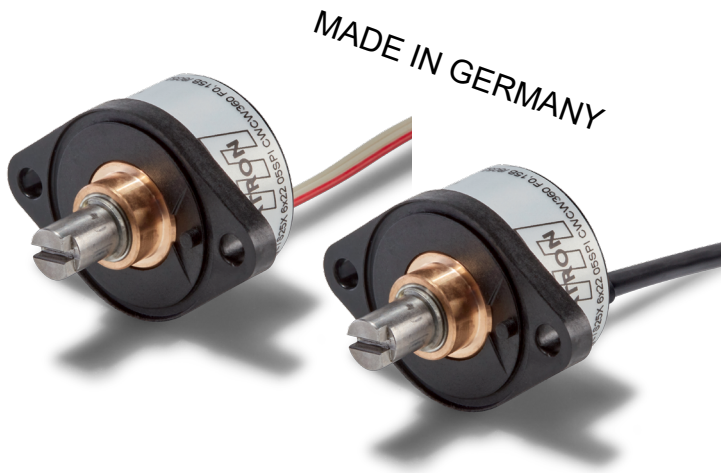


# Data Sheet for Angle Sensors

Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F



## ETx25F Family Key Features:

- 3D Hall magnetic gradient-based signal capturing
- $\mu$  Processor controlled digital signal processing
- Housing made of glass-fibre reinforced thermoplastic
- Metal sleeve bearing > 100 million shaft revolutions
- $\varnothing$ 6 mm stainless steel shaft
- Up to IP55M (IP66S)
- Operating temperature range -40..85°C
- Measuring range up to 360° singleturn, 72000° multiturn
- Electrical connection: 0.15 m flat ribbon cable or 1 m round cable
- Programmable

## Applications:

- Apparatus construction
- Angular measurements
- Speed measurement
- With low operational speeds [up to 100 rpm]
- Simple up to medium environmental requirements
- High requirements on the lifetime
- Applications with increased vibrations
- Requirements to an user defined signal output function

## Output electronics:

- Analogue singleturn: voltage - also redundant, current, PWM
- Analogue multiturn: voltage
- Incremental: AB+index (Z) up to 1024 ppr (4096 steps)
- Digital: SPI - also redundant, SER

## ETx25F rotary encoders with shaft and shaft bearing:

Our ETx25F rotary encoder product family is based exclusively on state-of-the-art 3D Hall gradient-based  $\mu$  processors with digital signal processing. ETx25F angle encoders use the well established rotary encoder platform from the hugely popular ETx25 high-runner rotary encoder family from MEGATRON.

ETx25F rotary encoders differ from angle encoders of the ETx25 family (without F in its product name), by the flange mounting and by the absence of electrical connections such as clamping connections or solder connections.

The ETx25F rotary encoder concept focuses on applications with simple to medium environmental requirements. With a service life of >100 million shaft revolutions, thanks to the applied sleeve bearing which is one of the best on the market.

For measuring, the shaft of the ETx25F is normally linked to the application by means of a shaft coupling.

ETx25F rotary encoders are widely resistant to temperature changes, external magnetic fields, shocks and vibrations.

MEGATRON implements customer-specific adaptations in a timely manner starting from small series on the basis of a clearly structured price model. The signal output function of single-turn rotary encoders with analogue outputs can be programmed ex works according customer's wishes. Our combined single/multiturn absolute encoder ETA25F PM allows also the programming of the encoder by the customer to the needs of his application.

# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

| Index   | Page        |
|---|-------------|
| <b>Information about the ETx25F rotary encoder family:</b>  |             |
| Quick overview ETx25F series  | 3/4/5       |
| Technical drawings  | 6           |
| Mechanical and environmental data, scope of delivery  | 7           |
| Compliance  | 8           |
| Options   | 9           |
| Support   | 9           |
| Accessory   | 29          |
| <b>Information about the ETx25F rotary encoder series:</b><br>(electrical data, order codes, pin assignments) |             |
| <b>Singleturn rotary encoder (measuring range up to 360°):</b>  |             |
| <b>Analogue output not redundant:</b>   |             |
| ETA25F voltage/current  | 10/11       |
| <b>Analogue output redundant:</b>   |             |
| ETA25F X voltage  | 12/13/14    |
| <b>Analogue PWM output not redundant:</b>   |             |
| ETP25F PWM  | 15/16       |
| <b>Incremental output not redundant:</b>  |             |
| ETI25F incremental  | 17/18/19    |
| <b>Digital output not redundant:</b>  |             |
| ETS25F SER, SPI   | 20/21       |
| <b>Digital output redundant:</b>  |             |
| ETS25F X SPI  | 22/23/24    |
| <b>Multiturn/singleturn rotary encoder, programmable (measuring range up to 72000°):</b>                      |             |
| <b>Analogue output not redundant:</b>   |             |
| ETA25F PM voltage   | 25/26/27/28 |

General

Drawing

Mechanical  
Data

Analogue  
ETA25F

Incremental  
ETI25F

Serial  
ETS25F

Multiturn  
ETA25F PM

Accessory

Customizing

# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

| Quick overview |   | Singleturn absolute rotary encoders with analogue output  |  |   |
|----------------|---|---|--|---|
| 1              | Series  | ETA25F  | ETA25F X   | ETA25F PWM  |
| 2              | Technology                                      | Magnetic gradient-based signal capturing, with $\mu$ Processor controlled digital signal processing |  |   |
| 3              | Not redundant / redundant                       | Not redundant   | Redundant  | Not redundant   |
| 4              | Output signal                                   | 1 x Analogue, absolute  | 2 x Analogue, absolute                             | 1 x Analogue, absolute                                  |
| 5              | Bearing   | Sleeve bearing made of bronze   |  |   |
| 6              | Shaft material                                  | Stainless steel   |  |   |
| 7              | Shaft diameter                                  | Standard $\varnothing$ 6 mm, Optional $\varnothing$ 6.35 mm - further shaft diameters on request    |  |   |
| 8              | Max. operational speed                          | Continuous rotational shaft speed up to 100 rpm (< 1 min 800 rpm)                                   |  |   |
| 9              | Lifetime  | > 100 Mio. shaft rotating movements   |  |   |
| 10             | Operating temperature range                     | -40..+85 °C   |  |   |
| 11             | Protection grade                                | Standard IP40 from shaft side, optional IP55M   |  |   |
| 12             | Effective electrical angle of rotation          | 360°  |  |   |
| 13             | Supply voltage / output signal                  | VSUP=5 V (4.5...5.5 V) / OUT=0...5 V (ratiometric)  | VSUP=5 V (4.5...5.5 V) / OUT=0...5 V (ratiometric) | VSUP=5 V (4.5...5.5 V) / OUT=5 V / 244 Hz / PWM 10-90 % |
| 14             |   | VSUP=24 V (15...30 V) / OUT=0...10 V  | VSUP=24 V (15...30 V) / OUT=0...10 V               | -   |
| 15             |   | VSUP=24 V (9...30 V) / OUT=4...20 mA  | -  | -   |
| 16             |   | Option: VSUP=24 V (9...30 V) / OUT=0...5 V  | -  | -   |
| 17             | Electrical connection                           | Standard: flat ribbon cable 0.15 m, option: round cable 1 m, AWG26                                  |  |   |
| 18             | Programmable by customer                        | NO  | NO   | NO  |
| 19             | Programmable ex works                           | YES   | YES  | YES   |
| 20             | Detailed information about the series see pages | 10/11   | 12/13/14   | 15/16   |

# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

| Quick overview |   | Incremental rotary encoder, rotary encoder with digital output                                      |                              |                                 |
|----------------|---|---|------------------------------|---------------------------------|
| 1              | Series  | ETI25F  | ETS25F                       | ETS25F X                        |
| 2              | Technology                                      | Magnetic gradient-based signal capturing, with $\mu$ Processor controlled digital signal processing |                              |                                 |
| 3              | Not redundant / redundant                       | Not redundant   | Redundant                    | Redundant                       |
| 4              | Output signal                                   | 1 x Incremental   | 1 x Digital                  | 2 x Digital                     |
| 5              | Bearing material                                | Sleeve bearing made of bronze   |                              |                                 |
| 6              | Shaft material                                  | Stainless steel   |                              |                                 |
| 7              | Shaft diameter                                  | Standard $\varnothing$ 6 mm, Optional $\varnothing$ 6.35 mm - further shaft diameters on request    |                              |                                 |
| 8              | Max. operational speed                          | Continuous rotational shaft speed up to 100 rpm (< 1 min 800 rpm)                                   |                              |                                 |
| 9              | Lifetime  | > 100 Mio. shaft rotating movements   |                              |                                 |
| 10             | Operating temperature range                     | -40..+85 °C   |                              |                                 |
| 11             | Protection grade                                | Standard IP40 from shaft side, optional IP55M   |                              |                                 |
| 12             | Effective electrical angle of rotation          | 360°  |                              |                                 |
| 13             | Supply voltage / output signal                  | VSUP=24 V (10...30 V) / OUT=A, B, Z, Push-Pull  | 5 VDC $\pm$ 10% / SPI 14 Bit | 5 VDC $\pm$ 10% / SPI 14 Bit    |
| 14             |   | VSUP=24 V (10...30 V) / OUT=Open Collector  | 5 VDC $\pm$ 10% / SER 12 Bit | -                               |
| 15             |   | VSUP=5 V $\pm$ 10% / OUT=A, B, Z, TTL   | -                            | -                               |
| 16             |   | -   | -                            | -                               |
| 17             | Electrical connection                           | Standard: flat ribbon cable 0.15 m, option: round cable max. 0.6 m, AWG26                           |                              | flat ribbon cable 0.15 m, AWG26 |
| 18             | Programmable by customer                        | NO  | NO                           | NO                              |
| 19             | Programmable ex works                           | YES   | YES                          | YES                             |
| 20             | Detailed information about the series see pages | 17/18/19  | 20/21                        | 22/23/24                        |

# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

| Quick overview |   | Multiturn encoder with analogue output programmable from the customer                               |
|----------------|---|---|
| 1              | Series  | ETA25F PM   |
| 2              | Technology                                      | Magnetic gradient-based signal capturing, with $\mu$ Processor controlled digital signal processing |
| 3              | Not redundant / redundant                       | Not redundant   |
| 4              | Output signal                                   | 1 x Analogue, absolute  |
| 5              | Bearing material                                | Sleeve bearing made of bronze   |
| 6              | Shaft material                                  | Stainless steel   |
| 7              | Shaft diameter                                  | Standard $\varnothing$ 6 mm, optional $\varnothing$ 6,35 mm - further shaft diameters on request    |
| 8              | Max. operational speed                          | Continuous rotational shaft speed up to 100 rpm (< 1 min 800 rev/min)                               |
| 9              | Lifetime  | > 100 Mio. shaft rotating movements   |
| 10             | Operating temperature range                     | -40..+85 °C   |
| 11             | Protection grade                                | Standard IP40 from shaft side, optional IP55M   |
| 12             | Effective electrical angle of rotation          | up to 72000°  |
| 13             | Supply voltage / output signal                  | VSUP=24 V (9...30 V) / OUT=0...5 V  |
| 14             |   | VSUP=24 V (15...30 V) / OUT=0...10 V  |
| 15             |   | -   |
| 16             |   | -   |
| 17             | Electrical connection                           | Standard: flat ribbon cable 0.15 m, option: round cable 1 m, AWG26                                  |
| 18             | Programmable by customer                        | YES   |
| 19             | Programmable ex works                           | YES   |
| 20             | Detailed information about the series see pages | 25/26/27/28   |

General

Drawing

Mechanical Data

Analogue ETA25F

Incremental ET125F

Serial ETS25F

Multiturn ETA25F PM

Accessory

Customizing

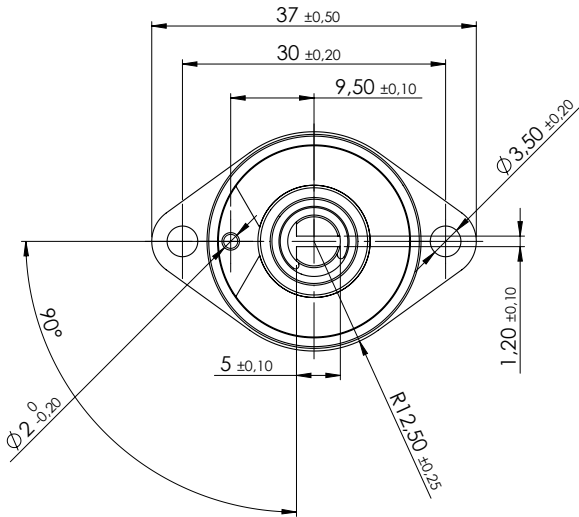
# Data Sheet for Angle Sensors



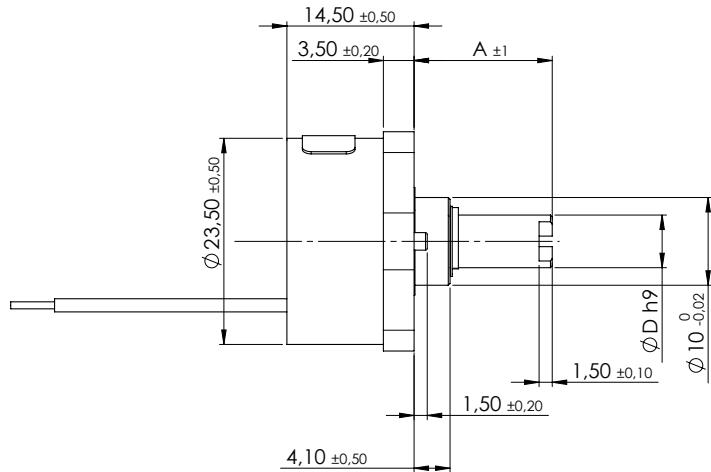
Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Drawing ETx25F Family



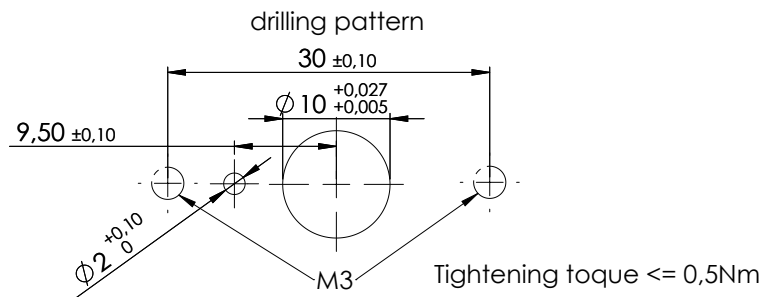
View shows 0° position



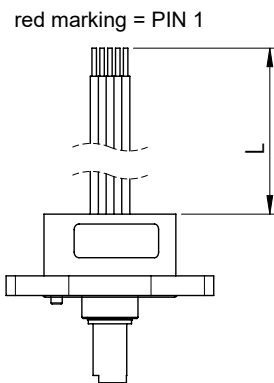
### Standard shaft dimensions

|                  |         |
|------------------|---------|
| Shaft length A   | 15.6 mm |
| Shaft diameter D | 6 mm    |

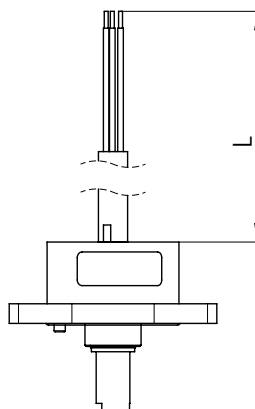
planarity of installation surface 0,1  
roughness of installation surface  $\sqrt{Ra}$  6,3



### Option F Flat ribbon cable



### Option R Round cable



| Option | Standard Cable Length L | Cable Cross Section | Allowed Tolerance (*) |
|--------|-------------------------|---------------------|-----------------------|
| R      | 1000 mm                 | AWG26               | -20 mm...+40 mm       |
| F      | 150 mm                  | AWG26               | -10 mm...+25 mm       |

Cables without cable shield

(\*) Tolerances according IPC Association

# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Mechanical and Environmental Data, Miscellaneous - ETx25F Family

|  |   |
|--|---|
| Mechanical angle of rotation 1.)                 | Endless   |
| Lifetime 2.)                                     | > 100 Mio. shaft rotating movements<br>For Option D (with shaft sealing) the sealing is at least working up to 200 000 shaft rotating movements                   |
| Bearing  | Sleeve bearing  |
| Max. operational speed                           | 100 rpm (< 1 min 800 rpm)   |
| Operational torque without / with shaft sealing  | $0.1 \leq M \leq 0.6$ Ncm / $0.3 \leq M \leq 1.3$ Ncm (@ RT, 10 rpm)  |
| Operating temperature range                      | -40..+85 °C (fixed cable)   |
| Storage temperature range                        | -40..+105 °C  |
| Protection grade front side (IEC 60529) Standard | IP40  |
| Option D (with shaft sealing)                    | IP55M bzw. IP66S  |
| Protection grade rear side (IEC 60529)           | IP50 (end of cable excluded)<br>IP66 (end of cable excluded)  |
| Vibration (IEC 68-2-6, Test Fc)                  | $\pm 1.5$ mm / 20 g / 10 bis 2000 Hz / 16 frequency cycles (3x4 h)  |
| Mechanical shock (IEC 68-27, Test Ea)            | 50 g / 11 ms / halfsine (3x6 shocks)  |
| Housing diameter / length                        | 23.5 mm (dimensions of the mounting flange, height: 37 mm, width 25 mm)   |
| Housing depth                                    | 14.5 mm   |
| Shaft diameter                                   | 6 mm or 6.35 mm - other shaft diameter on request   |
| Shaft type                                       | Solid shaft   |
| Max. radial load                                 | 1 N   |
| Max. shaft load                                  | 1 N   |
| Mass   | Option F (0.15 m flat ribbon cable) app. XX g<br>Option R (1.00 m round cable) app. XX g  |
| Connection type                                  | Flat ribbon cable AWG26, 0.15 m with tinned cable endings<br>Round cable, not shielded, AWG26, 1 m with tinned cable endings<br>Other connection types on request |
| Connection position                              | Axial   |
| Sensor mounting                                  | Flange, by means of two pieces of screws M3   |
| Fastening parts included in delivery             | None<br>When ordering option D, a sealing element (o-ring) for sealing between the mounting plate and the rotary encoder is scope of delivery                     |
| Fastening torque per screw or nut                | $\leq 0.5$ Nm   |
| Material shaft                                   | Stainless steel   |
| Material housing                                 | Glass-fibre reinforced thermoplastic / bronze   |

