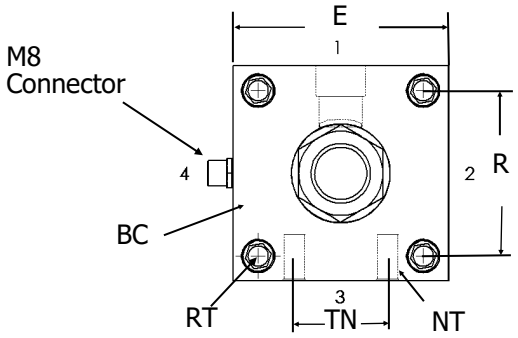
Analog Reporting

NAD Dimensions = ("D" Series **SENC**)



NAD SERIES										FM RA1		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
96	1-5/8	7/8	1-7/16	1	2-59/64	1-13/16	3-7/64	1-23/32	5-35/64	1-8	1/2	1
160	1-5/8	7/8	1-7/16	1	2-54/64	1-13/16	3-7/64	1-23/32	5-35/64	1-8	1/2	1



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
96	4-1/8	1-27/32	4.559	1/2-20X3/4	3.224	1/2-20X1/2
160	5-1/8	2-1/2	5.689	1/2-20X3/4	4.024	1/2-20X1/2

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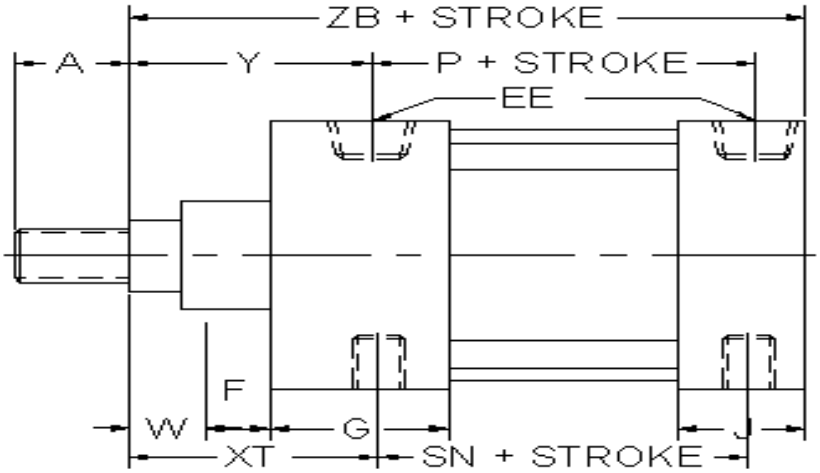
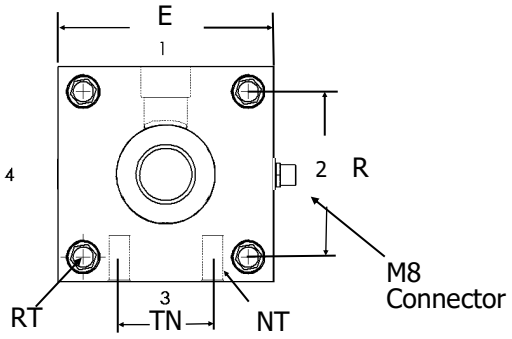
NAK Dimensions = ("K" Series)

Analog Reporting



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	3/8	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	3/8	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
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
5	1	2-3/4	1-3/4	1-1/4	5/8	2-7/8	5/8-11 X 15/16	1/2	1-1/8	3/4	2-1/2	2-7/16	5-7/8
	1-3/8								1-5/8	1	2-3/4	2-11/16	6-1/8
6	1-3/8	3	2	1-1/2	3/4	3-1/8	3/4-10 X 1-1/8	3/4	1-5/8	7/8	2-7/8	2-13/16	6-5/8
	1-3/4								2	1-1/8	3-1/8	3-1/16	6-7/8

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
4	4-1/2	2-1/16	2-1/4	3/8-24 X 12	3-21/64
5	5-1/2	2-11/16	2-3/4	1/2-20 X 9/16	4-7/64
6	6-1/2	3-1/4	3-1/4	1/2-20 X 9/16	4-7/8



iNSiGHT® ANALOG REPORTING

"NAD" SERIES (NON-NFPA) ORDERING INFORMATION CE

	SPECIFIC INFORMATION	CODE	NA	D24	SL15	RA1	Options	Maximum Stroke in.
SERIES	iNSiGHT SERIES ANALOG CYLINDER	NA						
NAD (NON-NFPA Tie-Rod)	1 3/4" BORE - 3/4" ROD RA1 STANDARD	D24						20
	2" BORE - 3/4" ROD RA1 STANDARD	D30						20
	2 1/2" BORE - 3/4" ROD RA1 STANDARD	D49						24
	3" BORE - 3/4" ROD RA1 STANDARD	D70						48
	3 1/2" BORE - 1" ROD RA1 STANDARD	D96						48
	4 1/2" BORE - 1" ROD RA1 STANDARD	D160						48
STROKE	SPECIFY STROKE LENGTH IN DECIMALS	SL						
ROD END	FULL MALE THREAD (Standard)	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						

