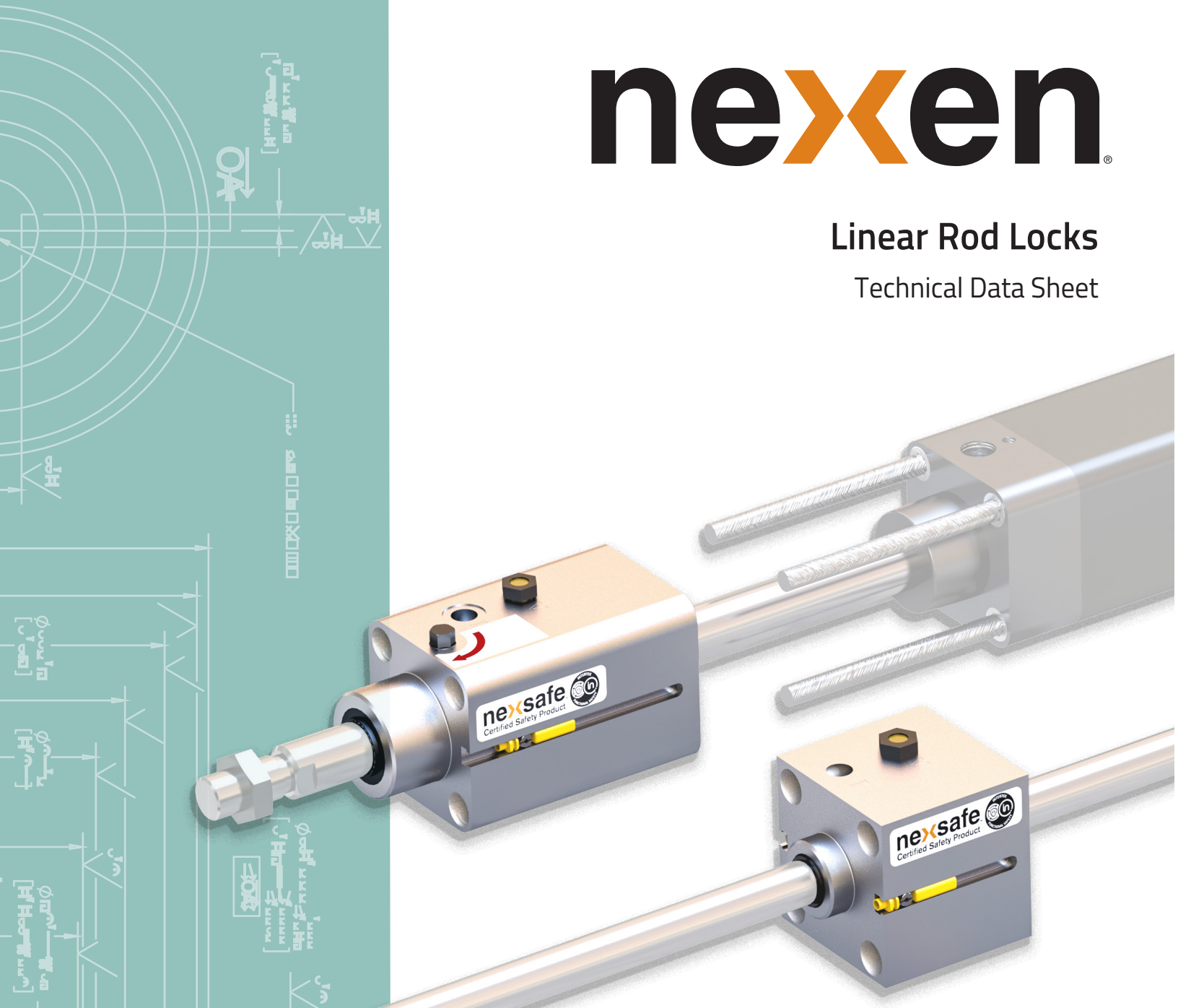
nexen®

# Linear Rod Locks

Technical Data Sheet




**NexSafe® Safety Rated Rod Lock: Spring Engaged, Air Released**
**SAFE-RLSSB-S**: Stand Alone Version
**SAFE-RLSSB-C:** Cylinder Mount Version
**Options:** Manual Release & Sensors Available

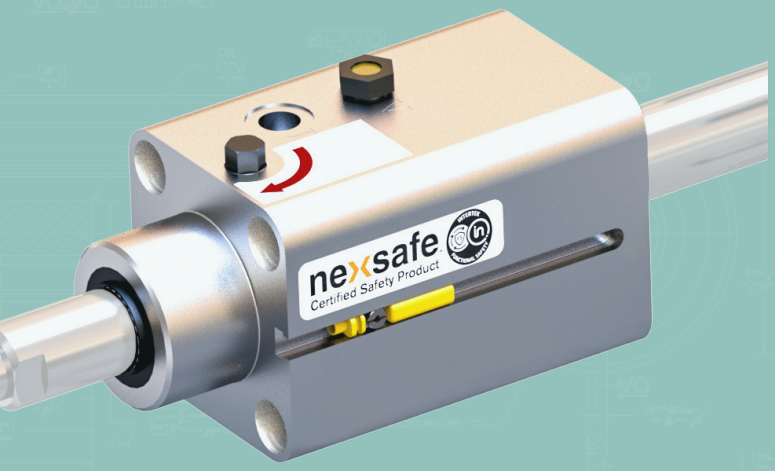
nexsafe®
Certified Safety Products

INTERTEK FS FUNCTIONAL SAFETY

# The Standard In Performance

Nexen's new generation of linear holding/locking devices take rod locking technology to the next level. With superior performance, these spring-engaged, air-released units supplement air cylinders and guide rods for holding in power-off/e-stop situations. High clamping forces ensure positive holding with minimal air required for release. Choose from our standard products, or we will work with you to meet your unique application specifications.

nexsafe®
Certified Safety Products




**Nexen's Spring Engaged, Air Released Rod Locks are safety rated to comply with international safety standard ISO 13849-1. Category Level up to 4 and Performance Level up to e, able to be achieved using Nexsafe products in recommended configuration.**

**Precision Operation Maintains Accurate Positioning**
The RLSS series of Rod Locks guarantees accurate positioning and provides precision holding while other operations are performed. The Rod Lock engages without causing any rod displacement, and also features extremely low backlash making them ideal for precision applications.

**Large Clamping Surface Ensures Consistent Performance**
The RLSS line is designed with a large clamping surface that provides uniform force to the rod contact area on every engagement. The clamping mechanism utilizes numerous ball bearings to reduce friction.

**Spring-engaged Units Engage in Power-off Situations**
Nexen's Rod Locks are spring-engaged, so they operate even in power-off situations to promote safety for operators and machinery. Multiple springs ensure reliable performance and redundancy. The fast response time of these spring-engaged products also increases positioning accuracy. Nexen's Rod Locks also feature locking mode sensing capability that allows engagement/disengagement feedback with the use of up to two optional inductive sensors.

**Sealed to Withstand Harsh Environments**
Every RLSS Rod Lock is sealed to protect internal components. These seals are designed to withstand even harsh wash-down environments and are IP67 rated (anodized models exceed NEMA 4X rating). Consult Nexen for use in wash-down of humid environment applications. Rod Locks are available in natural brushed aluminum or with a black anodized coating.

**Manual Release**
The cam operated manual release feature mechanically disengages the rod lock with the simple turn of a hex screw using a standard wrench. The default-to-lock function springs back to the engaged position when released.

