

# Single-Turn Continuous Rotation Analog Displacement Sensor



## FEATURES

- Conductive plastic potentiometer technology, infinite resolution
- Servo mount anodized light alloy housing
- Precious metal contacts
- Stainless steel shaft and bearings
- Applicable standards: NFC 93255, MIL R 39023

## QUICK REFERENCE DATA

|                  |                                |
|------------------|--------------------------------|
| Sensor type      | ROTATIONAL, conductive plastic |
| Output type      | Output by turrets              |
| Market appliance | Industrial, avionics           |
| Dimensions       | 1 1/16" (27 mm)                |

## ELECTRICAL SPECIFICATIONS

| PARAMETER                                        |                                                                                         |     |     |      |      |      |      |      |      |      |      |      |          |
|--------------------------------------------------|-----------------------------------------------------------------------------------------|-----|-----|------|------|------|------|------|------|------|------|------|----------|
| Theoretical electrical travel (TET)              | 345° ± 3°                                                                               |     |     |      |      |      |      |      |      |      |      |      |          |
| Theoretical electrical travel (TET) - on request | 30°                                                                                     | 60° | 90° | 100° | 120° | 140° | 170° | 180° | 210° | 308° | 308° | 348° | 333° 20' |
| Useful electrical travel (UET) - on request      | 30°                                                                                     | 44° | 70° | 90°  | 120° | 140° | 170° | 100° | 210° | 140° | 180° | 342° | 300°     |
| Independent linearity standard                   | ± 1 %                                                                                   |     |     |      |      |      |      |      |      |      |      |      |          |
| Independent linearity optional                   | ± 0.8 %, ± 0.5 %, ± 0.25 %, ± 0.2 %, ± 0.1 %                                            |     |     |      |      |      |      |      |      |      |      |      |          |
| Total resistance (R <sub>n</sub> )               | 4.7 kΩ or 10 kΩ                                                                         |     |     |      |      |      |      |      |      |      |      |      |          |
| Tolerance on R <sub>n</sub>                      | ± 20 %                                                                                  |     |     |      |      |      |      |      |      |      |      |      |          |
| Output smoothness                                | ≤ 0.1 % (≤ 0.05 % on request)                                                           |     |     |      |      |      |      |      |      |      |      |      |          |
| Power rating at 70 °C                            | 1.25 W (see "Power Rating Chart")                                                       |     |     |      |      |      |      |      |      |      |      |      |          |
| Temperature coefficient                          | -300 ± 300 ppm/°C                                                                       |     |     |      |      |      |      |      |      |      |      |      |          |
| Wiper current                                    | ≤ 1 mA                                                                                  |     |     |      |      |      |      |      |      |      |      |      |          |
| Recommended load impedance                       | ≥ 100 R <sub>n</sub> for linearity = 1 %<br>≥ 1000 R <sub>n</sub> for linearity ≤ 0.1 % |     |     |      |      |      |      |      |      |      |      |      |          |
| Insulation resistance                            | ≥ 1 GΩ at 500 V <sub>DC</sub> (≥ 10 GΩ at 500 V <sub>DC</sub> on request)               |     |     |      |      |      |      |      |      |      |      |      |          |
| Dielectric strength                              | 750 V <sub>RMS</sub> , 50 Hz, 1 min                                                     |     |     |      |      |      |      |      |      |      |      |      |          |

## MECHANICAL SPECIFICATIONS

| PARAMETER                   |                                                                                       |
|-----------------------------|---------------------------------------------------------------------------------------|
| Mechanical rotation         | 360° continuous                                                                       |
| Moment of inertia           | ≤ 0.4 g cm <sup>2</sup> (for 1 stage), ≤ 0.2 g cm <sup>2</sup> (per additional stage) |
| Mounting                    | Standard                                                                              |
| Running and starting torque | ≤ 12 cN cm (for 1 stage), ≤ 10 cN cm (per additional stage)                           |
| Protection class            | IP 50                                                                                 |
| Weight                      | < 18 g (for 1 stage), < 6 g (per additional stage)                                    |

