

## ANGLE SENSORS V23-1



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# 1. About this document

This is the Technical Reference Manual for Angle Sensors.

The items in this documentation may be usable with SIRIUS, KRYPTON, IOLITE or DEWE-43 devices.

The manual is divided into several chapters. You will find:

- Overview of available accessories
- Overview of available sensors
- Technical specifications

## 1.1. Legend

The following symbols and formats will be used throughout the document.



### **Important**

It gives you important information about the subject.  
Please read carefully!



### **Hint**

It gives you a hint or provides additional information about a subject.



### **Example**

Gives you an example of a specific subject.

## 1.2. Online versions

### 1.2.1. Device Technical Reference Manual

The most recent version of this manual can be downloaded from our homepage:

<https://download.dewesoft.com/list/manuals-brochures/hardware-manuals>

In the *Hardware Manuals* section click the download link for the *Device® technical reference manual*.

### 1.2.2. DEWESoft® User Manual

The DEWESoft® User Manual document provides basics and additional information and examples for working with DEWESoft® and certain parts of the program.

The latest version of the DEWESoft® tutorials can be found here:

<https://download.dewesoft.com/list/manuals-brochures/software-manuals>

In the *Software Manuals* section click the download link of the DEWESoft X User Manual entry.

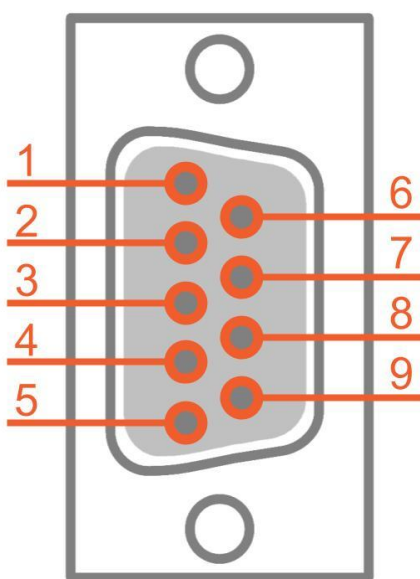
## 2. Angle Sensors

### 2.1. DS-TACHO-1

#### 2.1.1. Electrical specifications

| General specifications     |  |
|----------------------------|--|
| Parameter                  | Description  |
| Trigger / Retrigger level: | $\pm 10$ mV ... $\pm 2$ V (adjustable with screwdriver)                        |
| Input type                 | AC-Coupled, 1Hz  |
| Input impedance            | 150 kOhm   |
| Max input voltage:         | $\pm 50$ Vdc, $\pm 100$ Vac  |
| Power supply output        | +5Vdc (max current depending on used DEWESoft device: eg. DEWE-43: max 800 mA) |

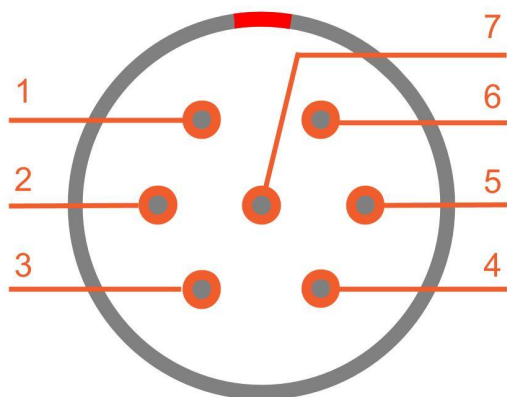
#### 2.1.2. Connectors



9 pin DSUB-9 female

| Pin | Description                   |
|-----|-------------------------------|
| 1   | P out (+5 V)                  |
| 2   | Signal (Analog in from tacho) |
| 3   | n.c.                          |
| 4   | GND                           |
| 5   | +12 V                         |
| 6   | P out (+5 V)                  |
| 7   | GND                           |
| 8   | n.c.                          |
| 9   | n.c.                          |

### 2.1.2.1. Output connector pinout



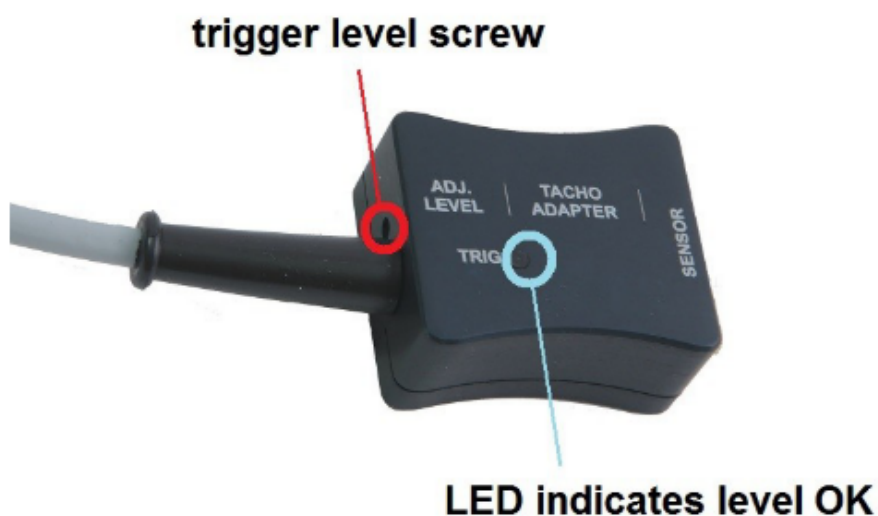
*7 pin LEMO connector on cable side*

| Pin | Description  |
|-----|--|
| 1   | Digital Out  |
| 2   | n.c.   |
| 3   | n.c.   |
| 4   | n.c.   |
| 5   | +5V power supply input (from e.g. DEWE-43, SIRIUS) |
| 6   | n.c.   |
| 7   | GND  |

### 2.1.3. Operation

Connect the DS-TACHO1 with the LEMO 7pin to a DEWE-43 or SIRIUS Counter input, and on the DSUB 9pin side to your analog tacho probe signal (e.g. magnetic pick up sensor with screw, 1 pulse per revolution).

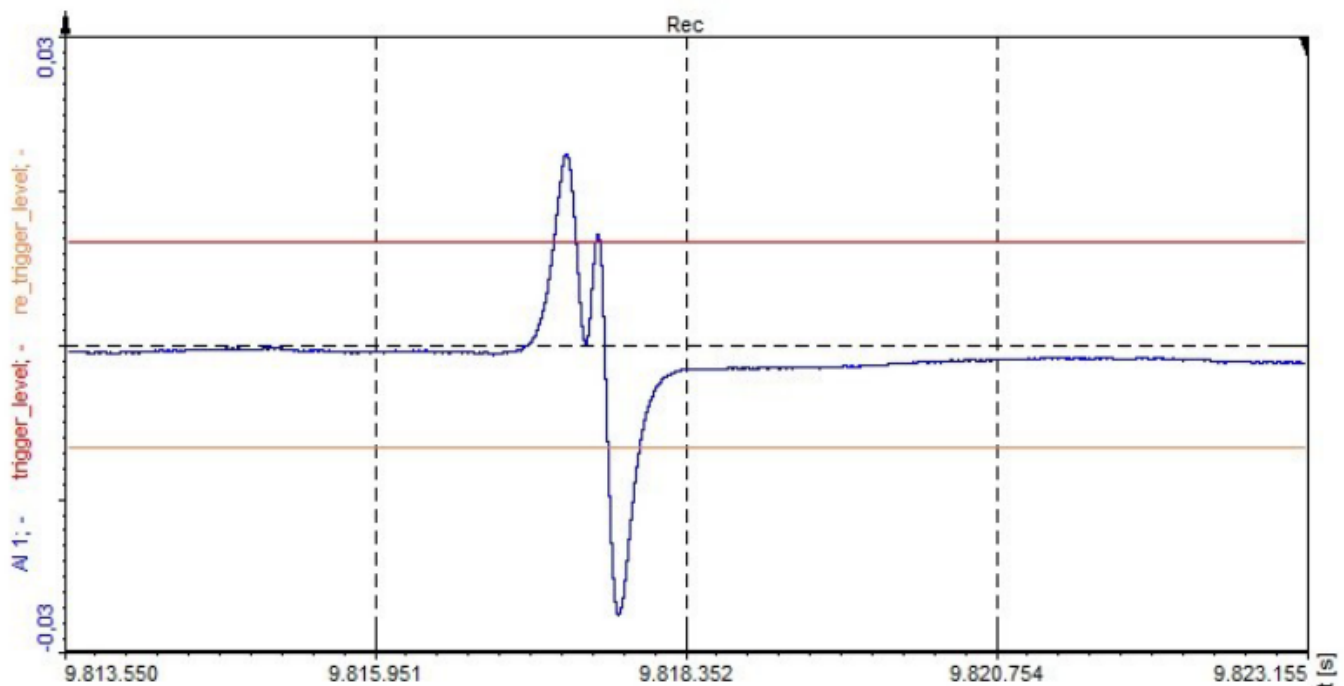
Start the rotating machine, then use a screwdriver to manually adjust the trigger level on the DS-TACHO1, see picture below.



