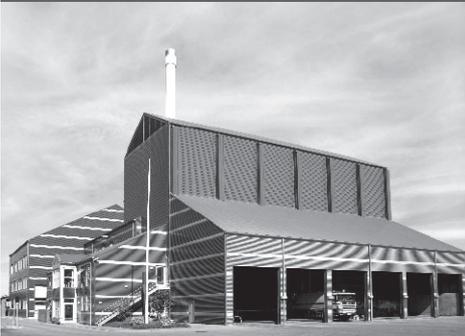




-power in control



DATA SHEET



Rudder/azimuth angle Transmitter CAN, RTC 300/RTC 600

- CANopen interface
- Measuring angle full +/-180 °
- High accuracy
- Easy zero and CW/CCW adjustm.
- Continuous shaft rotation



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1. General information

1.1 Product description

The RTC 300 and RTC 600 are robust angle sensors intended for marine applications like high accuracy rudder, azimuth or pitch angle measurements. They may also be suitable for other applications.

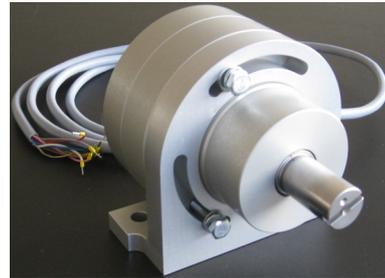
For a rudder or azimuth indicator system, these CAN bus-based angle transmitters combined with either the traditional XL indicators or the display-based XDi indicator form a complete MED approved (wheel marked) high accuracy indicator system.

The use of CAN bus, the very high linearity and full 16 bit data resolution position these sensors in the top performance class and thereby eliminates the need for complicated and time-consuming calibration procedures after installation, simply to comply with the rudder system accuracy requirements laid out in ISO 20673.

All DEIF angle transmitters are based on a "no touch" measuring principle, ensuring a long life without degradation of performance or accuracy due to wear and tear of electro-mechanical components such as potentiometers.



RTC 600 without bracket and RTC 300 standard size



RTC 600 with 90 deg. mounting bracket

The **RTC 600** is the heavy-duty version, mechanically compatible with the well-proven DEIF RT-2 analogue rudder transmitter, and it is designed to fulfil the same high standards as the RT-2.

The **RTC 300** is a physically smaller version for integration in rudder machines or azimuth thruster systems. Built into a standard Ø50 mm housing with a 6 mm axle, it is compatible with a number of angle encoders and potentiometers on the market and thereby offers an easy way of upgrading an existing system with the new high accuracy RTC 300 CAN bus-based angle transmitter.

The RTC 300 and RTC 600 may also be used as angle feedback units in control systems.

2. Technical information

2.1 Technical specifications

	RTC 300	RTC 600
Type	CAN angle transmitter	CAN angle transmitter
Interface	1 CANopen interface ISO/DIS 11898-2	1 CANopen interface ISO/DIS 11898-2
CAN NodeID	Programmable by wire: Default NodeID: 1,2,3,4,5,6,7,8 May be changed via CAN	Programmable by wire: Default NodeID: 1,2,3,4,5,6,7,8 May be changed via CAN
CANopen communication	Standard DS-301 Rev. 4.02	Standard DS-301 Rev. 4.02
CANopen device profile	DSP-406 Rev. 3.1 Encoder class C2	DSP-406 Rev. 3.1 Encoder class C2
Bit rate	125 kbps	125 kbps
Auto start on CAN	Yes (can be changed via CAN)	Yes (can be changed via CAN)
Output	TPDO 1, 16 bit resolution (Byte 0,1)	TPDO 1, 16 bit resolution (Byte 0,1)
Operating voltage (VCC)	18 to 31.2 V _{dc}	18 to 31.2 V _{dc}
Current	≤30 mA	≤30 mA
Output short-circuit protection	To GND and VCC	To GND and VCC
Reverse aux. voltage protection	Yes	Yes
Measuring angle electrical	0 to 360 deg.	0 to 360 deg.
Rotation direction	Default clockwise (CW) Programmable by wire to counter-clockwise (CCW)	Default clockwise (CW) Programmable by wire to counterclockwise (CCW)
Zero point	Freely programmable within 360 deg.	Freely programmable within 360 deg.
Linearity Angle span up to +/-180 deg.	Better than: ±0.25 deg.	Better than: ±0.25 deg.
Update rate	Default 20 Hz	Default 20 Hz
Hysteresis and repeatability	<0.1 deg.	<0.1 deg.
Temperature coefficient	<25 ppm	<25 ppm
Programming by wire	4 wires S1 to S4	4 wires S1 to S4
Programming wire short-circuit protection	To VCC and GND	To VCC and GND
Protection	IP67	IP67

