micronor

FIBER OPTIC ABSOLUTE ENCODER

MR430 Series ZapFREE® Absolute Rotary Position Sensor System

The MR430 series ZapFREE® Fiber Optic Position Sensor is a small form factor, rotary position sensor with 13-bit, single-turn resolution.

The MR430 features an innovative design which enables new applications and OEM product features not formerly possible with electronics-based sensors.

The sensor is 100% passive and is unaffected by EMI, RFI, microwaves and magnetic fields. The innovative, all-dielectric design also provides 100% electrical isolation and immunity to high voltages & lightning.
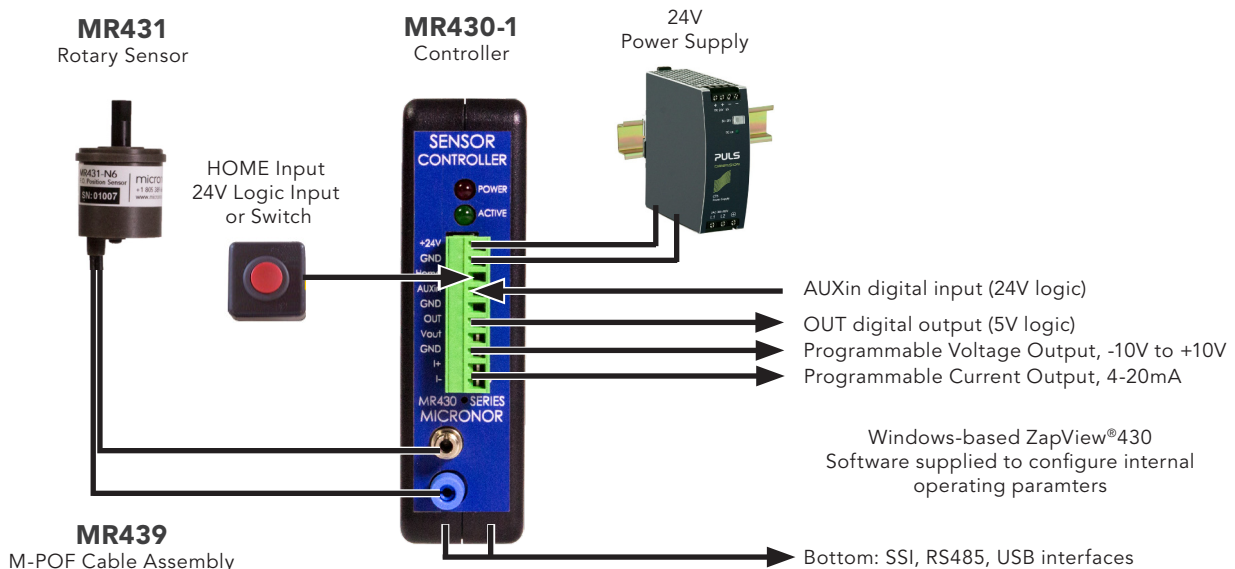
ZAP FREE®

MR

Ex

MR430 Fiber Optic Position Sensor System
Small Form Factor, Size 11
MRI Safe, All-Dielectric Construction
Inherently Safe, Simple Mechanical Device

Features

- 100% passive optical sensor - no power supply required
- Size 11 (Ø1.1") small form factor
- Single turn resolution 0.044°
- Up to 25-bit output (13 bits Single Turn + 12 bits Multi-Turn)
- Immune to EMI, RFI, high voltage and lightning
- Immune and invisible to magnetic fields
- Non-metallic, all-dielectric MRI Safe sensor
- M-POF fiber optic link can extend up to 30 meters
- DIN rail mount controller

Applications

- Medical and MRI
- Transformer tap changer
- Switchgear
- Oil & Gas
- Transportation
- Semiconductor equipment
- Welding
- Robotic

MR431
Rotary Sensor

MR430-1
Controller

24V
Power Supply

HOME Input
24V Logic Input
or Switch

AUXin digital input (24V logic)
OUT digital output (5V logic)
Programmable Voltage Output, -10V to +10V
Programmable Current Output, 4-20mA

Windows-based ZapView®430
Software supplied to configure internal
operating paramters

