



MR221 / MR222

Heavy Duty

Geared Limit Switches

User Guide

Document No. 98-0221-02
Revision D



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Revision History

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A	12-Sep-2007	DNH	Initial release, Micronor Inc.
A1	24-Mar-2022	DNH	<ul style="list-style-type: none">• Minor Update, 24-March-2011• Updated Micronor Inc. address only
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C	20-Oct-2015	DNH	<ul style="list-style-type: none">• Minor Updated, 20-Oct-2015• Added new Camarillo address and tel/fax
D	06-Dec-2022	DNH	<ul style="list-style-type: none">• Updated contact info for Micronor Sensors and manufacturer Micronor AG• Added Position Sensor documentation – MR265 and Encoder-based 4-20mA outputs

File Reference

98-0221-02_D_MR221-MR222_Manual_DRAFT_06-Dec-2022

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1. Product Overview

1.1 Product Description

MICRONOR MR221/MR222 series Heavy Duty Geared Limit Switches are designed for use in machine applications requiring the highest quality, industrial-grade CE approved limit switches. These heavy duty switches can be used in applications with side loads as high as 200 lbf (890 N) and axial loads up to 80 lbf (360 N). Enclosure options include NEMA 4 (watertight) or NEMA 4X (watertight and corrosion resistant), ensuring the best product match for the operating environment. This new product line draws upon Micronor's 30+ years expertise in electromechanical control and sensor design – including custom engineered feedback units, motorized potentiometers, encoders, resolvers and proprietary stepless CAM-switch technology.

Rotary limit switches are used in machinery and mechanisms where motion is expressed in rotary motion. The primary purpose of a rotary limit switch is to control the intermediate or end limits of linear or rotary motion. The switch is often used as a safety device to protect against accidental damage to the equipment. Applications range from machine tools in factory environments to cranes and hoists operating in the harsh environments of rail yards and sea ports.

Features:

- Combines gear reducer, coupling and cam switches into one compact unit
- Limit switches mechanically decoupled from heavy duty drive shaft – provides reliability and accuracy
- One-ended (MR221) or two-ended (MR222) models
- NEMA 4-rated die cast aluminum enclosure or NEMA 4X stainless steel enclosure
- Standard 1/2"Ø stainless steel shaft with #404 Woodruff Key slot.
- Industrial grade, heavy duty bearings
- Protective shaft cover provided for installations where only one end is used
- 2, 4, 6 or 8 cam switch channels
- Easy to replace, heavy duty limit switches
- Two conduit wiring connections tapped for 1/2" NPT
- 4-20mA position output options – Transducer or Encoder based

