CORRSYS
DATRON
Sensorsysteme GmbH

WPT

Incremental Wheel Pulse Transducer

for

acquisition of wheel rotation data

USER MANUAL

Notes:

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Contents

In a continuous effort to improve our products CORRSYS-DATRON reserves the right to change specifications without prior notice.

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Safety Instructions

Please read carefully before operating the equipment.

CORRSYS-DATRON is not responsible for damage that may occur when this system is used in any way other than that for which it is intended.

To assure safe and proper operation, all supplied equipment, components and/or accessories must be carefully transported and stored, as well as professionally installed and operated. Careful maintenance and usage in full accordance with operating instructions is imperative.

CORRSYS-DATRON equipment should be installed and operated only by qualified persons who are familiar with devices of this type.

Local regulations may not permit the operation of motor vehicles on public highways while the equipment is mounted on the exterior of the vehicle.

- Use the equipment only for intended applications. Improper application is not advised.
- Do not modify or change the equipment or its accessories in any way.
- Improper use or mounting of the equipment may affect the safety of the vehicle and/or occupants.
- The equipment must not be mounted and/or operated in any way that may compromise vehicle and/or occupant safety.
- Equipment must be mounted firmly and securely.
- **Use only original equipment, components and/or accessories included in the scope of delivery.**
- Do not use defective or damaged equipment, components and/or accessories .
- Always note correct pin assignments and operating voltages when connecting equipment to power supplies, data acquisition/evaluation systems, and/or any other applicable system or component. Equipment may be damaged if not properly connected and/or operated.
- For additional information, please call the CORRSYS-DATRON Hotline: ++49 (6441) 9282-82 or: hotline@corrsys-datron.com

Warning

- The sensor must be mounted with the care and accuracy that precision testing equipment requires.
- Due to design, axial load exceeding 20 N will damage the sensor!
- Due to design radial load exceeding 40 N will damage the sensor!
- DO NOT clean any sensor component with steam!

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1. Overview

WPT Incremental Wheel Pulse Transducer

for

Acquisition of Wheel Rotation and Calculation of:

- *Wheel Speed*
- *Distance Travelled*
- *Vehicle Speed*

Art.no.

Wheel Incremental Transducer	11355

The CORRSYS-DATRON Wheel Pulse Transducer is a universally adaptable measuring unit for the acquisition data derived from vehicle wheel rotation. The WPT delivers 1000 pulses per rotation (standard, other values are possible*).

Available signals with cable version “open end”: A, A inverted, B, B inverted, Z, Z inverted (0 impulse).
Available signals with cable version “D-Sub 9”: A.

The WPT Wheel Pulse Transducer is ultra-compact and extremely light in weight. For maximum flexibility, the incremental transducer unit of the WPT can be exchanged quickly and easily.

Output signals generated by the WPT provide the basis from which wheel rotation speed, acceleration, distance and speed are calculated.

** on request*

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Application

The CORRSYS-DATRON Wheel Pulse Transducer is a universally adaptable measuring unit for the acquisition of wheel rotation on vehicles and is applicable to these and other measurement applications:

- Acquisition of wheel rotation speed, distance and wheel speed
- Wheel slip measurement on passenger cars
- Acceleration and braking tests (pay attention to wheel slip)
- ABS testing
- Measurement of the difference between wheel speeds (e.g. testing of all-wheel drive vehicles)
- Special configurations available for trucks and busses