*How to adjust the trigger level*

When the trigger is detected correctly, the blue LED will flash. Vary the RPM on the machine to check if the trigger level is ok for the whole RPM range.

The lowest detectable frequency for the counter input on the DEWE-43 / SIRIUS is 5 Hz, therefore if you have 1 pulse/ revolution, the lowest RPM is 300. If you need to measure lower RPM, you could increase the number of pulses per revolution (e.g. for an inductive probe, mount a screw every 90° on the rotating disk and then divide the result by 4).



*Example of analog input signal*

In this example you see the input signal of a magnetic tachometer probe (coil) when a screw on the disk is passing by. The higher the RPM, the higher the induced voltage, so here you have to set the trigger level low (shown in the picture +/10 mV).

The upper (red) line is the trigger level, the lower (orange) line is the retrigger level. The signal has to fall below the lower line to be armed for the next trigger again. This even makes it possible to correctly detect a bad signal as shown above!



## 2.2. DS-TACHO-2

DS TACHO 2 is a remote optical LED sensor. It has a visible red LED light source and green LED on-target indicator. The red LED light source acts as the aiming device during setup and can accurately measure speeds from 1 up to 250000 RPM from a distance of up to 1 meter with a maximum offset angle of 45 degrees from the rotating object. The sensor is housed in a threaded stainless-steel tube and supplied with a 90-degree mounting bracket and a 2.4 meter shielded cable.



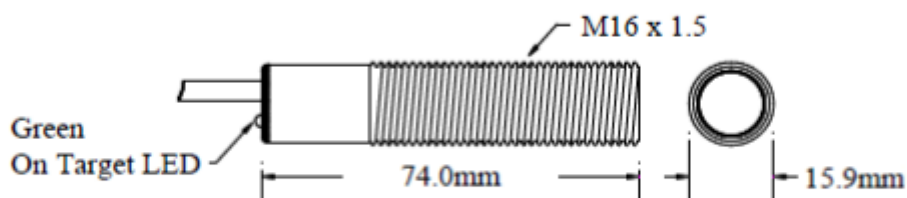
*DS TACHO 2*

Common usage of the sensor is in a wide range of general purpose applications in relatively clean environments.



## 2.2.1. Specifications

| Name                  | Description  |
|-----------------------|--|
| Speed range           | 1 – 250 000 RPM                                      |
| Distance to object    | Up to 1 meter and 45 degrees offset from target      |
| Illumination          | Visible red LED                                      |
| Power supply          | 3-15VDC, 45mA  |
| Operating temperature | -10°C to +70°C                                       |
| Connector             | L1B7m connector for SIRIUS and DEWE-43 counter input |
| Output signal         | Negative pulse input voltage (+V) to 0               |
| Dimensions            | 74 mm length, 16mm diameter                          |
| Cable length          | 2.4 meters   |



*Sensor dimensions*

## 2.2.2. Operating instructions

The remote optical sensor is capable of detecting a reflected pulse from a target consisting of reflective tape at distances of up to 1 meter from the rotating object and angles up to 45 degrees.

For most applications, a 12-mm square piece of reflective tape should be applied to a clean area on the rotating object. The sensor should be optically aligned to illuminate the on-target indicator once per revolution. The sensor must be mounted steady to obtain accurate measurement. The optical sensor must be placed at a slight angle (15 degrees recommended) from perpendicular, so that the sensor will receive only pulses from the reflective marker.

The optical sensor must be at least **25 mm** from the reflective target to avoid false triggering. The green LED on-target indicator will blink at the input frequency rate when the sensor is properly aimed.



*Green LED on-target indicator*



### **Hint**

The green LED On-Target Indicator will blink on and off at slow speeds and remain on steady at high speeds.

## 2.2.3. Set up in DEWESoft

Connect the sensor to the counter input (ACC+, STG+, Multi, ...) and enter the counter setup.

| +                   | Used   | C | Sample rate | Name     | Description | Counter type | Min  | Values | Max      | Unit | Setup |
|---------------------|--------|---|-------------|----------|-------------|--------------|------|--------|----------|------|-------|
| Event counting mode |        |   |             |          |             |              |      |        |          |      |       |
|                     | Used   |   | 20000       | CNT1     | -           | Events       | 0,00 | 84074  | 10000,00 | -    | Setup |
|                     | Used   |   | 20000       | CNT1/IN0 | -           | Digital      | 0,00 | 1      | 1,00     | -    | ...   |
|                     | Unused |   | 20000       | CNT1/IN1 | -           | Digital      | 0,00 | 1      | 1,00     | -    | ...   |
|                     | Unused |   | 20000       | CNT1/IN2 | -           | Digital      | 0,00 | 0      | 1,00     | -    | ...   |
| Event counting mode |        |   |             |          |             |              |      |        |          |      |       |
|                     |        |   |             | CNT2     | -           |              |      |        |          |      | Setup |

Counter channel setup

Under the Basic application select **Sensor (encoder, CDM, tacho...)** mode. From the dropdown menu select the **Tacho (Digital)** as a sensor type. It depends on the connection of the sensor which signal is selected as **Signal input** (CNT\_IN1 or CNT\_IN0). After selecting all the mentioned parameters, you can immediately see the angle and the frequency of rotation.

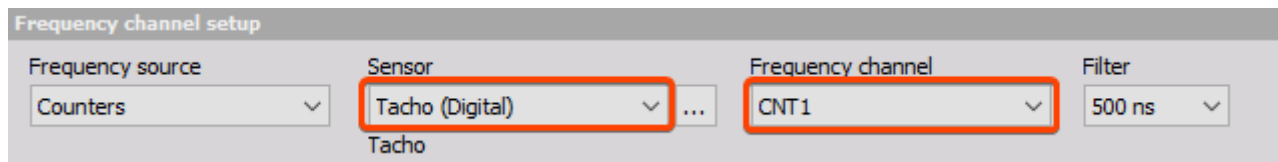
| Used   | C | Name             | Description | Physical unit | Scale | Offset | Min  | Values | Max      | Unit |
|--------|---|------------------|-------------|---------------|-------|--------|------|--------|----------|------|
| Unused |   | CNT1/Angle       | -           | revs          | 1,00  | 0,00   | 0,00 | 0,000  | 10000,00 | Revs |
| Used   |   | CNT1/Frequency   | -           | RPM           | 1,00  | 0,00   | 0,00 | 0,0000 | 1,00     | RPM  |
| Unused |   | CNT1/Raw_Count   | -           |               | 1,00  | 0,00   | 0,00 | 783    | 1,00     | -    |
| Unused |   | CNT1/Raw_EdgeSen | -           |               | 1,00  | 0,00   | 0,00 | 0      | 1,00     | -    |