Temperature	Operating: -25 to 80 °C Storage: -40 to 80 °C	Operating: -25 to 80 °C Storage: -40 to 80 °C
Torque (start/rotate)	<0.25 Nm	<0.25 Nm
Shaft load (axial/radial)	100 N/75 N	500 N/1000 N
Material	Housing: Aluminium Shaft: Stainless steel	Housing: Aluminium Shaft: Stainless steel
Vibration	4 g, 2 to 2000 Hz all axes	4 g, 2 to 2000 Hz all axes
Shock	50 g, half sine, 10 to 15 ms, 50 cycles	50 g, half sine, 10 to 15 ms, 50 cycles
Connection	2 m shielded cable, 8 wires (4 wires are used for programming on-ly)	2 m shielded cable, 8 wires (4 wires are used for programming only)
Insulation	Any wire to housing: 500 V _{eff} , 50 Hz, 1 min.	Any wire to housing: 500 V _{eff} , 50 Hz, 1 min.
Weight	RTC 300: 0.35 kg	RTC 600: 1.80 kg RTC 600 w/bracket: 2.15 kg
Approvals	Please refer to www.deif.com for an updated list of certificates	Please refer to www.deif.com for an updated list of certificates
Accessory	None	90 deg. mounting bracket (0.35 kg)

2.2 Driving capability

The CANopen driver in the RTC angle transmitters is capable of driving a CAN bus line with up to 50 physical nodes. In practice, this number may be slightly higher or lower, depending on the actual installation, cable length and architecture of the physical network. But for normal rudder or azimuth indicator systems, the number of nodes should not be a limitation.

However, it is very important to terminate the CAN bus cable in both ends with a 120 Ω resistor. The angle transmitter is often positioned in one end of the CAN network, and therefore a 120 Ω termination resistor is included with the RTC package.

2.3 Rudder system, MED approval

All DEIF rudder/azimuth transmitters and rudder/azimuth indicators are MED approved as a system according to ISO 20 673. Please refer to www.deif.com for approval status and certificates.

DEIF's traditional illuminated indicators, like the XL series or the display-based XDi indicator series, are all available with CANopen interface, and, used in combination with an RTC angle transmitter, they will provide a high-performance MED approved rudder/azimuth system.

Calibration accuracy when this rudder transmitter is used in a rudder system, shaft to output:

Example 1:

In a rudder indication system with a +/-45 deg. scale, the rudder transmitter calibration accuracy will be better than: +/-0.6 %.

Example 2:

In a rudder indication system with a +/-70 deg. scale, the rudder transmitter calibration accuracy will be better than: +/-0.5 %.

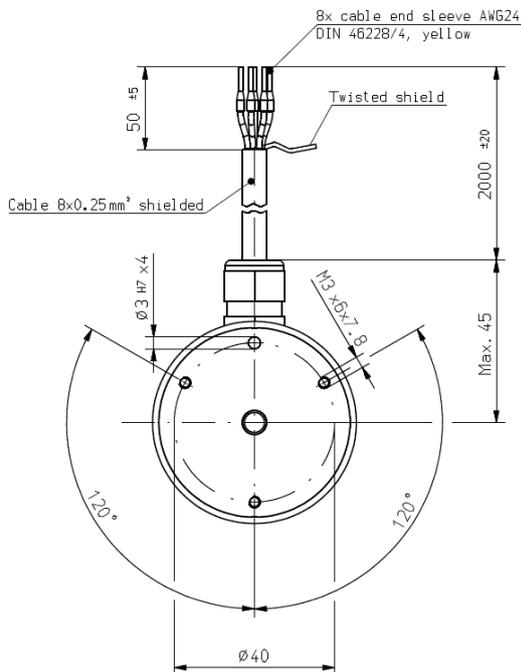
2.4 Applications - rudder and azimuth systems

For more detailed information on how to use the DEIF angle transmitters and illuminated indicators in rudder or azimuth applications, please refer to the related application notes that can be downloaded from www.deif.com.

