





Programming Manual for series ETA25PM, ETA25FPM, ETA25KPM, HTA36PM, HTA25PM, HTA25KPM

Series	ETA25PM	ETA25PM	ETA25PM
Design			
Option	F	R	K

Series	ETA25PM
Design	
Option	TS (On request, only with MOQ orderable)

Series	ETA25FPM	ETA25KPM
Design		




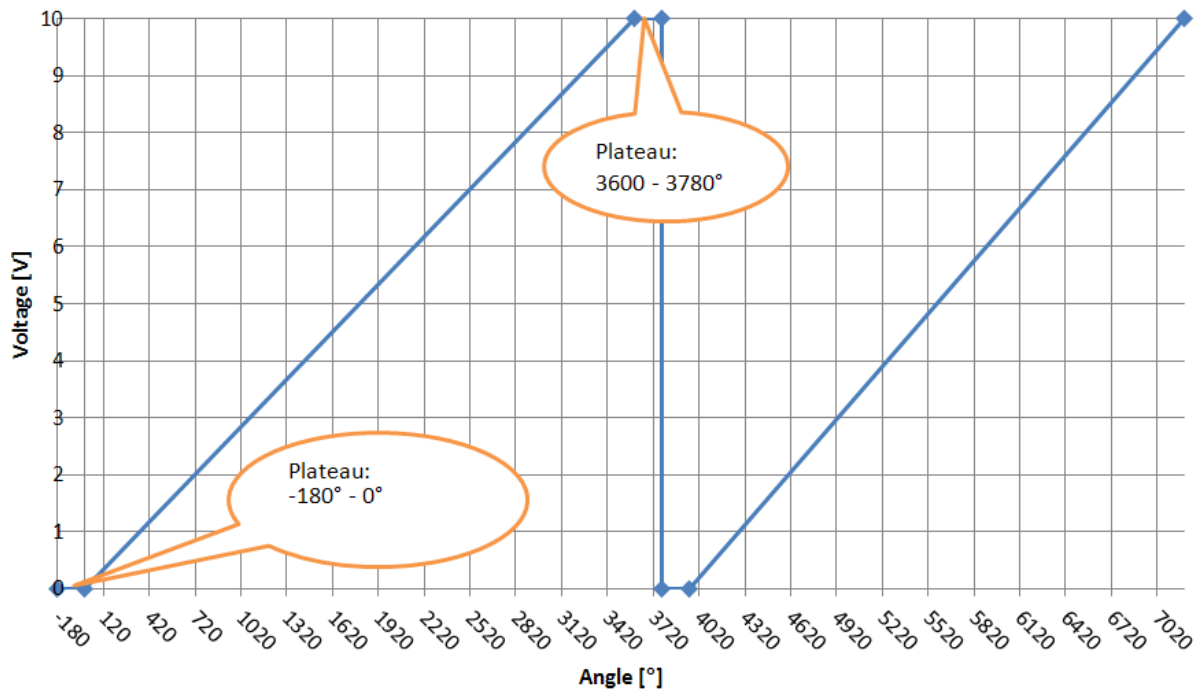
Series	HTA36PM	HTA25KPM	HTA25PM
Design			

Table 1: Overview of the user programmable multiturn sensors

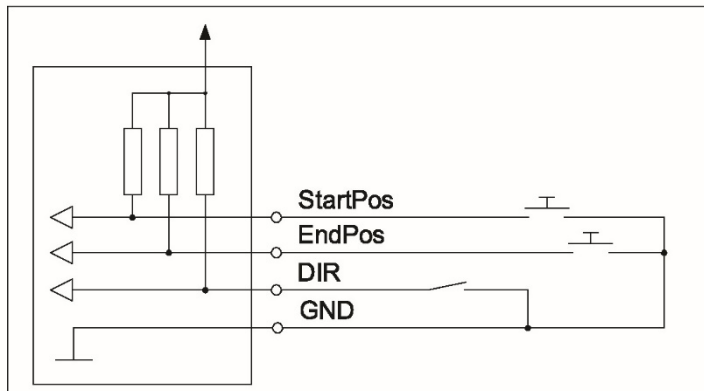
1. State of delivery



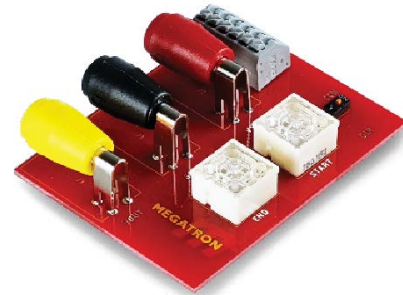
Picture 1: Signal output multi-turn encoder state of delivery

When delivered, the electrical angle is set to 10 revolutions (3600° = 10 turns). The signal increases when the shaft is turned clockwise while looking at the shaft end. Before the starting point and after the end of the signal transition there is a plateau of half a turn on each side (180°). This means that the signal has a periodicity of 11 turns.