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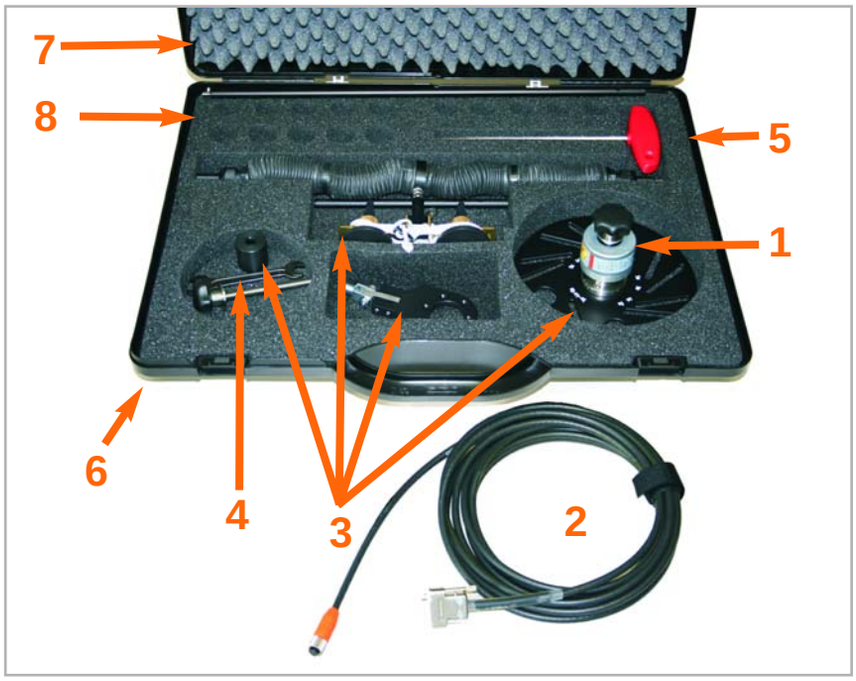
2. Extent of Delivery



Standard Delivery: 11355 Wheel Incremental Transducer without mounting collets

Pos.	Art. no.	Description
1.	14865	Transducer, 5-30V, 1000P IP67, 8 pin.
2.	14921	Signal cable, 5m 8P for WPT 5-30V 9P SUB-D
3.	11968	Mounting hardware
4.	11281	Open-ended wrench 10-13
5.	11291	Nut driver, hexagon
6.	15176	Transport case, 545x405x120mm
7.	15178	Foam insert for transport case
8.	15181	Foam insert for WPT transport case

Options / Accessories

- 10070 Mounting collets, 17 mm (standard)
- 10071 Mounting collets, 19 mm (standard)
- 10072 Mounting collets, 21 mm (standard)

  Other sizes available upon request.

- 11296 Centering stars, 5-lug
- 11297 Centering stars, 4-lug
- 11298 Centering stars, 3 lug
- 10036 Suction cup for fixing the safety line

- 14897 Signal cable 5m 8P WPT IP67 open end
- 14898 Signal cable 10m 8P WPT IP67 open end
- 14915 Signal cable 5m 8P WPT 3P Lemo
- 15083 Signal cable 10m 8P WPT 5-30V 9P SUB-D

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3. Technical Data

3.1 Specifications

Characteristic Mechanical Values

Max. permissible rotational speed	6000 min^{-1} (continuous operation 3000 min^{-1})
Available pulse values	Standard: 1000 pulses/rotation, 10 to 3600 pulses/rotation on request
System protection	IP 67
Operating temperature range	-40° C ... +85° C
Shock resistance	2500 m/s^2, 6 ms
Vibration resistance	100 m/s^2, 10 ... 2000 Hz

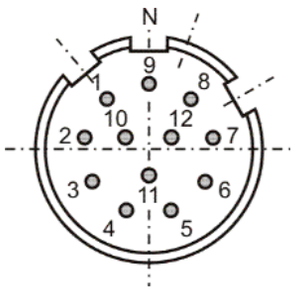
Characteristic Electrical Values

Output circuit	**RS-422 (TTL compatible)**	**Push-pull circuit**
Power supply, UB	5 ... 30 V DC	10 ... 30 V DC
Power consumption, signals inverted, without load	type 40 mA / max. 90 mA	type 50 mA / max. 100 mA
Permissible weight/channel	max. ±20 mA	max. ±20 mA
Pulse frequency	max. 300 kHz	max. 300 kHz
Signal level, high	min. 2.5 V	min. UB - 1V
Signal level, low	max. 0.5 V	max. 0.5 V
Rising and falling time	max. 200 ns	max. 1 µs
Reverse polarity protection of the power supply	yes	yes
Short circuit-proof outputs	max. 1 channel could be short-circuited	yes
Output signal	2 channels, A and B, 90° shifted, 1 zero impulse per rotation, all signals with inversion	
Plugs	12 pin M23 or 8 pin M12 plug radial flange connector on the housing, pins separately sealed, IP 67 in unplugged condition	

3.1 Pin Assignments

3.2.1 Pin assignment: 12-pin M23 flange male plug - sensor connector

WPT Art.no. **14375**



Pin	Signal	Pin	Signal
Pin 1	Signal B inverted	Pin 8	Signal B
Pin 2	$+U_B$ Sensor *	Pin 9	n.c.
Pin 3	Zero pulse	Pin 10	0 V (GND)
Pin 4	Zero pulse inverted	Pin 11	0 V Sensor *
Pin 5	Signal A	Pin 12	$+U_B$
Pin 6	Signal A inverted	Shield	on the housing
Pin 7	n.c.		

