

KINAX WT 711

Programmable Transmitter for Angular Position

Unit in field type housing

Application

The **KINAX WT 711** (Figs. 1 and 2) converts the angular position of a shaft into a **load-independent** direct current signal, proportional to the angular position. The unit is **contact-free**. The compact housing has made this unit ideal for building onto other equipment and plant.

Features / Benefits

- Measuring range, sense of rotation, characteristic, switching point and other additional functions programmed using PC / Simplifies project planning and engineering, short delivery times, low stocking

Measured variable	Measuring range limits
Angular position	Programmable between 0 ... 10 and 0 ... 50 or 0 ... 50 and 0 ... 350 α °

- Available in type of protection "Intrinsic safety" Ex ia IIC T6 / Can be mounted within the hazardous area (see "Table 3: Data on explosion protection")
- Simulation of measured value / The testing of the subsequent device chain is already possible during the installation phase
- Measured value acquisition / Display of the instantaneous value and a trend graph of the measured value on the screen
- 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
- The shaft can be turned through full
- Patented measuring method
- Unit in field type housing / Compact for building onto other equipment and plant

Layout and mode of operation

The transmitter consists of 2 main parts: the differential screen capacitor D and the electronic circuitry E (Fig. 3).

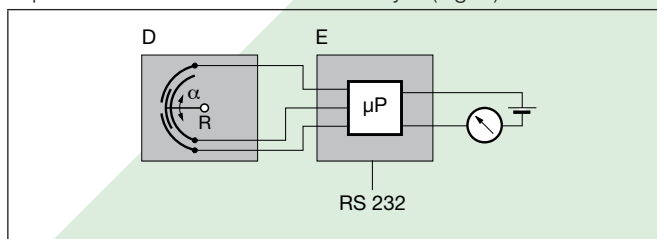


Fig. 3. Block diagram.



Fig. 1. KINAX WT 711 with shaft dia. 2 mm.



Fig. 2. KINAX WT 711 and additional gear.

The angular deflection α of the device to be measured is transferred to the rotor R of the differential screen capacitor with the aid of a mechanical coupling. It is then converted into a change of capacitance proportional to the angle.

All changes to the position of the rotor result in a change in the capacitance at the input to the microprocessor. This is transformed into a DC current signal proportional to the measured value.

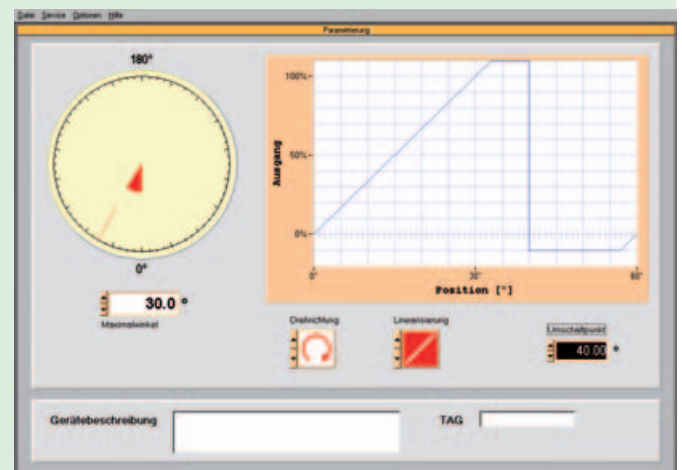


Fig. 4. Print screen example of the menu-controlled programming.

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Programming

A PC, the programming cable PK 610 plus ancillary cable and the configuration software 2W2 are required to program the transmitter. (Details of the programming cable and the software are to be found in the separate data sheet: PK 610 Le).

The connections between "PC ↔ PK 610 ↔ KINAX WT 711" can be seen from Fig. 5. The transmitter can be programmed either with or without the power supply connected.

The software 2W2 is supplied on one CD and runs under Windows 95 or higher.

The programming cable PK 610 adjusts the signal level between the PC and the transmitter KINAX WT 711.