## PERFORMANCE

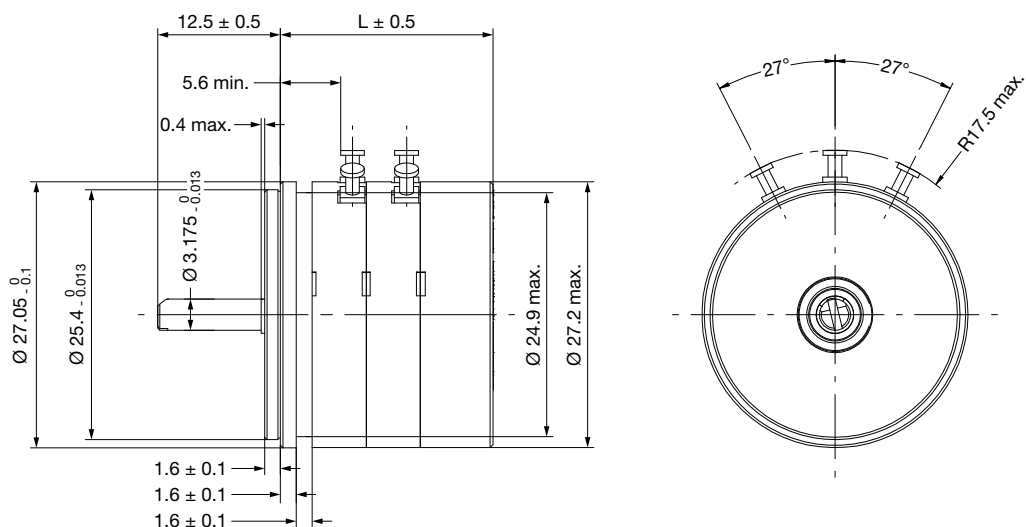
| PARAMETER                   |                   |
|-----------------------------|-------------------|
| Operating temperature range | -55 °C to +125 °C |
| Life                        | 25M cycles        |
| Rotation speed (max.)       | 600 rpm           |

### Note

- Nothing stated herein shall be construed as a guarantee of quality or durability.

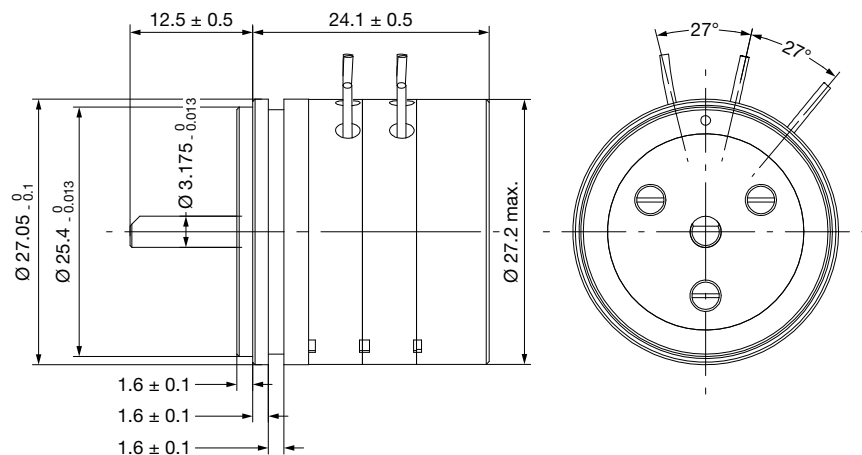
**SAP PART NUMBERING GUIDELINES**

| MODEL | SIZE (mm) | GANG | VALUE     | LINEARITY                                       | ANGLE | PACKAGING |
|-------|-----------|------|-----------|-------------------------------------------------|-------|-----------|
| POPR  | 27        | 1    | 472 = 4K7 | A = 1 %<br>B = 0.5 %<br>C = 0.25 %<br>D = 0.1 % | 345   | B = box   |
|       |           | 2    | 103 = 10K |                                                 |       |           |
|       |           | 3    |           |                                                 |       |           |
|       |           | 4    |           |                                                 |       |           |
|       |           | 5    |           |                                                 |       |           |
|       |           | 6    |           |                                                 |       |           |