* Sensor leads are internally connected to the power supply and can be used with extension cables for power adjustment or regulation of the transducer.

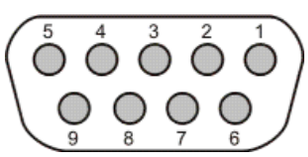
If sensor leads are not used, they must either be isolated or connected 0 V Sensor with 0V and U_B Sensor with UB.

On type RS 422 the lead end must be covered with a corresponding shaft resistor when extension cables are used.

Unused outputs must be isolated prior initial operation.

Cables:

A. Signal Cable K-006-130-20-5m female

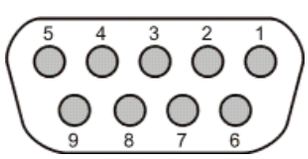


9 pin D-Sub
Part.no. 10465

A. Power supply U_B = 5 VDC

Pin	Signal
Pin 1	1 kΩ against Pin 5 and Pin 7 each
Pin 2	Signal A
Pin 3	n.c.
Pin 4	n.c.
Pin 5	0V (GND), 1 kΩ against Pin 1
Pin 6	n.c.
Pin 7	$+U_B$ (5 VDC), 1 kΩ against Pin1
Pin 8	n.c.
Pin 9	n.c.
Shield	on housing

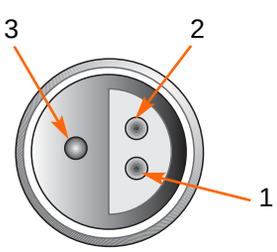
B. Signal Cable K-006-130-10-5m female



9 pin D-Sub
Part.no. 10464

B. Power supply U_B = 10 ... 30 VDC

Pin	Signal
Pin 1	Bridge to Pin 7
Pin 2	Signal A
Pin 3	n.c.
Pin 4	$+U_B$ (10 ... 30 VDC),
Pin 5	0V (GND)
Pin 6	n.c.
Pin 7	Bridge to Pin 1
Pin 8	n.c.
Pin 9	n.c.
Shield	on housing



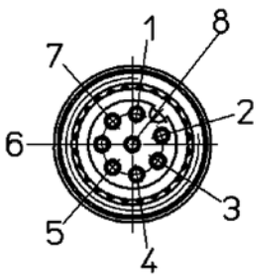
3 pin Lemo
Part.no. 10466

C. Signal Cable K006.52.51

Pin	Signal
Pin 1	Signal A
Pin 2	GND
Pin 3	+12V

3.2.2 Pin assignment: 8 pin M12 male plug - sensor connector

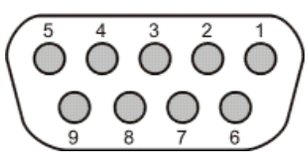
WPT Art.no. **14865**



Pin	Signal
Pin 1	GND
Pin 2	$+U_B$
Pin 3	Signal A
Pin 4	Signal A inverted
Pin 5	Signal B
Pin 6	Signal B inverted
Pin 7	0 imp
Pin 8	0 imp inverted

Cables:

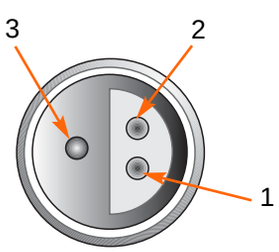
A. Signal Cable K-006-181-20-5m female



9 pin D-Sub
Part.no. 14921

A. Power supply U_B = 5 ... 30 VDC

Pin	Signal
Pin 1	Bridge to Pin 7
Pin 2	Signal A
Pin 3	n.c.
Pin 4	$+U_B$ (5 ... 30 VDC),
Pin 5	0V (GND)
Pin 6	n.c.
Pin 7	Bridge to Pin 1
Pin 8	n.c.
Pin 9	n.c.
Shield	on housing



