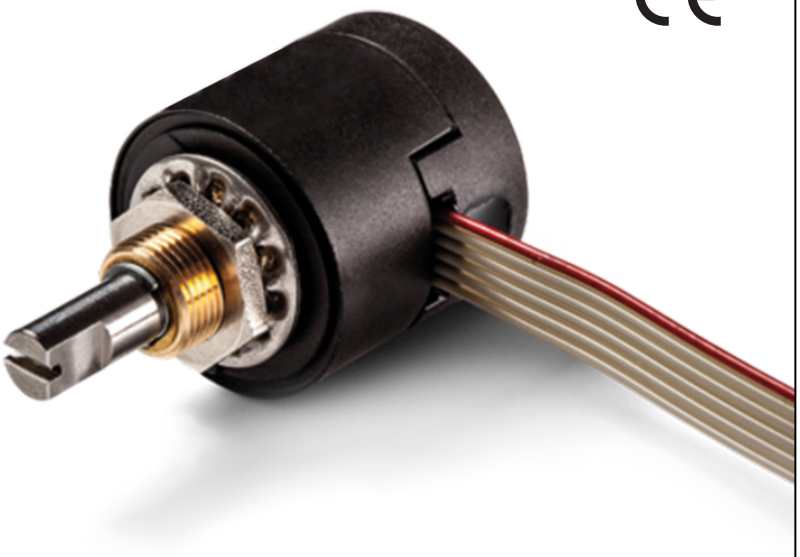
CM26M

Multiturn Encoder with adjustable electrical angle

Programming Manual

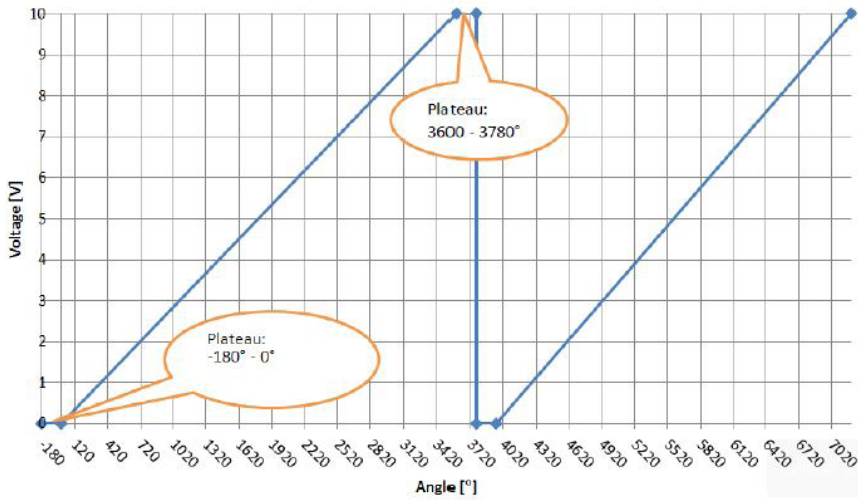


C/ Dolors Bassa, 3 (P.I. Cal Batlle) - 17400 Breda (Girona) | +34 972 160 017 | info@encoderhohner.com | **www.encoderhohner.com**

SERIE CM26M - Multiturn Encoder with adjustable electrical angle

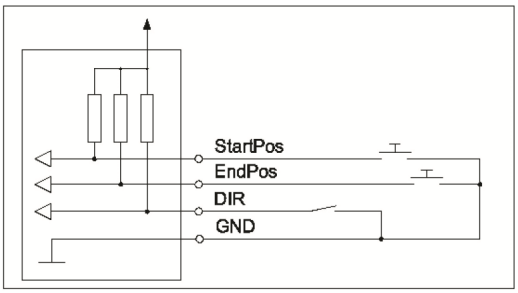
The CM26M encoder setting at the state of delivery (without any specific prerequisite from the customer) it's with an electrical angle adjusted to 3.600°(10 turns), and the signal increases with the shaft clockwise rotation, seen from the side of the shaft.

Before the starting point and after the end of the signal transition, there is a plateau of a half turn each side (180°). That means the signal has a periodicity of 11 turns.



Picture 1. *Signal output multi-turn encoder state of delivery*

Function of the Control Inputs STARTPOS, ENDPOS and turning Direction DIR (CW, CCW)



Picture 2. *Interface to adjust the encoder signal (internal Pull-Up: 470 Ohm against 3.3V)*

In order to parameterize a programmable multiturn angle sensor, a circuit must be made as shown in **picture 2**, consisting of two push buttons and one switch.

The control inputs STARTPOS, ENDPOS and DIR can be switched by manual contacts or you can connect it with a control unit (PLC). Please take care to connect the ground potential of the encoder properly with the control unit. The signal inputs should be driven by relais contacts or open-collector outputs. If you put 24V at the signal inputs you would not harm the sensor because it is protected. But you should avoid this because it could interfere your output signal in the measurement mode.