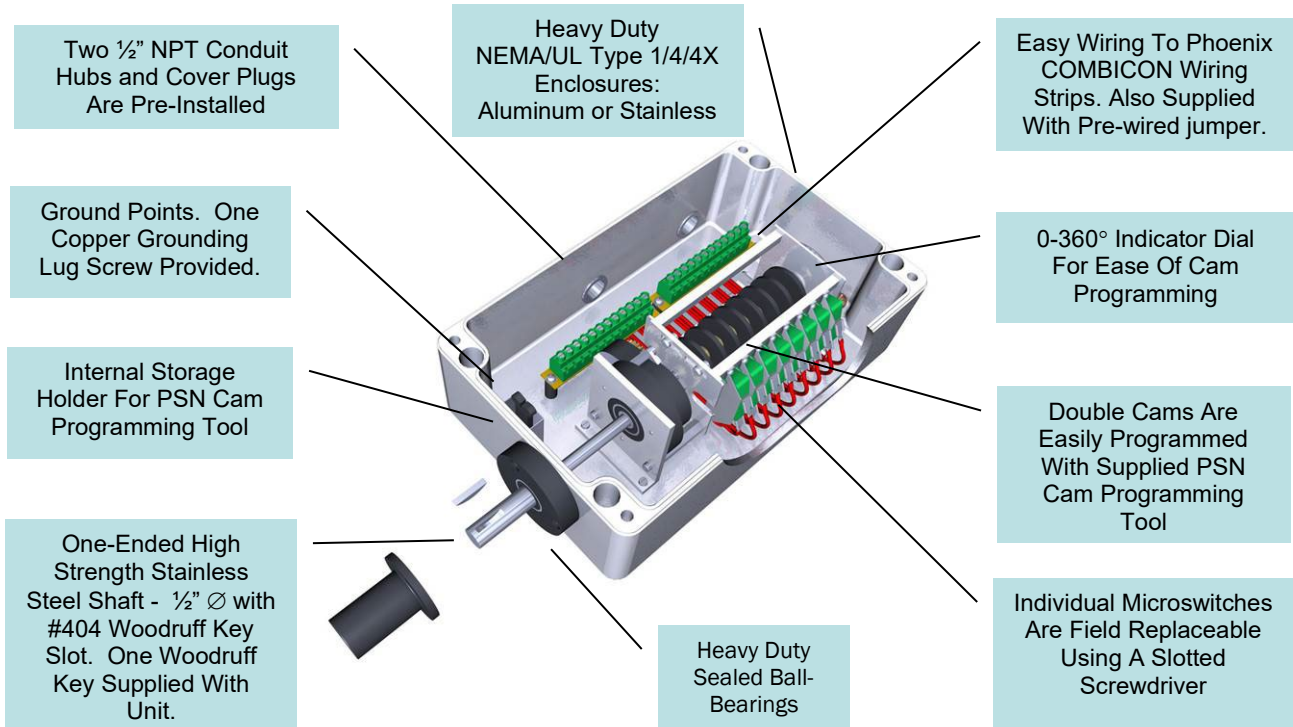


Figure 1. Features of the MR221 One-Ended Geared Limit Switch

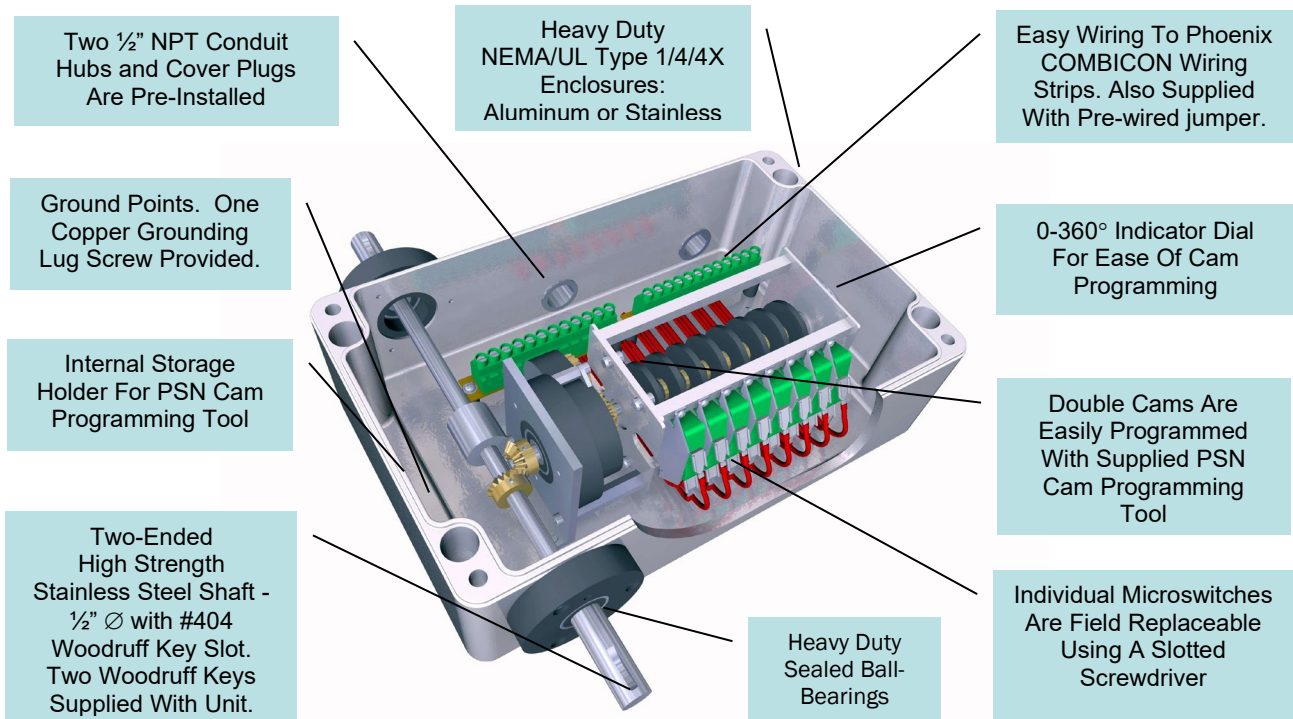


Figure 2. Features of the MR222 Two-Ended Geared Limit Switch

1.2 Schematic Diagram

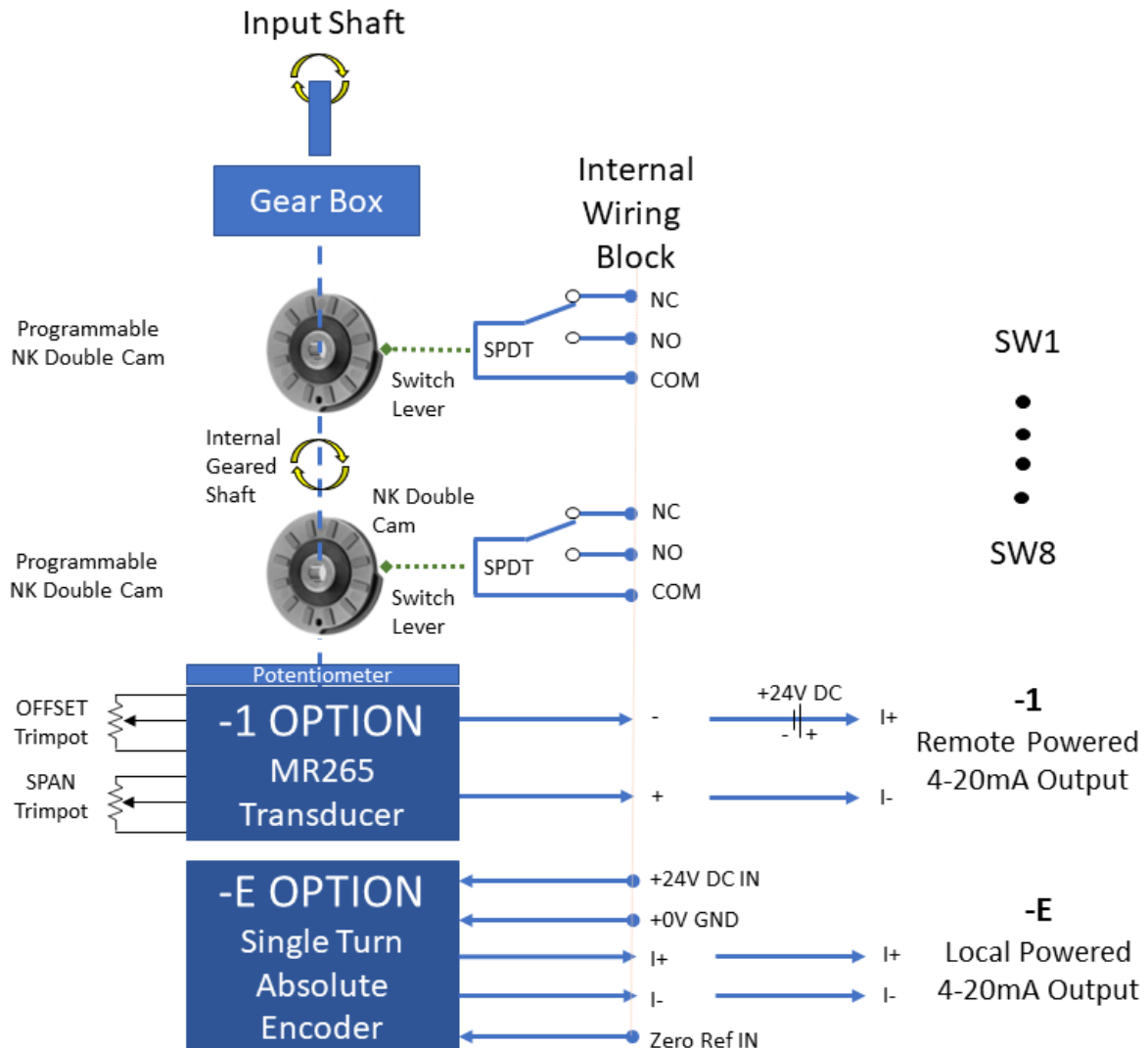
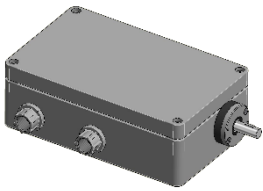


Figure 3. MR221-MR222 Schematic Diagram

1.3 Ordering Code



MR2221 Alum

MR222 Alum

MR221-X SS

MR222-X SS

M R 2 2 1 - **L 8** - **M 1 0 0** - **E** -

Shaft Option

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

No. of Switches (Channels)

- L2 L4 L6 L8

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

Special options available:

- 125 VDC / 10A rated switches
- Integrated Multi-Turn SSI Encoder feedback
- Housing without conduit hubs or holes to allow for custom field installation by user
- Contact Micronor Sales for more info

Other gear ratios available upon request

Position Transducer Output Option

(Blank) None

- 1 MR265 Loop-Powered 4-20mA Output (available for Standard AI Housing, max 6 Channels Only)
- E Single Turn Absolute Encoder with 4-20mA Output (available for Standard AI Housing Only)

Enclosure Option

- (Blank) Die Cast Aluminum(Standard)
- X Stainless Steel (Special)

2. Initial Preparation

2.1 Unpacking and Inspection

The unit was carefully inspected mechanically and electrically before shipment. When received, the shipping carton should contain the following items listed below. Account for and inspect each item before the carton is discarded. In the event of a damaged instrument, write or call your nearest MICRONOR office in either the USA. or Switzerland. Please retain the shipping container in case reshipment is required for any reason.

2.2 Damage in Shipment

All instruments are insured when shipped by MICRONOR. If you receive a damaged instrument you should:

- 1) Report the damage to your shipper immediately.
- 2) Inform MICRONOR
- 3) Save all shipping cartons.

Failure to follow this procedure may affect your claim for compensation.

2.3 Standard Contents

The MR221 / MR222 series limit switches consist of the configurations described by the following part number format:

2.4 Warranty Information

MICRONOR warrants this product to be free from defects in material and workmanship for a period of twelve (12) months from date of shipment. During the warranty period we will, at our option, either repair or replace any product that proves to be defective.

To exercise this warranty, write or call MICRONOR SENSORS, or directly contact MICRONOR AG in Switzerland. You will be given prompt assistance and return instructions. Send the instrument, transportation prepaid, to the indicated service facility. Repairs will be made and the instrument returned transportation prepaid. Repaired products are warranted for the balance of the original warranty period, or at least 90 days.

Limitations of Warranty

This warranty does not apply to defects resulting from unauthorized modification or misuse of any product or part. This warranty also does not apply to optical interfaces, cable assemblies, fuses or AC line cords.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability of fitness for a particular use. MICRONOR or MICRONOR SENSORS shall not be liable for any indirect, special or consequent damages.

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3. Specifications

3.1 Electrical, Mechanical and Environmental

Parameter	Specification	Notes
Enclosure Ratings	UL/NEMA Type 1/4/4X + IP66	Choice of die cast aluminum with powder coat finish or stainless steel housing NOTE: IP rating applies only when unit installed, connected and torqued properly.
Switch Rating	Mechanical Life Resistive Load Inductive Load Motor Load Temperature	10 x 10 ⁶ 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/3A 230 VAC/Power Factor 0.85/10 A -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°
Mechanical Rating	Max RPM Mechanical Life Max Side Load Max Axial (Thrust) Load Bearing Life	3000 RPM 10 x 10 ⁶ 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 lbf) side load at 1000 RPM
Wire Range	24-10 AWG	Connections via Phoenix COMBICON Type MKDS 5/3-6,35 (1714968) printed circuit terminal blocks with screw connection
Temperature	Storage Temperature Operating Temperature	-30°C to +70°C -15°C to +60°C

Specifications subject to change without notice

3.2 -1 Position Output Option, MR265 Loop-Powered Based

The MR22X-1 (MR265) option is a precision, 2-Wire, potentiometer-based, loop-powered 4-20mA output option.

Parameter	Specification	Notes
MR265	Potentiometer-based transducer	4mA point programmable via Offset trimpot 20mA point programmable via Span trimpot
Angular Travel	355° (equivalent to 98.6% of usable gear ratio)	Equivalent to 98.6% of usable gear ratio, rThis represents the 5° dead spot between the two ends of potentiometer.
Ext Burden Resistance	500Ω	
Loop Voltage Requirements	24-30 V DC, absolute max ratings	Typical 15mA @ 24V DC (no load)
Linearity/Accuracy	±0.5%	
Temperature	0°C to +70°C	MR22X operating/storage temperature derated due to MR265 electronics rating

Specifications subject to change without notice

3.3 -E Position Output, Absolute Encoder-Based

The MR22X-E is a precision, absolute encoder based, 4-wire interface option (2-Wire power + 2-Wire current loop). The single turn, absolute encoder is in series with the cam switches geared to cover the

Parameter	Specification	Notes
Encoder	ST Absolute encoder with 4-20mA output	Posital UCD-AC105-0013-R060-2TW Type: Magnetic, single turn, absolute encoder Input 1: Set1/Direction Input 2: Set2/Zero Set
Angular Travel	360°C	Continuous
Ext Burden Resistance	500Ω	
Loop Voltage Requirements	24-30 V DC, absolute max ratings	Typical 15mA @ 24V DC (no load)
Linearity	0.15%	
Accuracy (INL)	±0.0878° (≤ 12 bit)	
Resolution	13 Bits	
Analog Accuracy	±20 μA @ 20mA	@ 20 mA = ±20 μA at 20 mA (with ideal power supply)

Specifications subject to change without notice

3.4 Test Summary

Parameter	Specification	Notes
Temperature Test	Standard	Per UL 508, Section 43
Dielectric Voltage Withstand Test	Standard	Per UL 508, Section 49
Resistive Load Test	Standard AC DC	Per UL 508, Sections 45 (Overload) and 46 (Endurance) Endurance Test at 240 VAC/6 A and Overload Test at 240 VAC/9A Endurance Test at 24 VDC/6 A and Overload Test at 24 VDC/9 A
Inductive Load Test	Standard AC DC	Per UL 508, Sections 45 (Overload) and 46 (Endurance) 240 VAC and 120 VAC (Std Duty B300 Rating) 24 VDC/2 A (Pilot Duty Rating)
Hosedown Test	Standard	Per UL 50, Section 35, Type 1/4/4X
Bending Test	Standard	Per UL 50, Section 46
Torque Test	Standard	Per UL 50, Section 46
UL Product Category	UL Category	Auxiliary Devices (NKCR, NKCR7)
UL Test Report	UL File No.	E302565 (Certified for U.S. and Canada) NOTE: UL/cUL listing was discontinued 1-Jan-2015 and CE mark added in its place.
UL Product Identity	UL ID Code	Industrial Control Equipment
UL Control No.	UL Control No.	37V8

UL General Installation Instructions

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

Specifications subject to change without notice

4. Installation Guidelines

4.1 Mounting The Enclosure

Use appropriate hardware to mount limit switch enclosure. On the mounting screws, be sure to use caulking or other sealant appropriate for the operating environment and to ensure proper sealing.

4.1.1 MR221/MR222 Aluminum Housing Models

The unit is designed to mount to a flat surface using hole pattern shown in **Figure 4**.

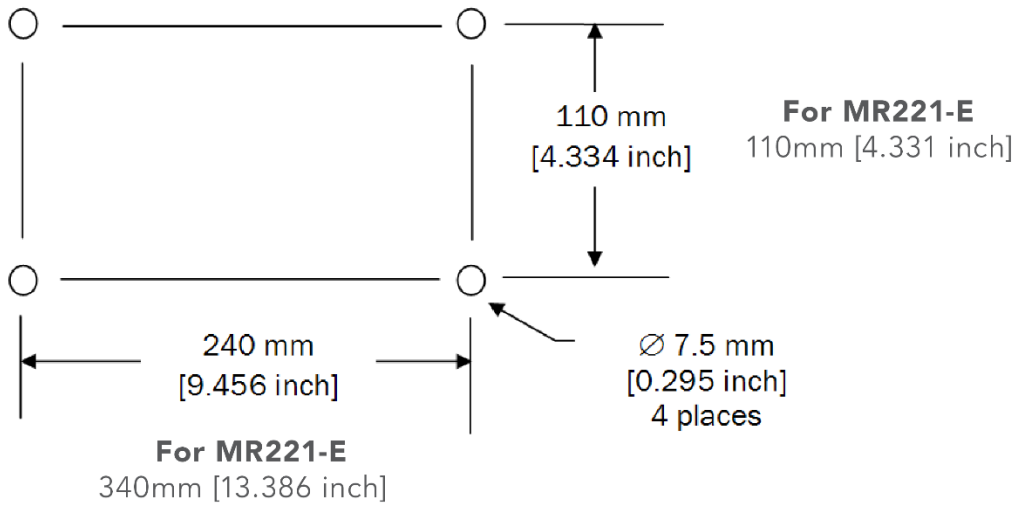


Figure 4. Mounting Hole Pattern for Aluminum Housings

4.1.2 MR221/MR222 Stainless Steel Housing Models

The unit is designed to mount to a flat surface using hole pattern shown in **Figure 5**.