MR439
M-POF Cable Assembly

Bottom: SSI, RS485, USB interfaces

MR430 Controller

Specifications

Position Measurement	
Single Turn Resolution	13 bits, 8192 counts (0.044°)
Turn Counter	Up to 12 bits (4096 turns)
Electrical Interfaces	**Electrical connections shall not exceed 3 meters**
SSI	Up to 25 bits (13 bits ST + 12 bits Multiturn), Programmable baudrate 25 kHz -250 kHz
RS485/Modbus RTU	57,600 Baud default, Consult instruction manual for software protocol details
USB	USB, Disables Modbus interface when used, Assigned Virtual Com Port
Current Output (I+/I-)	Isolated 4-20mA (270V isolation maximum), Output scalable by user, Accuracy = ±0.08% Full Scale
Voltage Output (Vout)	+10V to -10V, Output scalable by user, Accuracy = ±0.25% Full Scale
Digital Output (OUT)	0-5V maximum, 5mA load, Programmable Set Point
Digital Inputs (HOME and AUXin)	+24V logic
Power Supply	+18 VDC to +32 VDC, 65 mA max at 24 VDC
Interface Update Rate	
Angular Speed	230 radians/second or 2200 RPM for accurate position reporting
Update Rate	1.17 kHz (850 μs)
Reporting Delay	SSI: Maximum 800 μs (time from actual position to SSI output) Analog Outputs: Maximum 1.0 ms
Optical Interface	**Class 1 Laser Safety**
Interface	Duplex, M-POF Assembly
System Loss Budget	23dB at 645nm
Maximum Optical Link Length	Up to 30 m (~100 ft) with MR431 Sensor, Typical 2-way loss is 0.75dB/m
Explosive Atmospheres	**Inherently Safe, Optical Radiation**
EX Classification	Controller shall be installed in non-hazardous location only
IEC Ex	EPL Mb/Gb/Gc/Db/Dc
Environmental Performance	
Temperature/Humidity	Operating: -5°C to +55°C (23°F to +131°F), Storage: -25°C to +65°C (-13°F to +149°F), 25-95% RH (non-condensing)
Ingress Protection	IP40
Physical Attributes	
Housing Dimensions	114 mm W x 89 mm D x 32 mm H, includes 35mm DIN rail mount

Front View

J1 - Electrical/Power Connections

Optical Output

Optical Input
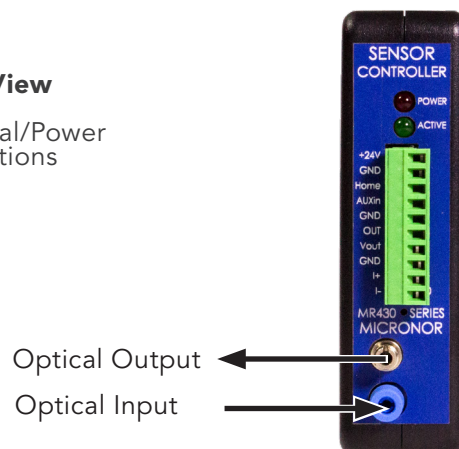
Bottom View

J2 - USB
J3 - SSI/RS485

MR430 Controller

J1 - Discrete Power/Electrical Connections

Pin	Function	Notes
	J1 Electrical Interface via Terminal Plug Phoenix 1803659 (one supplied with Controller)	
1	+24V	+24V Power Supply
2	GND	GND (all GND connected together)
3	HOME	HOME input (+24V logic)
4	AUXin	Auxiliary Input (+24V logic)
5	GND	GND (all GND connected together)
6	OUT	Digital Output (+5V logic)
7	Vout	User Scalable,Analog Output, -10V to +10V
8	GND	GND (all GND connected together)
9	I+	User Programmable Analog Output, 4-20mA, +
10	I-	User Programmable Analog Output, 4-20mA, -

J3 - SSI/RS485 Interface Connections

| Pin	RS485	SSI	MR4430-99-01 Wire Color
	J3 Electrical Interface via Plug Hirose 3240-10P-C(50) Pigtail Assembly available as Micronor MR430-99-01		
1	+5V	+5V	Brown
2	RCV- (RS422 Input)		Red
3	RCV+ (RS422 Input)		Orange
4	TX- (RS422 Input)		Yellow
5	TX+ (RS422 Input)		Green
6	GND	GND	Blue
7		SSI CLK-	Purple
8		SSI CLK+	Grey
9		SSI DAT+	White
10		SSI DAT+	Black