That means after you have adjusted the sensor (details see below), there should NOT be a 24V voltage source at the control inputs.

The input line DIR to define the direction of rotation is read in the adjusting mode and in the reset mode (but not in the reference mode).

If you need a CCW sense of rotation you should connect the input DIR with ground. For CW sense of rotation you can leave the input not connected.

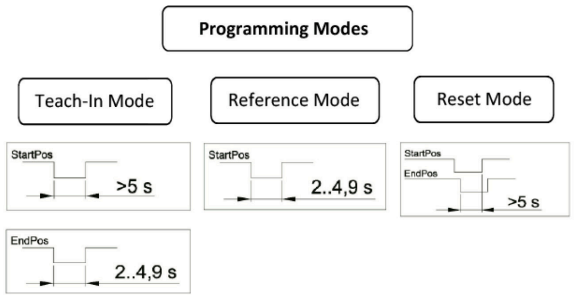
⚠ *If you program start and stop, the turning sense has to be conform with the DIR input signal. That means in case of DIR signal input "High" (or not connected) you should turn the shaft clockwise to adjust the end position afterwards.*
If you need a counter clockwise signal output, you have to tie the DIR input down to ground. If you do not stick to this rule your sensor does not function correctly.
Please note that the start and end position is stored in a flash memory. Because of this you should not do more than 10 000 adjusting cycles.

There are 3 adjusting modes for the CM26M encoder:

1. TEACH-IN Mode. Programming the number of turns, the zero position and the direction of rotation, for the output signal (0...10V).

2. REFERENCE Mode. Adjust of the signal "ZERO" to the current shaft position. Doesn't affect the "TEACH-IN mode" of the encoder programming.

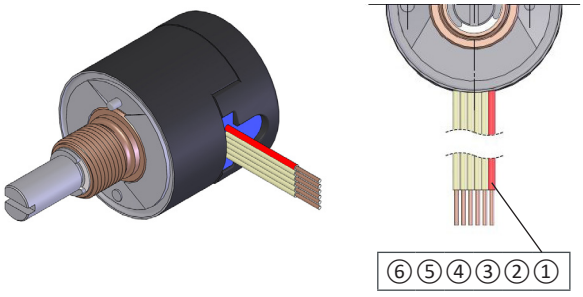
3. RESET Mode. The encoder is reset and adjusted to 10 turns with flat sections. Moreover, the "ZERO" signal is set to the current shaft position, and the direction of rotation is programmed according to the DIR red wire status (clockwise if it's in the air, counter clockwise if it's connected to GND).



Teach-In Mode	Reference Mode	Reset Mode
Teach StartPos and EndPos. Startpos is the minimum signal level. Please, take care to connect the DIR-Input accordingly.	Moves the zero position to the current position. The programmed angle is not affected.	Moves the zero position to the current position. The sense of rotation is programmed according to the input signal. Output signal 10-turn with Plateaus.

1. TEACH-IN MODE

To do the CM26M encoder programming, is needed the connection of every assembled wire and following certain steps, as described below:



Picture 3. *CM26M Absolute multiturn encoder. Cable definition.*

⚠ *Previously to the programming, we should consider the desired direction of rotation for the encoder operation, because of depending to the clockwise or counter clockwise, we should leave in the air the red wire (DIR) or either connected it to GND (negative), respectively.*

Necessary connections:

① **DIR - Direction** (red color)
Clockwise programming wire. It will only be connected to GND during the programming, in case a counter clockwise is desired. If the encoder needs a clockwise, it will be left in the air.

② **ENDPOS - Programming wire**
It is left in the air for now.

③ **STARTPOS - Programming wire**
It is left in the air for now.

④ **VCC - Power Supply (15...30V)**
The positive power supply is connected.

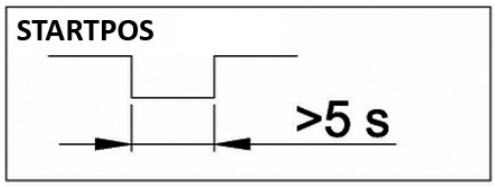
⑤ **OUT - Analog Output (0...10V).**
It is recommended to connect the oscilloscope probe.

⑥ **GND**
The negative power supply is connected.

⚠ *We should ensure that no wire makes contact with the other wires. If not, we could cause a short circuit that would damage the encoder.*

> STEP 1.

With the power supply on and with the connections mentioned above ready, connect the STARTPOS wire to negative (GND) over a longer period than 5 seconds. This step offers us the starting point of the analog output signal (adjustment of the minimum value "ZERO" to the current position of the shaft). After a while, we leave the STARTPOS wire back to the air.



Picture 4. *Start of the angle adjust mode.*

> STEP 2.