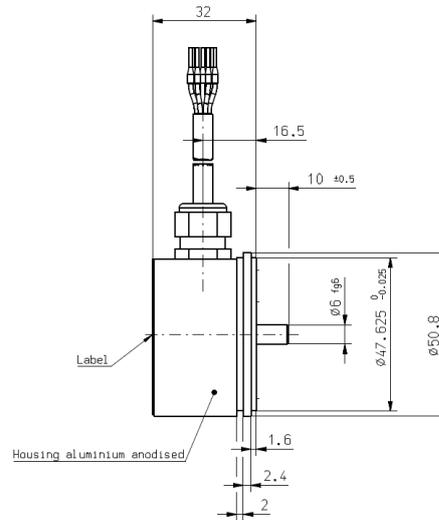
2.5 Unit dimensions and wiring

2.5.1 Unit dimensions in mm

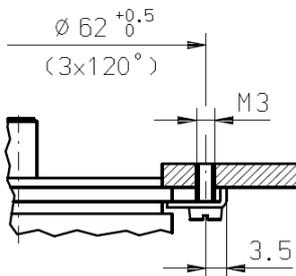
Front view - RTC 300



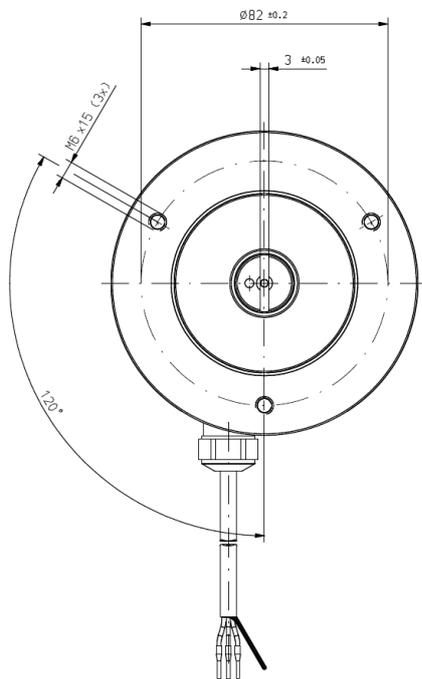
Side view - RTC 300



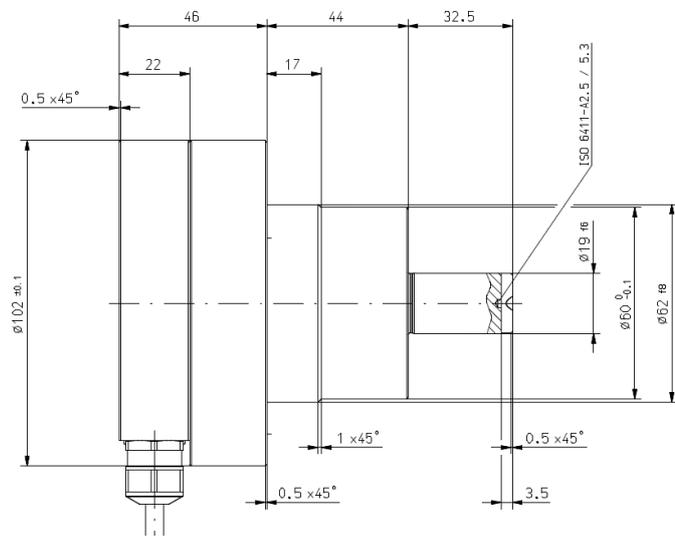
Fixation clip - RTC 300



Front view - RTC 600



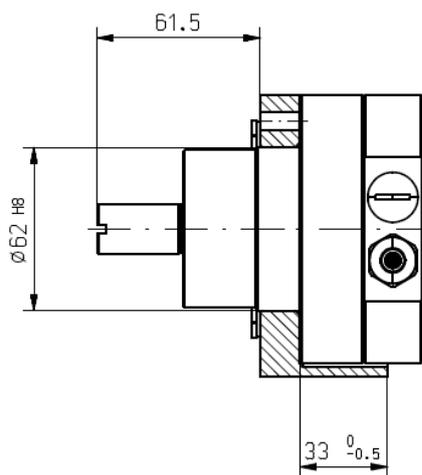
Side view - RTC 600



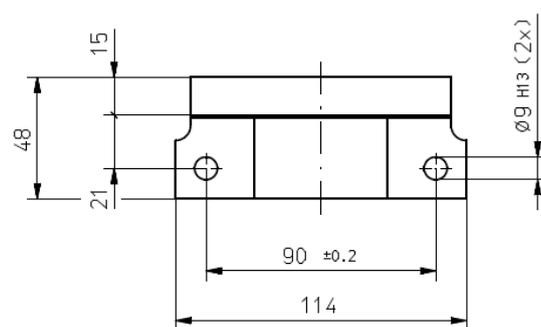
2.5.2 RTC 600 with bracket

The 90 degree mounting bracket for the RTC 600 is supplied separately, including the screws and washers needed for mounting.

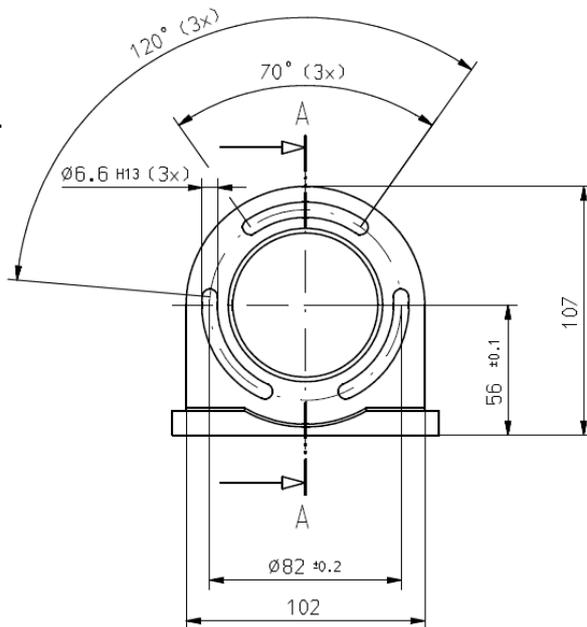
Side view



Bottom view



Front view



2.5.3 Wiring of RTC 300/RTC 600

Wire	Marking	Signal	Remark
Blue	0 V	Supply voltage	18 to 32 V _{dc} at max. 60 mA
Red	24 V _{dc}		
Green	CAN high	CAN bus	Remember to terminate the CAN bus
Yellow	CAN low		
White	S1	Setup	See the RTC 300/RTC 600 quick guide for setup details Normal operation: All four setup wires must be connected to 0 V (blue)
Grey	S2		
Pink	S3		
Brown	S4		

3. Ordering information

3.1 Available variants

Type	Variant no.	Description	Item no.	Note
RTC 600 w/M	03	Rudder/azimuth Transmitter CAN-open with 90 deg. mounting bracket	2951860010-03	Mechanically compatible with RT-2 w/bracket