Counter setup

## 2.2.4. Measurement

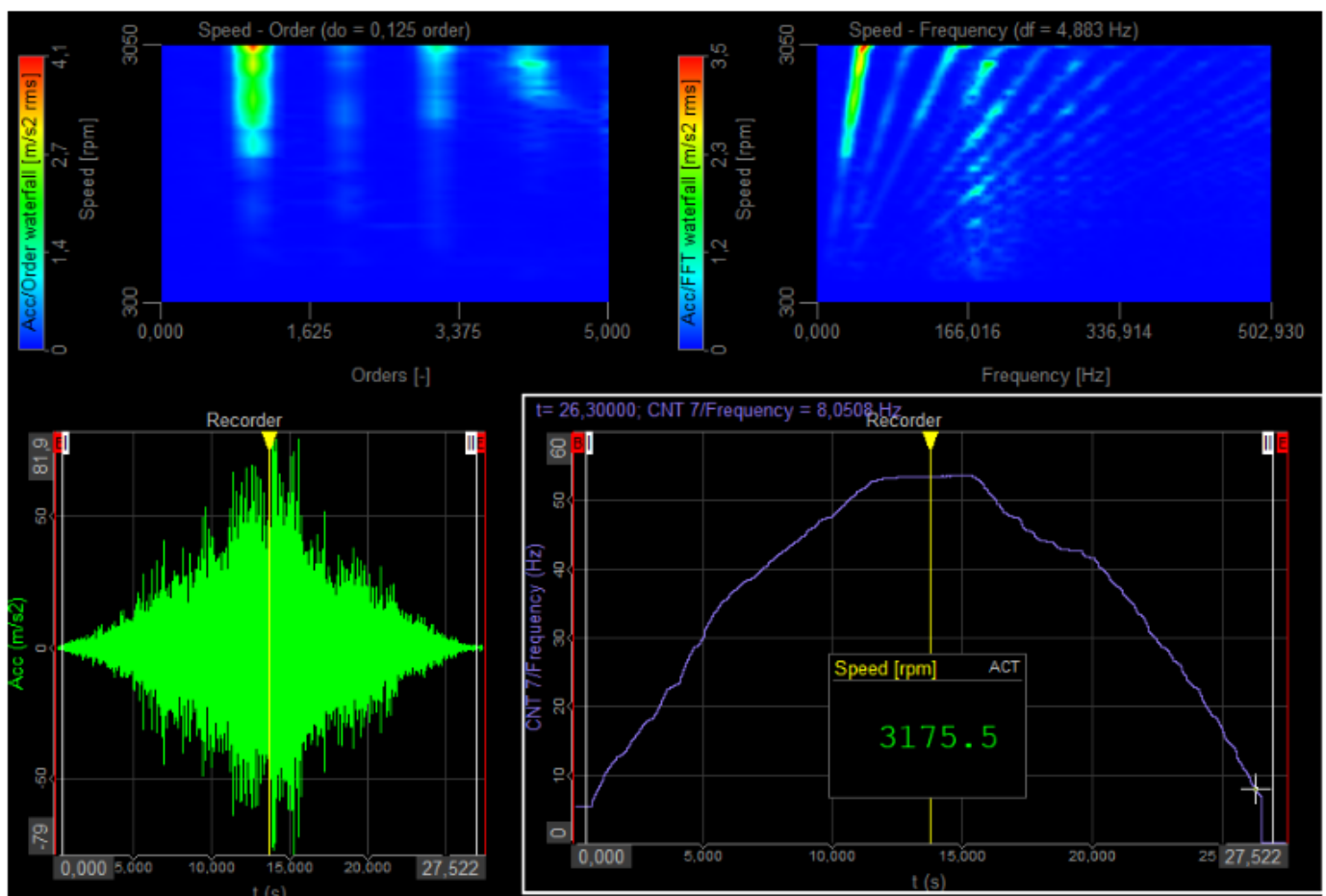
Once the sensor is properly connected and defined in DEWESoft, it can be used for frequency measurements (for example: order tracking, balancing, basic RPM measurements, ...).

Example: in the order tracking setup you can directly select the tacho as a frequency channel.



*Tacho as a frequency channel*

The lowest detectable frequency for the counter input on the DEWE-43 / SIRIUS is 5 Hz, therefore if you have 1 pulse/revolution, the lowest RPM is 300.



*Measurement screen example*

## 2.3. DS-TACHO-3

The DS-TACHO-3 is an optical laser sensor suitable for RPM measurement or simple object detection.



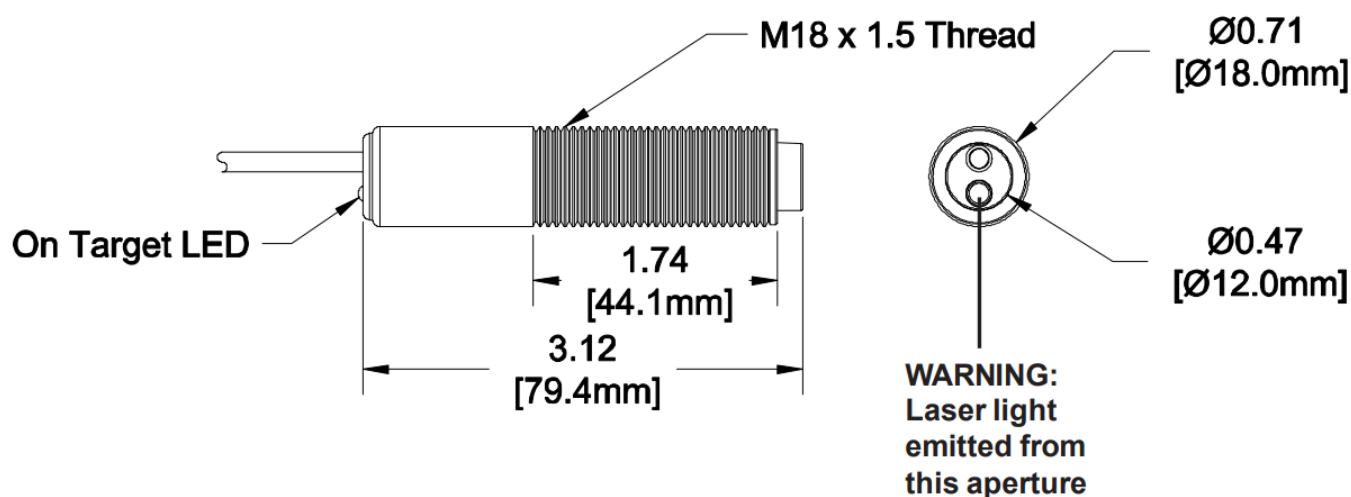
*DS-TACHO3 (Shipping includes the mounting material)*

### 2.3.1. Specifications

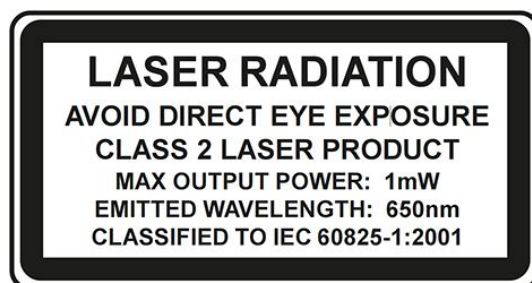
| Name                  | Description  |
|-----------------------|--|
| Speed Range:          | 1-250,000 RPM  |
| Illumination:         | Visible Red Laser, Class 2   |
| Laser Specifications: | Class 2 (per IEC 60825-1 Ed 1.2 2001-8)  |
| Classification:       | Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 50, dated July 26, 2001. |
| Maximum Laser Output: | 1 mW   |
| Pulse Duration:       | Continuous   |
| Beam Divergence:      | <1.5 mrad  |
| Beam Diameter:        | 4 x 7 mm typical at 2 m  |
| Laser Diode Life:     | 8,000 operating hours MTBF (1 year warranty)   |
| On-Target Indicator:  | Green LED on wire end cap  |
| Operating Range:      | Up to 25 feet [7.6 m] and 60 degrees offset from target  |
| Power Requirement:    | 3.0 - 15 Vdc, 0.13 W   |
| Output:               | Positive pulse when target present – Output Voltage=Supply Voltage   |
| Operating Temp.:      | 14 °F to 158° F [-10 °C to 70° C]  |

|               |  |
|---------------|--|
| Humidity:     | Maximum relative humidity 80% for temperature up to 88 °F [31 °C]<br>decreasing linearly to 50%<br>relative humidity at 104 °F [40 °C] |
| Connection:   | Lemo 1B 7 pin (FGG.1B.307)   |
| Cable Length: | 8 feet [2.4 m]   |
| Material:     | 303 Stainless Steel supplied with two M18 Jam Nuts and Mounting<br>Bracket   |
| Lens:         | Acrylic Plastic  |
| Dimensions:   | Threaded Tube 3.12 in x 0.71 in diameter [M18 x 1.5 x 79.4 mm] long  |

