Operating Instructions

Programmable Transmitter for angular position KINAX 2W2

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1. Safety instructions

1.1 Symbols

The symbols in these instructions point out risks and have the following meaning:

Warning in case of risks.
Non-observance can result in malfunctioning.

Non-observance can result in malfunctioning and personal injury.

Information on proper product handling.

1.2 Intended use

- The KINAX 2W2 is a precision instrument. It is used to determine angular positions, processing and providing measured values of electrical output signals for the downstream device. Encoders use for this purpose only.
- The angular position transmitter is not intended to measure rotation speed.
- The device is intended for installation in industrial plants and meets the requirements of EN 61010-1.
- Manufacturer is not liable for any damage caused by inappropriate handling, modification or any application not according to the intended purpose.

1.3 Commissioning

- Installation, assembly, setup and commissioning of the device has to be carried out exclusively by skilled workers.
- Observe manufacturer's operating instructions.
- Check all electric connections prior to commissioning the plant.
- If assembly, electric connection or other work on the device and the plant are not carried out properly, this may result in malfunctioning or breakdown of the device.
- Safety measures should be taken to avoid any danger to persons, any damage of the plant and any damage of the equipment due to breakdown or malfunctioning of the device.
- Do not operate the device outside of the limit values stated in the operating instructions.

1.4 Repair work and modifications

Repair work and modifications shall exclusively be carried out by the manufacturer. In case of any tampering with the device, the guaranty claim shall lapse. We reserve the right of changing the product to improve it.

1.5 Disposal

The disposal of devices and components may only be realised in accordance with good professional practice observing the country-specific regulations.

1.6 Transport and storage

Transport and store the devices exclusively in their original packaging. Do not drop devices or expose them to substantial shocks.

2. Scope of delivery

- Transmitter for angular position KINAX 2W2, acc. made to order
- 3 clamps
- 1 Safety instructions

3. Application

The KINAX 2W2 transmitter converts the angular position of a shaft into a **load independent** direct current signal, proportional to the angular position.

Due to the compact design, the angular position transmitters are particularly suitable for installation in or mounting / on devices and apparatuses.

4. Main features

- Compact angular position transmitters for installation or mounting
- Capacitive scanning system
- 4...20mA analog output signal with 2-wire connection
- Drive shaft without stops, rotating
- Low starting troque < 0.001 Nm
- Non-wearing and low-maintenance
- Adjustment / Independent fine adjustment of the analog output, zero position and measuring range
- Characteristic of the output value / Programmable as a linear, V-characteristic, or any characteristic curve

5. Technical data

5.1 Measuring input

Measuring ranges:	Programmable between 0 to 50° or 0 to 350°
Shaft-diameter	2 mm, 6 mm [0.078″, 0.236″]
Starting torque:	< 0.001 Ncm [0.0014 oz-in] at 2 mm [0.078″] shaft < 0.03 Ncm [0.0425 oz-in] at 6 mm [0.236″] shaft
Direction of rotation:	programmable

5.2 Measuring output

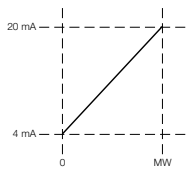
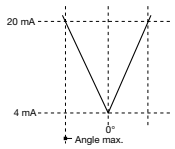
Output variable I_A:	Load-independent DC current, proportional to the input angle
Standard ranges:	4…20 mA, 2-wire connection
DC voltage:	Input voltage U_i: 12...33 V
Max. residual ripple:	0.3 % p.p.
Setting time:	< 5 ms
External resistance:	$R_{ext.}$ max. [kΩ] = $\frac{H\ [V] - 12\ V}{I_A\ [mA]}$

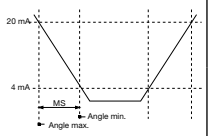
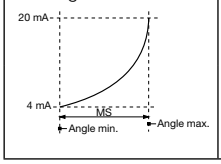
H = Power supply
I_A = Output signal end value

5.3 Accuracy

Reference value:	Measuring range
Basic accuracy:	0.5 % with linear characteristic

