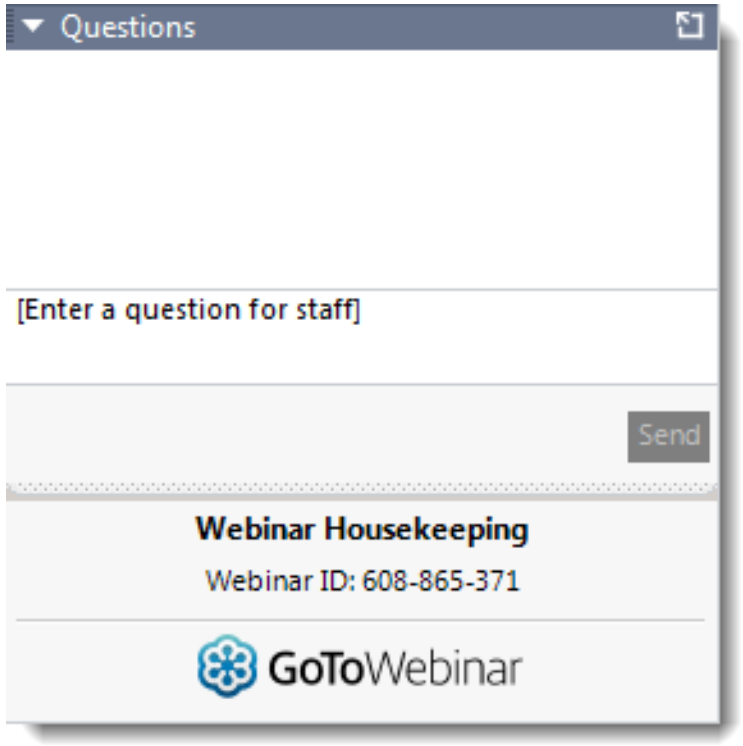
NELES

Product school

Pneumatic actuators overview
Welcome and thank you for attending this session

In session features

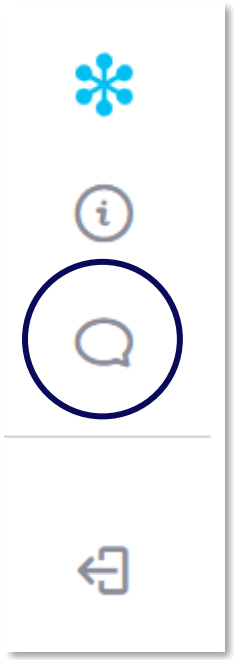
Practicalities – submit questions

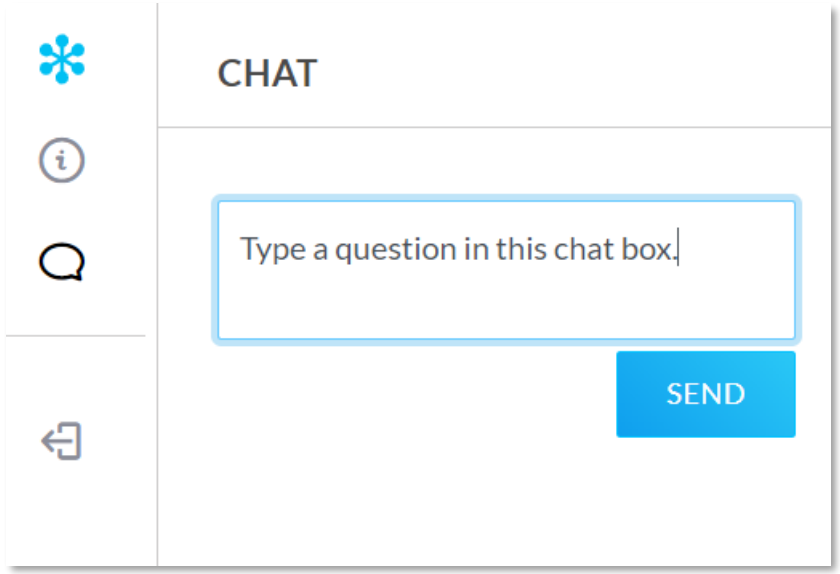


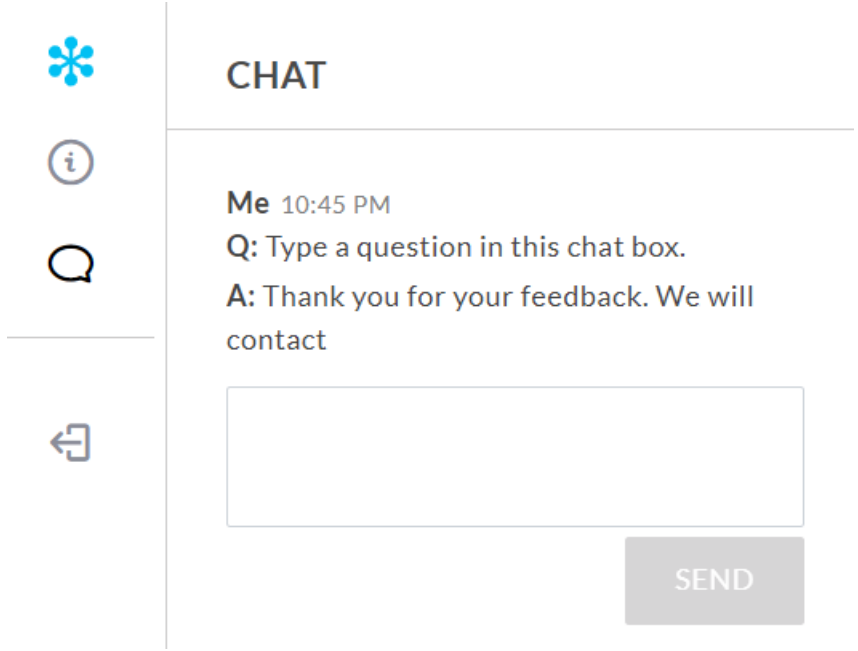
In session features

Practicalities

How to submit your questions







Presenter

- Name
  - Mark Buzzell
- Brief Bio
  - I’ve been with Neles since 2007. Most of this time as technical support and then product management for the Neles intelligent valve controllers. Recent addition of pneumatic rotary actuators to my product management responsibility.
- Position
  - Product Manager – Valve Controls and Actuation

Training Objectives

Rotary Actuators

NELES

<u>This training will **cover**:</u>

- Features and benefits of the following Neles rotary actuators
  - Quadra-Powr™ QPX, Valv-Powr™ VPVL, B-series, MGR, and N1-series.
- Actuator Selection Tools Excel Tool

<u>This training will **not cover**:</u>

- How to install, operate, and maintain the products.
- The following series/brands are not covered:
  - Linear actuators (VB, VC), Valvcon™

Valve Actuators

Types

- An actuator is a device which supplies force and motion to a valve closure member. It can be operated through the following methods:
  - Manual
    - Handle / Gear
  - Pneumatic
    - Fluid or gas (air) pressure on a cylinder or diaphragm
  - Electric
    - Motor
  - Hydraulic / Electro-hydraulic
    - Fluid pressure

NELES

Jamesbury™ Manual Actuators

MGR

Valve Actuators

Manual Operation

- Handles
  - Used for low torque applications
  - Lever, oval and round handles

- Manual gear
  - Useful when no air or electricity is available
  - Customer requires manual operation, but the torque is large
  - Hand lever operator is not available for purchase
  - Hand lever wouldn’t have clearance to turn when installed

Manual Gear Actuators

Manual Gear Actuators

Jamesbury ™

MGR

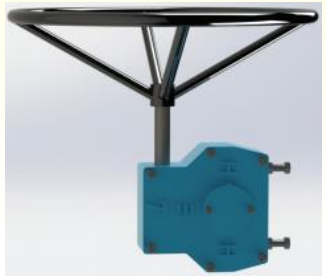
Jamesbury valves
Female square (150 – 4500 Nm)
Keyed drive (9000 – 26000 Nm)

Neles

M series

Neles valves
Keyed drive (330 - 8400 Nm)

Easyflow by Neles™



MEG

Easyflow valves
Female square (225 - 800 Nm)
Keyed drive (1100 – 6000 Nm)

Jamesbury™ MGR Series

Manual Gear Actuator

NELES

- Fully enclosed and waterproof to IP67 (IP68 option)
- Cast iron enclosure with polyurethane coating
- Lifetime lubricated with metal position indicator
- Optional Padlock Flange
- Temperature rating from -4...+250°F
  - Low temp option for -60°F and high temp for +392°F.
- Female square drive (MGR5/Q to MGR16/Q)
- Female key drive (MGR20/K85 to MGR40/K135)
- Torque output ranges from 111…19,177 Ft-lbs.

Jamesbury™ MGR Series

Manual Gear Actuator

NELES

- Very similar to the M-series. Type coding was kept similar for easy conversion to the new MGR series. i.e. M5/Q to MGR5/QA
- The M-series inventory is mostly gone and converted to MGRs.
- MGR pricing has been included in price book since 2020
- Main differences: size 15/16 have a lower max torque and size 14 has a larger handwheel. Envelope dimensions are all very similar.

M-series Typecode			
Sign	Category	Option	Description
Sign 1	Series/ Size	**M5/Q**	F05 / 14mm Sq
		M7/Q	F07 / 19mm Sq
		M10/Q	F10 / 22mm Sq
		M12/Q	F14 / 36mm Sq
		M14/Q	F16 / 46mm Sq
		M15/Q	F16 / 46mm Sq
		M16/Q	F25 / 55mm Sq
		M20/K85	F25 / 85mm Key
		M30/K105	F30 / 105mm Key
		M40/K135	F35 / 135mm Key
Sign 2	M Series Options		
		PF	Padlock Flange
		HT	High Temp
		MA	Marinized/buried
Sample:		**M12/QPF**	

MGR-Series Typecode			
Sign	Category	Option	Description
Sign 1	Series	**MGR**	Series MGR
Sign 2	Size	**5/Q**	F05 - 14 mm Female Square
		7/Q	F07 - 19 mm Female Square
		10/Q	F10 - 22 mm Female Square
		12/Q	F14 - 36 mm Female Square
		14/Q	F16 - 46 mm Female Square
		15/Q	F16 - 46 mm Female Square
		16/Q	F25 - 55 mm Female Square
		20/K85	F25 - 85 mm Female Key
		30/K105	F30 - 105 mm Female Key
		40/K135	F35 - 135 mm Female Key
Sign 3	Operation	-	Handwheel w/o padlock flange
		PF	Handwheel w/ padlock flange
Sign 4	Temp. Rating	-	Standard Temp: -4..+250F
		LT	Low Temp: -60..+250F
		HT	High Temp: - 4..+392F
		OX	Oxygen Service: -4..+250F
Sign 5	Enclosure Rating	-	Standard Service - IP67
		B	Burried Service - IP68
		M	Marinized Service - IP68
Sign 6	Model	**A**	Model A
Sample:		**MGR12/QPFA**	

	Main Differences				
	Output Torque		Handwheel	Dimensions	
	API 608/609	Max	Diameter	A	C + D1
MGR5/QA vs M5/Q	Larger	Larger	Smaller	Within 1/2" or smaller	Within 1 1/4" or smaller
MGR7/QA vs M7/Q	Larger	Larger	2" larger		
MGR10/QA vs M10/Q	Same	Same	Same		
MGR12/QA vs M12/Q	Larger	Larger	2" larger		
MGR14/QA vs M14/Q	Larger	2% smaller	**8" larger**		
MGR15/QA vs M15/Q	1% smaller	**6% smaller**	2" larger		
MGR16/QA vs M16/Q	Larger	**17% smaller**	Smaller		
MGR20/K85A vs M20/K85	Larger	Larger	Smaller		
MGR30/K105A vs M30/K105	Larger	Larger	Smaller		
MGR40/K135A vs M40/K135	Larger	Larger	Smaller		

MGR Series Recent Changes

Manual Gear Actuator

NELES

- **MGR5 handwheel** was changed from 8” to 4” to better suit this small gear operator. With this change the rim pull, at max output torque, has increase from 35 lbs to 69 lbs but is still below API 608 & 609 limits.
- The **“M” marinized** service option now automatically includes C5-M rated paint, and a standard hand wheel is now automatically included.
- **Limit switch adapter kits** –
  - A new limit switch adapter kit was added to cover the MGR5. These are NAMUR adapters which must be combined with a NAMUR mounting kit from the limit switch manufacturer.
  - StoneL has already designed the complete mounting kits to eliminate the need/cost of using two separate kits with the Quartz.
- The **mechanical position indicator** was upgraded from plastic to aluminum.
- The **nameplate labels** were changed to show the Neles logo.