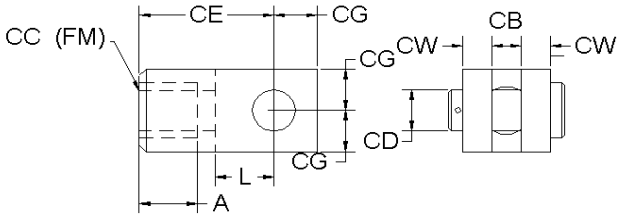
"NAK" SERIES (NFPA) ORDERING INFORMATION CE

	SPECIFIC INFORMATION	CODE	NA	K150	SL15	RA2	Options	Maximum Stroke in.
SERIES	iNSiGHT SERIES ANALOG CYLINDER	NA						
NAK (NFPA Tie-rod) STANDARD ROD	1 1/2" BORE - 5/8" ROD RA2 STANDARD	K150						20
	2" BORE - 5/8" ROD RA2 STANDARD	K200						20
	2 1/2" BORE - 5/8" ROD RA2 STANDARD	K250						24
	3 1/4" BORE - 1" ROD RA2 STANDARD	K320						36
	4" BORE - 1" ROD RA2 STANDARD	K400						48
	5" BORE - 1" ROD RA2 STANDARD	K500						48
	6" BORE - 1 3/8" ROD RA2 STANDARD	K600						48
NAK (NFPA Tie-rod) OVERSIZED ROD	1 1/2" BORE - 1" ROD RA2 STANDARD	K152						20
	2" BORE - 1" ROD RA2 STANDARD	K202						20
	2 1/2" BORE - 1" ROD RA2 STANDARD	K252						24
	3 1/4" BORE - 1 3/8" ROD RA2 STANDARD	K322						36
	4" BORE - 1 3/8" ROD RA2 STANDARD	K402						48
	5" BORE - 1 3/8" ROD RA2 STANDARD	K502						48
	6" BORE - 1 3/4" ROD RA2 STANDARD	K602						48
STROKE	SPECIFY STROKE LENGTH IN DECIMALS	SL						
ROD END	FULL MALE THREAD	RA1						
	REDUCED MALE THREAD (Standard)	RA2						
	FEMALE THREAD	RA3						
Options	STAINLESS STEEL ROD	SS						
	SIDE END ANGLE MOUTNING (MS1)	MI						
	FRONT TRUNION (MT1)	MA						
	REAR (CAP) CLEVIS DETACHABLE	MG						
	ROD CLEVIS	MF						
	ROD EYE	MX						
	EYE BRACKET	MH						
	CLEVIS PIN AND RETAINERS	MZ						
	FRONT FLANGE	MJ						
	REAR FLANGE	MK						
	ALL TIE RODS EXTENDED (X1)	MN						
	REAR TIE RODS EXTENDED (X2)	MO						
	FRONT TIE RODS EXTENDED (X3)	MP						
	2 TIE RODS EACH END EXTENDED (X4)	MR						
	METALLIC ROD WIPER	MW						
	ROD MODIFICATION (DRAWING PREFERRED	RM						

Motion Controls LLC.

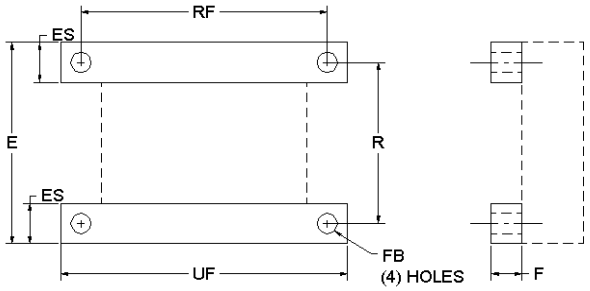
"NAD" Mounting

Rod Clevis and Pin (Code MF)



ROD CLEVIS & PIN *(Code: MF)*										CC
MODEL	PART NO.	A	CB	CD	CE	CG	CW	ER	L	(FM)
24-30 49 70	7010	1	1/2	5/8	2-5/64	9/16	5/16	51/64	27/32	3/4-10
96-160	7015	1	1/2	3/4	2-21/64	3/4	1/2	1-1/16	1-1/32	1-8

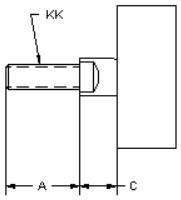
Flange Mount



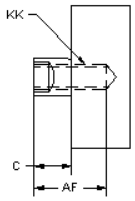
FLANGE MOUNT *(Code: MJ (front) MK (rear))*								
MODEL	PART NO.	E	F	R	ES	FB	RF	UF
24	7009	2-15/32	7/16	1.718	3/4	5/16	3-1/32	3-19/32
30	7025	2-15/32	7/16	1.875	3/4	5/16	3-1/32	3-19/32
49	7013	2 15/16	7/16	2.206	3/4	5/16	3 7/16	4
70	7026	3 3/8	7/16	2.625	3/4	5/16	3 31/32	4 1/2
96	7019	4-1/4	5/8	3.224	1	1/2	5-1/16	5-15/16
160	7022	5-1/64	5/8	4.024	1	1/2	6-1/16	7