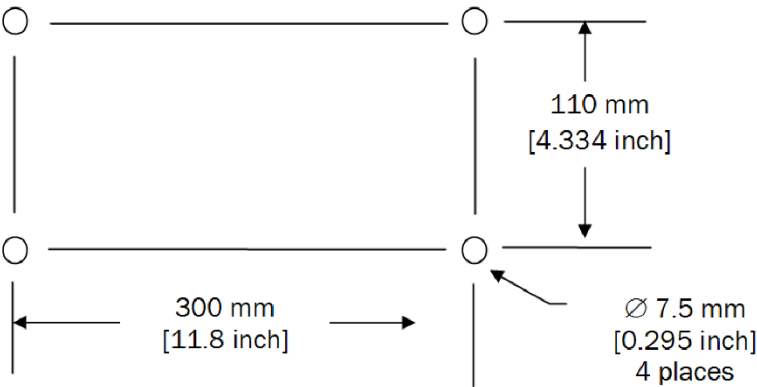


Figure 5. Mounting Hole Pattern for Stainless Steel Housings

4.2 Coupling To Customer Equipment's Shaft(s)

In general, heavy duty/zero backlash couplings should be used to couple the limit switch's shaft to the customer's equipment (usually the drum or overspeed sensor).

When ordering from a particular coupling supplier, be sure to describe the limit switch's shaft characteristics as "12.7mm (0.5-inch) \varnothing with #404 Woodruff Key". You will NOT need to purchase separate #404 Woodruff Keys as these are already supplied with the unit). A reference drawing of the shaft end is shown in **Figure 6** below.

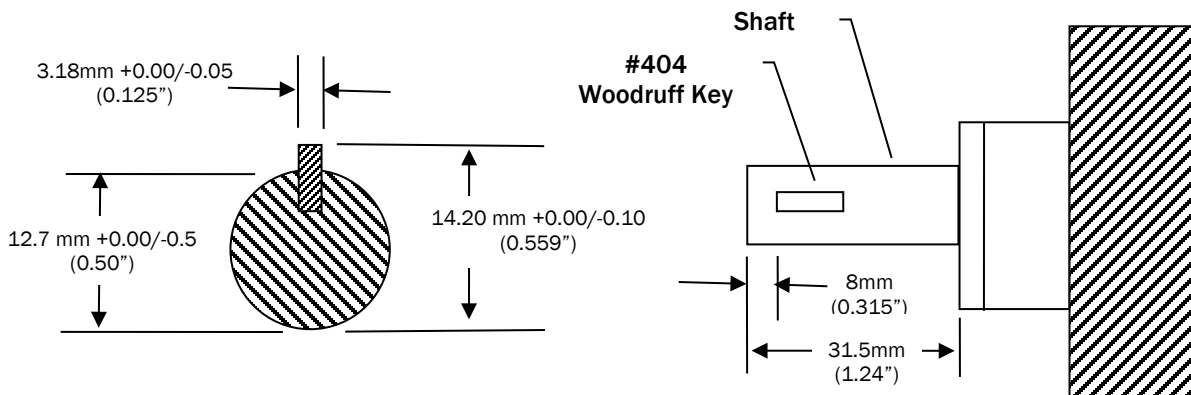


Figure 6. Reference Dimensions For Shaft

To order a coupling from most suppliers, the process is to select the coupling style (heavy duty/zero backlash) and the shaft dimensions (and any special features) of both sides. Designating Side A for the Micronor limit switch and Side B for the customer's equipment (typically the drum or over speed sensor):

- Side A (Micronor side) for 12.7mm (0.5-inch) \varnothing shaft with #404 Woodruff Key
- Side B (Customer equipment, specify shaft OD, shape and any key/slot features)

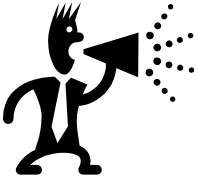
Be sure to follow the coupling manufacturer's assembly and installation instructions. This includes using the proper tools and torque values for securing all screws and set-screws.



IF YOU ARE NOT USING BOTH SHAFT ENDS of the Limit Switch...

- Be sure to install and secure a protective shaft cover over the unused shaft.
- For safety reasons, the unused shaft end should never be left uncovered.

4.3 Wiring To The Limit Switch



Important wiring notes

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

Electrical connections should be performed consistent with governing electrical code and following these steps:

1. Pre-plan cam programming and wiring by filling in Wiring Table label on inside of cover. Select wire type, color and size consistent with the project requirements and safety codes. Copper conductors should be rated 60°C or higher.
2. According to the wiring table, determine how much of the provided **Commons** wire jumper will be used. Clip off any unused portion and discard all clippings.
3. Standard ½" NPT conduit can be coupled directly to the supplied conduit hubs.
4. Pull wire through conduit ports.
5. Strip wire ends approximately 5-6mm (0,22") length. Using a slotted screwdriver, loosen terminal contacts of Phoenix COMBICON wiring block(s), insert wire end and close contact by tightening screw (see **Figure 7**).
6. If not using one of the conduit hub ports, be sure to properly seal the opening using the supplied threaded plug and proper sealant.

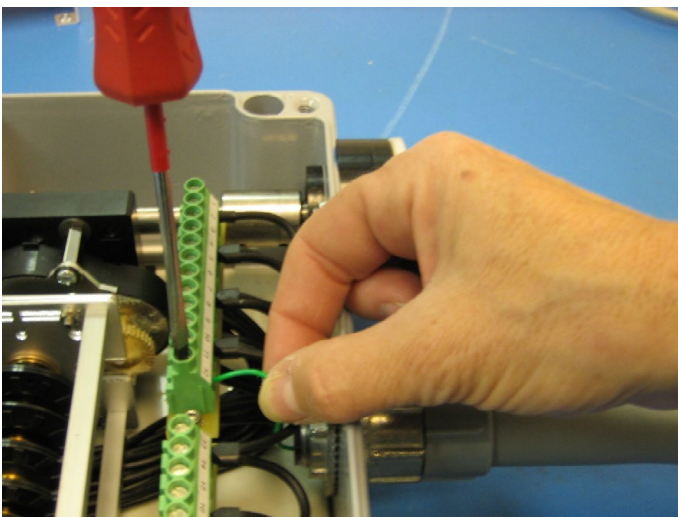


Figure 7. Wiring to the Phoenix COMBICON Terminal Blocks

Table 1. Wiring Table Template

Contact No.	Switch No.	Contact Type	Cam Program (Input shaft degrees or dial setting)		Wire Color and Size	Signal Name
			ON	OFF		
1	Switch 1	Common				
2	Switch 1	NC				
3	Switch 1	NO				
4	Switch 2	Common				
5	Switch 2	NC				
6	Switch 2	NO				
7	Switch 3	Common				
8	Switch 3	NC				
9	Switch 3	NO				
10	Switch 4	Common				
11	Switch 4	NC				
12	Switch 4	NO				
13	Switch 5	Common				
14	Switch 5	NC				
15	Switch 5	NO				
16	Switch 6	Common				
17	Switch 6	NC				
18	Switch 6	NO				
19	Switch 7	Common				
20	Switch 7	NC				
21	Switch 7	NO				
22	Switch 8	Common				
23	Switch 8	NC				
24	Switch 8	NO				
25	Encoder	+0V (Gnd)				
26	Encoder	+24VDC				
27	Encoder	Set1/Direction				
28	Encoder	Set2/Zero Set				
29	Encoder	I+				
30	Encoder	I- (Gnd)				
31	No Connection	---				
32	No Connection	---				
33	No Connection	---				
34	No Connection	---				
35	No Connection	---				
36	No Connection	---				



Another Note About Foreign Objects and Debris (FOD)

- Do not allow any FOD (including wire clippings) to be left behind in the enclosure.
- FOD could become lodged in the switch mechanism and cause an electrical short or other system failure

4.4 Programming The Cams

The Micronor Programmable Cam Switches are designed to be both versatile and easy to operate. However, initial planning is required for cams to be programmed to function as desired. Due to the design of the cam, switches cannot be engaged for more than 180°. If the system requires that the switch does not make contact for more than 180°, the normally closed (NC) contact must be wired.

As shown in Example A, a system might require that the connection for a switch be made from 0° to 70° and there be no connection from 71° to 359°. To accomplish this, the switch must be wired in the normally closed position.

As shown in Example B, a system that requires a connection for 290°, the normally open contact must be wired so that a connection is made when the switch is engaged, and no connection is made when the switch is disengaged.

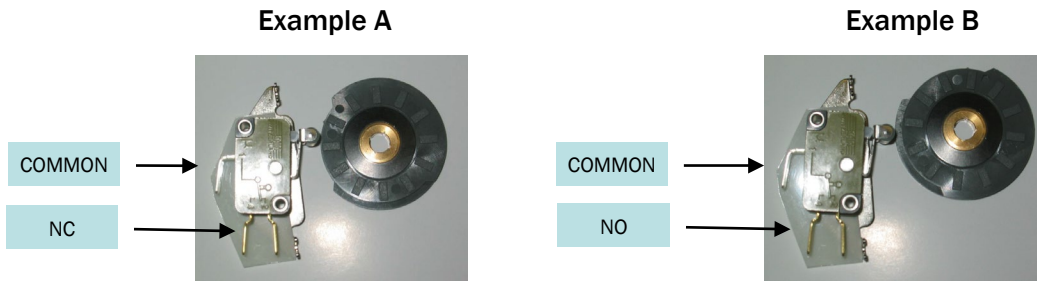


Figure 8. Cam Programming Examples for <180° (A) and ≥180° (B)

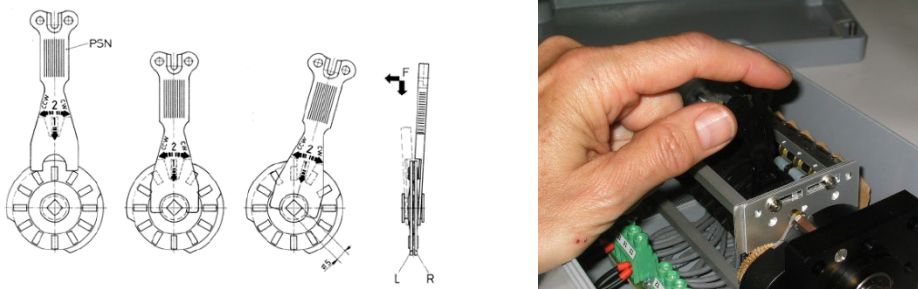


Figure 9. How to Program Cams with the PSN Programming Tool

The following instructions may be used to program the start and stop times of each switch using the supplied PSN (black) cam programming tool:

1. Turn external shaft to the desired START position via dial setting. Insert PSN key with the numbered side away from the cam and the notched side towards the cam.
2. While gently applying pressure against the cam with the key; rotate the cam to the desired position.
3. Turn external shaft to the desired STOP position, flip over the PSN key and repeat steps 1 and 2 on the other side of the cam.
4. Test the unit to confirm that the switches engage (START) and disengage (STOP) at the appropriate positions.

