

# 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 $\alpha^\circ$

- **Simulation of measured values / 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).

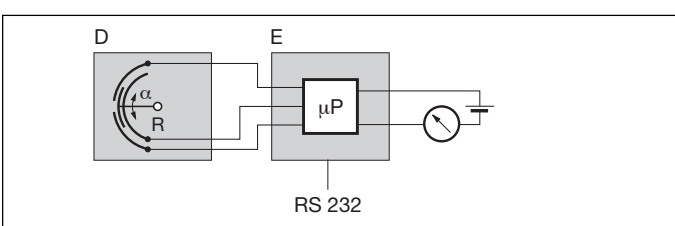


Fig. 3. Block diagram.



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



Fig. 2. KINAX WT 711 and additional gear.

The angular deflection  $\alpha$  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.

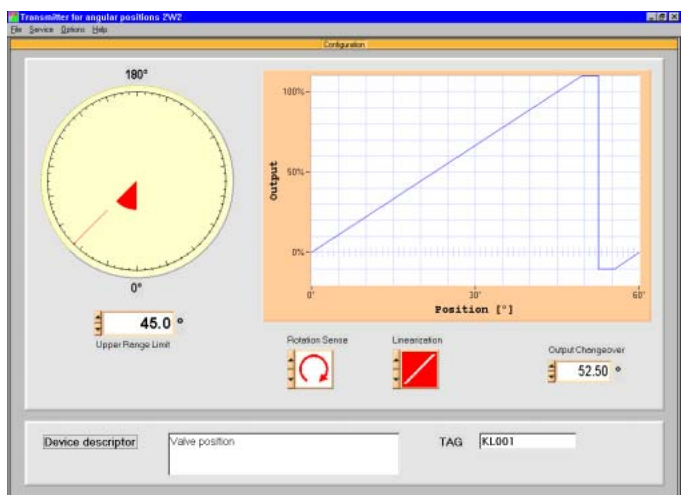


Fig. 4. Print screen example of the menu-controlled programming software.

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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.

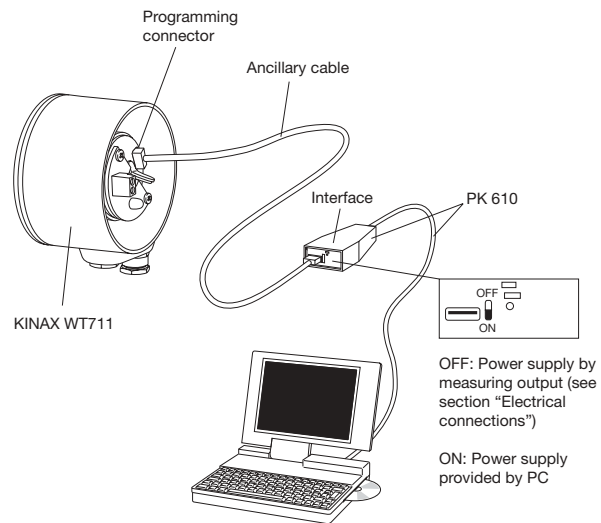


Fig. 5. Example of the set-up for programming a KINAX WT 711 without the power supply. For this case the switch on the interface must be set to "ON".

### Technical data

#### General

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

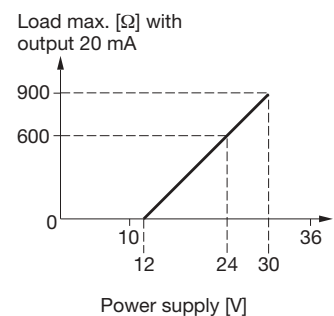
#### Measuring input

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

#### Measuring output

Power supply:	H = 12 to 33 V DC
Output variable $I_A$ :	Protected against wrong polarity Load-independent DC current, proportional to the input angle
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):	$R_{ext}$ max. [k $\Omega$ ] = $\frac{H [V] - 12 V}{I_A [mA]}$
	H = DC power supply $I_A$ = End value of output variable



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

#### Programming connector

Interface:	Serial interface
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#### Accuracy data

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

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## Programmable Transmitter for Angular Position