### 2.3.2. Dimensions



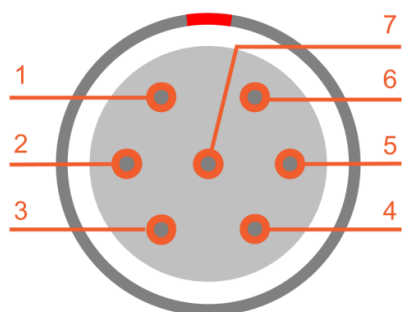
*Sensor Dimensions*



### 2.3.3. Operation instructions

The Remote Optical Laser Sensor has a visible red laser light source and green LED on-target indicator. The class 2 laser source acts as the aiming device during setup and can accurately measure speeds from 1-250,000 RPM from a distance of up to 25 feet with a maximum offset angle of 60 degrees from the rotating object. The sensor is housed in a threaded 303 stainless steel tube and supplied with a 90-degree mounting bracket and jam nuts.

The DS-TACHO3 is supplied with a Lemo 1B connector (FGG.1B.307) fitting to Dewesoft counter inputs.



*DS-TACHO3 connector: pin-out  
(7-pin LEMO male)*

| Pin | Pin description | Sensor connection          |
|-----|-----------------|----------------------------|
| 1   | 1: IN0/A        | Signal (V+ to 0 Vds pulse) |
| 5   | +12 V           | +V (Positive power supply) |
| 7   | GND             | GND                        |

Correct operation of the sensor can be checked at any time by aiming it at an original design fluorescent light and observing a 120 Hz or 100 Hz (two times your mains frequency) square wave on the signal output. If the sensor is being used with a tachometer, the tachometer will read 7200 RPM or 6000 RPM. The Sensor will not pick up newer “energy efficient” design fluorescent lights.



## 2.3.4. Set up in DewesoftX®

Connect the sensor to the counter input (ACC+, STG+, Multi, ...) and enter the counter setup.

| + | Used   | C | Sample rate | Name     | Description         | Counter type | Min  | Values | Max      | Unit | Setup |
|---|--------|---|-------------|----------|---------------------|--------------|------|--------|----------|------|-------|
| + | Used   | C | 20000       | CNT1     | Event counting mode | Events       | 0,00 | 84074  | 10000,00 | -    | ...   |
| + | Used   | C | 20000       | CNT1/IN0 | -                   | Digital      | 0,00 | 1      | 1,00     | -    | ...   |
| + | Unused | C | 20000       | CNT1/IN1 | -                   | Digital      | 0,00 | 1      | 1,00     | -    | ...   |
| + | Unused | C | 20000       | CNT1/IN2 | -                   | Digital      | 0,00 | 0      | 1,00     | -    | ...   |

Counter channel setup

Under the Basic application select Sensor (encoder, CDM, tacho...) mode. From the dropdown menu select the Tacho (Digital) as a sensor type. It depends on the connection of the sensor which signal is selected as Signal input (CNT\_IN1 or CNT\_IN0). After selecting all the mentioned parameters, you can immediately see the angle and the frequency of rotation.

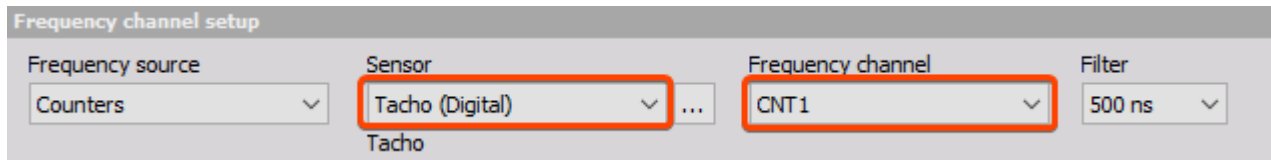
| Used   | C | Name             | Description | Physical unit | Scale | Offset | Min  | Values    | Max      | Unit |
|--------|---|------------------|-------------|---------------|-------|--------|------|-----------|----------|------|
| Unused | C | CNT1/Angle       | -           | revs          | 1,00  | 0,00   | 0,00 | 1,999     | 10000,00 | Revs |
| Used   | C | CNT1/Frequency   | -           | RPM           | 1,00  | 0,00   | 0,00 | 1149,6045 | 1,00     | RPM  |
| Unused | C | CNT1/Raw_Count   | -           |               | 1,00  | 0,00   | 0,00 | 3666      | 1,00     | -    |
| Unused | C | CNT1/Raw_EdgeSep | -           |               | 1,00  | 0,00   | 0,00 | 0         | 1,00     | -    |

Counter settings

### 2.3.5. Measurement

Once the sensor is properly connected and defined in DewesoftX®, it can be used for frequency measurements (for example: order tracking, balancing, basic RPM measurements, ...).

Example: in the order tracking setup you can directly select the tachometer as a frequency channel.



Frequency measurement

The lowest detectable frequency for the counter input on the DEWE-43 / SIRIUS is 5 Hz, therefore if you have 1 pulse/revolution, the lowest RPM is 300.

## 2.4. DS-TACHO-4

Always keep in mind that the Tacho-4 sensors are threshold sensors. This is important especially for the proximity detection mode, the most commonly used for rotating: working distance could change with the albedo and/or the form and distance of the target, also, **contrast** appears as an important parameter: teeth-no teeth, black and white marks.

The recommended distance for encoding application is a few millimetres: put the probe close to the target to avoid an incorrect reading resulting from rocking and wagging of the turning part (Descartes optical law); on the other hand, the reflective tape allows for much more than 100 mm. It is highly recommended that you use the adhesives encoders for optimal results.

A few phenomena may affect the detection function, such as a drop of liquid on top of the probe, excessive dust covering the top, more generally, a non transparent environment for our light source such as diesel engine sump film (i.e. carbon is not transparent for the near I.R.). Patented concept implemented in the sensors strongly simplifies mounting and set-ups. 152 sensor lights sources are not dangerous: No Laser inside. Prior to measurement, it is recommended that a detection test be performed, even at low speed, to ensure detection feasibility and determine detection distance required for the sensor.

If it is impossible to perform a test due to technical reason or mounting specifics, a theoretical method would be to fix the probe at a distance equivalent to the width of the black and width strips to detect- in any event, without exceeding 4mm.

### Important



Fixing and support of the probe will influence acquisition of the reading. Please be careful regarding vibration. We recommend that you design your supports including appropriate vibration orders studies. The further the probe will be away from the target, the more the TTL amplitude signal will decrease.

### 2.4.1. DS-TACHO-4: Connecting the sensor

Power supply must be perfectly rectified, filtered, and constantly deliver more than 120mA /12V. This is not an "open collector" output sensor, but PNP output. 152 G7 can support reverse tension, this tension modifies signal's Amplitude. 152 G7 TTL Voltage output is 5Vcc , 152 G7 Voltage output is nominal voltage input -1.5Vcc. If the sensor is connected to the acquisition system the use of dedicated measurement connectors and matching cables is recommended. Please refrain from extending the cable. Otherwise, the sensor's operation may be affected. To confirm that the sensor is live, check if a faint red LED glows on the small light channel in front of the sensor optical head; You can also use a digital camera to see the I.R. Light. The brightness of this small red light is independent of the position of the potentiometer.

