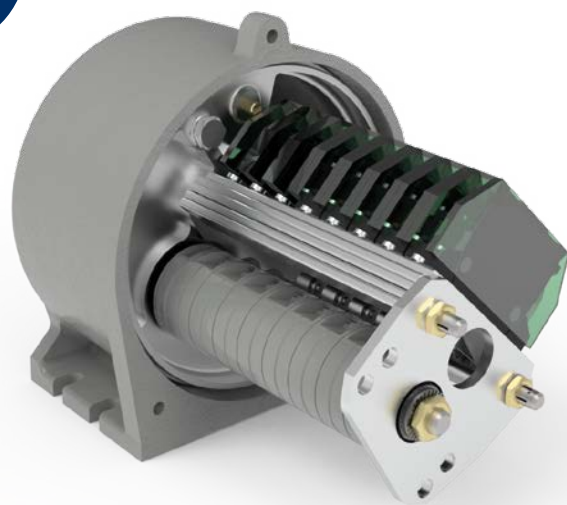




## SERIES 100 / 110

GEARED CAM LIMIT SWITCHES



# Stromag

Founded in 1932, Stromag has grown to become a globally recognized leader in the development and manufacture of innovative power transmission components for industrial drivetrain applications. Stromag engineers utilize the latest design technologies and materials to provide creative, energy-efficient solutions that meet their customer's most challenging requirements.

Stromag's extensive product range includes flexible couplings, disc brakes, limit switches, an array of hydraulically, pneumatically, and electrically actuated brakes, and a complete line of electric, hydraulic and pneumatic clutches.

Stromag engineered solutions improve drivetrain performance in a variety of key markets including energy, off-highway, metals, marine, transportation, printing, textiles, and material handling on applications such as wind turbines, conveyor systems, rolling mills, agriculture and construction machinery, municipal vehicles, forklifts, cranes, presses, deck winches, diesel engines, gensets and stage machinery.



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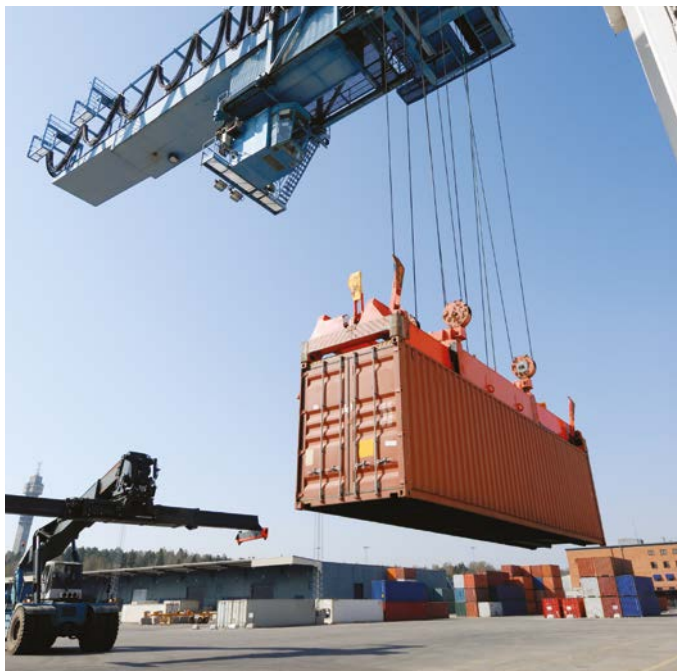
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# Stromag Geared Cam Limit Switches

## AT A GLANCE



## STROMAG SERIES 100/110

### BENEFITS INCLUDE

- Heavy duty housings for rough environments
- Execution for up to 120°C possible
- For nuclear application (on request) too

## Series 100 / 110 – Basic Design

Revision number: 3.1.3.1-01

Revision date: 19.11.2019

### Features

- Geared Cam Limit Switch in metal or synthetic housing with IP65 and IP66 protective ratings
- High variants of gears available

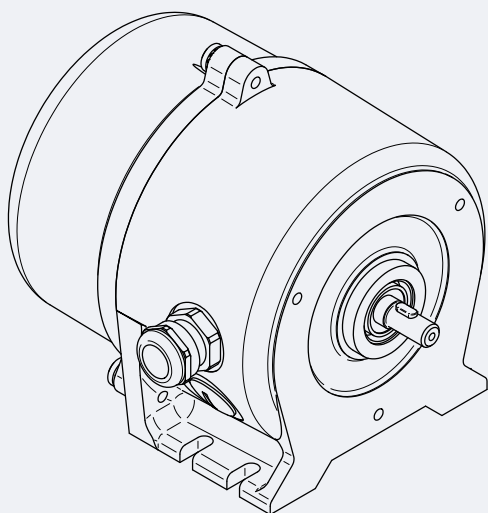
### Application

- Cranes on- and offshore
- Steel works
- Generally for rough environments

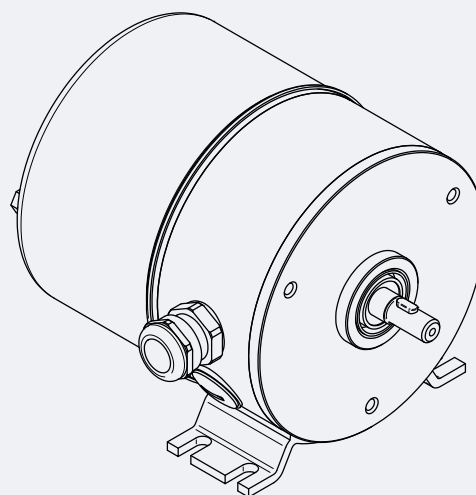
### Additional information

- Available as geared, lever or counterweight execution
- -40°/-30°C up to +85°C depending on built in switching contacts

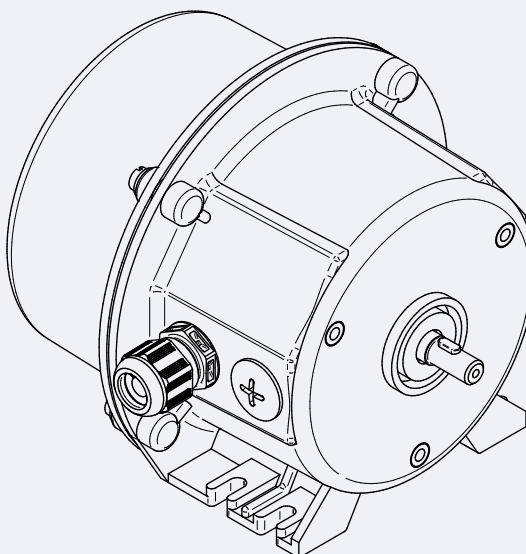
Cast iron housing IP66



Steel sheet housing IP65



Polycarbonate housing IP66



# Stromag Geared Cam Limit Switches

## Limit Switch Control Current

## Series 100 / 110 – Gear Data

Revision number: 3.1.3.2-01

Revision date: 19.11.2019

### Features

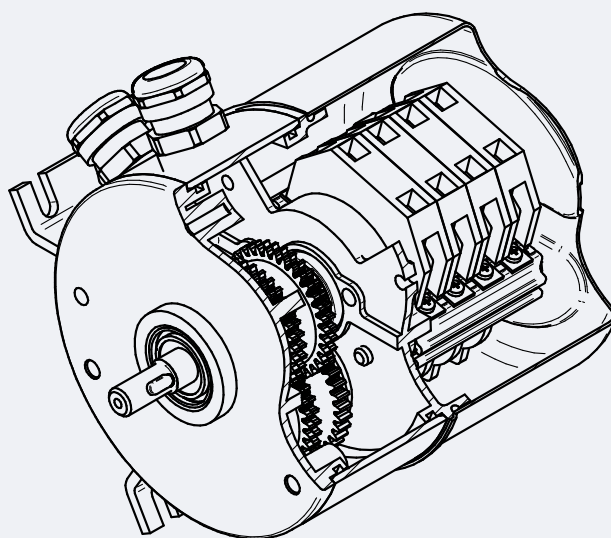
- Positive form locked connection gear in synthetic or metal execution
- High variants of gear ratios possible, 0,175 up to 17222 restricted by housing size