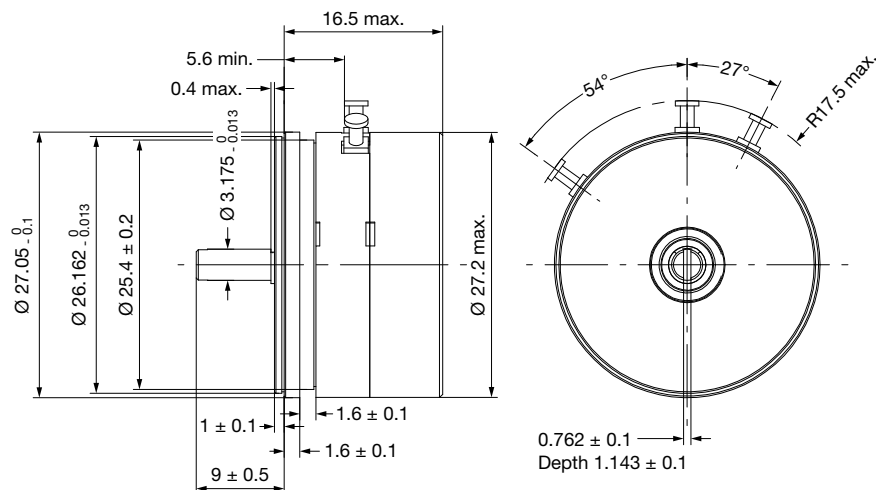
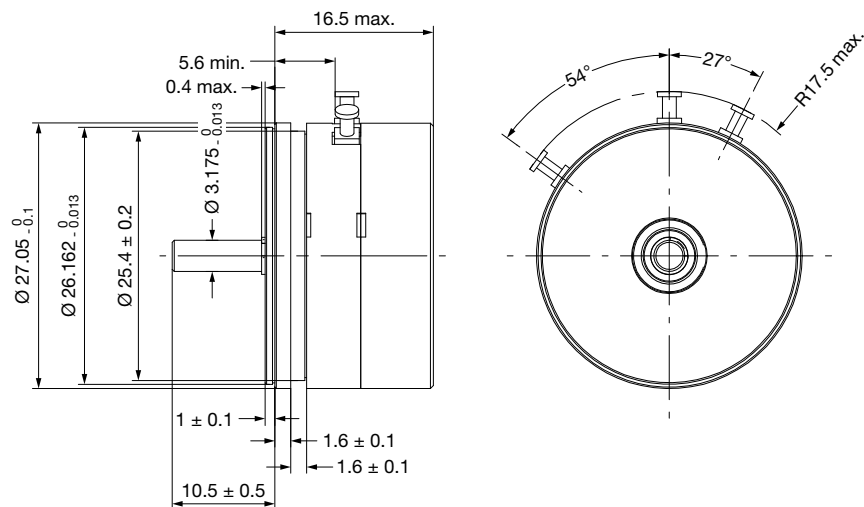
**DIMENSIONS** in millimeters


|                |    |      |    |      |    |      |
|----------------|----|------|----|------|----|------|
| Number of cups | 1  | 2    | 3  | 4    | 5  | 6    |
| L              | 16 | 21.5 | 27 | 32.5 | 38 | 43.5 |