2. Function of the StartPos, EndPos and DIR (CW, CCW) control inputs



Picture 2: Interface for adjusting the encoder signal (internal Pull-Up: 470 Ohm against 3.3V)



Picture 3: Optional external programmer from MEGATRON

To parameterize a programmable multiturn angle sensor, a circuit as shown in figure 2, consisting of two pushbuttons and a switch, must be made. Alternatively, an external programmer (figure 3) can be ordered from MEGATRON, in which the circuit as shown in figure 2 is already integrated.

This manual applies to both a self-built circuit (as shown in Figure 2) and an external programmer (Figure 3).

For more information on the external programmer, see the last page (page 9) of this manual.

The control inputs StartPos, EndPos, DIR can be connected either via potential free operating contacts or to digital outputs of a control system (e.g. PLC). Make sure that the ground potentials of the encoder and the control are connected with low impedance and in star configuration. The signal inputs should preferably be wired with potential-free relay contacts or open collector outputs. Although 24V wiring is possible without damage, it can cause signal distortion during measurement. I.e. after completing the parameterisation (see below), no external 24V signal should be present at the control inputs.

The DIR input line, which defines the direction of rotation, is read in setting mode and reset mode (but not in reference mode). If CCW rotation is required, the DIR input should be connected to ground. For CW rotation, leave the input unconnected.



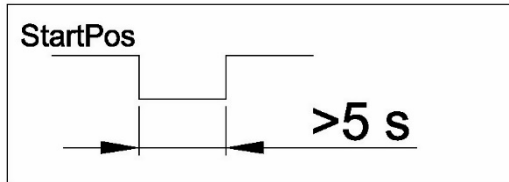
Please note

When programming start and stop, the direction of rotation must match the DIR input signal. This means that if the DIR signal input is high (or not connected), you should turn the shaft clockwise to set the end position. If you need a counterclockwise signal output, you must connect the DIR input to ground. If you do not follow this rule, your sensor will not work correctly. Please note that the start and end positions are stored in flash memory. Therefore, you should not make more than 10,000 adjustment cycles.

3. Programming Modes

3.1 Teach-In Mode

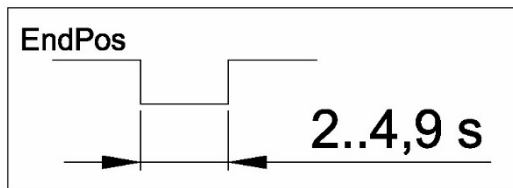
The angle setting mode allows you to define (teach-in) the start and end positions and the direction of rotation according to the movement of the sensor shaft.



Picture 4: Start of the angle adjust mode

To activate the angle adjustment mode, switch the StartPos input line as shown above. At the same time the start position is set. This means that the start of the signal transition is set at the current shaft position. Then move the sensor to the end position. Make sure that this is done in accordance with the signal input DIR. At the beginning of the movement away from the start position (0V or 4mA), the sensor does not know the correct slope. Therefore the slope of the output signal is based on the maximum number of turns 5V/10V/200 rev. (16mA/200 rev.)

When the end position is set, the maximum signal level is set at the current shaft position (5V/10V or 20mA).