### Application

- Cranes on- and offshore

### Additional information

- Pre-tensioned gear wheels for less backlash possible



| Available Gear Size Series 110 Synthetics Housing |                                                                              |                                      |            |                                                       |                                                    |                 |                        |                                                  |          |         |         |                                                            |                                                                    |                     |  |
|---------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------|------------|-------------------------------------------------------|----------------------------------------------------|-----------------|------------------------|--------------------------------------------------|----------|---------|---------|------------------------------------------------------------|--------------------------------------------------------------------|---------------------|--|
| Available Gear Size Series 100 Cast Iron Housing  |                                                                              |                                      |            |                                                       |                                                    |                 |                        |                                                  |          |         |         |                                                            |                                                                    |                     |  |
| Available Gear Size Series 100 Sheet Housing      |                                                                              |                                      |            |                                                       |                                                    |                 |                        |                                                  |          |         |         |                                                            |                                                                    |                     |  |
| Size                                              | Gearbox - for contacts 51, 52, 53, 80, 81, 88, 90, 90G with cam discs 40° FV |                                      |            |                                                       |                                                    |                 |                        |                                                  |          |         |         |                                                            |                                                                    |                     |  |
|                                                   | Nominal revolutions                                                          | Usable revolutions with 40° cam disc | Gear ratio | Castor revolutions of the drive shaft after each side | Mechanical hysteresis [revolutions at drive shaft] |                 | Max. input speed [rpm] | Min. input speed for alternating operation [rpm] |          |         |         | Min. drive torque for Switching an individual contact [Nm] | Max. drive torque for forced opening of an individual contact [Nm] |                     |  |
|                                                   |                                                                              |                                      |            |                                                       | Contact                                            |                 |                        | Contact                                          |          |         |         |                                                            | Contact                                                            |                     |  |
|                                                   |                                                                              |                                      |            |                                                       | 51, 52                                             | 80, 88, 90, 90G |                        | 51, 52                                           | 90, 90G  | 88      | 80      |                                                            | 51, 52, 53                                                         | 80, 81, 88, 90, 90G |  |
| 1                                                 | 0,153                                                                        | 0,152                                | 0,175      | 0,022                                                 | 0,001                                              | 0,002           | 50                     | 0,001                                            | 0,037    | 0,007   | 0,074   | 1,5                                                        | 5,368                                                              | 9,881               |  |
|                                                   | 0,45                                                                         | 0,449                                | 0,514      | 0,066                                                 | 0,004                                              | 0,007           | 150                    | 0,004                                            | 0,109    | 0,022   | 0,218   | 0,5                                                        | 1,813                                                              | 3,344               |  |
|                                                   | 0,76                                                                         | 0,872                                | 1          | 0,128                                                 | 0,008                                              | 0,014           | 150                    | 0,007                                            | 0,212    | 0,042   | 0,424   | 0,2                                                        | 0,875                                                              | 1,663               |  |
|                                                   | 0,91                                                                         | 0,906                                | 1,039      | 0,133                                                 | 0,009                                              | 0,014           | 500                    | 0,007                                            | 0,22     | 0,044   | 0,441   | 0,2                                                        | 0,85                                                               | 1,608               |  |
|                                                   | 1,69                                                                         | 1,696                                | 1,944      | 0,248                                                 | 0,016                                              | 0,027           | 600                    | 0,014                                            | 0,413    | 0,083   | 0,825   | 0,2                                                        | 0,547                                                              | 0,952               |  |
|                                                   | 5                                                                            | 4,998                                | 5,73       | 0,732                                                 | 0,048                                              | 0,08            | 600                    | 0,041                                            | 1,216    | 0,243   | 2,432   | 0,2                                                        | 0,318                                                              | 0,455               |  |
|                                                   | 6,4                                                                          | 6,41                                 | 7,352      | 0,939                                                 | 0,061                                              | 0,102           | 600                    | 0,052                                            | 1,56     | 0,312   | 3,12    | 0,2                                                        | 0,292                                                              | 0,399               |  |
|                                                   | 8,3                                                                          | 8,28                                 | 9,496      | 1,213                                                 | 0,079                                              | 0,132           | 750                    | 0,067                                            | 2,015    | 0,403   | 4,03    | 0,2                                                        | 0,271                                                              | 0,354               |  |
|                                                   | 16                                                                           | 16                                   | 18,35      | 2,345                                                 | 0,152                                              | 0,255           | 750                    | 0,13                                             | 3,894    | 0,779   | 7,788   | 0,2                                                        | 0,237                                                              | 0,28                |  |
|                                                   | 24                                                                           | 24,24                                | 27,796     | 3,552                                                 | 0,231                                              | 0,386           | 1000                   | 0,197                                            | 5,898    | 1,18    | 11,797  | 0,2                                                        | 0,224                                                              | 0,253               |  |
| 2                                                 | 37                                                                           | 37,14                                | 42,586     | 5,442                                                 | 0,353                                              | 0,591           | 1000                   | 0,301                                            | 9,037    | 1,807   | 18,074  | 0,2                                                        | 0,216                                                              | 0,234               |  |
|                                                   | 51                                                                           | 51,25                                | 58,759     | 7,508                                                 | 0,487                                              | 0,816           | 1250                   | 0,416                                            | 12,469   | 2,494   | 24,938  | 0,2                                                        | 0,211                                                              | 0,225               |  |
|                                                   | 92                                                                           | 91,66                                | 105,092    | 13,428                                                | 0,872                                              | 1,46            | 1250                   | 0,743                                            | 22,301   | 4,46    | 44,602  | 0,2                                                        | 0,206                                                              | 0,214               |  |
|                                                   | 166                                                                          | 166,57                               | 190,974    | 24,402                                                | 1,584                                              | 2,652           | 1250                   | 1,351                                            | 40,526   | 8,105   | 81,052  | 0,2                                                        | 0,204                                                              | 0,208               |  |
| 3                                                 | 353                                                                          | 346,57                               | 397,338    | 50,771                                                | 3,296                                              | 5,519           | 1250                   | 2,811                                            | 84,318   | 16,864  | 168,635 | 0,2                                                        | 0,202                                                              | 0,204               |  |
|                                                   | 761                                                                          | 746,98                               | 856,411    | 109,43                                                | 7,103                                              | 11,895          | 1250                   | 6,058                                            | 181,736  | 36,347  | 363,472 | 0,2                                                        | 0,201                                                              | 0,202               |  |
| 4                                                 | 1335                                                                         | 1310,32                              | 1502,28    | 191,958                                               | 12,461                                             | 20,865          | 1500                   | 10,626                                           | 318,794  | 63,759  | 637,588 | 0,2                                                        | 0,2                                                                | 0,201               |  |
|                                                   | 1612                                                                         | 1581,84                              | 1813,576   | 231,735                                               | 15,043                                             | 25,189          | 1500                   | 12,828                                           | 384,853  | 76,971  | 769,706 | 0,2                                                        | 0,2                                                                | 0,201               |  |
|                                                   | 3414                                                                         | 3349,78                              | 3840,514   | 490,732                                               | 31,855                                             | 53,34           | 1500                   | 27,166                                           | 814,982  | 162,996 | -       | 0,2                                                        | 0,2                                                                | 0,2                 |  |
| 5                                                 | 5049                                                                         | 4954,15                              | 5679,917   | 725,767                                               | 47,112                                             | 78,888          | 1500                   | 40,177                                           | 1205,316 | 241,063 | -       | 0,2                                                        | 0,2                                                                | 0,2                 |  |
|                                                   | 7229                                                                         | 7093,66                              | 8132,854   | 1039,198                                              | 67,458                                             | 112,956         | 1500                   | 57,528                                           | -        | 345,169 | -       | 0,2                                                        | 0,2                                                                | 0,2                 |  |
|                                                   | 15309                                                                        | 15021,86                             | 17222,514  | 2200,654                                              | 142,851                                            | 239,202         | 1500                   | 121,824                                          | -        | 730,946 | -       | 0,2                                                        | 0,2                                                                | 0,2                 |  |

### Series 100 – Steel Sheet Housing B3

Revision number: 3.1.3.3-01

Revision date: 19.11.2019

#### Features

- IP65 sheet steel housing foot mounted version B3
- Different kinds of housing sizes possible depending on gear and number of contacts

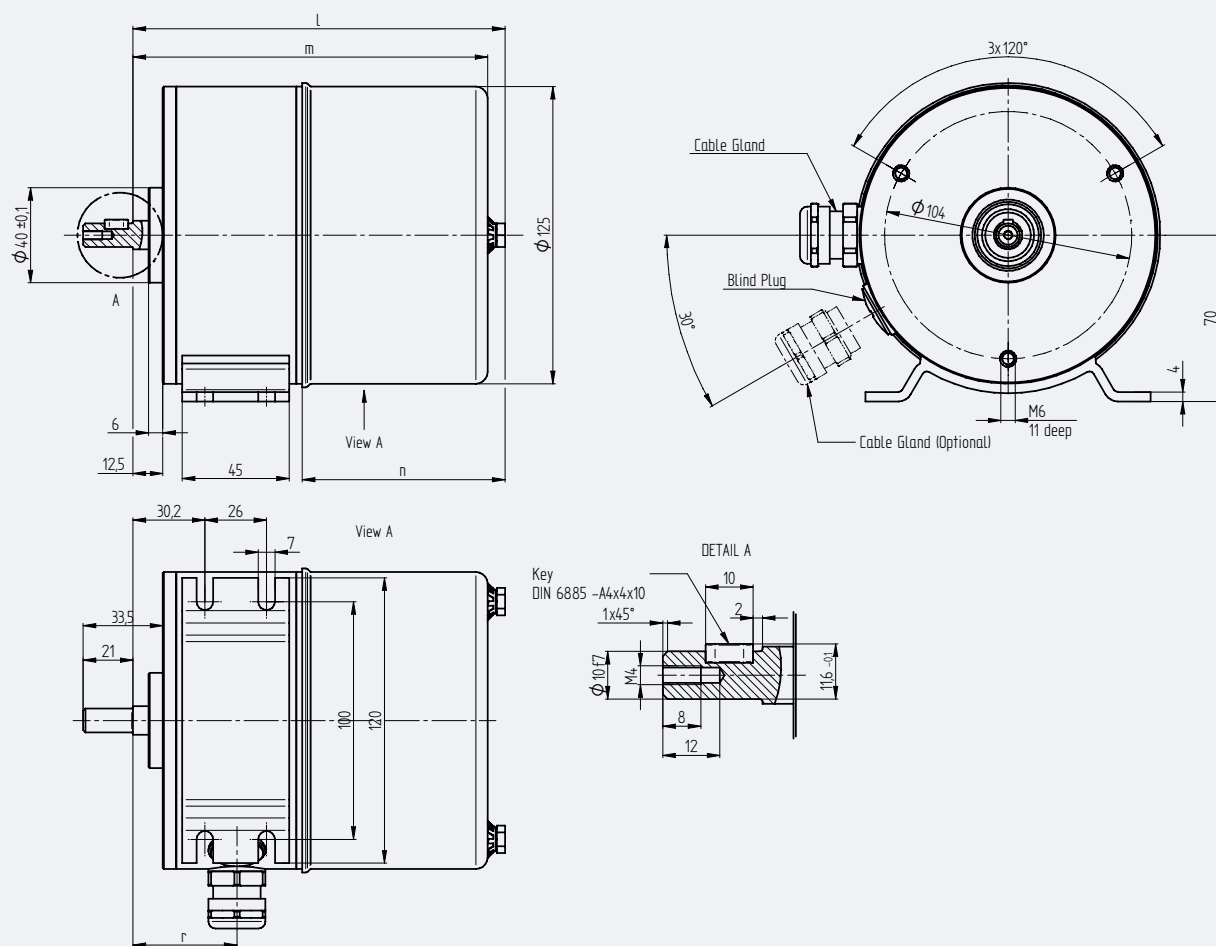
#### Application

- Crane on- and offshore

#### Additional information

- For rough environments
- Increased protection against corrosion through 2 component paint

Steel sheet housing B3



| Size | 1     | 1a    | 1b    | 1c    | 2     | 2a    | 2b    | 2c    | 3     | 3a    | 3b    | 3c    | 4     | 4a    | 4b    | 4c    | 5     | 5a    | 5b    | 5c    |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| l    | 157   | 213   | 279   | 305   | 171   | 227   | 293   | 319   | 185   | 241   | 307   | 333   | 199   | 255   | 321   | 347   | 213   | 269   | 335   | 361   |
| m    | 150   | 206   | 272   | 298   | 164   | 220   | 286   | 312   | 178   | 234   | 300   | 326   | 192   | 248   | 314   | 340   | 206   | 262   | 328   | 354   |
| n    | 85    | 141   | 208   | 233   | 85    | 141   | 208   | 233   | 85    | 141   | 208   | 233   | 85    | 141   | 208   | 233   | 85    | 141   | 208   | 233   |
| o    | 141,5 | 197,5 | 263,5 | 289,5 | 155,5 | 211,5 | 277,5 | 303,5 | 169,5 | 225,5 | 291,5 | 317,5 | 183,5 | 239,5 | 305,5 | 331,5 | 197,5 | 253,5 | 319,5 | 345,5 |
| p    | 148,5 | 204,5 | 270,5 | 296,5 | 162,5 | 218,5 | 284,5 | 310,5 | 176,5 | 232,5 | 298,5 | 324,5 | 190,5 | 246,5 | 312,5 | 338,5 | 204,5 | 260,5 | 326,5 | 352,5 |
| r    | 44    | 44    | 44    | 44    | 58    | 58    | 58    | 58    | 72    | 72    | 72    | 72    | 86    | 86    | 86    | 86    | 100   | 100   | 100   | 100   |
| kg   | 2     | 2,7   | 4     | 4,7   | 2,2   | 2,9   | 4,2   | 4,9   | 2,4   | 3,1   | 4,4   | 5,1   | 2,6   | 3,3   | 4,6   | 5,3   | 2,8   | 3,5   | 4,8   | 5,5   |

