Model WPT/E_/S

User Manual

Michigan Scientific Corporation

Michigan Scientific Corporation
8500 Ance Road
Charlevoix, MI 49720

Revision Date: 10/27/2021 8:47 a.m. selindbeck

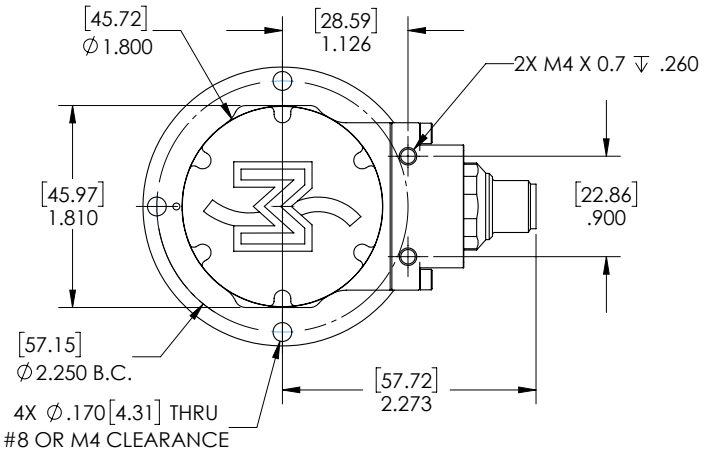
Contents

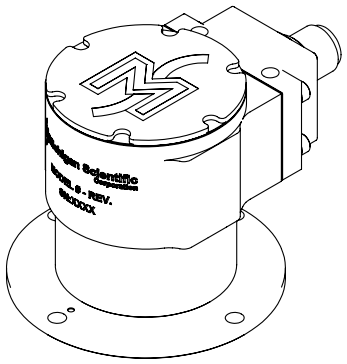
High Resolution Wheel Pulse Transducer...

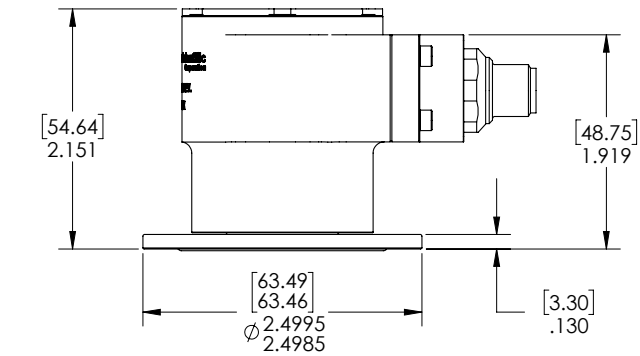
- Contains precision electronics in a rugged housing
- Measures rotational velocity, angular position, and direction of rotation
- Used to determine wheel speed, acceleration, distance, and vehicle speed for GPS and map validation
- Mounts directly to production wheel
- Can be adapted to mount on many different vehicles

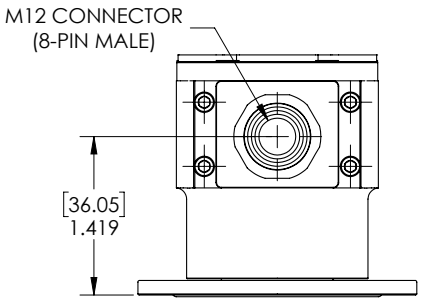
Specifications

Electrical Specifications	
Input Voltage	+5 to +20 Vdc
Input Current	60 mA
Output Type	0-5 V TTL
Reverse Voltage Protection	20 V
Encoder Accuracy (Maximum Cumulative Error)	0.25°
Mechanical Specifications	
Size (W x D x H)	2.50 x 2.15 x 3.52 in (63.5 x 54.61 x 89.4 mm)
Weight (Sensor Only)	14.5 oz (410 g)
Temperature Range	Up to 2000 ppr: -40° C to 100° C (-40° F to 212° F) 2000 ppr and up: -25° C to 100° C (-13° F to 212° F)
Protection Rating	IP67, NEMA 6
Maximum Speed With Seals	3,000 rpm
Maximum Speed Without Seals	Under 2,000 ppr: 10,000 rpm Above 2,000 ppr: 8,500 rpm
Unit Torque With Seals	21 in-oz
Unit Torque Without Seals	3 in-oz





