SHAFTED ROTARY POSITION SENSORS

J1 LINE SHAFTED ROTARY ENCODERS

Joral manufactures J1 Line shafted rotary position sensors for the market of controls, power equipment, hydraulics, and off road vehicles.

The J1 shafted rotary position sensor marries a unique mechanical design with the latest in magnetic sensing technologies to provide a sensor that will survive in the most extreme real world environments.

- Rugged duty, bullet proof hardware *(MIL STD 202)*
- Totally encapsulated electronics & sealed bearings *(IP67)*
- Unique Captive Shaft Design
- Standard housings as well as application specific pages *(standard housings 30mm, 40mm, 50mm, 58mm)*
- LED indicators provide live feedback for power and output

J150 w/ Flange

J158

J150

J140

J130

UNIQUE CAPTIVE SHAFT DESIGN

J1 Line sensor's shaft and bearing package is designed captive to provide extreme resistance to shaft push out forces.

- Solid aluminum body design
- Dual chrome steel ball bearings and heavy clamp ring captive shaft design
- Simple mechanical design with minimum moving components
- Designed to withstand drop onto shaft and shaft push-out forces

TOTALLY ENCAPSULATED ELECTRONICS

The J1 Line's electronics are 100% sealed in an automotive grade potting compound

- Provides protection from shock, vibration, and direct impact, as well as external contaminants and moisture
- Clear compound allows LED indicators to be clearly viewed for live feedback

AT-A-GLANCE SPECIFICATIONS

Connection options include but not limited to: M12, M12 Pigtail, M8, Terminal Block, Flying Lead Cable, and various Deutsch connectors

Available Incremental Outputs:
- Quadrature Single Ended
- Quadrature Differential
- Step and Direction
- J1939 CAN Bus

Available Absolute Position Outputs:
- SSI (Synchronous serial interface)
- Analog or Current Output
- PWM (Pulse width modulation)
- J1939 CAN Bus
- Modicon MODBUS

ZERO POWER Multi-turn Capable **Contact Joral for available Zero Power options**

Joral, LLC • 5050 South Towne Drive • New Berlin, WI 53151 • (262)522-3266 • www.JORALLLC.com

SHAFTED ROTARY POSITION SENSORS

STANDARD OPERATING CHARACTERISTICS

Encoder Output	Resolution	Characteristics
Quadrature Single Ended Incremental Output	**8 to 2048 PPR -** Standard Resolutions: 8, 10, 16, 20, 32, 40, 50, 64, 80, 100, 125, 128, 200, 250, 256, 400, 500, 512, 1024, 2048	**Format:** Two channel quadrature A and B outputs with index pulse Z **Driver:** 7272 push-pull driver
Quadrature Differential Incremental Output	**8 to 2048 PPR -** Standard Resolutions: 8, 10, 16, 20, 32, 40, 50, 64, 80, 100, 125, 128, 200, 250, 256, 400, 500, 512, 1024, 2048	**Format:** Two channel quadrature A and B outputs with index pulse Z and complementary outputs A', B', and Z' **Driver:** 7272 push-pull driver
Step and Direction Incremental Output	**16 to 512 PPR -** Standard Resolutions: 16, 32, 64, 128, 256, 512	**Format:** One channel STEP output and one channel DIRECTION output with Index pulse Z **Driver:** 7272 push-pull driver
SSI Absolute Position Output Absolute Output	**8192 Positions** 0.0439 degrees per position	**Format:** Clock and data output **Driver:** Differential Output
PWM Absolute Position Output Absolute Output	**1024 or 2048 Positions**	**Format:** Pulse Width Modulation in 1 µsec increments **Driver:** 7272 push-pull driver
Analog Voltage Absolute Position Absolute Output	**0 to 5 VDC** -OR- **4 to 20 mA** 10 bit internal resolution	**Format:** Output Voltage/Current proportional to 0-360 degrees **Output Loading:** 10mA max
J1939 CAN Bus Absolute or Incremental Output	**1000 or 8192 Positions -** see J1939 output pages for message information	**Format:** Standard SAE J1939 CAN Bus - One message for status, one message for settings

ELECTRICAL SPECIFICATIONS

Input Power	6 to 30 VDC at approximately 60mA max, not including output loads
Electrical Protection	Over-voltage, Reserve-voltage, Output short-circuit protected
LED Indicators	Power and output channel status
Connection Types	M8, M12, M12 on pigtail, Terminal block, Flying lead cable, Deutsch - 4 or 6 pin

ENVIRONMENTAL SPECIFICATIONS

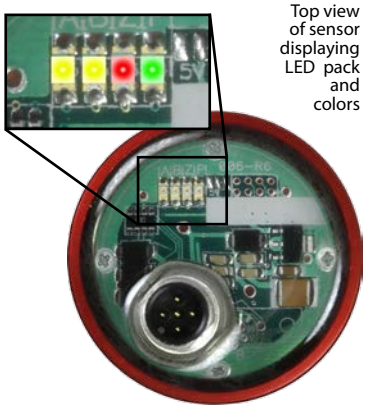
Operating Temperature	-30 to +80 degrees C
Storage Temperature	-40 to +100 degrees C
Humidity	100%
Vibration	5 to 3000 Hz, 20g (MIL STD 202)
Shock	400g 6msec (MIL STD 202)
Sensor Sealing	IP67 (connector Dependant) ***Terminal block not IP rated***