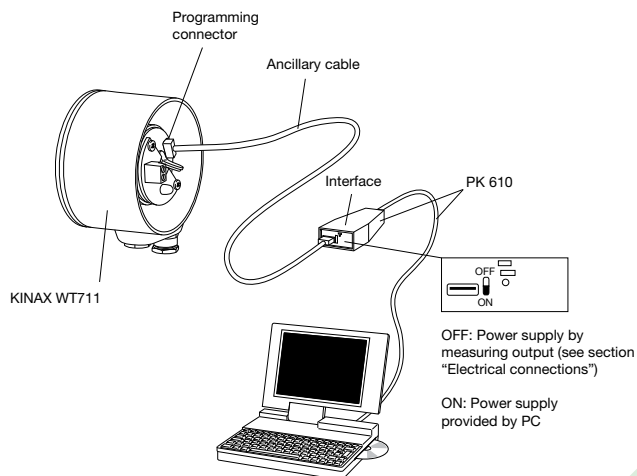


Fig. 5. Example of the set-up for programming a KINAX WT 711 without the power supply. For this case the switch on the interface must be set to "ON".

Technical data

General

Measured quantity: Angle of rotation α \curvearrowright °
 Measuring principle: Capacitive method
 Differential screen capacitor with contact-free, non-wearing positional pick-up. Drive shaft fully rotatable without steps (patented measuring method)

Zero point correction: Approx. $\pm 5\%$
 Span adjustment: Approx. $\pm 5\%$
 Current limitation: I_A max. 40 mA
 Standard range: 4...20 mA, two-wire
 External resistance (load):

$$R_{\text{ext max.}} [\text{k}\Omega] = \frac{H [\text{V}] - 12\text{V}}{I_A [\text{mA}]}$$

H = DC power supply
 I_A = End value of output variable

Measuring input

Measuring range of rotation angle: Programmable between 0 ... 10 and 0 ... 50 \curvearrowright ° or 0 ... 50 and 0 ... 350 \curvearrowright °
 Drive shaft diameters: 2 or 6 mm resp. 1/4"

Frictional torque: < 0.001 Ncm with shaft dia. 2 mm
 < 0.03 Ncm with shaft dia 6 mm resp. 1/4", without additional gear
 Approx. 0.6 ... 3.2 Ncm with additional gear, depending on transmission

Sens of rotation of the drive shaft: Programmable for sense of rotation clockwise or counterclockwise

Measuring output

Power supply: H = 12 to 33 V DC (possible with standard version, non-Ex)
 H = 12 to 30 V DC (necessary with Ex version, type of protection "Intrinsically safe" Ex ia IIC T6)
 Protected against wrong polarity
 Output variable I_A : Load-independent DC current, proportional to the input angle

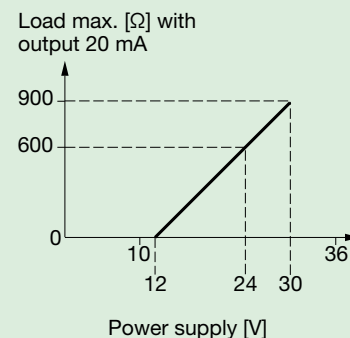
Residual ripple in output current: < 0.3% p.p.
 Response time: < 5 ms

Programming connector

Interface: Serial interface

Accuracy data

Reference value: Measuring span
 Basic accuracy: Error limits at reference conditions $\leq \pm 0.5\%$
 Reproducibility: < 0.2%



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Reference conditions

Ambient temperature	23 °C ± 2 K
Power supply	18 V DC
Output burden	0 Ω
Adjustments	350° version measuring range > 50...350° characteristic linear
	50° version measuring range ≥ 10...50° characteristic linear

Influence effects (maxima) (included in basic error)

Dependence on external resistance ΔR_{ext} max.	± 0.1%
Power supply influence	± 0.1%
Additional error (maxima)	
Temperature influence (- 25...+ 75 °C)	± 0.2% / 10 K
Bearing play influence	± 0.1%

Additional errors (cumulative)

Output characteristic	Definitions	Device version	Additional error
simple "V" characteristic 	Angle max. = MW Angle min. = 0°	350°	$f = \left(\frac{0.18^\circ}{MW} \times 100 \right)$
		50°	$f = \left(\frac{0.05^\circ}{MW} \times 100 \right)$
"V" characteristic with offset 	MS = (angle max.) - (angle min.) Angle max. = ± final angle Angle min. = > 0°	350°	$f = \left(\frac{0.25^\circ}{MS} \times 100 \right)$
		50°	$f = \left(\frac{0.09^\circ}{MS} \times 100 \right)$
any characteristic 	MS = (angle max.) - (angle min.)	350°	$f = \left(\frac{0.25^\circ}{MS} \times 100 \right)$
		50°	$f = \left(\frac{0.09^\circ}{MS} \times 100 \right)$