- ✓ CAT 4 PL e
- ✓ SIL 3

Certificate NO. FS-CRT-0007
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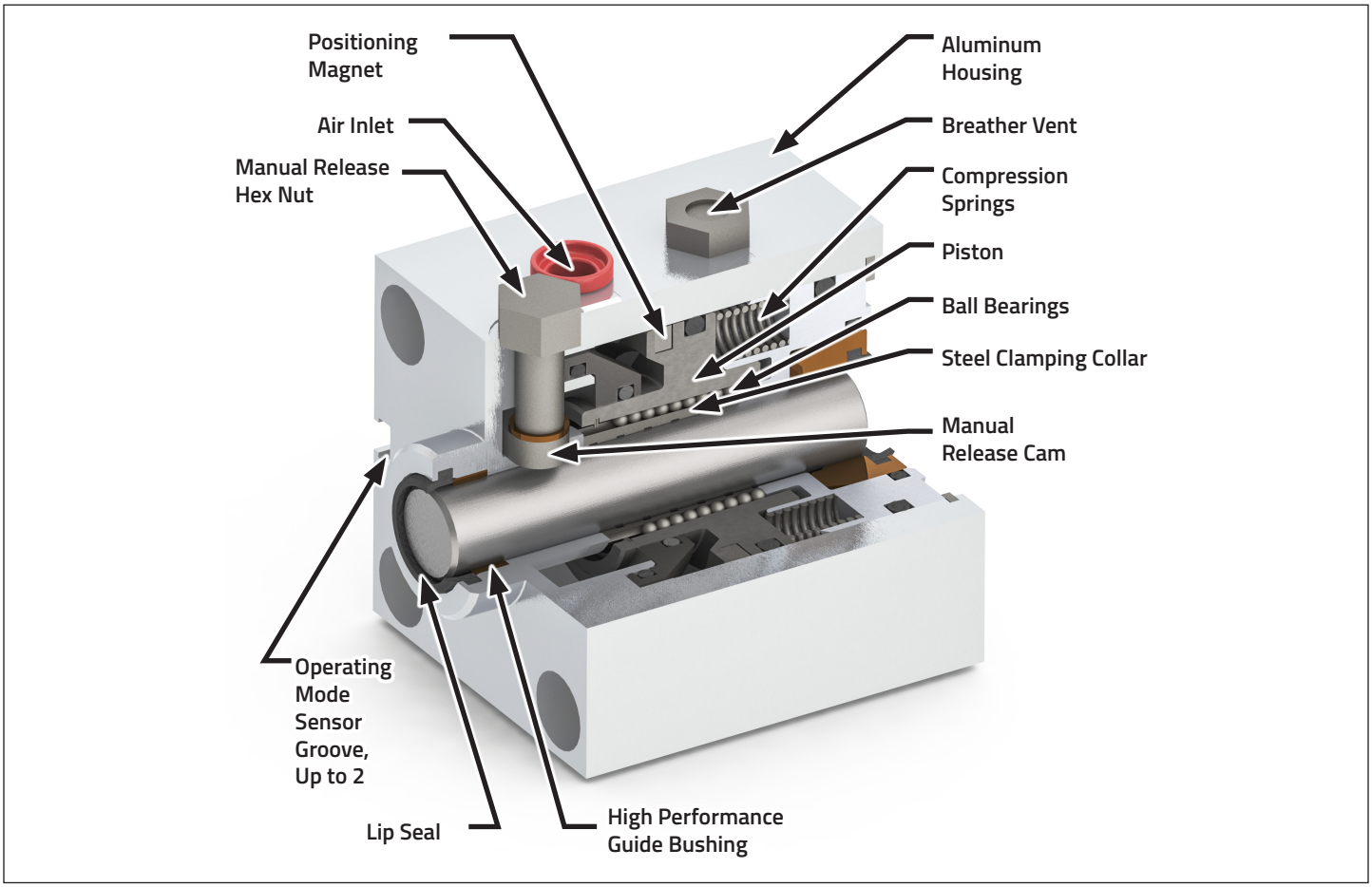
# Nexen's Static Rod Locks

Delivering precision holding with virtually no backlash and providing high accuracy in demanding applications. Nexen's spring-engaged, air-released units come in both ISO and NFPA sizes and will accept standard accessories.

The Rod Lock's large clamping surface ensures high clamping/holding force, and Nexen offers models for use on a pneumatic cylinder or as a stand-alone unit on a guide rod. Increased holding forces can be done by stacking multiple Rod Locks together. The patented design is sealed and features a natural brushed aluminum or corrosion-resistant, anodized finish. Whatever your application, precision operation with hassle-free performance comes standard with each compact unit.

### Rod Lock Cutaway (with Manual Release)




### Understanding Rod Lock Nomenclature

The diagram below explains the components of a Rod Lock model number. In this example, the Nexen Rod Lock listed is a cylinder mounted, spring-engaged, black anodized, static rod lock for a two inch cylinder with a one inch rod.

**SAFE-RLSSB-200-100-C-A-MR**

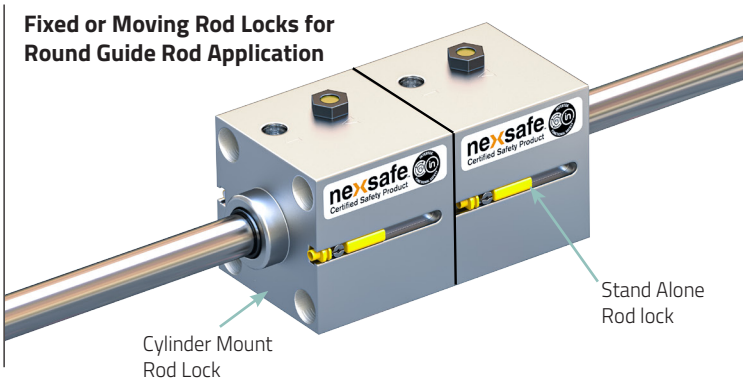
| SAFE = Safety Rated Unit | RLS = Rod Lock, Static | S = Spring Engaged | Position Sensor Functionality | Cylinder Size | Rod Size | C = Cylinder Mount<br>S = Stand Alone | N = Natural<br>A = Anodized* | MR = Manual Release |
|---|---|---|---|---|---|---|---|---|

*Anodized units are black anodize standard. Clear anodize is also available and is designated by ",CLEAR" in the product description.

# Rod Locks Without Manual Release

**Cylinder-Mounted Rod Lock Application**

**Fixed or Moving Rod Locks for Round Guide Rod Application**




Nexen's cylinder mounted Rod Locks match the cylinder's profile for easy, compact integration and can be stacked onto another Rod Lock.

## NFPA/Imperial Models

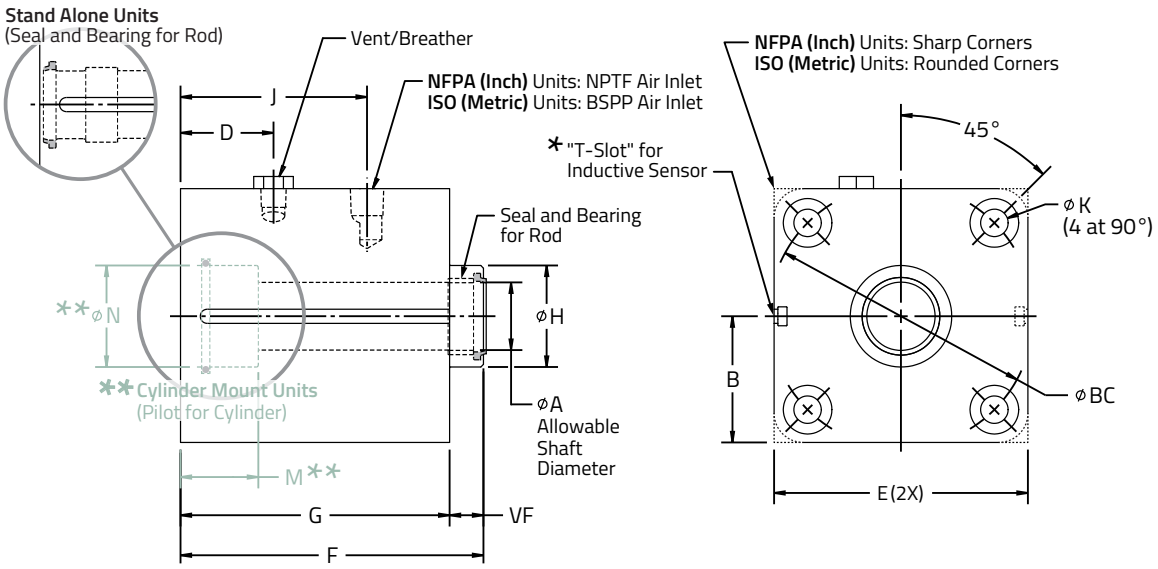
| Model Size | Rod Diameter (in) | Bore Size (in) | Air Chamber Volume ($in^3$) | Approximate Engagement Time (sec) | Holding Force (lbs) | Product Numbers | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Cylinder Mount | | Stand Alone | |
| | | | | | | Anodized Finish | Natural Finish | Anodized Finish | Natural Finish |
| **150-063** | 0.625 | 1.50 | 0.30 | 0.030 | 180 | 966193 | 966194 | 966197 | 966198 |
| **200-063** | 0.625 | 2.00 | 0.54 | 0.040 | 314 | 966307 | 966306 | 966228 | 966227 |
| **250-063** | 0.625 | 2.50 | 1.10 | 0.045 | 491 | 966327 | 966326 | 966242 | 966241 |
| **200-100** | 1.000 | 2.00 | 0.38 | 0.040 | 250 | 966223 | 966224 | 966225 | 966226 |
| **325-100** | 1.000 | 3.25 | 2.13 | 0.070 | 830 | 966333 | 966332 | 966249 | 966248 |
| **400-100** | 1.000 | 4.00 | 3.17 | 0.100 | 1256 | 966337 | 966336 | 966256 | 966255 |
| **500-100** | 1.000 | 5.00 | 5.37 | 0.150 | 1963 | 966357 | 966356 | 966270 | 966269 |
| **325-138** | 1.375 | 3.25 | 1.97 | 0.060 | 830 | N/A | N/A | 966178 | N/A |
| **400-138** | 1.375 | 4.00 | 2.53 | 0.100 | 1256 | 966339 | 966338 | 966263 | 966262 |
| **500-138** | 1.375 | 5.00 | 4.93 | 0.130 | 1963 | 966359 | 966358 | 966277 | 966276 |
| **600-138** | 1.375 | 6.00 | 12.07 | 0.175 | 2830 | 966363 | 966362 | 966284 | 966176 |
| **800-138** | 1.375 | 8.00 | 23.00 | 0.265 | 5026 | N/A | N/A | N/A | 966396 |
| **600-175** | 1.750 | 6.00 | 11.51 | 0.165 | 2830 | N/A | N/A | 966392 | N/A |
| **800-175** | 1.750 | 8.00 | 23.48 | 0.265 | 5026 | N/A | N/A | N/A | N/A |
| **800-250** | 2.500 | 8.00 | 17.75 | 0.210 | 4020 | 966393 | N/A | N/A | N/A |