Shafted J140 w/ shell removed displaying total encapsulation

MECHANICAL SPECIFICATIONS

Housing Diameter	30mm, 40mm, 50mm, 58mm
Housing Material	Aluminum
Standard Shaft Diameter	6mm (w/ flat spot)
Standard Shaft Length	0.411 inches (10.44mm)
Shaft Material	Non-magnetic stainless steel
Bearings	Dual chrome ball-bearings
Max Speed	3000 RPM

Model	Housing Diam.	Weight	Height	Height w/ M12
J130	30mm	4 oz	1.49 inches (37.85mm)	2.15 inches (54.6mm)
J140	40mm	4 oz	1.7 inches (43.2mm)	2.13 inches (54.1mm)
J150	50mm	6 oz	1.53 inches (38.86mm)	2.08 inches (52.8mm)
J150 [63]	50mm w/ flange	7 oz	1.53 inches (38.86mm)	2.08 inches (52.8mm)
J158	58mm	8 oz	1.55 inches (39.4mm)	2.1 inches (53.3mm)



Top view of sensor displaying LED pack and colors

SHAFTED ROTARY POSITION SENSORS

J130/J140 J1 Line *shafted rotary position sensor*

- Multiple shaft and connector options available
- Shaft and captive bearing package resistant to shaft push out forces, withstands extreme mechanical vibration
- Extremely compact, J1939 capable
- LED indicators for power and output feedback
- 100% moisture resistant electronic package (IP67)
- Outputs: Quadrature, Step and Direction, SSI, PWM, Analog, Modicon MODBUS, & J1939 Can Bus

Above: 40mm Shafted (J140)
Below: 30mm Shafted (J130)

STANDARD OPERATING CHARACTERISTICS

ELECTRICAL	**Outputs**	**A - *[PPR]* - SEPP**	Incremental 13 bit Quadrature w/ Single Ended Output | A B Z
		A - *[PPR]* - DIPP	Incremental 13 bit Quadrature w/ Differential Output | A B Z & A' B' Z'
		A - 1939	J1939 13 bit @ 1000 positions (8192 positions max)
		B - PWM	PWM absolute position
		A - SSI1	SSI absolute position @ 8192 positions
		V1	Voltage Out / 5 VDC IN, 0-5 VDC OUT
		V2	Voltage Out / 6-36 VDC IN, 0-5 VDC OUT
		I1	Current Out / 0-24 VDC IN, 4-20 mA OUT
	Input Power		6 to 30 VDC at approx 60 mA max, *not including output loads*
	Electrical Protection		Over-voltage, reserve-voltage, output short-circuit protected
	LED Indicators		Power and output channels
	Connections		Terminal Plug, M8, M12, M12 Pigtail, Flying Lead Cable, Shielded Flying Lead, or Deutsch - 4 or 6 pin
	Resolution		0.3°
	Repeatability		0.30%
	Nonlinearity		<1%
MECHANICAL	**Housing Diameter**		30mm (J130) or 40mm (J140)
	Housing Material		Aluminum
	Housing Height		J130 - 1.49" body; 2.15" w/ M12 (and) J140 - 1.7" body; 2.13" w/ M12
	Mounting		Mounting holes or servo groove
	Weight		J130 & J140 - 4 oz
	Shaft Form Factor		6mm w/ flat, Extended 6mm w/ flat, 1/4" (0.250") w/ flat, 10mm round, 3/8" slotted, Extended 3/8" slotted
	Shaft Material		Non-magnetic stainless steel
	Bearing Material		Dual chrome ball-bearings
	Shaft Speed		3000 RPM max
ENVIRONMENTAL	**Operating Temperature**		-30° to +80° C
	Storage Temperature		-40° to +90° C
	Humidity		100%
	Shock		400g/6ms *(MIL STD 202)*
	Vibration		5 to 3000 Hz, 20g *(MIL STD 202)*
	Protection Class		IP67 *(connection dependent)*

General ordering guide found on next page (S1 ; I2 / 2)

J130/J140 GENERAL ORDERING GUIDE

Build part number first by selecting **Housing Style** (code 1), **MagElec** (code 2), and **Connection** (code 3). Add **Special Codes** (code 4) to the end of the Joral part number. Refer to **'Special Part Number Information'** for explanation of modifiers.

Examples:
- **J130-A-0512-SEPP-M12-42** - 30mm Red aluminum (J130), 3/8" slotted shaft (modifier 42), 13 bit incremental quadrature @ 512 PPR
- **J140-A-1939-SC72-90** - 40mm Red aluminum (J140), 72" Shielded cable (SC72), 13 bit J1939 @ 8192 counts per rotation (modifier 90)
- **J130-V1-0-270-0-5-CW-C72** - Red aluminum (J130), 72" Cable (C72), 5v input (V1) @ 0-270°, 0v to 5v out, clockwise direction (CW)

Code 1: Housing Style	Code 2: MagElec (Sensor Output)		Code 3: Connection		Code 4: Special Codes	
J130 J130 = 30mm shafted made out of red aluminum, Connector orientation BACK EXIT only.	**A - _ _ _ _ - SEPP**	13 bit single ended quadrature - A B Z	**TRM**	Pluggable Terminal block	**40**	1/4" (0.250") w/ flat
			INS	Wire insertion terminal	**41**	10mm round
	A - _ _ _ _ - DIPP	13 bit differential quadrature - A B Z, A' B' Z'	**M8**	M8 male	**42**	3/8" slotted
			M12	M12 male	**43**	Extended 3/8" slotted
J140 J140 = 40mm shafted made out of red aluminum, Connector orientation BACK EXIT only.	**A - 1939**	13 bit J1939 @ 1000 positions	**M12P**	M12 male on 18' pigtail	**44**	Extended 6mm w/ flat
			CXX	Flying lead cable (enter XX as inches)	**45**	6mm w/ flat
	B - PWM	Absolute position PWM			**51**	Red aluminum
	A - SSI1	Absolute position SSI @ 8192 positions	**SCXX**	Shielded cable (enter XX as inches)	**53**	Black aluminum
					90	13 bit @ 8192 counts per rotation (Typical J1939 option)
**** More outputs and connection options available, contact Joral if desired configuration is not listed***	**V1**	5 VDC IN, 0-5 VDC OUT	**CSP**	Cable with custom end		
	V2	6-36 VDC IN, 0-5 VDC OUT	**DE4**	DT04 - 4 pin male Deutsch		
	I1	0-24 VDC IN, 4-20 mA OUT	**DE6**	DT04 - 6 pin male Deutsch		