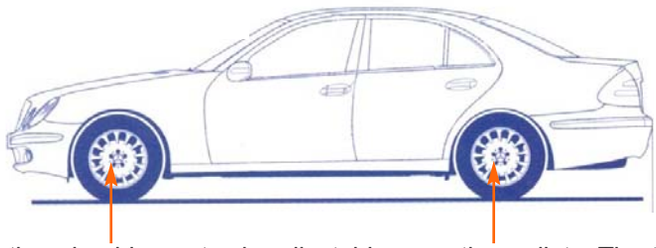
B. Signal Cable K-006-181-30-5m

3 pin Lemo
Part.no. 14915

Pin	Signal
Pin 1	Signal A
Pin 2	GND
Pin 3	+12V

4. Mounting and Connection

4.1 Mounting Options



The Wheel Pulse Transducer mounts to the wheel lug nuts via adjustable mounting collets. The torsional protection rod (which maintains rotation around the wheel axis) is affixed to the vehicle body with suction holders.

- Mounting disk: Fits 3-, 4- and 5-lug rims
- Mounting collets: Standard: 17, 19, 21 mm *(other sizes available upon request)*
- Centering stars: 3-, 4- and 5-fold star, optional
- Torsional mounting: Joints, guide rod, suction holder, gaiter seals

4.2 Mounting Instructions

1. Select the following parts:

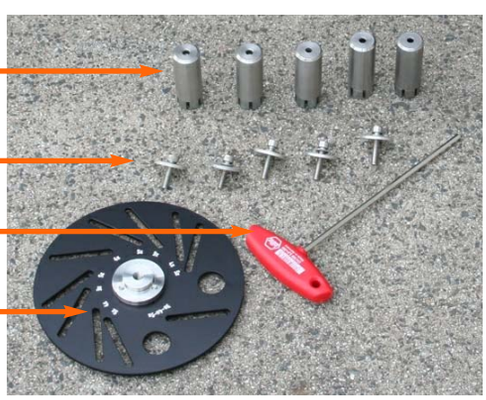


Fig. 1

2. Remove hubcap or any covering over wheel nuts and clean dirt/debris from wheel nuts.

Remove the retainer screws from the top of each collet, then place the mounting collets firmly on the wheel nuts.

Fig. 2

3. Align the mounting disk with the collets and affix it with retainer bolts and washers. Do **NOT** fully tighten the bolts at this step!

   NOTE: Each mounting slot on the disk is marked to ensure proper alignment with 3-, 4-, and 5-lug configurations.

   ATTENTION: The lobe of the washers (Fig.3b) must show towards the collets!

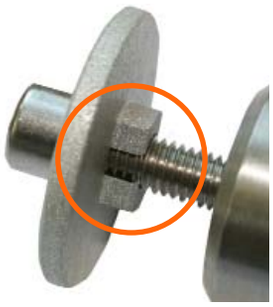


Fig. 3b

Fig. 3a

4. A rough centering of the mounting plate can be achieved by slight rotation in clockwise direction.

Fig. 4

5. If you use centering stars for mounting, select the centering star that corresponds to the lug configuration (3x, 4x, or 5x) of the wheel on which the sensor will be mounted. (Fig. 5 shows 5-fold star)

   NOTE: Each centering star is fitted with nylon knobs, which facilitate positioning and serve as leverage points.

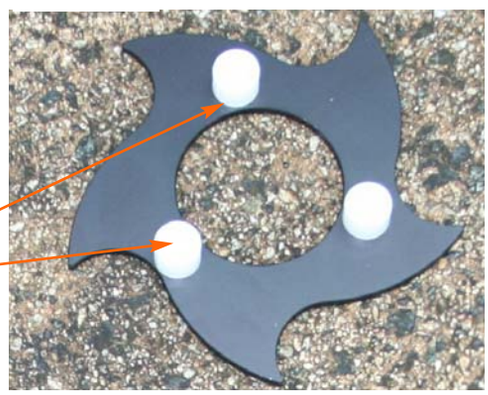


Fig. 5

6. Slide the centering star onto the mounting disk hub and rotate the centering star so that its edges press firmly against the collet retainer washers. Then, apply pressure to the positioning knobs on the centering star, as shown, and tighten one of the bolts using a 5 mm hex nut driver. This will ensure that the mounting disk is properly centered on the wheel.

Fig. 6

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7. Continue to hold the centering star tightly against the mounting washers, then tighten the mounting bolts in a cross pattern. The deviation of concentricity should be within 0.2 mm (see page 18, Signal errors due to incorrect mounting).