4.5 Connecting and Programming the 4-20mA Position Output Options

The MR221-MR222 Gear Limit Switch family includes two options for continuous position feedback as a 4-20mA analog output:

- -1 MR265 Loop-Powered 4-20mA Output Option
- -E Encoder-based 4-20mA Output Option

4.5.1 Programming the -1 MR265 4-20mA Position Output Option

The MR22X-1 (MR265) 4-20mA Position Output Option is a 2-Wire or loop-power feedback option. That is, the loop is powered in series and provides the advantage that this feedback option can be powered remotely from the PLC location. In contrast, the MR22X-E option is a 4-wire sensor design requiring power be located near the MR22X unit.

The schematic diagram of **Figure 10** shows how the I+/- current outputs are wired. A 24V DC supply must be inserted in series to power the current loop.

The MR265 Transducer option is based on a PCB Controller and an internal single turn potentiometer mounted on the cam shaft. The analog output is adjustable over a mechanical range of 0° to 355° corresponding to the MR22X's gear ratio less 1.4% (equivalent to 5° not covered by potentiometer) and controller by two accessible trimpots (Offset and Span) and two jumpers (Direction), Offset and Span.

As shown in **Figure 11**, the analog output may be adjusted anywhere between 4mA to 20mA within the yellow shaded area along with the desired electrical direction (4-20mA or 20-4mA) controlled onboard jumpers.

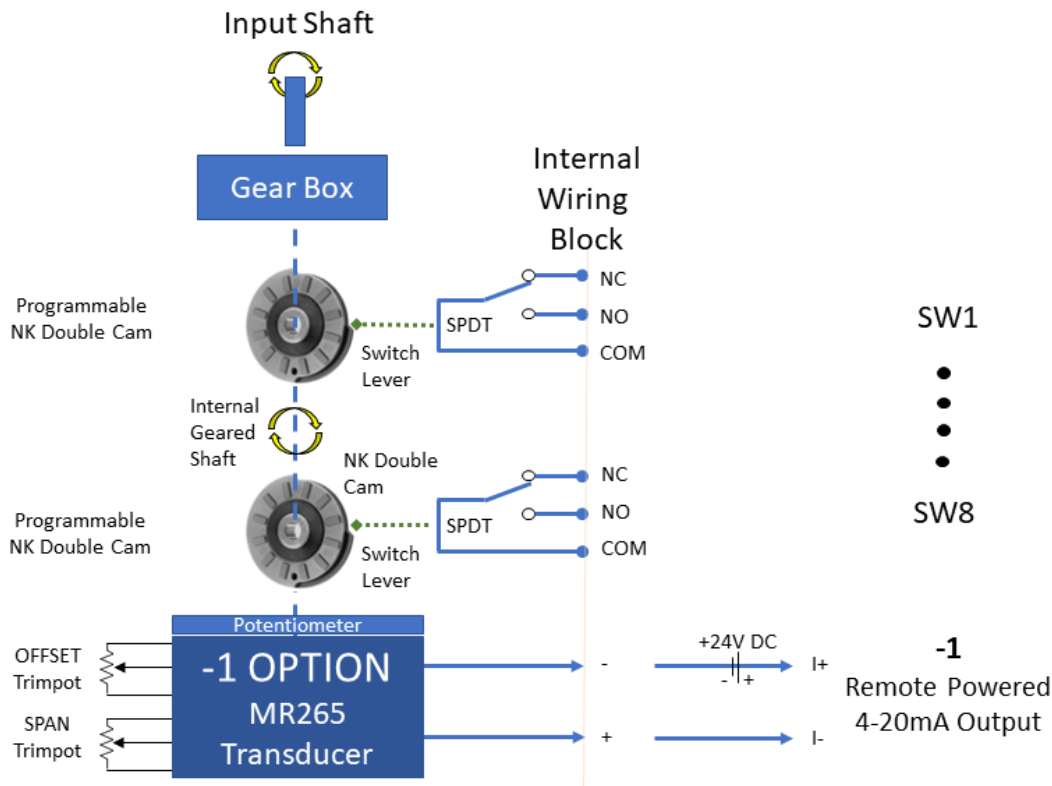
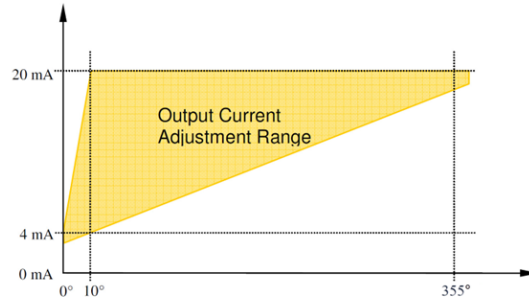


Figure 10. How to wire MR22X-1 MR265 Position Output

SLOPE Trimpot Settings

- Min Offset: 0°
- Max Offset: 10°
- Min Slope: 48.5 $\mu\text{A}/^\circ$
- Max Slope: 1.6 $\text{mA}/^\circ$

The curve to the right visualizes the adjustment range which lies within the yellow shaded area.

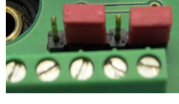
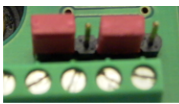


DIRECTION Jumper Settings

4-20mA Output
Follows Scale 0-100

4-20mA Output
Follows Scale 100-0

Direction from input shaft to current loop interface varies according to the gear transmission and ratio.



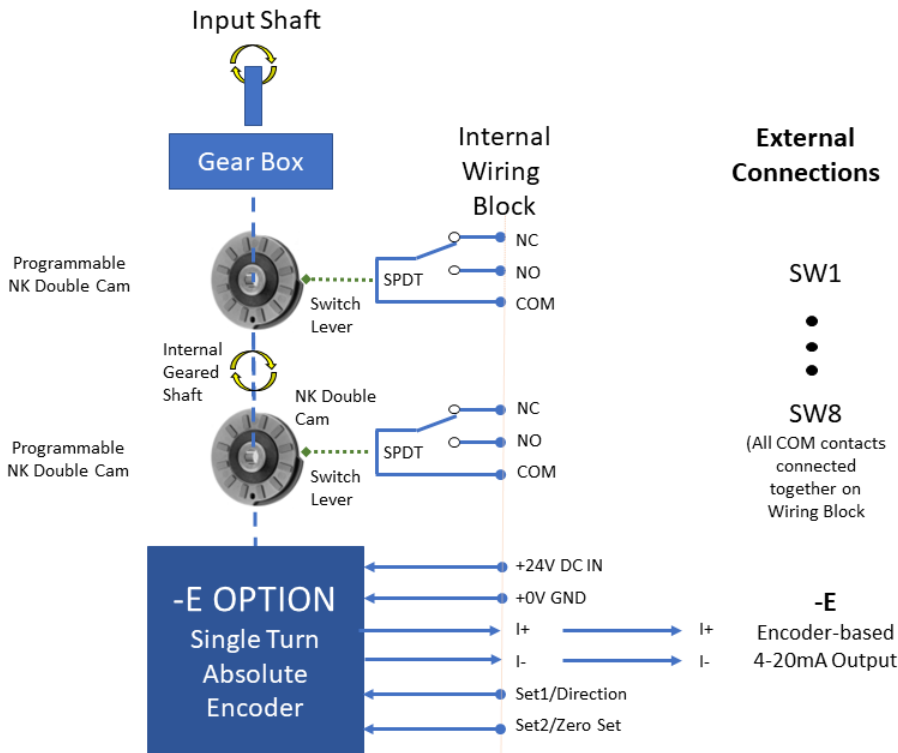
PROGRAMMING Instructions

1. Set potentiometer to desired lower limit (must be within 10° of max potentiometer deflection).
2. Adjust output to 4mA via the trimpot labeled **Offset**.
3. Set potentiometer to desired upper maximum setting.
4. Adjust output to 20mA via the trimpot labeled **Span**.

Figure 11. How to set 4mA/20mA points and Direction of MR265 Output

4.5.2 Programming the -E Encoder-based 4-20mA Position Output Option

As shown in **Figure 12** below, the MR221-MR222 Gear Limit Switch family also includes an option for 4-20mA position feedback via an integrated single-turn absolute encoder. The 4-20mA output is scaled over the full # of turns (gear ratio) of the ordered limit switch. A programmable input (Set2/Zero Set) to the encoder allows the 4.01mA point to be electronically (versus mechanically) set once the unit is installed in the field. It is recommended that the Zero Set point correspond to the 0 point on the internal dial scale.



To program 4mA point, touch input Set2 to 24V DC IN and then release. The analog output will reset to 4.01mA. This should be done with the internal mechanical scale set to 360 (0) position.

Figure 12. How to set 4mA point for -E Encoder Position Output

4.6 Closing and Sealing the Enclosure



Apply Proper Sealing Techniques To Prevent Damaging Ingress

- On the mounting screws, be sure to use caulking or other sealant appropriate for the operating environment.
- If not using one of the conduit hub (wiring) ports, be sure to properly seal the opening using the supplied threaded plug and proper sealant.
- Failure to apply proper sealing techniques voids product warranty.

5. Maintenance and Service

Under normal operating conditions and use, the MR221/MR222 Limit Switches require no maintenance. The only replaceable component part is the microswitch (consult Section 5.2). Cleaning and re-lubrication of the internal, exposed gears might be necessary if the unit had not been properly sealed and the grease has become contaminated.