Calculation additional error:

Output characteristic	Definition	Additional error
Linear 	Programmable Angle max = MW Angle min = 0° $[f_{Add}]$=%	Device type 350°: $f_{Add}=(\frac{0,18°}{MS}$ x100-0,05)
		Device type 50°: $f_{Add}=(\frac{0,05°}{MS}$ x100-0,05)
	e.g. at MW=180°: $f = f_{add} + f_{Abs} = 0,05\% + 0,5\% = 0,55\%$	
simple V-characteristic 	Programmable Angle max = MW Angle min = 0° $[f_{Add}]$=%	Device type 350°: $f_{Add}=(\frac{0,18°}{MS}$ x100)
		Device type 50°: $f_{Add}=(\frac{0,05°}{MS}$ x100)

Offset V-characteristic 	MS=(angle max.)-(angle min.) Angle max = ± final angle Angle min. = > 0° $[f_{Add}]$=%	Device type 350°: $f_{Add}=(\frac{0,25°}{MS} \times 100)$
		Device type 50°: $f_{Add}=(\frac{0,09°}{MS} \times 100)$
Beliebige Kennlinie 	MS=(angle max.)-(angle min.) $[f_{Add}]$=%	Device type 350°: $f_{Add}=(\frac{0,25°}{MS} \times 100)$
		Device type 50°: $f_{Add}=(\frac{0,09°}{MS} \times 100)$

Reproducibility: < 0,2 %

Influence of temperature (-25 … +75 °C) [-13 ... +167 °F]: ± 0,2 % / 10 K

5.4 Installation Data

Material: Housing: Metal (aluminium), Surface chromated Alodine 400

Mounting position: Any

Admissible static loading of shaft:

Sense	Drive shafts dia.	
	2 mm	6 mm
radial max.	16 N	83 N
axial max.	25 N	130 N

5.5 Regulations

Spurious radiation: En 61000-6-3

Immunity: EN 61000-6-2

Common-mode voltage: 100 V AC, CATII

Test voltage: 750 V DC, 1 min. all electrical connections against housing

Housing protection: IP 50 acc. to EN 60529

5.6 Environmental conditions

Climatic rating: Temperature – 25 to + 75 °C [-13...+167 °F] Annual mean relative humidity ≤ 90 %

Altitude: 2000 m max.

Transportation and storage temperature: – 40 to 80 °C [-40...+176 °F]

Vibration resistance: 5 g per 2h in 3 directions

Shock resistance: 3x50 g per 10 splicing in all directions

5.7 Dimensional drawing

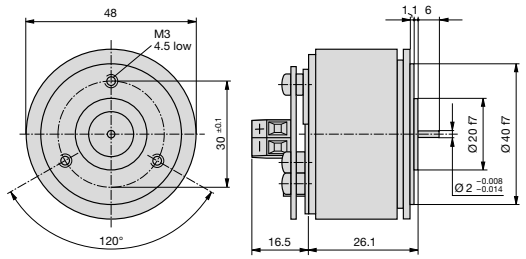


Fig. 1. KINAX 2W2 with standard drive shaft at front only, ∅ 2 mm, length 6 mm [0.078″, 0.236″], screw terminal version.

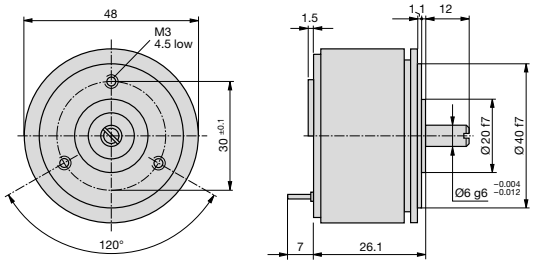
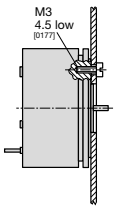
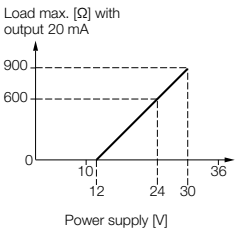
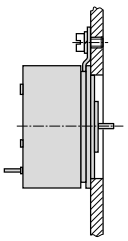
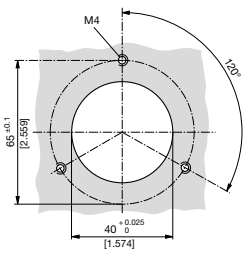


Fig. 2. KINAX 2W2 with special drive shaft at front only, ∅ 6 mm, length 12 mm [0.236″, 0.472″].