Optional Rod Ends

OPTIONAL ROD ENDS



SMALL MALE (SM)
STYLE #2 (RA2)



SHORT FEMALE (SF)
STYLE #3 (RA3)

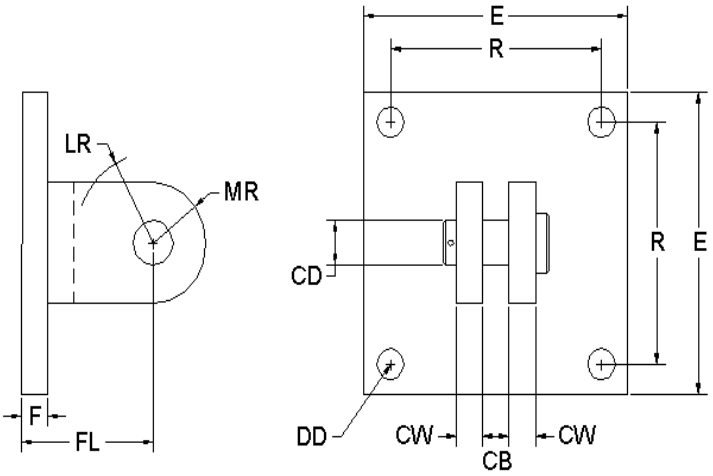
OPTIONAL ROD ENDS						SM RA2 & SF RA3
	ROD	A**	C**		CC	
BORE	DIA.	AD	CD	AF	(FM)	KK
1-3/4	3/4	1-1/2	3/4	3/4	3/4-10	1/2-13
2	3/4	1-1/2	3/4	3/4	3/4-10	1/2-13
2-1/2	3/4	1-1/2	3/4	3/4	3/4-10	1/2-13
3	3/4	1-1/2	3/4	3/4	3/4-10	1/2-13
3-1/2	1	1-5/8	1	1-1/8	1-8	3/4-10
4-1/2	1	1-5/8	1	1-1/8	1-8	3/4-10

Motion Controls LLC.

QVLA®

"NAD" Mounting

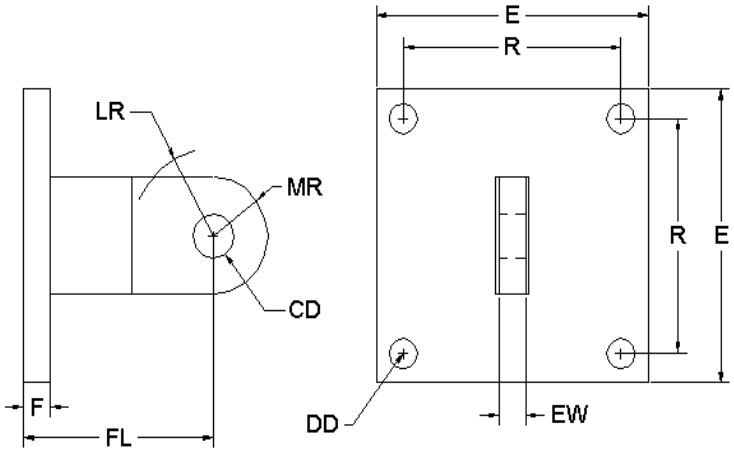
Clevis Bracket and Pin (Code MG)



CLEVIS BRACKET & PIN *(Code: MG)*											
MODEL	PART NO.	E	F	FL	R	CW	CB	CD	DD	LR	MR
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
96	7016	4-1/8	3/8	2-1/16	3.224	3/8	1/2	3/4	1/2	1-1/4	1
160	7020	5-1/8	3/8	2-3/8	4.024	3/8	1/2	3/4	1/2	1-1/2	1-3/8

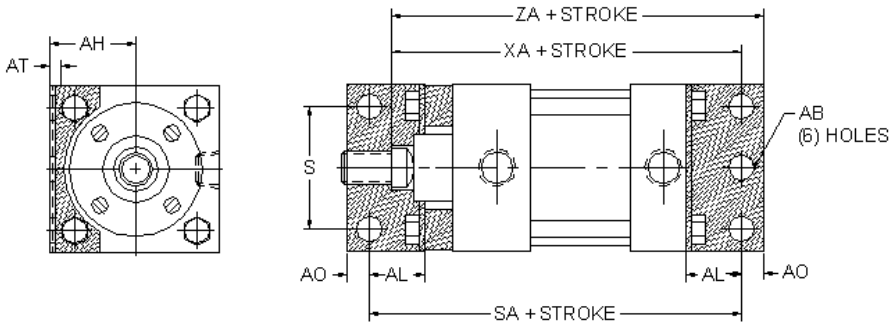
Eye Bracket (Code MH)

Note: Eye bracket not available on the NAD-70 use eye bracket from NAD-49, part number 7012.