Special Part Number Information *Review below code sections for important P/N build information*

Code 1: Housing Style

- **J130** - 30mm, Red aluminum / Back exit connections only
- **J140** - 40mm, Red aluminum / Back exit connections only

Code 2: MagElec

(A - _ _ _ _ - SEPP) or **(A - _ _ _ _ - DIPP)**

- Enter Quadrature PPR in place of _ _ _ _
- A = 13 bit PPR
- **Available 13 bit PPR:** 0008, 0010, 0016, 0020, 0025, 0032, 0040, 0050, 0064, 0080, 0100, 0125, 0128, 0200, 0250, 0256, 0400, 0500, 1024, 2048

A - 1939

- Standard J1939 output is 1000 positions
- A = 13 bit
- **MODIFIER 90 -** for 8192 positions (max resolution) add code 90 to end of J130/J140 P/N

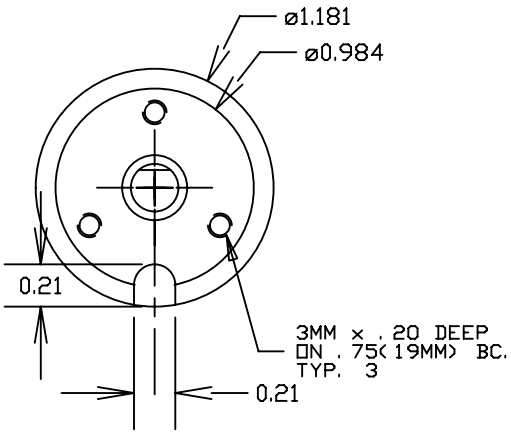
V1, V2, and **I1** (Analog MagElec P/N Guide)

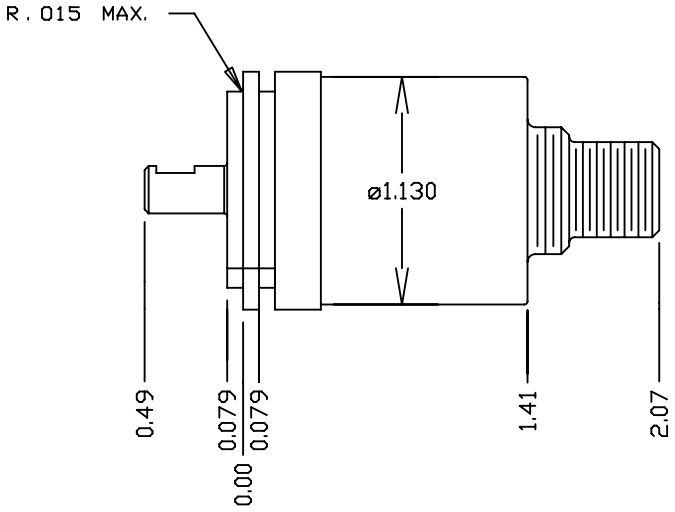
- First select MagElec code **(V1, V2 or I1)** then Angle Range **(A1-A2),** Voltage Range **(VR1-VR2)** and Signal Direction **(Clockwise [CW] or Counter [CCW])**
- **PART NUMBER FORMULA** (MagElec)-(A1-A2)-(VR1-VR2)-(CW or CCW)
- **EXACT V1, V2, and I1 EXAMPLES**
  J130 - **V1 - 0-360 - 0.5-4.5 - CW** - C72
  J140 - **V2 - 0-180 - 0-5 - CCW** - DE4
  J130 - **I1 - 180-270 - 4-20 - CW** - M12

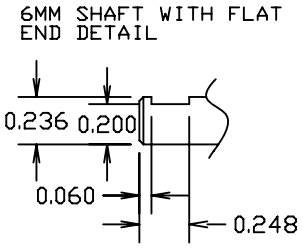
Code 3: Connections

- **All Outputs, All Connections** - Connector exit back exit only (sensor epoxy side) for housing style J130 and J140
- **J1939 Output** - Addressing via varying value resistor in connection requires at least five conductors *(M12, DE6 and Cables addressing compatible)*
- **All Outputs w/ Deutsch -** DE4 and DE6 connection Deutsch connectors add $20 to J130/J140 list

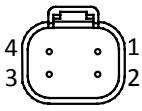
J130 DIMENSIONS & GENERAL PIN OUTS







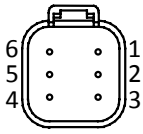
DT04-4P MALE FACE VIEW



DT04-4P J1939 OUTPUT

1 = YEL = CAN HIGH
2 = GRN = CAN LOW
3 = RED = +VDC (VIN)
4 = BLK = COMMON/GROUND

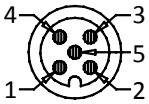
DT04-6P MALE FACE VIEW



DT04-6P J1939 OUTPUT

1 = YEL = CAN HIGH
2 = GRN = CAN LOW
3 = RED = +VDC (VIN)
4 = BLK = ADDRESS GROUND
5 = WHT = ADDRESS PROG. RESISTOR
6 = BLK = COMMON/GROUND

