micronor sensors

HEAVY DUTY ROTARY LIMIT SWITCHES

MR221/MR222 CE-Approved Geared Limit Switches

Questions?
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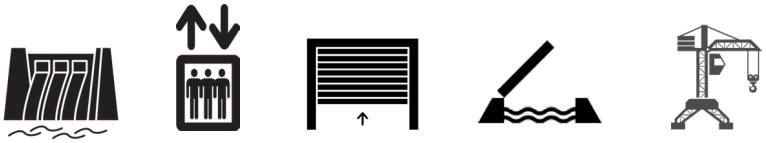
MR220 SERIES

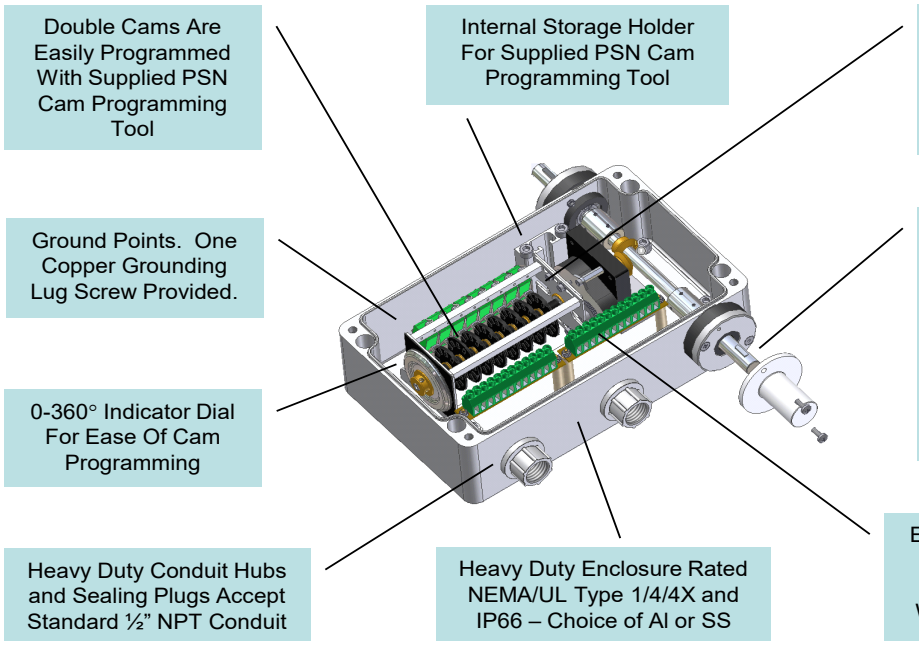
MICRONOR MR221 and MR222 series Heavy Duty Geared Limit Switches are for use in the most demanding industrial applications – dam gatess, flood channels, bridges, cranes, hoists, presses, packers, machine tools, handling devices, etc. - where a limit switch is required.

The primary purpose of the switch is to control the intermediate or end limits of rotary or linear rotation (when coupled to the shaft of a rope or wire drum). Each cam switch channel is independently programmable from 4° to 356°. Wiring to the SPDT contacts and transducer output is easy via Phoenix COMBICON screw-down wiring blocks.



Features

- Compact design with heavy duty sealed bearings
- Choice of single-ended (MR221) or double-ended (MR222) models
- Choice of 2, 4, 6 or 8 cam switch channels
- Optional MR265 4-20mA Position Transducer feedback
- Choice of NEMA/UL 1/4/4X/IP66 rated housing - Aluminum or Stainless
- High torque Ø1/2" stainless steel with #404 Woodruff Key
- Conduit hubs provided for direct use of ½" NPT conduit
- Modular, easy to replace, limit switches