# Stromag Geared Cam Limit Switches

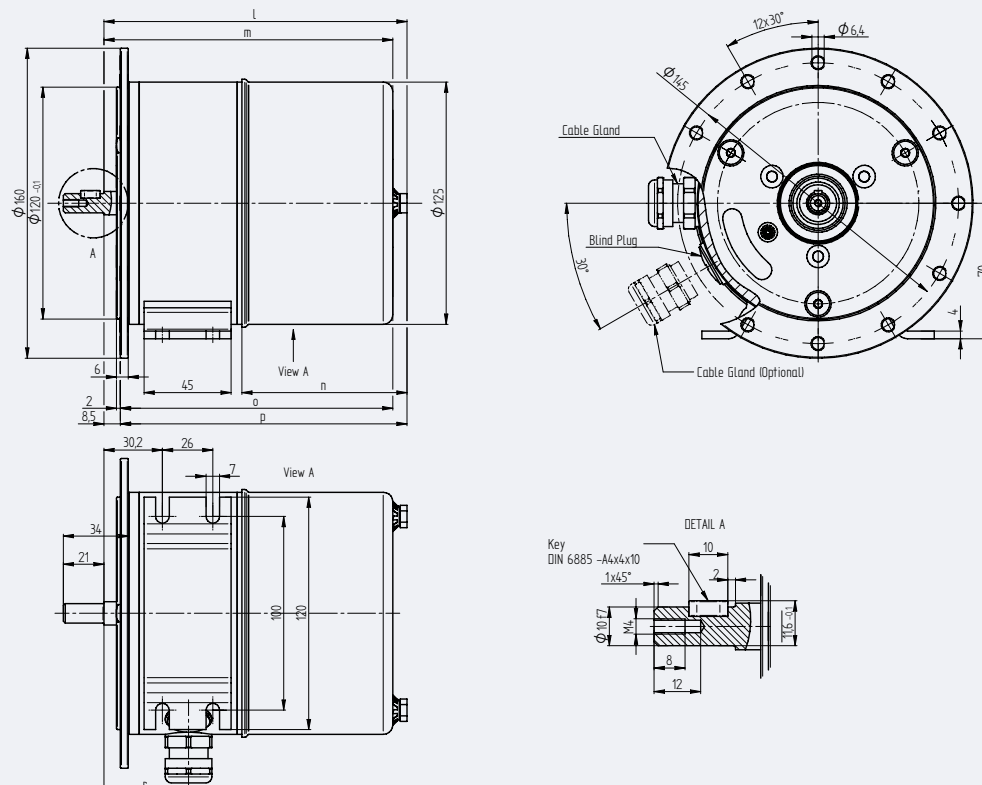
## Limit Switch Control Current

## Series 100 – Steel Sheet Housing B3 / B5

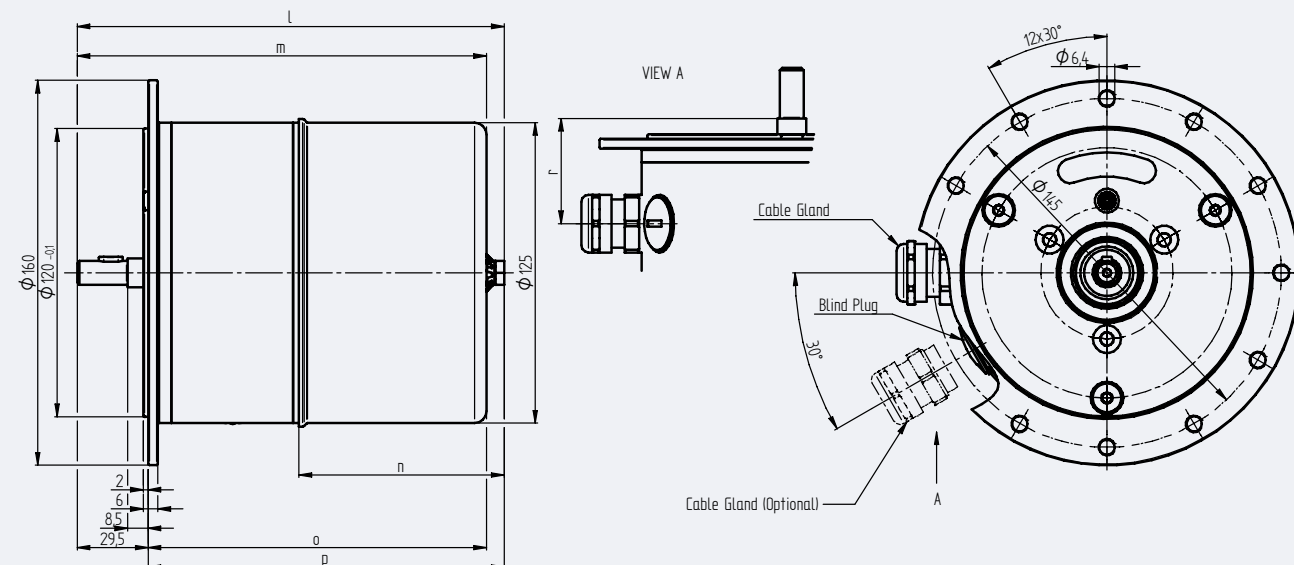
Revision number: 3.1.3.3-01

Revision date: 19.11.2019

Steel housing B3/B5



Steel housing B5



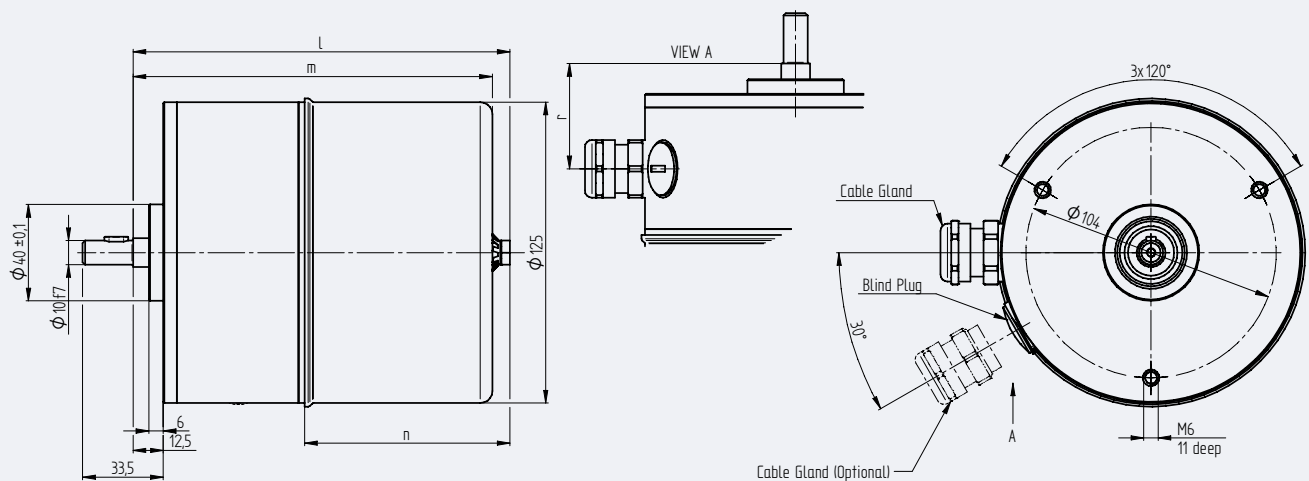


### Series 100 – Steel Sheet Housing B14

Revision number: 3.1.3.3-01

Revision date: 19.11.2019

Steel housing B14





## Stromag Geared Cam Limit Switches

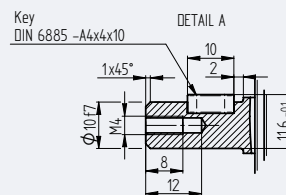
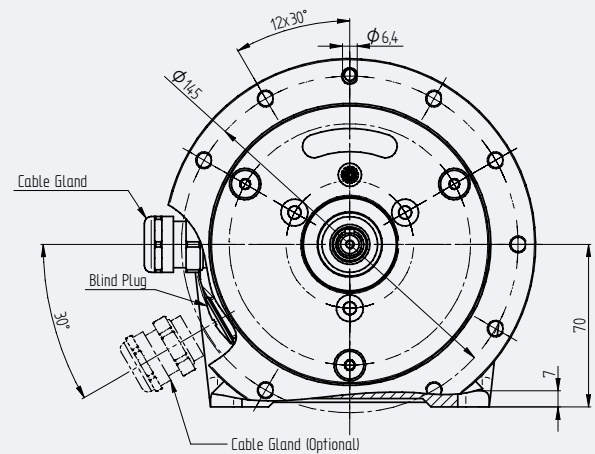
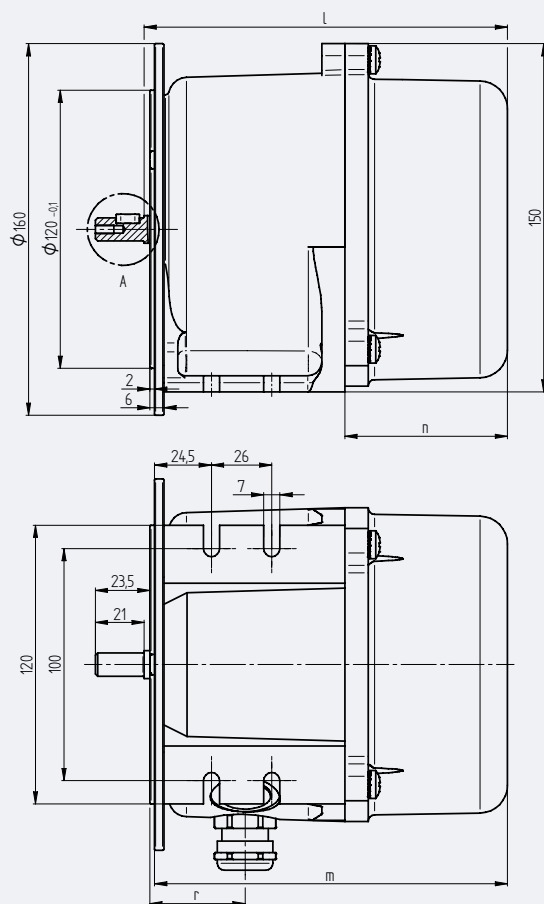
## Limit Switch Control Current

## Series 100 – Cast Iron Housing B3 / B5

Revision number: 3.1.3.4-01

**Revision date: 19.11.2019**

Cast iron housing B3/B5



# Stromag Geared Cam Limit Switches

## Limit Switch Control Current

### Series 110 – Polycarbonate Housing B3

Revision number: 3.1.3.5-01

Revision date: 19.11.2019

#### Features

- IP66 reinforced polycarbonate housing, foot mounted version B3
- Different kinds of sizes possible depending on number of contacts