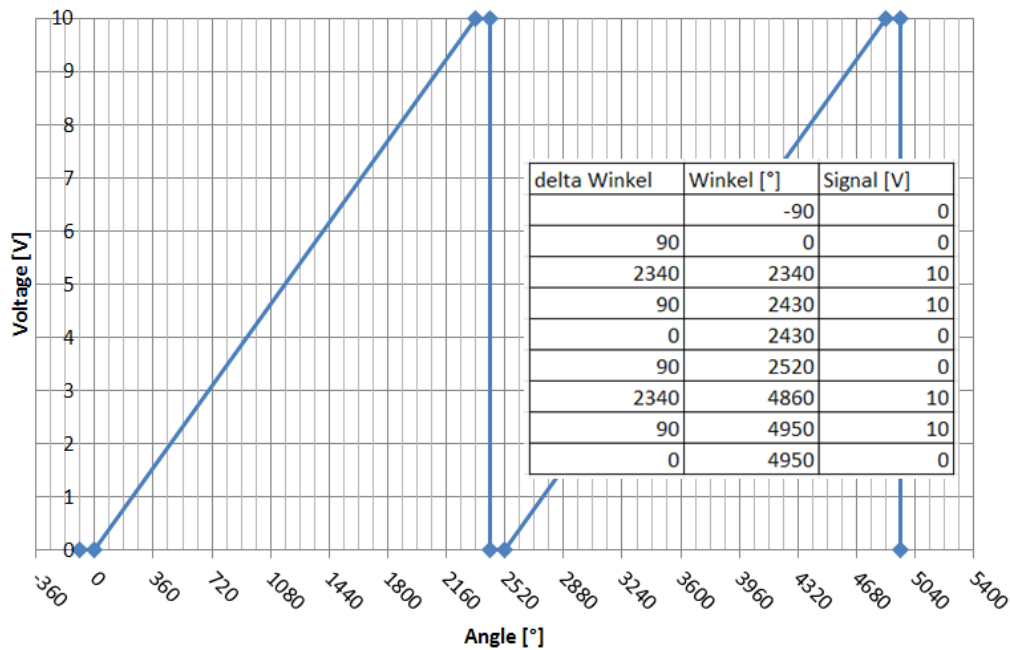


Picture 5: Setting of the end position and closing the angle adjustment mode.

When the end position is set, the end point of the signal rise is aligned with the current position of the actuator shaft and the maximum signal level (5V/10V or 20mA) is output.

Once the end position has been set, the signal characteristic is calculated by the microprocessor in the sensor. The distance to the next full rotation is divided into two equal plateaus.

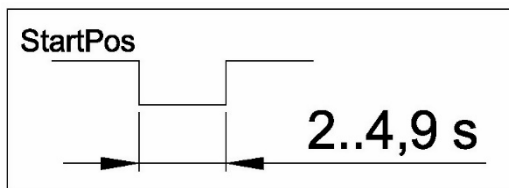
Example how the signal characteristic and the plateaus are calculated



Picture 5: Example of how to set StartPos, Direction of Rotation (DIR) and EndPos

Signal slope over 6.5 rev. = $6.5 \cdot 360^\circ = 2340^\circ$
 Periodicity 7.0 rev. = $7.0 \cdot 360^\circ = 2520^\circ$
 Difference = 180°
 Width of the plateaus = $2 \times 90^\circ$

3.2 Reference mode

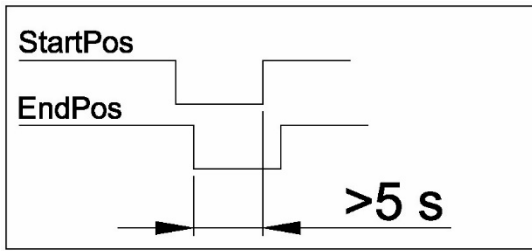


Picture 6: Readjustment of the zero position

When the control input StartPos is set according to the above time interval, the zero point (minimum signal level) is moved to the current shaft position. The electrical signal angle and direction of rotation are not affected. The signal input DIR is not taken into account.

This function is helpful if the sensor was moved without power supply more than $\pm 179^\circ$ and due to this lost the reference to the zero point of the multi turn information.

3.3 Reset Mode - to reset the electrical angle to factory default settings



Picture 7: Resetmode

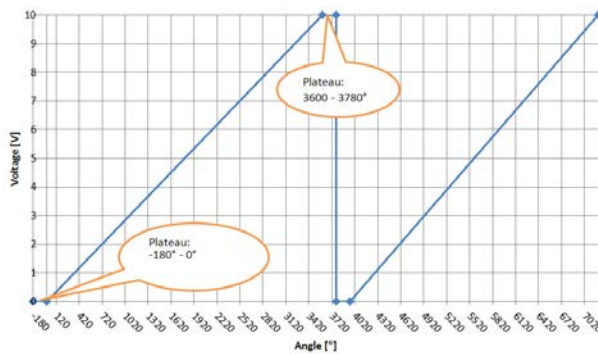
If both control inputs StartPos and EndPos are switched as shown in Figure 6, the electrical angle is reset to the factory setting (10 revolutions). In addition, the zero position of the signal is moved to the current signal position and the direction of rotation is set according to the state of the DIR input. This means that if DIR is not connected, you will get a clockwise signal characteristic.