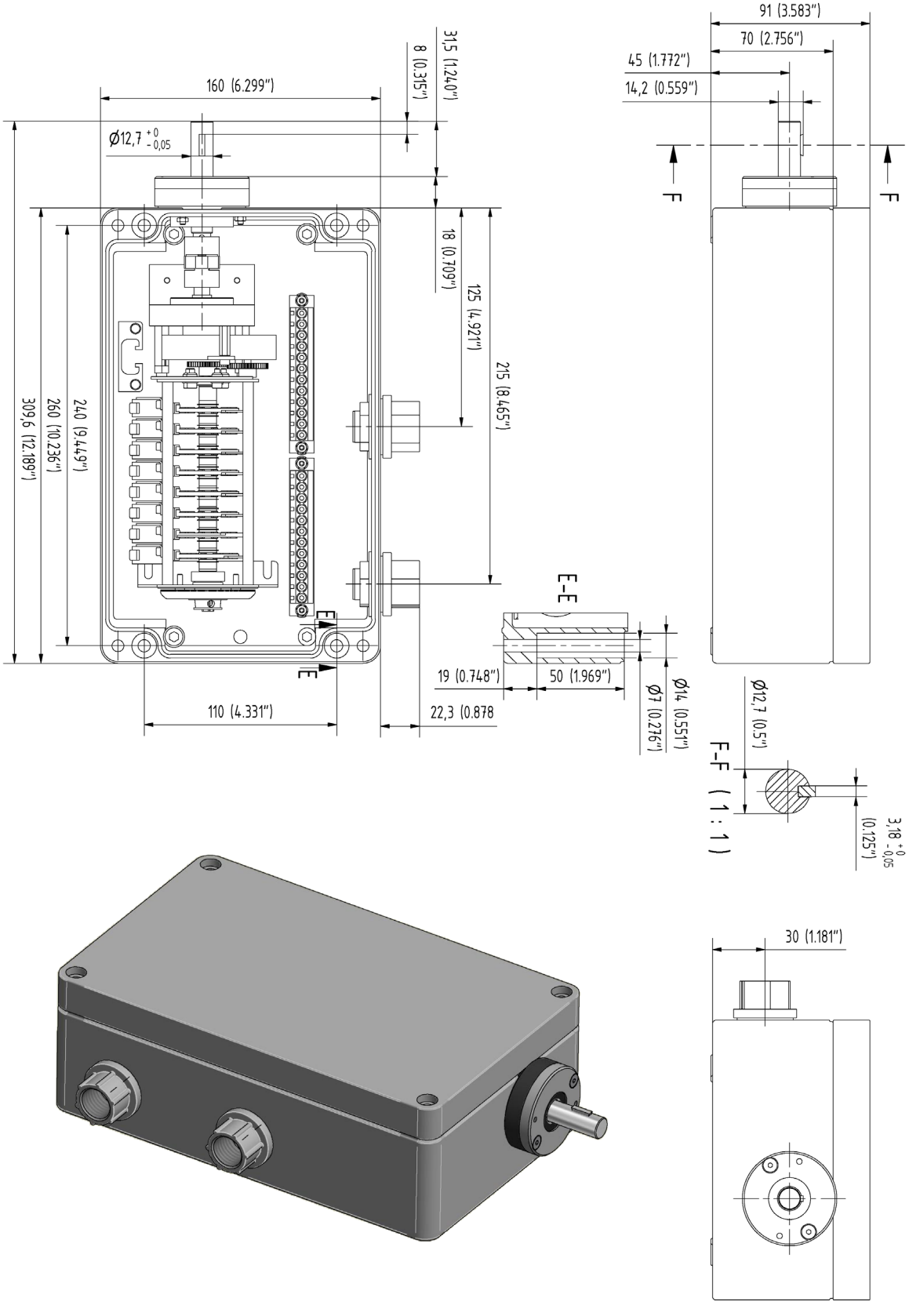
FIELD PROVEN DESIGN Since 2006

MR221 Standard Model With/Without -1 (4-20mA) Transducer Output

Die Cast Aluminum Housing, Single-Ended Shaft, With/Without 4-20mA Transducer Option

4-20mA Transducer Option Limited to 6 Channels in this size (KWG260)