## ISO/Metric Models

| Model Size | Rod Diameter (mm) | Bore Size (mm) | Air Chamber Volume ($cm^3$) | Approximate Engagement Time (sec) | Holding Force (N) | Product Numbers | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Cylinder Mount | | Stand Alone | |
| | | | | | | Anodized Finish | Natural Finish | Anodized Finish | Natural Finish |
| **032-012** | 12 | 32 | 3.80 | 0.030 | 800 | 966048 | 966036 | 966088 | 966068 |
| **040-016** | 16 | 40 | 5.34 | 0.030 | 890 | 966049 | 966029 | 966089 | 966069 |
| **050-020** | 20 | 50 | 7.08 | 0.035 | 1400 | 966050 | 966030 | 966090 | 966070 |
| **063-020** | 20 | 63 | 13.39 | 0.045 | 2225 | 966051 | 966031 | 966091 | 966071 |
| **080-025** | 25 | 80 | 30.22 | 0.060 | 3560 | 966052 | 966032 | 966092 | 966072 |
| **100-025** | 25 | 100 | 92.83 | 0.100 | 5500 | 966244 | 966087 | 966260 | 966251 |
| **125-032** | 32 | 125 | 179.90 | 0.130 | 8560 | 966054 | 966034 | 966094 | 966074 |

The part numbers listed above are for units with one sensor slots and no sensors, and do not represent all possible configurations. Contact Nexen if one or more of these specifications must be modified for your application.

# Rod Locks Without Manual Release, Approximate Dimensions




Contact Nexen if one or more of these dimensions must be modified for your application. | Contact Nexen if two sensor slots are required for your application.

**NFPA/Imperial Models** (Dimensions shown in inches)

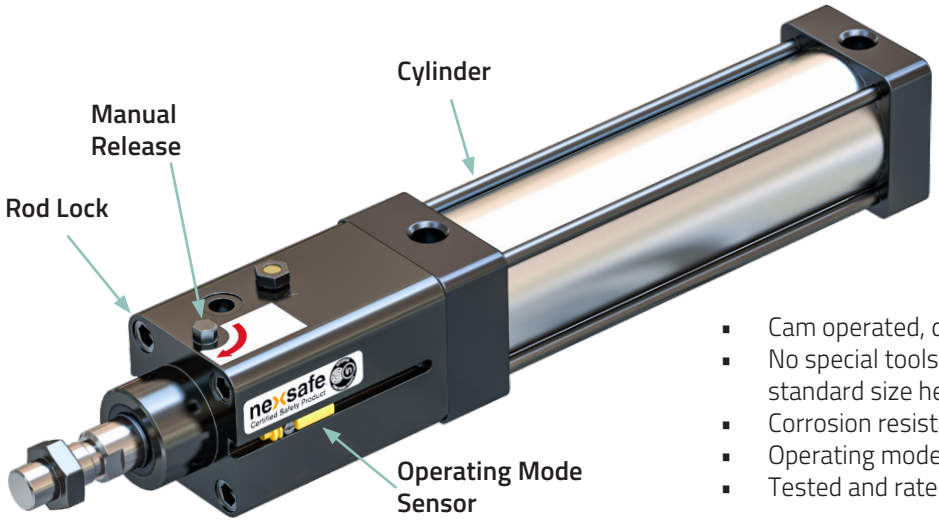
| Model Size | ØA +.000 -.002 | B (to ℄) | ØBC | D | E | F | VF | G | øH -.001 -.003 | J | K ø | K ⌴ | K ↧ | M | øN +.003 +.001 | NPT Air Inlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **150-063** | 0.625 | 0.990 | 2.022 | 1.01 | 2.00 | 3.27 | 0.375 | 2.895 | 1.125 | 1.91 | 0.281 | 0.438 | 0.91 | 0.65 | 1.125 | 1/8–27 |
| **200-063** | 0.625 | 1.240 | 2.602 | 1.00 | 2.50 | 2.80 | 0.375 | 2.422 | 1.125 | 1.98 | 0.344 | 0.516 | 1.03 | 0.67 | 1.125 | 1/8–27 |
| **250-063** | 0.625 | 1.490 | 3.097 | 1.04 | 3.00 | 2.92 | 0.375 | 2.540 | 1.125 | 2.09 | 0.344 | 0.516 | 1.03 | 0.67 | 1.125 | 1/8–27 |
| **200-100** | 1.000 | 1.240 | 2.602 | 1.59 | 2.50 | 4.24 | 0.500 | 3.735 | 1.500 | 2.71 | 0.344 | 0.516 | 1.03 | 0.90 | 1.500 | 1/8–27 |
| **325-100** | 1.000 | 1.865 | 3.903 | 1.37 | 3.75 | 4.48 | 0.500 | 3.976 | 1.500 | 2.76 | 0.406 | 0.719 | 1.28 | 0.90 | 1.500 | 1/4–18 |
| **400-100** | 1.000 | 2.240 | 4.695 | 1.38 | 4.50 | 4.48 | 0.500 | 3.976 | 1.500 | 2.81 | 0.406 | 0.719 | 1.28 | 0.90 | 1.500 | 1/4–18 |
| **500-100** | 1.000 | 2.740 | 5.798 | 1.50 | 5.50 | 4.94 | 0.500 | 4.443 | 1.500 | 3.23 | 0.531 | 0.844 | 1.50 | 0.87 | 1.500 | 1/4–18 |
| **325-138** | 1.375 | 1.865 | 3.903 | 1.68 | 3.75 | 5.00 | 0.625 | 4.375 | 2.000 | 3.23 | 0.406 | 0.719 | 1.28 | 1.00 | 2.000 | 1/4–18 |
| **400-138** | 1.375 | 2.240 | 4.695 | 1.63 | 4.50 | 4.92 | 0.750 | 4.165 | 2.000 | 2.92 | 0.406 | 0.719 | 1.28 | 1.07 | 2.000 | 1/4–18 |
| **500-138** | 1.375 | 2.740 | 5.798 | 1.54 | 5.50 | 5.72 | 0.625 | 5.095 | 2.000 | 3.66 | 0.531 | 0.844 | 1.50 | 1.07 | 2.000 | 1/4–18 |
| **600-138** | 1.375 | 3.220 | 6.901 | 1.87 | 6.46 | 5.93 | 0.625 | 5.306 | 2.000 | 3.64 | 0.545 | 0.844 | 1.50 | 1.05 | 2.000 | 1/4–18 |
| **800-138** | 1.375 | 4.240 | 9.108 | 1.99 | 8.50 | 7.38 | 0.755 | 6.625 | 2.000 | 3.74 | 0.656 | --- | --- | 1.05 | 2.000 | 1/4–18 |
| **600-175** | 1.750 | 3.220 | 6.901 | 2.11 | 6.46 | 6.27 | 0.875 | 5.399 | 2.375 | 3.88 | 0.545 | 0.844 | 1.50 | 1.19 | 2.375 | 1/4–18 |
| **800-175** | 1.750 | 4.240 | 9.108 | 2.10 | 8.50 | 8.00 | 0.875 | 7.125 | 2.375 | 3.98 | 0.656 | --- | --- | 1.23 | 2.375 | 1/4–18 |
| **800-250** | 2.500* | 4.240 | 9.108 | 2.75 | 8.50 | 8.88 | 1.380 | 7.500 | 3.125 | 4.35 | 0.656 | --- | --- | 1.57 | 3.125 | 1/4–18 |