4. Technical Data

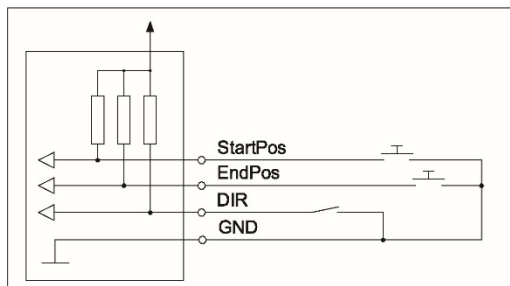
Minimum electrical angle	10°
Maximum electrical angle	72 000° (200 rev.)
Maximum number of adjustment cycles (flash-storage write cycles)	10 000
Resolution	
>= 360°	12 Bit
180°	11 Bit
90°	10 Bit
45°	9 Bit

Table 2: Technical Data

Programming



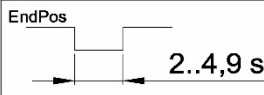
Factory setting: 10 turns + 2x plateau (0.5 rev). The zero point is not positioned. The direction of rotation is CW (if the DIR input is not connected). If you need CCW, connect DIR to GND while programming. Afterwards you can disconnect (but this is not a must).



Programming interface with internal pull-up resistors

Programming Modes

Teach-In Mode



Teach StartPos and EndPos
 Caution:
 StartPos is the minimum signal level.
 Be sure to connect the DIR input accordingly!

Reference Mode



Moves the zero position to the current position.
 The programmed angle is not affected

Reset Mode



Moves the zero position to the current position.
 The direction of rotation is programmed according to the input signal.
 10-turn output signal with plateaus

Programming instructions for special version: ETA25PM 6,35 12 2410 (with integrated switch and push button switches for programming procedure)

Programming status on delivery:

Start and zero position factory programmed with no mechanical reference.

Teach-in procedure (Teach-in modus):

- Move the shaft of the angle sensor to the desired start position and press and hold down the start button.

The LED will illuminate red for 5 seconds in the following sequence: 2 seconds at a frequency of 4 Hz, then 3 seconds at a frequency of 2 Hz.

- Release the start button after 5 seconds. The LED now lights up red continuously. (Continuous illumination of the LED indicates that the start position has been programmed).
- Move the shaft of the angle sensor to the desired end position and keep the end position button pressed.

The LED will change from a steady red light to flashing green at the following rate 4Hz for 2s. The LED then lights green for 5 seconds.

- When the LED is steady green, release the end position button. The LED goes out.

If the programmed start and end positions deviate from the set direction of rotation (e.g., the direction of rotation switch was set to CW, but programming was done in CCW direction), the LED will flash alternately red and green after approx. 4...8s (error message).

Reference method for programming the zero point:

If the start position (0°) has changed, e.g. due to external conditions, a new start position can be defined without reprogramming the end position. There is then a parallel shift of the end value to the newly programmed start value (reference operation). Turn sensor to desired ZERO position and press START button.

Programming the zero point (reference mode):

- Move the shaft of the angle sensor and press and hold the start button.
- The LED starts flashing red at a frequency of 4 Hz for a duration of 2 s.
- Release the start button as soon as the LED starts flashing red.