1.) According IEC 60393

2.) Determined by climatic conditions according to IEC 68-1, para. 5.3.1 without load collectives

# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Compliance - ETx25F Family

### Immunity

|  |         |
|--|---------|
| EN 61000-4-3 RF sine wave                    | Class A |
| EN 61000-4-6 Conducted sine wave             | Class A |
| EN 61000-4-8 Power frequency magnetic fields | Class A |

### Elektrostatic Discharge - ETx25F Family

|                  |         |
|------------------|---------|
| EN 61000-4-2 ESD | Class B |
|------------------|---------|

### REACH - ETx25F Family

REACH Regulation (EC) 1907/2006 including the SVHC list

### RoHS - ETx25F Family

RoHS Directive 2011/65/EU

General

Drawing

Mechanical  
Data

Analogue  
ETA25F

Incremental  
ETI25F

Seriell  
ETS25F

Multiturn  
ETA25F PM

Accessory

Customizing



# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Possible options - ETx25F Family

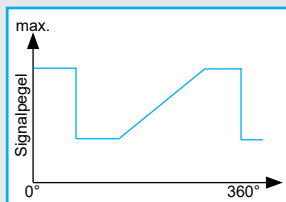
### Standard options starting from small series - ETx25F Family

Shaft:
 

- Special shaft diameter deviating from standard  $\varnothing$  6 mm respectively  $\varnothing$  6.35 mm
- Special shaft length
- Special shaft flattening
- Screwdriver slot

Output signal :
 

- Changed sense of rotation (CW/CCW)
- Change of the effective electrical angle [XXX°]
- Signal output function with max. 5 signal changes - ETA25F (X)



- Changed amount of increments ETI 25F

Signal cable:
 

- Changed cable length

### Options for project business (higher quantities) - ETx25F Family

Cable assembly:
 

- Special cable style
- Cable with plug

Haptic:
 

- Changed operating torque

Shaft bearing:
 

- Other shaft bearing (e.g. ball bearing)
- Other shaft bearing material

Housing:
 

- Custom specific housing design
- Other housing material
- MU-metal shielding

Electronics:
 

- Other supply voltages
- Changed update-rate
- Redundant electronics with common supply voltage and ground

Everything else:
 

- On request

### Megatron support

| Department:      | Request:  | E-Mail:           | Phone:           |
|------------------|---|-------------------|------------------|
| Sales            | <ul style="list-style-type: none"> <li>▪ Technical support</li> <li>▪ Application support</li> <li>▪ Prices</li> <li>▪ Delivery time</li> </ul> | sales@megatron.de | +49 89 46094-520 |
| Order processing | <ul style="list-style-type: none"> <li>▪ Order</li> <li>▪ Delivery time</li> <li>▪ Return (RMA)</li> </ul>                                      | order@megatron.de | +49 89 46094-100 |

Further Information material
 

- **Available on the Megatron homepage <https://www.megatron.de/>**
- Free 3D-models in STEP format
- Programming manual for series ETA25K PM
- Accessories: programmer, counter-/quadrature- ICs, shaft couplings

# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Series ETA25F - Singleturn, analog output, not redundant

### Key features ETA25F :

- Supply voltage: 5 VDC  $\pm 10\%$ , 15..30 VDC, 9..30 VDC
- Signal output: 0..5 V, 0..10 V, 4..20 mA

## Electrical Data ETA25F - Singleturn, analogue output, not redundant

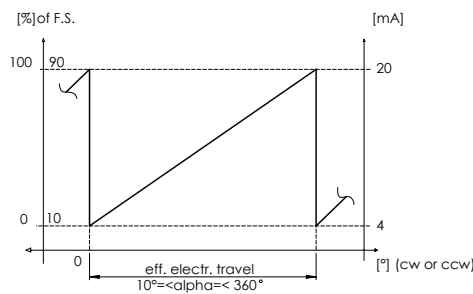
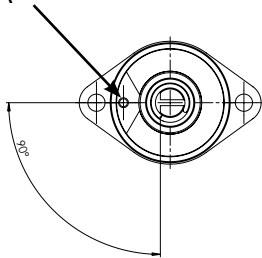
|  |  |           |                |
|--|--|-----------|----------------|
| Effective electrical angle of rotation 1.)     | $15^\circ \leq \alpha \leq 360^\circ$ (programmable in factory), $\pm 0.5^\circ$                 |           |                |
| Independent linearity (best straight line) 1.) | $\pm 0.3\%$ @ $360^\circ$  |           |                |
| Absolute Linearity 1.)                         | $\pm 0.6\%$ @ $360^\circ$  |           |                |
| Output signal                                  | 0...5 V ratiometric  | 0...10 V  | 4...20 mA      |
| Resolution                                     | 14 Bit for $15^\circ \leq \alpha < 90^\circ$ resp. 12 Bit for $90^\circ \leq \alpha < 360^\circ$ |           |                |
| Update rate                                    | 200 $\mu$ s  |           | 600 $\mu$ s    |
| Supply voltage                                 | 5 V $\pm 10\%$   | 15...30 V | 9...30 V       |
| Power consumption (no load)                    | $\leq 16$ mA   |           | $\leq 14$ mA   |
| Output load                                    | $\geq 5$ kOhm  |           | $\leq 500$ Ohm |
| Insulation voltage 1.)                         | 1000 VAC @ 50 Hz, 1 min  |           |                |
| Insulation resistance 1.)                      | 2 MOhm @ 500 VDC, 1 min  |           |                |

1.) According IEC 60393

## Relationship between anti rotation pin and effective electrical angle, ETA25F - Singleturn, analogue output, not redundant

If the shaft flattening is facing the antirotation pin A then the output signal is 0% fullscale (see drawing below).

Anti rotation pin A



# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

| Order Code   |  |   |  |  |  |  |  |  |  |
|--|--|---|--|--|--|--|--|--|--|
| Description  |  | Selection: standard=black/bold, possible options=grey/cursive       |  |  |  |  |  |  |  |
| <b>Series ETA25F</b>   |  | <b>ETA25F</b>   |  |  |  |  |  |  |  |
| <b>Shaft diameter, shaft length:</b><br><b>Shaft diameter Ø 6 mm, shaft length 15.6 mm</b><br>Option: Shaft diameter Ø 6.35 mm, shaft length 15.6 mm<br>Option: Userdefined shaft dimensions [mm] Ø ≤6.35mm  |  | <b>6x15,6</b><br><i>6,35x15,6</i><br><i>XxXX</i>                    |  |  |  |  |  |  |  |
| <b>Supply voltage / Output signal:</b><br><b>VSUP=5 V (4.5...5.5 V) / OUT=0...5 V (ratiometric)</b><br><b>VSUP=24 V (15...30 V) / OUT=0...10 V</b><br><b>VSUP=24 V (9...30 V) / OUT=4...20 mA</b><br><b>VSUP=24 V (9...30 V) / OUT=0...5 V</b>   |  | <b>0505</b><br><b>2410</b><br><b>2442</b><br><i>2405</i>            |  |  |  |  |  |  |  |
| <b>Sense of rotation:</b><br><b>Sense of rotation CW (output signal increases clockwise)</b><br>Option: CCW (output signal increases counter clockwise)  |  | <b>CW</b><br><i>CCW</i>   |  |  |  |  |  |  |  |
| <b>Electrical angle:</b><br><b>Electrical angle 360° (positive integer)</b><br>Option: user defined rotation angle (≥15°, positive integer)  |  | <b>360</b><br><i>XXX</i>  |  |  |  |  |  |  |  |
| <b>Shaft sealing (standard without shaft sealing):</b><br>Option: D with shaft sealing   |  | <i>D</i>  |  |  |  |  |  |  |  |
| <b>Electrical connection, cable length, anti rotation pin:</b><br><b>Standards:</b><br><b>Flat ribbon cable standard length 0.15 m</b><br>Round cable 1 m [x.xx m]   |  | <b>F0,15A</b><br><i>R1,00A</i>                                      |  |  |  |  |  |  |  |
| <b>Electrical connection, cable length, anti rotation pin (Options):</b><br><b>Electrical connection:</b><br>Option: flat ribbon cable<br>Option: round cable<br><b>Cable length:</b><br>Option: cable length in user-defined length<br>[x,XX m] (only for option F and R, flat ribbon cable ≤3 m)<br><b>Anti rotation pin:</b><br>Anti rotation pin A<br>Option: Without anti rotation pin in combination with project business (*) |  | <i>F</i><br><i>R</i><br><br><i>X,XX</i><br><br><i>A</i><br><i>Y</i> |  |  |  |  |  |  |  |