Design Features

MGR Series

NELES

Features

Optional padlock flange (PF)

Cast iron housing with polyurethane coating

Worm gear design with high performance axial bearings
Self locking - won't back drive)

Greased for life, maintenance free

Sealed to IP67
(IP68 option)

NELES

Neles Pneumatic Actuators

The basics

Rotary Pneumatic Actuators

NELES

Rack & Pinion

Spring return

VPVL S/R

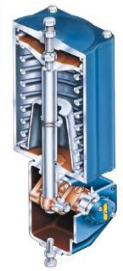
Double acting

VPVL DA

Basic control & on/off applications
Mid torque range
Cost effective and light weight

Piston (Cylinder)

Spring return



B1JU

Double acting

B1CU

Control & On/off applications
High Torque range
Robust high cycle design

Spring Diaphragm

Spring return

QPX

Control & On/off applications
Low torque range
Rolling diaphragm, low friction

Scotch Yoke

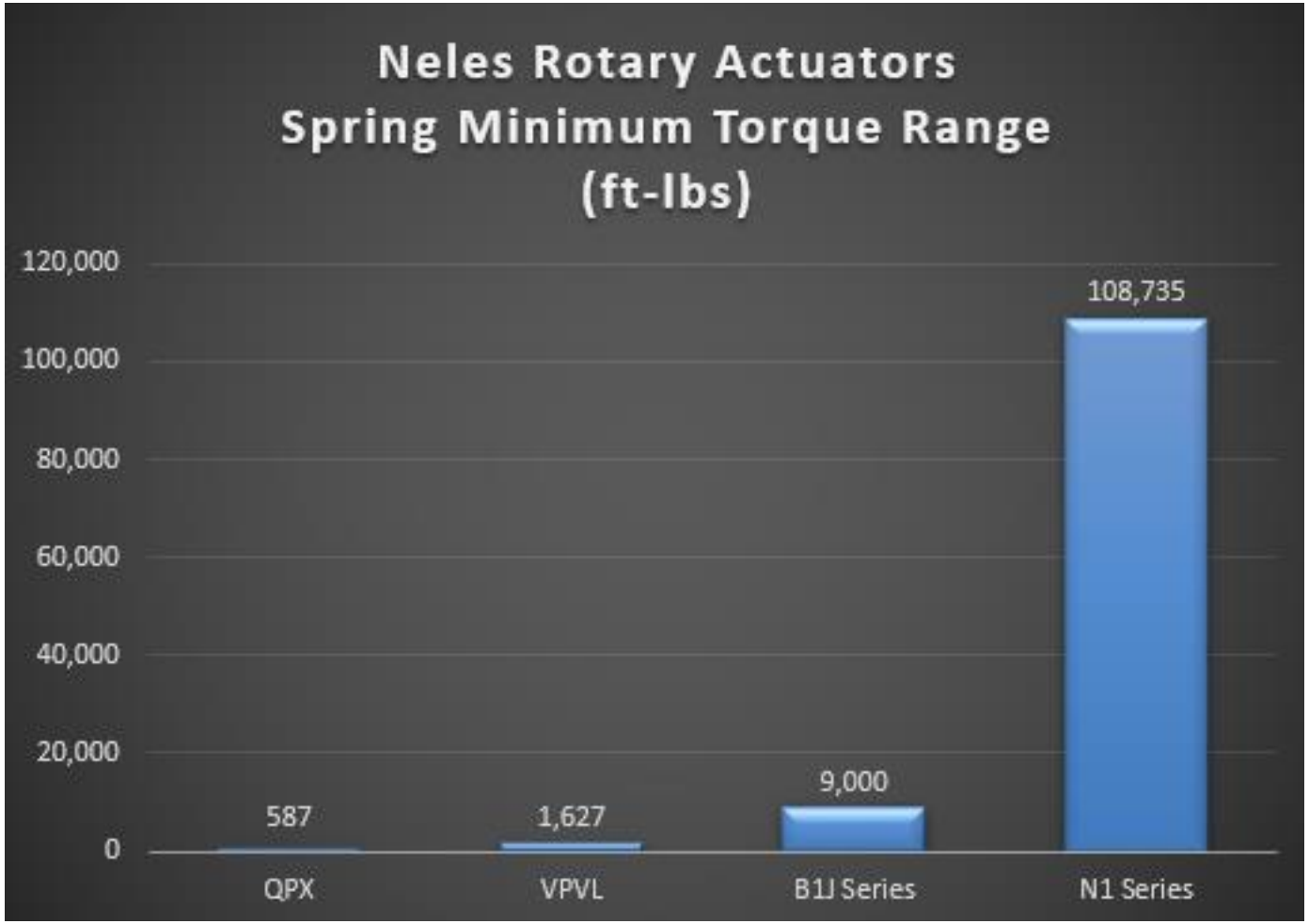
Spring return

Double acting

N1

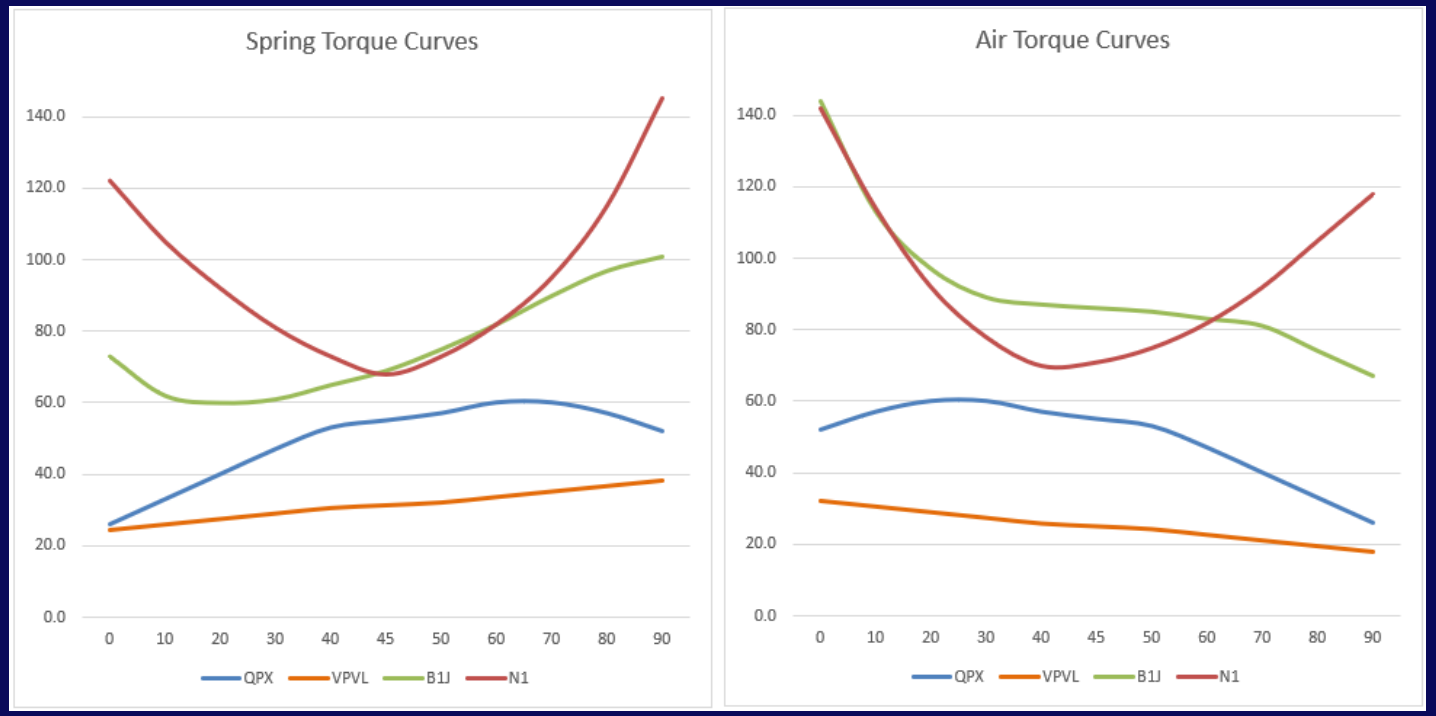
On/off applications
Very High Torque Range
Robust modular design

Pneumatic Actuator Series Torque Range



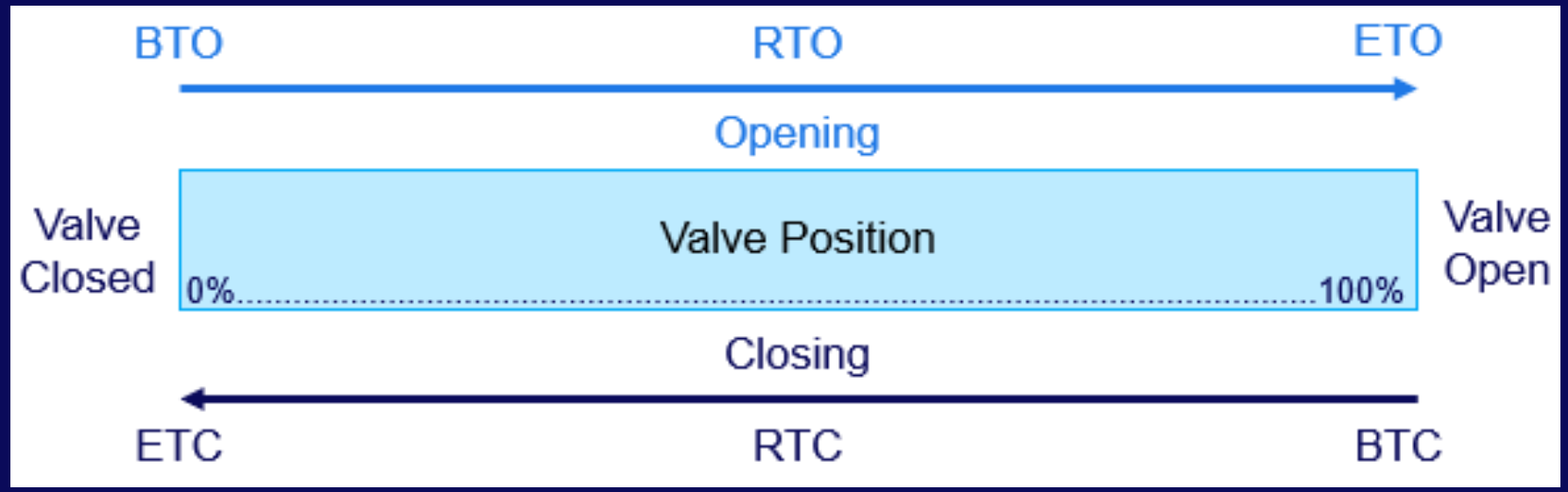
Pneumatic Actuator Torque Curves

- VPVL (Rack & Pinion)
- QPX (Spring Diaphragm)
- B-series (Piston Type)
- N1 (Scotch yoke)



Pneumatic Actuator Torque Terms

- **BTO** = Break to open
- RTO = Run to open
- ETO = End to open
- BTC = Break to close
- RTC = Run to close
- **ETC** = End to close

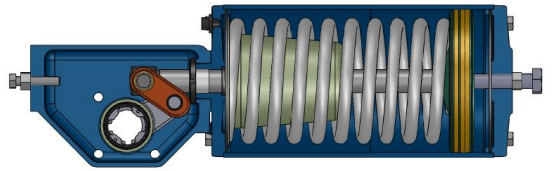


- **BOLD** = Default torques shown in Nelprof on/off sizings (use show details to see all torques)

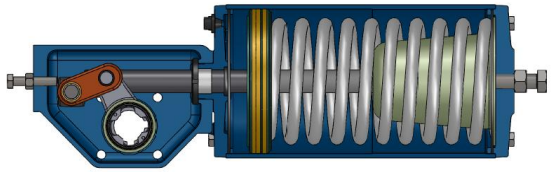
Pneumatic Actuator Failure Action

NELES

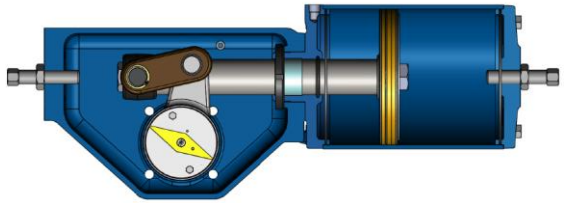
- Fail close (single acting, spring to close)
  - The actuator will close the valve upon loss of air
  - i.e. VPVL_SR_, QPX, B1J, N1_C



- Fail open (single acting, spring to open)
  - The actuator will open the valve upon loss of air
  - i.e. VPVL_SR_FO, QPX_SO (inverted), B1JA, N1_A



- Fail in place (double acting, no springs)
  - The actuator will leave the valve at its last position upon loss of air.
  - i.e. VPVL_DA, B1C, N1_D
  - Note: in some cases upon loss of supply pressure it is possible for the process to move the valve



- Note: Fail position on loss of electric depends upon the functionality of the instrumentation

Pneumatic Actuator Application Suitability

NELES

	VPVL	QPX	B-Series	N1-series
Application Type: On/Off	General on/off	General on/off	General, ESD, High cycle	General, ESD
Application Type: Control	General control	Extra fine control	Fine control	General control
Style	Rack & pinion	Spring & diaphragm	Piston	Scotch Yoke
Valve Action	Rotary	Rotary	Rotary	Rotary
Torque / Thrust Output	1A: 4…1,627 ft lbs (6..2,207 Nm) 2A: 7..4,582 ft lbs (9..6,212 Nm)	1A: 11...587 ft lbs (15..796 Nm)	1A: 21..9,000 ft lbs (28..12,200 Nm) 2A: 30...75,630 ft lbs (45..102,710 Nm)	1A: 18...58,370 ft lbs (25..79,139 Nm) 2A: 52..210,184 ft lbs (71...284,972 Nm)
Spring Range Options	60, 80psi (4, 5.5 bar)	20, 40, 60, 80psi (1.4, 2.7, 4, 5.5 bar)	40, 60, 80psi (2.7, 4, 5.5 bar)	Up to 6 spring options per size
Max Supply Pressure	116 psi (8 bar)	100 psi (7 bar)	1A: 120 psi (8.5 bar) 2A: 145 psi (10 bar)	65…116 psi (4.5…8 bar)
Max Design Pressure	174 psi (12 bar)	160 psi (11 bar)	160 psi (11 bar)	174 psi (12 bar)
Supply Medium	Air, nitrogen	Air, nitrogen, water, natural gas (sweet)	Air, natural gas (sweet)	Air, nitrogen, natural gas (sweet)
Actuator Action	Single or double	Single	Single (B1J) or double (B1C)	Single or double
Fail Action	Fail safe or fail in place	Fail safe	Fail safe or fail in place	Fail safe or fail in place
Field Reversable Fail Position	Yes	Yes	No	Yes
Temperature Rating	-40...176°F (-40…+80°C) Standard +5…302°F (-15…+150°C) High temp -60…176°F (-51…+80°C) Cold temp	-20...150°F (-29…+66°C)	-4...158°F (-20...70°C) Standard -4...248°F (-20...120°C) High temp -40...158°F (-40...70°C) Cold temp -67…158°F (-55…70°C) Arctic temp	-20...+80°C Standard -20...+125°C High Temp (-30...+110°C Low Temp) (-60…+110°C Arctic Temp)
Enclosure Rating	IP67, IP68M	-	Standard: IP66 Optional: IP66M, IP67M	IP66M, IP67M