M12-5P MALE FACE VIEW



M12-5P/CABLE/FLYING LEAD QUADRATURE OUTPUT

1 = BRN = +VDC (VIN)
2 = WHT = CHANNEL B
3 = BLUE = COMMON/GROUND
4 = BLK = CHANNEL A
5 = GRY = CHANNEL Z

M12-5P AND 5 CONDUCTOR CABLE J1939 OUTPUT

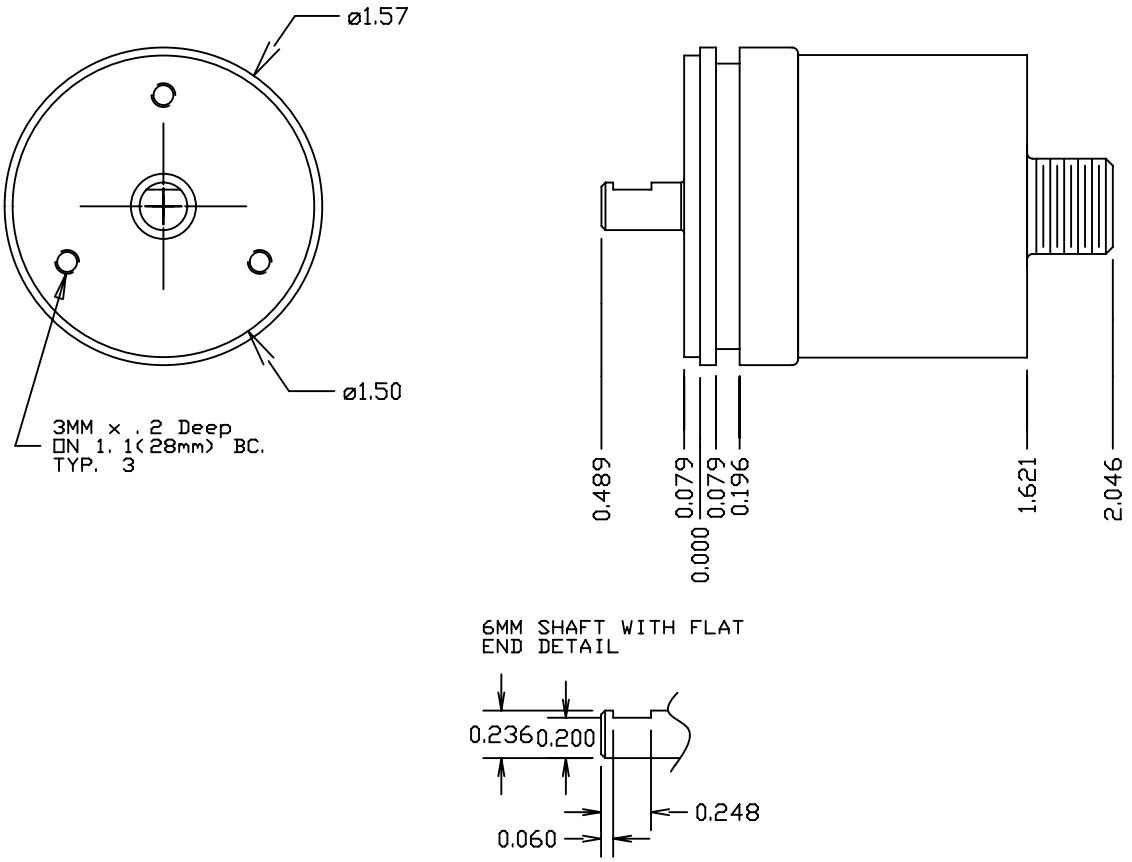
1 = BRN = +VDC (VIN)
2 = WHT = CAN HIGH
3 = BLUE = COMMON/GROUND
4 = BLK = CAN LOW
5 = GRY = OPTIONAL ADDRESS PROGRAMMING RESISTOR

M12-5P/CABLE/FLYING LEAD PROPORTIONAL (ANALOG) OUTPUT

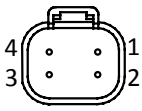
1 = BRN = +VDC (VIN)
2 = WHT = DIG. LIMIT OUT*
3 = BLUE = COMMON/GROUND
4 = BLK = PROP. VDC OUTPUT
5 = GRY = NOT USED
**OPTION CONSULT FACTORY*

Dimensions informative only
For most recent dimensions please consult factory

J140 DIMENSIONS & GENERAL PIN OUTS



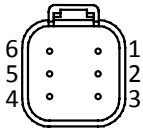
DT04-4P MALE FACE VIEW



DT04-4P J1939 OUTPUT

1 = YEL = CAN HIGH
2 = GRN = CAN LOW
3 = RED = +VDC (VIN)
4 = BLK = COMMON/GROUND

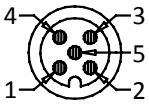
DT04-6P MALE FACE VIEW



DT04-6P J1939 OUTPUT

1 = YEL = CAN HIGH
2 = GRN = CAN LOW
3 = RED = +VDC (VIN)
4 = BLK = ADDRESS GROUND
5 = WHT = ADDRESS PROG. RESISTOR
6 = BLK = COMMON/GROUND