### 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 $\Delta R_{\text{ext}}$ max.	± 0.1%
Power supply influence	± 0.1%
<b>Additional error (maxima)</b>	
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:	Metal, 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 <sup>2</sup> 1 glands PG9									
Permissible vibrations:	5 g every 2 h in 3 directions f ≤ 200 Hz									
Shock:	3 × 50 g 10 shocks each in 3 directions									
Permissible static load on the shaft:	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="border: none;">Drive shafts dia.</td> <td style="border: none;">2 mm</td> <td style="border: none;">6 mm resp. 1/4"</td> </tr> <tr> <td style="border: none;">radial max.</td> <td style="border: none;">16 N</td> <td style="border: none;">83 N</td> </tr> <tr> <td style="border: none;">axial max.</td> <td style="border: none;">25 N</td> <td style="border: none;">130 N</td> </tr> </table>	Drive shafts dia.	2 mm	6 mm resp. 1/4"	radial max.	16 N	83 N	axial max.	25 N	130 N
Drive shafts dia.	2 mm	6 mm resp. 1/4"								
radial max.	16 N	83 N								
axial max.	25 N	130 N								
Weight:	Basic unit alone approx. 0.55 kg with additional gear approx. 0.9 kg									
Fixation:	3 cheesehead screws M3 or with 3 clamps									

### Regulations

Electromagnetic compatibility:	The standards DIN EN 50 081-2 and DIN EN 50 082-2 are observed
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:	All electrical connections to housing 500 Veff., 50 Hz, 1 min.
Permissible common-mode voltage:	100 V, 50 Hz

### Environmental conditions

Climatic rating:	Standard version Temperature -25 to + 75 °C Annual mean relative humidity ≤ 90% or version with improved climatic rating Temperature - 40 to + 75 °C Annual mean relative humidity ≤ 95%
Transportation and storage temperature:	- 40 to 80 °C

### 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 - 110X00XXX	50°	0 ... 50°	55°	Clockwise	Linear
711 - 120X00XXX	350°	0 ... 350°	355°	Clockwise	Linear

**Table 1: Specification and ordering information**

Order Code <b>711</b> -							
Features, Selection	*SCODE	no-go					
<b>1. Version of the transmitter</b> 1) Standard							1 . . . . .

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## Programmable Transmitter for Angular Position

Order Code <b>711</b> -			
Features, Selection	*SCODE	no-go	
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 90%;"> <p><b>2. Mechanical angle range</b></p> <p>1) Angle range to 50°</p> <p>2) Angle range &gt; 50 to 350°</p> </div> <div style="width: 8%; text-align: center;"> </div> </div>			
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 90%;"> <p><b>3. Sense of rotation</b></p> <p>0) Sense of rotation clockwise</p> <p>1) Sense of rotation counterclockwise</p> <p>2) For "V" characteristic</p> </div> <div style="width: 8%; text-align: center;"> <p>1 . . . . .</p> <p>2 . . . . .</p> </div> </div>			
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 90%;"> <p><b>4. Drive shaft</b></p> <p>0) Standard dia. 2 mm, length 6 mm</p> <p>1) Special dia. 6 mm, length 6 mm</p> <p>2) Special dia. 1/4", length 6 mm</p> <p>A) Transformation 1:4, dia. 6 mm, length 15 mm</p> <p>B) Transformation 1:1, dia. 6 mm, length 15 mm</p> <p>C) Transformation 4:1, dia. 6 mm, length 15 mm</p> <p>D) Transformation 32:1, dia. 6 mm, length 15 mm</p> <p>E) Transformation 64:1, dia. 6 mm, length 15 mm</p> </div> <div style="width: 8%; text-align: center;"> <p>. 0 . . . . .</p> <p>. 1 . . . . .</p> <p>. 2 . . . . .</p> <p>. . A . . . . .</p> <p>. . B . . . . .</p> <p>. . C . . . . .</p> <p>. . D . . . . .</p> <p>. . E . . . . .</p> </div> </div>			
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 90%;"> <p><b>5. Measuring range</b></p> <p>0) Basic configuration, programmed</p> <p>9) [°angle], 0 to final value / switching point:</p> <p>Z) "V" characteristic [± °angle], min/max.:</p> <p>Specify in line 9:</p> <p>Final value    ≥ 10 to 50° with angle range ≥ 50°,                   &gt; 50 to 350° with angle range &gt; 350°</p> <p>Switching point &gt; Final value, max. 60° with angle range ≥ 50°,                   &gt; Final value, max. 360° with angle range &gt; 350°                   ≥ 105% final value with non-linear characteristic                   (Lines 1 to 4 in feature 5)</p> <p>Specify in line Z:</p> <p>Minimal value    &gt; 0</p> <p>Maximal value    ≥ 25 with angle range ≥ 50°,                   Span (max. value – min. value) ≥ 5°;                   &gt; 25 to 175 with angle range &gt; 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 &lt; 4 to 4 to +20 mA (output)</p> </div> <div style="width: 8%; text-align: center;"> <p>G</p> <p>EF</p> <p>F</p> <p>DE</p> </div> <div style="width: 2%;"></div> <div style="width: 8%; text-align: center;"> <p>. . . . 0 . . . .</p> <p>. . . . 9 . . . .</p> <p>. . . . Z . . . .</p> </div> </div>			
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 90%;"> <p><b>6. Characteristic of output variable</b></p> <p>0) Characteristic linear</p> <p>1) Function X to the power of 1/2</p> <p>2) Function X to the power of 3/2</p> <p>3) Function X to the power of 5/2</p> <p>4) Customized</p> <p>Lines 1 to 4: Not possible with "V" characteristic</p> <p>Line 4 (on inquiry): Give an algorithm or fixed points (23 values in 5% steps from – 5% to 105% of the measuring range, output continuously variable – 10 to 110%)</p> </div> <div style="width: 8%; text-align: center;"> <p>FG</p> <p>FG</p> <p>FG</p> <p>FG</p> </div> <div style="width: 2%;"></div> <div style="width: 8%; text-align: center;"> <p>. . . . . 0 . . . .</p> <p>. . . . . 1 . . . .</p> <p>. . . . . 2 . . . .</p> <p>. . . . . 3 . . . .</p> <p>. . . . . 4 . . . .</p> </div> </div>			