NOTE: +5V can be used to power a RS485-to-RS232 converter module., Max Load 15mA

MR431 Sensor and MR439 Pigtail

Specifications

Measurement Parameters	
Measurement Range	0° to 360° (continuous)
Resolution	13 bits (8192), 0.044°
Accuracy	0.5° max., 0.3° typical
Repeatability	±0.175°
Maximum RPM	500 RPM continuous, 2200 RPM intermittent Note: 2200 RPM for <2 seconds duration, in stop motion allowed.
Mechanical Performance	
Starting Torque	0.1 N*m
Max Shaft Load	500g at 5mm distance
Optical Interface	
Optical Interface	Duplex, POF and M-POF
Link Length	Up to 30 meters (~100 feet) with MR430 Controller
Explosive Atmosphere	**Inherently Safe, Simple Mechanical Device**
EX Classification	Inherently safe, simple mechanical device when used with MR430-1 Controller
IEC Ex	EPL Mb/Gb/Gc/Db/Dc
MR Attributes	**ACR Guidance Document for Safe MR Practices**
MRI Useage Zones	MR431 sensor and MR439 cabling is designed for safe use in Zones I-IV
Materials	MRI Safe, Non-metallic, Body/Shaft: Acetal
Environmental Performance	
Sensor Temperature	Operating: -5°C to +55°C (+23°F to +131°F), Storage: -40°C to +80°C (-40°F to +176°F)
Cable Temperature	Operation: -40°C to +60°C (-40°F to +140°F), Storage: -40°C to +60°C (-40°F to +140°F),
Humidity	0%-95% RH (non-condensing)
Ingress Protection	IP65
Physical Attributes	
Housing Dimension	Ø 25mm x 26mm x Ø 6mm Shaft
Unit Weight	15 g (0.53 oz) without pigtail

Specifications subject to change without notice
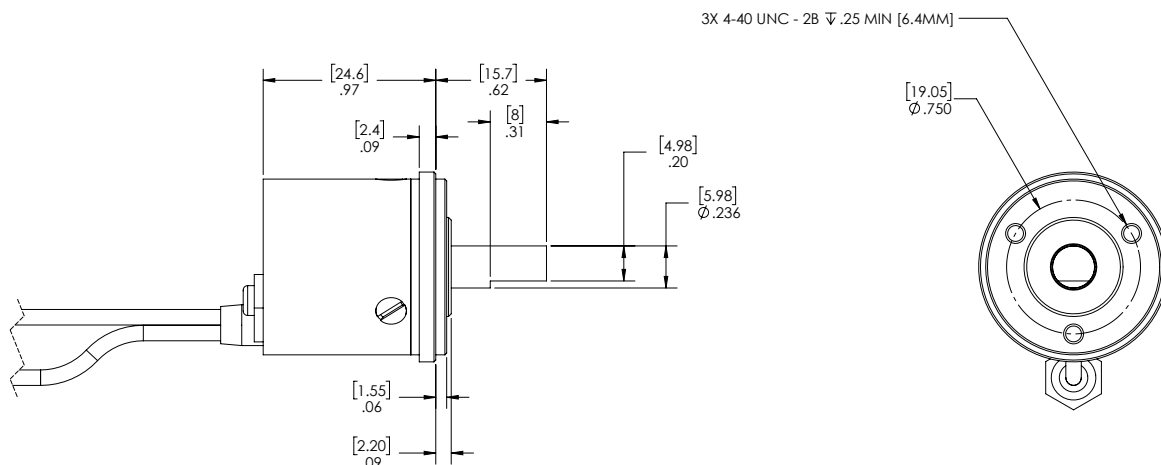
Ordering Info

A complete MR430 sensor system consists of Controller, Sensor and M-POF Cable Assembly.

M R 4 3 0 - 1
Controller

M R 4 3 1 - A 0 6
Sensor

M R 4 3 9 - P 0 5
Cable Assembly

Pigtail Length
P05   Length=5m
P10   Length=10m
P20   Length=20m

NOTES: (1) Contact Micronor sales for OEM custom lengths.

Quick Ship Configurations

MR430-1	DIN rail mount controller
MR431-A06	Sensor
MR439-P05	5m Sensor Cable Assembly
MR439-P10	10m Sensor Cable Assembly

Accessories

MR430-99-01	SSI/RS485 Interface (J2) Pigtail Assembly, Length=1m
MR431-1101	Set of 3x Non-Metallic Synchro Clamps and Screws for mounting MR431 Sensor

Product Documentation and Software

MR430 series datasheets, drawings, CAD files, manuals and software can be downloaded from the Micronor Product Web Pages:
Product Family, https://www.micronor.com/product/mr430-system-series/
MR430 Controller, https://micronor.com/product/mr430/
MR431 Sensor, https://micronor.com/product/mr431/
ZapView 430 Software, https://micronor.com/product/zapview-430/