Pneumatic Actuator Application Suitability

NELES

	VPVL	QPX	B-Series	N1-series
Housing Construction	Anodized aluminum w/ PTFE coating, polyester coated end caps Optional: stainless steel (size limits)	Gray/ductile iron housing with carbon steel cylinder w/ polyurethane coating	Cast iron housing with aluminum or steel cylinder	Cast iron with steel cylinder
Valve Shaft Connection	Female Single Square Parallel	Keyed (1 position) or Male square diagonal	Keyed (2 position)	Keyed (1 or 2 position)
Valve Mounting Standard	ISO 5211	ISO 5211 With Keyed Shaft Jamesbury Mounting with Male Drive	ISO 5211	ISO 5211
Solenoid Mounting	Namur (Direct Mount)	Nipple / Bracket Mount	Nipple / bracket mount	Nipple / Bracket Mount
Positioner Mounting	Namur / VDI-VDE 3845	Namur / VDI-VDE 3845 with Keyed Shaft Construction	Namur / VDI-VDE 3845	Namur / VDI-VDE 3845
Oversized Ports for Fast Acting	Optional (FJ)	Standard (QPX3..5)	Optional (F,F1,F2)	Optional
Lockout Travel Stop	Optional (LD)	Optional (LD-)	Optional (Q,W)	-
Travel Range	-4..+4°, 86..94°	-5..+5°, 85..95°	-5..+5°, 85..95°	-5..+5°, 85..95°
100% Adjustable stop	Optional (AS)	Optional (AS)	Optional (X,Z)	-
Stainless Steel Construction	Optional (VPVLSS)	N/A	N/A	(Option: St.St. Cylinder pipe)
Manual Override	Optional declutable override (DO_)	Optional jackscrew (MJX_) or declutable override (QPX_/M only)	Optional jackscrew override (R,RR)	Optional manual gear (HW) or hydraulic override (HP)
SIL Capable	Up to SIL 3	Up to SIL 2	Up to SIL 3	Up to SIL 3
Cycle Life Estimate	up to 1,000,000	up to 250,000	up to 3,000,000	

Rotary Actuators

More Information

NELES

- Click on the underlined links below to access the information

More Information	VPVL	QPX	B-series	MGR	N1	RNP
Website	✓	✓	✓	✓	✓	✓
Technical Bulletin	✓	✓	✓	✓	✓	✓
IMO (Installation, Maintenance and Operating)	✓	✓	B1C / B1J	✓	✓	✓
Safety Manual	✓	✓	✓			
Commercial Brochure				✓		

NELES

Jamesbury™ Valv-Powr™ VPVL

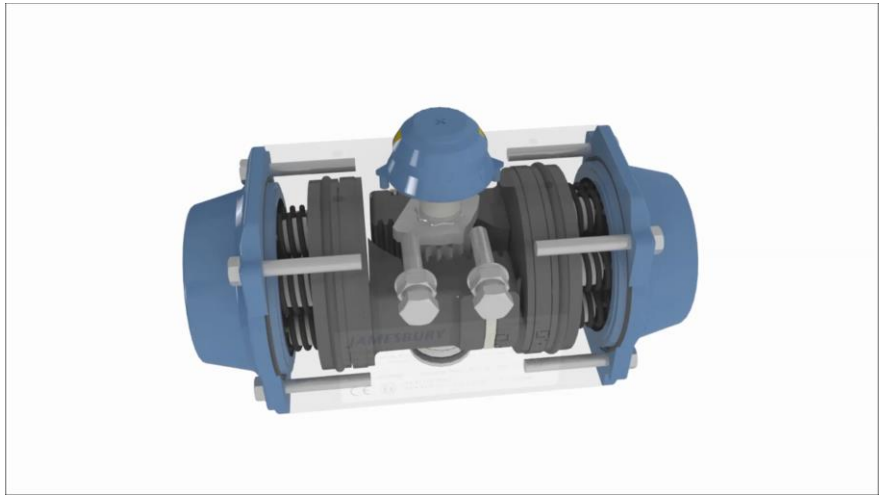
Neles Pneumatic Actuators

Jamesbury™ VPVL

Compact Rack and Pinion Pneumatic Actuator

NELES

- Compact, light weight & cost effective
- High cycle design
- Capable of -40°F as standard
- Easy conversion from single acting to double acting
- Ideal for on/off and general control applications



Designed for improved safety & reliability

VPVL

Robust design with self contained springs

- Springs are self contained and epoxy coated for reliability and removal without risk of injury
  - Maintenance can be performed without special tools/training
- “LD” lockout kit to lock in failsafe position per OSHA requirements
  - Slotted adjustable stop screws alert to presence of internal air pressure

NELES

Challenge

Operational safety

Availability

Maintainability

Solution

Robust design with self contained springs

Designed for difficult environments

VPVL

Robust enclosures and materials

- 2 enclosure options:
  - Hard anodized PTFE coated body with polyester coated end caps
  - Forged stainless steel
- All stainless-steel fasteners
- IP67 / IP68M protection class
- Rated from -40..+176°F as standard with options down to -60°F or up to +302°F

NELES

Challenge

Corrosive environments

Extreme temperatures

Solution

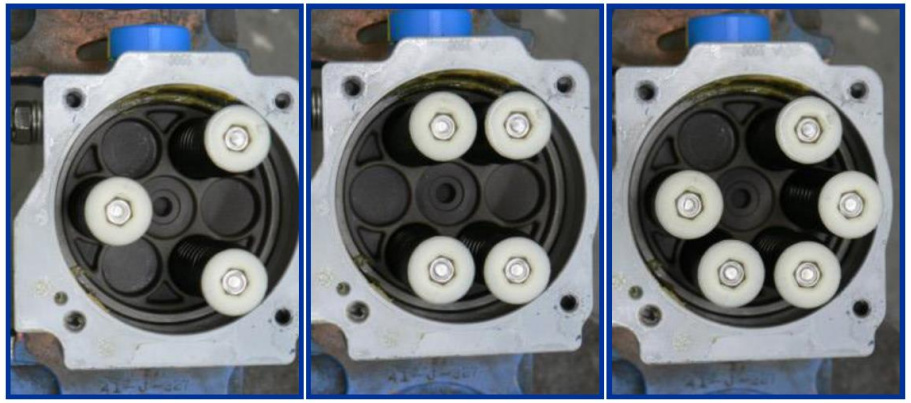
Robust enclosures and materials

Designed for field modification

VPVL

Flexible design that’s easy to modify

- Modular components
- Same body and end caps for single and double acting
- Easy conversion from 80psi to 60psi springs
- Multiple field mountable accessories



NELES

Challenge

Stocking various models

Need to retrofit in the field

Solution

Flexible design that’s easy to modify

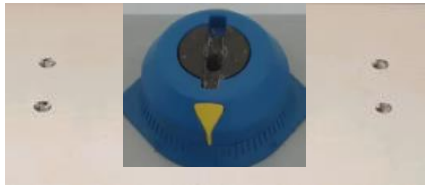
Designed for easy automation

VPVL

Easy mounting to the valve / instrumentation / accessories

- Valve mounting complies with ISO 5211 easy mounting to the valve

- Accessory mounting complies with VDI/VDE 3845 for easy installation of switches/positioners
  - **Metal feedback** connection



- Air supply mounting complies with NAMUR NA19 for easy installation of solenoid valves
  - VPVL051 – 600 (NAMUR ¼”), VPVL650 - 800 (NAMUR ½”)

NELES

Challenge

Complicated to automate

Solution

Easy mounting to the valve / instrumentation / accessories

Designed for failsafe override

VPVL

Multiple options to lock the valve in its failsafe position

- Options to operate the valve in the air or spring stroke directions.
- Declutchable manual override (DO_)
  - 6 options to match to the VPVL mounting and torque requirements
  - Note: vent the supply air pressure from the actuator prior to using
- 100% travel stop (AS) to partially or fully limit in the air (counterclockwise) direction

VPVL Actuator Model (DA or SR)	Declutchable Override Kit
VPVL250 and VPVL300	DO-1
VPVL350 and VPVL400	DO-2
VPVL450 and VPVL500	DO-3
VPVL550 and VPVL600	DO-4
VPVL650 and VPVL700*	DO-5
VPVL800	DO-6