Fig. 7

8. Select the following parts:
   - A. Transducer with mounting plate
   - B. Transducer mounting bolt
   - C. Suction mount
   - D. Torsion mounting assembly
   - E. Extension rod

Fig. 8

9. If the transducer mounting plate is not already mounted to the transducer, slide the plate onto the back of the transducer as shown in Fig. 9 and secure it by tightening the set screw.
   - A. Transducer mounting plate
   - B. Transducer
   - C. Set screw

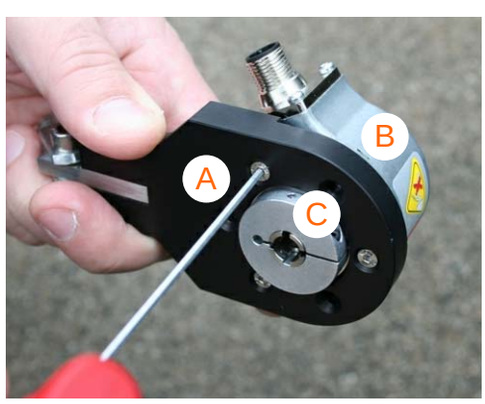

Fig. 9

10. Slide the transducer mounting bolt through the hole at the center of the transducer, then thread the bolt into the hole at the center of the mounting hub. Tighten the bolt securely using the knob.

Fig. 10

11. Some vehicle body configurations may require the use of the spacer shown in Figure 11a/11b in order to mount the torsion assembly parallel to the vehicle. The spacer is placed between the mounting disk and the transducer. When using the spacer, it is necessary to use the long transducer mounting bolt.

Danger

Axial load exceeding 20 N / radial load exceeding 40 N will damage the sensor!

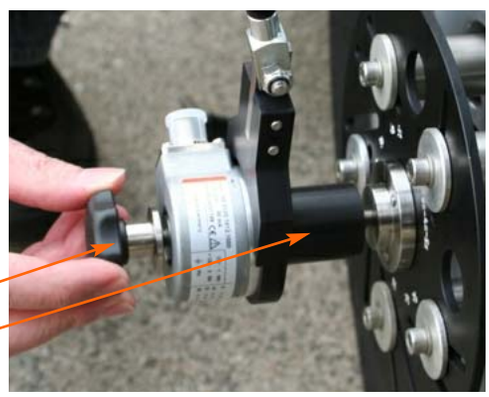

Fig. 11a

ATTENTION: The slot of the spacer must be directed towards the Sensor!

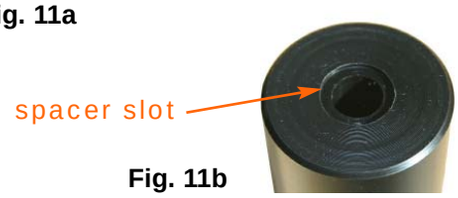

Fig. 11b

12. Measure or visually estimate the distance from the top of the transducer mounting clamp to an area of the vehicle body onto which the suction holders can be attached.

    Next, select either or both of the two extension rod sections and configure the assembly to the required length. Each rod has a threaded female end and a threaded male end. This allows the rods to be fitted together, as well as into the main section of the torsion assembly.

    If multiple sections are required, tighten them together by hand, then slide a small screwdriver (or similar tool of appropriate diameter) into the small holes near the the ends of the extension rods. Using the screwdrivers for leverage, tighten the sections together firmly (use caution to avoid stripping the threads).

    Then, screw the extension rod(s) into the threaded female receptacle at the top of the mounting plate as shown in Figure 12 and tighten.

Fig. 12

13. Loosen the cap at the bottom end of the gaiter that protects the mounting assembly. Then, slide the gaiter back to enable access to the threaded end of the rod.

Fig. 13

14. Screw the main section of the torsion assembly into the top of the extension rod(s) and tighten.
Slide the protective gaiter back over the threaded joint and re-thread the cap, but do not fully tighten it at this step (see step 17, page 17).
Press the suction holders firmly against the vehicle body and latch the suction holder lock handles as shown in Figure 14 (latched position is approximately parallel to vehicle body surface).

When the suction holders produce an effective vacuum, you will feel a distinct resistance.