M12-5P MALE FACE VIEW



M12-5P/CABLE/FLYING LEAD QUADRATURE OUTPUT

1 = BRN = +VDC (VIN)
2 = WHT = CHANNEL B
3 = BLUE = COMMON/GROUND
4 = BLK = CHANNEL A
5 = GRY = CHANNEL Z

M12-5P AND 5 CONDUCTOR CABLE J1939 OUTPUT

1 = BRN = +VDC (VIN)
2 = WHT = CAN HIGH
3 = BLUE = COMMON/GROUND
4 = BLK = CAN LOW
5 = GRY = OPTIONAL ADDRESS PROGRAMMING RESISTOR

M12-5P/CABLE/FLYING LEAD PROPORTIONAL (ANALOG) OUTPUT

1 = BRN = +VDC (VIN)
2 = WHT = DIG. LIMIT OUT*
3 = BLUE = COMMON/GROUND
4 = BLK = PROP. VDC OUTPUT
5 = GRY = NOT USED
**OPTION CONSULT FACTORY*

Dimensions informative only
For most recent dimensions please consult factory

SHAFTED ROTARY POSITION SENSORS

J150/J158 J1 Line *shafted rotary position sensor*

- 100% moisture resistant electronic package (IP67)
- Multiple shaft and connector options available
- Shaft and captive bearing package resistant to shaft push out forces, withstands extreme mechanical vibration
- LED indicators for power and output feedback
- Incremental or Absolute position
- Outputs: Quadrature, Step and Direction, SSI, PWM, Analog, Modicon MODBUS, & J1939 Can Bus

Left: 58mm Shafted (J158)
Right: 50mm Shafted (J150)

STANDARD OPERATING CHARACTERISTICS

ELECTRICAL	**Outputs**	**A - *[PPR]* - SEPP**	Incremental 13 bit Quadrature w/ Single Ended Output | A B Z
		A - *[PPR]* - DIPP	Incremental 13 bit Quadrature w/ Differential Output | A B Z & A' B' Z'
		A - 1939	J1939 13 bit @ 1000 positions (8192 positions max)
		A - MOD1	Modicon MODBUS @ 8192 positions
		B - PWM	PWM absolute position
		A - SSI1	SSI absolute position @ 8192 positions
		V1	Voltage Out / 5 VDC IN, 0-5 VDC OUT *(code V3 for 2x redundant output)*
		V2	Voltage Out / 6-36 VDC IN, 0-5 VDC OUT
		I1	Current Out / 0-24 VDC IN, 4-20 mA OUT *(code I1 for 2x redundant output)*
	Input Power		6 to 30 VDC at approx 60 mA max, *not including output loads*
	Electrical Protection		Over-voltage, reserve-voltage, output short-circuit protected
	LED Indicators		Power and output channels
	Connections		Terminal Plug, M8, M12, M12 Pigtail, Flying Lead Cable, Shielded Flying Lead, or Deutsch - 4 or 6 pin
	Resolution		0.3°
	Repeatability		0.30%
	Nonlinearity		<1%
MECHANICAL	**Housing Diameter**		50mm (J150) or 58mm (J158)
	Housing Material		Aluminum
	Housing Height		J150 - 1.53" body; 2.1" w/ M12 (and) J158 - 1.55" body; 2.1" w/ M12
	Mounting		Mounting holes or servo groove
	Weight		J150 - 6 oz / J158 - 8 oz
	Shaft Form Factor		6mm w/ flat, Extended 6mm w/ flat, 1/4" (0.250") w/ flat, 10mm round, 3/8" slotted, Extended 3/8" slotted
	Shaft Material		Non-magnetic stainless steel
	Bearing Material		Dual chrome ball-bearings
	Shaft Speed		3000 RPM max
ENVIRONMENTAL	**Operating Temperature**		-30° to +80° C
	Storage Temperature		-40° to +90° C
	Humidity		100%
	Shock		400g/6ms *(MIL STD 202)*
	Vibration		5 to 3000 Hz, 20g *(MIL STD 202)*
	Protection Class		IP67 *(connection dependent)*

General ordering guide found on next page (S1 ; I3 / 2)

J150/J158 GENERAL ORDERING GUIDE

Build part number first by selecting **Housing Style** (code 1), **MagElec** (code 2), and **Connection** (code 3). Add **Special Codes** (code 4) to the end of the Joral part number. Refer to **'Special Part Number Information'** for explanation of modifiers.

Examples: **J150-A-0080-SEPP-M12-41** - 50mm Red aluminum (J150), 10mm round shaft (modifier 41), 13 bit incremental quadrature @ 80 PPR

J150-A-1939-SC72-90 - 50mm Red aluminum (J150), 72" Shielded cable (SC72), 13 bit J1939 @ 8192 counts per rotation (modifier 90)

J158-V1-0-180-0-5-CW-C72 - 58mm Red alu. (J158), 72" Cable (C72), 5v input (V1) @ 0-180°, 0v to 5v out, clockwise direction (CW)