EYE BRACKET *(Code: MH)*										
MODEL	PART NO.	E	F	FL	R	CD	DD	EW	LR	MR
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
96	7017	4-1/8	3/8	3	3.224	3/4	1/2	1/2	1-1/4	1
160	7021	5-1/8	3/8	3-1/2	4.024	3/4	1/2	1/2	1-1/2	1-3/8

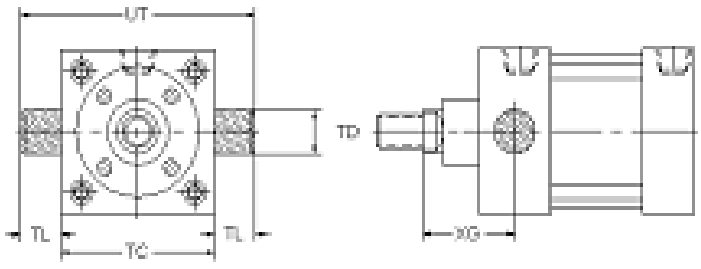
MS1 Mount (Code MI)



SINGLE END ANGLE MOUNTING MS1 *(Code: MI)*										
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	
4	9/16	3-1/2	2-1/4	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	
5	11/16	4-1/4	2-3/4	1-3/8	5/8	3/16	7-7/8	7-1/4	7-7/8	1-1/8
								7-1/2	8-1/8	
6	13/16	5-1/4	3-1/4	1-3/8	5/8	3/16	8-1/2	8	8-5/8	1-1/4
								8-1/4	8-7/8	

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)



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
4	4-1/2	1.000	1	6-1/2	2-1/4	5
					2-1/2	5-1/4
5	5-1/2	1.000	1	7-1/2	2-1/4	5
					2-1/2	5-1/4
6	6-1/2	1.375	1-3/8	9-1/4	2-5/8	5-7/8
					2-7/8	6-1/8

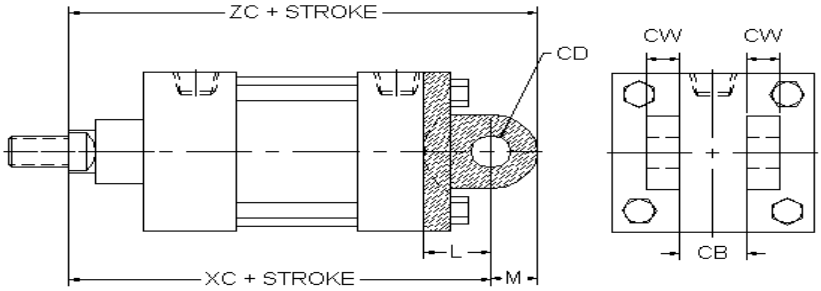
"NAK" Mounting

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.

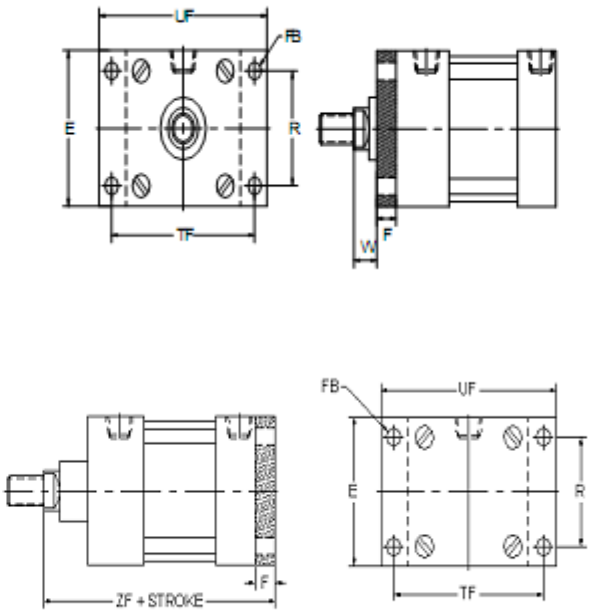


Conforms to NFPA Type MP1 & MP2 mount cylinders. Also available as a separate modular mounting kit, complete with clevis bracket, four mounting screws, pin and two snap-rings.

