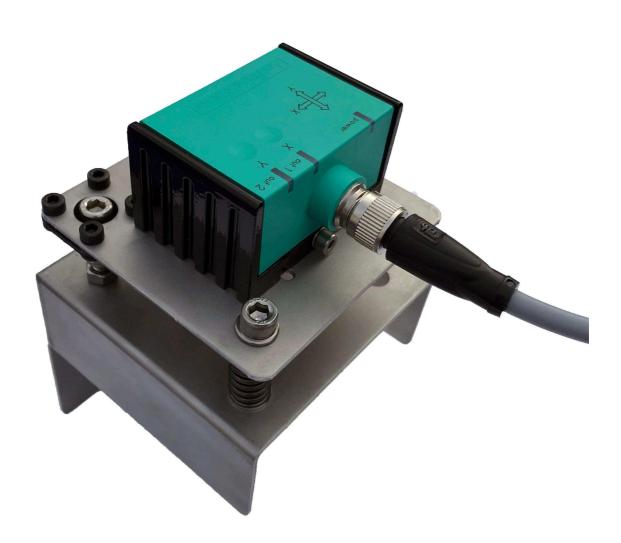
Marine Inclinometer

General





Marine Inclinometer September 2019

General Description

The inclinometer unit is an electronic angle measurement system, intended for Trim and Heel measurements onboard any vessel. The angle measurement is performed upon the signal from a solid state gravity sensor. This signal is amplified, and converted into 4 - 20 mA standard loop.

Mount the box or unit longitudinal or across.

Features

- E1-Type approval
- Measuring range -15° to +15°
- Analog output 4 mA to 20 mA
- Fixed evaluation limits
- High shock resistance
- Increased noise immunity 100 V/m

Installation of the Inclinometer

Due to the sensitive angle measuring nature of this device, the inclinometer unit must be mounted with care:

- Mount the unit vertically.
- Mount on a rigid construction longitudinal or across.
- If possible, mount in locations with fairly stable ambient temperature (e.g. in accommodation quarters).
- With reference to even keel, the horizontal edge of the unit has to be mounted within ±5°.