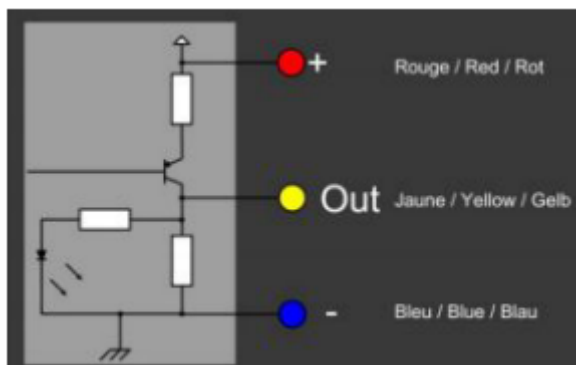
### 2.4.1.1. Sensor plug-in

V Rating: 12/24Vcc

V Minima: 10Vcc

V Maxima: 30Vcc

I: 120mA/12Vcc



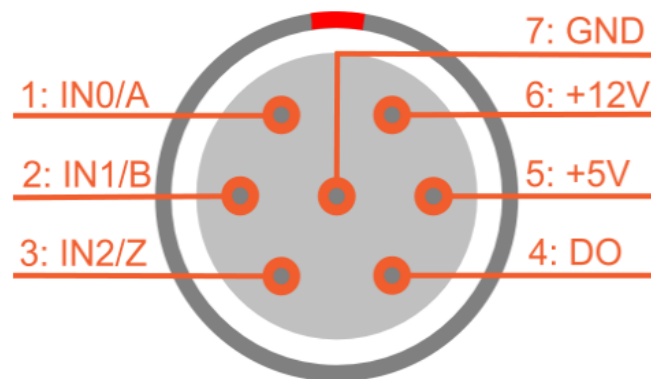
*Sensor pinout*

### 2.4.2. DS-TACHO-4: Specifications

| Specifications           | DS-Tacho4                   |
|--------------------------|-----------------------------|
| Supply voltage           | 9 - 30 VDC                  |
| Supply current @ 12 V    | 100 mA                      |
| Max. input frequency     | 260 kHz                     |
| Output                   | TTL                         |
| Rise time                | 100 ns                      |
| Fall time                | <1 $\mu$ s                  |
| Temperature range        | -10 to 50 °C non condensing |
| Temperature fiber sensor | -40 to 100 °C               |
| Temperature B&W tape     | -10 to 60 °C                |
| Weight                   | 150 g ( 0.33 lb.)           |
| Working area of probe    | 2 - 5 mm                    |
| Trigger level adjustable | Potentiometer 3/4 turn      |

|                  |  |
|------------------|--|
| Probe diameter   | M6 x 20 mm   |
| Black/white tape | 2 mm black, 2 mm white; width 10 mm; 1 m tape included     |
| Connector        | Lemo FGG.1B.307, directly fits to a Dewesoft counter input |

### 2.4.3. DS-TACHO-4: Pinout



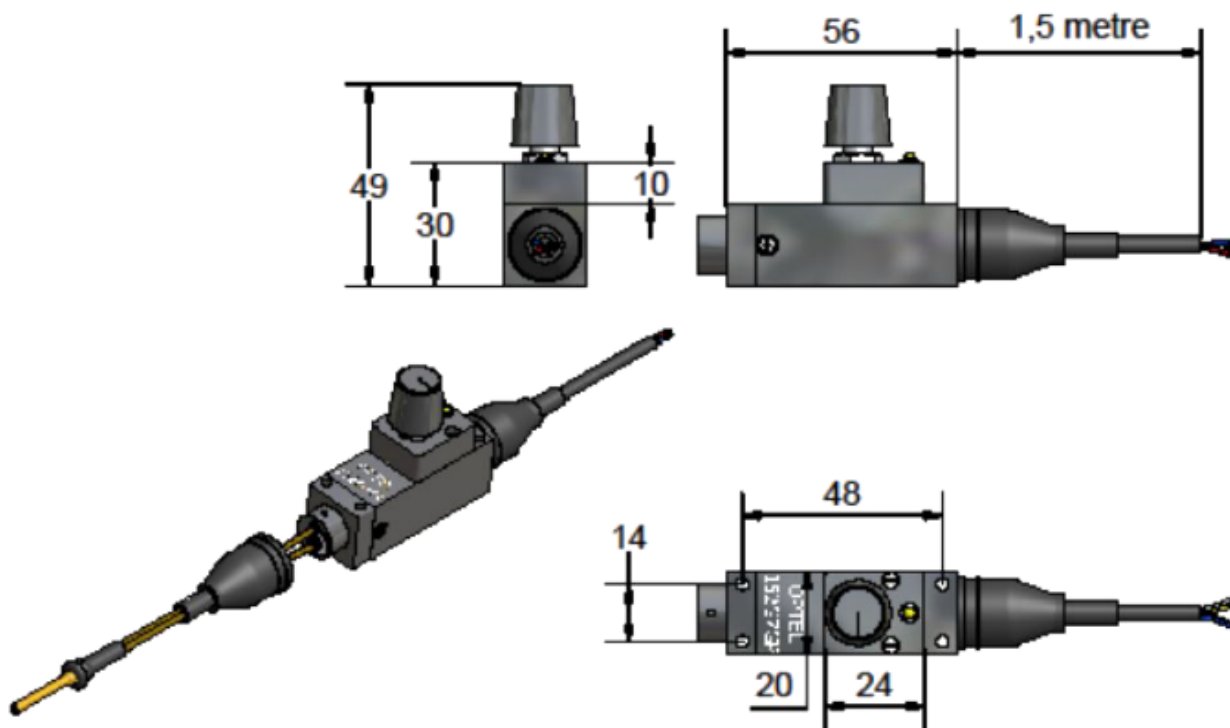
Counter pin-out (Lemo 7 pin)

**Connector Type:** L1B7f

Connector on the measurement module: EGG.1B.307.CL1

Mating connector: FGG.1B.307.CLAD52

#### 2.4.4. DS-TACHO-4: Dimensions



*Sensor dimensions*

### 2.4.5. DS-TACHO-4: Scope of Supply

The DS-Tacho4 shipment contains the following items:

- 1) Probe
- 2) Sensor
- 3) Tripod
- 4) Tape
- 5) Adapter sleeve (6mm)