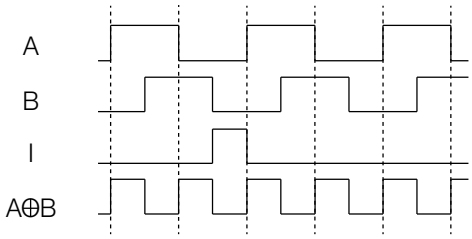




Encoder Output

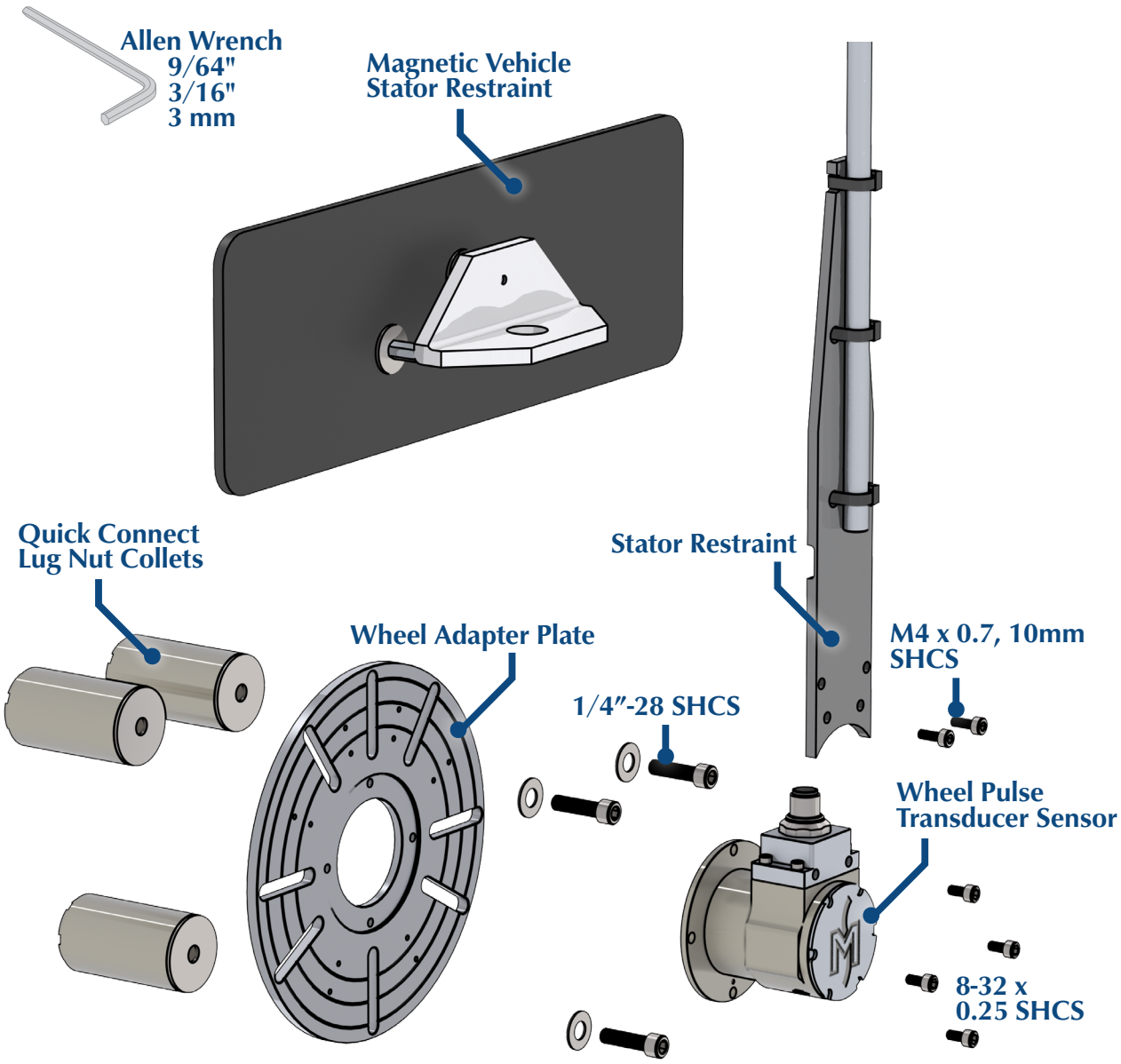
Optical encoder resolutions ranging from 50 to 5,000 are offered. All encoder choices have four outputs. Outputs A and B are in quadrature, meaning they are 90° out of phase. Output I is an index pulse. Output A⊕B is the exclusive OR of A and B, which doubles the basic resolution of the encoder. The outputs, 0 to 5 volt pulses, can drive TTL loads.