(\*) The anti rotation pin A can be easily tweaked, for example by means of a side cutter

## Order example ETA25F - Singleturn, analogue output, not redundant

**Requirement:**  
Shaft Ø 6.00 mm, shaft length 15.6 mm, VSUP=5 V / OUT=0...5 V, sense of rotation CW, rotation angle 360°, no shaft sealing, flat ribbon cable 0.15 m, anti rotation pin A

**Example for order code:**  
ETA25F 6x15,6 0505 CW360 F0,15A

## Cable- and pin-assignment ETA25F - Singleturn, analogue output, not redundant

| Function: | Option F     | Option R |
|-----------|--------------|----------|
| OUT       | Lead 2       | brown    |
| VSUP      | Lead 1 (red) | red      |
| GND       | Lead 3       | black    |

# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Series ETA25F X - Singleturn, analogue output, redundant

### Key features ETA25F X :

- Independent signal processing. The ETA25F X rotary encoder electronics are based mainly on one 3D-Hall IC in which two semiconductor chips independently capture, evaluate and output the measured values
- Supply voltage, signal output and ground are galvanically insulated => separate electrical connections
- Supply voltage: 5 VDC or 15..30 VDC
- Signal output: 0..5 V or 0..10 V

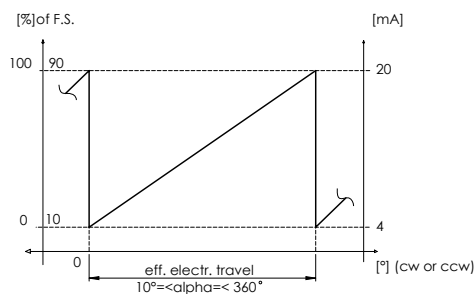
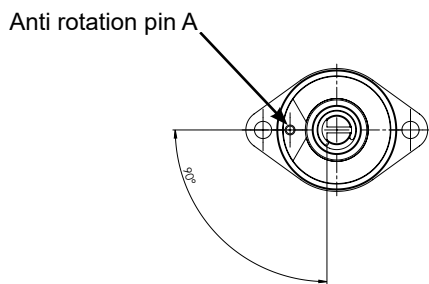
## Electrical Data ETA25F X - Singleturn, analogue output, redundant

|  |  |           |
|--|--|-----------|
| Effective electrical angle of rotation 1.)     | $15^\circ \leq \alpha \leq 360^\circ$ (programmable in factory), $\pm 0.5^\circ$                 |           |
| Independent linearity (best straight line) 1.) | $\pm 0.3\%$ @ $360^\circ$  |           |
| Absolute Linearity 1.)                         | $\pm 0.6\%$ @ $360^\circ$  |           |
| Output signal                                  | 0...5 V ratiometric  | 0...10 V  |
| Resolution                                     | 14 Bit for $15^\circ \leq \alpha < 90^\circ$ resp. 12 Bit for $90^\circ \leq \alpha < 360^\circ$ |           |
| Update rate                                    | 200 $\mu$ s  |           |
| Supply voltage                                 | 5 V $\pm 10\%$   | 15...30 V |
| Power consumption (no load)                    | $\leq 23$ mA   |           |
| Output load                                    | $\geq 5$ kOhm  |           |
| Insulation voltage 1.)                         | 1000 VAC @ 50 Hz, 1 min  |           |
| Insulation resistance 1.)                      | 2 MOhm @ 500 VDC, 1 min  |           |

1.) According IEC 60393

## Relationship between anti rotation pin and effective electrical angle, ETA25F X - Singleturn, analogue output, redundant

If the shaft flattening is facing the anti rotation pin (A) (see drawing below), then each of the output signals OUT 1 and OUT 2 are 0% fullscale.



# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

| Order Code  |                 |   |  |                            |                         |                         |                          |   |                                |
|---|-----------------|---|--|----------------------------|-------------------------|-------------------------|--------------------------|---|--------------------------------|
| Description   |                 | Selection: standard=black/bold, possible options=grey/cursive |  |                            |                         |                         |                          |   |                                |
| <b>Series ETA25F X (X=electric redundant)</b>   | <b>ETA25F X</b> |   |  |                            |                         |                         |                          |   |                                |
| <b>Shaft diameter, shaft length:</b><br><b>Shaft diameter Ø 6 mm, shaft length 15.6 mm</b><br>Option: Shaft diameter Ø 6.35 mm, shaft length 15.6 mm<br>Option: Userdefined shaft dimensions [mm]   |                 | <b>6x15,6</b><br><i>6,35x15,6</i><br><i>XXXX</i>              |  |                            |                         |                         |                          |   |                                |
| <b>Supply voltage / Output signal:</b><br><b>VSUP=5 V (4,5...5.5 V) / OUT=0...5 V (ratiometric)</b><br><b>VSUP=24 V (15...30 V) / OUT=0...10 V</b>  |                 |   |  | <b>0505</b><br><b>2410</b> |                         |                         |                          |   |                                |
| <b>Sense of rotation, output 1:</b><br><b>Sense of rotation CW (output signal increases clockwise)</b><br>Option: CCW (output signal increases counter clockwise)   |                 |   |  |                            | <b>CW</b><br><i>CCW</i> |                         |                          |   |                                |
| <b>Sense of rotation, output 2:</b><br><b>Sense of rotation CW (output signal increases clockwise)</b><br>Option: CCW (output signal increases counter clockwise)   |                 |   |  |                            |                         | <b>CW</b><br><i>CCW</i> |                          |   |                                |
| <b>Electrical angle:</b><br><b>Electrical angle 360° (positive integer)</b><br>Option: user defined rotation angle (≥15°)   |                 |   |  |                            |                         |                         | <b>360</b><br><i>XXX</i> |   |                                |
| <b>Shaft sealing (standard without shaft sealing):</b><br>Option: D with shaft sealing  |                 |   |  |                            |                         |                         |                          | <i>D</i>                                |                                |
| <b>Electrical connection, cable length, anti rotation pin (according drawing):</b><br><b>Flat ribbon cable standard length 0.15 m</b><br>Round cable 1 m [x.xx m]   |                 |   |  |                            |                         |                         |                          |   | <b>F0,15A</b><br><i>R1,00A</i> |
| <b>Electrical connection, cable length, anti rotation pin (Options):</b><br><b>Electrical connection:</b><br>Option: flat ribbon cable<br>Option: round cable<br><b>Cable length:</b><br>Option: cable length in user-defined length [x.xx m]<br><b>Anti rotation pin:</b><br>Anti rotation pin A<br>Option: Without anti rotation pin.<br>Available for project business with high amounts (*) |                 |   |  |                            |                         |                         |                          | <i>F</i><br><i>R</i><br><br><i>X,XX</i> | <i>A</i><br><i>Y</i>           |

(\*) The anti rotation pin A can be easily tweaked, for example by means of a side cutter

## Order example ETA25F X - Singleturn, analogue output, redundant

### Requirement:

Redundant, shaft Ø 6.00 mm, shaft length 15.6 mm, VSUP=5 V / OUT=0...5 V, signal 1 sense of rotation CW, signal 2 sense of rotation CW, rotation angle 360° signal 1 and 2, no shaft sealing, flat ribbon cable 0.15 m, anti rotation pin A

### Example for order code:

ETA25F X 6x15.6 0505 CW CW 360 F0.15A

# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Order example ETA25F X - Singleturn, analogue output, redundant

| <u>Function:</u> | <u>Option F</u> | <u>Option R</u> |
|------------------|-----------------|-----------------|
| VSUP 1           | Lead 1 (red)    | red             |
| OUT 1            | Lead 2          | brown           |
| GND 1            | Lead 3          | black           |
| GND 2            | Lead 4          | green           |
| OUT 2            | Lead 5          | yellow          |
| VSUP 2           | Lead 6          | orange          |

General

Drawing

Mechanical  
Data

Analogue  
ETA25F

Incremental  
ETI25F

Seriell  
ETS25F

Multiturn  
ETA25F PM

Accessory

Customizing

# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Series ETP25F - Singleturn, PWM output, not redundant

### Key features ETP25F:

- PWM signal output
- Frequency 244 Hz (constant)
- Pulsewidth (=duty cycle) 10% (=0°) to 90% (=360°)
- Supply voltage: 5 VDC +/-10%

## Electrical Data ETP25F - Singleturn, PWM output, not redundant

|  |  |
|--|--|
| Effective electrical angle of rotation 1.)     | $10^\circ \leq \alpha \leq 360^\circ$ (programmable in factory), $\pm 0.5^\circ$ |
| Independent linearity (best straight line) 1.) | $\pm 0.4\%$ @ 360°   |
| Absolute Linearity 1.)                         | $\pm 0.6\%$ @ 360°   |
| Output signal                                  | PWM (pulse width modulation)   |
| Output signal voltage                          | 5V   |
| Carrier frequency                              | 244Hz (constant)   |
| Minimum duty cycle                             | 10%, equal to app. 0.4ms   |
| Maximum duty cycle                             | 90%, equal to app. 3.5ms   |
| Resolution                                     | 12 Bit   |
| Supply voltage                                 | 5 V $\pm 10\%$   |
| Power consumption (no load)                    | $\leq 10$ mA   |
| Output load                                    | $\geq 5$ kOhm  |
| Insulation voltage 1.)                         | 1000 VAC @ 50 Hz, 1 min  |
| Insulation resistance 1.)                      | 2 MOhm @ 500 VDC, 1 min  |