NELES

Challenge

Overriding the actuator in case of supply failure

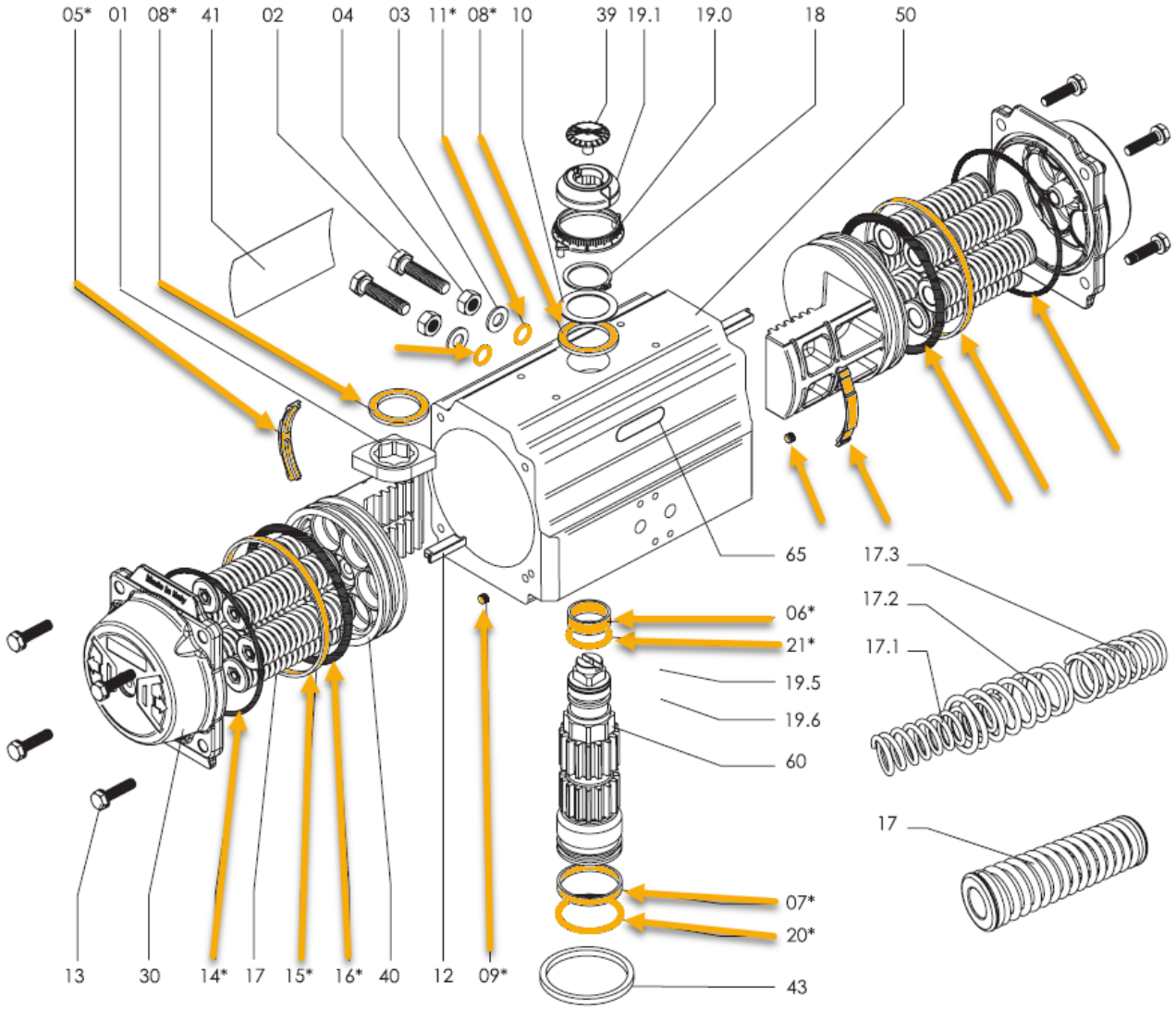
Solution

Multiple options to lock the valve in its failsafe position

VPVL Spare Parts

- Complete Service Kit
  - Items: 5, 6, 7, 8, 9, 11, 14, 15, 16, 20, 21

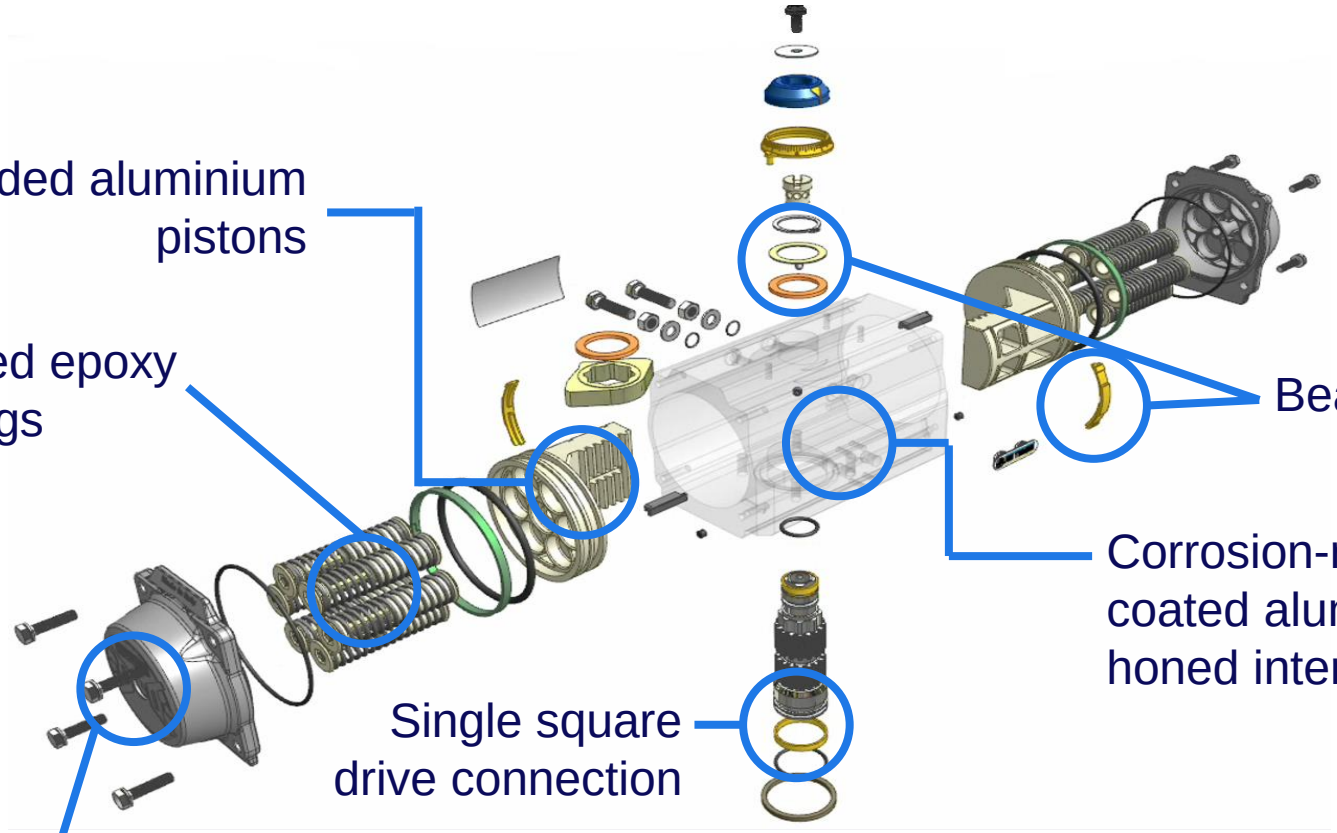
Complete Service Kit		
Actuator	**Standard**	**High Temp.**
VPVL-01/011	RKP-152	RKP-232
VPVL-050/051	RKP-262	RKP-233
VPVL-100	RKP-263	RKP-234
VPVL-200	RKP-264	RKP-235
VPVL-250	RKP-265	RKP-236
VPVL-300	RKP-266	RKP-237
VPVL-350	RKP-267	RKP-238
VPVL-400	RKP-268	RKP-239
VPVL-450	RKP-269	RKP-240
VPVL-500	RKP-270	RKP-241
VPVL-550	RKP-271	RKP-242
VPVL-600	RKP-272	RKP-243
VPVL-650	RKP-273	RKP-244
VPVL-700	RKP-274	RKP-245
VPVL-800	RKP-275	RKP-246



Design Features

VPVL

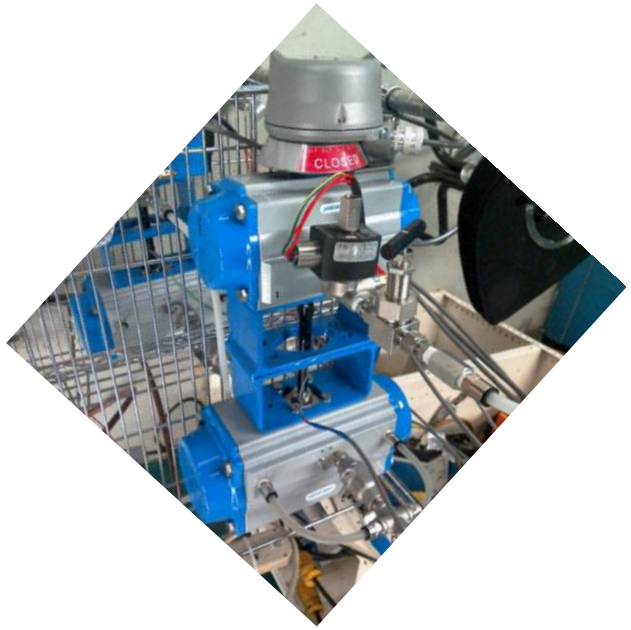
Features



VPVL Competition

NELES

- Head to head lab test ran from Dec 2015 through July 2017
  - EL-O-Matic failed after < 600k cycles, Rotork GT failed after < 1 million cycles
  - VPVL and Hytork XL both lasted the full 1.25 million cycles under load.



NELES

Jamesbury™ Quadra-Powr™ QPX

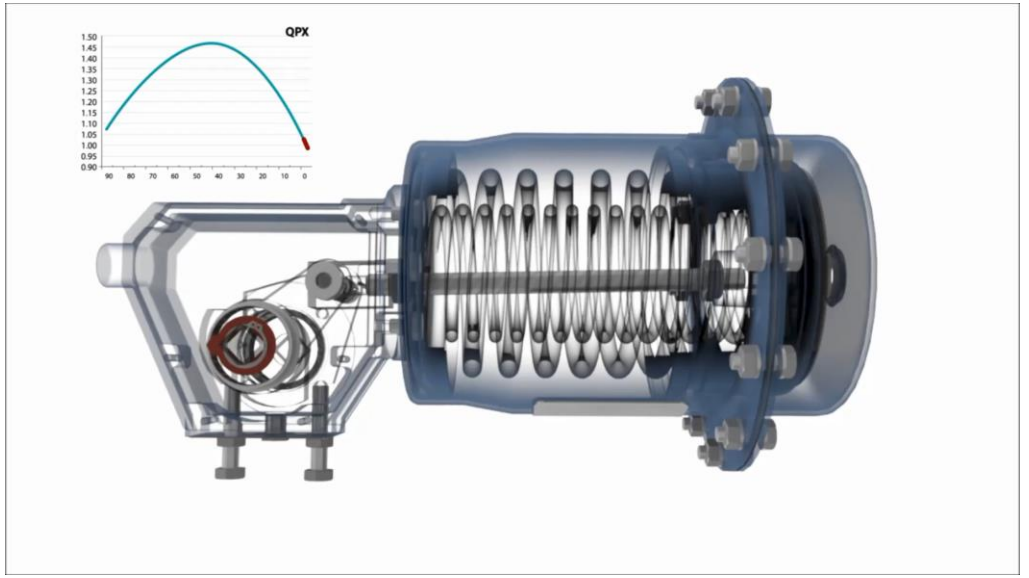
Neles Pneumatic Actuators

Jamesbury™ QPX

Spring Diaphragm Pneumatic Actuator

NELES

- Excellent for both on-off and modulating applications
  - Rolling polyamide diaphragm design provides long life and high durability.
  - UHMW polyethylene bearing fully guides the diaphragm retainer for low friction
- Simple conversion from fail open to fail close
  - By simply inverting the actuator.
- Flexible supply pressure / media (20..100psi):
  - Air, gas, water, or mineral-based hydraulic fluid



Designed for improved safety & reliability

QPX

Robust design with self contained springs

- Springs are self contained and epoxy coated for reliability and removal without risk of injury
- All steel housing construction
  - Ideal for firesafe applications where aluminum isn't typically allowed.
- Fusible plug option for failsafe actuation during a fire

NELES

Challenge

Operational safety

Availability

Maintainability

Firesafe

Solution

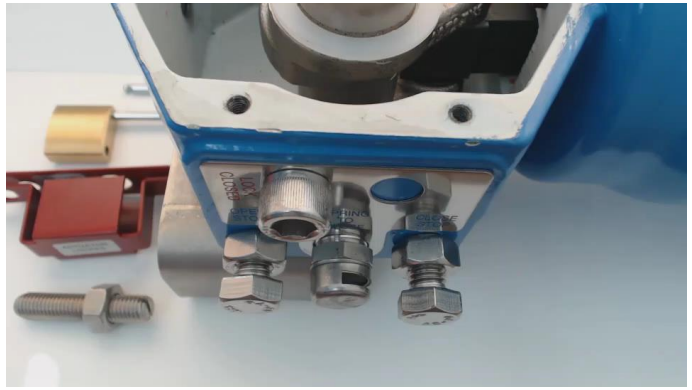
Robust design with self contained springs

Designed for improved safety

QPX

Multiple options to lock the valve in its failsafe position

- Lockout kit (LD) to lock in failsafe position per OSHA requirements



- 100% adjustable stop (AS)
  - Partially limit air direction or fully lock in failsafe position

- Both options do not modify the open/close stop positions and are easy to add in the field

NELES

Challenge

Operational safety

Maintainability

Solution

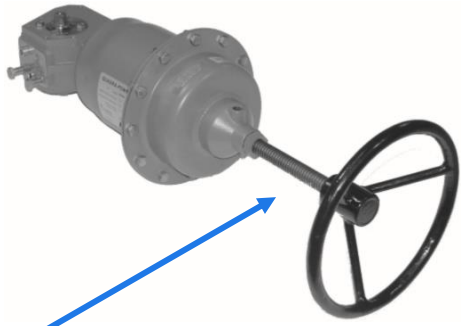
Multiple options to lock the valve in its failsafe position

Designed for failsafe override

QPX

Multiple override options

- Two options to operate the valve in the air stroke direction
- Manual jackscrew (MJX) override
- Sandwich manual override (SRO)
  - QPX_/M only



NELES

Challenge

Overriding the actuator in case of supply failure

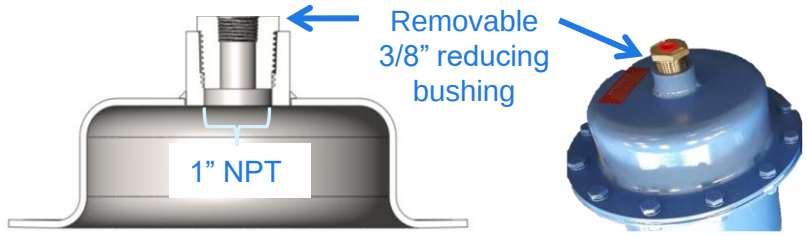
Solution

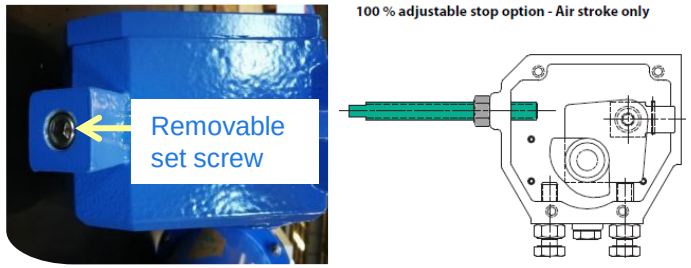
Multiple override options

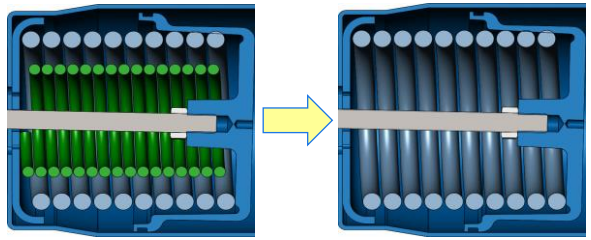
New Model C Design Changes

QPX

- Oversized ports as standard
  - 3/8” NPT with QPX 1 & 2
  - 1” NPT with QPX 3, 4, & 5 with 3/8” removable bushing
- Adjustable stop threading in housing as standard
  - Simple addition with a removable a set screw
- Single spring design for all versions
  - Prevents potential of nested springs rubbing together or on the diaphragm retainer
- New actuator rod design
  - Prevents potential of nut interference with the spring retainer by changing from continuously threaded rod with nut to the new partially threaded design.
- Paint system improved to match the B-series







QPX Spare Parts

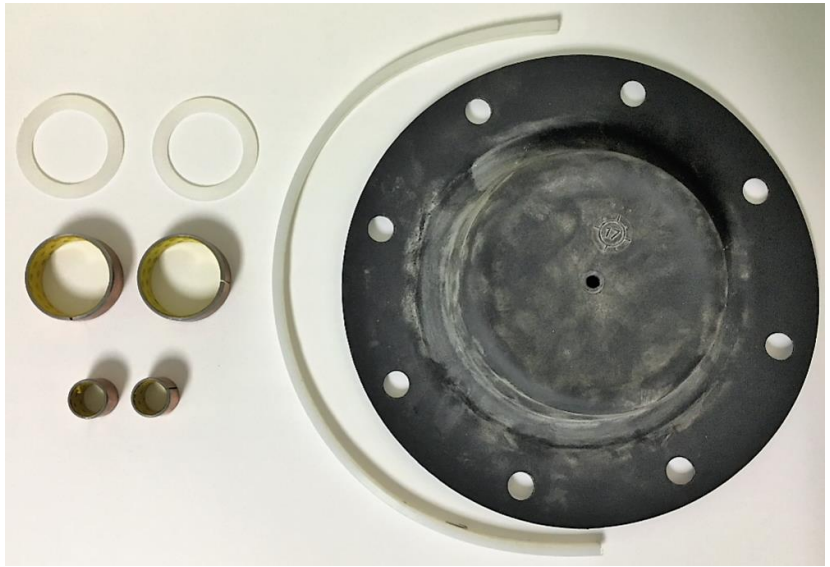
- Complete Kit
  - Items: 6, 31, 62, 14, 64