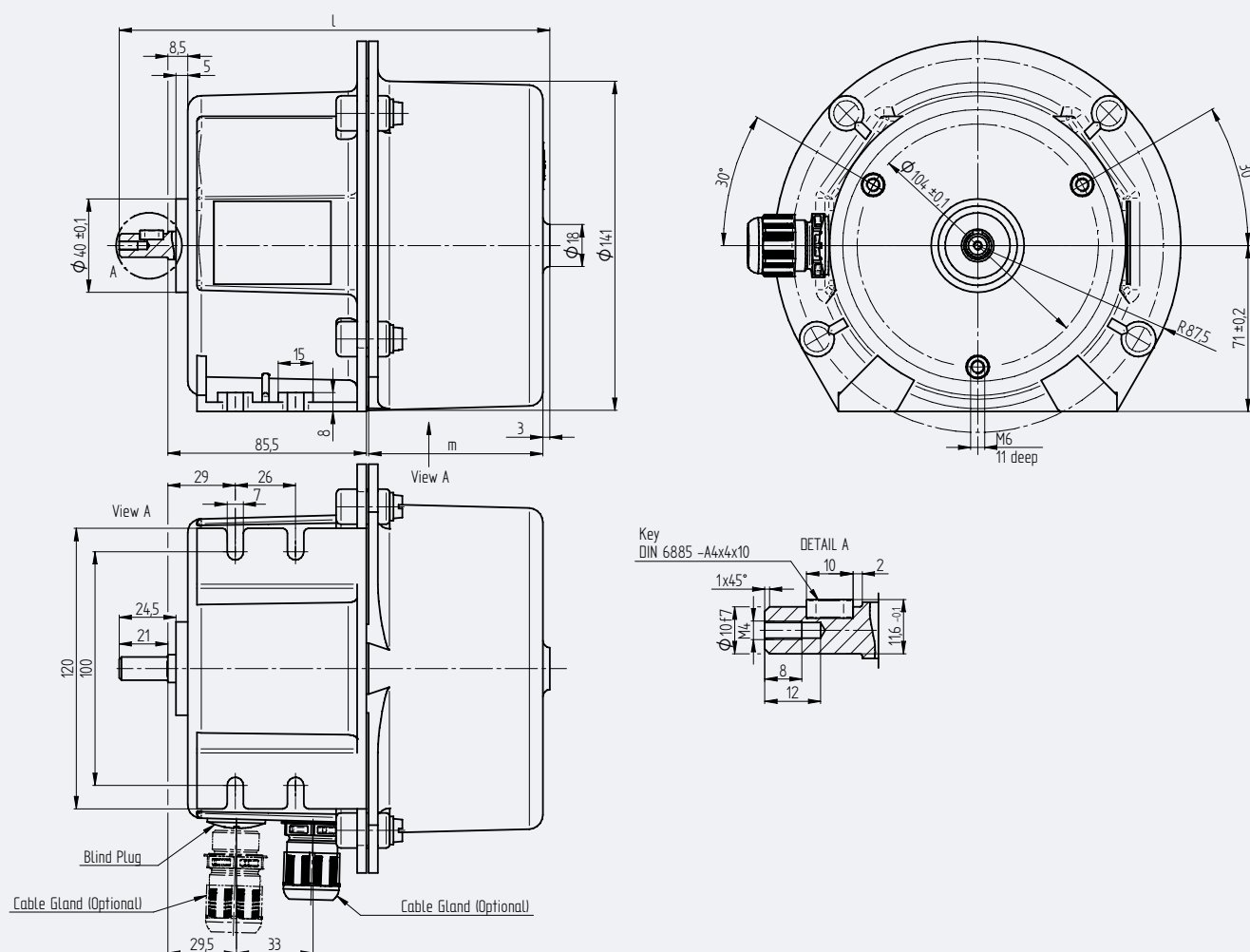
#### Application

- Crane on- and offshore
- Treatment plants

#### Additional information

- For rough environments
- High resistance against corrosion

Polycarbonate housing B3



| Size | a     | b     | c     |
|------|-------|-------|-------|
| l    | 185,5 | 250,5 | 310,5 |
| m    | 75    | 140   | 200   |
| n    | 160   | 225   | 285   |
| kg   | 1,6   | 2     | 2,4   |