September 2019 Marine Inclinometer

Technical Data

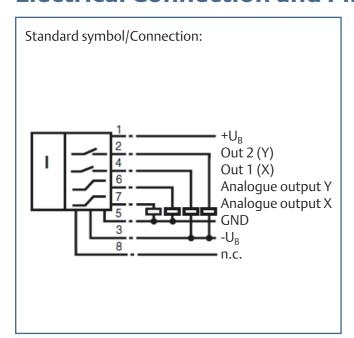
| Mission Time (T_M) $20 a$ Diagnostic Coverage (DC) 0% Indicators/Operating MeansLED, greenOperation indicatorLED, greenSwitching state $2 yellow LEDs$: Switching status (each output)Electrical Specifications $10 \dots 30 V DC$ Operating voltage U_B $10 \dots 30 V DC$ No-load supply current I_0 $\leq 25 mA$ Time delay before availability t_V $\leq 200 ms$ | General Specifications | |
|--|---|--|
| Absolute accuracy ≤ ± 0.2 ° Response delay ≤ 25 ms Respotal accuracy ≤ ± 0.02 ° Temperature influence ≤ 0.004 °/K Functional Safety Related Parameters MTTF _d 304 a Mission Time (T _M) 20 a Diagnostic Coverage (DC) 0% Indicators/Operating Means LED, green Switching state 2 yellow LEDs: Switching status (each output) Electrical Specifications Electrical Specifications Operating voltage U _g 10 30 V DC No-load supply current I ₀ ≤ 25 mA Time delay before availability t _v ≤ 200 ms Switching Output 2 switch outputs PNP, NO, reverse polarity protected, short-circuit protected Operating current I ₁ ≤ 100 mA Voltage drop ≤ 3 V Analog Output 2 current outputs 4 20 mA (one output for each axis) Load resistor 0 200 Ω at UB = 10 18 V Output type 2 current outputs 4 20 mA (one output for each axis) Load resistor 0 200 Ω at UB = 18 30 V Ambient Conditions 20 | Туре | Inclination sensor, 2-axis |
| Response delay ≤ 25 ms Resolution ≤ 0.01 ° Repeat accuracy ≤ ± 0.02 ° Temperature influence ≤ 0.004 °/K Functional Safety Related Parameters MITTF _d 304 a Mission Time (T _M) 20 a Diagnostic Coverage (DC) 0 % Indicators/Operating Means UED, green Switching state Electrical Specifications Operating voltage U ₈ 10 30 V DC No-load supply current l ₀ ≤ 25 mA Time delay before availability t _v ≤ 200 ms Switching Output Output type 2 switch outputs PNP, NO, reverse polarity protected, short-circuit protected Operating current l _v ≤ 100 mA Voltage drop ≤ 3 V Analog Output Output type 2 current outputs 4 20 mA (one output for each axis) Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colsp | Measurement range | -15 +15 ° |
| Resolution ≤ 0.01° Repeat accuracy ≤ ± 0.02° Temperature influence ≤ 0.004 °/K Functional Safety Related Parameters MTTF _d 304 a Mission Time (T _M) 20 a Diagnostic Coverage (DC) 0% Indicators/Operating Means Operation indicator LED, green Switching status (each output) Electrical Specifications Operating voltage U ₉ 10 30 ∨ DC No-load supply current l ₀ ≤ 25 mA Time delay before availability t _v ≤ 200 ms Switching Output Output type 2 switch outputs PNP, NO, reverse polarity protected, short-circuit protected Operating current l ₁ ≤ 100 mA Voltage drop ≤ 3 ∨ Analog Output Output type 2 current outputs 4 20 mA (one output for each axis) Load resistor 0 200 Ω at UB = 10 18 ∨ 0 500 Ω at UB = 18 30 ∨ Ambient Conditions Ambient Conditions Ambient Lemperature | Absolute accuracy | ≤ ± 0.2 ° |
| Repeat accuracy ≤ ± 0.02 ° Temperature influence ≤ 0.004 °/K Functional Safety Related Parameters MITF₀ 304 a Mission Time (T₀) 20 a Diagnostic Coverage (DC) 0 % Indicators/Operating Means Operation indicator Switching state 2 yellow LEDs: Switching status (each output) Electrical Specifications Operating voltage U₀ No-load supply current I₀ ≤ 25 mA Time delay before availability t₀ ≤ 2 switch outputs PNP, NO, reverse polarity protected, short-circuit protected Switching Output Operating current I₀ ≤ 100 mA Voltage drop ≤ 3 V Analog Output Output type 2 current outputs 4 20 mA (one output for each axis) Load resistor 0 200 Ω at UB = 10 18 V Output type 2 current outputs 4 20 mA (one output for each axis) Load resistor 0 200 Ω at UB = 10 18 V Output type 2 current outputs 4 20 mA (one output for each axis) Load resistor 0 200 Ω at UB = 10 18 V Output type | Response delay | ≤ 25 ms |
| Temperature influence \$0.004*/K Functional Safety Related Parameters MITF _d 304 a Mission Time (T _W) 20 a Diagnostic Coverage (DC) 0% Indicators/Operating Means Operation indicator Switching state 2 yellow LEDs: Switching status (each output) Electrical Specifications Operating voltage U _B 10 30 ∨ DC No-load supply current I _B ≤ 25 mA Time delay before availability t _v ≤ 200 ms Switching Output Output type 2 switch outputs PNP, NO, reverse polarity protected, short-circuit protected Operating current I _L ≤ 100 mA Voltage drop ≤ 3 ∨ Analog Output Output type 2 current outputs 4 20 mA (one output for each axis) Load resistor 0 200 Ω at UB = 10 18 ∨ 0 500 Ω at UB = 18 30 ∨ Ambient Conditions Ambient temperature 4-40 85 °C (-40 185 °F) Storage temperature 4-40 85 °C (-40 185 °F) Mechanical Specifications Connection type 8-pin, M12 x 1 connector Housing material PA Degree of protection 1P68 / IP69K | Resolution | ≤ 0.01 ° |
| Functional Safety Related Parameters MITF _d 304 a Mission Time (T _{fol}) 20 a Diagnostic Coverage (DC) 0 % Indicators/Operating Means UED, green Switching state 2 yellow LEDs: Switching status (each output) Electrical Specifications Operating voltage U _B 10 30 V DC No-load supply current I ₀ ≤ 25 mA Time delay before availability t _v ≤ 200 ms Switching Output Output type Operating current I ₁ ≤ 100 mA Voltage drop ≤ 3 V Analog Output Output type 2 current outputs 4 20 mA (one output for each axis) Load resistor 0 200 Ω at UB = 10 18 V O 500 Ω at UB = 18 30 V Ambient Conditions Ambient Lemperature -40 85 °C (-40 185 °F) Storage temperature -40 85 °C (-40 185 °F) Mechanical Specifications Connection type 8-pin, M12 x 1 connector Housing material PA Degree of protection 1P68 / IP69K | Repeat accuracy | ≤ ± 0.02 ° |
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| short-circuit protected Operating current I₁ ≤ 100 mA Voltage drop ≤ 3 V Analog Output Output type 2 current outputs 4 20 mA (one output for each axis) Load resistor 0 200 Ω at UB = 10 18 V 0 500 Ω at UB = 18 30 V Ambient Conditions Ambient temperature -40 85 °C (-40 185 °F) Storage temperature -40 85 °C (-40 185 °F) Mechanical Specifications 8-pin, M12 x 1 connector Housing material PA Degree of protection IP68 / IP69K | Switching Output | |
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| 0 500 Ω at UB = 18 30 VAmbient ConditionsAmbient temperature-40 85 °C (-40 185 °F)Storage temperature-40 85 °C (-40 185 °F)Mechanical SpecificationsConnection type8-pin, M12 x 1 connectorHousing materialPADegree of protectionIP68 / IP69K | Output type | 2 current outputs 4 20 mA (one output for each axis) |
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| Storage temperature -40 85 °C (-40 185 °F) Mechanical Specifications Connection type 8-pin, M12 x 1 connector Housing material PA Degree of protection IP68 / IP69K | Ambient Conditions | |
| Mechanical SpecificationsConnection type8-pin, M12 x 1 connectorHousing materialPADegree of protectionIP68 / IP69K | Ambient temperature | -40 85 °C (-40 185 °F) |
| Connection type 8-pin, M12 x 1 connector Housing material PA Degree of protection 1P68 / IP69K | Storage temperature | -40 85 °C (-40 185 °F) |
| Housing material PA Degree of protection IP68 / IP69K | Mechanical Specifications | |
| Housing material PA Degree of protection IP68 / IP69K | Connection type | 8-pin, M12 x 1 connector |
| | Housing material | PA |
| Mass 240 g | Degree of protection | IP68 / IP69K |
| | Mass | 240 g |