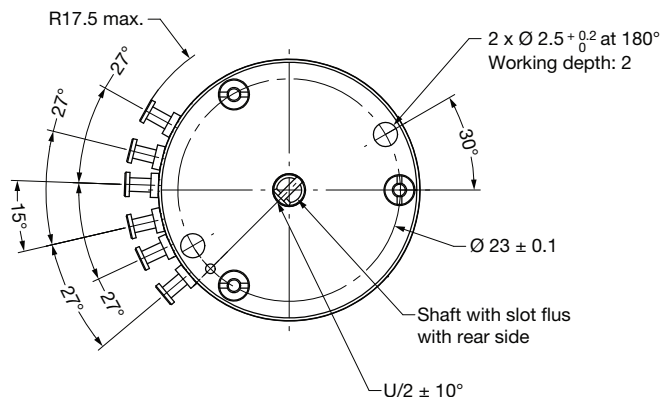
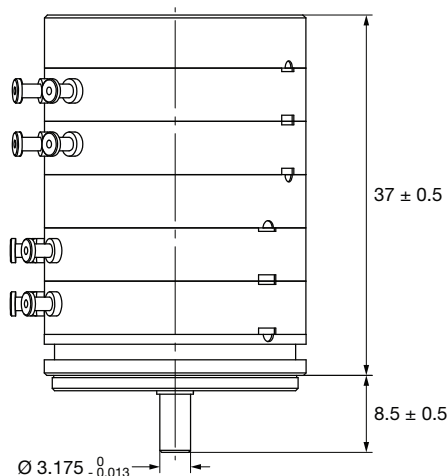
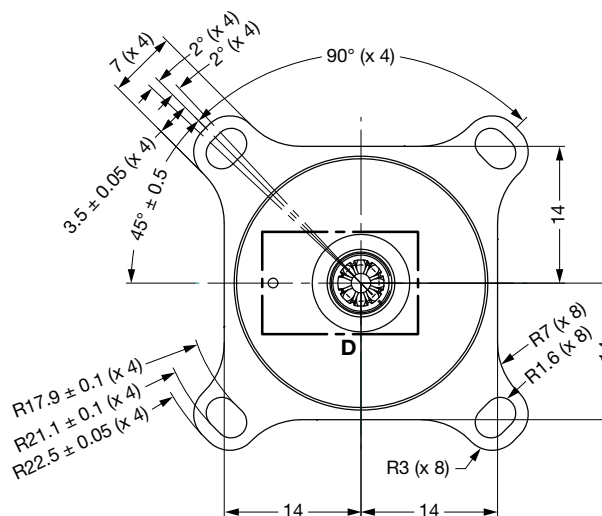
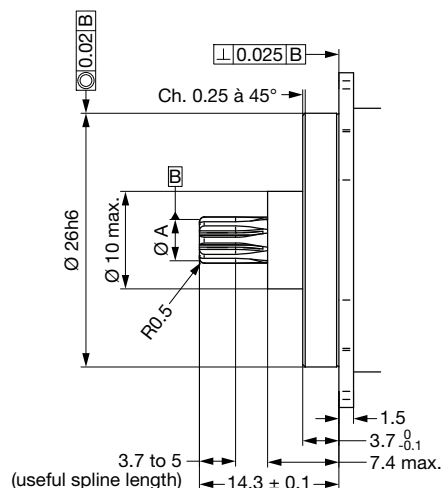
**DESIGNS ON REQUEST**
**DIMENSIONS** in millimeters

**OPTION 1**


**DIMENSIONS** in millimeters

**OPTION 2**

**OPTION 3**


**DIMENSIONS** in millimeters

**OPTION 4: 4 CUPS WITH INTERMEDIATE HOUSING**

**OPTION 5: FLANGE 4 EARS AND SHAFT OF COUPLING (EXAMPLE OF CUSTOMIZATION, OTHER VARIANTS ALSO FEASIBLE)**

**External involute spline data per ANSI B92.1A**

Fillet root side fit table 38

Number of teeth: 8 (-1)

Spline pitch: 48/96

Pressure angle: 30°

Base diameter: 3.6661852

Pitch diameter (A): 4.23333

Major diameter: 4.7244 / 4.7752

Form diameter: 3.81

Minor diameter: 2.921 min.