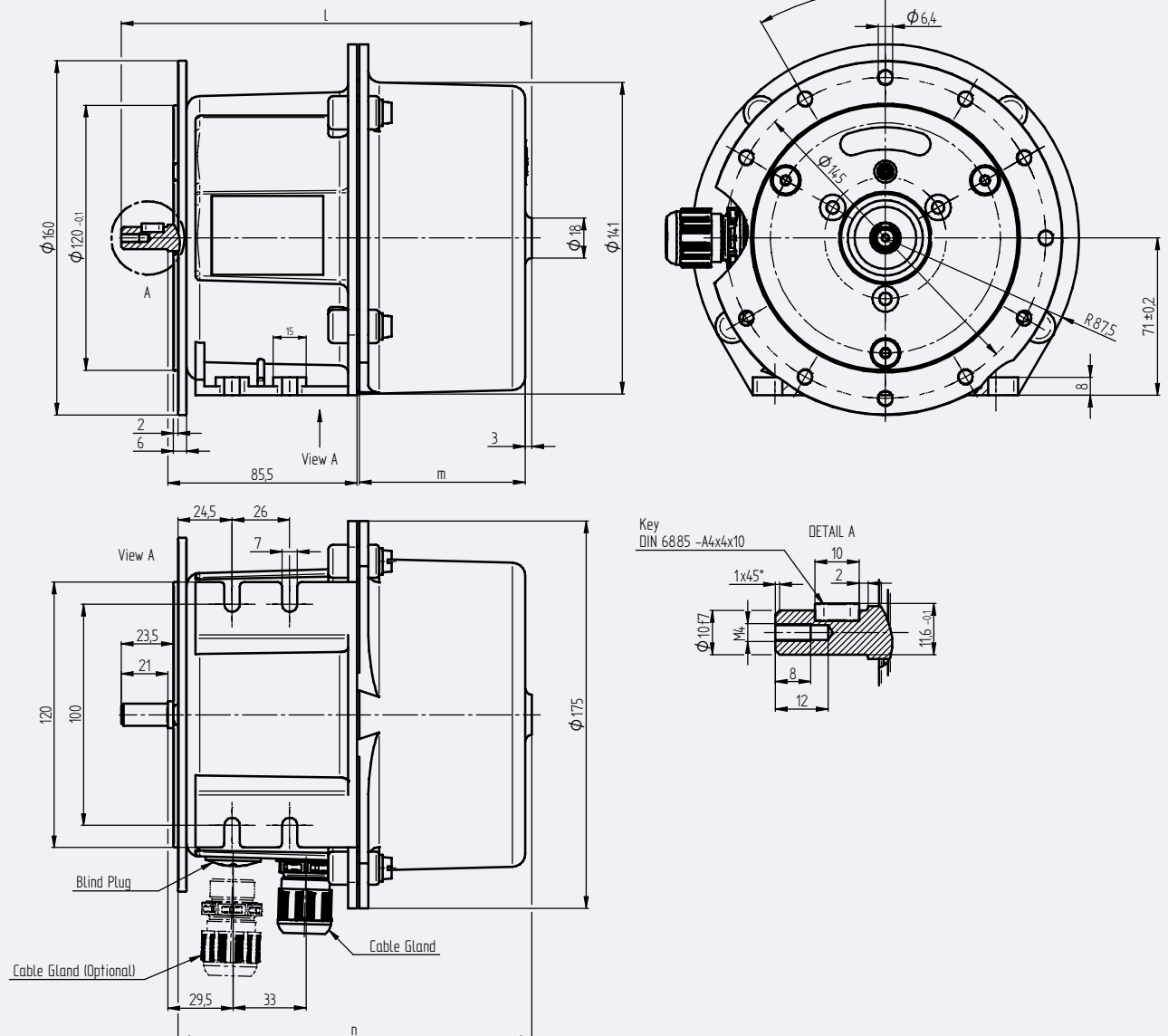


### Series 110 – Polycarbonate Housing B3 / B5

Revision number: 3.1.3.5-01

Revision date: 19.11.2019

Polycarbonate housing B3 / B5



# Stromag Geared Cam Limit Switches

## Limit Switch Control Current

### Series 100 – Lever Limit Switch

Revision number: 3.1.3.6-01

Revision date: 19.11.2019

#### Features

- Different type and number of contacts possible

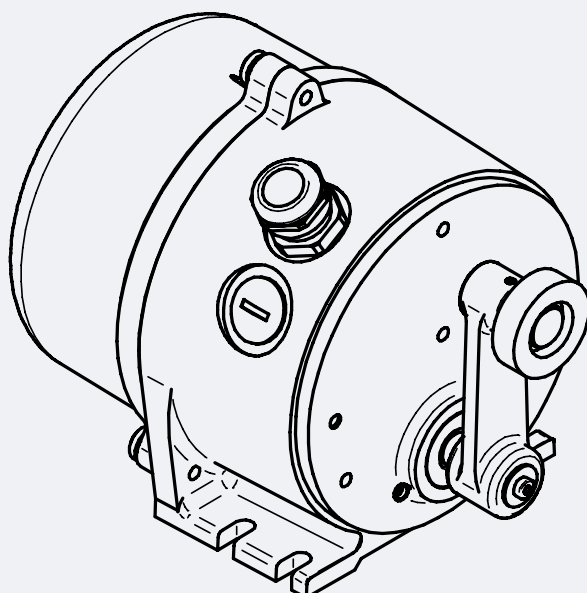
#### Application

- Cranes

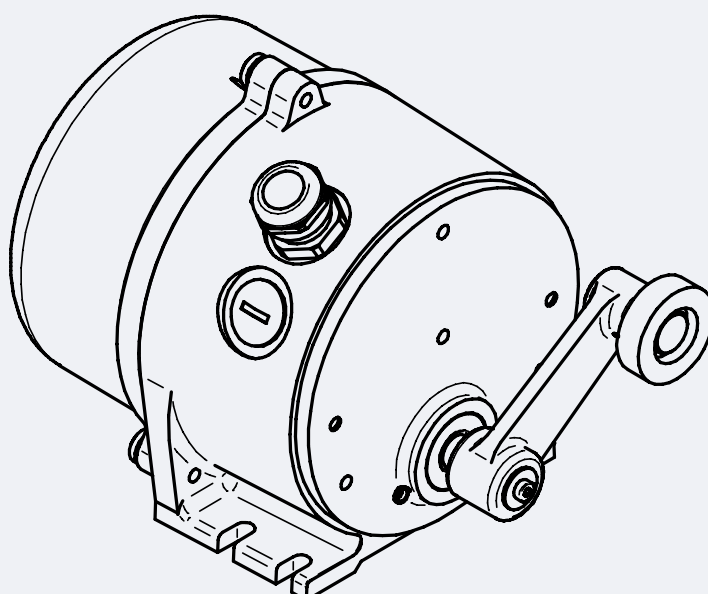
#### Additional information

- Actuation to both sides standard

Series 100 lever switch  
in neutral position



Series 100 lever switch  
in switched position



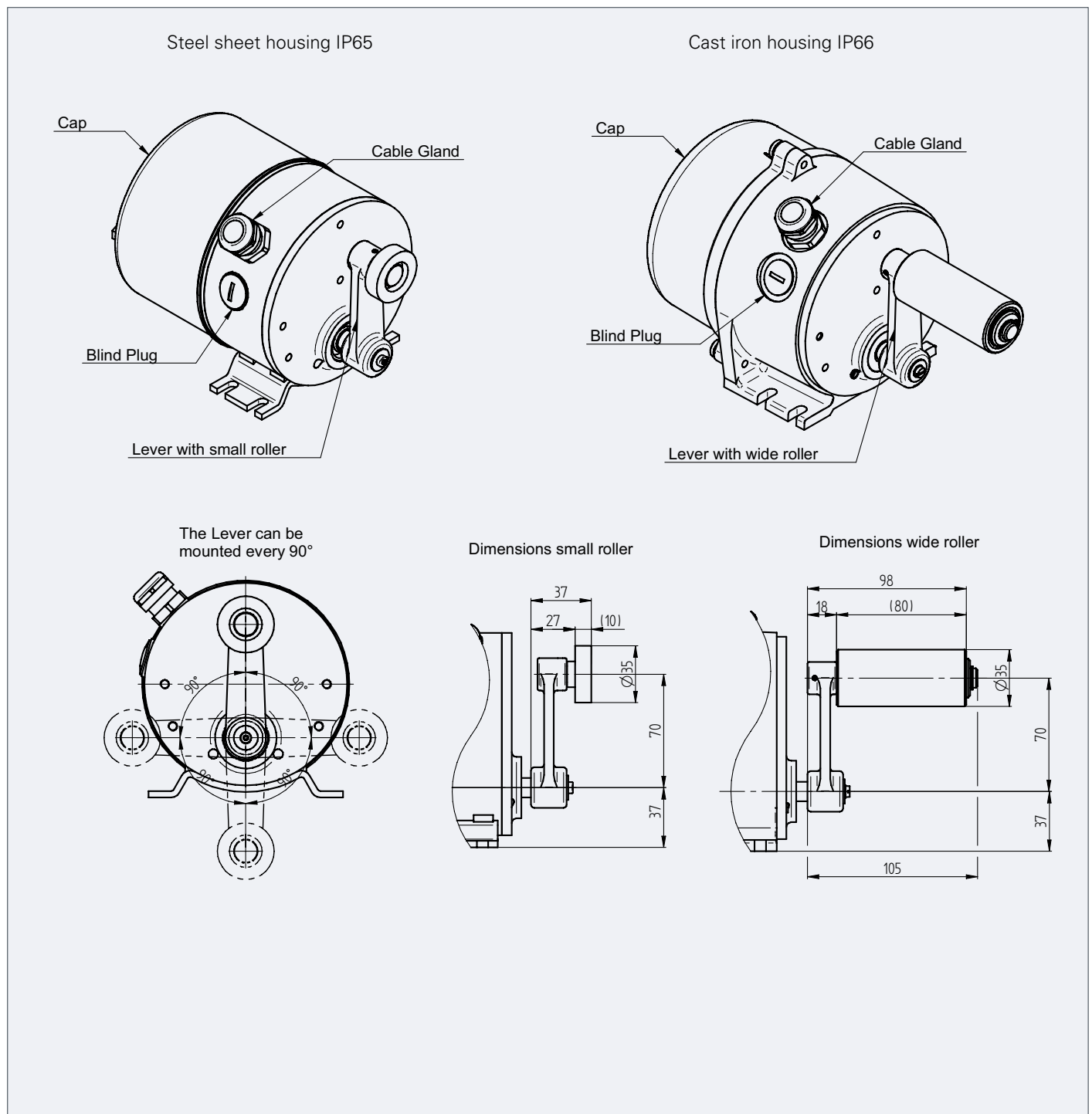
### Series 100 – Available Levers

Revision number: 3.1.3.7-01

Revision date: 19.11.2019

#### Features

- Execution with lever with roller or wide roller available

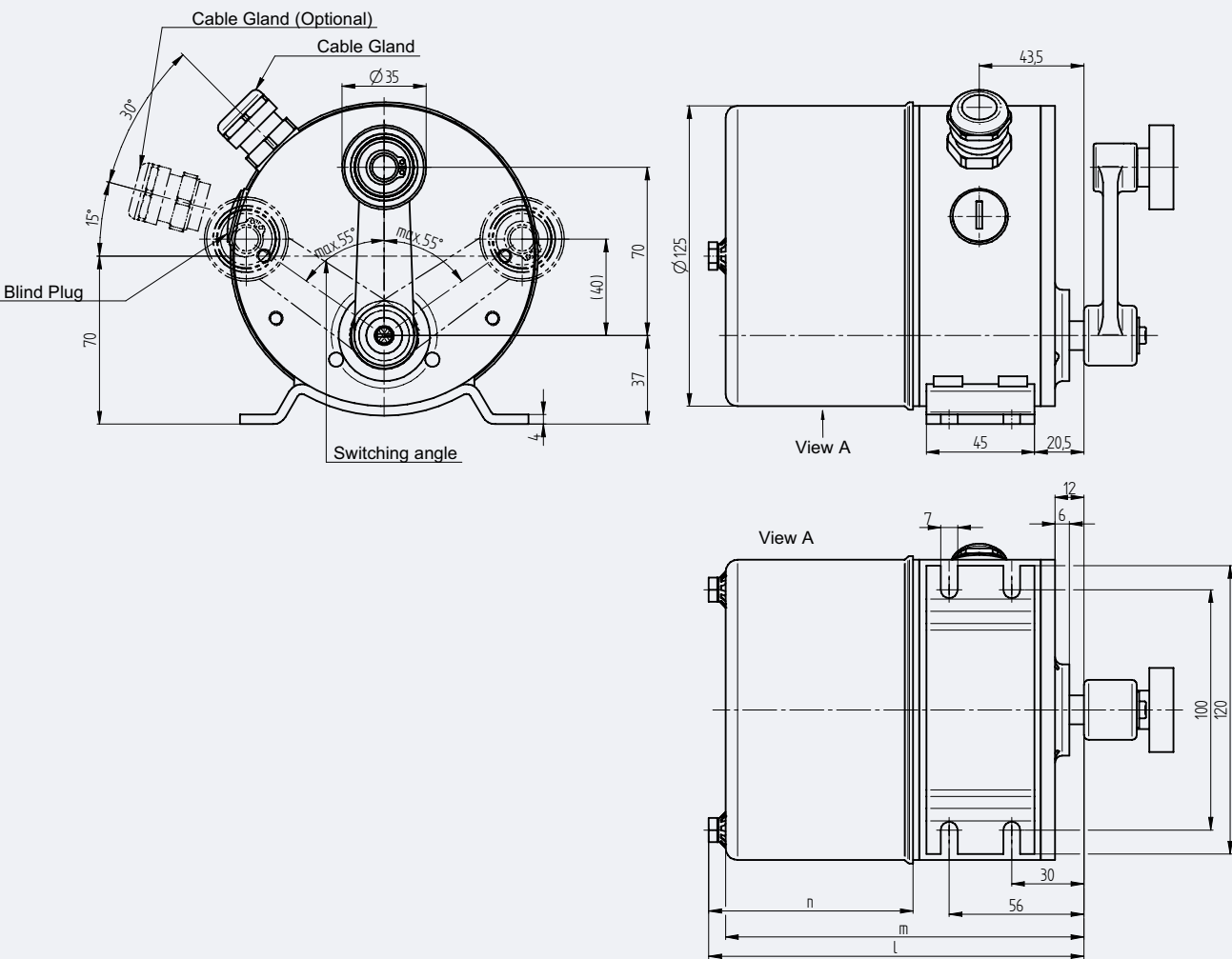


# Stromag Geared Cam Limit Switches

## Limit Switch Control Current

### Series 100 – Lever Limit Switch Steel Sheet Housing

Revision number: 3.1.3.8-01      Revision date: 19.11.2019

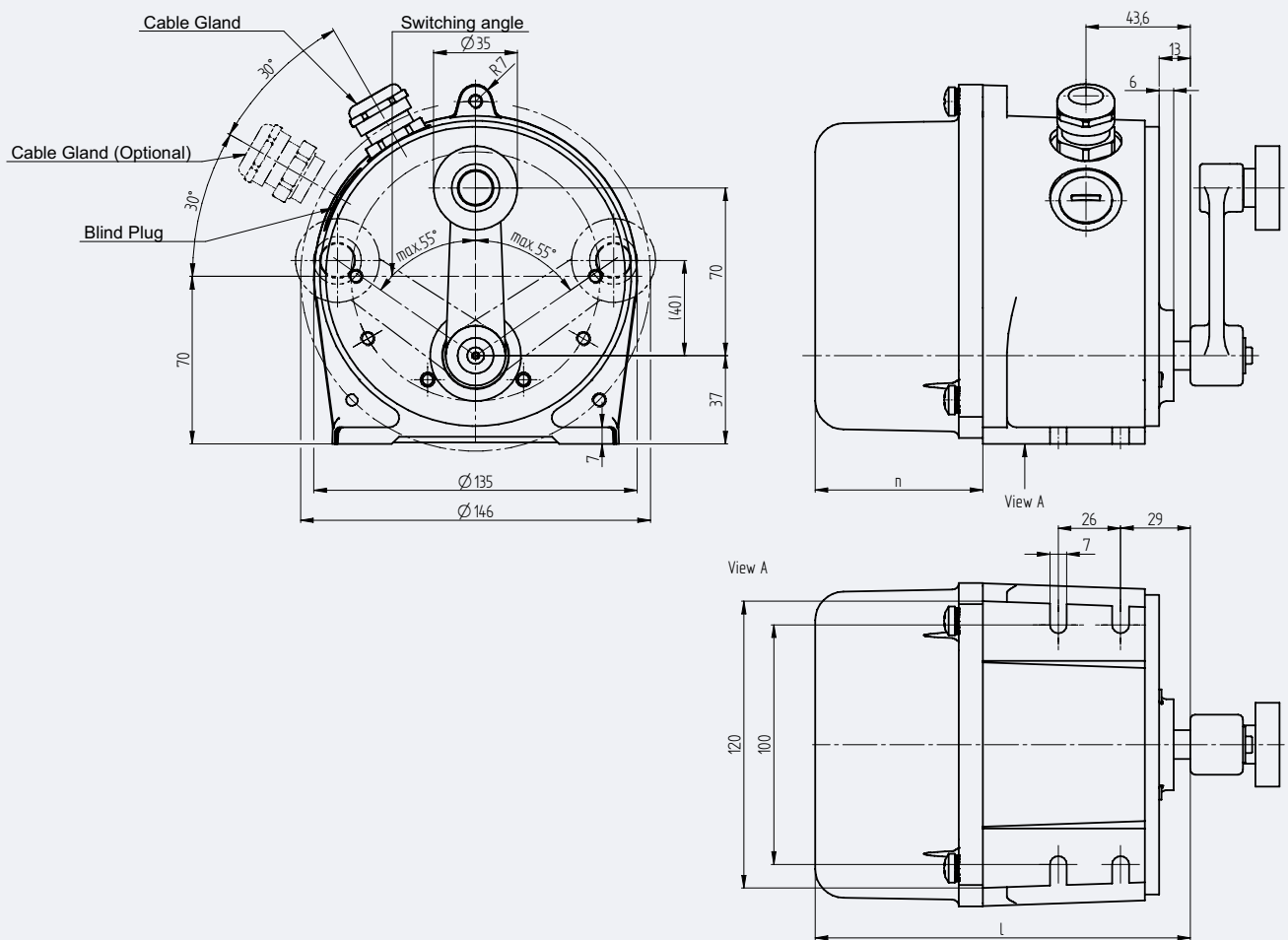


| Size                    | 1   | 1a  | 1b  | 1c  |
|-------------------------|-----|-----|-----|-----|
| l                       | 156 | 212 | 278 | 304 |
| m                       | 149 | 205 | 271 | 297 |
| n                       | 85  | 141 | 208 | 233 |
| Max. number of contacts | 4   | 8   | 12  | 14  |