*The allowable shaft tolerance for this size is +0/-.003 in

**ISO/Metric Models** (Dimensions shown in mm)

| Model Size | ØA | B (to ℄) | ØBC | D | E | F | VF | G | ØH | J | K ø | K ⌴ | K ↧ | M | ØN | BSPP Air Inlet |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **032-012** | 12.000 +0/-.034 | 23.75 | 45.96 | 27.6 | 48.0 | 17.00 | 17.00 | 70.82 | 30.00 -.08/-.23 | 48.8 | 6.4 | 10.00 | 24.0 | 20.6 | 30.00 +.25/-0 | 1/8-28 |
| **040-016** | 16.000 +0/-.034 | 26.75 | 53.74 | 31.5 | 54.0 | 21.50 | 21.50 | 64.50 | 35.00 -.08/-.23 | 56.1 | 6.4 | 10.00 | 24.0 | 22.5 | 35.00 +.25/-0 | 1/8-28 |
| **050-020** | 20.000 +0/-.041 | 31.75 | 65.76 | 47.2 | 64.0 | 24.30 | 24.30 | 79.50 | 40.00 -.08/-.23 | 71.5 | 8.4 | 13.00 | 26.5 | 29.6 | 40.00 +.23/+.08 | 1/8-28 |
| **063-020** | 20.000 +0/-.033 | 37.25 | 79.90 | 46.5 | 75.0 | 20.00 | 20.00 | 83.00 | 45.00 -.08/-.13 | 75.0 | 8.4 | 13.00 | 26.5 | 29.5 | 45.00 +.23/+.08 | 1/8-28 |
| **080-025** | 25.000 +0/-.041 | 46.25 | 101.82 | 44.9 | 93.0 | 20.50 | 20.50 | 98.00 | 45.00 -.08/-.13 | 80.0 | 10.5 | 15.90 | 44.6 | 35.0 | 45.00 +.25/-0 | 1/4-19 |
| **100-025** | 25.000 +0/-.041 | 54.75 | 125.87 | 50.0 | 110.0 | 20.50 | 20.50 | 112.47 | 55.00 -.08/-.13 | 98.0 | 10.5 | 15.90 | 44.6 | 38.5 | 55.00 +.25/-0 | 1/4-19 |
| **125-032** | 32.000 +0/-.050 | 69.75 | 155.56 | 76.0 | 140.0 | 174.5 | 27.50 | 147.00 | 60.00 -.08/-.13 | 116.0 | 12.5 | 19.05 | 56.4 | 50.8 | 60.00 .+.25/-0 | 1/4-19 |

# Rod Locks With Manual Release




- Cam operated, default to the lock function
- No special tools needed for manual disengagement, uses standard size hex head
- Corrosion resistant disengagement hex
- Operating mode feedback sensor (optional)
- Tested and rated to 5,000 cycles

## NFPA /Imperial Models

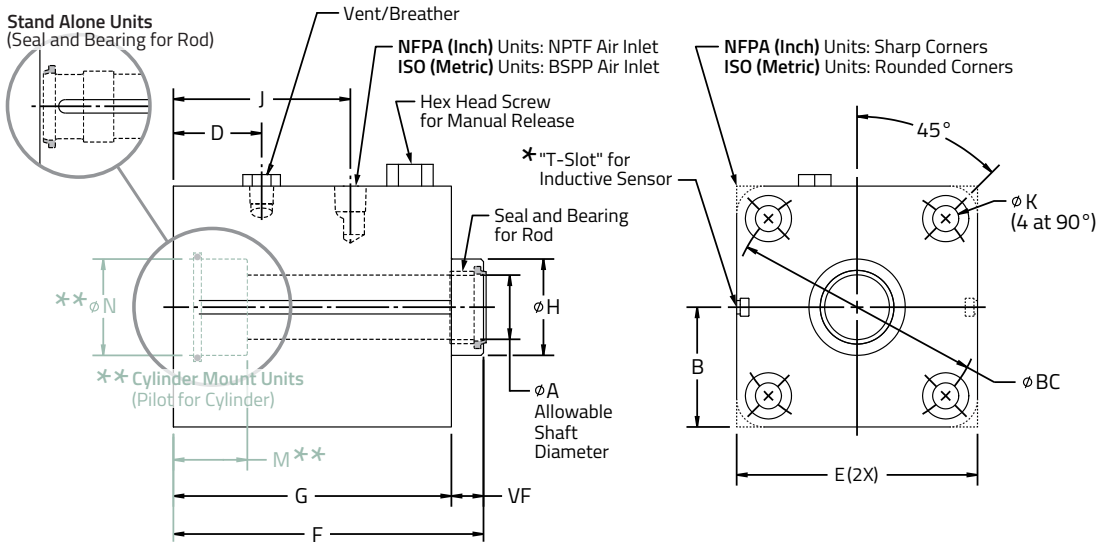
| | | | | | | | Product Numbers | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Cylinder Mount | | Stand Alone | |
| Model Size | Rod Diameter (in) | Bore Size (in) | Air Chamber Volume ($in^3$) | Approximate Engagement Time (sec) | Holding Force (lbs) | Minimum Torque to Override (ftlb) | Anodized Finish | Natural Finish | Anodized Finish | Natural Finish |
| **150-063** | 0.625 | 1.50 | 0.31 | 0.030 | 180 | 6 | 966218 | 966201 | N/A | 966199 |
| **200-063** | 0.625 | 2.00 | 0.61 | 0.040 | 314 | 16 | 966116 | 966126 | N/A | N/A |
| **250-063** | 0.625 | 2.50 | 1.19 | 0.045 | 491 | 16 | 966123 | 966128 | 966125 | N/A |
| **200-100** | 1.000 | 2.00 | 0.48 | 0.040 | 250 | 16 | 966117 | 966127 | 966188 | 966191 |
| **250-100** | 1.000 | 2.50 | 1.34 | 0.050 | 491 | 16 | 966124 | N/A | N/A | N/A |
| **325-100** | 1.000 | 3.25 | 3.46 | 0.070 | 830 | 17 | 966134 | 966139 | 966137 | N/A |
| **400-100** | 1.000 | 4.00 | 5.34 | 0.100 | 1256 | 45 | 966144 | 966157 | 966148 | 966149 |
| **500-100** | 1.000 | 5.00 | 11.20 | 0.150 | 1963 | 72 | 966155 | 966159 | 966187 | N/A |
| **325-138** | 1.375 | 3.25 | 2.17 | 0.060 | 830 | 17 | 966136 | N/A | N/A | N/A |
| **400-138** | 1.375 | 4.00 | 5.96 | 0.100 | 1256 | 45 | 966147 | 966158 | N/A | N/A |
| **500-138** | 1.375 | 5.00 | 6.25 | 0.130 | 1963 | 72 | 966156 | 966165 | N/A | 966167 |
| **600-138** | 1.375 | 6.00 | 14.24 | 0.175 | 2830 | 135 | 966162 | 966166 | N/A | N/A |
| **800-138** | 1.375 | 8.00 | 23.00 | 0.265 | 5026 | 160 | 966383 | N/A | N/A | N/A |
| **600-175** | 1.750 | 6.00 | 12.92 | 0.165 | 2830 | 135 | 966385 | N/A | N/A | N/A |
| **800-175** | 1.750 | 8.00 | 23.48 | 0.265 | 5026 | 160 | 966384 | N/A | N/A | N/A |
| **800-250** | 2.500 | 8.00 | 17.75 | 0.210 | 4020 | 160 | 966388 | N/A | N/A | N/A |

## ISO/Metric Models

| | | | | | | | Product Numbers | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Cylinder Mount | | Stand Alone | |
| Model Size | Rod Diameter (mm) | Bore Size (mm) | Air Chamber Volume ($cm^3$) | Approximate Engagement Time (sec) | Holding Force (N) | Minimum Torque to Override (Nm) | Anodized Finish | Natural Finish | Anodized Finish | Natural Finish |
| **032-012** | 12 | 32 | 3.57 | 0.030 | 800 | 8 | 966046 | 966038 | 966055 | N/A |
| **040-016** | 16 | 40 | 5.72 | 0.030 | 890 | 8 | 966019 | 966039 | 966045 | 966028 |
| **050-020** | 20 | 50 | 7.97 | 0.035 | 1400 | 22 | 966020 | 966040 | 966047 | N/A |
| **063-020** | 20 | 63 | 17.64 | 0.045 | 2225 | 22 | 966021 | 966041 | 966026 | N/A |
| **080-025** | 25 | 80 | 36.76 | 0.060 | 3560 | 22 | 966022 | 966042 | 966025 | N/A |
| **100-025** | 25 | 100 | 85.69 | 0.100 | 5500 | 65 | 966086 | 966237 | 966245 | N/A |
| **125-032** | 32 | 125 | 138.47 | 0.130 | 8560 | 100 | 966024 | 966044 | N/A | 966057 |

The part numbers listed above are for units with one sensor slots and no sensors, and do not represent all possible configurations. Contact Nexen if one or more of these specifications must be modified for your application.

# Rod Locks With Manual Release, Approximate Dimensions




Contact Nexen if one or more of these dimensions must be modified for your application.

If two sensor slots are required for your application, Contact Nexen.