ATTENTION: To assure proper function of the suction holders, the mounting area must be free of grease, oil, dust and other contaminants. For this reason it its necessary to clean the painted surface in the mounting area before attaching the suction holders. Do not use cleaning products that leave residue of any kind on the surface.

Fig. 14

15. Plug the signal cable into the transducer and tighten the connector.

Fig. 15

16. Wind the signal cable loosely around the torsion rod and secure with a cable tie.

WARNING: Be sure to leave enough slack in the cable to allow for suspension travel, but use caution to assure that the cable is not wound too loosely around the torsion bar. Under no circumstances should the cable be loose enough to touch the tire or to be pulled under the fender during testing. Either circumstance would inevitably result in damage to the equipment and could also cause an accident.

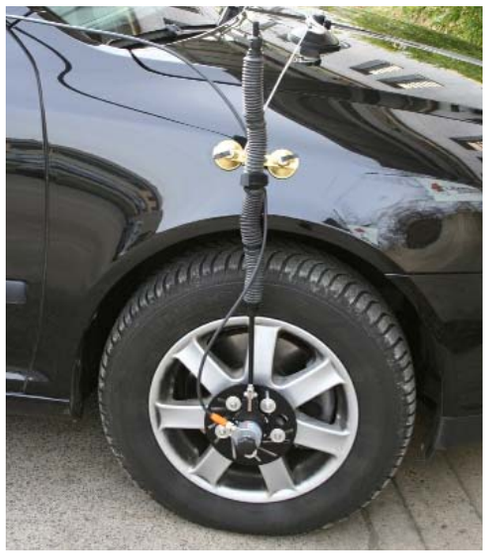

Fig. 16

17. Slide the protective gaiters over the lower and upper sections of the torsion rod assembly and tighten the caps. Then, secure the safety line to the vehicle. In Figure 17, the safety line is tied to an optional suction cup.

The safety line should always be used to avoid damage or injury in the event that a suction holder separates from the vehicle body during the test drive.

A. Suction cup
B. Cap
C. Gaiter
D. Safety line
E. Optional suction cup

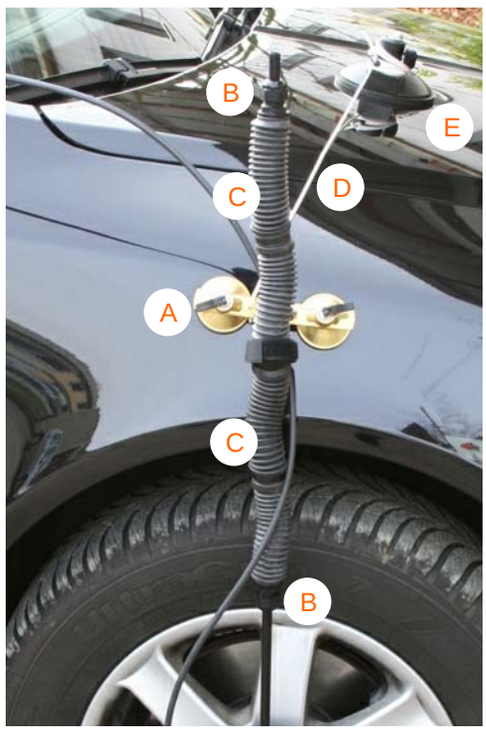

Fig. 17

4.3 Connecting the Sensor

Finally, connect the signal cable to data acquisition. When using other than CORRSYS-DATRON data acquisition systems, make sure that the polarity of the sensor supply is correct and the data acquisition supplies the sensor-specific current and signal conditions.

5. Troubleshooting

When troubleshooting the CORRSYS-DATRON Incremental Wheel Pulse Transducer, begin by checking the following:

Cables and power supply

- Check all connections to determine that each is complete and that the system is connected to a power supply that provides voltage output within the specified range.
- Check to determine that the correct cables have been used for all connections.
- The following problems can be caused by incorrect or incomplete cable connections and/or connection to incorrect power supply voltage:
  - A sensor will not show any signal with vehicle motion.

Signal errors due to incorrect mounting

- Make sure that the sensor is mounted parallel to the wheel.
- The deviation of concentricity should be within 0.2 mm (see Step 7 on page 14).
- Please see that the torsion mounting assembly is adapted to the vehicle type (suspension travel).
- Do not exceed the maximum rotational speed of 3000 RPM or 250 kph.

If none of the above recommendations provides a solution, please contact us.
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