Encoder Outputs



Pin	Channel	Color
1	5-20 Vdc	
2	Ground	
3	A Out	
4	B Out	
5	I Out	
6	A⊕B Out	

Installation



Mounting Plate Installation

1. Remove the 1/4"-28 socket head cap screw (SHCS) and small washer from the top of the Quick Connect Lug Nut Collets.
2. Place the Quick Connect Lug Nut Collets on the back side of the plate, keeping the large washer between the top of the collet and the plate.
3. Align the collets with the respective slots based on the total number of lugs.
4. Install the screw and washer through the plate and into the collet, but do not tighten the screw yet.

5. Attach the Quick Connect Lug Nut Collets to the vehicle lug nuts and tighten the screws until snug.

6. Using the concentric rings etched on the wheel plate as a guide, adjust the plate until it is centered on the wheel.

7. After the plate is centered, torque the screws to 75 in-lb (8.5 Nm).

Magnetic Vehicle Stator Restraint (MVSR)

1. Assemble the MVSR by threading the stand-offs into the plastic bracket.

2. Insert the 8-32 flat head screws through the back of the magnetic sheet into the threaded stand-offs.

3. Attach the MVSR to the body of the vehicle near the wheel so that the centerline of the magnetic sheet lines up with the center axis of the wheel.

Optional: Apply waterproof tape around the edges of the magnet on the vehicle to increase holding strength.

Wheel Pulse Transducer (WPT) Sensor

1. Pilot the rotor of the WPT sensor to the mounting plate.

2. Install four 8-32 x 0.25 in SHCS to the rotor and mounting holes.

3. Torque the screws to 22 in-lb (2.5 Nm).

Stator Restraint

1. Insert the end of the stator restraint tube into the hole in the MVSR.

2. Attach the plastic end of the stator restraint to the end of the encoder module using two M4 x 0.7, 10 mm length SHCS.

3. Torque screws to 25 in-lb (2.8 Nm).

Optional: Measure and record the angle of the stator restraint tube under static conditions.

Notes

It may be useful to use an angular measuring device to confirm that the magnetic sheet is properly aligned with the center axis of the wheel.

Stator Cable

1. Attach the female connector end on the stator cable to the male connector on the WPT sensor.
2. Route the stator cable along the stator restraint tube, securing it with zip-ties.
3. Secure the cable to the body of the vehicle.
4. Wrap fusion tape around the connector and receptacle.

Notes

Do not route the cable through the MVSR.

Leave enough slack in the cable to accommodate the full wheel travel. The cable must be routed so that the bend radius of the cable is greater than 2.25 in [57 mm] for the entire travel of the wheel.