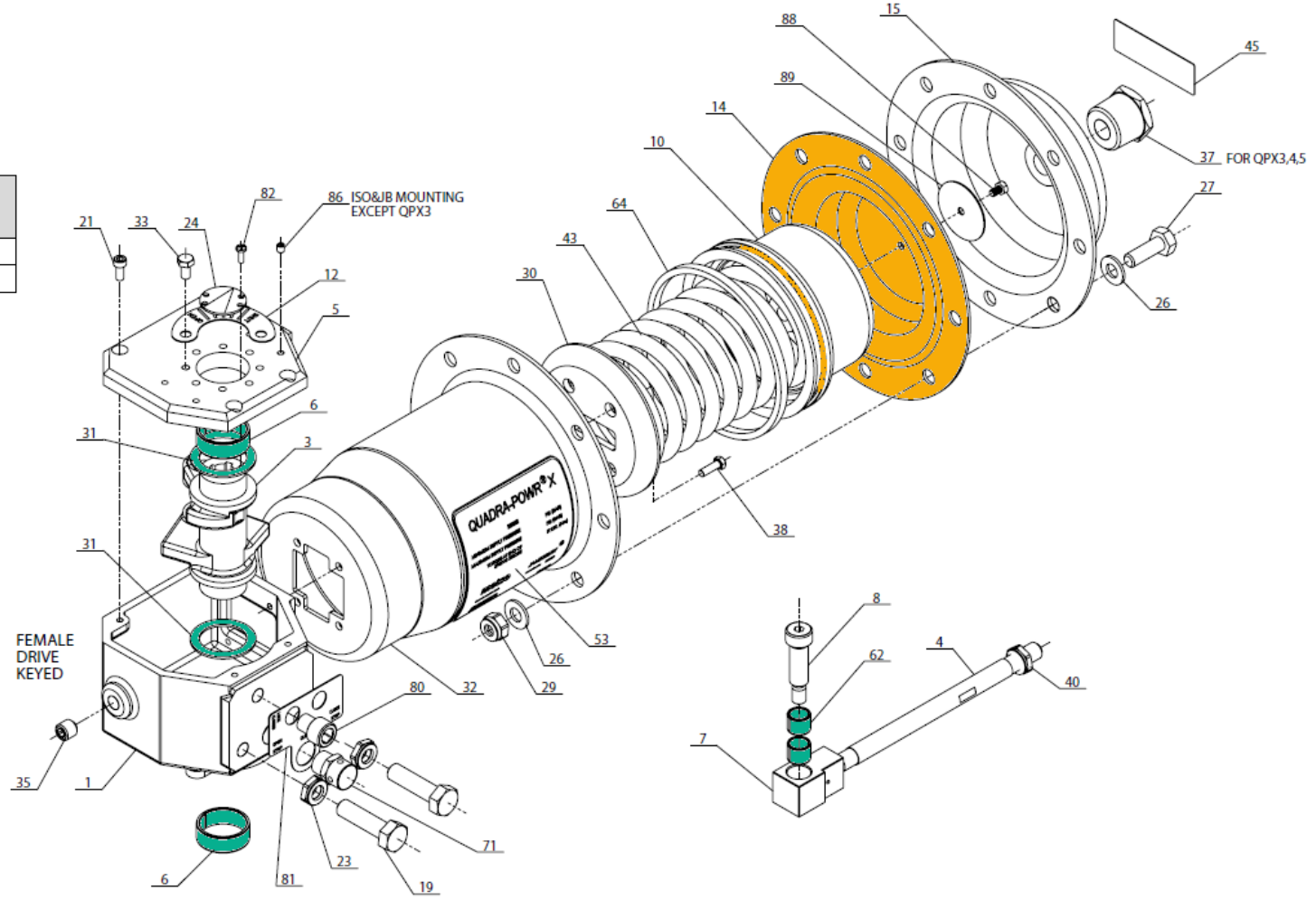
QPX Actuator Service Kits

Item No.	Part Name	Service Kit Type	QPXI	QPX2A Only	QPX2	QPX3	QPX4	QPX5
	Service Kits	Diaphragm Kit	RKQ75		RKQ76	RKQ77	RKQ78	RKQ79
		Complete Kit	RKQ68	RKQ69	RKQ70	RKQ71	RKQ72	RKQ73

Diaphragm Kit contains the Diaphragm, Diaphragm Retainer Bearing and Service Instructions.

Complete Kit contains the Diaphragm, Diaphragm Retainer Bearing, Driver Arm Bearing, Thrust Bearing, Clevis Bearing and Service Instructions.





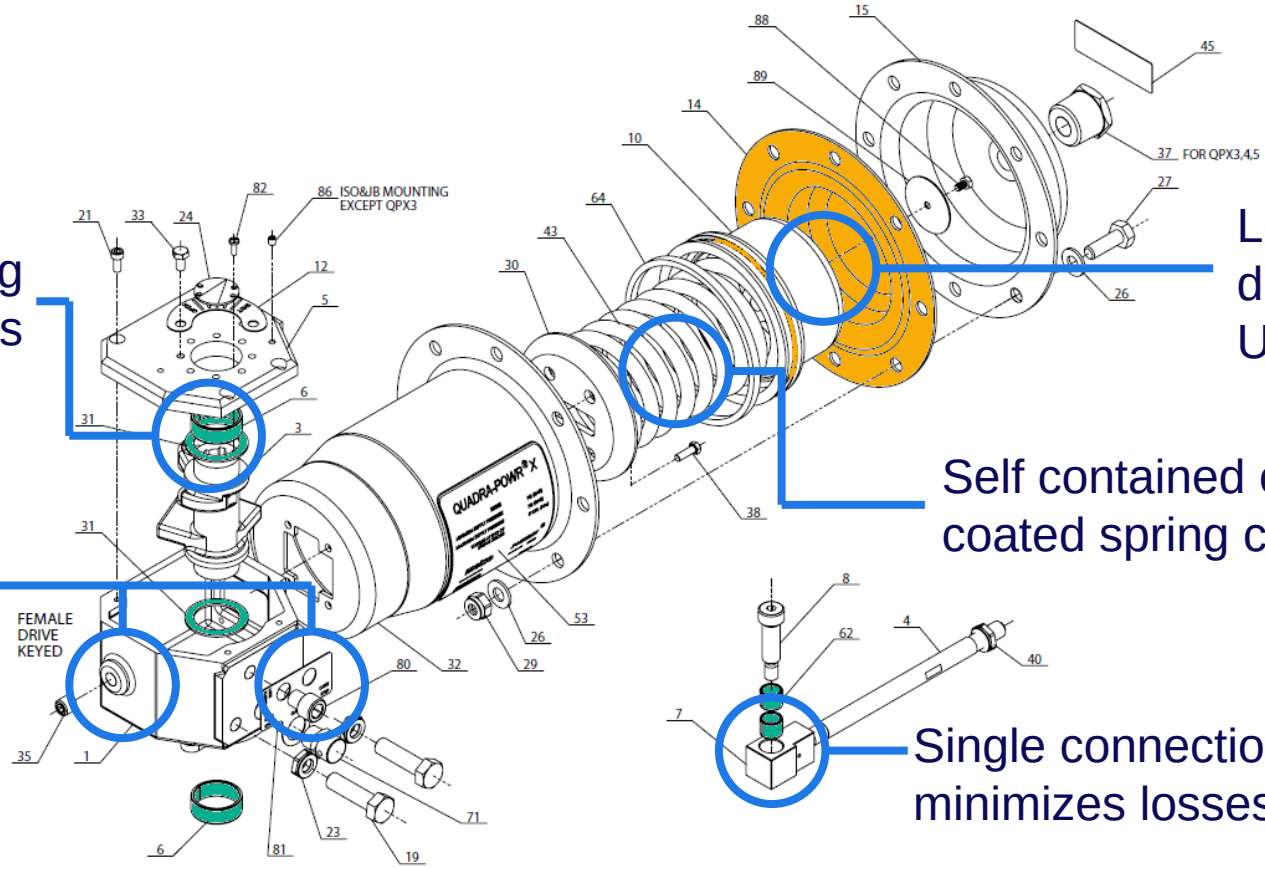
Design Features

QPX

Features

Bearings on all sliding and rotating parts

Field mountable lockout and 100% adjustable stops



Low friction rolling diaphragm with UHMW bearing

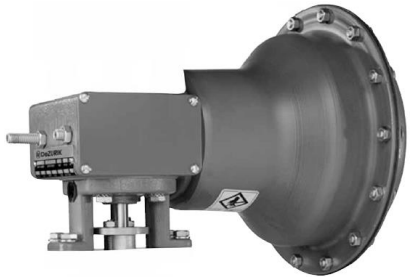
Self contained epoxy coated spring cartridge

Single connection point minimizes losses

Competition

QPX

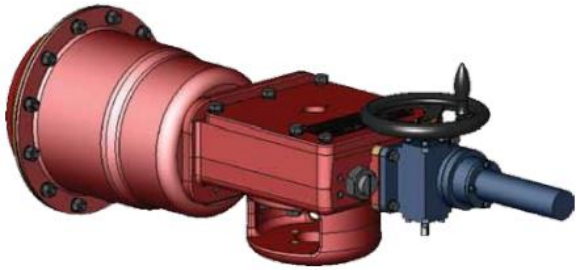
DeZurik DR



Dynaflo

Flowserve
Valtek NR

Masoneilan
Model 31/32



Jflow JFD

Samson 3278

Competition

QPX

- Jflow JFD (copy of the QPX model B)
  - Pros:
    - Double female square drive connection with adapters for flexible inventory (may add hysteresis)
  - Cons:
    - No standard options for 100% Adjustable stop, lockout kit, or oversized ports.
    - Nested spring design

NELES

Neles™ B-series

Neles Pneumatic Actuators

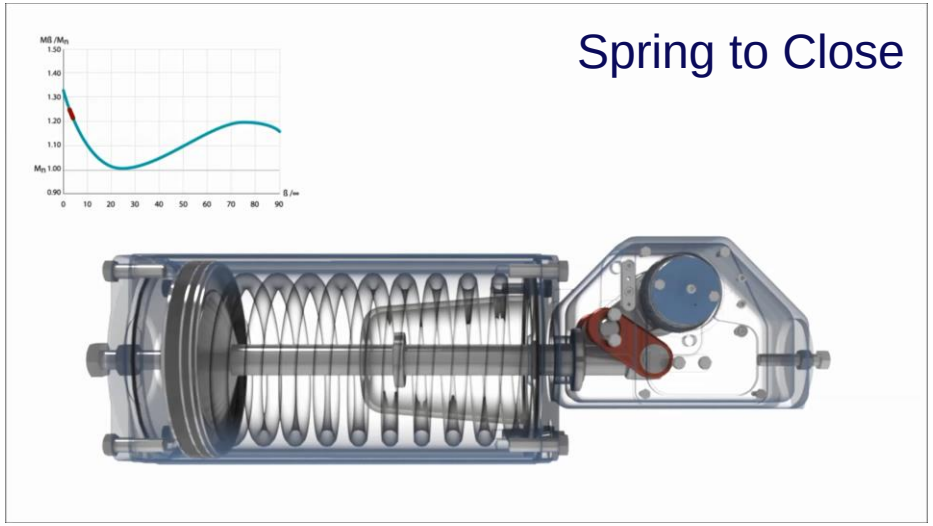
Neles B-series

Piston Type Pneumatic Actuator

NELES

- Suitable for a wide range of applications
  - Control, ESD, high cycle, arctic service…
  - Spring return or double acting

- Bench-mark for robustness and reliability
  - Long cycle life with up to 3 million cycles possible
  - Proven reliable design w/ over 1 million units sold
  - Environmental rating as IP66 standard
    - Optional IP66M or IP67M

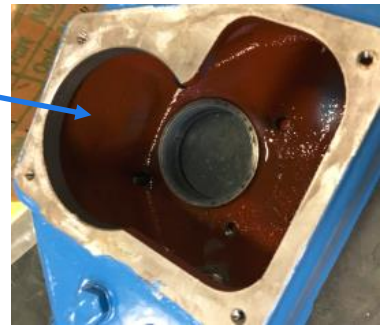


Designed for difficult environments

B-series

Robust enclosures and materials

- Polyester coated aluminum or steel cylinders and housing
- Internally painted with epoxy paint and corrosion inhibitor
- IP66 protection class with IP66M / IP67M option. Tropicalized option to over pressurize the housing
- Versions available for arctic use down to -67°F through high temp areas up to +248°F



NELES

Challenge

Corrosive environments

Extreme temperatures

Solution

Robust enclosures and materials

Designed for high cycle applications

B-series

NELES

High cycle bearing and seal designs

- Long run “L” option (NA standard) includes double-delta piston rod seal and woven PTFE bearings

Double-delta seal

- Super long run “S” option upgrades the piston rod seal to a lip seal design

Lip seal

- Both options include woven PTFE bearings which last for millions of cycles without maintenance

Woven PTFE bearing

Challenge

Durability and reliability

Cycle life

Solution

High cycle bearing and seal designs

Designed for high speed applications

B-series

NELES

Oversized port options

- Multiple oversized pneumatic port options on both the cylinder base and cylinder end
- Achieve fast stroke times down to 0.5 seconds
- Optional shock absorber on the cylinder (Z) or housing end (N)

Actuator Size B1C	Air supply			
	Standard code "-"	High cycle code "F"	Oversized code "F1"	Large oversized code "F2"
6	1/4 NPT	-	-	-
9	1/4 NPT	3/8 NPT	-	-
11	3/8 NPT	1/2 NPT	-	-
13	3/8 NPT	1/2 NPT	-	-
17	1/2 NPT	3/4 NPT	-	-
20	1/2 NPT	3/4 NPT	-	-
25	1/2 NPT	3/4 NPT	-	-
32	3/4 NPT	1 NPT	-	-
40	3/4 NPT	1 NPT	-	-
50	1 NPT	1 1/4 NPT	1 1/2 NPT	-
60	1 NPT	1 1/4 NPT	1 1/2 NPT	-
75	1 NPT	1 1/4 NPT	1 1/2 NPT	-
502	1 NPT	1 1/4 NPT	1 1/2 NPT	-
602	1 NPT	1 1/4 NPT	1 1/2 NPT	-
752	1 NPT	1 1/4 NPT	1 1/2 NPT	-

Actuator Size B1J, B1JA	Air supply			
	Standard code "-"	High cycle code "F"	Oversized code "F1"	Large oversized code "F2"
6	3/8 NPT	-	-	-
8	3/8 NPT	1/2 NPT	-	-
10	3/8 NPT	1/2 NPT	-	-
12	1/2 NPT	3/4 NPT	-	-
16	1/2 NPT	3/4 NPT	1 NPT	-
20	3/4 NPT	1 NPT	1 1/4 NPT	1 1/2 NPT
25	3/4 NPT	1 NPT	1 1/4 NPT	1 1/2 NPT
32	1 NPT	1 1/4 NPT	1 1/2 NPT	2 NPT
322	1 NPT	1 1/4 NPT	1 1/2 NPT	2 NPT
40	1 NPT	1 1/4 NPT	1 1/2 NPT	2 NPT