Continuation of table 1 see next page!

# KINAX WT 711

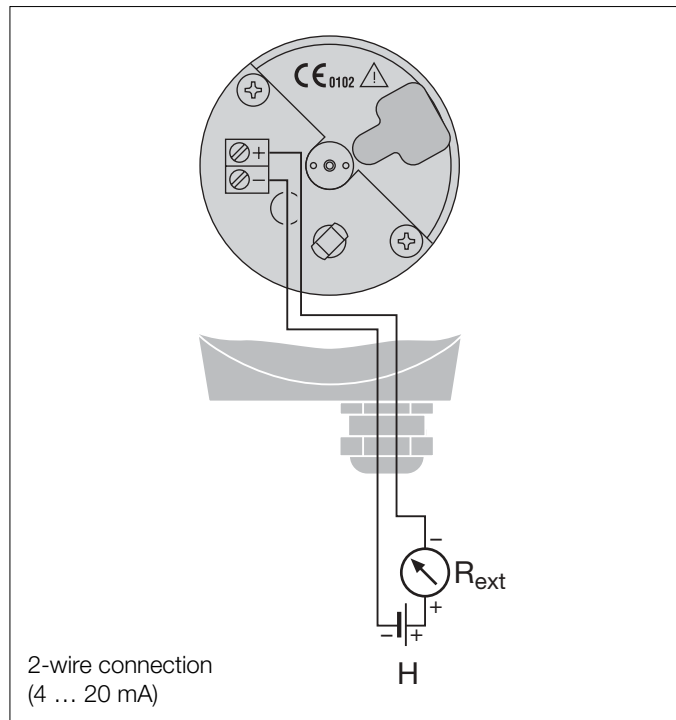
## Programmable Transmitter for Angular Position

Order Code 711 -										
Features, Selection		*SCODE		no-go						
<b>7. Test certificate</b>										
0) Without test certificate										0 . . . . .
D) Test certificate in German										D . . . . .
E) Test certificate in English										E . . . . .
<b>8. Marking the system zero position</b>										
0) System zero position not marked										. 0 . . . . .
1) System zero position marked									G	. 1 . . . . .
<b>9. Climatic rating</b>										
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 "SCODE".

### Electrical connections

2-wire connection



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



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

It is 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. 7. KINAX WT 711 measuring transmitter and additional gear.

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.