### Series 100 – Lever Limit Switch Cast Iron Housing

Revision number: 3.1.3.9-01

Revision date: 19.11.2019



| Size                    | 1     | 1a    | 1b    | 1c    |
|-------------------------|-------|-------|-------|-------|
| l                       | 156,5 | 216,5 | 278   | 303   |
| n                       | 70    | 130   | 191,5 | 216,5 |
| Max. number of contacts | 4     | 8     | 12    | 14    |

# Stromag Geared Cam Limit Switches

## Limit Switch Control Current

### Series 100 – Counterweight Limit Switch

Revision number: 3.1.3.10-01

Revision date: 19.11.2019

#### Features

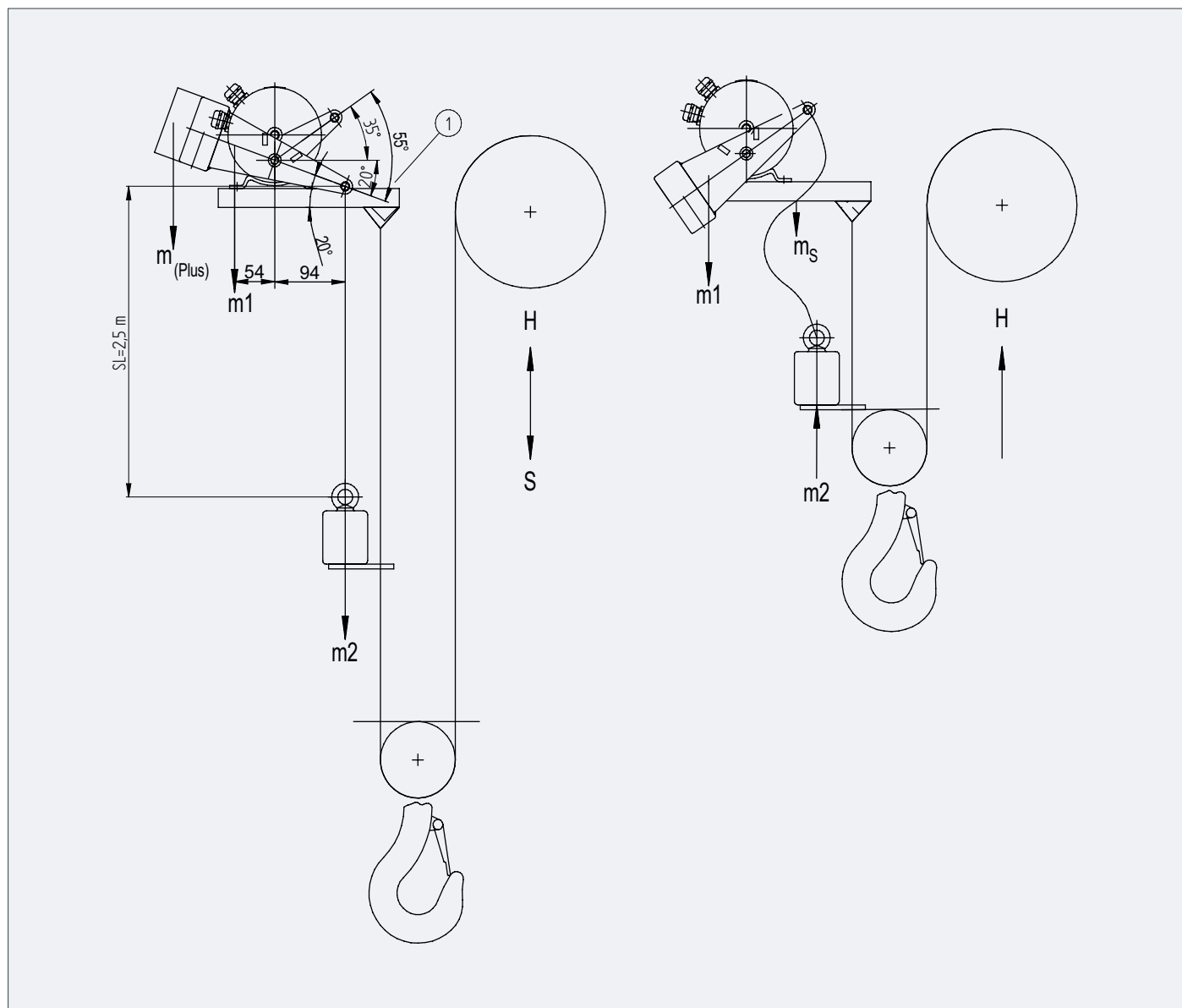
- Safety limit switch redundant additional to the geared cam limit switch for the emergency stop of the hook travel

#### Application

- Cranes onshore

#### Additional information

- Rope in different length available
- Rope reeving for different kind of rope diameter available



**A** Normal operation  
Techn. condition:  $m1 < m2$

**B** Emergency-stop shutdown  
Techn. condition:  $m1 > m_s$

**1** Switching angle

**2** Hoist rope (d = 6 mm)  
rope length according to the castor run of the drive

**H** Lift

**m1** Counterweight lever

**m2** Counterweight

**ms** Rope weight

**m<sub>(plus)</sub>** Additional weight

**S** Lower





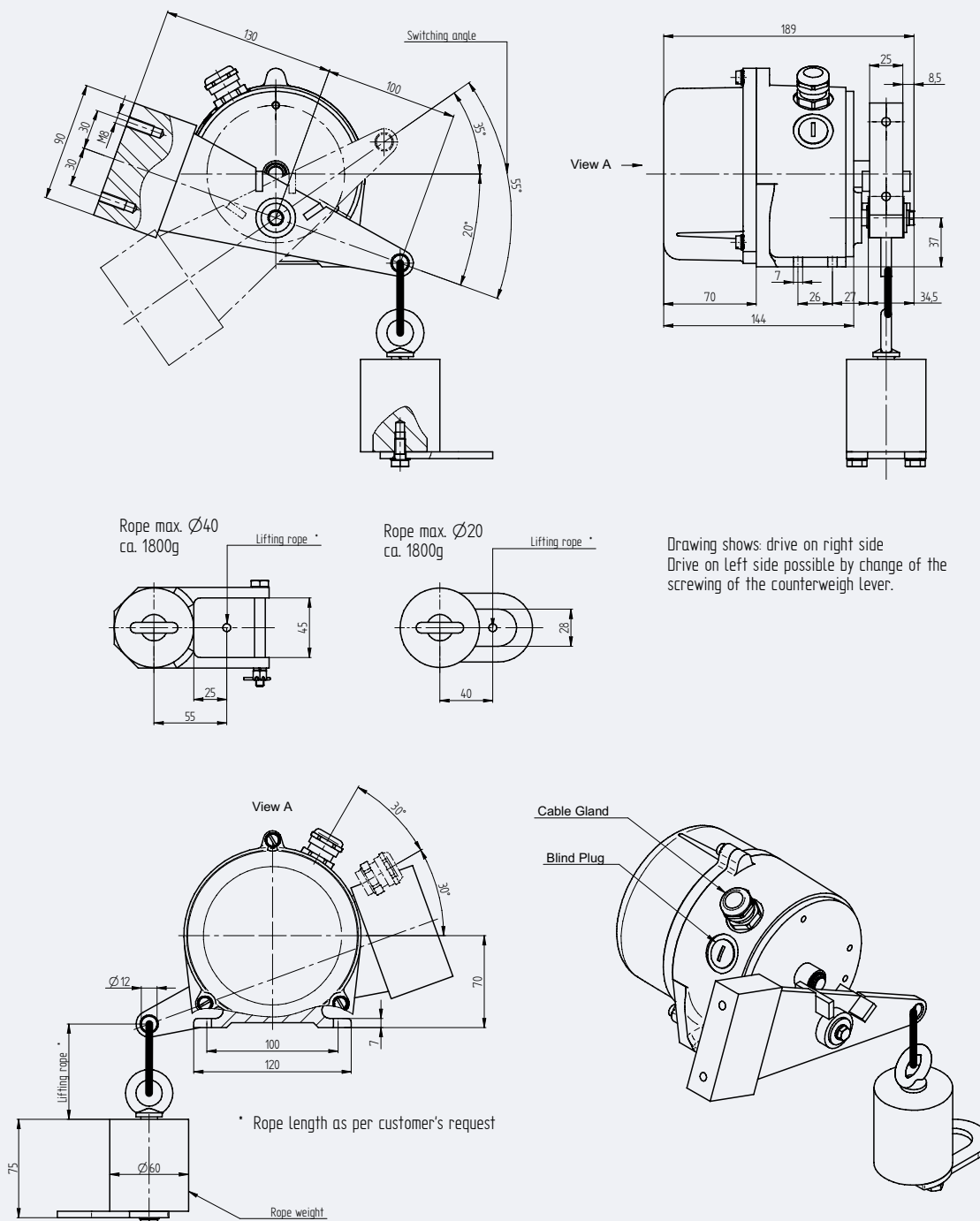
# Stromag Geared Cam Limit Switches

## Limit Switch Control Current

## Series 100 – Counterweight Limit Switch Iron Cast Housing

Revision number: 3.1.3.12-01

Revision date: 19.11.2019



# Stromag Geared Cam Limit Switches

## Limit Switch Control Current

### Series 100 / 110 – Available Switches

Revision number: 3.1.3.13-03

Revision date: 31.03.2022

#### Features

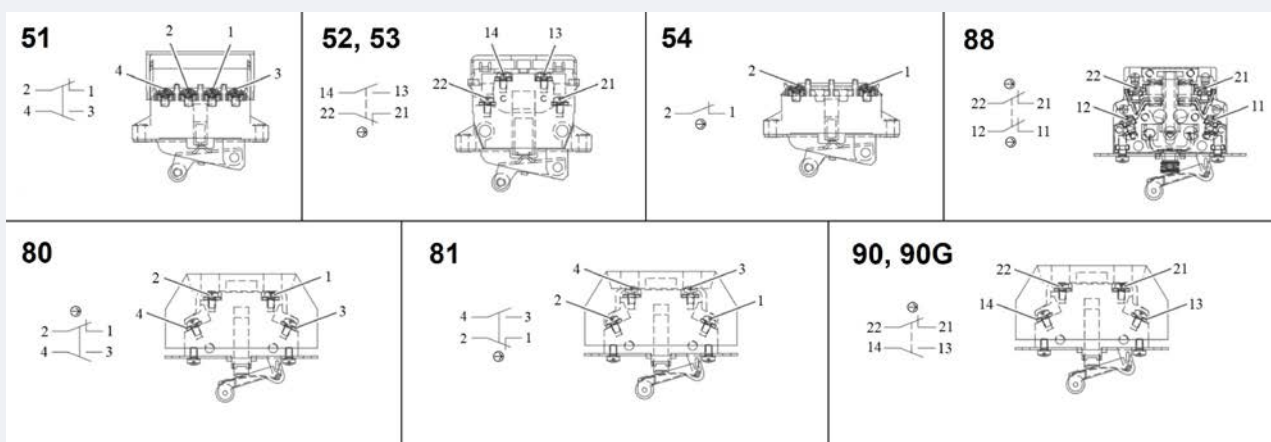
- Snap – and push action contacts available in silver and gold
- Isolated contact elements possible
- Positive opening contacts available