Challenge

Achieving fast stroke times for operational performance and plant safety

Solution

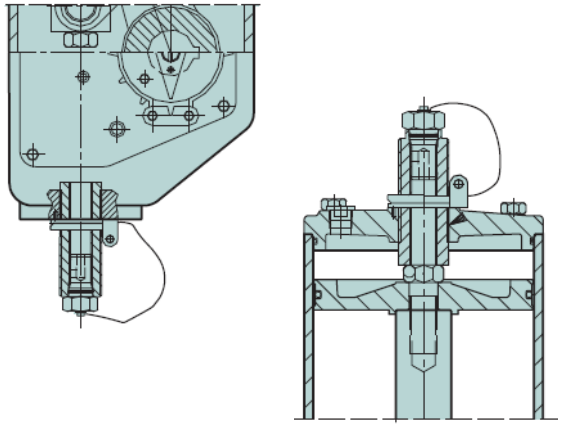
Oversized port options

Designed for improved safety

B-series

Multiple options to lock the valve in its failsafe position

- Optional mechanical locking device on the housing end (Q), cylinder end (W), or both (QW)
- Up to 100% adjustable stops on the closed (X), open (Z), or both positions (XZ)
  - **Now adding this option in Shrewsbury**
  - Standard stop range varies by size



	B1CU		B1JU	
	Closed	Open	Closed	Open
Minimum	5°	10°	5°	10°
Range	5° - 15°	10° - 15°	5° - 20°	10° - 15°

NELES

Challenge

Operational safety

Maintainability

Solution

Multiple options to lock the valve in its failsafe position

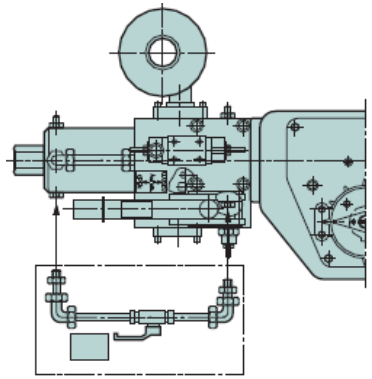
Designed for failsafe override

B-series

Multiple override options

- Optional handwheel override (R/RR) to drive in the air direction (single acting). With double acting can be selected on the housing end (L/RL), cylinder end (K/RK), or both

- Manual hydraulic override option (H)



NELES

Challenge

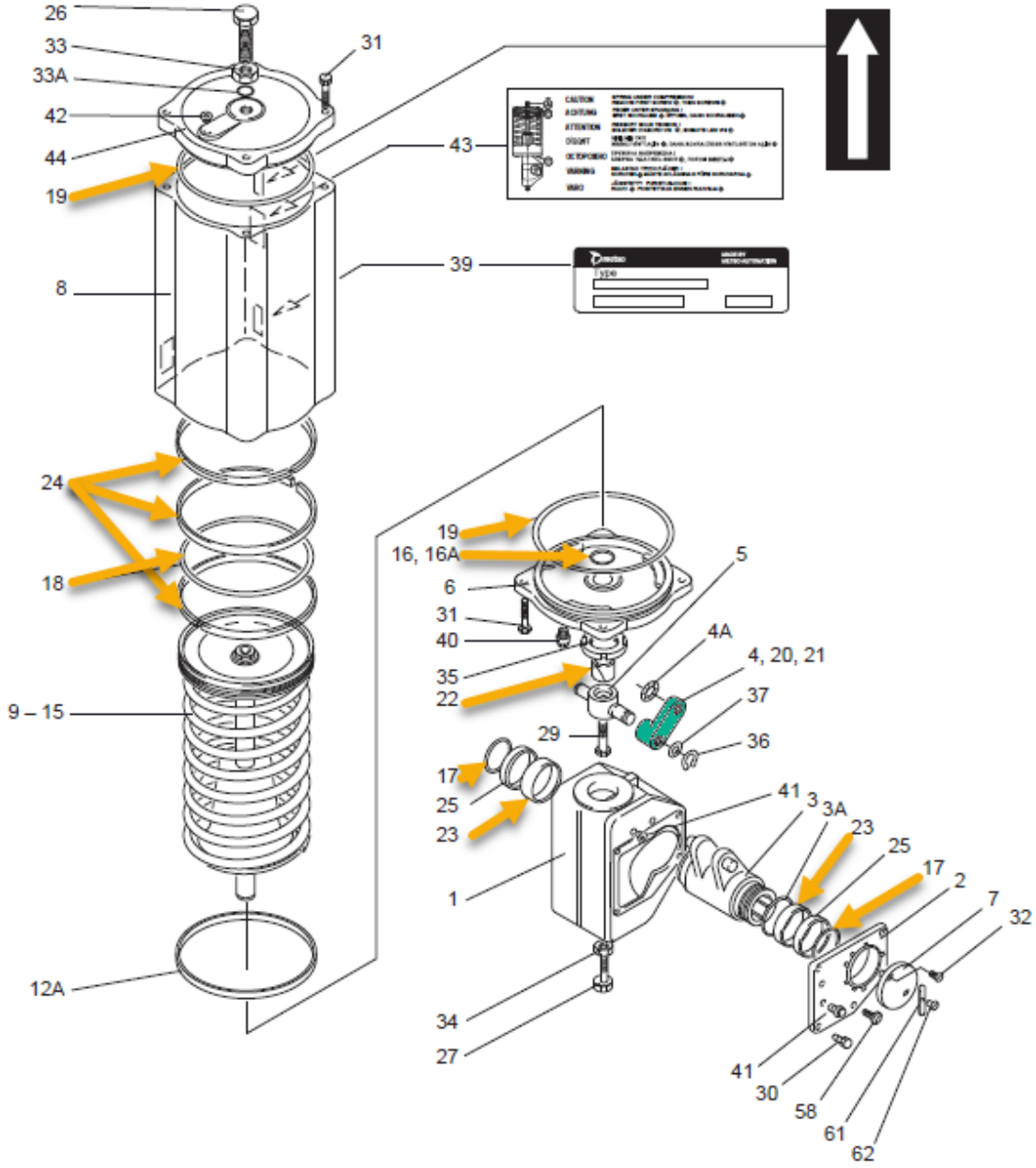
Overriding the actuator in case of supply failure

Solution

Multiple override options

B-Series Spare Parts

- Service Kits
  - Items 16, 16A, 17, 18, 19, 22, 23, 24
  - Shown in yellow
- Connection Arm
  - Items 4, 20, 21
  - Sold as an assembly (arm plus bearing)
  - Shown in green

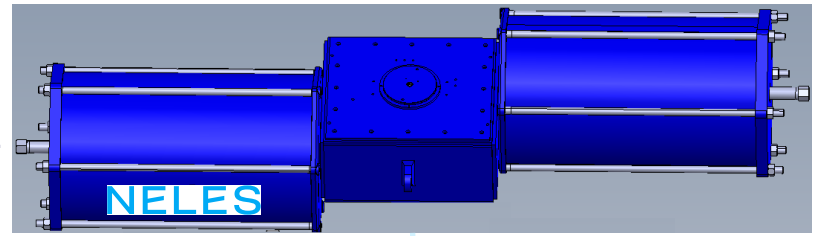


B-Series

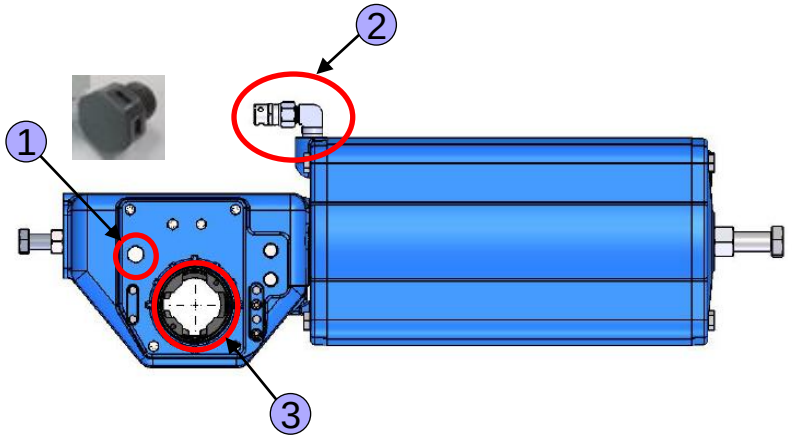
Recent Features/Options

- B1J size **40** to replace the **322**
  - 89% of the 322 torque (6200 vs 7000 ft. lbs.)
  - Single cylinder option instead the double cylinder
    - Lower cost / weight / instrumentation requirements
- IP66M / IP67M option (“6” / “7”)
  - 1. IP68 relief valve in housing cover
  - 2. Spring case connection: ”6” = 90° elbow + bug screen (pointing downwards), ”7” = plumbed as a re-breather with the instrumentation.
  - 3. Special bushing ring (item 25, solid) in housing and housing cover lever arm bore
- Arctic Low Temperature Option (“A”) to -55C

B1JU322



B1JU40

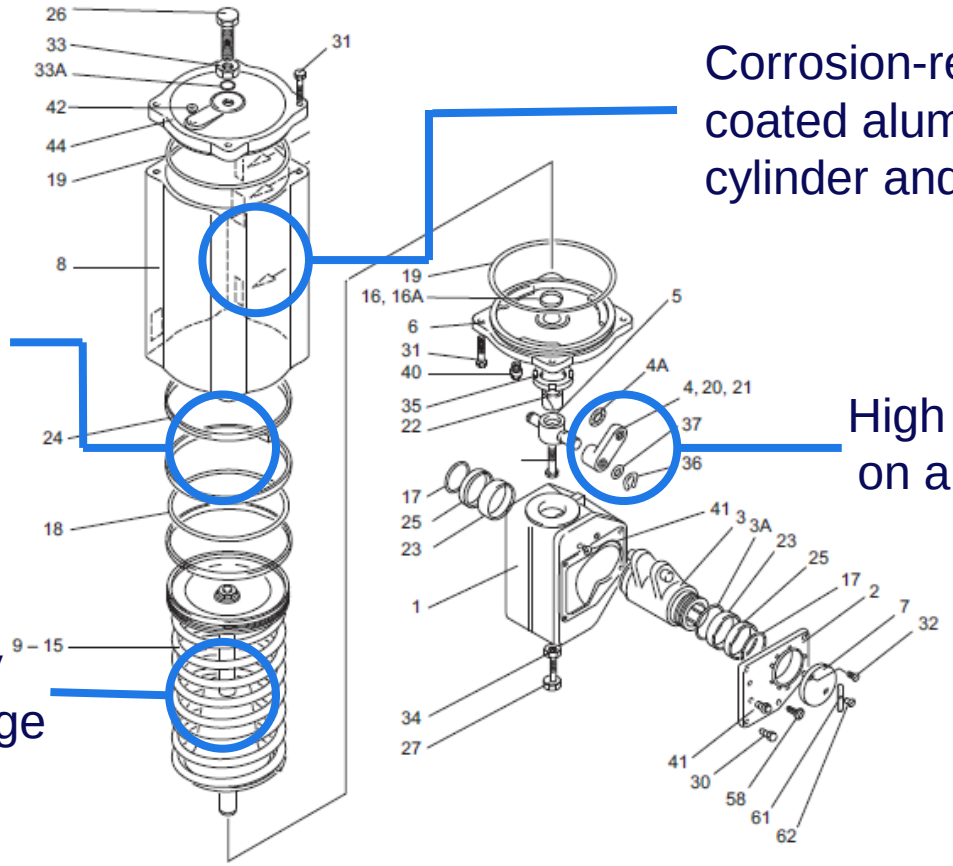


Design Features

B-series

NELES

Features



Corrosion-resistant polyester coated aluminium or steel cylinder and housing

High cycle bearing strips over the cylinder seals (no need for grease)

High cycle bearings on all rotating parts

Self contained epoxy coated spring cartridge

NELES

Neles™ N1-series

Neles Pneumatic Actuators

Neles N1 -series

Heavy Duty Scotch Yoke Actuator

NELES

- Suitable for the most demanding applications
  - High torque, Critical On/Off (ESD)…
  - Spring return or double acting

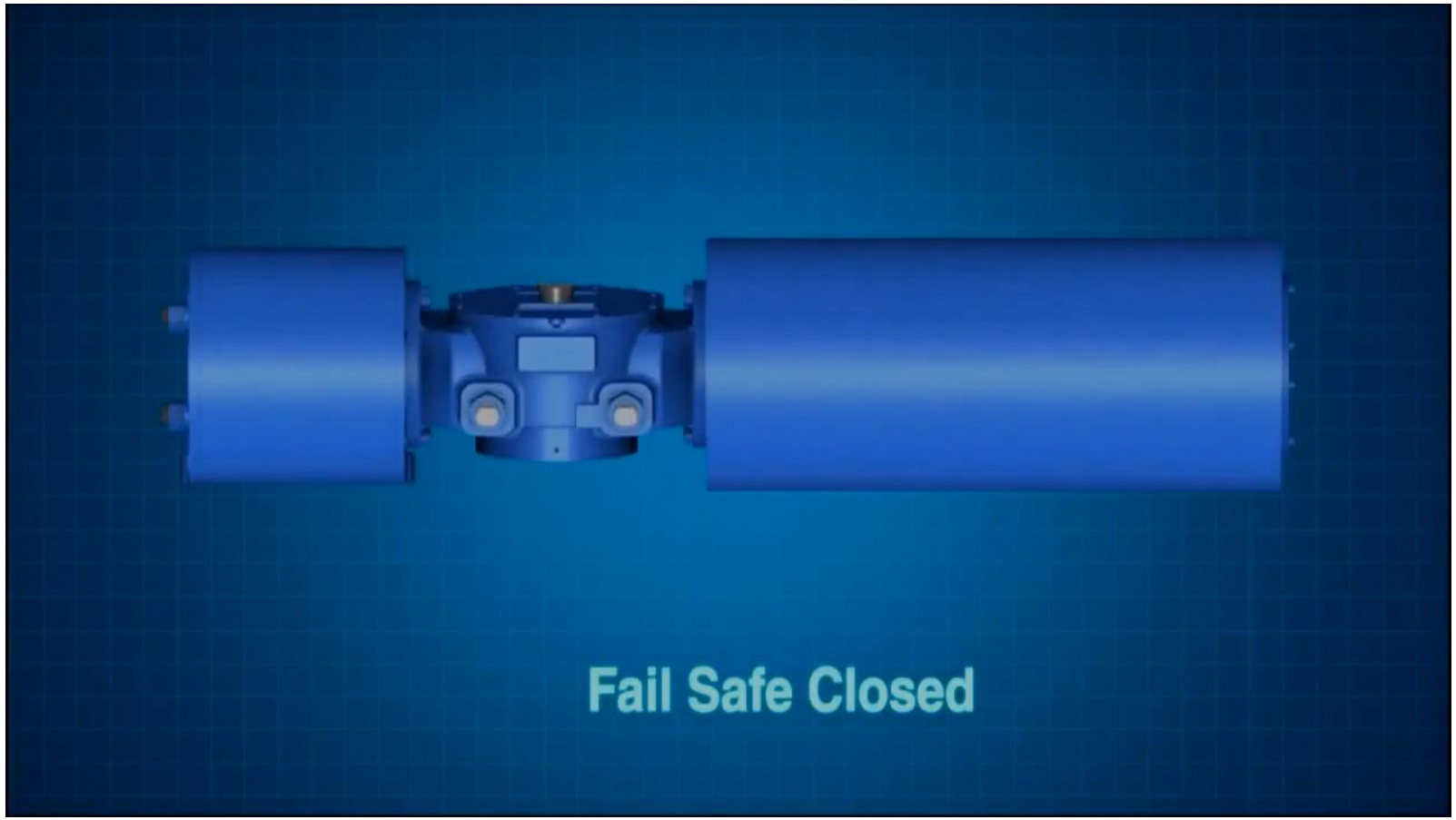
- When highest reliability and torque is needed
  - Safe and reliable design
  - Heavy duty high performance
  - High efficiency and durability
  - Corrosion resistant
  - Easy to maintain