### 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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## Programmable Transmitter for Angular Position

### Standard accessories

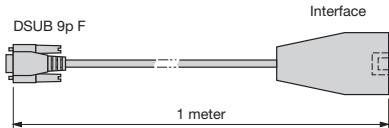
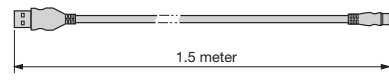
#### Transmitter:

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

**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 <b>(Download free of charge under <a href="http://www.camillebauer.ch">http://www.camillebauer.ch</a>)</b> 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

### Dimensional drawings

#### Basic unit

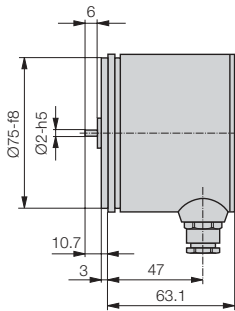


Fig. 8. Basic unit, shaft dia. 2mm (fixation see Figs. 12 and 13).

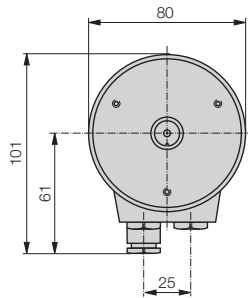
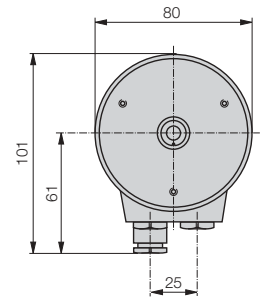
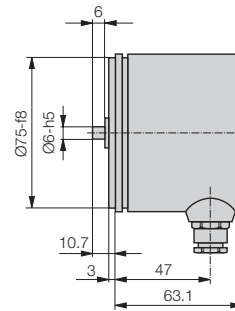


Fig. 9. Basic unit, shaft dia. 6 mm (fixation see Figs. 12 and 13).



#### Basic unit with additional gear

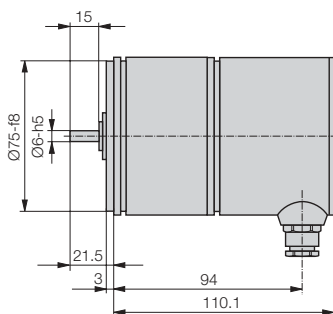


Fig. 10. Basic unit with additional gear (fixation see Fig. 13).

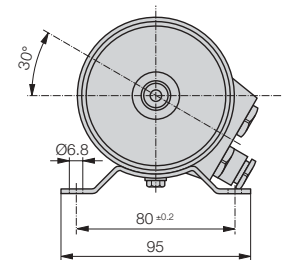
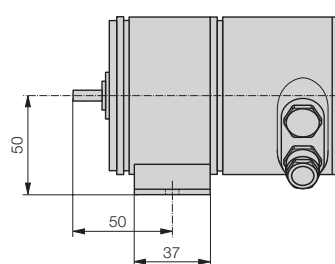
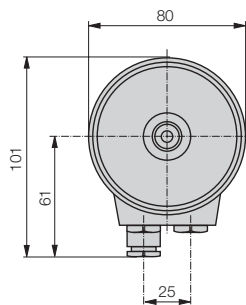


Fig. 11. Fixing with mounting foot.

(If the cable glands are in the way when mounted as above, the KINAX WT 710 should be rotated over 120°, after loosening the 3 screws holding the gear).

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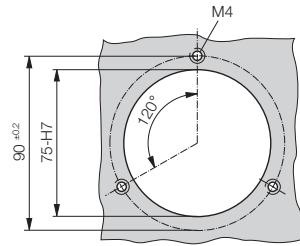
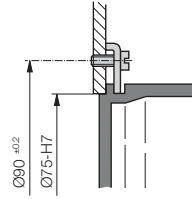
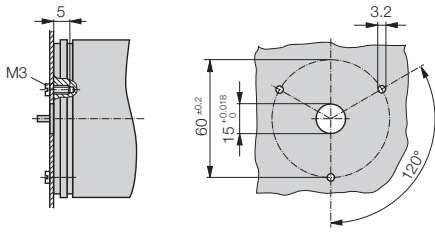


Fig. 12. Left: Fixing with cheesehead screws  
Right: Drilling plan for cheesehead screws mounting.

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