RTC 600	04	Rudder/azimuth Transmitter CAN-open without mounting bracket	2951860010-04	Mechanically compatible with RT-2
RTC 300	05	Rudder/azimuth Transmitter CAN-open	2951860010-05	Standard Ø50 mm housing and 6 mm axle

3.2 Available accessories

Item no.	Variant no.	Description	Note
1124410003	01	Adjustable lever max. 1127 mm for RTA 602, RTC 600 or RT-2	
1124410004	02	Position linkage 317 mm for RTA 602, RTC 600 or RT-2	
1220000010	03	90 deg. mounting bracket for RTA 602 or RTC 600	Included in RTC 600 variant 03

3.3 Order specifications and disclaimer

3.3.1 Order specifications

Variants

Mandatory information			Additional options to the standard variant		
Item no.	Type	Variant no.	Option	Option	Option

Example:

Mandatory information			Additional options to the standard variant		
Item no.	Type	Variant no.	Option	Option	Option
2951860010-04	RTC 600	04	None		

Accessories

Mandatory information		
Item no.	Variant no.	Accessory

Example:

Mandatory information		
Item no.	Variant no.	Accessory
1124410003	01	Adjustable lever max. 1127 mm for RTA 602, RTC 600 or RT-2

3.3.2 Disclaimer

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is a discrepancy, the English version prevails.