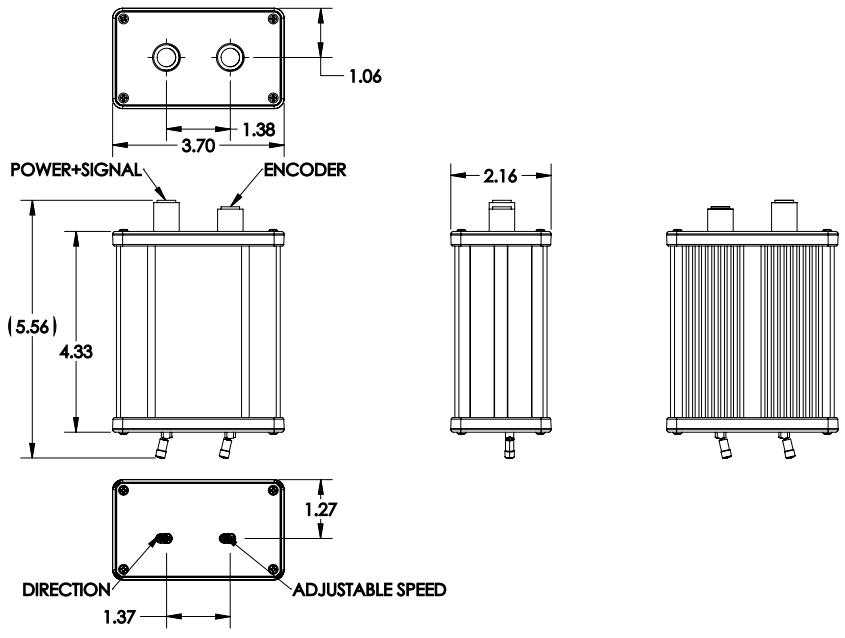
Fully-installed example

Encoder Signal Conditioners

Michigan Scientific Corporation manufacturers encoder signal conditioners which can be used to convert the digital pulses of the WPT sensor encoder to other signal formats. The EC-LV can be added in-line with the stator cable and does not require any additional programming. The EC-LV converts digital pulses to linear voltages.

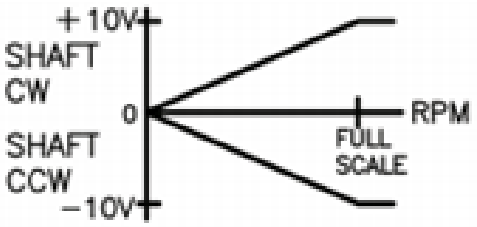
Specifications

Electrical Specifications	
Input Voltage	+5 to +20 Vdc
Maximum Input Current	270 mA
Output Type (Angular Position)	0-10 Vdc
Output Type (Angular Velocity)	± 10 Vdc
Output Type (Sine-Cosine)	10 V peak-to-peak
Reverse Voltage Protection	20 Vdc
Mechanical Specifications	
Size (W x D x H)	5.6 x 3.7 x 2.2 in (142 x 94 x 56 mm)
Weight	12.4 oz (351 g)
Temperature Range	-40 °F to 212 °F (-40 °C to 100 °C)
Protection Rating	IP40

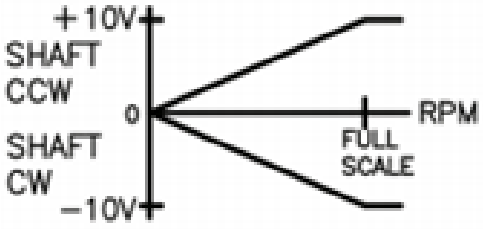


EC-LV Linear Voltage Conditioner

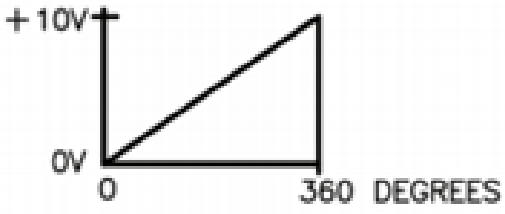
The EC-LV conditioner converts 0-5 V digital pulses to linear voltages proportional to angular position and angular velocity. The external switches allow the user to select the speed range and direction of rotation. It outputs angular position and velocity signals in addition to the encoder signals.



VELOCITY OUTPUT WITH
OPTION PIN #2 OPEN



VELOCITY OUTPUT WITH
OPTION PIN #2 GROUNDED



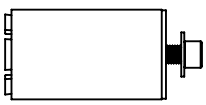
POSITION OUTPUT
(0 IS AT INDEX PULSE)

Quick Connect Lug Nut Collet Extensions

Michigan Scientific offers a wide variety of Quick Connect Lug Nut Collets that mount wheel adapter plates directly to a vehicle's original lug nuts. The table below shows the standard sizes available.