**NFPA/Imperial Models** (Dimensions shown in inches)

| Model Size | ØA +.000 -.002 | B (to ℄) | ØBC | D | E | F | VF | G | ØH -.001 -.003 | J | K ø | K ⌴ | K ↧ | M | øN +.003 +.001 | NPT Air Inlet | Hex Head |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **150-063** | 0.625 | 0.990 | 2.022 | 1.01 | 2.00 | 3.30 | 0.375 | 2.927 | 1.125 | 1.91 | 0.281 | 0.438 | 0.09 | 0.65 | 1.125 | 1/8–27 | 5/16 |
| **200-063** | 0.625 | 1.240 | 2.602 | 1.00 | 2.50 | 3.25 | 0.375 | 2.875 | 1.125 | 1.98 | 0.344 | 0.516 | 1.03 | 0.67 | 1.125 | 1/8–27 | 1/2 |
| **250-063** | 0.625 | 1.490 | 3.097 | 1.04 | 3.00 | 3.38 | 0.500 | 2.875 | 1.125 | 2.12 | 0.344 | 0.516 | 1.03 | 0.67 | 1.125 | 1/8–27 | 1/2 |
| **200-100** | 1.000 | 1.240 | 2.602 | 1.67 | 2.50 | 4.38 | 0.500 | 3.875 | 1.500 | 2.81 | 0.344 | 0.516 | 1.03 | 0.90 | 1.500 | 1/8–27 | 1/2 |
| **250-100** | 1.000 | 1.490 | 3.097 | 1.55 | 3.00 | 4.50 | 0.500 | 4.000 | 1.500 | 2.88 | 0.344 | 0.516 | 1.03 | 0.90 | 1.500 | 1/8–27 | 1/2 |
| **325-100** | 1.000 | 1.865 | 3.903 | 1.37 | 3.75 | 5.00 | 0.500 | 4.500 | 1.500 | 2.99 | 0.406 | 0.719 | 1.28 | 0.91 | 1.500 | 1/4–18 | 5/8 |
| **400-100** | 1.000 | 2.240 | 4.695 | 1.50 | 4.50 | 5.38 | 0.500 | 4.875 | 1.500 | 3.15 | 0.406 | 0.719 | 1.28 | 0.90 | 1.500 | 1/4–18 | 7/8 |
| **500-100** | 1.000 | 2.740 | 5.798 | 1.50 | 5.50 | 5.88 | 0.500 | 5.375 | 1.500 | 3.38 | 0.531 | 0.844 | 1.50 | 0.88 | 1.500 | 1/4–18 | 7/8 |
| **325-138** | 1.375 | 1.865 | 3.903 | 1.68 | 3.75 | 5.50 | 0.625 | 4.875 | 2.000 | 3.23 | 0.406 | 0.719 | 1.28 | 1.00 | 2.000 | 1/4–18 | 5/8 |
| **400-138** | 1.375 | 2.240 | 4.695 | 1.63 | 4.50 | 5.88 | 0.750 | 5.125 | 2.000 | 3.45 | 0.406 | 0.719 | 1.28 | 1.08 | 2.000 | 1/4–18 | 7/8 |
| **500-138** | 1.375 | 2.740 | 5.798 | 1.54 | 5.50 | 6.50 | 0.750 | 5.750 | 2.000 | 3.42 | 0.531 | 0.844 | 1.50 | 1.07 | 2.000 | 1/4–18 | 7/8 |
| **600-138** | 1.375 | 3.220 | 6.901 | 1.87 | 6.46 | 7.13 | 0.755 | 6.375 | 2.000 | 3.67 | 0.545 | 0.844 | 1.50 | 1.06 | 2.000 | 1/4–18 | 1-5/16 |
| **800-138** | 1.375 | 4.240 | 9.108 | 1.99 | 8.50 | 7.38 | 0.755 | 6.625 | 2.000 | 3.74 | 0.656 | --- | --- | 1.05 | 2.000 | 1/4–18 | 1-5/16 |
| **600-175** | 1.750 | 3.220 | 6.901 | 1.95 | 6.46 | 7.75 | 0.875 | 6.875 | 2.375 | 3.82 | 0.545 | 0.844 | 1.50 | 1.19 | 2.375 | 1/4–18 | 1-5/16 |
| **800-175** | 1.750 | 4.240 | 9.108 | 2.10 | 8.50 | 8.00 | 0.875 | 7.125 | 2.375 | 3.98 | 0.656 | --- | --- | 1.23 | 2.375 | 1/4–18 | 1-5/16 |
| **800-250** | 2.500* | 4.240 | 9.108 | 2.75 | 8.50 | 8.88 | 1.380 | 7.500 | 3.125 | 4.35 | 0.656 | --- | --- | 1.57 | 3.125 | 1/4–18 | 1-5/16 |

*The allowable shaft tolerance for this is size is +0/-.003 in

**ISO/Metric Models** (Dimensions shown in mm)

| Model Size | ØA | B (to ℄) | ØBC | D | E | F | VF | G | ØH | J | K ø | K ⌴ | K ↧ | M | ØN | BSPP Air Inlet | Hex Head |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **032-012** | 12.000 +0/-.034 | 23.75 | 45.96 | 27.6 | 48.0 | 89.8 | 17.00 | 70.82 | 30.00 -.08/-.23 | 48.0 | 6.4 | 10.00 | 24.0 | 20.6 | 30.00 +.25/-0 | 1/8-28 | 8 |
| **040-016** | 16.000 +0/-.034 | 26.75 | 53.74 | 31.5 | 54.0 | 97.5 | 21.50 | 75.00 | 35.00 -.08/-.23 | 54.5 | 6.4 | 10.00 | 24.0 | 22.5 | 35.00 +.25/-0 | 1/8-28 | 8 |
| **050-020** | 20.000 +0/-.041 | 31.75 | 65.76 | 47.2 | 64.0 | 123.8 | 24.30 | 98.00 | 40.00 -.08/-.23 | 71.0 | 8.4 | 13.00 | 26.5 | 29.6 | 40.00 +.23/+.08 | 1/8-28 | 13 |
| **063-020** | 20.000 +0/-.033 | 37.25 | 79.90 | 46.5 | 75.0 | 118.5 | 20.00 | 97.00 | 45.00 -.08/-.13 | 76.7 | 8.4 | 13.00 | 26.5 | 29.5 | 45.00 +.23/+.08 | 1/8-28 | 13 |
| **080-025** | 25.000 +0/-.041 | 46.25 | 101.82 | 44.9 | 93.0 | 136.5 | 20.50 | 116.00 | 45.00 -.08/-.13 | 80.0 | 10.5 | 15.90 | 44.6 | 35.0 | 45.00 +.25/-0 | 1/4-19 | 16 |
| **100-025** | 25.000 +0/-.041 | 54.75 | 125.87 | 50.0 | 110.0 | 155.0 | 20.50 | 134.52 | 55.00 -.08/-.13 | 93.0 | 10.5 | 15.90 | 44.6 | 38.5 | 55.00 +.25/-0 | 1/4-19 | 22 |
| **125-032** | 32.000 +0/-.050 | 69.75 | 155.56 | 76.0 | 140.0 | 194.5 | 27.50 | 167.00 | 60.00 -.08/-.13 | 116.0 | 12.5 | 19.05 | 56.4 | 50.9 | 60.00 +.25/-0 | 1/4-19 | 22 |

## Rod Lock Operation Specifications

- All of Nexen's Rod Locks will operate in both directions, engaging with the same holding force.
- Rod Locks can be mounted in any position.
- Rod rotation is not allowed when a Rod Lock is engaged (not intended for torsional braking).
- Nexen's Rod Lock complies with ISO 15552 standards.
- Nexen's Rod Lock $B_{10}$ is 1 million cycles, $B_{10D}$ is 2 million.
- Standard release pressure of 4.1 bar [60 psi] with 8.3 bar [120 psi] maximum allowable. Units with lower release pressures and holding forces also available.
- Allowable operating temperatures range from 4.5°C–65.5°C [40°F–150°F].

## Requirements for Optimal Performance

Nexen's series of Rod Locks must be used in an application that meets the following specifications

- Nexen's Rod Locks are suitable for infrequent dynamic braking (emergency stops) when used with hardened shaft material. E-stop travel distance must be less than 100 mm [3.9 in]. Refer to the sample calculation.
- Nexen recommends the following rod material for cylinder rods and guide rods. Deviations from these specifications will result in poor rod lock performance and shaft damage.

| Hardness Specification | Hard Chrome Plating Thickness |
|---|---|
| Less than 52 HRC | 20 microns [0.0008 in] |
| Greater than 52 HRC | 8 - 13 microns [0.0003 - 0.0005 in] |

- Nexen recommends a surface roughness Rmax of 1.6 microns [63 microinch] or better.
- The Rod Lock requires clean, dry, pressure regulated air. Lubrication is not required.
- The rated holding force corresponds to static load conditions. If the rated value is exceeded, slipping may occur.
- The rod must be kept clean and dry to maintain optimum holding forces.
- Cylinder pilot must properly mate with rod lock seal for IP67 rating. Consult Nexen for use in wash-down or humid environment applications.
- The rod diameter must be within the h8 tolerance range. Refer to USAS (ANSI) B4.1-1967 (1974), ISO 286-1-1988, ISO 286-2-1988. Specify precision, hardened and ground, HRC, linear shafting.