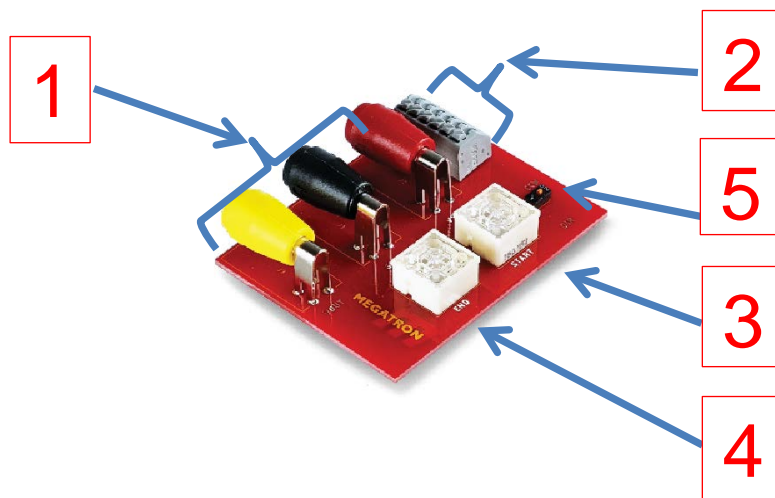
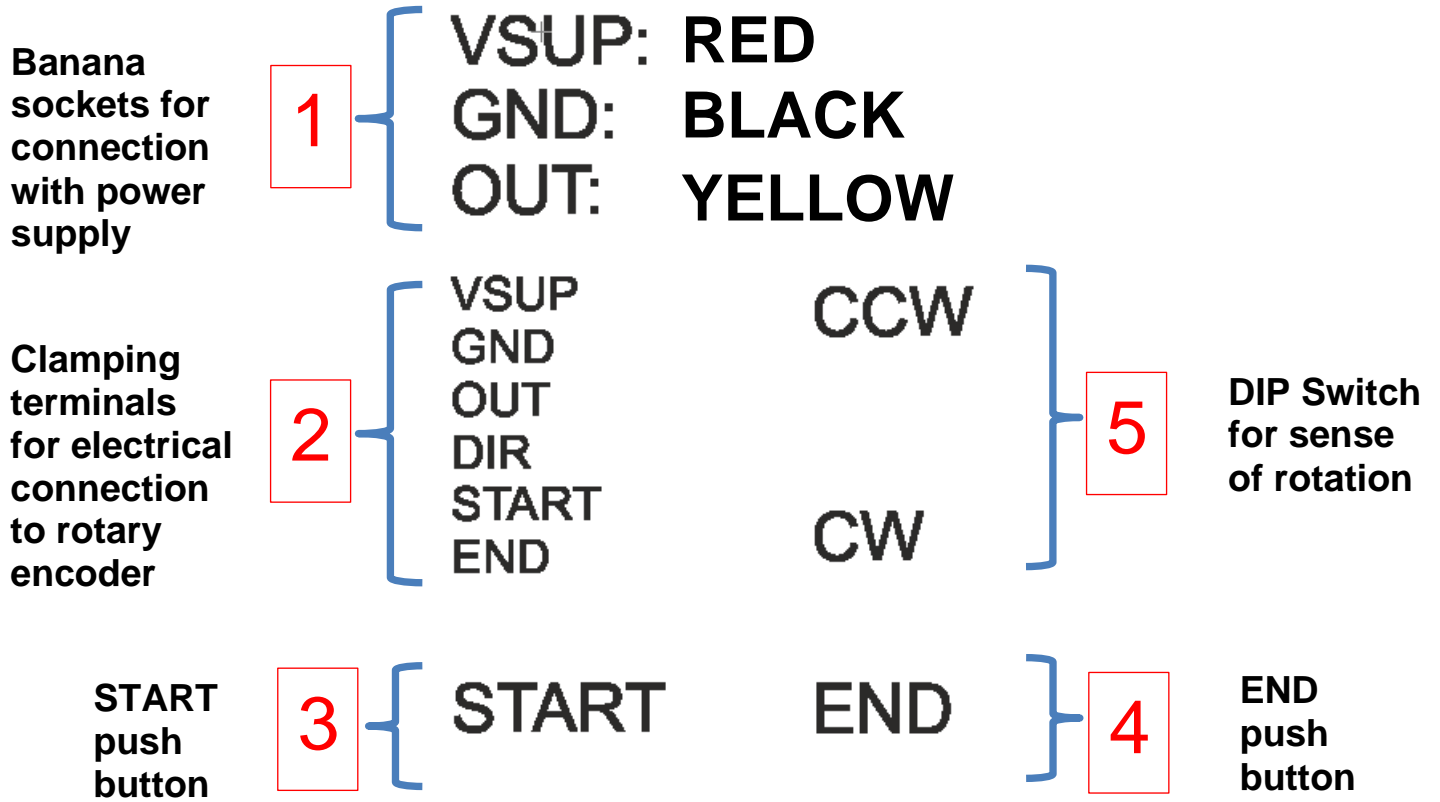
The LED lights up red for 5s and then goes out (confirmation of zero position).

Resetting the programming to the delivery status (factory reset):

- Press and hold the START and END buttons simultaneously.
- The LED flashes red and green alternately for 5 seconds at a frequency of 4 Hz.
- Release both buttons as soon as the LED lights up permanently.

To indicate that the reset to the delivery state was successful, the LED lights up green and red for 5s.

Programmer for PM rotary encoders



Subject to change without notice.