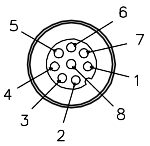
Quick Connect Collet Lug Nut Extension Specifications

Model	Min. Lug Size (inch [mm])	Max. Lug Size (inch [mm])	Available Lengths (inch [mm])	Outside Diameter (inch [mm])
AAA	0.560 [14.2]	0.625 [15.9]	1.625, 2.500 [41.3], [63.5]	0.945 [24.8]
AA	0.625 [15.9]	0.688 [17.5]	1.625, 2.500 [41.3], [63.5]	0.945 [24.8]
A	0.688 [17.5]	0.75 [19.1]	1.470, 1.625, 2.000, 3.000 [37.3], [41.3], [50.8], [76.2]	1.100 [27.9]
AB	0.728 [18.5]	0.787 [20.0]	1.625 [41.3]	1.125 [28.6]
BB	0.765 [19.4]	0.825 [21.0]	2.125, 3.000 [54.0], [76.2]	1.270 [32.3]
B	0.813 [20.7]	0.875 [22.2]	2.125, 3.000 [54.0], [76.2]	1.270 [32.3]
B-SS	0.813 [20.7]	0.875 [22.2]	2.125 [54.0]	1.220 [31.0]
CCC	0.875 [22.2]	0.938 [23.8]	2.125, 3.000 [54.0], [76.2]	1.302 [33.1]
CC	0.921 [23.4]	0.984 [25.0]	2.125, 3.000 [54.0], [76.2]	1.470 [37.3]
C	1.000 [25.4]	1.063 [27.0]	2.125, 3.000 [54.0], [76.2]	1.470 [37.3]
DD	1.125 [28.6]	1.188 [30.2]	3.000 [76.2]	1.630 [47.4]
D	1.250 [31.8]	1.310 [33.3]	2.875 [73.0]	1.850 [47.0]
D-HS	1.250 [31.8]	1.310 [33.3]	3.250 [82.6]	1.875 [47.6]
DF	1.475 [37.5]	1.535 [39.0]	3.250 [82.6]	2.186 [55.6]
F	1.563 [38.3]	1.625 [41.3]	3.250 [82.6]	2.186 [55.6]



Quick Connect Lug Nut Collet

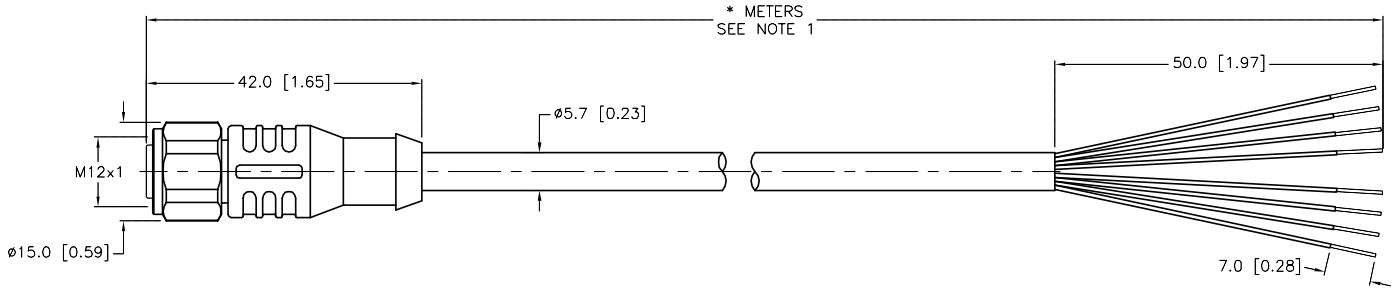
FEMALE END VIEW



1 = WHITE
2 = BROWN
3 = GREEN
4 = YELLOW
5 = GRAY
6 = PINK
7 = BLUE
8 = RED

SPECIFICATIONS

CONTACT CARRIER MATERIAL	NYLON OR TPU
MOLDED HEAD MATERIAL/COLOR	TPU/YELLOW
CONTACT MATERIAL/PLATING	BRASS/GOLD
COUPLING NUT MATERIAL/FINISH	STAINLESS STEEL/PASSIVATED
RATED CURRENT [A]	2.0 A
RATED VOLTAGE [V]	60 VAC/75 VDC
OUTER CABLE JACKET MATERIAL/COLOR	TPU/GRAY
CONDUCTOR INSULATION MATERIAL	PVC
NUMBER OF CONDUCTORS [AWG]	8x24 AWG
TEMPERATURE RANGE	−40°C to +90°C (−40°F to +194°F)
PROTECTION CLASS	NEMA 1,3,4,6P AND IEC IP68, IP69K