6. Mounting

Mechanical mounting

All versions of the transmitter can be mounted either directly or by means of 3 mounting clips to the item being measured. Both methods of mounting and the relevant drilling and cut-out plans can be seen from Table:

Mounting versions[2]		Drilling and cut-out diagrams for mounting transmitters)
directly		
with 3 clamps		

Mounting/positioning

Three **M3** screws are needed for the **"directly"** mounted versions and three **M4** screws for those **"with clamps"**. The screws are not supplied, because the required length varies according to the thickness of the mounting surface.

When deciding where to install the transmitter (measuring location), take care that the **"Ambient conditions"** given in Section "5. Technical data" are **not exceeded**.

Angular position transmitters of the KINAX 2W2 range do not require a mechanical zero position mark. After mounting, the transmitter can be moved to any position and configured using the 2W2 software. A power supply connection to the KINAX 2W2 is not required in order to use the 2W2 configuration software (Fig. 3; AUX switch on the PK 610 in the ON position.

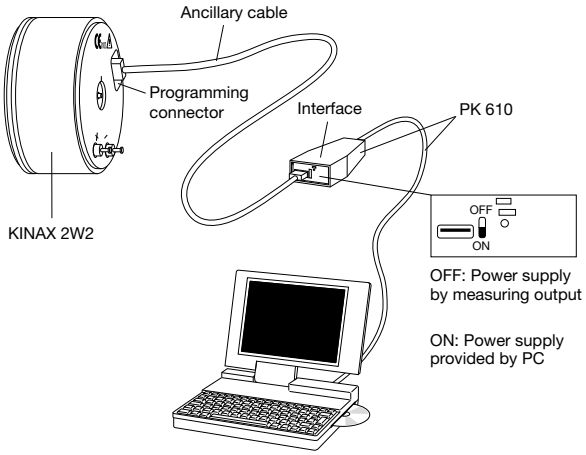


Fig. 3. Connection diagram programming

If you programm the KINAX 2W2 with a connected power supply, then the switch on the interface PK610 must be imperative switched to OFF. If this is ignored, this can lead to the destruction of the device.

Positioning procedure for the KINAX 2W2

1. Mount the angular position transmitter and mechanically connect it to the object to be measured. Connect the KINAX 2W2 to the programming device according to Fig. 3. Start the 2W2 configuration software. If necessary, configure the device with the required measuring range data.
2. Place the measuring device in a defined position (prefereably the zero position).
3. Select the **"Adjustment"** menu item under **"SERVICE"** in the configuration software. In the **"Mechanical position"** window enter the current angle of the measuring device and then select **"Adjust".** The measuring device is now configured for the defined angle.

7. Electrical connections

For connecting the external wires, the transmitter has 2 soldering pins at the back (Fig. 4) or a connecting print with screw terminals (Fig. 5). The soldering posts suffice Protection Class IP 00 acc. to IEC 60 529.