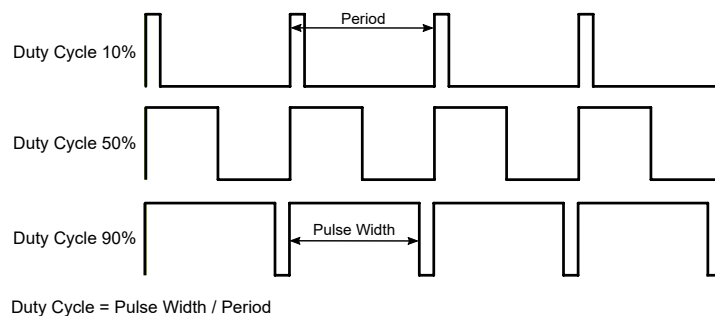
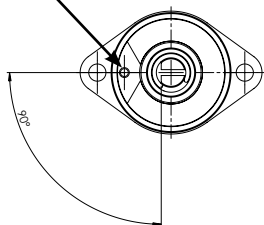
1.) According IEC 60393

## Relationship between anti rotation pin and effective electrical angle of rotation

### Series ETP25F - Singeltturn, PWM output, not redundant

If the shaft flattening is facing the antirotation pin A then the duty cycle of the output signal is 10%.

Anti rotation pin A



## Function description PWM signal output ETP25F:

The ETP25F provides a constant carrier frequency with 244 Hz on the signal output, with HIGH and LOW signal levels which have a constant signal amplitude. A constant carrier frequency means a constant length of the period duration. The duty cycle and thus the pulse width changes in dependency of the rotating angle between 10% to 90% relative to the signal period. If the CW option is selected, the duty cycle increases clockwise when turning the shaft clockwise. If the CCW option is selected, the duty cycle decreases clockwise if the shaft is turned clockwise. Normally no signal conversion is required for further processing of the output signal, because many  $\mu$ Controllers already have an input for PWM signals.

# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Order Code ETP25F - Analog, PWM output, singleturn

| Description   |               | Selection: standard=black/bold, possible options=grey/cursive |             |                         |                          |                      |                                |                      |
|---|---------------|---|-------------|-------------------------|--------------------------|----------------------|--------------------------------|----------------------|
| <b>Series ETP25F</b>  | <b>ETP25F</b> |   |             |                         |                          |                      |                                |                      |
| <b>Shaft diameter, shaft length:</b><br><b>Shaft diameter Ø 6 mm, shaft length 15.6 mm</b><br>Option: Shaft diameter Ø 6.35 mm, shaft length 22 mm<br>Option: Userdefined shaft dimensions [mm] Ø ≤6.35mm   |               | <b>6x15,6</b><br><i>6,35x15,6</i><br><i>XxXX</i>              |             |                         |                          |                      |                                |                      |
| <b>Supply voltage / Output signal:</b><br><b>VSUP=5 V (4.5...5.5 V) / OUT=5 V / 244 Hz / PWM 10-90 %</b>  |               |   | <b>5PWM</b> |                         |                          |                      |                                |                      |
| <b>Sense of rotation:</b><br><b>Sense of rotation CW (pulse width increases clockwise)</b><br>Option: CCW (pulse width increases counterclockwise)  |               |   |             | <b>CW</b><br><i>CCW</i> |                          |                      |                                |                      |
| <b>Electrical angle:</b><br><b>Electrical angle 360° (positive integer)</b><br>Option: user defined rotation angle (≥ 10°, positive integer)  |               |   |             |                         | <b>360</b><br><i>XXX</i> |                      |                                |                      |
| <b>Shaft sealing (standard without shaft sealing):</b><br>Option: D with shaft sealing  |               |   |             |                         |                          | <i>D</i>             |                                |                      |
| <b>Electrical connection, cable length, anti rotation pin:</b><br><b>Flat ribbon cable standard length 0.15 m</b><br>Option: Round cable 1 m [x.xx m]   |               |   |             |                         |                          |                      | <b>F0,15A</b><br><i>R1,00A</i> |                      |
| <b>Electrical connection, cable length, anti rotation pin (Options):</b><br><b>Electrical connection:</b><br>Option: flat ribbon cable<br>Option: round cable<br><b>Cable length:</b><br>Option: cable length in user-defined length [x.xx m]<br><b>Anti rotation pin:</b><br>Anti rotation pin A<br>Option: Without anti rotation pin.<br>Available for project business with high amounts (*) |               |   |             |                         |                          | <i>F</i><br><i>R</i> | <i>X,XX</i>                    | <i>A</i><br><i>Y</i> |

(\*) The anti rotation pin A can be easily tweaked, for example by means of a side cutter

## Order example ETP25F - Analogue, PWM output, singleturn

### Requirement:

Shaft Ø 6.00 mm, shaft length 15.6 mm, VSUP=5 V / OUT=244 Hz, sense of rotation CW, rotation angle 360°, no shaft sealing, electrical connection: flat ribbon cable 0.15 m, anti rotation pin A

### Example for order code:

ETP25F 6x15,6 5PWM CW 360 F0,15A

## Cable- and Pin-assignment

### ETP25 - Analogue, PWM output, singleturn

| Function | Option F     | Option R |
|----------|--------------|----------|
| OUT      | Lead 1 (rot) | brown    |
| VSUP     | Lead 2       | red      |
| GND      | Lead 3       | black    |



# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Series ETI25F - Singleturn, incremental output, not redundant

### Key features ETI25F:

- Channels A, B and Index signal Z
- Signal output TTL, Push-Pull, Open Collector
- Maximal number of pulses per channel 1024 pulses per revolution (=4096 steps)
- Option: User defined number of pulses per revolution request 1..128 pulses per revolution - ex works programmable

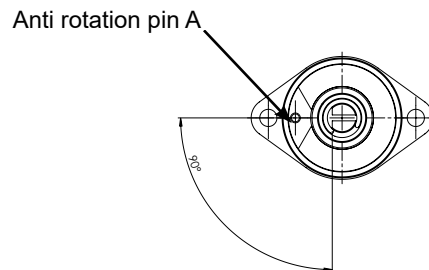
## Electrical Data ETI25F - Singleturn, incremental output, not redundant

| Output Signal               | TTL                             | Push-Pull       | Open Collector |
|-----------------------------|---------------------------------|-----------------|----------------|
| Number of pulses            | 1024, 512, 256, 1-128 Imp./Rev. |                 |                |
| Limit frequency             | 100 kHz                         |                 |                |
| Switch-on delay             | 20 ms                           |                 |                |
| Supply voltage              | 3,3 VDC $\pm$ 10%               | 5 VDC $\pm$ 10% | 10...30 V      |
| Power consumption (no load) | $\leq$ 15 mA                    | $\leq$ 50 mA    | $\leq$ 25 mA   |
| Output load                 | $\geq$ 5 kOhm                   |                 |                |
| Max. Pull-Up Voltage        |                                 |                 | 30 VDC         |
| Insulation voltage 1.)      | 1000 VAC @ 50 Hz, 1 min         |                 |                |
| Insulation resistance 1.)   | 2 MOhm @ 500 VDC, 1 min         |                 |                |

1.) According IEC 60393

## Relationship between anti rotation pin and index signal, series ETI25F - singelturn, incremental output, not redundant

If the shaft flattening is facing the antirotation pin A then the index signal (Z) will be given out.



# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Order Code ETI25F - single turn, incremental output, not redundant

| Description   |        | Selection: standard=black/bold, possible options=grey/cursive |  |             |                |          |               |  |
|---|--------|---|--|-------------|----------------|----------|---------------|--|
| Series ETI25F   | ETI25F |   |  |             |                |          |               |  |
| <b>Shaft diameter, shaft length:</b><br><b>Shaft diameter Ø 6 mm, shaft length 15.6 mm</b><br>Option: Shaft diameter Ø 6.35 mm, shaft length 15.6 mm<br>Option: Userdefined shaft [mm] Ø ≤6.35mm  |        | <b>6x15,6</b>   |  |             |                |          |               |  |
|   |        | <i>6.35x15,6</i>  |  |             |                |          |               |  |
|   |        | <i>XxXX</i>   |  |             |                |          |               |  |
| <b>Number of pulses (pulses per revolution):</b><br><b>1024</b><br>Option: 512<br>Option: 256<br>Option: 128<br>Option: user defined pulses (<128)  |        |   |  | <b>1024</b> |                |          |               |  |
|   |        |   |  | <i>0512</i> |                |          |               |  |
|   |        |   |  | <i>0256</i> |                |          |               |  |
|   |        |   |  | <i>0128</i> |                |          |               |  |
|   |        |   |  | <i>0XXX</i> |                |          |               |  |
| <b>Supply voltage / Output signal:</b><br><b>VSUP=24 V (10...30 V) / OUT=A, B, Z, Push-Pull</b><br><b>VSUP=24 V (10...30 V) / OUT=Open Collector</b><br><b>VSUP=5 V ± 10% / OUT=A, B, Z, TTL</b>  |        |   |  |             | <b>24BZPP</b>  |          |               |  |
|   |        |   |  |             | <b>24BZOC</b>  |          |               |  |
|   |        |   |  |             | <b>05BZTTL</b> |          |               |  |
| <b>Shaft sealing (standard without shaft sealing):</b><br>Option: D with shaft sealing  |        |   |  |             |                | <i>D</i> |               |  |
| <b>Electrical connection, cable length, anti rotation pin:</b><br><b>Flat ribbon cable standard length 0.15 m</b><br>Round cable 1 m [x.xx m]   |        |   |  |             |                |          | <b>F0,15A</b> |  |
|   |        |   |  |             |                |          | <i>R1,00A</i> |  |
| <b>Electrical connection, cable length, anti rotation pin (Options):</b><br><b>Electrical connection:</b><br>Option: flat ribbon cable<br>Option: round cable<br><b>Cable length:</b><br>Option: cable length in user-defined length [x.xx m]<br><b>Anti rotation pin:</b><br>Anti rotation pin A<br>Option: Without anti rotation pin.<br>Available for project business with high amounts (*) |        |   |  |             |                | <i>F</i> |               |  |
|   |        |   |  |             |                | <i>R</i> |               |  |
|   |        |   |  |             |                |          | <i>X,XX</i>   |  |
|   |        |   |  |             |                |          | <i>A</i>      |  |
|   |        |   |  |             |                |          | <i>Y</i>      |  |

(\*) The anti rotation pin A can be easily tweaked, for example by means of a side cutter

## Order example ETI25F - single turn, incremental output, not redundant

**Requirement:**  
 Shaft Ø 6.00 mm, shaft length 15.6 mm, number of pulses 1024 TTL output, VSUP=5 V/TTL, no shaft sealing, flat ribbon cable 0.15 m, anti rotation pin A

**Example for order code:**  
 ETA25F 6x15.6 1024 05BZTTL F0.15A

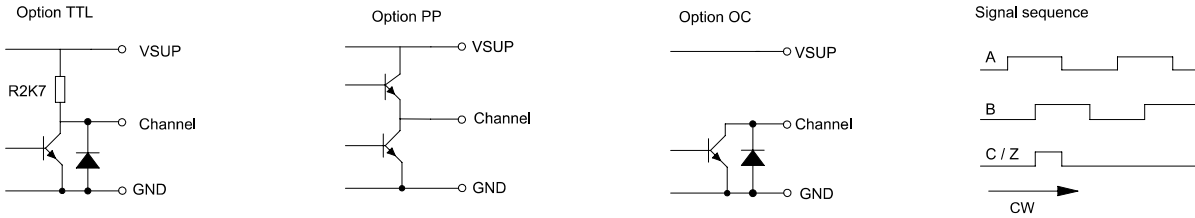
# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

Output circuits of the angle encoder per channel ETI25F - single turn, incremental output, not redundant



### Cable and pin assignment for option R ETI25F - Singelturn, incremental output, not redundant

| Option R | Function:<br>Push-Pull, TTL, OC |
|----------|---------------------------------|
| red      | VSUP                            |
| black    | GND                             |
| brown    | A                               |
| orange   | B                               |
| yellow   | Z                               |
| green    | NC                              |

### Cable and pin assignment for option F ETI25F - Singelturn, incremental output, not redundant

| Option F     | Function:<br>OC, TTL | Function:<br>Push-Pull |
|--------------|----------------------|------------------------|
| Lead 1 (red) | VSUP                 | VSUP                   |
| Lead 2       | GND                  | Z                      |
| Lead 3       | A                    | B                      |
| Lead 4       | B                    | A                      |
| Lead 5       | Z                    | GND                    |

# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Series ETS25F - Singleturn, digital output, not redundant

### Key features ETS25F:

- Signal output SPI or SER
- Supply voltage 5 VDC +/-10%
- Maximum allowed signal cable length 0.6 m

## Electrical Data ETS25F - Singleturn, digital output, not redundant

|  |                         |                  |
|--|-------------------------|------------------|
| Effective electrical angle of rotation 1.)     | 360°                    |                  |
| Independent linearity (best straight line) 1.) | ±0.4% @ 360°            |                  |
| Absolute linearity 1.)                         | ±0.8% @ 360°            |                  |
| Output signal                                  | SER                     | SPI              |
| Resolution                                     | 12 Bit                  | 14 Bit           |
| Update rate                                    | 96 µs                   | 600 µs           |
| Supply voltage                                 | 5 VDC ±10%              |                  |
| Power consumption (no load)                    | ≤ 14 mA                 | standard ≤ 12 mA |
| Insulation voltage 1.)                         | 1000 VAC @ 50 Hz, 1 min |                  |
| Insulation resistance 1.)                      | 2 MOhm @ 500 VDC, 1 min |                  |

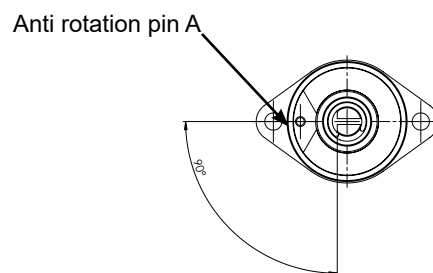
1.) According IEC 60393

## Relationship between anti rotation pin and effective electrical angle ETS25F - Singleturn, digital output, not redundant

Information only valid for SPI signal output.

If the shaft flattening is facing the antirotation pin A then the output signal is 0% fullscale.

**Zero alignment is not available for option 05SER !**



# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Order Code ETS25F - Singleturn, digital output, not redundant

|  |   |  |                              |          |                      |               |                      |
|--|---|--|------------------------------|----------|----------------------|---------------|----------------------|
| <b>Description:</b><br>Effective electrical angle: 360°<br>Sense of rotation: CW (by rotating the shaft clockwise the output signal rises)   | Selection: standard=black/bold, possible options=grey/cursive |  |                              |          |                      |               |                      |
| <b>Series ETS25F</b>   | <b>ETS25F</b>   |  |                              |          |                      |               |                      |
| <b>Shaft diameter, shaft length:</b><br><b>Shaft diameter Ø 6 mm, shaft length 15.6 mm</b><br>Option: Shaft diameter Ø 6.35 mm, shaft length 15.6 mm<br>Option: Userdefined shaft [mm] Ø ≤6.35 mm  |   | <b>6x15,6</b><br><i>6.35x15,6</i><br><i>XxXX</i> |                              |          |                      |               |                      |
| <b>Supply voltage / Output signal:</b><br><b>14 Bit / 5 VDC ± 10% / SPI</b><br>12 Bit / 5 VDC ± 10% / SER  |   |  | <b>05SPI</b><br><i>05SER</i> |          |                      |               |                      |
| <b>Shaft sealing (standard without shaft sealing):</b><br>Option: D with shaft sealing   |   |  |                              | <i>D</i> |                      |               |                      |
| <b>Electrical connection, cable length, anti rotation pin:</b><br><b>Flat ribbon cable standard length 0.15 m</b>  |   |  |                              |          |                      | <b>F0,15A</b> |                      |
| <b>Electrical connection, cable length, anti rotation pin (Options):</b><br><b>Electrical connection:</b><br>Option: flat ribbon cable<br>Option: round cable<br><b>Cable length:</b><br>Option: cable length in user-defined length [x.xx m] (maximum cable length 0.6 m)<br><b>Anti rotation pin:</b><br>Anti rotation pin A<br>Option: Without anti rotation pin.<br>Available for project business with high amounts (*) |   |  |                              |          | <i>F</i><br><i>R</i> | <i>X,XX</i>   | <i>A</i><br><i>Y</i> |

(\*) The anti rotation pin A can be easily tweaked, for example by means of a side cutter

## Order example ETS25F - Singleturn, digital output, not redundant

|   |
|---|
| <b>Requirement:</b><br>Shaft Ø 6.00 mm, shaft length 15.6 mm, 14 Bit/5 VDC/SPI, no shaft sealing, flat ribbon cable 0.15 m, anti rotation pin A |
| <b>Example for order code:</b><br>ETS25F 6x15,6 05SPI F0,15A  |

## Cable and pin assignment ETS25F Singleturn, digital output, not redundant

| Function:  | Option F:    | Option R: |
|------------|--------------|-----------|
| VSUP       | Lead 1 (rot) | red       |
| GND        | Lead 2       | black     |
| Data       | Lead 3       | brown     |
| Clock      | Lead 4       | yellow    |
| Chipselect | Lead 5       | green     |

For details regarding the interfaces, please refer to the data sheets of the IC manufacturers.