Internal 8-Channel Configuration Shown

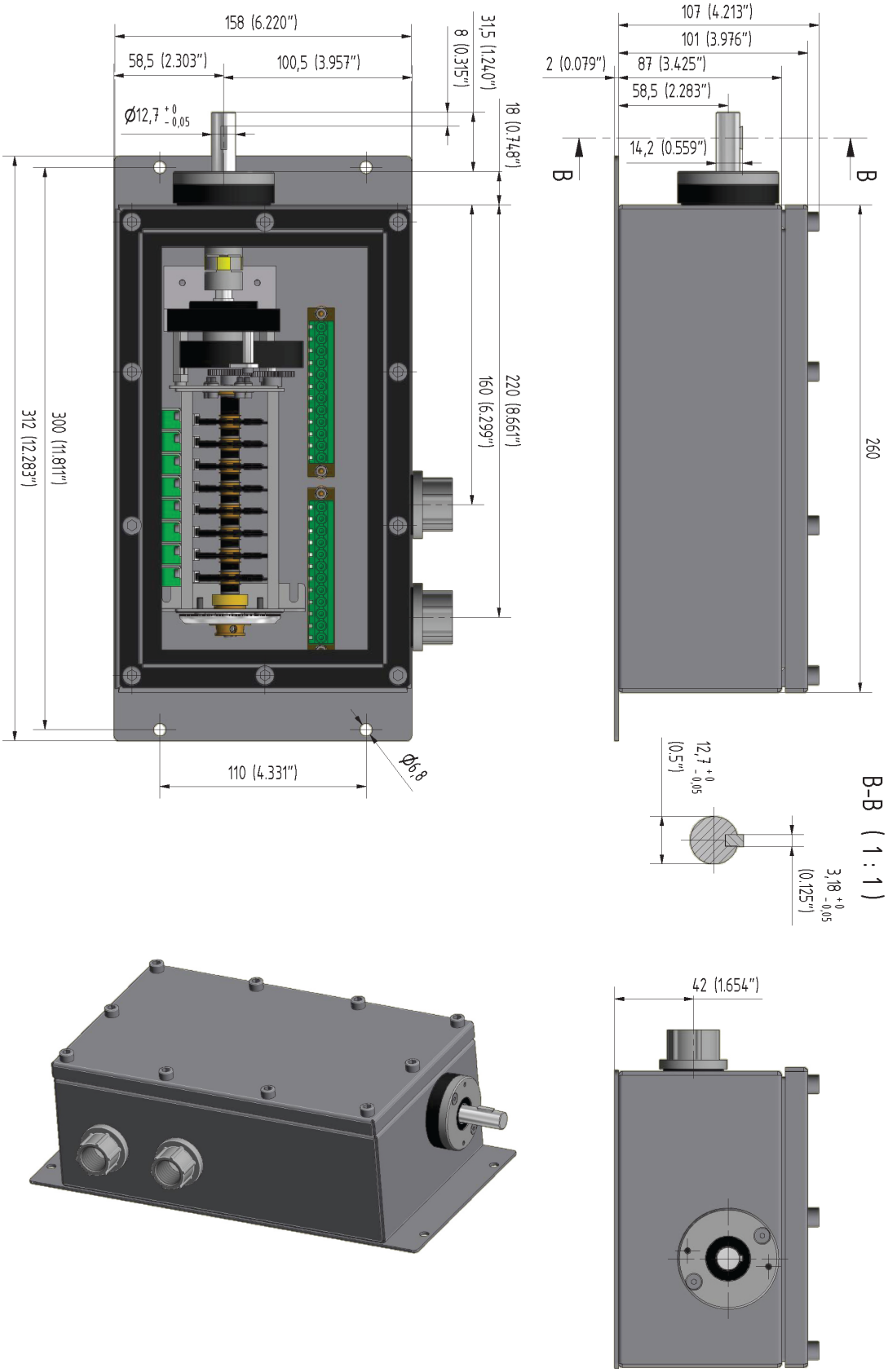


MR221-X Special SS Model With/Without -1 (4-20mA) Transducer Option

Stainless Steel Housing, Single-Ended Shaft

4-20mA Transducer Option Limited to 6 Channels in this size

Internal 8-Channel Configuration Shown

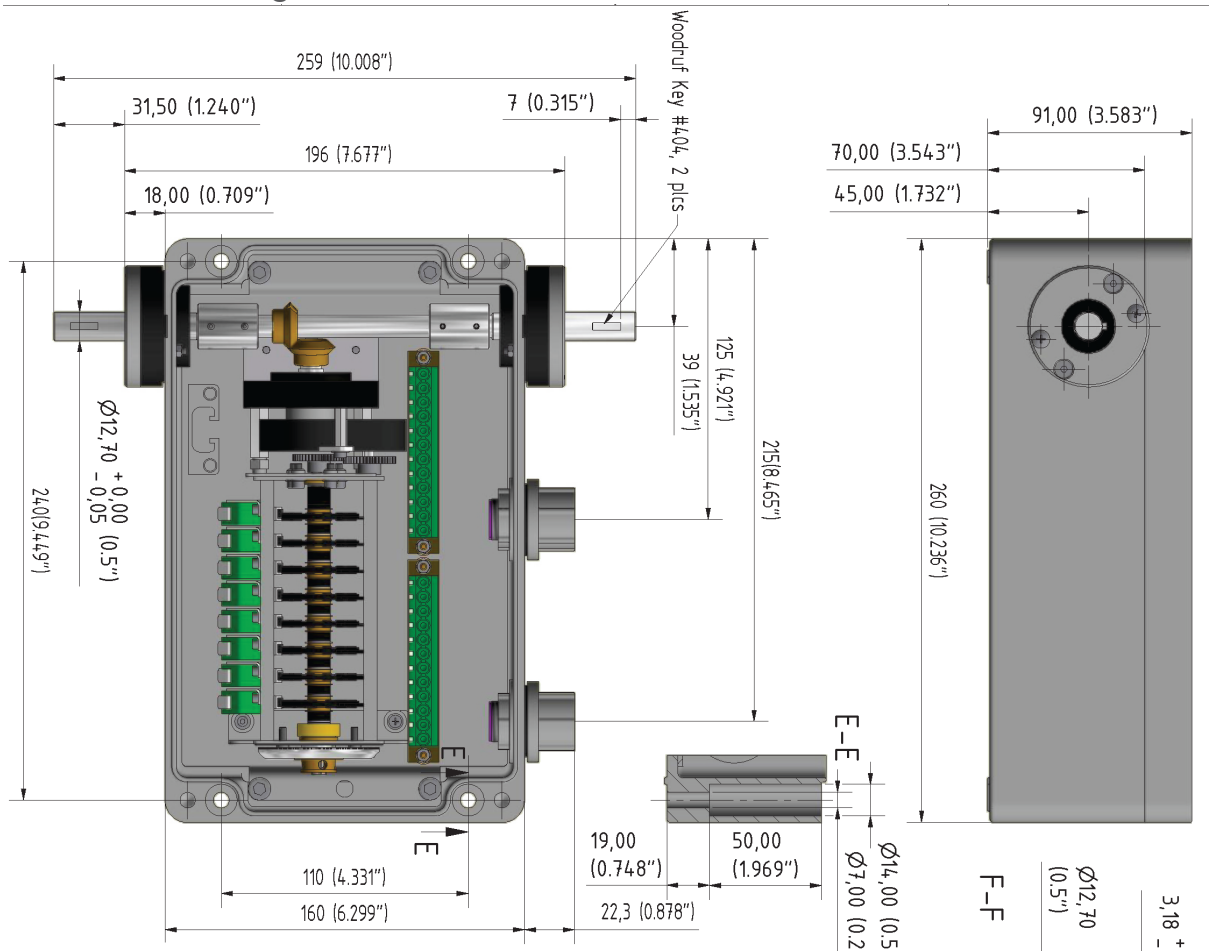


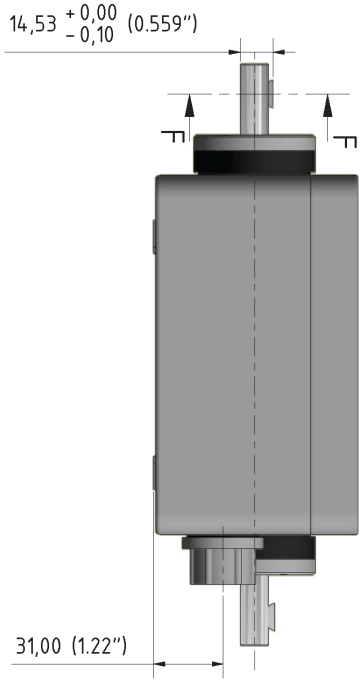