Circular tooth thickness

Maximum effective: 0.8910

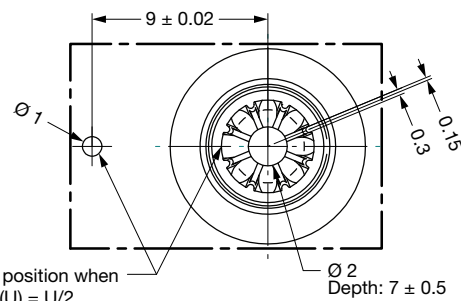
Minimum actual: 0.8525

Maximum actual: 0.8694

Minimum measurements over pins: 5.79374 / 5.8166

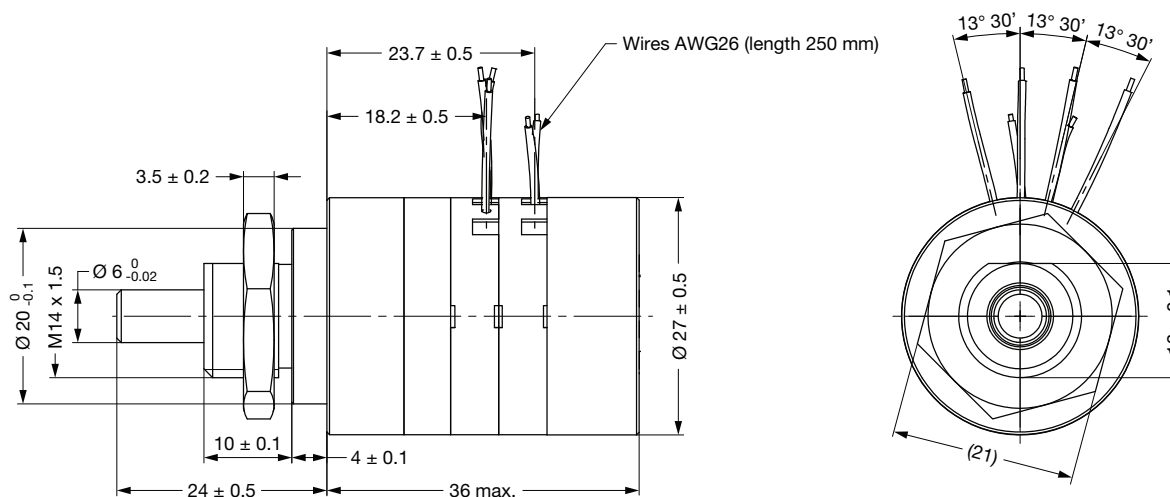
Pin diameter: 1.016 (ref.)

Fillet radius minimum: 0.1778

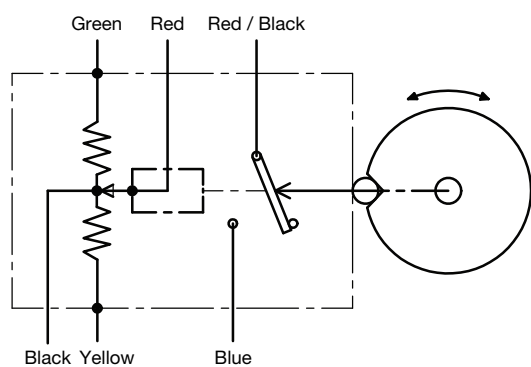
**Detail D**


**DIMENSIONS** in millimeters

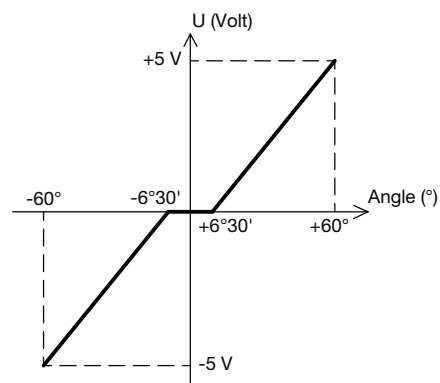
### OPTION 6: DOUBLE FUNCTIONS (POTENTIOMETER FUNCTION AND SWITCH) WITH RETURN SPRING



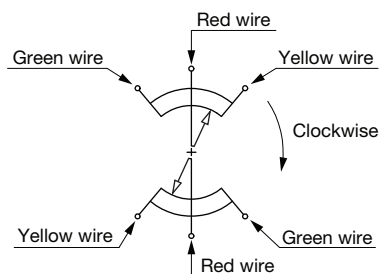
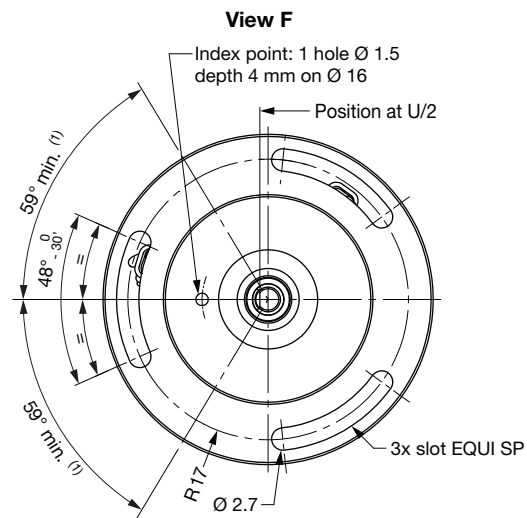
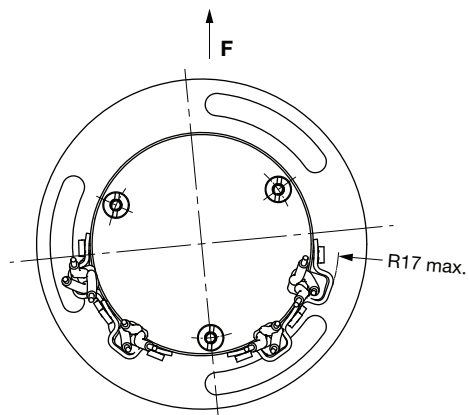
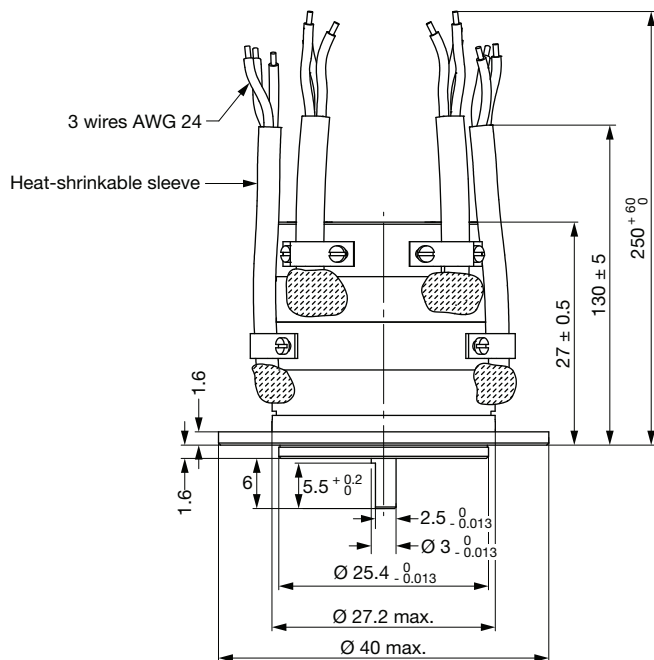
### Schematic Diagram