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
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
5	1	1-1/4	3/4	1-1/4	.750	5/8	7-1/8	7-7/8
	1 3/8						7-3/8	8-1/8
6	1 3/8	1-1/2	1	1-1/2	1.000	3/4	8-1/8	9-1/8
	1 3/4						8-3/8	9-3/8

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

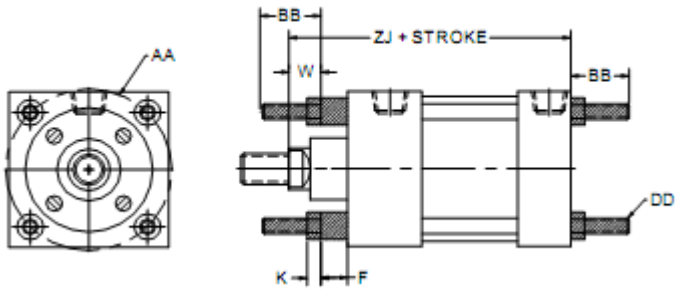
BORE	E	F	R	W	FB	TF	UF	ZF
1-1/2	2	3/8	1-7/16	5/8	5/16	2-3/4	3-3/8	5
				1				5-3/8
2	2-1/2	3/8	1-27/32	5/8	3/8	3-3/8	4-1/8	5
				1				5-3/8
2-1/2	3	3/8	2-3/16	5/8	3/8	3-7/8	4-5/8	5-1/8
				1				5-1/2
3-1/4	3-3/4	5/8	2-49/64	3/4	7/16	4-11/16	5-1/2	6-1/4
				1				6-1/2
4	4-1/2	5/8	3-21/64	3/4	7/16	5-7/16	6-1/4	6-1/4
				1				6-1/2
5	5-1/2	5/8	4-7/64	3/4	9/16	6-5/8	7-5/8	6-1/2
				1				6-3/4
6	6-1/2	3/4	4-7/8	7/8	9/16	7-5/8	8-5/8	7-3/8
				1-1/8				7-5/8

Motion Controls LLC.

VLA®

"NAK" Mounting

Extended Tie-Rod (Codes MN, MO, MP, MR)

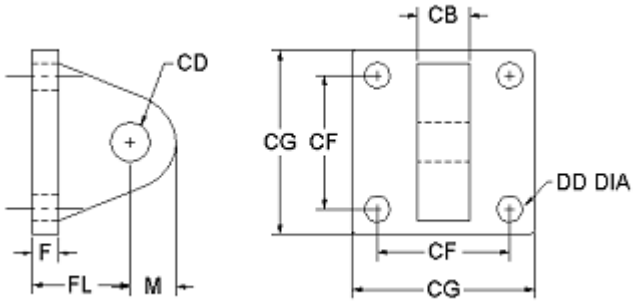


Conforms to NFPA Extended Tie-Rod mount.
Also available as a separate modular mounting kit with four tie rod extension studs. Two kits should be ordered for X1 mounting.

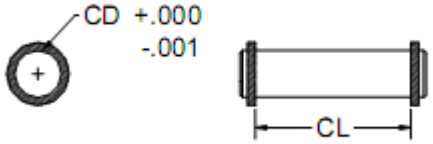
X1 - All extended *(CODE MN)*
X2 - Rear extended *(CODE MO)*
X3 - Front extended *(CODE MP)*
X4 - Two each end extended *(CODE MR)*

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
4	3/4	4.706	1-3/8	3/8-24	5-5/8	21/64	5/8
5	3/4	5.810	1-13/16	1/2-20	5-7/8	_	5/8
6	7/8	6.893	1-13/16	1/2-20	6-5/8	_	3/4

Eye Bracket (Code MH) (NOT MP4)



Pin (Code MZ)

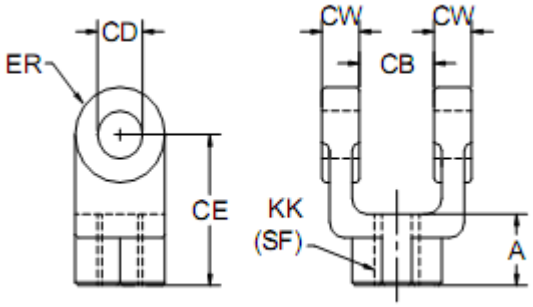


CYLINDER BORE	ROD DIA.	ACCESSORY DIMENSIONS													
		A	F	M	CA	CB	CD	CE	CF	CG	CL	CW	DD	ER	FL
1-1/2,2,2-1/2	5/8	3/4	3/8	1/2	1-1/2	3/4	1/2	1-1/2	1-5/8	2-1/2	1-3/4	1/2	3/8	9/16	1-1/8
3-1/4, 4, 5	1	1-1/8	5/8	3/4	2-1/16	1-1/4	3/4	2-3/8	2-35/64	3-1/2	2-1/2	5/8	1/2	13/16	1-7/8
6	1-3/8	1-5/8	3/4	1	2-13/16	1-1/2	1	3-1/8	3-1/4	4-1/2	3	3/4	5/8	1-3/32	2-1/4

		KK(SF)	ACCESSORY DIMENSIONS			
		ROD &	EYE	ROD	ROD	
CYLINDER	ROD	EYE	BRACKET	EYE	CLEVIS	PIN
BORE	DIA.	THREAD	P/N	P/N	P/N	P/N
1-1/2,2,2-1/2	5/8	7/16-20	6830	6799	8402	6843
3-1/4, 4, 5	1	3/4-16	6996	6995	8403	6994
6	1-3/8	1-14	7641	7555	8404	7643