MR222 Standard Model With/Without -1 (4-20mA) Transducer Option

Die Cast Aluminum Housing, Two-Ended Shaft

4-20mA Transducer Option Limited to 6 Channels in this size (KWG260)

Internal 8-Channel Configuration Shown



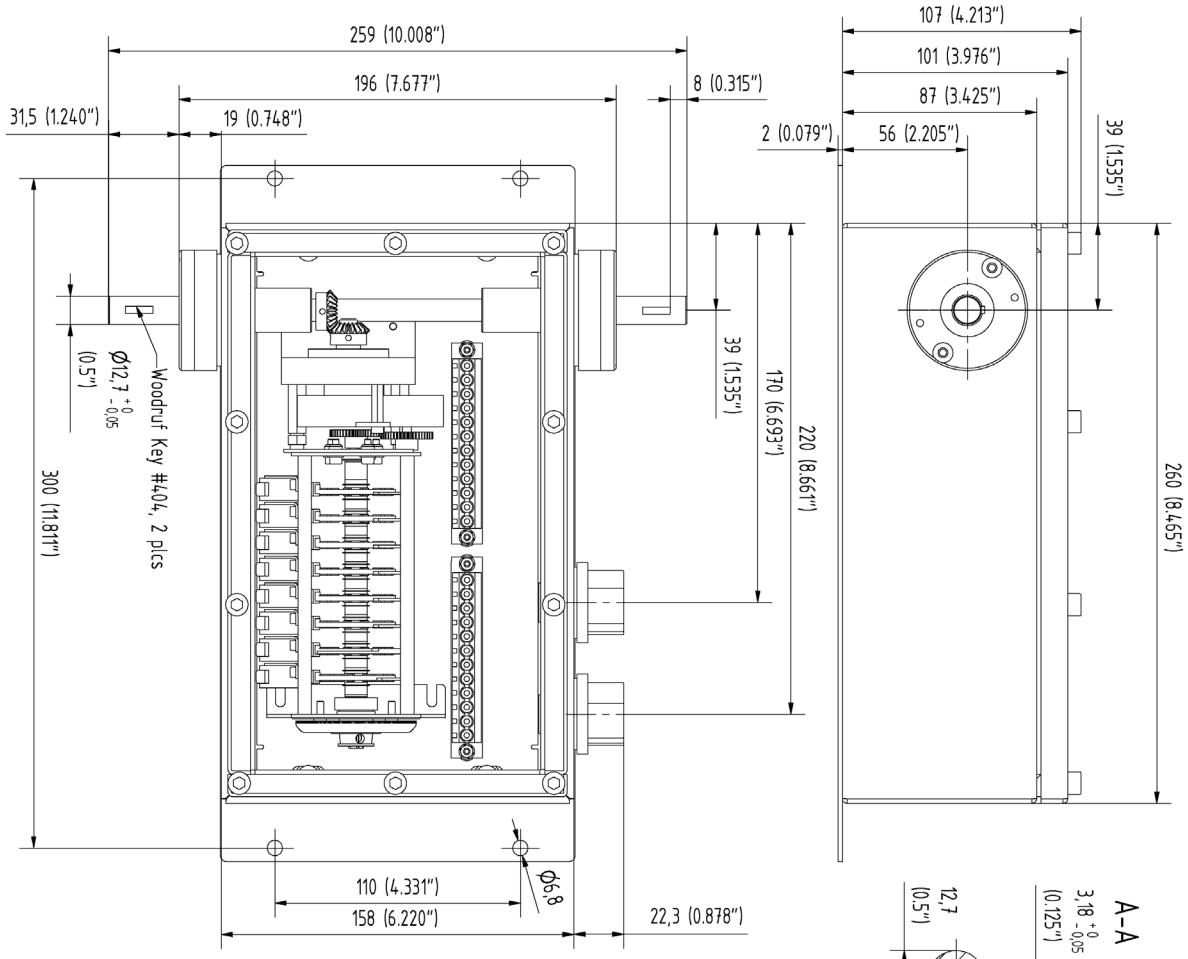


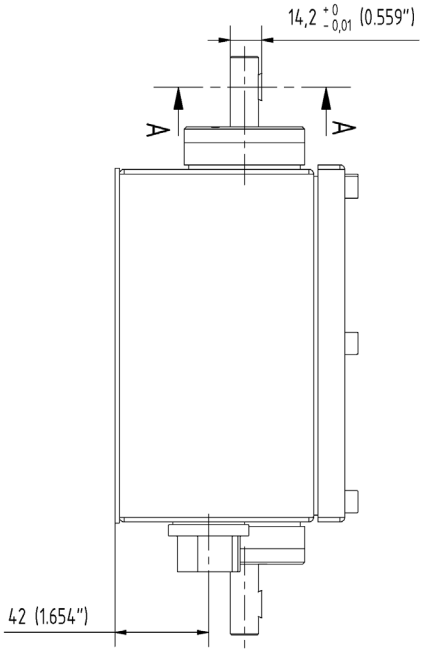
MR222-X Special SS Model With/Without -1 (4-20mA) Transducer Option