Taking as reference the radial mark of the shaft and as accurately as possible, we make as many turns as we want the encoder output signal range offers, maintaining at the same time the direction of rotation we want.
That is, if we wish a clockwise, the red wire (DIR), should be disconnected during the programming, and the programming turns will be made in clockwise.
Otherwise, the turns will be made in counter-clock wise and the red wire (DIR) will be connected to negative (GND).

> STEP 3.

Once the necessary turns are done in order to meet the desired requirements, connect the ENDPOS wire to negative (GND) during a time interval between 2 and 4,9 seconds. This step offers us the output signal final point adjustment (signal maximum value adjusted to the currently shaft position). After this time, we leave the STARTPOS wire back to the air, and the encoder is already programmed.

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

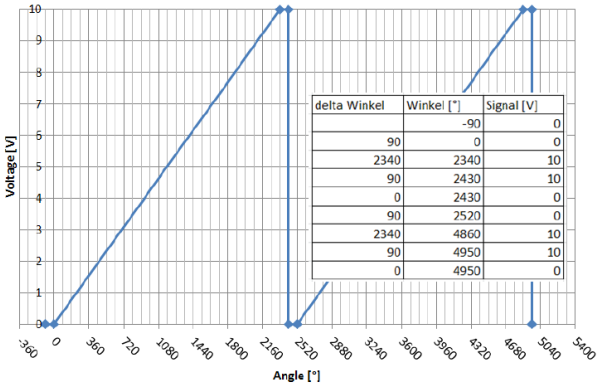
Moreover, disconnect the red wire (DIR) in case that it has been connected to GND (counter-clock wise).
If we note the output signal in the oscilloscope, we check that the level has been automatically adjusted to the maximum analog range value.

> STEP 4.

Then, the encoder is checked, verifying with the oscilloscope that the analog output offers the (0...10V) output range in programming turns, and in the correct clockwise.

Afterwards the internal micro controller calculates the signal characteristic line. For this purpose, the distance to the next full turn is rounded up and the difference angle is divided into two equal parts that are set as plateaus beyond the STARTPOS and the ENDPOS.

How the signal characteristic and the plateaus are calculated:



Picture 6. *Example how to adjust StartPos, sense of rotation (DIR) and the EndPos.*

Signalslope over 6.5 rev.	= 6,5 * 360°	= 2340°
Periodicity 7,0 rev.	= 7,0 * 360°	= 2520°
Difference		180°
Width of the plateaus		2x90°

2. REFERENCE MODE

This programming mode is useful when there is a loss of the encoder actual position.

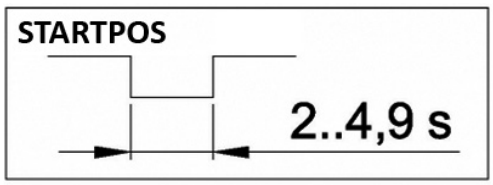
This happens when it is produced a power supply disconnection of the encoder, and at the same time, an upper shaft turn of ±179º mechanical (a half turn approx.).

When the encoder recovers the power supply, the analog output signal offered value doesn't correspond to a real value. That's when it's necessary to reset the analog signal zero position (minimum signal value) to the currently shaft position.

The angle (number of turns) and the encoder turning direction won't be affected, just likewise the state of the red wire (DIR) is also not considered.

> STEP 1.

With the power supply on and the encoder connected (PIN 4 and 6), connect the STARTPOS wire to negative (GND) during a time interval between 2 and 4,9 seconds. At this time, the analog signal come into the minimum output range value (0V).



Picture 7. *Readjustment of the zero position.*

In case that the time interval exceed 5 seconds, the encoder would go into "TEACH-IN mode" programming.

> STEP 2.

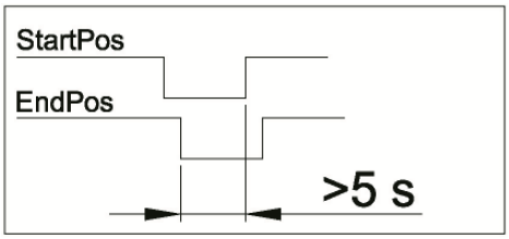
Check with the oscilloscope the encoder proper functioning and the readjustment of the "ZERO" value of the output signal with the "ZERO" shaft position.

3. RESET MODE

This programming mode restore the encoder values to 10 turns. The signal value of “ZERO” is adjusted to curent shaft position, and the direction of rotation is programmed according to if the red wire (DIR) is connected to GND (counter-clock wise) or without connecting (clockwise).

> STEP 1.

With the power supply on and the encoder connected (PIN 4 and 6), connect the STARTPOS wire and the ENDPOS wire to negative (GND) during a time interval greater than 5 seconds.



Picture 8. *Resetmode.*

> STEP 2.

Check that the encoder output signal accomplish with all the settings described above.

Once we have programmed the encoder in any of the three modes, we should leave the STARTPOS, ENDPOS and DIR wires without connecting.

The programming settings remain stored, regardless if the encoder disconnects or has a supply voltage loss, until that a new programming process is carried out.