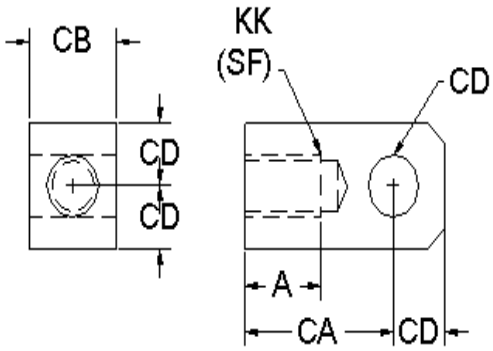
"NAK" Mounting

Rod Clevis (Code MF)



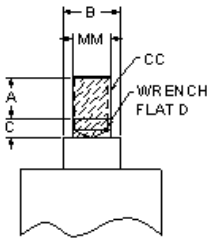
Rod Clevis available only in KK (SF) threading shown.
Select Style 2 (SM) rod thread to match.

Rod Eye (Code MX)

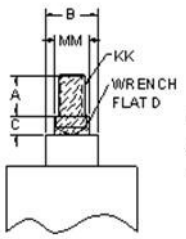


Rod eye available only in KK (SF) threading shown. Select Style 2 (SM) rod thread to match.

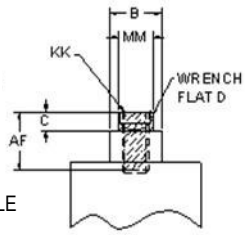
Optional Rod Ends



FULL MALE
(FM)
Code: RA1



SMALL MALE
(SM)
Code: RA2



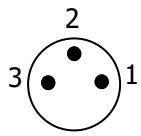
SHORT FEMALE
(SF)
Code: RA3

	ROD	ROD	A	-.001	ROD ENDS			
	DIAM.	DIA.	AD	-.003	C		CC	KK
BORE	MM	CODE	AF	B	CD	D	(FM)	(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
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
5	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
6	1-3/8	1	1-5/8	2.000	5/8	1-1/8	1 3/8-12	1-14
	1-3/4	2	2	2.375	3/4	1-1/2	1 3/4-12	1-1/4-12

Motion Controls LLC.

QVLA®

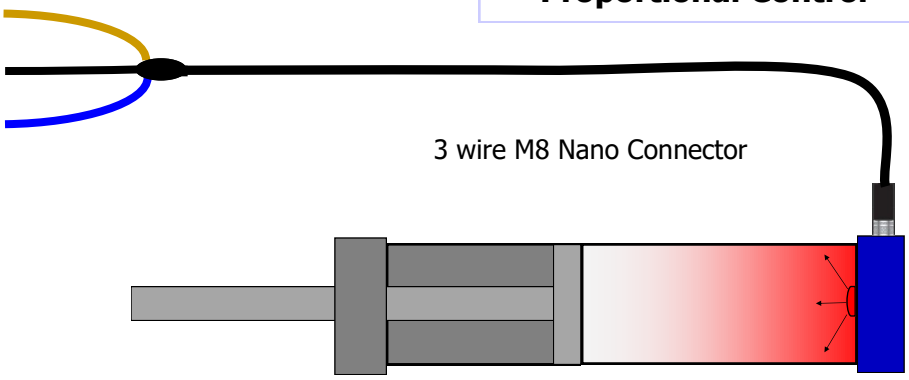
Proportional Control



1)+12-24vdc (Brown)

2) Signal (BLK)

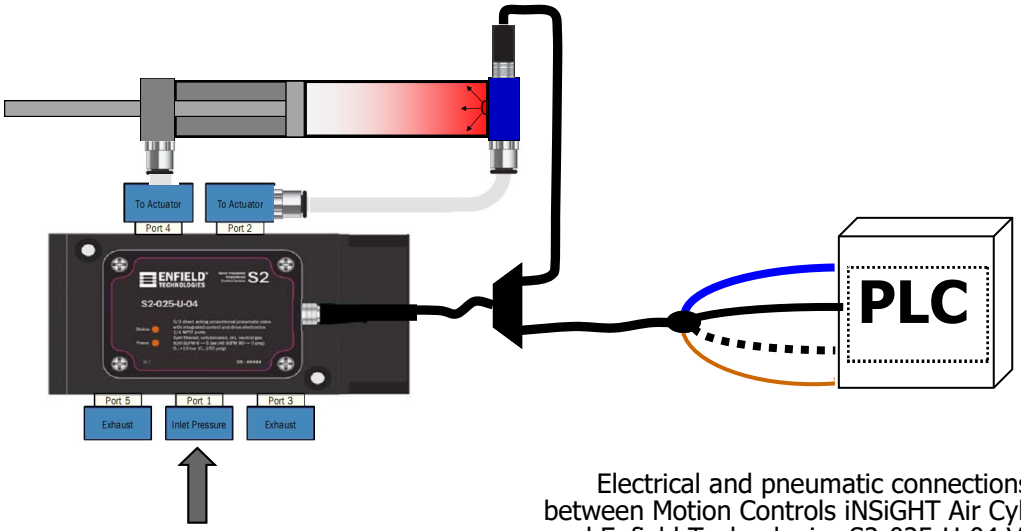
3) Ground (Blue)



With PLC

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

Software available for quick easy set up of Enfield valve available on their web site:
http://enfieldtech.com/products/positioning-system/



Electrical and pneumatic connections between Motion Controls iNSiGHT Air Cylinder and Enfield Technologies S2-025-U-04 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

BLUE — GROUND
BLACK— COMMAND
WHITE — FEEDBACK
BROWN — +24VDC

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.