Code 1: Housing Style	Code 2: MagElec (Sensor Output)		Code 3: Connection		Code 4: Special Codes	
J150 J150 = 50mm shafted made out of red aluminum, Connector orientation BACK EXIT only.	**A - _ _ _ _ - SEPP**	13 bit single ended quadrature - A B Z	**TRM**	Pluggable Terminal block	**40**	1/4" (0.250") w/ flat
			INS	Wire insertion terminal	**41**	10mm round
	A - _ _ _ _ - DIPP	13 bit differential quadrature - A B Z, A' B' Z'	**M8**	M8 male	**42**	3/8" slotted
			M12	M12 male	**43**	Extended 3/8" slotted
Modifier Flange Mount: Special Code - 63 Add special code 63 to the end of J150 P/N for flange mount *Flange drawing found on S1; I3 / 4*	**A - 1939**	13 bit J1939 @ 1000 positions	**M12P**	M12 male on 18' pigtail	**44**	Extended 6mm w/ flat
			CXX	Flying lead cable (enter XX as inches)	**45**	6mm w/ flat
	B - PWM	Absolute position PWM			**51**	Red aluminum
	A - MOD1	13 bit Modicon MODBUS @ 8192 positions	**SCXX**	Shielded cable (enter XX as inches)	**53**	Black aluminum
					63	Flange Mount
J158 J158 = 58mm shafted made out of red aluminum, Connector orientation BACK EXIT only.	**A - SSI1**	Absolute position SSI @ 8192 positions	**CSP**	Cable with custom end	**90**	13 bit @ 8192 counts per rotation (Typical J1939 option)
			DE4	DT04 - 4 pin male Deutsch		
	V1	5 VDC IN, 0-5 VDC OUT	**DE6**	DT04 - 6 pin male Deutsch		
	V2	6-36 VDC IN, 0-5 VDC OUT			**91**	13 bit @ 1000 counts per rotation (Typical MODBUS option)
	V3	0-24 VDC IN, 4-20 mA OUT x2 (Redundant output)				
**** More outputs and connection options available, contact Joral if desired configuration is not listed***	**I1**	0-24 VDC IN, 4-20 mA OUT				
	I2	0-24 VDC IN, 4-20 mA OUT x2 (Redundant output)				

Special Part Number Information *Review below code sections for important P/N build information*

Code 1: Housing Style

- **Modifier 63** - For flange mount (J150 only) add code 63 to end of Joral P/N
- **J150** - 50mm, Red aluminum / Back exit connections only
- **J158** - 58mm, Red aluminum / Back exit connections only

Code 2: MagElec

(A - _ _ _ _ - SEPP) or **(A - _ _ _ _ - DIPP)**

- Enter Quadrature PPR in place of _ _ _ _
- A = 13 bit PPR
- **Available 13 bit PPR:** 0008, 0010, 0016, 0020, 0025, 0032, 0040, 0050, 0064, 0080, 0100, 0125, 0128, 0200, 0250, 0256, 0400, 0500, 1024, 2048

A - 1939

- Standard J1939 output is 1000 positions
- A = 13 bit
- **MODIFIER 90 -** for 8192 positions (max resolution) add code 90 to end of J150/J158 P/N

A - MOD1

- Standard MOD1 output is 8192 positions
- A = 13 bit
- **MODIFIER 91 -** for 1000 positions add code 91 to end of J150/J158 P/N

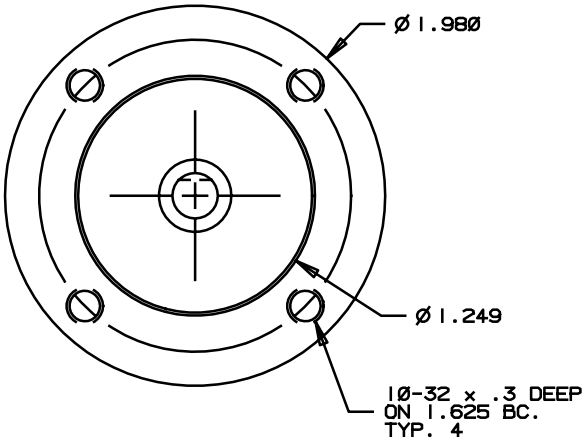
V1, V2, and **I1** (Analog MagElec P/N Guide)

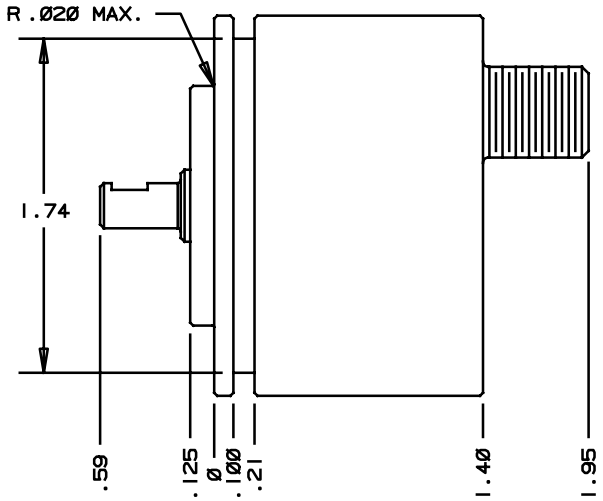
- First select MagElec code **(V1, V2 or I1)** then Angle Range **(A1-A2),** Voltage Range **(VR1-VR2)** and Signal Direction **(Clockwise [CW] or Counter [CCW])**
- **PART NUMBER FORMULA** (MagElec)-(A1-A2)-(VR1-VR2)-(CW or CCW)
- **EXACT V1, V2, and I1 EXAMPLES**
  J150 - **V1 - 0-360 - 0.5-4.5 - CW** - C72
  J158 - **V2 - 0-180 - 0-5 - CCW** - DE4
  J158 - **I1 - 180-270 - 4-20 - CW** - M12