## Additional Cylinder Requirements

- Longer cylinder rod.
  *Extra length = rod lock length (F) – cylinder pilot length*
  (for dimension, see pages 5 & 7)
- Mounting bolts included with cylinder-mount rod locks (except 8 inch bore units)
- Longer tie rods on 8 inch cylinders and cylinders without tapped holes

## Dynamic Stopping Capabilities (Dynamic use voids the NexSafe rating)

All metric sizes and NFPA/Imperial for 5 in cylinders and below are capable of:

- 50,000 dynamic stops
- Up to 50% of the rated static load
- A maximum speed of 1.5 m/s [4.9 ft/s]

Nexen Group defines Dynamic and Emergency Stopping as:

**Dynamic Stopping**
- Frequent and/or intentional
- Capable of stopping 50% of the static load
- Allowable speeds up to 1.5 m/s [4.9 ft/s].
- Maintains static performance

**Emergency Stopping**
- Is infrequent
- Capable of stopping 100% of the static load if speed permits
- Design of system must adhere to a maximum E-stop distance of 100 mm [3.9 in]
- May reduce static performance

## Rod Lock Sample Calculations for Emergency Stops

E-stops performed with rod locks should be limited, as the rod lock and/or shaft friction surface may wear. Depending on the energy dissipated during a stop, the rod locks performance may be reduced after each stop.

**Sample Data**

| Lock Model[1] | Holding Force[1] (F) | Engagement Time [1] ($t_e$) | Acceleration of Gravity (g) | Mass of Load (m) | Load Velocity (V) |
|---|---|---|---|---|---|
| **RLSSB 032-012-S** | 800 N | 0.030 seconds | 9.8 m/s$^2$ | 45.4 kg | 0.50 m/s |

[1]For lock specifications, see page 4 and 6.

**Horizontal Travel**
(X and Y axis)

**Dynamic Stopping Time (in seconds):**

$$t_T = \frac{m \cdot V}{F} + t_e$$

$$t_T = \frac{45.4 \cdot 0.50}{800} + .030 = 0.058 \text{ seconds}$$

**Dynamic Stopping Distance (in meters):**

**Distance of Travel During Lock Engagement ($L_e$)**

$$L_e = V \cdot t_e$$

$$L_e = 0.5 \cdot 0.030 = 0.015 \text{ meters}$$

**Stopping Distance ($L_s$) at Full Lock Force**

$$L_s = \frac{0.5 \cdot m \cdot V^2}{F}$$

$$L_s = \frac{0.5 \cdot 45.4 \cdot 0.50^{\,2}}{800} = 0.007 \text{ meters}$$

**Total Travel Distance**

$$L_T = L_e + L_s$$

$$L_T = 0.015 + 0.007 = 0.022 \text{ meters or } 22 \text{ mm}$$

In this example, the load will travel 22 mm [0.87 in] from the time the lock engages until the system is brought to a complete stop.

**Vertical travel (Downward)**
(Z axis)

**Dynamic Stopping Time (in seconds):**

$$t_T = \frac{m \cdot (g \cdot t_e + V)}{[F - (m \cdot g)]} + t_e$$

$$t_T = \frac{45.4 \cdot (9.8 \cdot 0.030 + 0.50)}{[800 - (45.4 \cdot 9.8)]} + 0.030 = 0.132 \text{ seconds}$$

**Dynamic Stopping Distance (in meters):**

**Distance of Travel During Lock Engagement ($L_e$)**

$$L_e = 0.5 \cdot (t_e^{\,2}) \cdot g + V \cdot t_e$$

$$L_e = 0.5 \cdot (.030^2) \cdot 9.8 + .5 \cdot .030 = 0.019 \text{ meters}$$

**Stopping Distance ($L_s$) at Full Lock Force**

$$L_s = 0.5 \cdot [(t_e \cdot g) + V] \cdot (t_T - t_e)$$

$$L_s = 0.5 \cdot [(.030 \cdot 9.8) + 0.5] \cdot (0.132 - 0.030)$$

$$L_s = 0.040 \text{ meters}$$

**Total Travel Distance**

$$L_T = L_e + L_s$$

$$L_T = 0.019 + 0.040 = 0.059 \text{ meters or } 59 \text{ mm}$$

In this example, the load will travel 59 mm [2.32 in] from the time the lock engages until the system is brought to a complete stop.

E-stop travel distance must be less than 100 mm

**Note**: Pneumatic components are in accordance with ISO 4414
Minimum release pressure = 4.1 bar [60 psi]
Maximum pressure = 8.3 bar [120 psi]

### Cylinder Mounting

**Note:** Avoid repeated overlapping conditions when programming the Rod Lock into your system. (i.e.: forced motion during engagement or disengagement of the Rod Lock.) Shaft and/or collar wear will result. Design the control system to use the Rod Lock in static conditions.

Cylinder functioning is regulated by a 5/3 (5 ported, 4-way, 3 [center] position) valve (use cylinder manufacturers' recommended Cv valves), center open on the central port and supplied by exhaust ports.

**Note:** Do not use a valve with a closed center. This will cause imbalance in the piston if any of the circuits leak.

One-directional flow reducers can be used to control the speed of the cylinder rod. To ensure fast braking of the rod, a quick exhaust valve can be installed on or near the rod lock.

A normally closed (NC) 3-way solenoid valve directs air supply to the rod lock, keeping it disengaged until the electrical signal is interrupted.

**Vertical Mounting:** The force on the piston must not exceed its locking capacity when it is combined with the force of the load.

Use of a 5/3 (5 ported, 4-way, 3 [center] position) valve provides a braking effect and maintains accurate rod positioning. Stopping precision is determined by the rate of speed of the rod and loads in motion.

**Horizontal Mounting:** Pressure is maintained on both sides of the cylinder piston, keeping it balanced and preventing rod dis-placement upon release. Use exhaust ports 3 and 5 (see below).

### Stand-Alone Mounting

Specifications match those of the cylinder models listed above.

# Air Control Products:

## Optional Solenoid Valves

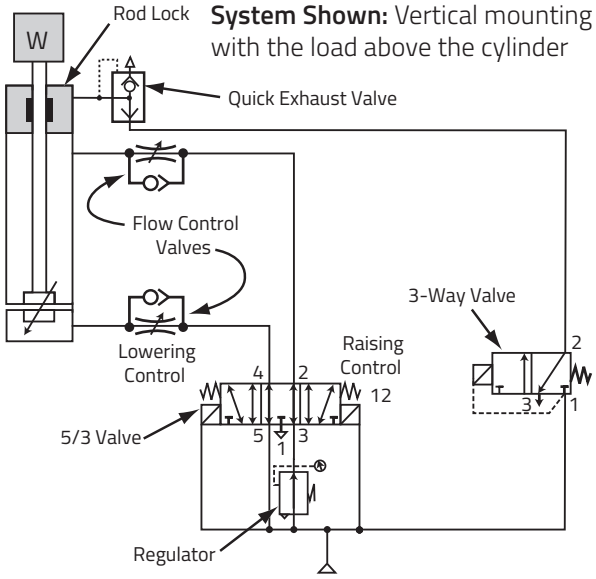
| Specifications | | | |
|---|---|---|---|
| **Description** | **Voltage** | **Port Size** | **Part #** |
| 3-way Solenoid Valve, NC | 24 VDC | 0.125-27 NPT | 964650 |
| 3-way Solenoid Valve, NC | 24 VDC | 0.125-28 BSPP | 964651 |
| 3-way Solenoid Valve, NC | 115 V | 0.125-27 NPT | 948804 |

## Quick Exhaust Valves

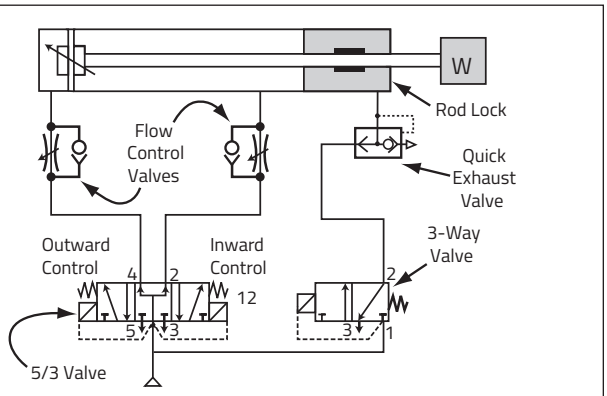
Nexen's optional Quick Exhaust Valves offer additional safety through quicker, more consistent response times when Rod Lock engagement is called for.

| Rod Lock Unit Size | Part Number |
|---|---|
| **Size 150-, 200- & 250-NFPA Inch Units** | 945100 (0.125-27 NPT) |
| **Size 032-, 040-, 050- & 063-Metric ISO Units** | 945127 (0.125-28 BSPP) |
| **Size 325-, 400-, 500-, 600- & 800-NFPA Inch Units** | 945125 (0.250-18 NPT) |
| **Size 080-, 100- & 125-Metric ISO Units** | 945128 (0.250-19 BSPP) |

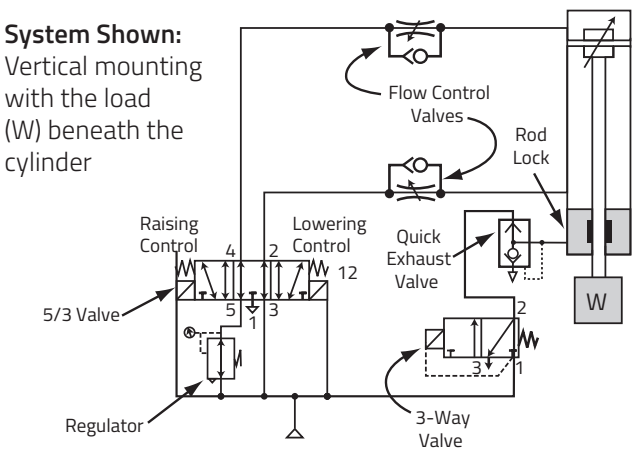
BSPP ports accept BSPP or BSPT fittings of the same size.
ISO-G and BSPP are the same thing.