#### Application

- For relays or PLC

#### Additional information

- Contact 52 and 53 usable for radioactive environment
- Contact 51 and 54 for temperature up to +120° Celsius



| Switching contact |                         |                          | Contact material |                        | Switching system   |                    | Connection                                     | Electrical data                           |                                              |                                         |                          |                     | Additional data     |                                               |                       |
|-------------------|-------------------------|--------------------------|------------------|------------------------|--------------------|--------------------|------------------------------------------------|-------------------------------------------|----------------------------------------------|-----------------------------------------|--------------------------|---------------------|---------------------|-----------------------------------------------|-----------------------|
| Designation       | Circuit as a changeover | Circuit as an NC contact | Silver           | Gold (PLC-Application) | Snap action switch | Push action switch | Screw terminals; 0,75 - 2,5 mm²/ AWG 14 ... 20 | Utilization category acc. to IEC 60947    | Conventional thermal current I <sub>th</sub> | Rated Insulation Voltage U <sub>i</sub> | Short circuit protection | Degree of Pollution | Mechanical Lifetime | Positive opening acc. to EN 60947-5-1 Annex K | Operating Temperature |
| 51                | •                       |                          |                  | •                      | •                  |                    | •                                              | AC-15: 230V, 2,5A<br>DC-13: 24V, 4A       | 6A                                           | 250V                                    | 10A gL/gG                | PD 2                | 30x106              |                                               | -30°C ... +85°C *     |
| 52                | •                       |                          |                  | •                      | •                  |                    | •                                              | AC-15: 230V, 2,5A<br>DC-13: 24V, 6A       | 10A                                          | 250V                                    | 6A gL/gG                 | PD 3                | 1x106               | •                                             | -30°C ... +85°C       |
| 53                | •                       |                          |                  | •                      |                    | •                  | •                                              | AC-15: 230V, 2,5A<br>DC-13: 24V, 6A       | 10A                                          | 250V                                    | 6A gL/gG                 | PD 3                | 1x106               | •                                             | -30°C ... +85°C       |
| 54                |                         | •                        | •                |                        |                    | •                  | •                                              | AC-15: 230V, 2,5A<br>DC-13: 24V, 1A       | 6A                                           | 250V                                    | 10A gL/gG                | PD 2                | 30x106              | •                                             | -30°C ... +85°C *     |
| 80                | •                       |                          | •                |                        | •                  |                    | •                                              | AC-15: 230V, 3A<br>DC-13: 110V, 1A        | 10A                                          | 400V                                    | 6A gG                    | PD 3                | 10x106              | •                                             | -40°C ... +85°C       |
| 81                | •                       |                          | •                |                        |                    | •                  | •                                              | AC-15: 230V, 3A<br>DC-13: 110V, 1A        | 10A                                          | 400V                                    | 6A gG                    | PD 3                | 10x106              | •                                             | -40°C ... +85°C       |
| 90                | •                       |                          | •                |                        | •                  |                    | •                                              | AC-15: 230V, 1A<br>DC-13: 110V, 0,5A      | 10A                                          | 400V                                    | 6A gR                    | PD 3                | 10x106              | •                                             | -40°C ... +85°C       |
| 90G               | •                       |                          |                  | •                      | •                  |                    | •                                              | AC-12: 230V, 0,25A,<br>DC-12: 110V, 0,25A | 10A                                          | 400V                                    | 2A gG                    | PD 3                | 10x106              | •                                             | -40°C ... +85°C       |
| 88                |                         | •                        |                  | •                      | •                  |                    | •                                              | AC-15: 230V, 1,5A<br>DC-13: 24V, 1,5A     | 10A                                          | 400V                                    | 10A gG                   | PD 3                | 1,5x106             | •                                             | -40°C ... +85°C       |

• = applicable

\* Up to +120°C in combination with high temperature type

# Stromag Geared Cam Limit Switches

## Limit Switch Control Current

### Series 100 / 110 – Cam Disc Types

Revision number: 3.1.3.14-01

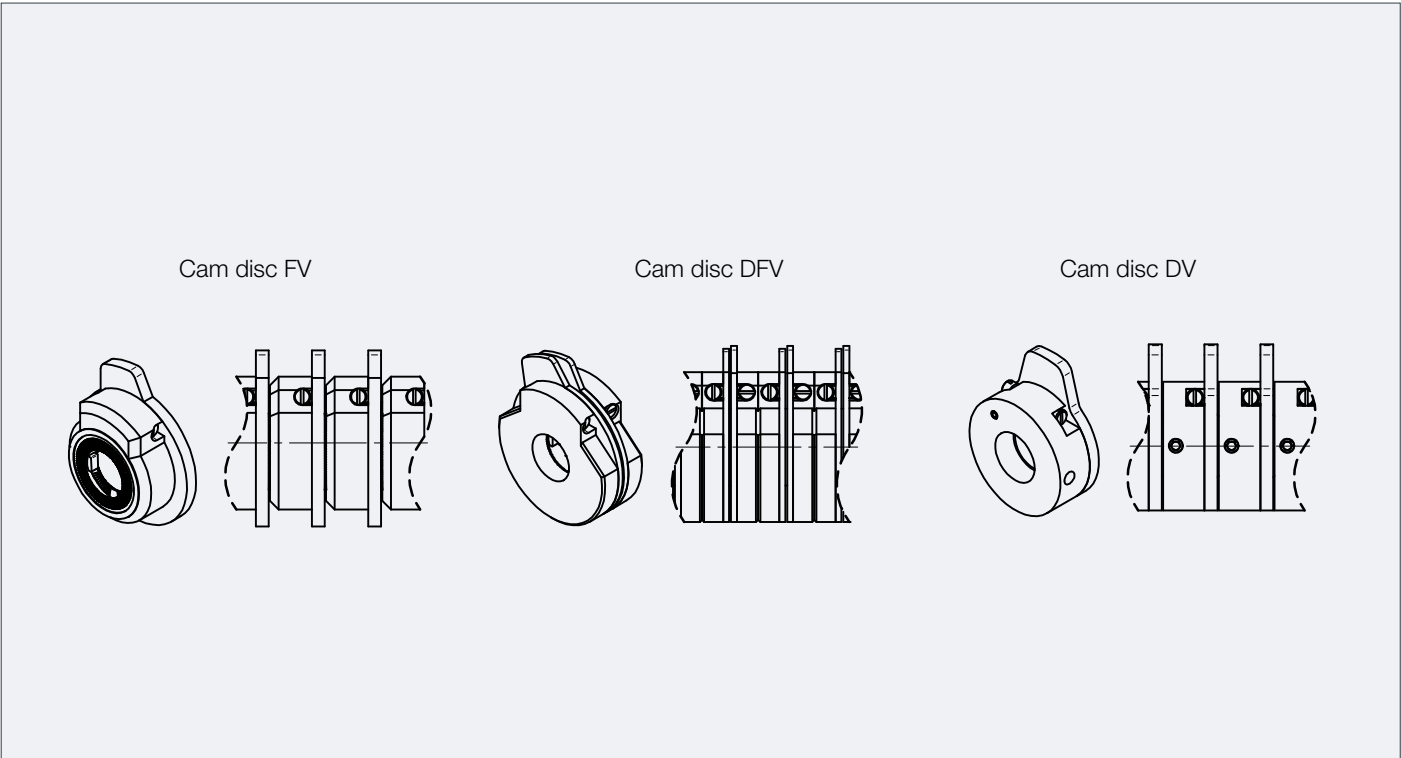
Revision date: 19.11.2019

**Features**

- Easy adjustable cam discs via self-locking worm, gear ratio of 74
- Large cam disc diameter for high switching point accuracy

**Additional information**

- FV for normal application
- DFV for flexible adjustment of the cam angle
- DV for radioactive and high temperature application



| Cam Disc Types | Standard Cam Angle | Special Cam Angel            | Gradation Cam Angle | Disc Material      |
|----------------|--------------------|------------------------------|---------------------|--------------------|
| FV             | 40°                | Other cam angles on request. | 1°                  | Synthetic Material |
| DFV            | 40°                |                              | 1°                  | Synthetic Material |
| DV             | 40°                |                              | 1°                  | Brass              |

### Series 100 / 110 – Option Anti-Condensation-Heating

Revision number: 3.1.3.15-02

Revision date: 06.09.2022

#### Features

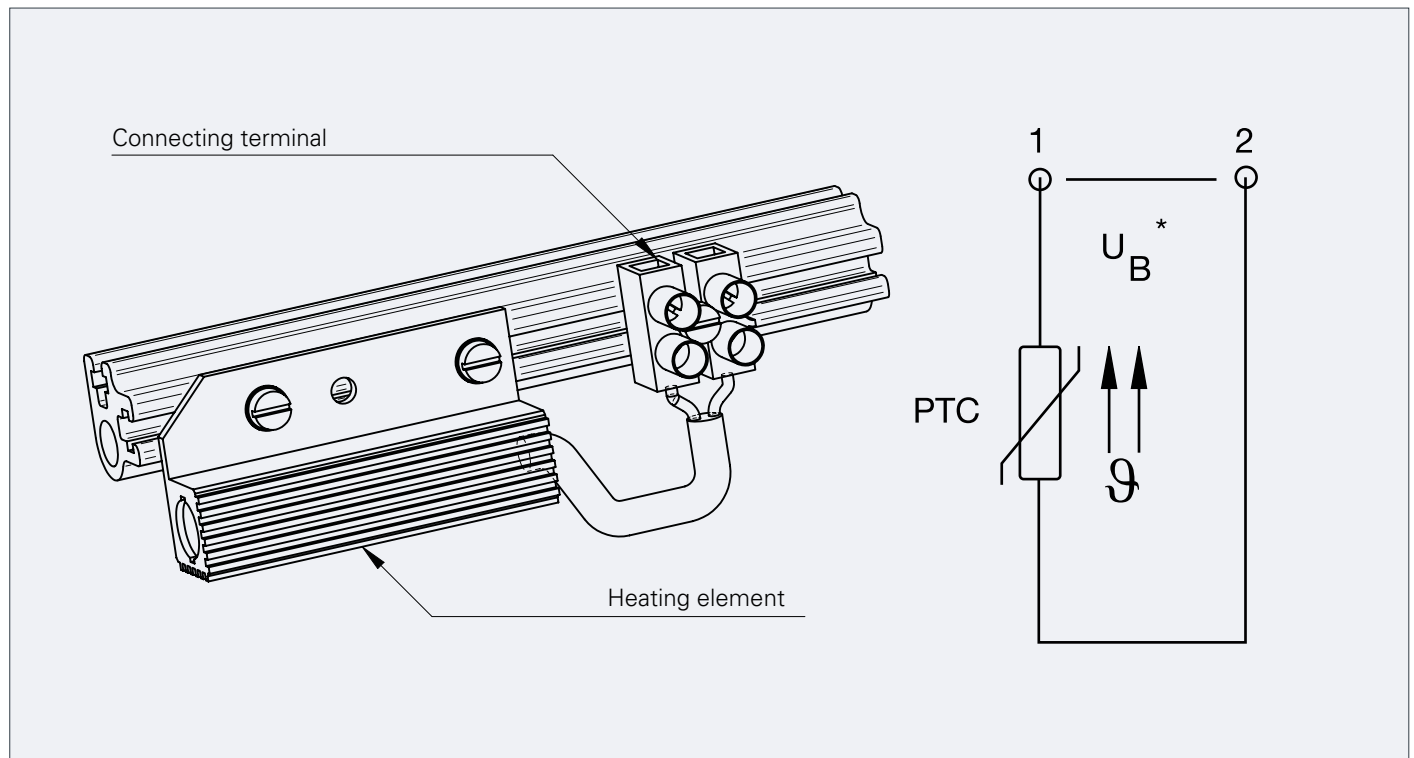
- Self-regulating PTC heating element

#### Application

- For anti-condensation to avoid water condensation within the geared cam limit switch