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Installation data

Dimensions:	see section "Dimensional drawings"
Housing:	Field type housing, cast aluminium Corrosion resistant finish Plastic protection cap
Mounting position:	Any
Electrical connecting terminals:	Screw-type terminals with indirect wire pressure, suited for max. 1.5 mm ² 1 gland PG9
Weight:	Basic unit alone approx. 0.55 kg with additional gear approx. 0.9 kg
Fixation:	3 cheesehead screws M3 or with 3 clamps

Impulse voltage withstand:	1 kV, 1.2/50 µs, 0.5 Ws IEC 255-4, Cl. II
Housing protection:	IP 43 acc. to EN 60 529 without gear IP 64 with gear or other similar mounting
Test voltage:	500 V _{eff} , 50 Hz, 1 min. all electrical connections to housing
Permissible common-mode voltage:	100 V, 50 Hz

Environmental conditions

Climatic rating:	Standard version Temperature -25 to + 70 °C Annual mean relative humidity ≤ 75% or Version with improved climatic rating Temperature - 25 to + 70 °C Annual mean relative humidity ≤ 95% Ex version see Ex-type-examination Certificate
Transportation and storage temperature:	- 25 to 80 °C

Mechanical withstand

Permissible vibrations:	acc. to EN 60 068-2-6
Shock:	acc. to EN 60 068-2-27
Mounting position:	Any

Regulations

Electromagnetic compatibility:	The standards DIN EN 50 081-2 and DIN EN 50 082-2 are observed
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Basic configuration

The transmitter KINAX WT 711 is also available already programmed with a **basic** configuration which is especially recommended in cases where the programming data is not known at the time

of ordering (see "Table 1: Specification and ordering information", feature 5").

Basic configuration:

Order Code	Mechanical angle range	Measuring range	Switching point	Sense of rotation	Characteristic of output variable
711 - 110X 00XX X	50°	0 ... 50°	55°	Clockwise	Linear
711 - 120X 00XX X	350°	0 ... 350°	355°	Clockwise	Linear

Table 1: Specification and ordering information

Features, Selection	Blocking code	no-go with blocking code	Article No./ Feature
Order code 711 - xxxx xxxx xxxx x			711 -
1. Version of the transmitter			
1) Standard			1
2) Ex ia IIC T6, CENELEC/ATEX, measuring output intrinsically safe	K		2

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Features, Selection	Blocking code	no-go with blocking code	Article No./ Feature
Order code 711 - xxxx xxxx xxxx x			711 -
2. Mechanical angle range			
1) Angle range to 50°			1
2) Angle range > 50 to 350°			2
3. Sense of rotation			
0) Sense of rotation clockwise	D		0
1) Sense of rotation counterclockwise	E		1
2) For "V" characteristic	F		2
Lines 1 and 2: Not possible with basic configuration			
4. Drive shaft			
0) Standard dia. 2 mm, length 6 mm			0
1) Special dia. 6 mm, length 6 mm			1
2) Spezial dia. 1/4", length 6 mm			2
A) Transformation 1 : 4, dia. 6 mm, length 15 mm		FK	A
B) Transformation 1 : 1, dia. 6 mm, length 15 mm		FK	B
C) Transformation 4 : 1, dia. 6 mm, length 15 mm		FK	C
D) Transformation 32 : 1, dia. 6 mm, length 15 mm		FK	D
E) Transformation 64 : 1, dia. 6 mm, length 15 mm		FK	E
5. Measuring range			
0) Basic configuration, programmed	G	EF	0
9) [°angle], 0 to final value / switching point:		F	9
Z) "V" characteristic [± °angle], min/max.:		DE	Z
Specify in line 9: Final value ≥ 10 to 50° with angle range ≥ 50°, > 50 to 350° with angle range > 350° Switching point > Final value, max. 60° with angle range ≥ 50°, > Final value, max. 360° with angle range > 350° ≥ 105% final value with non-linear characteristic (lines 1 to 4 in feature 6)			
Specify in line Z: Minimal value: > 0 Maximal value: ≥ 25 with angle range ≥ 50°, Span (max. value – min. value) ≥ 5°; > 25 to 175 with angle range > 350°, span ≥ 25° symmetrical about the center line, e.g. [± angle], min/max.: 15/120 correspond: – 120 to – 15 to 0 to 15 to 120° angle (input) + 20 to 4 to < 4 to 4 to +20 mA (output)			
6. Characteristic of output variable			
0) Characteristic linear			0
1) Function X to power of 1/2		FG	1
2) Function X to power of 3/2		FG	2
3) Function X to power of 5/2		FG	3
4) Customized		FG	4
Lines 1 to 4: Not possible with "V" characteristic			
Line 4 (on inquiry): Give an algorithm or fixed points (23 values in 5% steps from – 5% to 105% of measuring range, output continuously – 10 to 110%)			