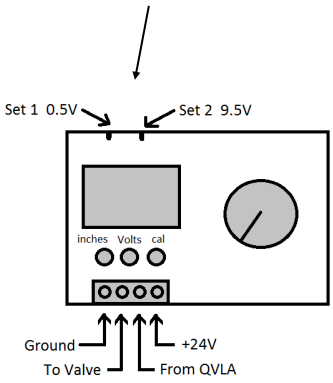
Motion Controls LLC.

Proportional Control

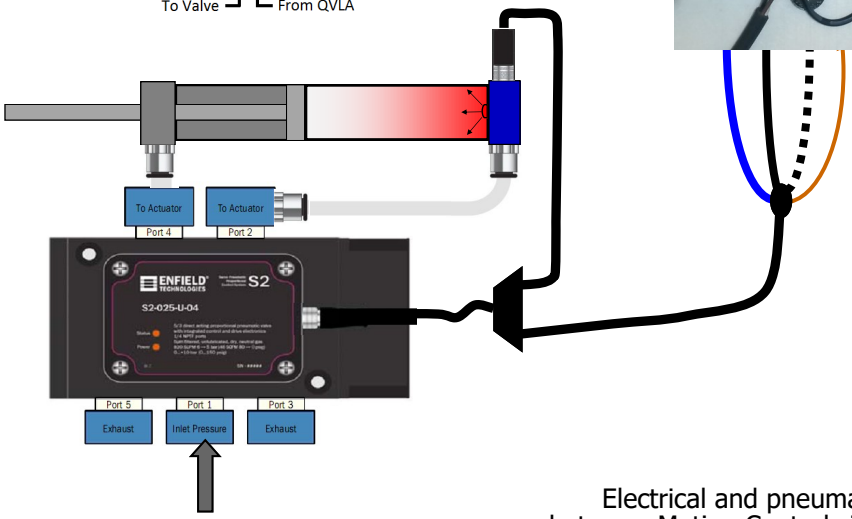
- No computer or PLC needed. The valve works with the cylinder to close the loop to the command signal generated by any exterior source. The command signal may be 4-20 mA or 0-10 VDC.
- The control signal choice is in the set-up software of the Enfield valve available through the USB cable and a PC.
- Motion Controls LLC sells a control box with a rotary knob providing a voltage input to the valve with a visual display of command signal and position signal at the same time. This is all that is needed to provide proportional control of your system.

Voltage Source Box

These set points enable custom voltage spreads if applicable and a special order.



Software available for quick easy set up of Enfield valve available on their web site:
http://enfieldtech.com/products/positioning-system/



BLUE — GROUND
BLACK— COMMAND
WHITE — FEEDBACK
BROWN — +24VDC

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

Electrical and pneumatic connections between Motion Controls iNSiGHT Air Cylinder and Enfield Technologies S2-025-U-04 Valve.

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. Different or changing light intensities measure dynamic states. Some dynamic states are shown below.

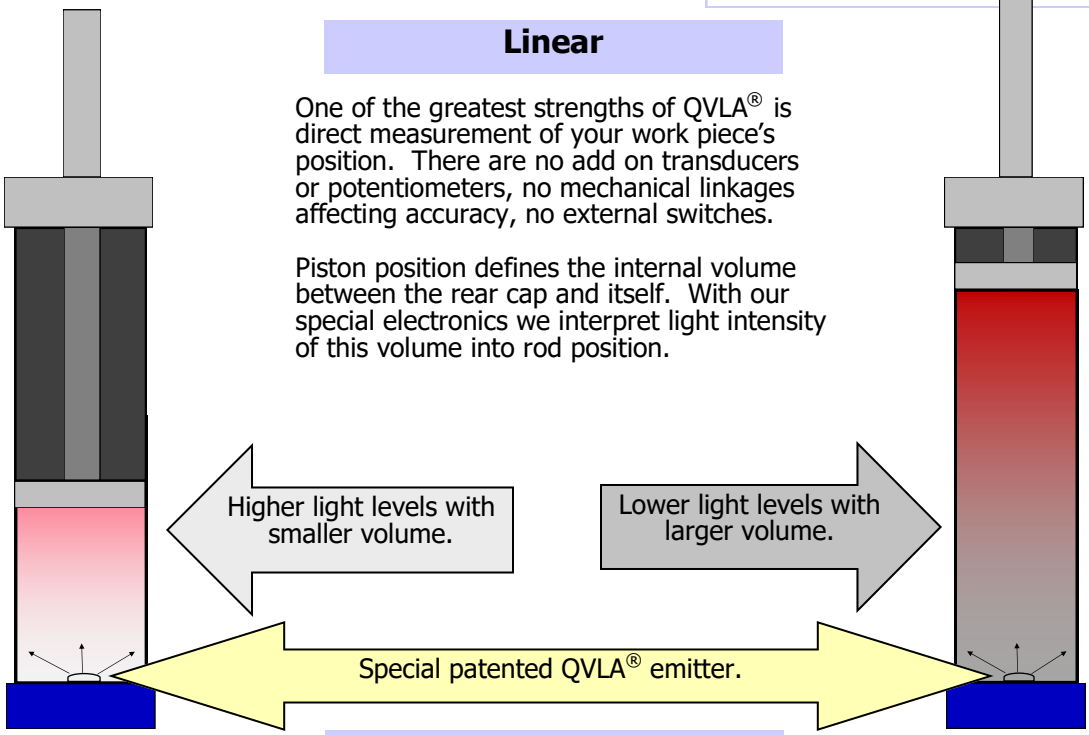
Motion Controls LLC.