SER-Interface  
Manufacturer: ams  
IC Typ: AS5045  
Web: www.ams.com

SPI-Interface  
Manufacturer: Melexis  
IC Typ: MLX90316EDC (not redundant version)  
Web: www.melexis.com

General

Drawing

Mechanical Data

Analogue ETA25F

Incremental ETI25F

Serial ETS25F

Multiturn ETA25F PM

Accessory

Customizing

# Data Sheet for Angle Sensors

Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Serie ETS25F X - Singleturn, digital output, redundant

### Key features ETA25F X :

- Independent signal processing. The ETS25F X rotary encoder electronics are based mainly on one 3D-Hall IC in which two semiconductor elements independently capture, evaluate and output measured values
- Supply voltage, signal output and ground are galvanically insulated => separate electrical connections
- Supply voltage: 2 x 5 VDC  $\pm 10\%$
- Signal output: 2 x SPI
- Maximum allowed signal cable length (each) 0.6 m

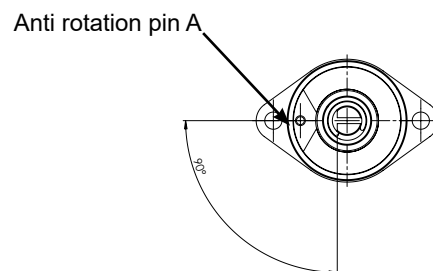
## Electrical Data ETS25F X - Singleturn, digital output, redundant

|  |                         |
|--|-------------------------|
| Effective electrical angle of rotation 1.)     | 360°                    |
| Independent linearity (best straight line) 1.) | $\pm 0.4\%$ @ 360°      |
| Absolute linearity 1.)                         | $\pm 0.8\%$ @ 360°      |
| Output signal                                  | SPI                     |
| Resolution                                     | 14 Bit                  |
| Update rate                                    | 600 $\mu$ s             |
| Supply voltage                                 | 5 VDC $\pm 10\%$        |
| Power consumption (no load)                    | $\leq 24$ mA            |
| Insulation voltage 1.)                         | 1000 VAC @ 50 Hz, 1 min |
| Insulation resistance 1.)                      | 2 MOhm @ 500 VDC, 1 min |

1.) According IEC 60393

## Relationship between anti rotation pin and effective electrical angle ETS25F X - Singleturn, digital output, redundant

If the shaft flattening is facing the anti rotation pin (A) (see drawing below), then each of the output signals OUT 1 and OUT 2 are 0% FS.



# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Order Code ETS25F X - Singleturn, digital output, redundant

**Description:**

Selection: standard=black/bold, possible options=grey/cursive

Effective electrical angle: 360°  
Sense of rotation: CW (by rotating the shaft clockwise the output signal rises for both signal outputs)

**Series ETS25F X (X=electric redundant)**

**ETS25F X**

**Shaft diameter, shaft length:**

**Shaft diameter Ø 6 mm, shaft length 15.6 mm**

Option: Shaft diameter Ø 6.35 mm,  
shaft length 15.6 mm

Option: Userdefined shaft dimensions [mm]

**6x15,6**  
*6,35x15,6*

*XxXX*

**Supply voltage / Output signal:**

**14 Bit / 5 VDC ± 10% / SPI**

**05SPI**

**Shaft sealing: (standard without shaft sealing)**

Option: D with shaft sealing

*D*

**Cable length, anti rotation pin:**

**Two 5 pol. flat ribbon cables arranged one above the other, standard cable length of each flat ribbon cable 0.15 m, anti rotation pin A**

**F0,15A**

**Electrical connection, cable length, anti rotation pin (Options):**

Electrical connection: flat ribbon cable

**Cable length:**

Option: cable length in user-defined length [x.xx m]

(maximum cable length 0.6 m)

*FX,XX*

**Anti rotation pin:**

Anti rotation pin A

Option: Without anti rotation pin.

Available for project business with high amounts (\*)

A  
Y

(\*) The anti rotation pin A can be easily tweaked, for example by means of a side cutter

## Order example ETS25F X - Singleturn, digital output, redundant

**Requirement:**

Shaft Ø 6.00 mm, shaft length 15.6 mm, 14 Bit/5 VDC/SPI, no shaft sealing, signal 1 sense of rotation CW, signal 2 sense of rotation CW, 360° effective electrical angle of rotation for signal 1 and 2, two 5 pol. flat ribbon cables arranged one above the other with cable length 0.15 m of each flat ribbon cable, anti rotation pin A

**Example for order code:**

ETS25F X 6x15,6 05SPI F0,15A

# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Cable and pin assignment ETS25F X - Singleturn, digital output, redundant

| <u>Function:</u> | <u>Option F:</u> | <u>Explanation:</u>            |
|------------------|------------------|--------------------------------|
| VSUP 1           | Lead 1 (red)     | 5 pol. flat ribbon cable No. 1 |
| GND 1            | Lead 2           | 5 pol. flat ribbon cable No. 1 |
| Data 1           | Lead 3           | 5 pol. flat ribbon cable No. 1 |
| Clock 1          | Lead 4           | 5 pol. flat ribbon cable No. 1 |
| Chipselect 1     | Lead 5           | 5 pol. flat ribbon cable No. 1 |
| VSUP 2           | Lead 1 (red)     | 5 pol. flat ribbon cable No. 2 |
| GND 2            | Lead 2           | 5 pol. flat ribbon cable No. 2 |
| Data 2           | Lead 3           | 5 pol. flat ribbon cable No. 2 |
| Clock 2          | Lead 4           | 5 pol. flat ribbon cable No. 2 |
| Chipselect 2     | Lead 5           | 5 pol. flat ribbon cable No. 2 |

General

Drawing

Mechanical Data

Analogue ETA25F

Incremental ETI25F

Serial ETS25F

Multiturn ETA25F PM

Accessory

Customizing



# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Series ETA25F PM - Multiturn/Singleturn, programmable, analogue output, not redundant

### Key features ETS25F PM :

- Measuring range 10° to max. 72000° (=200 shaft revolutions)
- Programmable by the user. Programmable are: the sense of rotation (CW/CCW), the effective electrical angle [°]
- Programmable up to 10.000 times
- Can also be used as programmable singleturn rotary encoder
- Maximum rotation of the shaft in a voltage-free state without loss of the angle information +/-179°
- Factory programming: effective electrical angle of rotation 3600° (= 10 shaft revolutions), sense rotation CW
- Supply voltage: 9..30 VDC, 15..30 VDC
- Output signal: 0..5 VDC, 0..10 V

## Electrical Data - ETA25F PM - Multiturn/Singleturn, programmable, analogue output, not redundant

|  |   |           |
|--|---|-----------|
| Effective electrical angle of rotation 1.)     | 0...10° - 0...72000° (max. 200 turns)<br>Start point, endpoint and sense of rotation programmable by the customer.<br>Ex works the angle is set to 3600°.<br>For detecting absolute position >360 the sensor should not be turned more than ±179° without supply voltage. |           |
| Independent linearity (best straight line) 1.) | ±0.05% @ 3600°  |           |
| Absolute Linearity 1.)                         | ±0.1% @ 3600°   |           |
| Output signal                                  | 0...5 V   | 0...10 V  |
| Resolution 1.)                                 | 12 Bit  |           |
| Update rate                                    | 3 ms  |           |
| Supply voltage                                 | 9...30 V  | 15...30 V |
| Power consumption (no load)                    | < 10 mA   |           |
| Output load                                    | ≥ 5 kOhm  |           |
| Insulation voltage 1.)                         | 1000 VAC @ 50 Hz, 1 min   |           |
| Insulation resistance 1.)                      | 2 MOhm @ 500 VDC, 1 min   |           |
| Max. number of programming cycles              | 10000   |           |

1.) According IEC 60393

# Data Sheet for Angle Sensors

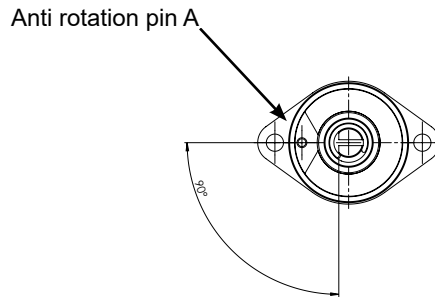


Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

Relationship between anti rotation pin and effective electrical angle in the state of delivery (factory programming). ETA25F PM - Multiturn/singleturn, programmable, analogue output, not redundant

If the shaft flattening is facing the antirotation pin A then the output signal is 0% fullscale.