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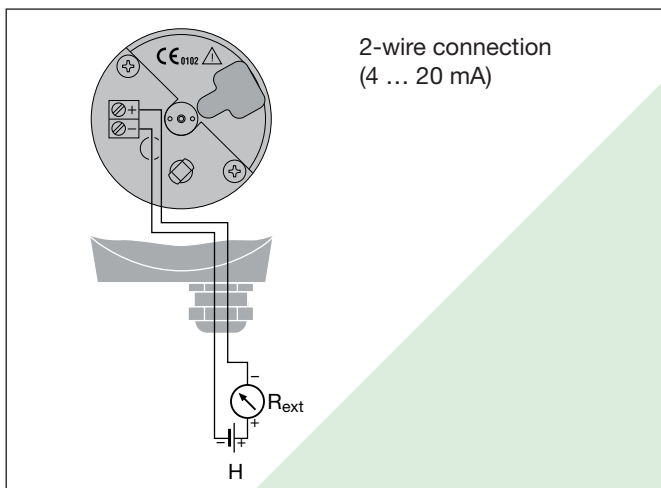
Features, Selection	Blocking code	no-go with blocking code	Article No./ Feature
Order code 711 - xxxx xxxx xxxx x			711 -
7. Test certificate			
0) Without test certificate			0
D) Test certificate in German			D
E) Test certificate in English			E
8. Marking the system zero position			
0) System zero position not marked			0
1) System zero position marked		G	1
9. Climatic rating			
0) Standard climatic rating			0
1) Improved climatic rating			1

Lines with letter(s) under "no-go" cannot be combined with preceding lines having the same letter under "Blocking code".

Table 2: Data on explosion protection

Order Code	Type of protection "Intrinsically safe"		Certificates	Mounting location of device
	Instrument	Measuring output		
711 - 2 ...	Ex ia IIC T6	$U_i = 30 \text{ V}$ $I_i = 160 \text{ mA}$ $P_i = \text{max. } 1 \text{ W}$ $C_i \leq 6.6 \text{ nF}$ $L_i \approx 0$	Type Examination Certificate ZELM 99 ATEX 0006	Within the hazardous area, zone 1

Electrical connections



- Built into transmission housing with float drive for liquid level measurements.
- Measurement of linear motion on coq-rails (racks), cylinder, sliding carriages, floats, nozzle needless etc.

It is a particularly suited for fitting on the back of measuring instruments with revolving indicator shaft, because its torque does not exceed 0.001 Ncm and therefore imposes hardly any interaction on the measuring instruments. The drive shaft is mounted in a ball bearing, eliminating friction almost completely. Fig. 6 shows a pressure gauge with measuring transducer fitted, by way of example.



Fig. 6. Pressure gauge fitted with KINAX WT 711 measuring transmitter.

Application

- Built onto measuring instruments with rotating pointer shafts, such as pressure gauges, vacuum gauges, absolute and differential pressure gauges as well as dial thermometers (liquid, vapour or mercury types).
- Built into actuator housings for position measurement, such as in valves, gates and butterfly valves.

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By fitting an additional gear to the basic unit (see Fig. 7) the measuring range of the transducer can be largely adapted to the measuring duty. Gear ratios range from 1:4 and 64:1. Owing to friction in the gearing and drive shaft, however, this increases the torque to some 0.6 to 3.2 Ncm depending on the transmission ratio. Consequently this combination may be used only with equipment delivering sufficient torque.



Fig. 7. KINAX WT 711 measuring transmitter and additional gear.

Standard accessories

Transmitter

- 3 clamps
- 1 protection cap
- 1 Operating Instructions in three languages: German, French, English

Transmitter with additional gear

- 3 clamps
- 1 mounting foot
- 2 screws M5 x 10
- 2 spring washer
- 1 Operating Instructions in three languages: German, French, English

Dimensional drawings

Basic unit

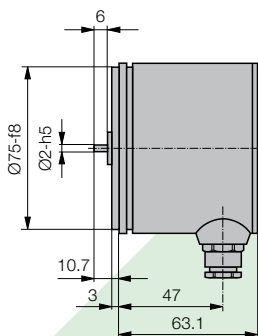


Fig. 8. Basic unit, shaft dia. 2 mm (fixation see Figs. 12 and 13).