Otherwise, it is more practical to replace the entire unit.

5.1 Replaceable Parts

The following replacement **accessory** part is available from Micronor:

- PSN Cam Programming Key, Micronor P/N PSN (consult Section 4.4 for application)

The following replacement **component** part is available from Micronor:

- Microswitch, Micronor P/N 6099.22.846 (consult Section 5.2 for application)

The following replacement **gear lubricant** is available from Etna-Bechem Lubricants Ltd:

- Contact: Etna-Bechem Lubricants Ltd.
 - 16824 Park Circle Dr, Chagrin Falls, OH 44023
 - Tel 440-543-9845, Fax 440-543-1789
 - Email jcs@etna.com, URL www.etna.com
- Type BERULUB FH 28 (Multipurpose synthetic specialty grease for metals and polymers, rated -31°F/320°F or -35°C/160°C, also consult Section 5.2 for application)

5.2 Replacing Microswitches

Age and heavy duty cycles can eventually wear out the microswitches. Replacements can be ordered using Micronor P/N 6099.22.846 (shown in **Figure 13** below).

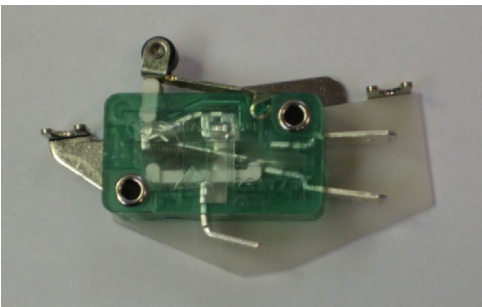


Figure 13. Micronor P/N 6099.22.846 Replacement Switch

To replace a microswitch, follow these steps while consulting **Figure 14**:

1. Using a large slotted or Phillips screwdriver, remove cover by loosening the 4 mounting screws located on top.
2. Using a slotted screwdriver, loosen (but do not remove) the two screws holding the rear mounting flange of the cam switch subassembly. To gain access to the microswitches, grab subassembly and pull back to disengage from the two mounting screws loosen in the previous step.
3. Remove the two screws holding the microswitch to the frame of the cam switch subassembly. Replace with the new switch and mount using the same screws.
4. Gently pull the FASTON receptacle connections off the terminals of the old switch and insert onto the corresponding terminals of the new switch.
5. Align the cam switch subassembly via the front alignment pins and the two back mounting screws (that were loosened in Step 2). Tighten the two bottom mounting screws.
6. Replace cover and tighten the four mounting bolts.

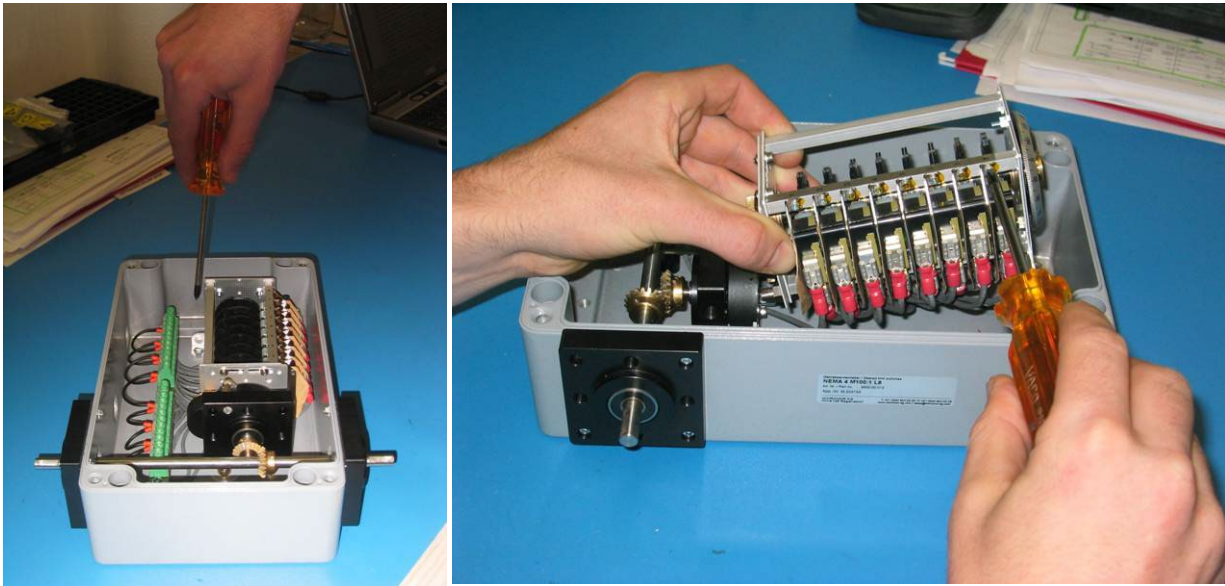


Figure 14. How to replace Microswitch

5.3 Lubricating Bevel Gear Junction (MR222 Only)

Under normal conditions, it is not necessary to lubricate the bevel gears used on the MR222 models (see **Figure 15**, couples the main shaft to the cam switch shaft). However, if the inside becomes accidentally contaminated, it would become necessary to clean and lubricate gears. Follow these steps:

1. Disconnect external couplings to both ends of the main shaft. This is done to facilitate manual rotation of the gears in the next step.
2. While manually rotating the main shaft, clean inside case and exposed gears using lintless swabs/wipes and reagent grade IPA (isopropyl alcohol).
3. While rotating the shaft, apply a moderate amount of grease all around and over each gear.

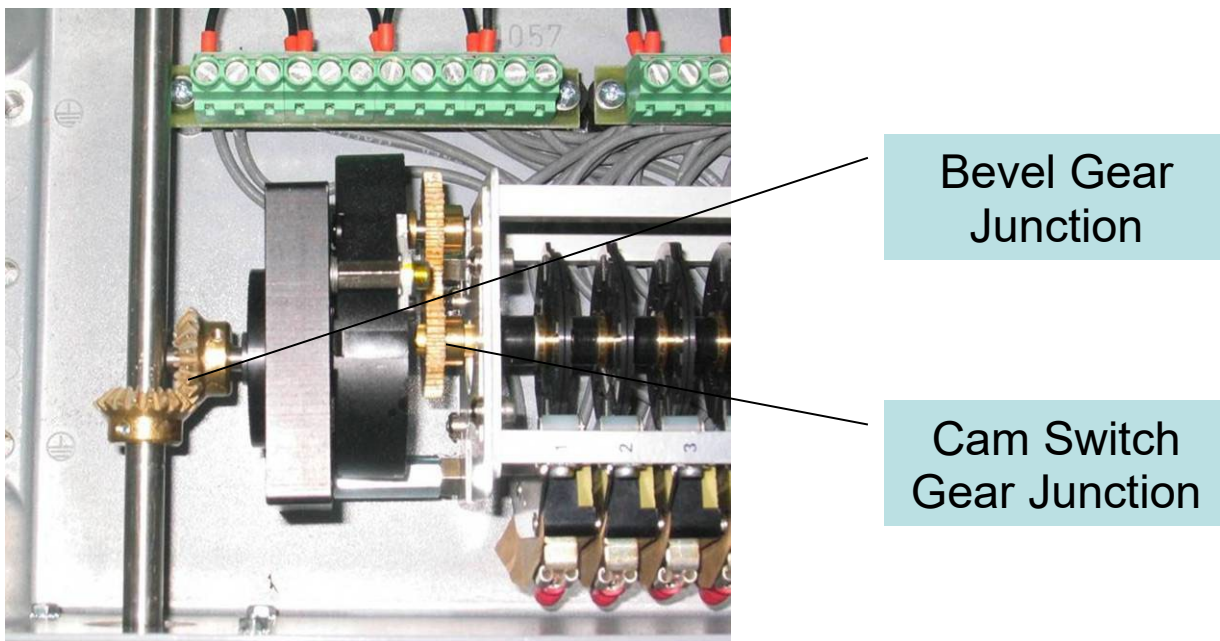


Figure 15. Location of the Bevel Gears and Cam Switch Gear Junctions

5.4 Lubricating Cam Switch Gear Junction

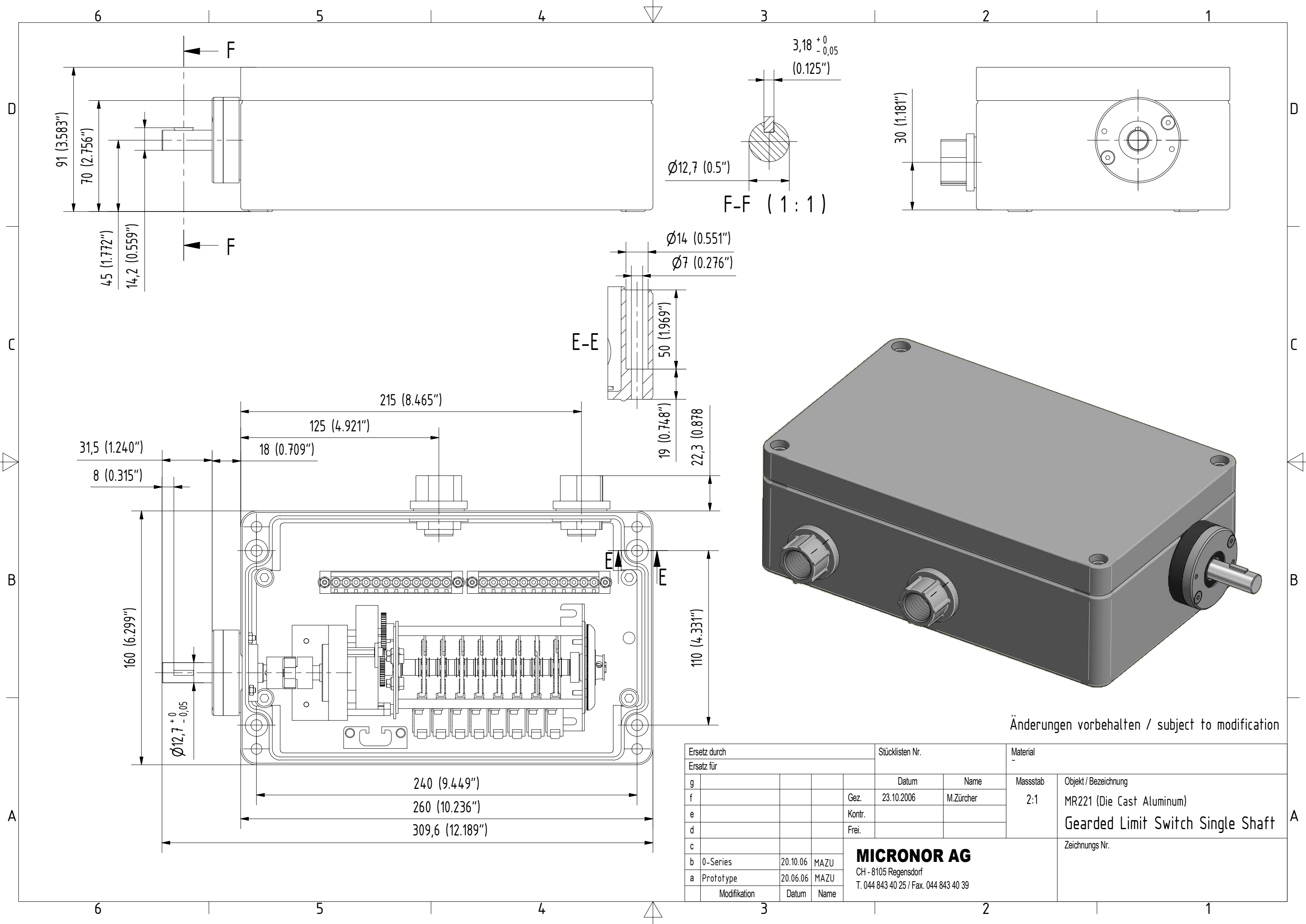
Under normal conditions, it is not necessary to lubricate the cam gears (see **Figure 15**, couples from the gear reduction module to the main shaft of the cam switch subassembly). However, if the inside becomes accidentally contaminated, it would become necessary to clean and re-lubricate the gears. Follow these steps:

1. Disconnect external couplings to both ends of the main shaft. This is done to facilitate manual rotation of the gears in the next step.
2. Using a slotted screwdriver (consult **Figure 14**), loosen (but do not remove) the two screws holding the rear mounting flange of the cam switch subassembly. To gain access to the microswitches, grab subassembly and pull back to disengage from the two mounting screws loosen in the previous step. This will expose the two gears – one that is attached to the gear box and the other attached to the cam switch shaft.
3. Clean inside of case and the two gears using lintless swabs/wipes and reagent grade IPA (isopropyl alcohol).
4. While rotating the shaft, apply a moderate amount of grease all around and over each gear.
5. Align the cam switch subassembly via the front alignment pins and the two back mounting screws (that were loosened in Step 2). Tighten the two bottom mounting screws.

6. Reference Drawings

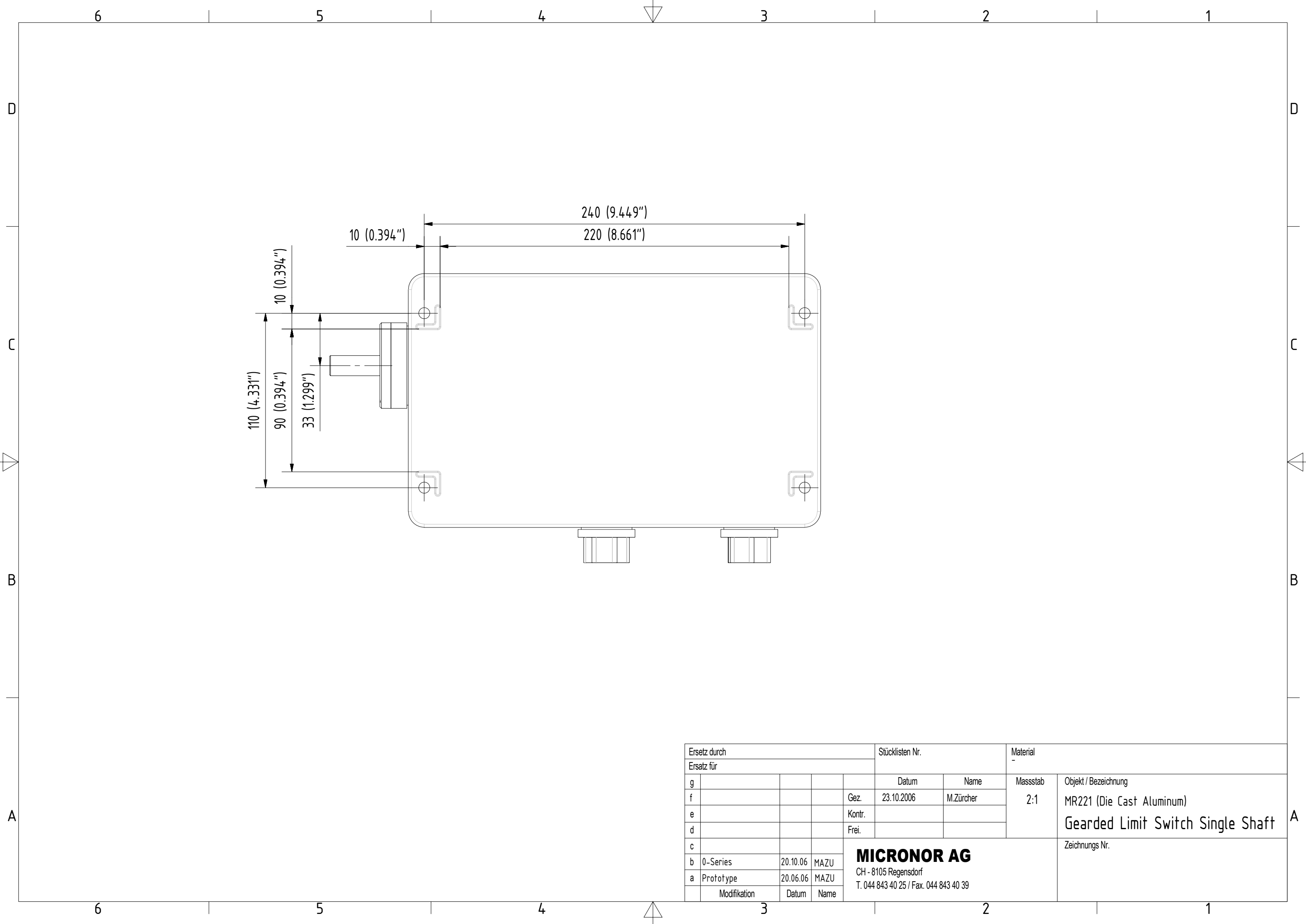
The following pages provide reference drawings for each model:

- Standard MR221 in Aluminum Housing, 925x.xx.xxx 2 pages
- Standard MR221-E in Extended Aluminum Housing, 9350.03.373, 1 page
- Standard MR222 in Aluminum Housing, 928x.xx.xxx, 2 pages
- Special MR221-X in Stainless Steel Housing, 926x.xx.xxx, 2 pages
- Special MR222-X in Stainless Steel Housing, 929x.xx.xxx, 2 pages

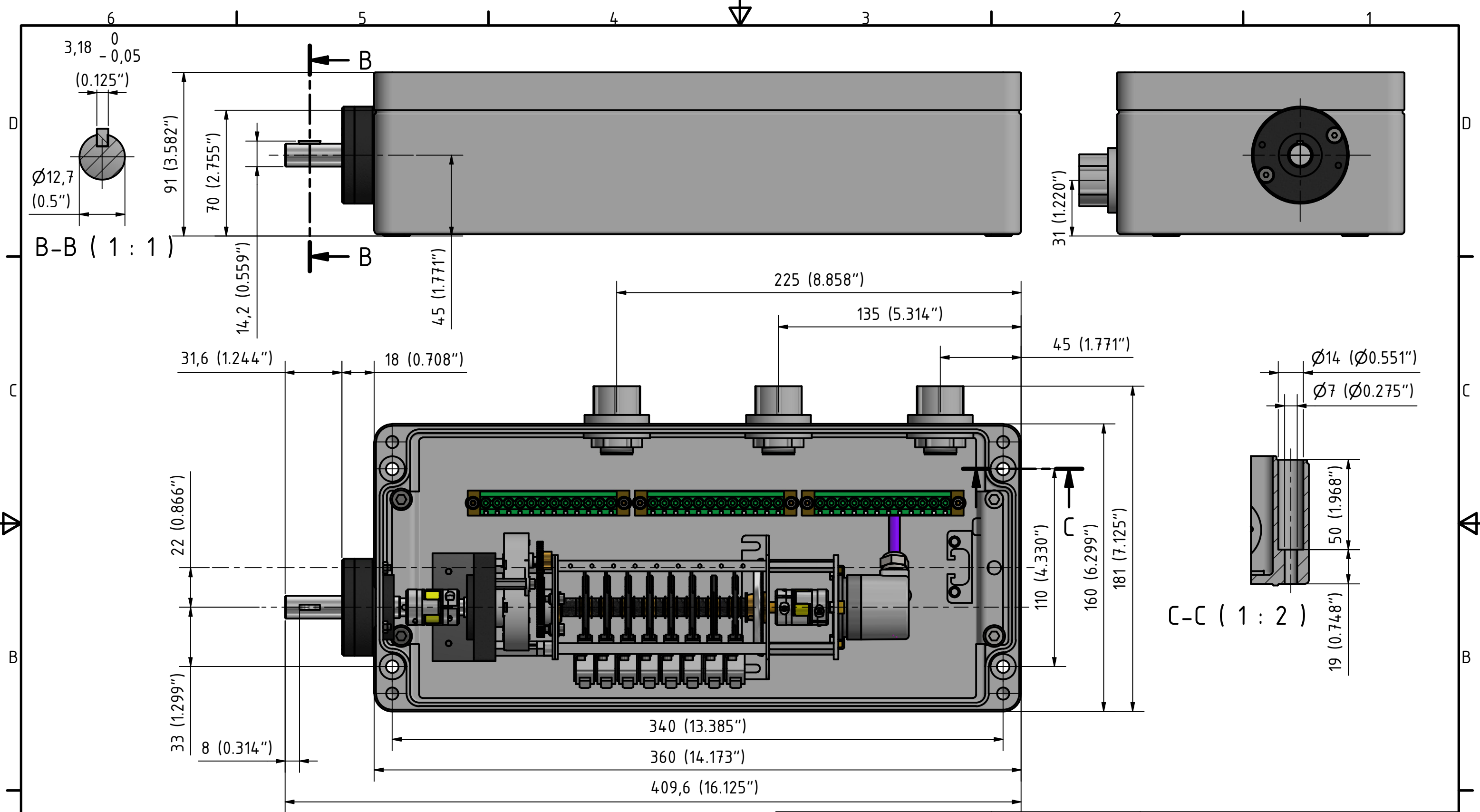


Änderungen vorbehalten / subject to modification

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f		Gez.	23.10.2006	M.Zürcher			
e		Kontr.					
d		Frei.			2:1	MR221 (Die Cast Aluminum) Gearded Limit Switch Single Shaft	
c							
b	0-Series	20.10.06	MAZU				
a	Prototype	20.06.06	MAZU		Zeichnungs Nr.		
	Modifikation	Datum	Name				
MICRONOR AG							
CH - 8105 Regensdorf							
T. 044 843 40 25 / Fax. 044 843 40 39							