*Scope of delivery*



#### 2.4.5.1. Sensor



*Sensor*

#### 2.4.5.3. Tripod



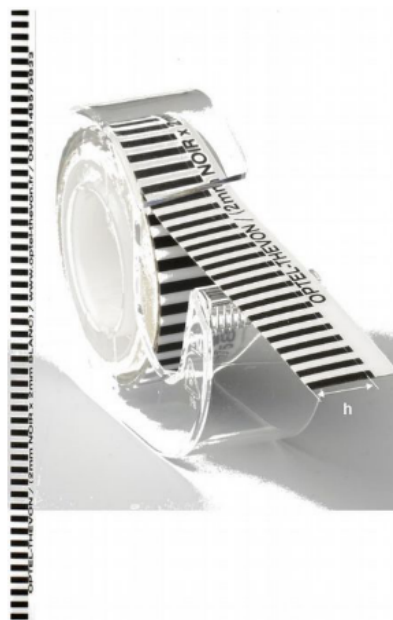
*Tripod: Box-dimensions: 63x50x55 mm*

#### 2.4.5.2. Probe



*Probe*

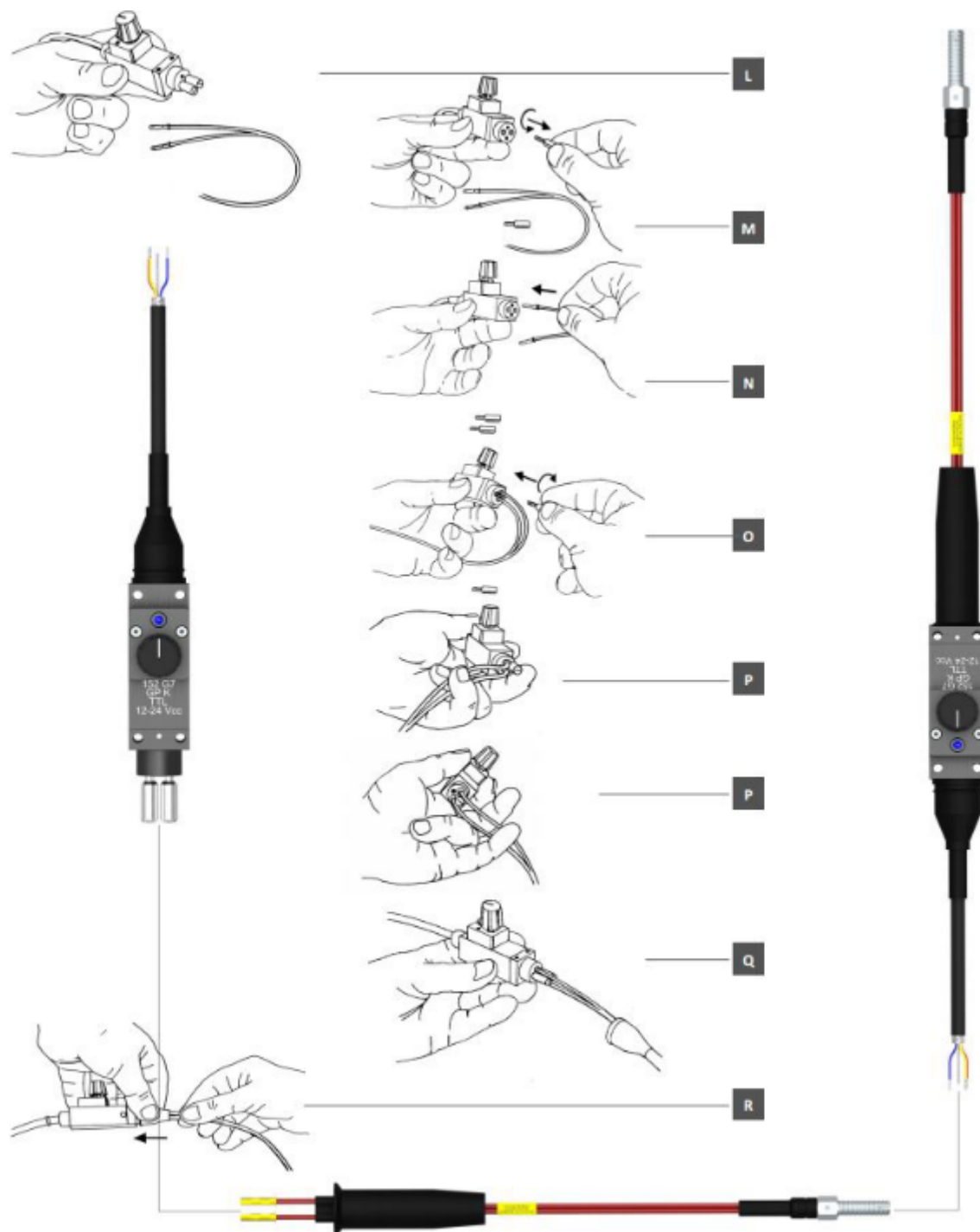
#### 2.4.5.4. Tape



*Black/white tape*

## 2.4.6. DS-TACHO-4: Operation

### 2.4.6.1. Mounting of the Probe



Mounting of the Probe

L: Ensure that you have all items required at your disposal, i.e. the sensor, the probe, and the two hand-pieces for optical fixation

M: Put the two hand-pieces down if they are on the optical head of the sensor

N: Insert the two optical fibres with their respective rivets

O: Screw the first hand-piece on and tighten moderately; a little gap between the rivet head and the optical head is normal

P: Remove the two fibres in order to allow for mounting of the second hand-piece

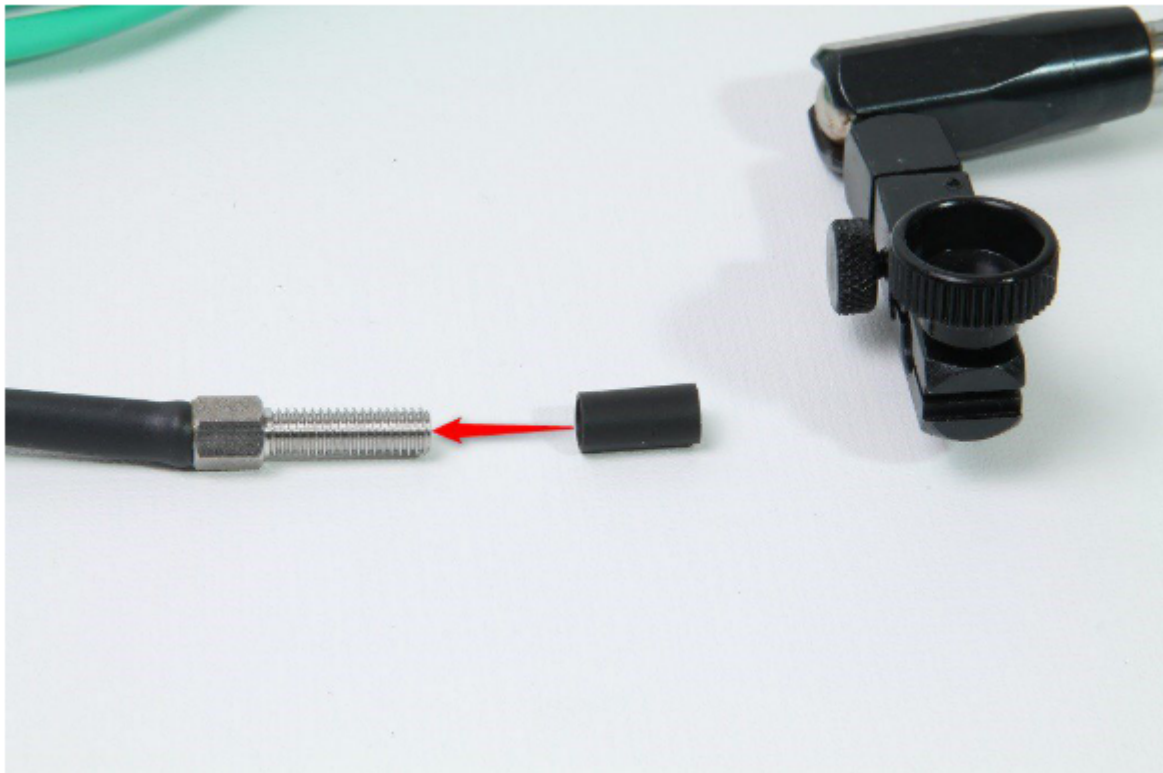
Q: Make sure that the two fibres and their rivets are assembled correctly

R: Hold both probe and sensor simultaneously when inserting the rubber sleeve to avoid damaging the two optical fibres on the level of the rivets.

#### 2.4.6.2. Using the Tripod

To mount the probe to the Tripod, you need the 6mm Adapter sleeve.

First put the adapter sleeve over the probe and then mount it in the Tripod.