Stainless Steel Housing, Two-Ended Shaft, With

4-20mA Transducer Option Limited to 6 Channels in this size

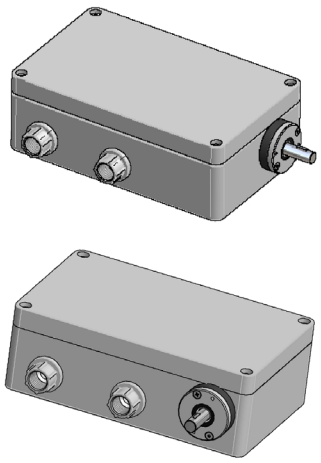
Internal 8-Channel Configuration Shown

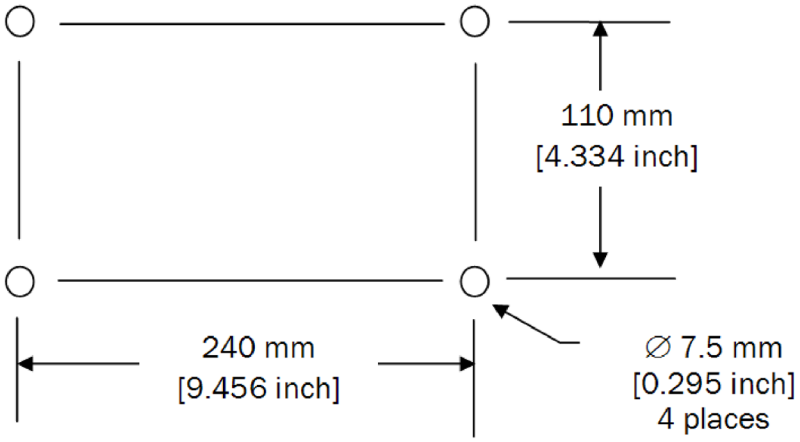




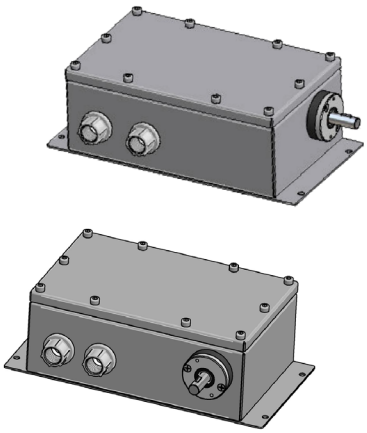
MOUNTING DIMENSIONS

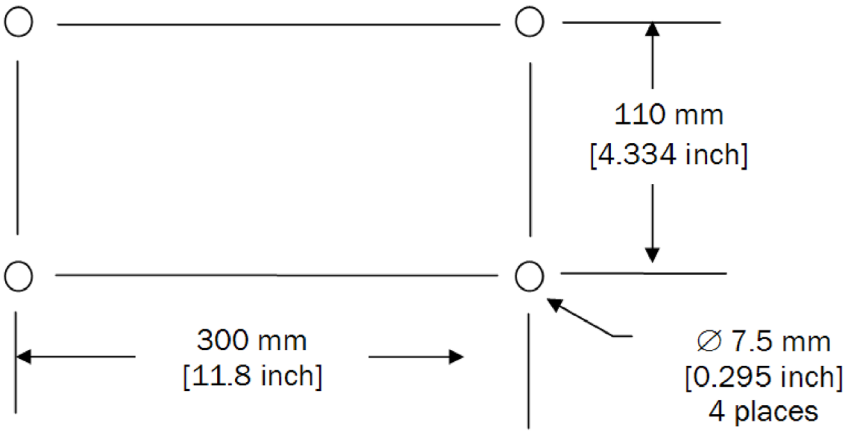
Standard MR221 / MR222 Models (Aluminum Housing)