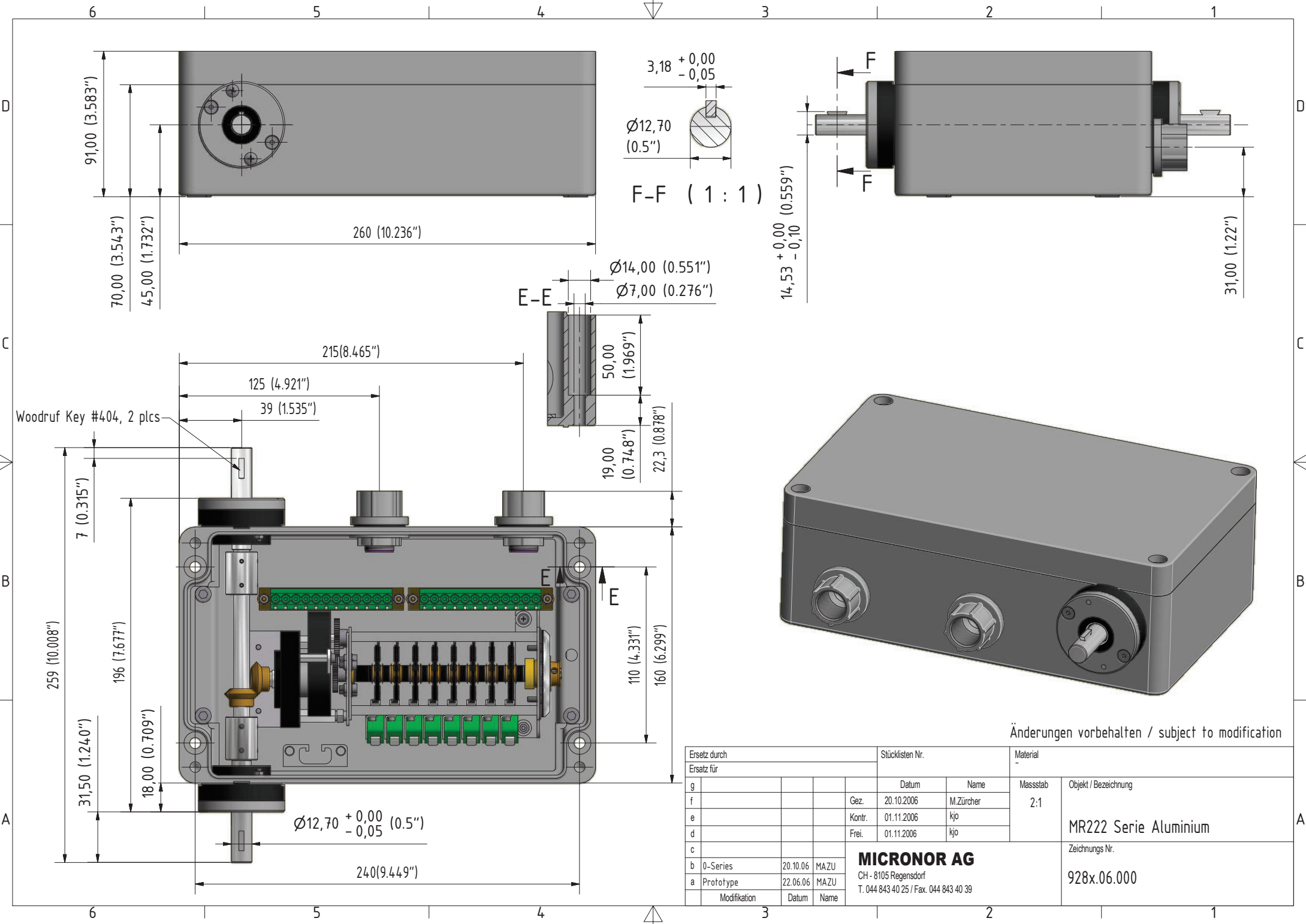
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Ersatz für							
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f			Gez.	23.10.2006	M.Zürcher		
e			Kontr.				
d			Frei.				
c				MICRONOR AG CH - 8105 Regensdorf T. 044 843 40 25 / Fax. 044 843 40 39			Zeichnungs Nr.
b	0-Series	20.10.06	MAZU				
a	Prototype	20.06.06	MAZU				
	Modifikation	Datum	Name				



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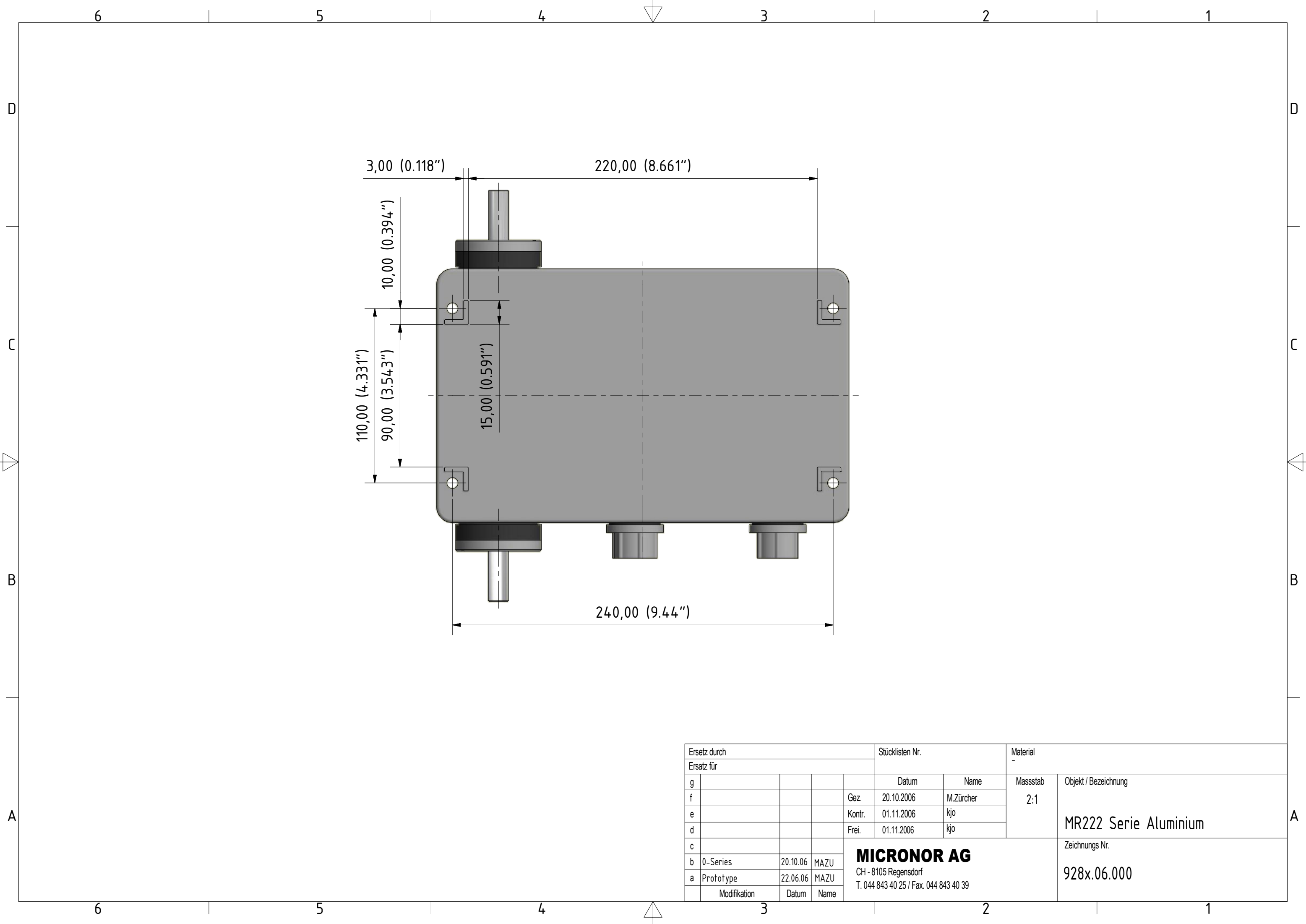
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e		Frei.			
d					Objekt / Bezeichnung KWG360 L8 U25:1 ESA36 Analog
c					
b		MICRONOR®			Zeichnungs Nr. 9350.03.373
a		CH - 8105 Regensdorf T. 044 843 40 25 / Fax. 044 843 40 39 www.micronor.ch			
	Änderungen	Datum	Name		