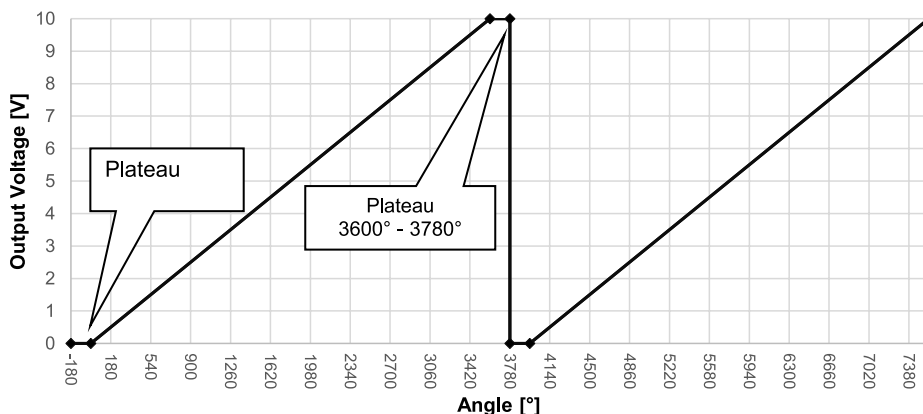


Signal output function in the delivery state (factory programming). Automatic function for inserting signal plateaus. ETA25F PM - Multiturn/Singleturn, programmable, analogue output, non-redundant

The function represents the relationship between the anti rotation pin A, the 0° position and the resulting output signal in the state of delivery, when turning the shaft clockwise (sense of rotation CW). The effective electrical angle of rotation is 3600° ex works. Before and after the linearly rising output signal for 3600° the ETA25F PM integrates automatically signal plateaus for a rotation angle of each 180° .

The following example describes the output signal when actuating the shaft in the delivery state for 11 revolutions clockwise (sense of rotation CW), starting at the 0° position:

1. 10 rotations of the shaft clockwise 0° to 3600°, linearly increasing output signal 0% to 100% FS
2. 1/2 rotation of the shaft 180° (3600° to 3780°) signal plateau 100% FS
3. 1/2 rotation of the shaft 180° (3780° to 3960°) signal plateau 0% FS



# Data Sheet for Angle Sensors



Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

## Order Code ETA25F PM - Multiturn/Singleturn, programmable, analogue output, not redundant

|  |                |   |                            |        |              |        |  |
|--|----------------|---|----------------------------|--------|--------------|--------|--|
| <b>Description:</b><br>User programmable multiturn rotary encoder.<br>Sense of rotation, rotation angle ex works: CW, 3600°  |                | Selection: standard=black/bold, possible options=grey/cursive |                            |        |              |        |  |
| <b>Series:</b>   | <b>ETA25PM</b> |   |                            |        |              |        |  |
| <b>Shaft diameter x shaft length:</b><br><b>Ø6 x 22 mm</b><br><i>Option Ø6.35 x 15.6 mm</i><br><i>Option userdefined shaft dimensions X x XX [mm] Ø ≤6.35mm</i>  |                | <b>6x15,6</b><br><i>6,35x15,6</i><br><i>XxXX</i>              |                            |        |              |        |  |
| <b>Supply voltage / Output signal:</b><br><b>VSUP=24 V (9...30 V) / OUT=0...5 V</b> (not available for option TS)<br><b>VSUP=24 V (15...30 V) / OUT=0...10 V</b>   |                |   | <b>2405</b><br><b>2410</b> |        |              |        |  |
| <b>Shaft sealing:</b><br><b>Standard without shaft sealing</b><br><i>Option D with shaft sealing</i>   |                |   |                            | -<br>D |              |        |  |
| <b>Cable length, anti rotation pin (according drawing):</b><br><b>Two 5 pol. flat ribbon cables arranged one above the other, standard cable length of each flat ribbon cable 0.15 m, anti rotation pin A</b>  |                |   |                            |        | <b>F0,15</b> |        |  |
| <b>Electrical connection, cable length, anti rotation pin (Options):</b><br><b>Electrical connection:</b><br>Option: flat ribbon cable<br>Option: round cable<br><b>Cable length:</b><br>Option: cable length in user-defined length [x.xx m] (maximum cable length 0.6 m)<br><b>Anti rotation pin:</b><br>Anti rotation pin A<br>Option: Without anti rotation pin.<br>Available for project business with high amounts (*) |                |   |                            | F<br>R | X,XX         | A<br>Y |  |

(\*) The anti rotation pin A can be easily tweaked, for example by means of a side cutter

## Order example ETA25F PM

**Requirement:**  
Shaft Ø 6.00 mm, shaft length 15.6 mm, VSUP=5 V / OUT=0...5 V, sense of rotation CW, effective electrical angle ex works 3600° (can be programmed by customer), no shaft sealing, flat ribbon cable 0.15 m, anti rotation pin A

**Example for order code:**  
ETA25F PM 6x22 0505 R1.00B

## Order example ETA25F PM programmer

### Key features ETS25F PM programmer:

- Programmable measuring range from 10° to max. 72000° (=200 shaft revolutions)
- Programmable: sense of rotation (CW/CCW), effective electrical angle [°]
- Up to 10.000 programming cycles per rotary encoder



### Order number:

127813

### Order code:

Programmer MAB36APM, MAB40APM, ETA25PM

General

Drawing

Mechanical Data

Analogue ETA25F

Incremental ETI25F

Serial ETS25F

Multiturn ETA25F PM

Accessory

Customizing

# Data Sheet for Angle Sensors

Hall-Effect Rotary Encoder with Sleeve Bearing and Flange Mounting

Family ETx25F

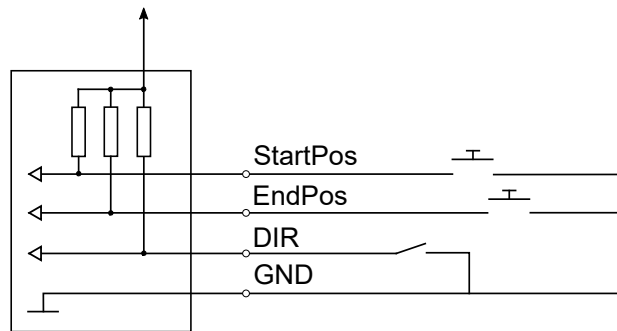
## Cable and pin assignment ETA25F PM Multiturn/singleturn, programmable, analogue output, not redundant

| Function: | Option E     | Option R |
|-----------|--------------|----------|
| DIR       | Lead 1 (red) | orange   |
| END       | Lead 2       | green    |
| START     | Lead 3       | yellow   |
| VSUP      | Lead 4       | red      |
| OUT       | Lead 5       | brown    |
| GND       | Lead 6       | black    |

## Programming of ETA25F PM - Multiturn/singleturn, programmable, analogue output, not redundant

The programming guide is available for download on the Megatron Homepage <https://www.megatron.de/>

To program the ETA25F PM rotary encoder either the following circuit must be built, or the programmer must be ordered from Megatron.



General

Drawing

Mechanical  
Data

Analogue  
ETA25F

Incremental  
ETI25F

Seriell  
ETS25F

Multiturn  
ETA25F PM

Accessory

Customizing

### Accessory for ETx25F Family

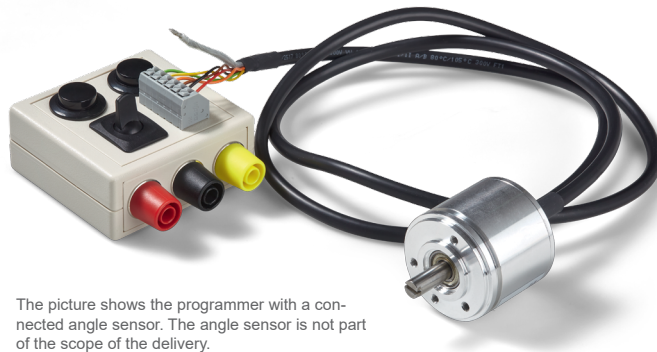
#### ▪ Shaft Couplings from MEGATRON

- Connect two shafts, even with different diameters
- Absorb larger angular and radial deviations
- Have a low inertia
- Do not cause a change in the transmission speed
- Damp torsional vibrations
- Serves as mechanical protection against oversized pairs of forces
- Made of plastic (also with metal hubs) act electrically and heat insulating



#### ▪ Programmer for ETA25F PM

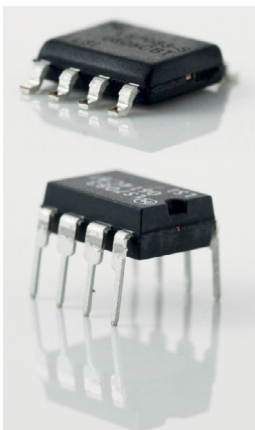
- For programming of the sense of rotation (CCW/CW)
- For programming of the effective electrical angle of rotation [°]



The picture shows the programmer with a connected angle sensor. The angle sensor is not part of the scope of the delivery.

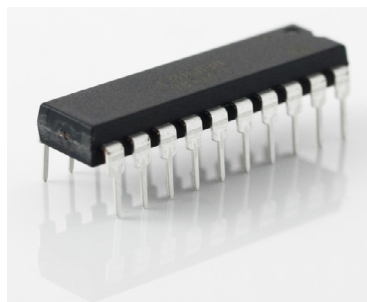
#### ▪ ICs for ETI25F

- LS7083 in DIP or SOIC form factor, generates from incremental-signals quadrature-signals
- LS7166 24-Bit counter IC



LS7083/4N-S

LS7083/4N



LS7166