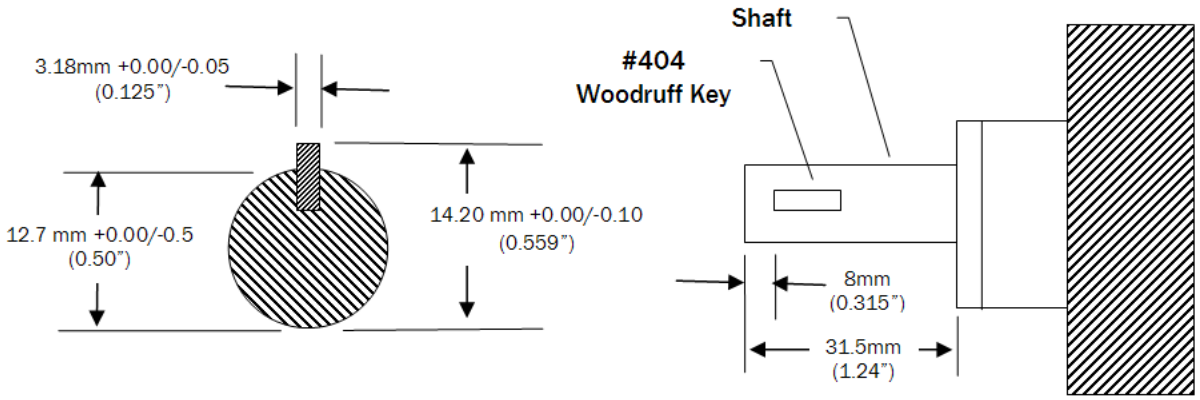


Special MR221-X / MR222-X Models (Stainless Steel Housing)





Detailed Shaft Dimensions For All Models



Specifications

Temperature Test	 Type 1/4/4X + IP66 Type 1/4/4X + IP66	NOTE: IP rating only applies when unit installed, connected and torqued properly. Copper free die cast aluminum housing with powder coat finish Stainless steel housing
Switch Rating	Mechanical Life Resistive Load Inductive Load Motor Load Temperature	10,000,000 cycles (typical) 230 VAC/6 A Continuous/10 A Momentary 24 VDC/6 A Continuous/10 A Momentary 230 VAC/Power Factor 0.7/3 A 125 VDC/0.5 A, 80 VDC /0.75 A, 40 VDC/1 A, 24 VDC/3 A 230 VAC/Power Factor 0.85/10A -40°C to +85°C
Cam Programming	1 - 2 (COM - NC) 1 - 3 (COM - NO) Repeatability	With Cam Valley Profile: 4°...180° (1...50%) With Cam Peak Profile: 4°...356° (1...99%) 1.8°
Transducer Rating (-1)	Type Ext Burden Resistance Loop Voltage Linearity / Accuracy Temperature	MR265, Precision Potentiometer-Based, Loop Powered 4-20mA Output 500Ω 24-30V DC (absolute maximum ratings), Typical 15mA @ 24V DC (no load) ±0.5% MR22X operating/storage temperature derated to 0-70°C
Mechanical Rating	Max RPM Mechanical Life Max Side Load Max Axial (Thrust) Load Bearing Life	3000 rpm 10 x 106 Cycles (typical) 890 N (200 lbf) to 500 RPM, 445 N (100 lbf) to 1800 RPM 360 N (80 lbf) to 500 RPM, 185 N (40 lbf) to 1800 RPM 10 years (87,660 hours) continuous running with 350 N (78 ibf) side load at 1000 RPM
Wire Range	24-10 AWG	Via Phoenix MKDS 5/3-6,35 COMBICON modular wiring blocks with screw connection
Temperature	Storage / Operating	-30°C to +70°C / -15°C to +60°C
Ingress Protection	IP	IP66 per EN60529 / NEMA 4
Mechanical Stress	Vibration Shock	50 m/s², 10-1000 Hz, per IEC 60068-2-6 1000 m/s², 3ms, per IEC 60068-2-27
Weight	Unit	4.260 kg (9.4 lb), typical

Specifications subject to change without notice

Test Summary

Temperature Test	Standard	Per UL508, Section 43
Dielectric Voltage WIthstand Test	Standard	Per UL508, Section 49
Resistive Load Test	Standard AC DC	Per UL508, Sections 45 (Overload) and 46 (Endurance) Endurance Test at 240 VAC/6A and Overload Test at 240 VAC/9A Endurance Test at 24 VDC/6A and Overload Test at 24 VDC/9A
Inductive Load Test	Standard AC DC	Per UL508, Sections 45 (Overload) and 46 (Endurance) 240 VAC adn 120 VAC (Standard Duty B300 Rating) 24 VDC/2A (Pilot Duty Rating)
Hosedown Test	Standard	Per UL50, Section 35, Type 1/4/4X
Bending Test	Standard	Per UL50, Section 46
Torque Test	Standard	Per UL50, Section 48
UL Product Category	UL Category	Auxiliary Devices (NKCR, NKCR7)
UL Test Report	UL File No.	E302565 (Certified for US and Canada), UL/cUL Listing discontinued 2015
UL Product Identity	UL ID Code	Industrial Control Equipment
UL Control No.	UL Control No.	37V8

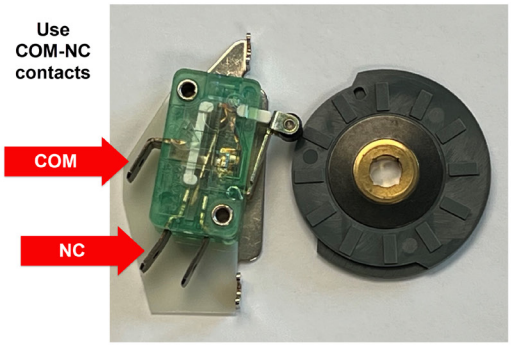
CAM PROGRAMMING

The MR221-MR222 limit switches are pre-wired to PHOENIX Screw-Down Wiring Strips. Each limit switch has threee connections which are prewired with AMP FASTON crimp-on receptacles and brought out to the wiring blocks:

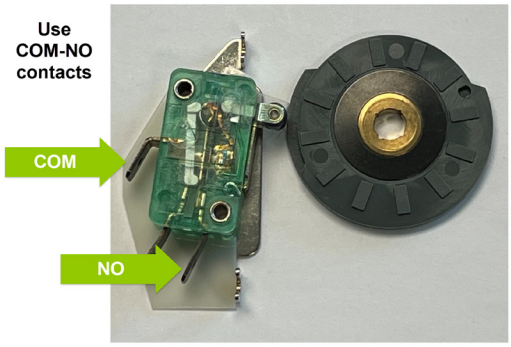
- COMMON (labeled 1 on the switch)
- NC (labeled 2 on the switch)
- NO (labeled 4 on the switch)

As shown below, selecting the proper contacts (COM/NO or COM/NC) depends on the number of revolutions that a contact must be closed. For switch closure ≤50% of the gear ratio (<180° of the cam), the user should use the COM/NC contacts corresponding to the plunger/roller riding in the Cam Valley. For switch closure >50% of the gear ratio (>180° of the cam), the user should use the COM/NO contacts corresponding to the plunger/roller being depressed by the Cam Peak. See figures below for K (Standard KS25B4) and L (Optional S840 V20) switches.

Set On/Off Points of Cam Valley For Closed Circuits <180°

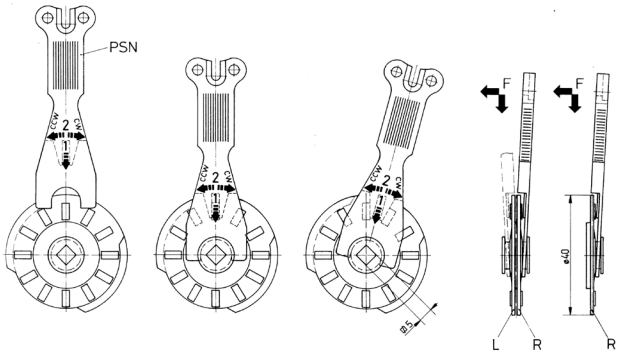


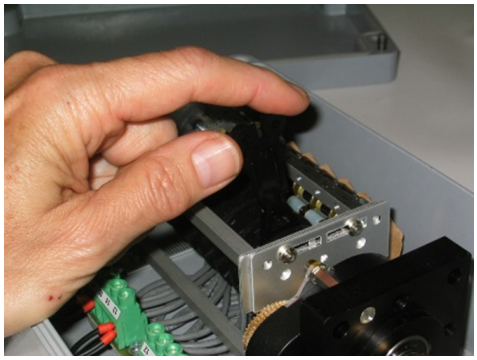
Set On/Off Points of Cam Peak For Closed Circuits >180°



It is recommended that the user initially document his limit switch settings so it is clear whether COM/NC or COM/NO contacts are needed for a particular limit switch channel. Either a table or diagram of of the Closed/Open settings will allow the user to establish the ON and OFF points and translate them to the 0-360 scale of the internal Reference Dial and Cams.

The following instructions may be used to program the On/Off cam settings of each switch using the supplied PSN (black) cam programming tool.





STEP 1	Turn External shaft to the desired ON position (contact closes) via the dial setting. Insert PSN key with the the numbered side away from the cam and notched side towards the cam.
STEP 2	While gently applying pressure against the cam with the key, rotate the cam to the desired position.
STEP 3	Turn external shaft tot he desired OFF position, flip over the PSN key and respeat Steps 1 and 2 on the other side of the cam.
STEP 4	Test the unit to confirm that the switch contact Closes (ON) and Open (OFF) at the appropriate input shaft position.