Discussion

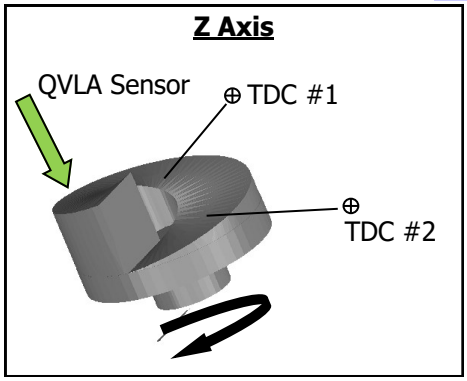
Linear

One of the greatest strengths of QVLA® is direct measurement of your work piece's position. There are no add on transducers or potentiometers, no mechanical linkages affecting accuracy, no external switches.

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.

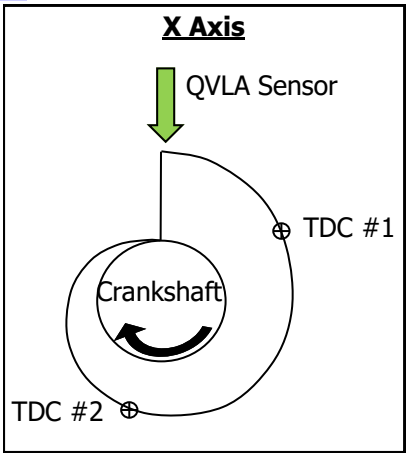


Spinning

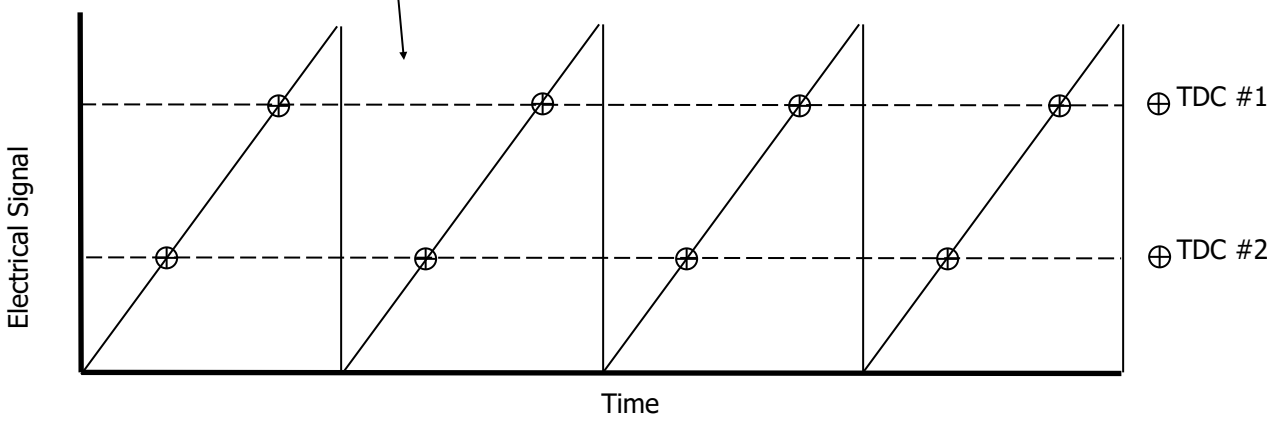


QVLA® provides an analog signal from a spinning profile in either a Z or X axis.
The generated electrical signal is a saw tooth variety shown below. The upward slope depicts 360 degrees.
Resolution:
QVLA analog signal is 50,000 bits. 50,000/360 = 138.8 bits per degree.
1 / 138.8 = .0072 degrees

Speed: QVLA operates ~ 35KHz. = 2,100,000 RPM



Example of timing for internal combustion engine.



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