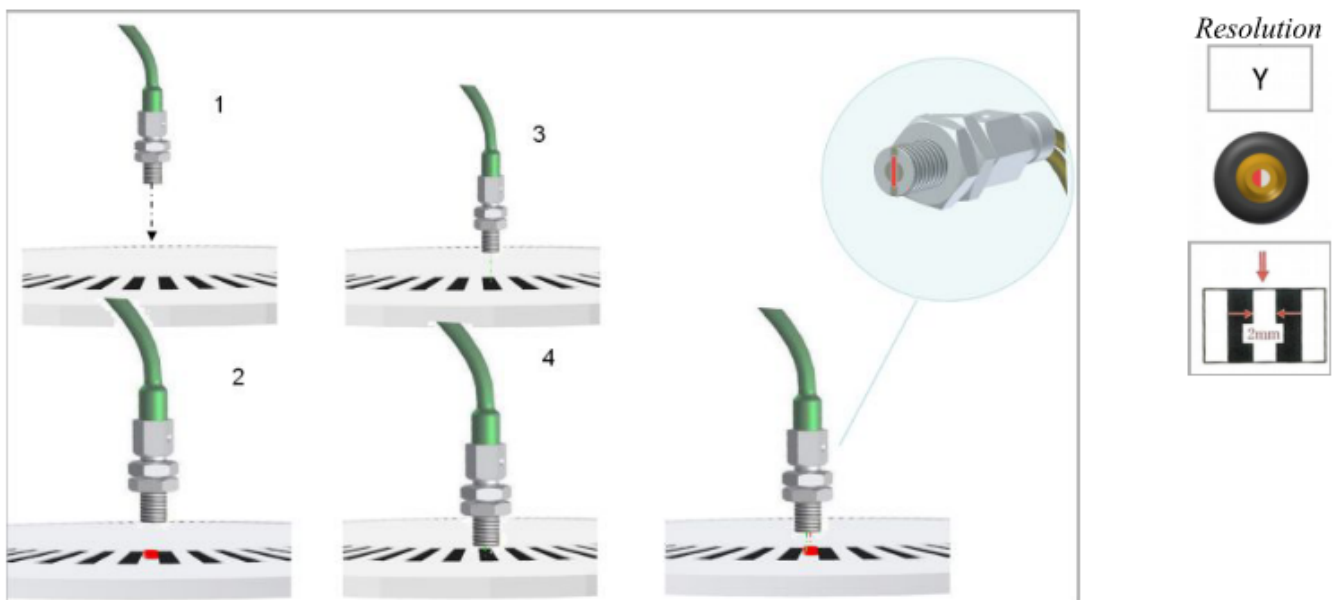
*Using the Tripod*

### 2.4.6.3. Adjustment of the probes

Operational mode of the sensor can be seen at the end of the optical fiber by a light beam (not dangerous), which is emitted when the sensor is in “1” mode and not emitted when the sensor is in “0” mode. The sensor keeps its wavelength near Infra-Red to ensure power and immunity of the detection function. This also gives an indication about the condition of the optical fiber.

The sensor should be placed about 2 to 5mm above the tape. A sensitivity potentiometer is available to adjust the trigger level for reliable pulse output.

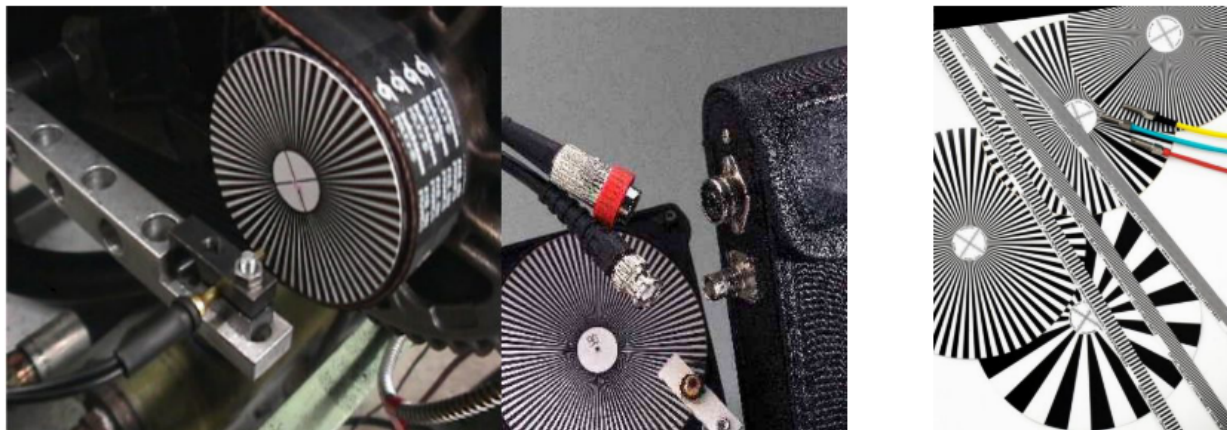
First turn the potentiometer in mid position. Bring the probe closer to the target until the indicator at the head lights up, targeting the white mark. Shift the probe, and repeat this operation in order to detect the triggering limits on the black marks of the target. Set up the probe in an average position (length), review this operation to confirm the accurate detection: the set up is finished.



*Probe adjustment*

#### 2.4.6.4. Optional Reflector Types

For optional reflector types please contact [sales@dewesoft.com](mailto:sales@dewesoft.com).

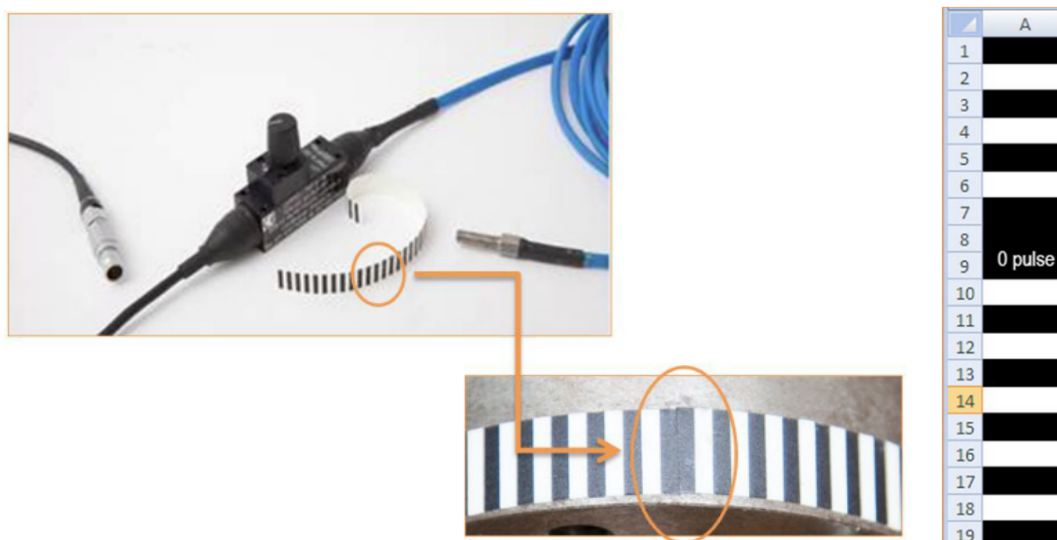


*Different reflector types*

#### 2.4.7. Automatic gap detection

When applying the black/white tape to the rotating shaft there will be an irregular rasterization at the transition point. This can be used as the zero pulse to indicate a defined start position. On the other hand this would result in a rpm drop or spike in our rpm measurement.

A software procedure automatically measures the pulses per revolution and also detects the exact gap length to enable robust and high quality measurement.



*Gap example*



#### **Important**

The zero pulse must be at least 3 pulses long.

## 3. Warranty information

### Notice

The information contained in this document is subject to change without notice.

### Note:

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The copy of the specific warranty terms applicable to your Dewesoft product and replacement parts can be obtained from your local sales and service office. To find a local dealer for your country, please visit <https://dewesoft.com/support/distributors>.

### 3.1. Calibration

Every instrument needs to be calibrated at regular intervals. The standard norm across nearly every industry is annual calibration. Before your Dewesoft data acquisition system is delivered, it is calibrated. Detailed calibration reports for your Dewesoft system can be requested. We retain them for at least one year, after system delivery.

### 3.2. Support

Dewesoft has a team of people ready to assist you if you have any questions or any technical difficulties regarding the system. For any support please contact your local distributor first or Dewesoft directly.