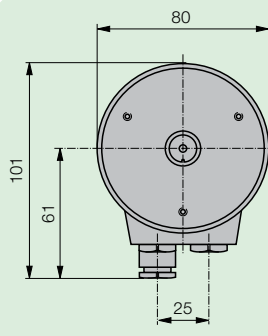
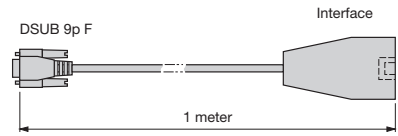
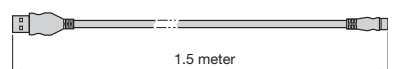


Fig. 9. Basic unit, shaft dia. 6 mm (fixation see Figs. 12 and 13).

Table 3: Accessories and spare parts

Description	Order No.
Programming cable PK 610 	137 887
Ancillary cable 	141 440
Configuration software 2W2 Windows 95 or higher on CD in German and English (download free of charge under http://www.camillebauer.ch) In addition, the CD contains all configuration programmes presently available for Camille Bauer products	146 557
Operating Instructions WT 711 Bd-f-e in German, French and English	151 176

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Basic unit with additional gear

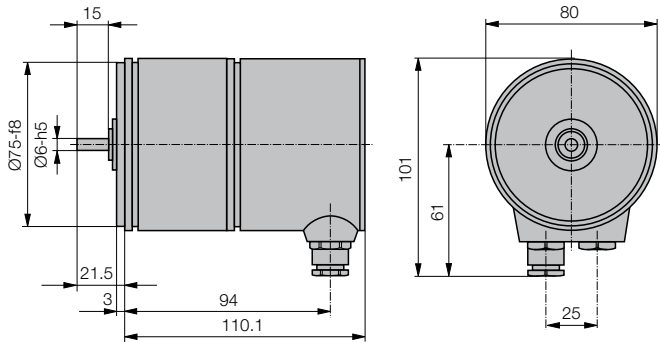


Fig. 10. Basic unit with additional gear (fixation see Fig. 13).

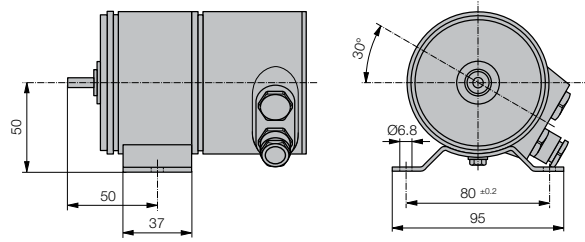


Fig. 11. Fixing with mounting foot.
(If the cable glands are in the way when mounted as above, the KINAX WT 711 should be rotated over 120°, after loosening the 3 screws holding the gear).

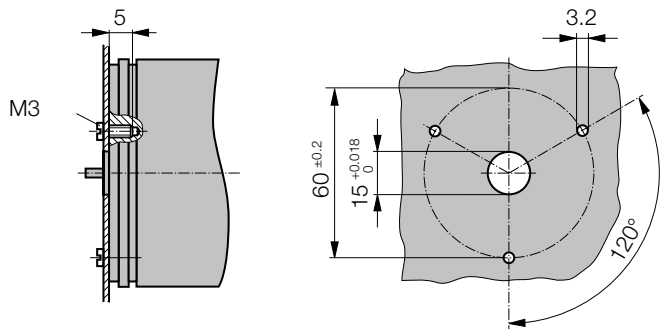


Fig. 12. Left: Fixing with cheesehead screws
Right: Drilling plan for cheesehead screws mounting.

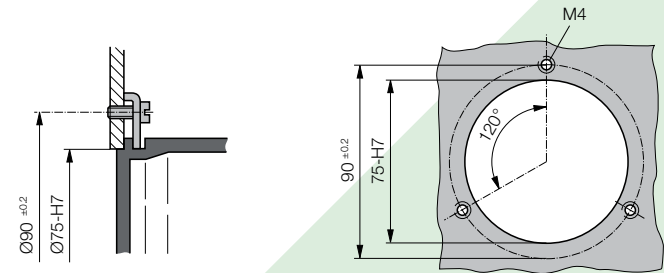


Fig. 13. Left: Fixing with clamps
Right: Drilling plan for clamp mounting.

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