### Electrical Function

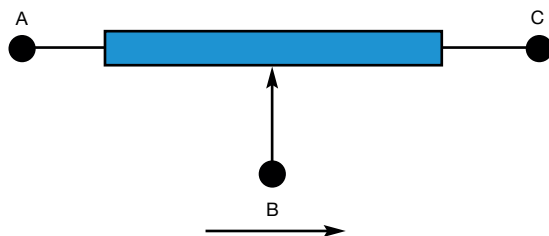


**DIMENSIONS** in millimeters

**OPTION 7: 4 FUNCTIONS (INCLUDING 2 FUNCTIONS/CUP AND FLANGE ALLOWING AN EASY ASSEMBLY ON CUSTOMER DEVICE)**

**Note**

(1) Angle before mechanical stop

## ELECTRICAL DIAGRAM

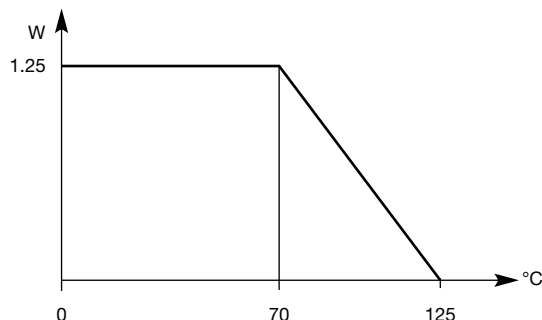


Clockwise direction viewed from control shaft side

## OPTIONS (on request)

- Other ohmic value: 1.5 k $\Omega$ ; 2 k $\Omega$ ; 5 k $\Omega$ ; 50 k $\Omega$
- Other tolerances on  $R_n$ :  $\pm 10\%$
- Other linearities:  $\pm 0.065\%$
- Other theoretical electrical travel
- Connectors (center tap)
- Through shaft
- Insulating resistance:  $\geq 10\text{ G}\Omega$  at 500 V<sub>DC</sub>
- Shaft: without flat surface (without D shape), other specific design feasible (e.g. lamella design)
- Total length (old model with one gang):  
14 mm in place of 16 mm

## POWER RATING CHART



- Type of wiper: 5 strands or 2 or 3 lamellas
- Protection class: IP 65 (front flange)
- Electrical reference:  $0.5 U \pm 0.1\% U$
- Electrical phasing between cups:  $\pm 0.1\%$  or  $0.03\%$  at  $U/2$
- Mechanical reference:  $U/2$  printing flange / shaft at  $\pm 10^\circ$  (by printing or machined hole on the flange)
- Intensity accidental = 5 mA
- Function: sine and / or cosine with accuracy  $\pm 1\%$
- Flange: with ears in place of synchro mechanical fixation



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