**System Shown:** Vertical mounting with the load above the cylinder




**System Shown:** Cylinder control using a 5/3 4-way valve with the center open on the central port




**System Shown:** Vertical mounting with the load (W) beneath the cylinder

## Safety Rating

With third party certification carried out by Intertek, Nexen's Rod Locks are safety certified components capable of meeting the following ratings per safety standard ISO 13849-1:2015. Reference Nexen's NexSafe Application guide for more information.

**Cycle Life ($B_{10D}$)** of 2 million cycles
**Common Cause Failure (CCF)** is 75%
**Mission Time** is10 Years
**Mean Time to Dangerous Failure ($MTTF_D$)** is dependent on average operation time with a maximum of 100 years.

**Average Cycle rate ($t_{cycle}$)** is the mean operation time between two cycles defined by your system.
**Maximum operation time ($T_{10D}$)** is $MTTF_D/10$

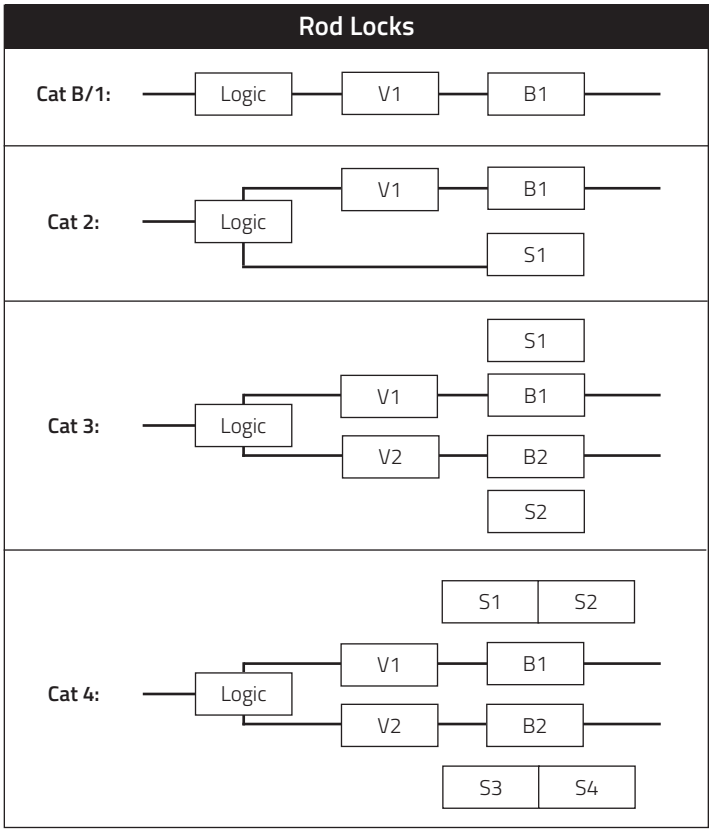
**Diagnostic Coverage (DC)** is dependent on brake redundancy and sensor setup:

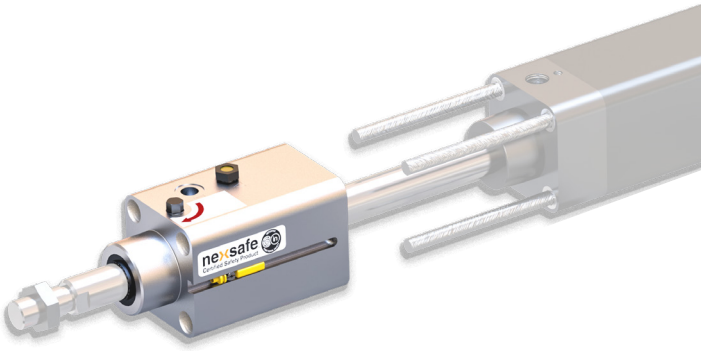
| If DC is 0% | If DC is 60% | If DC is 90% | If DC is 99% |
|---|---|---|---|
| No sensor feedback necessary. | Feedback sensor shall be used to monitor the operating mode of brake. | Feedback sensor shall be used to monitor the operating mode of brake. The brake must be cycled engaged and disengaged at least this often to check for brake functionality: | |
| | | every 3 months | once every day |

**Calculation Assumptions:**

- System can be reduced to a single channel with Logic, Valve, and Brake
- $MTTF_D$ is selected based on the category, performance level and diagnostic coverage; $t_{cycle}$ is back figured to provide a maximum cycle rate (rounded up)
- $B_{10D}$ for a pneumatic valve is 20,000,000 per 13849-1:2015, Annex C, Table C.1
- PFH for logic is $1.5X10^{-8}$ based on common industry manufacturers
- 260 operational days per year (5 days per week)
- 16 operation hours per day (two-8 hour shifts)

## Example Block Diagrams

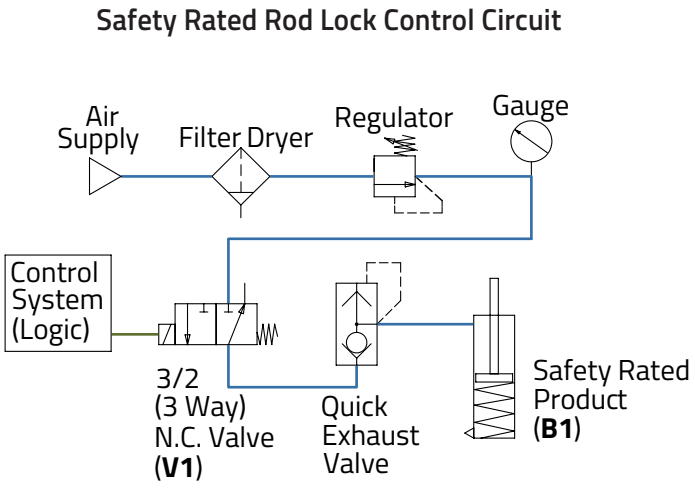



| Key | |
|---|---|
| **Logic=** | Customer Logic and Controls |
| **B=** | Rod Lock |
| **V=** | Pneumatic Control Valve |
| **S=** | Operating Mode Sensor |

# Safety Rating

**Category B or Category 1 Example:** One Brake, No Sensors




**Category B**

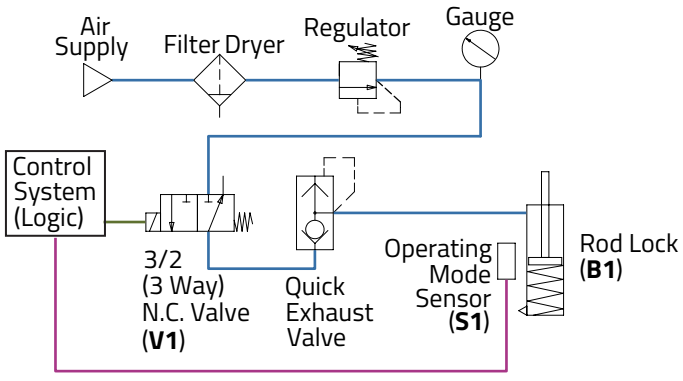
| Performance Level | | a | b |
|---|---|---|---|
| If DC is | | 0% | |
| $MTTF_D$ | years | 3.3 | 13 |
| $t_{cycle}$ | sec/cycle | 2.8 | 10.8 |
| $T_{10D}$ | years | 0.3 | 1.3 |

**Category 1**

| Performance Level | | b | c |
|---|---|---|---|
| If DC is | | 0% | |
| $MTTF_D$ | years | 33 | 43 |
| $t_{cycle}$ | sec/cycle | 27.3 | 35.7 |
| $T_{10D}$ | years | 3.3 | 4.3 |

Air to Disengage Rod Brake
Control Wiring
Sensor Feedback Wiring

**Category 2 Example:** One Brake, One Sensor




**Category 2:**

| Performance Level | | c | | d | |
|---|---|---|---|---|---|
| If DC is | | 60% | 90% | 60% | 90% |
| $MTTF_D$ | years | 27 | 18 | 68 | 39 |
| $t_{cycle}$ | sec/cycle | 22.4 | 14.9 | 56.6 | 32.3 |
| $T_{10D}$ | years | 2.7 | 1.8 | 6.8 | 3.9 |