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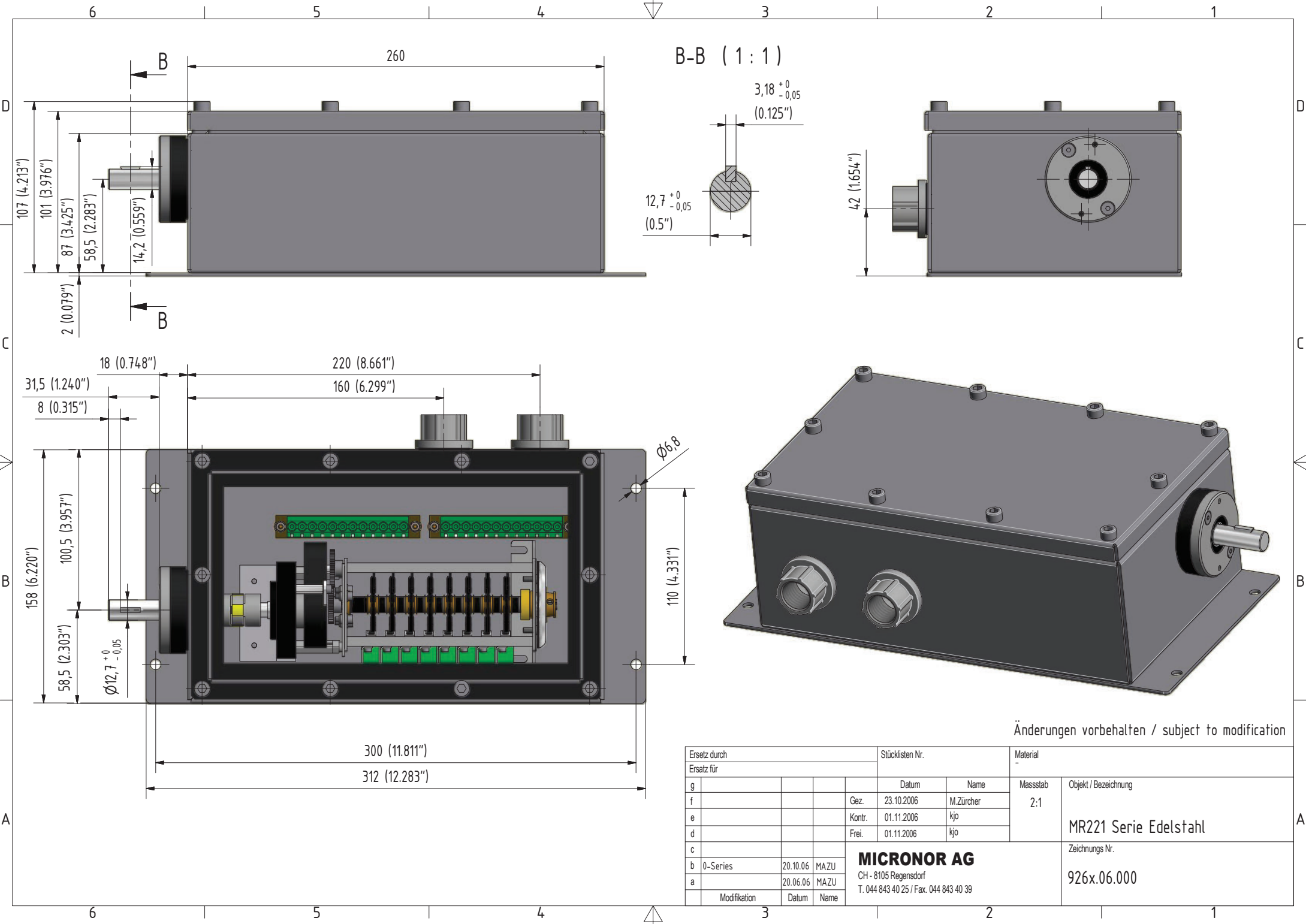


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f		Gez. 20.10.2006	M.Zürcher				
e		Kontr. 01.11.2006	kjo				
d		Frei. 01.11.2006	kjo	Zeichnungs Nr. 928x.06.000			
c		MICRONOR AG CH - 8105 Regensdorf T. 044 843 40 25 / Fax. 044 843 40 39					
b	0-Series					20.10.06	MAZU
a	Prototype					22.06.06	MAZU
Modifikation		Datum	Name				

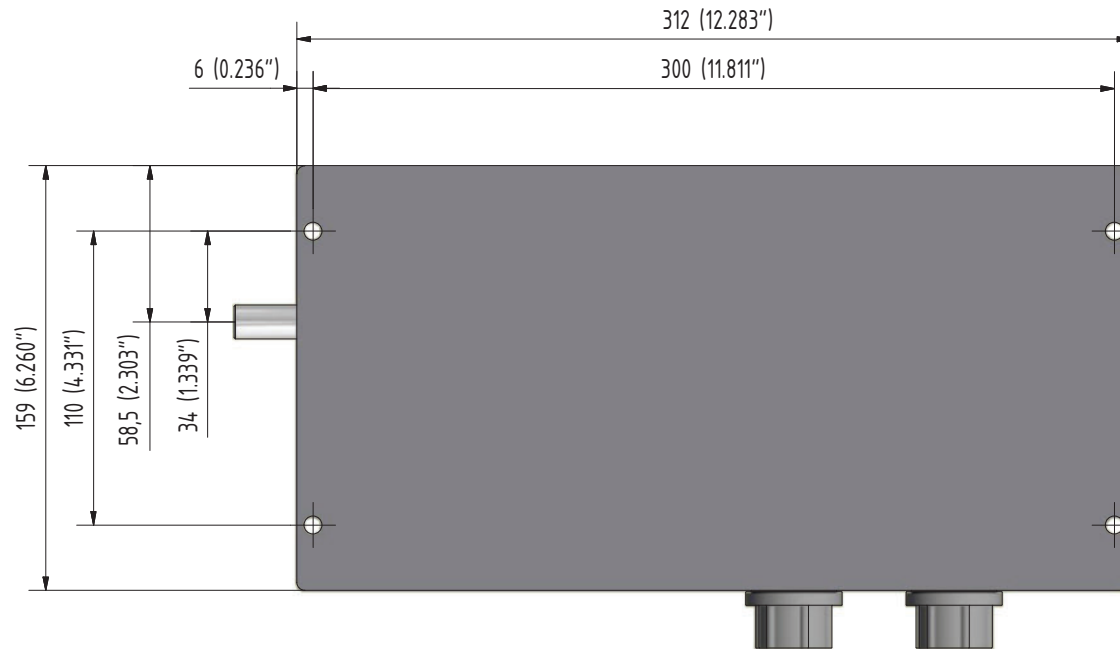


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a	Prototype	22.06.06	MAZU				
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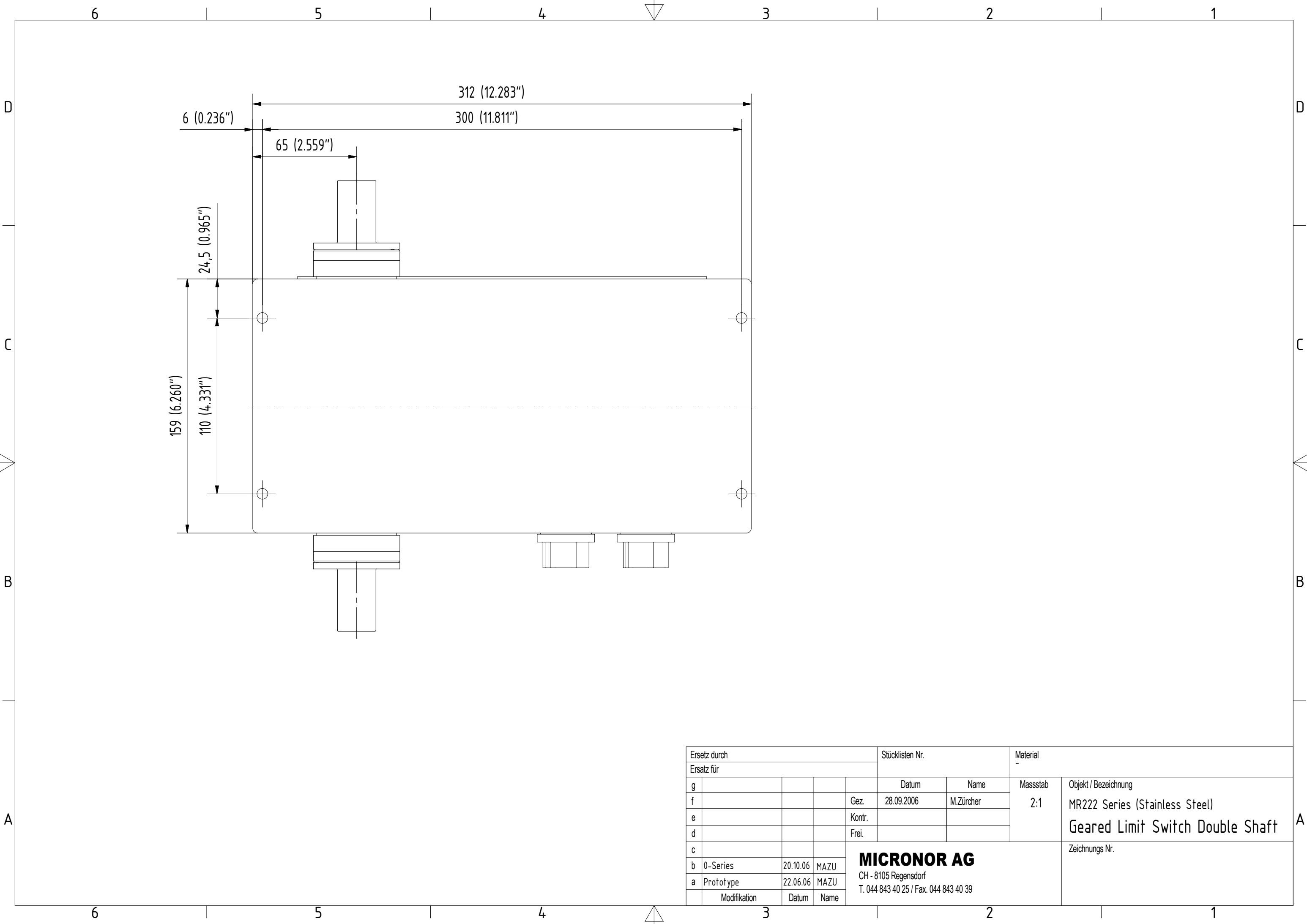


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d		Frei. 01.11.2006	kjo			
c					Zeichnungs Nr.	
b	0-Series	20.10.06	MAZU	MICRONOR AG CH - 8105 Regensdorf T. 044 843 40 25 / Fax. 044 843 40 39		
a		20.06.06	MAZU			926x.06.000
	Modifikation	Datum	Name			



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Ersetzt für						
g			Datum	Name	Massstab 2:1	Objekt / Bezeichnung MR221 Serie Edelstahl
f			Gez. 23.10.2006	M.Zürcher		
e			Kontr. 01.11.2006	kjo		
d			Frei. 01.11.2006	kjo		
c			MICRONOR AG CH - 8105 Regensdorf T. 044 843 40 25 / Fax. 044 843 40 39			Zeichnungs Nr. 926x.06.000
b	0-Series	20.10.06 MAZU				
a		20.06.06 MAZU				
	Modifikation	Datum	Name			



Ersetz durch				Stücklisten Nr.		Material	
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g				Datum	Name	Massstab 2:1	Objekt / Bezeichnung MR222 Series (Stainless Steel) Geared Limit Switch Double Shaft
f			Gez.	28.09.2006	M.Zürcher		
e			Kontr.				
d			Frei.				
c				MICRONOR AG CH - 8105 Regensdorf T. 044 843 40 25 / Fax. 044 843 40 39			Zeichnungs Nr.
b	0-Series	20.10.06	MAZU				
a	Prototype	22.06.06	MAZU				
	Modifikation	Datum	Name				