Dewesoft d.o.o.  
Gabrsko 11a  
1420 Trbovlje Slovenia

Europe Tel.: +386 356 25 300

Web: <http://www.dewesoft.com>

Email: [Support@dewesoft.com](mailto:Support@dewesoft.com)

The telephone hotline is available Monday to Friday from 07:00 to 16:00 CET (GMT +1:00)

### 3.3. Service/repair

The team of Dewesoft also performs any kinds of repairs to your system to assure a safe and proper operation in the future. For information regarding service and repairs please contact your local distributor first or Dewesoft directly on <https://dewesoft.com/support/rma-service>.

### 3.4. Restricted Rights

Use Slovenian law for duplication or disclosure. Dewesoft d.o.o. Gabrsko 11a, 1420 Trbovlje, Slovenia / Europe.

## 3.5. Printing History

Version 2.0.0, Revision 217 Released 2015 Last changed: 23. July 2018 at 16:54.

## 3.6. Copyright

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# 4. Safety instructions

Your safety is our primary concern! Please be safe!

## 4.1. Safety symbols in the manual



### Warning

Calls attention to a procedure, practice, or condition that could cause the body injury or death



### Caution

Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.

## 4.2. General Safety Instructions



### Warning

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Dewesoft d.o.o. assumes no liability for the customer's failure to comply with these requirements.

All accessories shown in this document are available as an option and will not be shipped as standard parts.



### 4.2.1. Environmental Considerations

Information about the environmental impact of the product.

### 4.2.2. Product End-of-Life Handling

Observe the following guidelines when recycling a Dewesoft system:

### 4.2.3. System and Components Recycling

Production of these components required the extraction and use of natural resources. The substances contained in the system could be harmful to your health and to the environment if the system is improperly handled at its end of life! Please recycle this product in an appropriate way to avoid unnecessary pollution of the environment and to keep natural resources.



This symbol indicates that this system complies with the European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). Please find further information about recycling on the Dewesoft web site [www.dewesoft.com](http://www.dewesoft.com)



Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment and is outside the scope of the 2002/95/EC RoHS Directive. However, we take care of our environment and the product is lead-free.

### 4.2.4. General safety and hazard warnings for all Dewesoft systems

Safety of the operator and the unit depend on following these rules.

- Use this system under the terms of the specifications only to avoid any possible danger.
- Read your manual before operating the system.
- Observe local laws when using the instrument.
- DO NOT touch internal wiring!
- DO NOT use higher supply voltage than specified!
- Use only original plugs and cables for harnessing.
- You may not connect higher voltages than rated to any connectors.
- The power cable and connector serve as Power-Breaker. The cable must not exceed 3 meters, the disconnect function must be possible without tools.
- Maintenance must be executed by qualified staff only.
- During the use of the system, it might be possible to access other parts of a more comprehensive system. Please read and follow the safety instructions provided in the manuals of all other components regarding warning and security advice for using the system.
- With this product, only use the power cable delivered or defined for the host country.
- DO NOT connect or disconnect sensors, probes or test leads, as these parts are connected to a voltage supply unit.
- Ground the equipment: For Safety Class 1 equipment (equipment having a protective earth terminal), a non-interruptible safety earth ground must be provided from the mains power source to the product input wiring terminals.
- Please note the characteristics and indicators on the system to avoid fire or electric shocks. Before connecting the system, please read the corresponding specifications in the product manual carefully.

- The inputs must not, unless otherwise noted (CATx identification), be connected to the main circuit of category II, III and IV.
- The power cord separates the system from the power supply. Do not block the power cord, since it has to be accessible for the users.
- DO NOT use the system if equipment covers or shields are removed.
- If you assume the system is damaged, get it examined by authorized personnel only.
- Adverse environmental conditions are Moisture or high humidity Dust, flammable gases, fumes or dissolver Thunderstorm or thunderstorm conditions (except assembly PNA) Electrostatic fields, etc.
- The measurement category can be adjusted depending on module configuration.
- Any other use than described above may damage your system and is attended with dangers like short-circuiting, fire or electric shocks.
- The whole system must not be changed, rebuilt or opened.
- DO NOT operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until the safe operation can be verified by service-trained personnel. If necessary, return the product to Dewesoft sales and service office for service and repair to ensure that safety features are maintained.
- If you assume a more riskless use is not provided anymore, the system has to be rendered inoperative and should be protected against inadvertent operation. It is assumed that a more riskless operation is not possible anymore if the system is damaged obviously or causes strange noises. The system does not work anymore. The system has been exposed to long storage in adverse environments. The system has been exposed to heavy shipment strain.
- Warranty void if damages caused by disregarding this manual. For consequential damages, NO liability will be assumed!
- Warranty void if damage to property or persons caused by improper use or disregarding the safety instructions.
- Unauthorized changing or rebuilding the system is prohibited due to safety and permission reasons (CE).
- Be careful with voltages >25 VAC or >35 VDC! These voltages are already high enough in order to get a perilous electric shock by touching the wiring.
- The product heats during operation. Make sure there is adequate ventilation. Ventilation slots must not be covered!
- Only fuses of the specified type and nominal current may be used. The use of patched fuses is prohibited.
- Prevent using metal bare wires! Risk of short circuit and fire hazard!
- DO NOT use the system before, during or shortly after a thunderstorm (risk of lightning and high energy over-voltage). An advanced range of application under certain conditions is allowed with therefore designed products only. For details please refer to the specifications.
- Make sure that your hands, shoes, clothes, the floor, the system or measuring leads, integrated circuits and so on, are dry.
- DO NOT use the system in rooms with flammable gases, fumes or dust or in adverse environmental conditions.
- Avoid operation in the immediate vicinity of high magnetic or electromagnetic fields, transmitting antennas or high-frequency generators, for exact values please refer to enclosed specifications.
- Use measurement leads or measurement accessories aligned with the specification of the system only. Fire hazard in case of overload!

- Lithium ion batteries are classified as not hazardous when used according to the recommendations of the manufacturer described in Battery Safety Data Sheet, which is available for download from [this link](#).
- Do not switch on the system after transporting it from a cold into a warm room and vice versa. The thereby created condensation may damage your system. Acclimatise the system unpowered to room temperature.
- Do not disassemble the system! There is a high risk of getting a perilous electric shock. Capacitors still might be charged, even if the system has been removed from the power supply.
- The electrical installations and equipment in industrial facilities must be observed by the security regulations and insurance institutions.
- The use of the measuring system in schools and other training facilities must be observed by skilled personnel.
- The measuring systems are not designed for use in humans and animals.
- Please contact a professional if you have doubts about the method of operation, safety or the connection of the system.
- Please be careful with the product. Shocks, hits and dropping it from already- lower level may damage your system.
- Please also consider the detailed technical reference manual as well as the security advice of the connected systems.
- This product has left the factory in safety-related flawlessness and in proper condition. In order to maintain this condition and guarantee safety use, the user has to consider the security advice and warnings in this manual.

#### EN 61326-3-1:2008

IEC 61326-1 applies to this part of IEC 61326 but is limited to systems and equipment for industrial applications intended to perform safety functions as defined in IEC 61508 with SIL 1-3.

The electromagnetic environments encompassed by this product family standard are industrial, both indoor and outdoor, as described for industrial locations in IEC 61000-6-2 or defined in 3.7 of IEC 61326-1.

Equipment and systems intended for use in other electromagnetic environments, for example, in the process industry or in environments with potentially explosive atmospheres, are excluded from the scope of this product family standard, IEC 61326-3-1.

Devices and systems according to IEC 61508 or IEC 61511 which are considered as “operationally well-tried”, are excluded from the scope of IEC 61326-3-1.

Fire-alarm and safety-alarm systems, intended for the protection of buildings, are excluded from the scope of IEC 61326-3-1.

### 4.3. Documentation version history

| Version | Date      | Notes           |
|---------|-----------|-----------------|
| V23-1   | 2.10.2023 | Initial version |