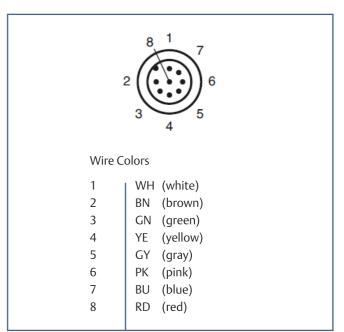
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| Factory Settings | | | | | | | | |
|---|--|-----|----|-----|-----|-----|--|--|
| Analog output (X) | -15° 15° | | | | | | | |
| Analog output (Y) | -15° 15° | | | | | | | |
| Switching output (X) | -15°15° | | | | | | | |
| Switching output (Y) | -15°15° | | | | | | | |
| Compliance with Standards and Directives -Standard Conformity | | | | | | | | |
| Shock and impact resistance | 100 g according to DIN EN 60068-2-27 | | | | | | | |
| Standards | EN 60947-5-2:2007 IEC 60947-5-2:2007 | | | | | | | |
| Approvals and Certificates | | | | | | | | |
| UL approval | cULus Listed, Class 2 Power Source | | | | | | | |
| CSA approval | cCSAus Listed, General Purpose, Class 2 Power Source | | | | | | | |
| E1 Type approval | 10R-04 | | | | | | | |
| EMC Properties | | | | | | | | |
| Interference immunity in accordance with DIN ISO 11452-2: 100 V/m Frequency band 20 MHz up to 2 GHz Mains-borne interference in accordance with ISO 7637-2: | | | | | | | | |
| Pulse | 1 | 2a | 2b | 3a | 3b | 4 | | |
| Severity level | III | III | Ш | III | III | III | | |
| Failure criterion | С | А | С | А | А | С | | |
| EN 61000-4-2: Severity level | CD: 8 kV AD: 15 kV | | | | | | | |
| EN 61000-4-3: Severity level | 30 V/m (802500 MHz) IV | | | | | | | |
| EN 61000-4-4: Severity level | 2 kV III | | | | | | | |
| EN 61000-4-6: Severity level | 10 V (0.0180 MHz) III | | | | | | | |
| EN 55011 | Klasse A | | | | | | | |

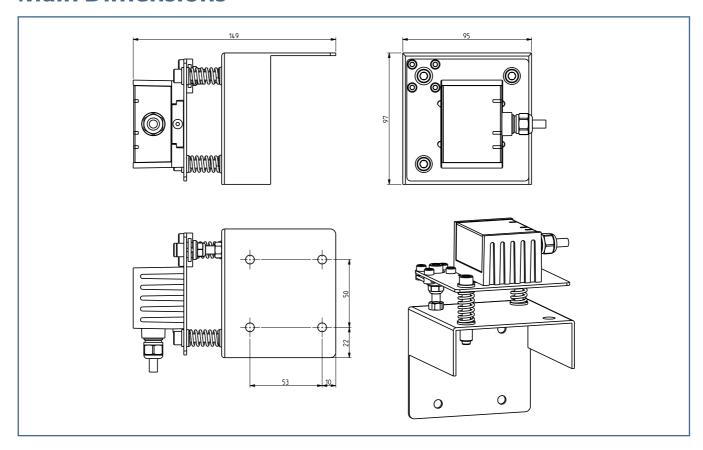
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Electrical Connection and Pinout





Main Dimensions



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