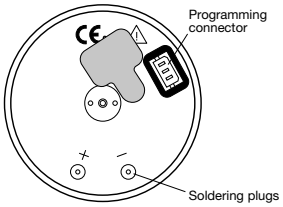


Fig. 4. Connection with soldering plugs

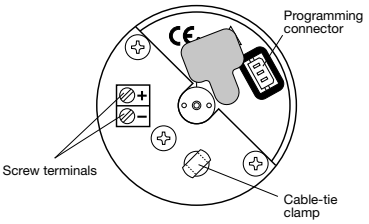


Fig. 5. Connection with screw terminals

Note that, …

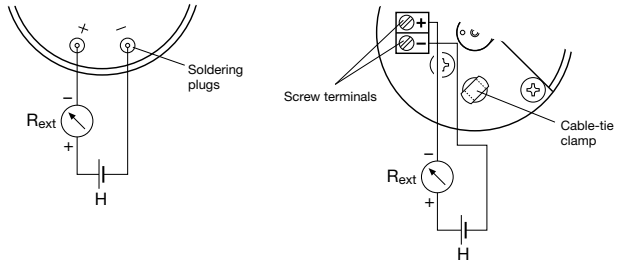
… the data required to carry out the prescribed measurement must correspond to those marked on the nameplate of the KINAX 2W2 (Range, Output, Supply Voltage)!

… the total loop resistance connected to the output (receiver plus leads) **does not** exceed the maximum permissible value $R_{ext.}$! See **"Measuring output"** in Section "5. Technical data" for the maximum values of $R_{ext.}$!

… twisted cores must be use for the measured variable input and output leads and routed as far away as possible from power cables!

In all other respects, observe all local regulations when selecting the type of electrical cable and installing them!

Do not **excessively heat** the soldering posts!
Solder using a **small** pencil bit soldering iron!



H = **DC** power supply H = 12 to 33 V
$R_{ext.}$ = External resistance

Fig. 6. Connection diagrams for 2-wire connection.

8. Setting the beginning and end

Fine adjustment

The analog output can be finely adjusted using the 2W2 configuration software. Select the menu item **"Adjustment"** under **"SERVICE"**. In the **"Analog output"** window, the zero position and the end value can now be adjusted.

Procedure:

1. Put the transmitter into operation and connect the programming device according to Fig. 3 (AUX switch on the PK 610 in the OFF position).
2. Place the measuring device in the zero position, i.e. in the position in which the KINAX 2W2 should output 4 mA. Adjust with the **"ZERO"** virtual knob until the output is correct.
3. Place the measuring object in the end position, i.e. in the position, in which the KINAX 2W2 should output 20 mA. Adjust with the virtual knob **"Span"** until the output signal is correct.
4. Close the adjustment with the **"Done"** button.

The adjusting range of the zero position and span is 5%. If this range is not sufficient, the span can be adapted by changing the mechanical characteristics (increase/ decrease the measuring span).

Simulation mode

The 2W2 configuration software supports the operation of the KINAX 2W2 in simulation mode. The simulation of the measured value allows the subsequent chain of devices to be tested during the installation phase.

Procedure:

1. Select the **"Simulation"** menu item under **"Service"** in the configuration software.
2. The window displays the device configuration. After the entry of the required angle, the analog output is set in accordance with the device configuration.

9. Electric commissioning

- Provide a separate power supply for the device in case of consumer loads with high interference levels.
- Install the entire plant in an EMC-compatible manner. Installation environment and wiring can affect the EMC of the device.

10. Maintenance

The device is free of maintenance. Repairs may only be carried out by authorized authorities.

11. Order code

Version	Angle range mechanical		Drive shaft		Output signal	Electrical connection	Test certificate	Configuration	Sense of rotation	Measuring range end value		Output characteristic	Climatic rating	Marine version	Article Number
Standard version	Angle range up to 50°	Angle range up to 350°	Standard, 2mm, 6mm front	6mm, 12mm front	Output 4 . . 20 mA, 2-wire	Connection on soldering pins	Test certificate English	Basic configuration programmed	Clockwise	Measuring range end value 50°	Measuring range end value 350°	Linear	Standard	Without maritime exec. (formerly Germ.Lloyd)	
•	•	–	•	–	•	•	•	•	•	•	–	•	•	•	195889
•	•	–	–	•	•	•	•	•	•	•	–	•	•	•	195897
•	–	•	•	–	•	•	•	•	•	–	•	•	•	•	195905
•	–	•	–	•	•	•	•	•	•	–	•	•	•	•	195913

• Variant active / - variant inactive