Code 3: Connections

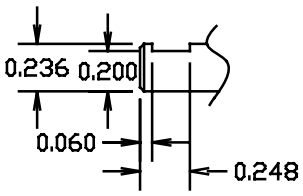
- **All Outputs, All Connections** - Connector exit back exit only (sensor epoxy side) for housing style J150 and J158
- **J1939 Output** - Addressing via varying value resistor in connection requires at least five conductors *(M12, DE6 and Cables addressing compatible)*
- **All Outputs w/ Deutsch -** DE4 and DE6 connection Deutsch connectors add $20 to J150/J158 list

J150 DIMENSIONS & GENERAL PIN OUTS

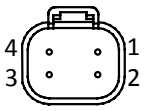




6MM SHAFT WITH FLAT
END DETAIL



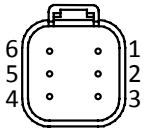
DT04-4P MALE
FACE VIEW



DT04-4P J1939 OUTPUT

1 = YEL = CAN HIGH
2 = GRN = CAN LOW
3 = RED = +VDC (VIN)
4 = BLK = COMMON/GROUND

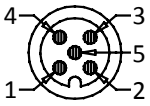
DT04-6P MALE
FACE VIEW



DT04-6P J1939 OUTPUT

1 = YEL = CAN HIGH
2 = GRN = CAN LOW
3 = RED = +VDC (VIN)
4 = BLK = ADDRESS GROUND
5 = WHT = ADDRESS PROG. RESISTOR
6 = BLK = COMMON/GROUND

M12-5P MALE
FACE VIEW



M12-5P/CABLE/FLYING LEAD QUADRATURE OUTPUT

1 = BRN = +VDC (VIN)
2 = WHT = CHANNEL B
3 = BLUE = COMMON/GROUND
4 = BLK = CHANNEL A
5 = GRY = CHANNEL Z

M12-5P AND 5 CONDUCTOR CABLE J1939 OUTPUT

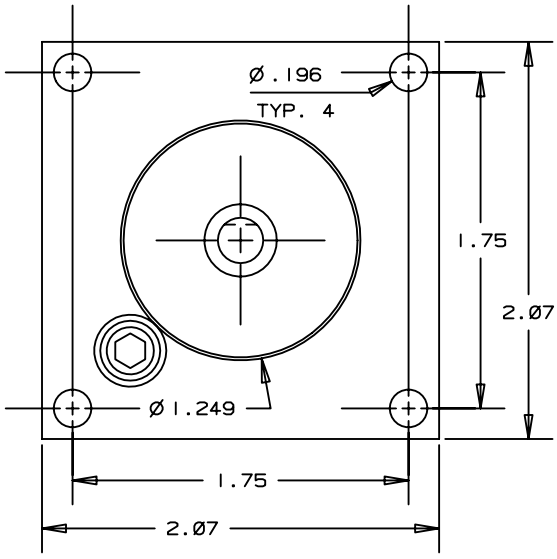
1 = BRN = +VDC (VIN)
2 = WHT = CAN HIGH
3 = BLUE = COMMON/GROUND
4 = BLK = CAN LOW
5 = GRY = OPTIONAL ADDRESS PROGRAMMING RESISTOR

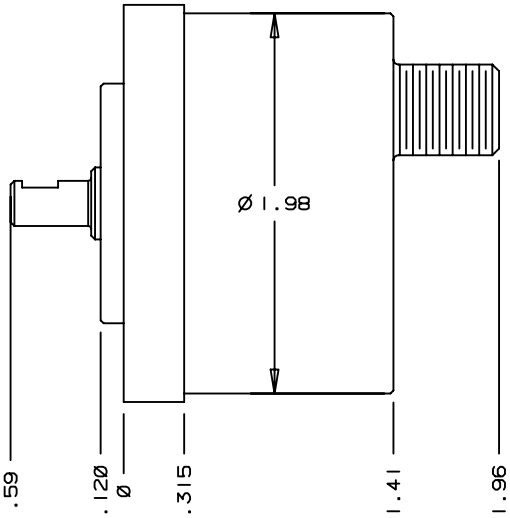
M12-5P/CABLE/FLYING LEAD PROPORTIONAL (ANALOG) OUTPUT

1 = BRN = +VDC (VIN)
2 = WHT = DIG. LIMIT OUT*
3 = BLUE = COMMON/GROUND
4 = BLK = PROP. VDC OUTPUT
5 = GRY = NOT USED
**OPTION CONSULT FACTORY*

Dimensions informative only
For most recent dimensions please consult factory

J150 FLANGE DIMENSIONS & GENERAL PIN OUTS

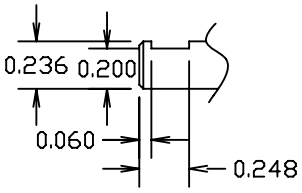




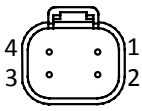
For Flange mount add special code 63 to end of Joral P/N

Example:
J150-A-0080-SEPP-M12-**63**

6MM SHAFT WITH FLAT END DETAIL

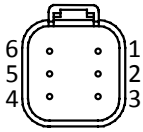


DT04-4P MALE FACE VIEW



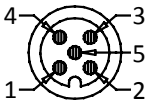
DT04-4P J1939 OUTPUT
1 = YEL = CAN HIGH
2 = GRN = CAN LOW
3 = RED = +VDC (VIN)
4 = BLK = COMMON/GROUND

DT04-6P MALE FACE VIEW



DT04-6P J1939 OUTPUT
1 = YEL = CAN HIGH
2 = GRN = CAN LOW
3 = RED = +VDC (VIN)
4 = BLK = ADDRESS GROUND
5 = WHT = ADDRESS PROG. RESISTOR
6 = BLK = COMMON/GROUND