Neles N1 -series

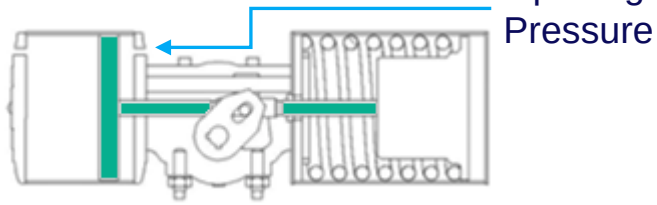
Heavy Duty Scotch Yoke Actuator

NELES

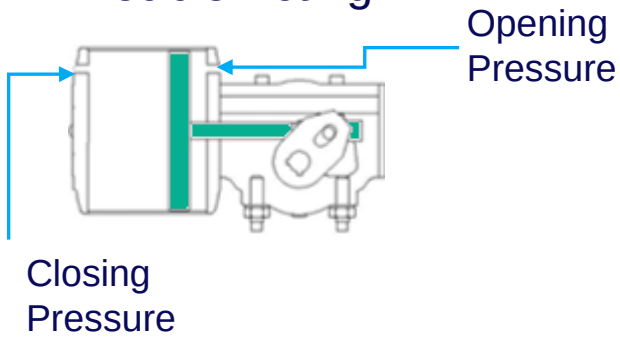
Spring to Close - Animation



Spring Return

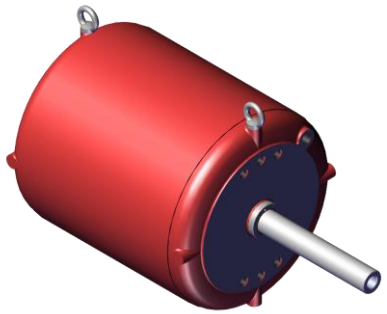


Double Acting



Designed for optimal sizing

N1 series – Modular design



Flexibility for optimal sizing:

16 cylinder sizes (Pneumatic Module)

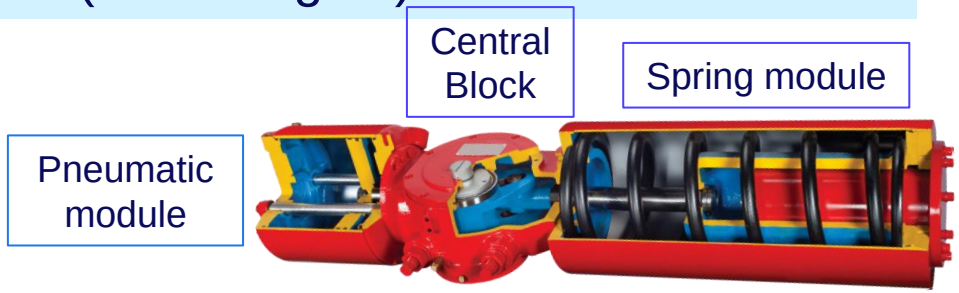
- Diameter: 63 – 1000 mm
- Diameter: 1100 – 1300 mm coming soon (ETO currently)

8 frame sizes (Central Block)

- X – J frame
- M coming soon (ETO currently)

11 spring module variants

- E1...E11 (E1 strongest)



NELES

Challenge

Sizing (MAST)

Weight and Size

Solution

Modular design

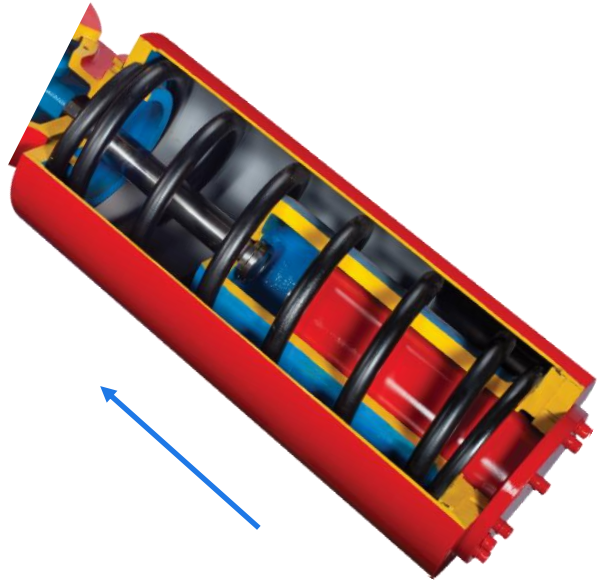
Wide range or pneumatic, frame, and spring options

Designed for improved safety and reliability

N1 -series

Scotch yoke design with completely sealed spring module

- Can NOT be disassembled
  - Guided spring retainer
  - Non-buckling spring catridge design
- Pull type spring module design
  - No stress on the barrel and cover
- Scotch yoke mechanism



NELES

Challenge

Operational safety

Availability

Maintanability

Solution

Scotch yoke design

Sealed Spring Cartridge

Designed extended lifecycle and high efficiency

N1 -series

Jacketed ball bearings on yoke and floating bush over yoke pin design

- Double jacketed - Lifetime lubricated ball bearings

- Reduced wear and tear of the yoke
- Very low friction coefficient

NELES

Challenge

Efficiency

Size and weight

Cycle life

Solution

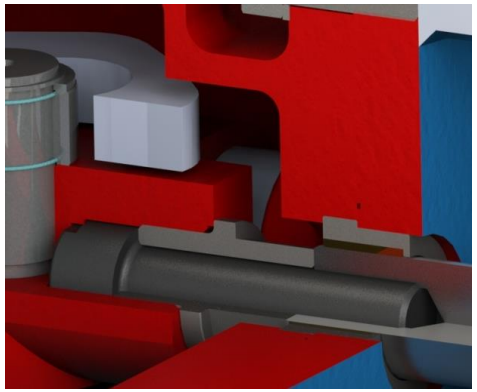
Jacketed ball bearings on yoke and floating bush over yoke pin design

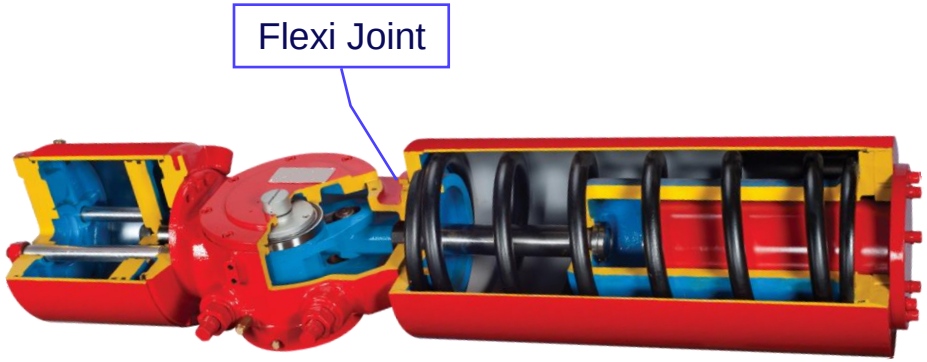
Designed for easy service and field conversion

N1 -series

Modular design – Flexi joint

- Easy to remove single module for maintenance
- Flexi joint for easy detaching and linear alignment
- Easy field conversion
  - Fail function
  - Torque output





NELES

Challenge

Handling when maintaining on site

Modification on site

Solution

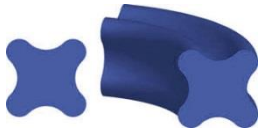
Modular design – Flexi joint

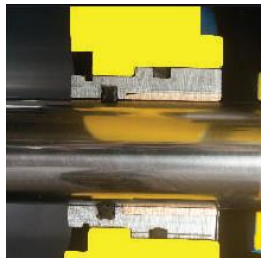
Designed for extended lifecycle and efficiency

N1 -series

Quad seal on piston and heavy duty bearings on tie rods and piston rod

- Unique Quad seal (X –profile) provides extended lifecycle
- Heavy duty bearings firmly guides linear motion and prevents wear and tear





NELES

Challenge

Durability and reliability

Cycle life

Solution

Quad seal on piston and heavy duty bearings on tie rods and piston rod

Designed for improved corrosion resistance and extended lifecycle

N1 -series

Internal tie rods, hermetically sealed spring cartridge and o-ring sealed central block

- Internal tie rods avoids corrosion
- Hermetically sealed spring module protects spring from contamination
- Central block cover sealed by o-ring
- Epoxy-polyurethane coating

NELES

Challenge

Harsh environments

External and internal corrosion

Solution

Internal tie rods, hermetically sealed spring cartridge and o-ring sealed central block

Designed for difficult environments

N1 series – Corrosion protection

External painting:

- 2-layer Epoxy primer
- Polyester top coated
- Std: C3 class / Off-Shore: C5

Internal painting:

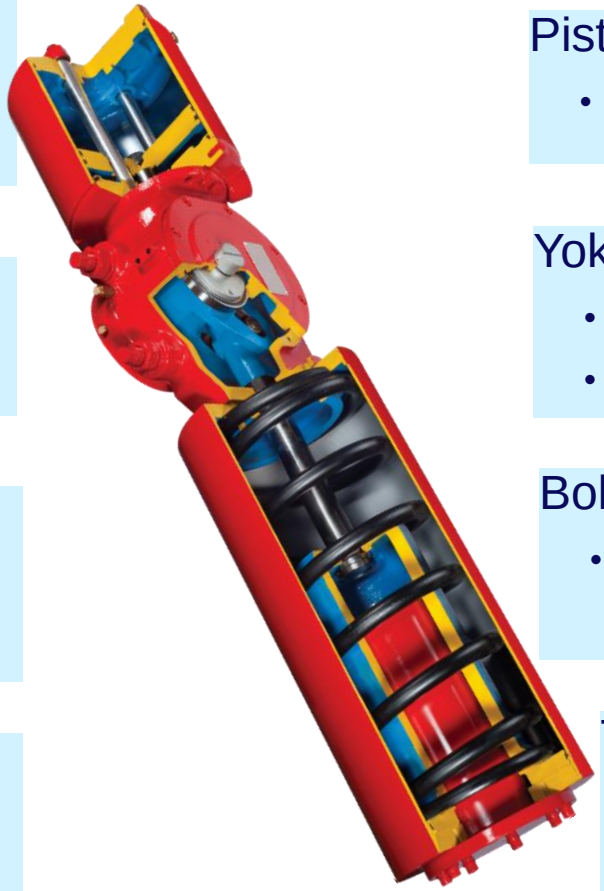
- Zinc Epoxy ester : Corrosion Resistant

Spring:

- Zinc-phosphate coating and powder paint coating : rust proofing

Cylinder material:

- Carbon steel Hard Chrome plated



Piston rod / Tie rods:

- Stainless Steel

Yoke:

- Hot Dip galvanization
- Mechanism greased

Bolts, nuts, studs:

- Carbon Steel - Zinc-coated / passivated and painted

Travel stop screws

- Carbon Steel - Zinc-coated / passivated and painted

NELES

Challenge

Harsh environments

External and internal corrosion

Solution

Painting , Material and Process

Designed for easy automation

N1 -series

Easy mounting and fixing of valve assembly components

- Valve side mounting face complies with ISO 5211
  - With ISO or Neles bore
- Accessory side mounting face complies with VDI/VDE 3845
  - N1A – VDI/VDE (1)
  - N1B-J – VDI/VDE (3)