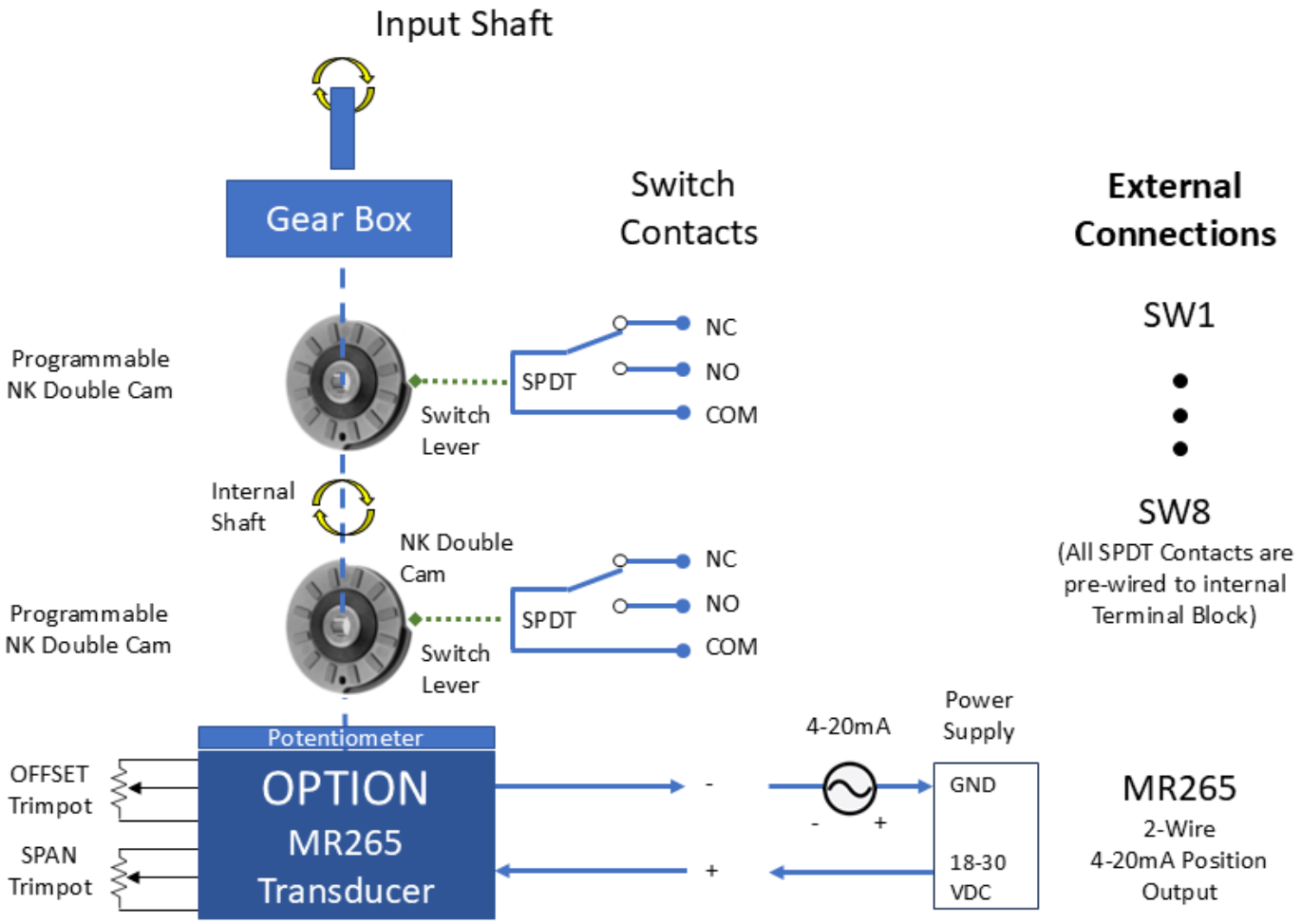
General Installation Instructions

- Use copper conductors rated at least 60°C
- TIghten terminal torque is 5-7 in-lbs
- Unused conduit ports must be properly sealed to prevent moisture and water leakage into the unit.

List of Contents

- One geared limit switch unit
- #404 Woodruff Keys (secured to shafts)
- One protective safety shaft cover (MR222 Only, for use when only one end is used)
- One PSN Cam programming tool (stored in internal holder)
- One Wire Jumper (Installed across all COMMONS on terminal block)
- One copper grounding screw and slit washer (installed inside unit)
- Water proof plugs (installed on threaded conduit hole)
- MR221-MR222 User Guide (one per shipment)

Schematic Diagram



Ordering Info

Examples:

MR221-L8-M100-0	Single ended shaft model with ratio 100:1 and 8 Channels, Std Alum housing, No Analog Output
MR221-L6-M100-1	Above with 4-20mA Position Transducer output (limited to 6 Channels)
MR221-L8-M100-0-X	Single ended shaft model, ratio 100:1, 8 Channels, SS housing, No Analog Output
MR221-L6-M100-1-X	Above with 4-20mA Postition Transducer output (limited to 6 Channels)

M R 2 2 1 - L 6 - M 1 0 0 - 1 - X

Shaft Option
MR221 One-Ended Shaft
MR222 Two-Ended Shaft

No. of Switches (Channels)
L2, L4, L6, L8 For Limit Switches Only
L2, L4, L6 For Limit Switches with MR265 4-20mA Transducer OptionOnly

Gear Ratio
Step UP (D1:x)
D2 1:2

Single Stage Step DOWN (Ux:1)

U1	**U1.25**	**U2.0**	**U2.6**
U2.75	**U3.5**	**U4.0**	**U5.0**

Multistage Step DOWN (Mx:1)

M12.5	**M20**	**M25**	**M30**
M37.5	**M40**	**M50**	**M52.5**
M75	**M100**	**M200**	**M300**
M420	**M600**	**M750**	**M1600**
M2250	**M2500**		

Other gear ratios available upon request

Special options available:
- **Special gear ratios**
- **125 VDC / 10A rated switches**
- **For Draw Wire Linear Limit Switch - see MR221W data sheet**
- **For Integrated 4-20mA Encoder feedback - see MR231 data sheet**
- **For Integrated Multi-Turn 4-20mA or SSI Encoder feedback - contact sales**
- **Housing without conduit hubs or holes to allow for custom field installation by user**

Position Transducer Output Option
0 None
1 MR265 Loop-Powered 4-20mA Output (available for Standard Al Housing, max 6 Channels Only)

Enclosure Option
(Blank) Die Cast Aluminum(Standard)
X Stainless Steel (Special)

Replacement Parts

6099.07.778 PSN (black) Cam Programming Key for NK Double Cams

6099.22.846 Microswitch mounted on bracket

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