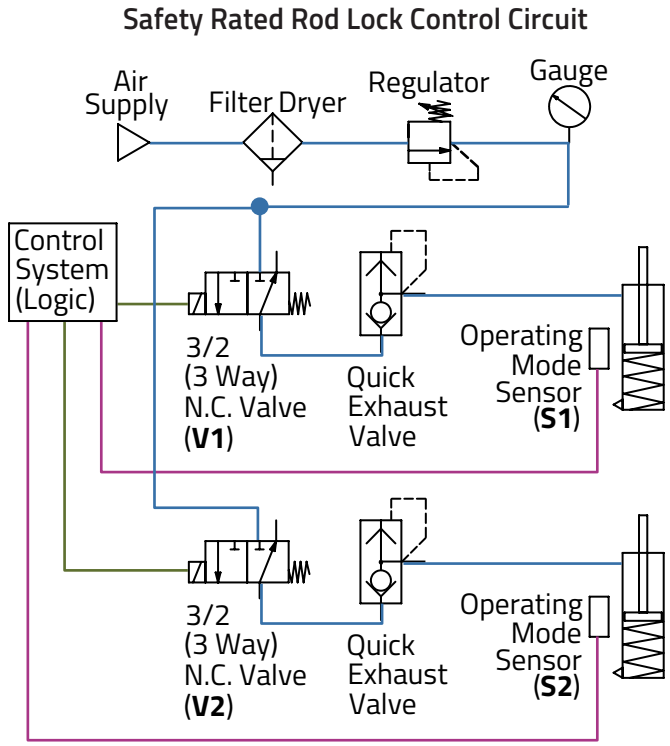
Air to Disengage Rod Brake
Control Wiring
Sensor Feedback Wiring

**Note**

- Valve power signal must be compared with Sensor output signal.
- Calculation is for Functional channel only. Test channel $MTTF_D$ is 100 years.

## Safety Rating

**Category 3 Example:** Two Redundant Brakes, One Sensor on Each




**Category 3:**

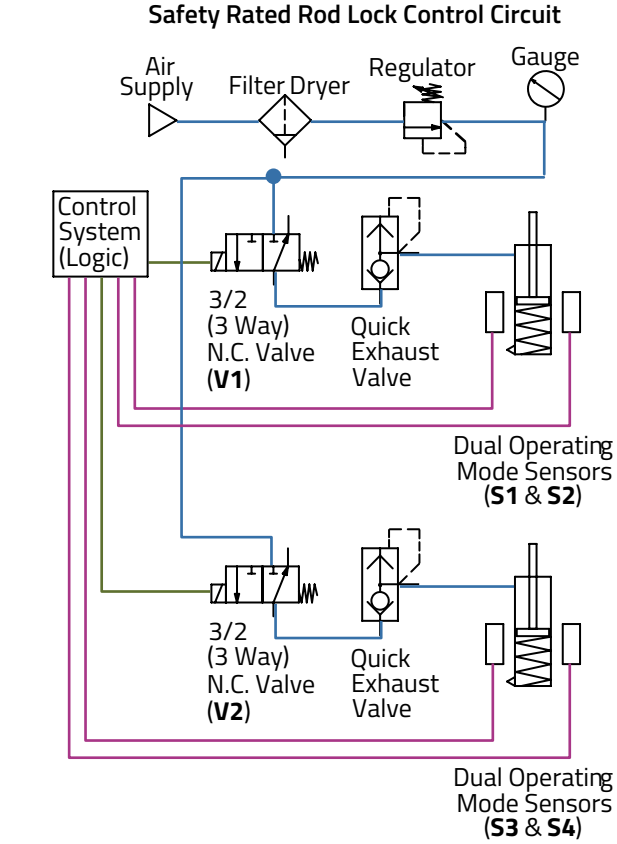
| Performance Level | | c | | d | |
|---|---|---|---|---|---|
| | If DC is | 60% | 90% | 60% | 90% |
| $MTTF_D$ | years | 12 | 6.2 | 27 | 15 |
| $t_{cycle}$ | sec/cycle | 9.9 | 5.2 | 22.4 | 12.4 |
| $T_{10D}$ | years | 1.2 | 0.6 | 2.7 | 1.5 |

Air to Disengage Rod Brake
Control Wiring
Sensor Feedback Wiring

**Note**

- Valve power signal must be compared with corresponding Sensor output signal.

**Category 4 Example:** Two Redundant Brakes, Two Sensors on Each




**Category 4:**

| Performance Level | | e |
|---|---|---|
| | If DC is | 99% |
| $MTTF_D$ | years | 33 |
| $t_{cycle}$ | sec/cycle | 27.3 |
| $T_{10D}$ | years | 3.3 |

Air to Disengage Rod Brake
Control Wiring
Sensor Feedback Wiring

**Note:**

- Each brake must have two Nexen operating mode sensors to achieve a Category 4 Safety Rating.
- All 4 sensors must have their data compared by the control system before use.

# Optional Operating Mode Sensors

### Safety Rating Compliance

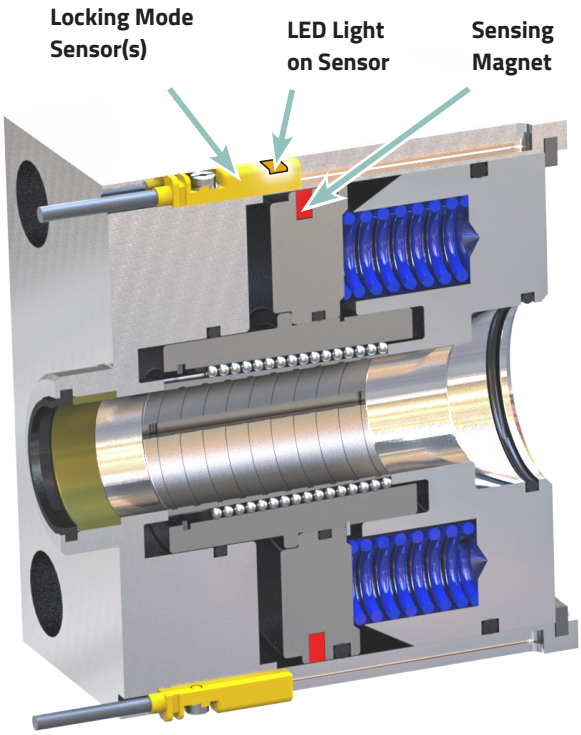
Nexen's Rod Locks are Safety Rated by Intertek and available with Operating Mode Sensors to maximize machine safety and efficiency. Safety Rated Rod Locks are available with zero, one or two sensor slots. By using the operating mode sensor(s) for either Engagement or Disengagement, system manufacturer's are able to gain higher safety category ratings per ISO 13849-1. Rating of the safety function is the responsibility of the system manufacturer.

### Industry 4.0 Solution

Nexen's Rod Lock Operating Mode Sensors for Engagement and Disengagement are Industry 4.0 compatible and can provide information to maximize machine efficiency.

Having this information available aides with:

- Accurate Linear Positioning
- Predictive Maintenance
- Operational Feedback




Note: Rod Locks are available with zero, one, or two sensor slots.

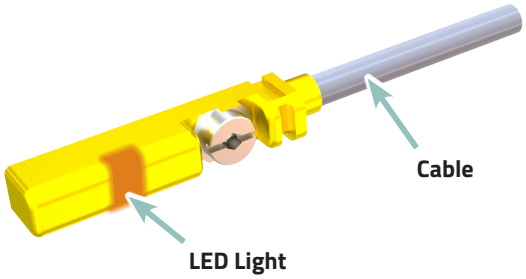
**Each of the two optional Proximity sensors can sense the following functions of the Rod Lock:**

| Disengagement Sensor Definition |
|---|
| Sensor is activated when the rated air pressure is applied and the piston moves to a disengaged position. |

| Engagement Sensor Definition |
|---|
| Sensor is activated when the piston moves out of the disengaged position into a position in which the clamp collar constricts on the rod. |

### Operating Mode Sensor

The Operating Mode Sensor(s) can be used to signal Engagement or Disengagement of the rod lock on the shaft. In an effort to give the system manufacturer the most versatility, the Operating Mode Sensors can be setup as Engagement or Disengagement and either redundant or individual states. All Safety Rod Locks can come equipped with two sensor slots. The sensors, ordered separately, are available in both PNP and NPN modes.




### Sensor Specifications

| | |
|---|---|
| **Sensor Type** | Magneto-resistive |
| **Supply Voltage** | 10 to 30 VDC |
| **Operational Current** | ≤ 150 mA |
| **Switching Type** | Normally Open |
| | PNP and NPN Available |
| **Switching State Indicator** | LED, Yellow |
| **Cable Length** | Flying Leads: 7 m [22.9 ft]<br>M8/M12 Connectors: 0.3 m [12 in] |
| **Protection Class** | IP68 |
| **Protection** | Short Circuit, Wire Breakage & Reverse Polarity Protection |

### Available Sensors

| Sensor Product Number | Type | Cable End |
|---|---|---|
| **966195** | PNP (Sourcing) | Flying Leads |
| **966190** | NPN (Sinking) | Flying Leads |
| **966239** | PNP (Sourcing) | M8 Connector |
| **966240** | PNP (Sourcing) | M12 Connector |

## Notes

# Industries and Applications


Hydraulic Presses | Scissor-Lift Tables | Positioning Equipment | Amusement Rides

Printing and Paper Handling | Theatrical Equipment | Injection Molding

Elevator and Lifts | Mining

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FORM NO. 21191-Z-0224