NELES

Challenge

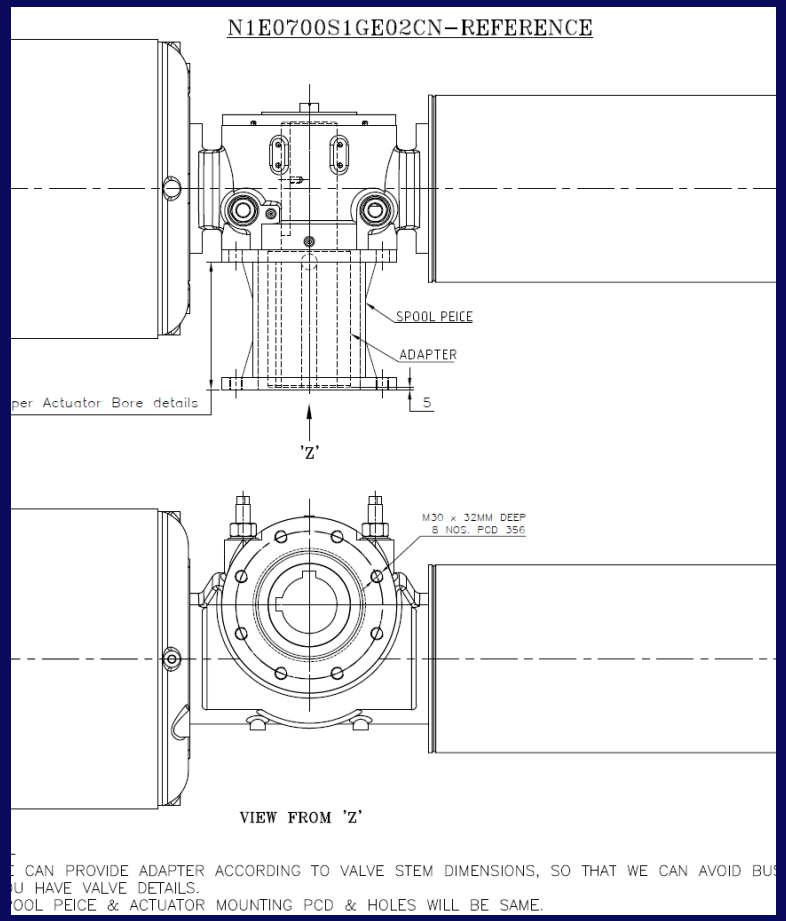
Complicated
to automate

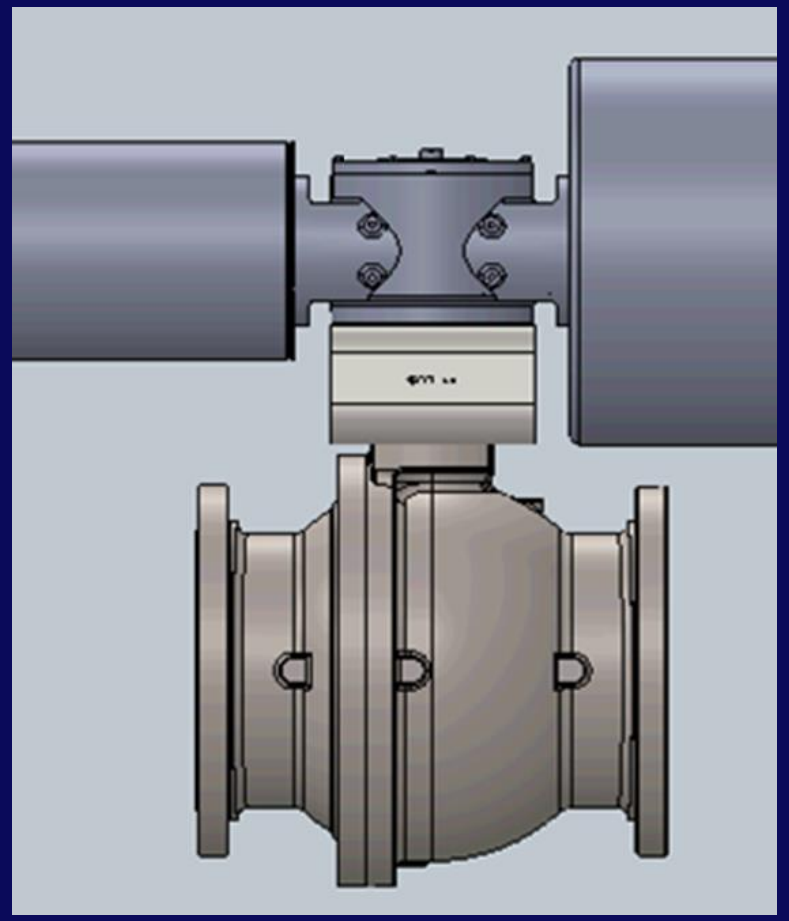
Solution

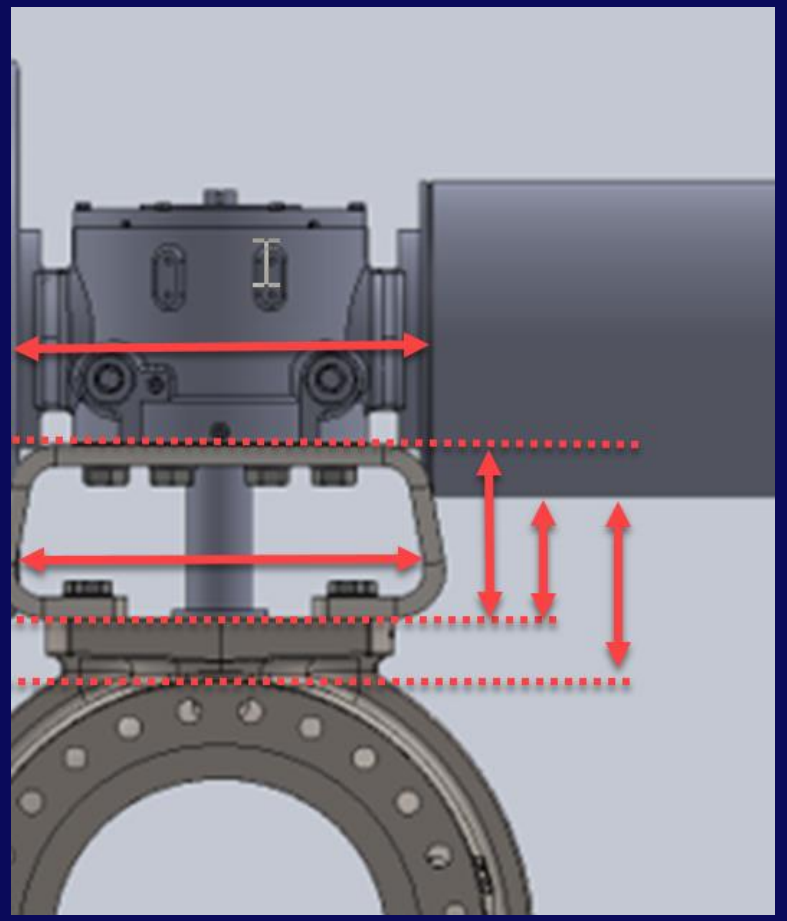
Easy mounting and fixing
of
valve assembly
components

Designed for optimal sizing and extended solutions

N1 -series

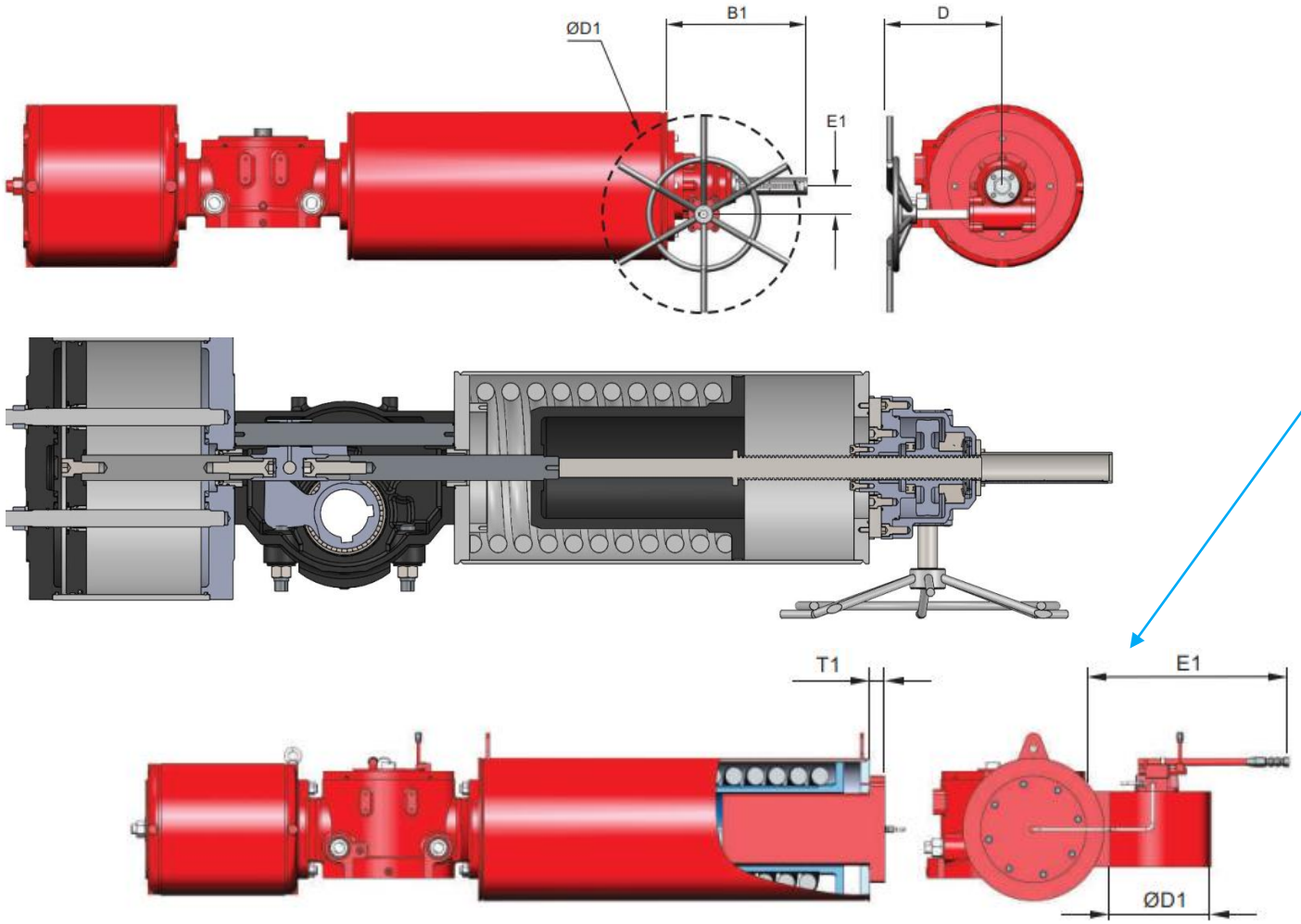






Handwheel Option

N1



- **Manual Override (HW)**
  - SWH : Side Handwheel
  - Single Acting up to N1C0500
- **Hydraulic Override (HP)**
  - Spring Return starting at “C” frame
  - Double Acting – all sizes
- Added as part of the actuator not currently available as an accessory.
  - i.e. N1C0400S1GE03CN/**HP**

Features designed to deliver improved performance and reliability over actuator life cycle

Features summary

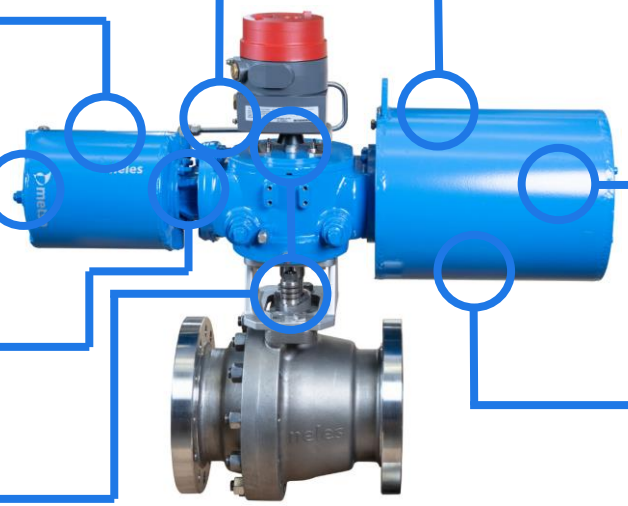
Ball bearings and floating bushing over yoke pin

Quad seal on piston

Internal tie rods and heavy duty bearings

Flexi joint

Easy mounting and fixing



Modular design, Scotch Yoke mechanism

Pull type safety contained spring cartridge

Hermetically sealed spring module

NELES

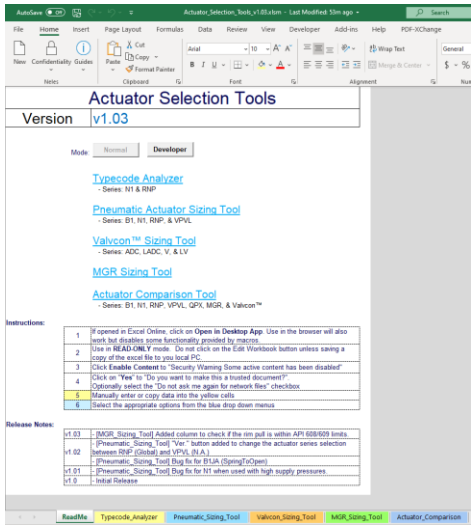
Actuator Selection Tools Excel Tool

Overview and Training

October 1, 2021

Actuator Selection Tools

- Overview
  - The Actuator selection tools is a compilation of Excel based tools designed to enable the growth of our actuation products through improved sizing and selection of bare shaft Neles actuators.
- Typecode analyzer
  - The typecode analyzer will breakdown complete N1 and RNP type codes into their individual components. Notes are included in the header to help with the basic meaning of each code.
- Pneumatic / Valvcon / MGR sizing tools
  - These tools allow you to size the applicable Neles actuators based on the required valve torques entered into the “Valve Requirement Data” fields.
  - The main goals of these tools are the following:
    - Allow for simple sizing of our actuators for use on 3rd party valves and for projects
    - Automatic sizing for the N1 series (not available in Nelprof yet)
    - Sizing for additional series which are not available in Nelprof such as the Valvcon electric actuators and the MGR manual gears.
- Actuator comparison tool
  - This tool allows you to compare a baseline Neles actuator model to up to 3 other Neles actuators. The tool will recommend a similar actuator based on the torque range of the main actuator. This can help when trying to convert from one actuator series to another, i.e. from a QPX to a B-series, or for example the impact of going up one actuator size. The comparison data includes key features such as: torque, valve ISO mounting pad, pneumatic port sizes, temp range.



Contact us

- Product Manager
  - Mark.Buzzell@neles.com
- Applications Engineering
  - apps.engineering@neles.com
- Area Sales Managers map
  - Link to map

Reinventing reliability

neles.com

@neles @nelesworld @nelesflow @Neles @nelesflow

NELES