CABLE LENGTH	TOLERANCE*
ALL LENGTHS	+ 4% (OR 50mm) OF LENGTH − 0% (OR 0mm) OF LENGTH WHICHEVER IS GREATER
STRIP LENGTH	**TOLERANCE***
0–7mm	±0.5mm
8–29mm	±1.0mm
30–49mm	±2.0mm
50–69mm	±3.0mm
70–100mm	±4.0mm
OVER 100mm	±5.0mm
* UNLESS OTHERWISE SPECIFIED	

NOTES:

1. "*" INDICATES CABLE LENGTH IN METERS. CONTACT TURCK TO ORDER SPECIFIC LENGTHS.

2. "/S90" DESIGNATES POLYURETHANE (TPU) CABLE.

SOURCE DRAWING - FOR REFERENCE ONLY

REV	DESCRIPTION	BY	DATE	ECO NO.
D	DRAWING PROCESSED AS PART OF ECO 33971	CBM	04/06/11	33971

RELATED DOCUMENTS
1.
2.
3.
4.

MATERIAL: SEE SPECIFICATIONS

FINISH: SEE SPECIFICATIONS

3RD ANGLE PROJECTION

ALL DIMENSIONS DISPLAYED ON THIS DRAWING ARE FOR REFERENCE ONLY

CONTACT TURCK FOR MORE INFORMATION

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High Technology Sensors and Automation Controls
3000 CAMPUS DRIVE
MINNEAPOLIS, MN 55441
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DRFT: RWC
DATE: 06/01/07
DSGN:
SCALE: 1=1.0

UNIT OF MEASUREMENT
MILLIMETER [INCH]
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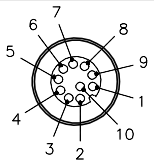
DESCRIPTION: RKCV 8T-*/S90
IDENTIFICATION NO.:
REV: D
FILE: 777010369
SHEET 1 OF 1

FEMALE END VIEW



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SPECIFICATIONS

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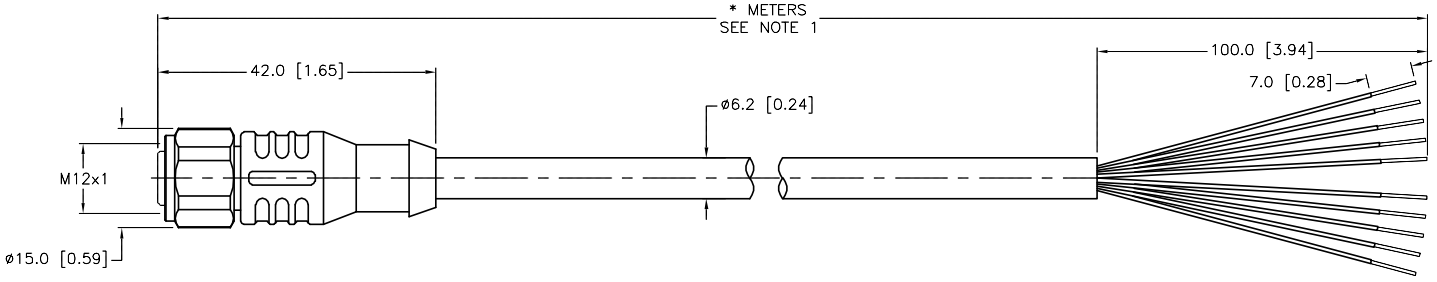

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2. "/S90" DESIGNATES POLYURETHANE (TPU) CABLE.

REV	DESCRIPTION	BY	DATE	ECO NO.
E	UPDATE COUPLING NUT	NF	02/21/20	75678

RELATED DOCUMENTS
1.
2.
3.
4.

3RD ANGLE PROJECTION

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MATERIAL: SEE SPECIFICATIONS

FINISH: SEE SPECIFICATIONS

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DRFT: RWC | DATE: 05/16/07

APVD: | SCALE: 1=1.0

UNIT OF MEASUREMENT
MILLIMETER [INCH]

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DESCRIPTION: RKCV 10T-*/S90

IDENTIFICATION NO.:

REV: E

FILE: 777010374

SHEET 1 OF 1

Approved 02/21/2020, work order #208133 by D.C.