M12-5P MALE FACE VIEW



M12-5P/CABLE/FLYING LEAD QUADRATURE OUTPUT
1 = BRN = +VDC (VIN)
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M12-5P AND 5 CONDUCTOR CABLE J1939 OUTPUT
1 = BRN = +VDC (VIN)
2 = WHT = CAN HIGH
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4 = BLK = CAN LOW
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M12-5P/CABLE/FLYING LEAD PROPORTIONAL (ANALOG) OUTPUT
1 = BRN = +VDC (VIN)
2 = WHT = DIG. LIMIT OUT*
3 = BLUE = COMMON/GROUND
4 = BLK = PROP. VDC OUTPUT
5 = GRY = NOT USED
**OPTION CONSULT FACTORY*

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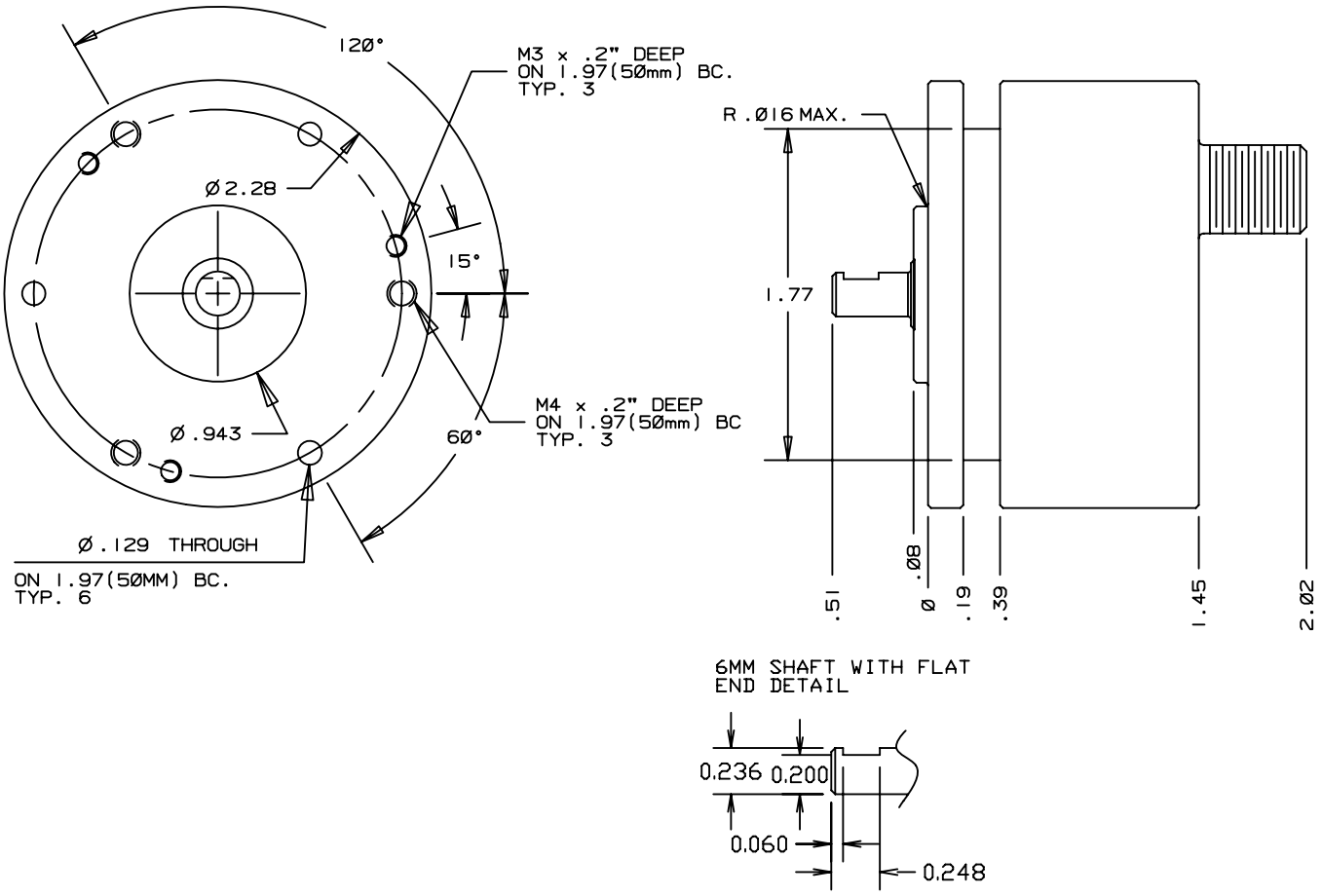
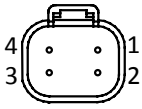
J158 DIMENSIONS & GENERAL PIN OUTS



DT04-4P MALE FACE VIEW



DT04-4P J1939 OUTPUT

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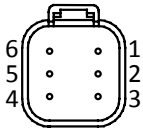
2 = GRN = CAN LOW
3 = RED = +VDC (VIN)
4 = BLK = COMMON/GROUND

DT04-6P MALE FACE VIEW



DT04-6P J1939 OUTPUT

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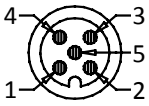
2 = GRN = CAN LOW
3 = RED = +VDC (VIN)
4 = BLK = ADDRESS GROUND
5 = WHT = ADDRESS PROG. RESISTOR
6 = BLK = COMMON/GROUND

M12-5P MALE FACE VIEW



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M12-5P/CABLE/FLYING LEAD PROPORTIONAL (ANALOG) OUTPUT

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**OPTION CONSULT FACTORY*

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