#### Additional information

- Additional safety for usage in low temperatures



| Design                                          | H1                                       | H2                                       |
|-------------------------------------------------|------------------------------------------|------------------------------------------|
| Supply Voltage U <sub>B</sub>                   | 12 – 30 V AC/DC                          | 110 – 250 V AC/DC                        |
| Heat Output                                     | ca. 2.5 Watts                            | ca. 4 Watts                              |
| PTC Cooling resistor (at 25 °C) R <sub>25</sub> | 20 Ω ± 35 %                              | 1500 Ω ± 35 %                            |
| PTC Reference temperature                       | 50 °C                                    | 50 °C                                    |
| Protection class (VDE 0100, 0160)               | II                                       | II                                       |
| Connecting cable                                | 2 x 0,25 mm <sup>2</sup> , Silicon cable | 2 x 0,25 mm <sup>2</sup> , Silicon cable |
| Radiator                                        | Anodised aluminum                        | Anodised aluminum                        |
| Weight                                          | approx. 40 g                             | approx. 40 g                             |

# Stromag Geared Cam Limit Switches

## Limit Switch Control Current

### Series 100 / 110 – Option Drive Flange F, F+M

Revision number: 3.1.3.16-01

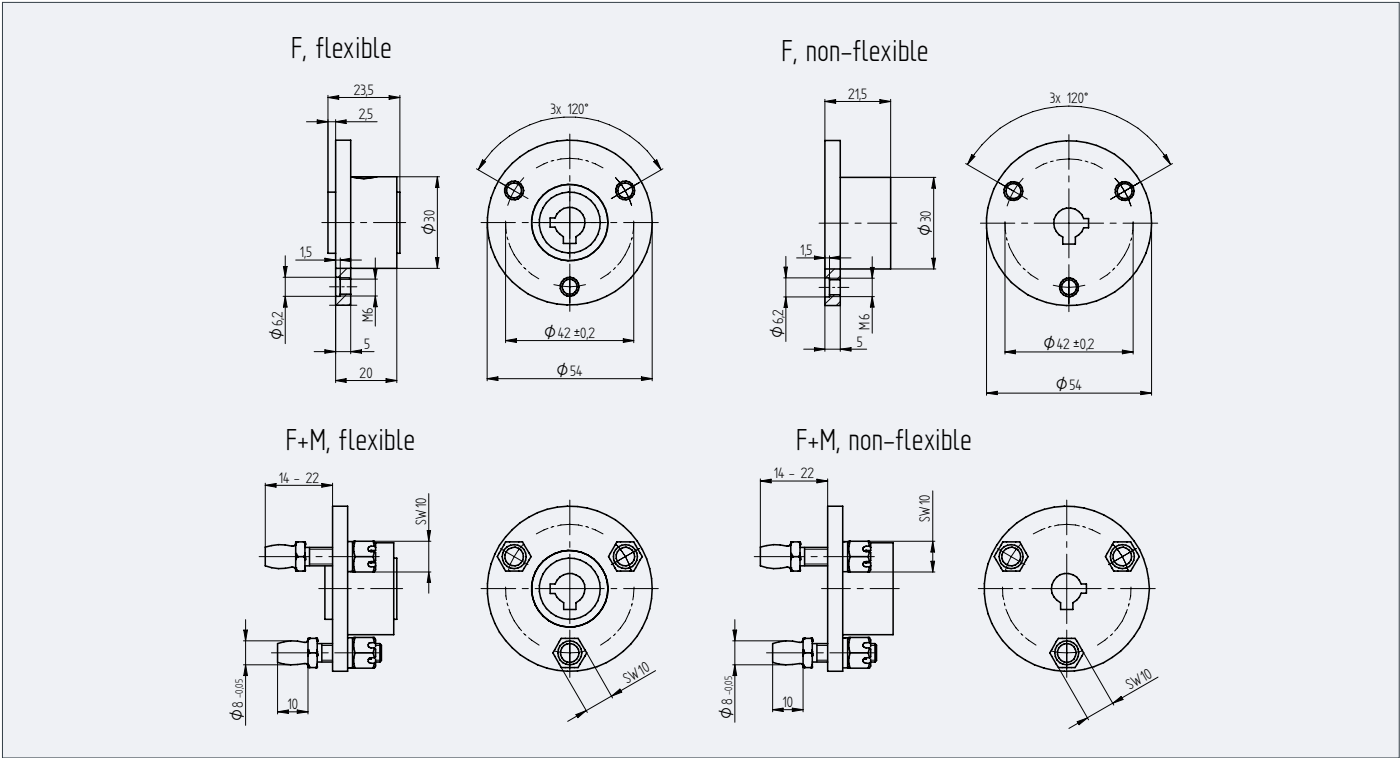
Revision date: 19.11.2019

**Features**

- For easy connection to the machine

**Application**

- Cranes

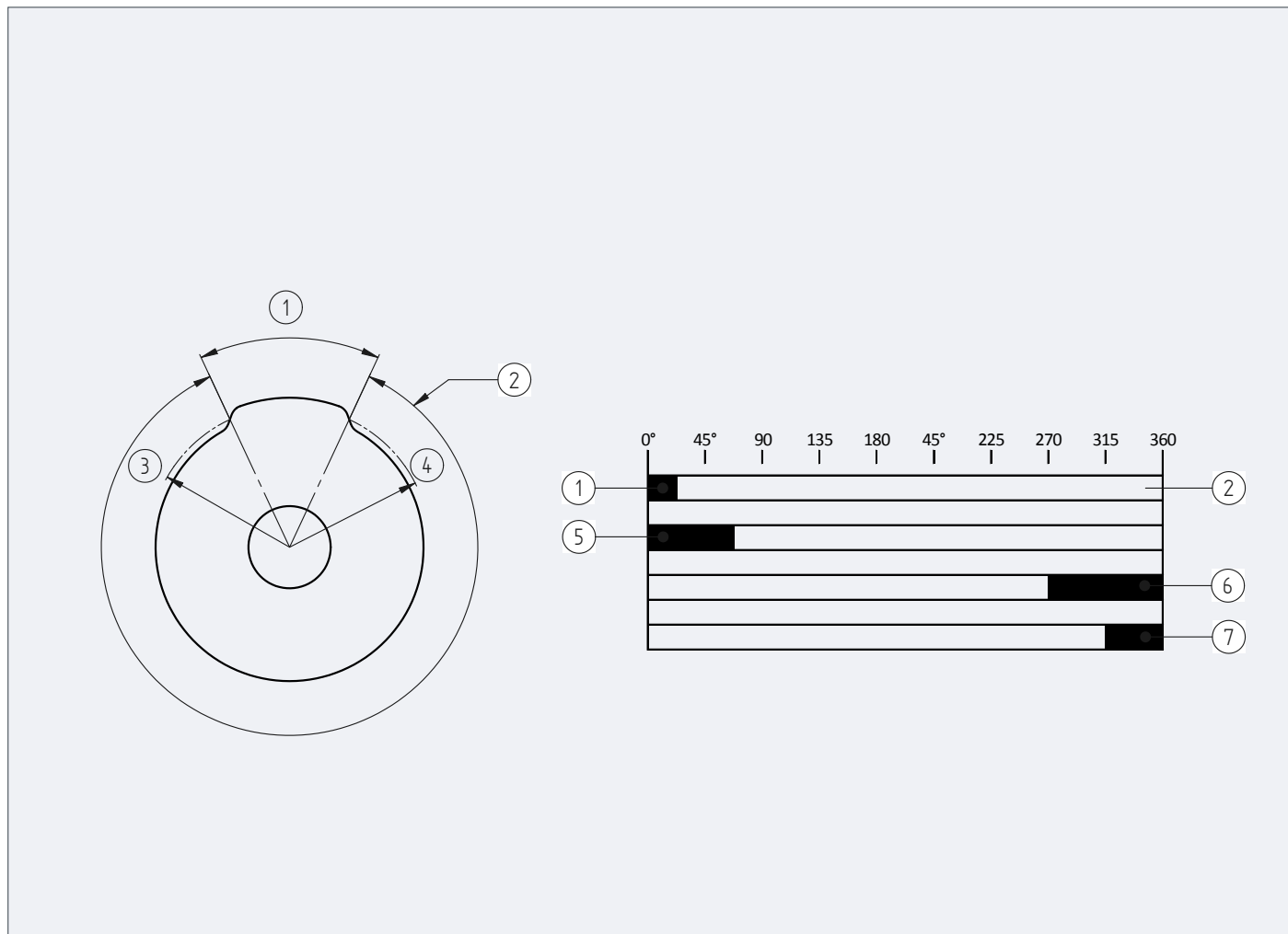


| Flange | Type         | Operating speed | Torsion angle<br>(with a torque of 5 Nm) | Comment                                     |
|--------|--------------|-----------------|------------------------------------------|---------------------------------------------|
| F      | flexible     | nmax = 1000 rpm | $5 \pm 0.5^\circ$                        | not for Counterweight<br>and Lever Switches |
| F      | non-flexible | nmax = 1000 rpm | $0^\circ$                                | not for Counterweight<br>and Lever Switches |
| F+M    | flexible     | nmax = 1000 rpm | $5 \pm 0.5^\circ$                        | not for Counterweight<br>and Lever Switches |
| F+M    | non-flexible | nmax = 1000 rpm | $0^\circ$                                | not for Counterweight<br>and Lever Switches |

### Series 100 / 110 – Customizable Cam Discs

Revision number: 3.1.3.17-01

Revision date: 19.11.2019



A Cam angle diagram

1 Effective cam angle  $\alpha$  (=castor angle)

2 Effective cam angle  $\beta$

3 Switching point radius

4 Reset point radius

B Application examples

1 Effective cam angle 15°

5 Effective cam angle 60°

6 Effective cam angle 90°

7 Effective cam angle 45°

The cam discs are named due to the effective cam angle. The effective cam angle corresponds to the switching point angle on the switching point radius of the cam disc. Standard cam angle for series 100/110 is 40°.

Any other cam angles (from 15° up to 345°) can be supplied as a special design upon request.

The usable revolutions enabled by a cam disc on the drive shaft, result in the following:

$$U = \frac{\beta \cdot i}{360^\circ} = \frac{(360^\circ - \alpha) \cdot i}{360^\circ} = 1 - \frac{\alpha \cdot i}{360^\circ}$$

U = Usable revolutions

$\alpha$  = Effective cam angle

$\beta$  = Usable cam angle ( $\beta = 360^\circ - \alpha$ )

i = gear ratio



# Stromag Geared Cam Limit Switches

## Limit Switch Control Current

## Series 100 – High Temperature & Radioactive Environment

Revision number: 3.1.3.18-01

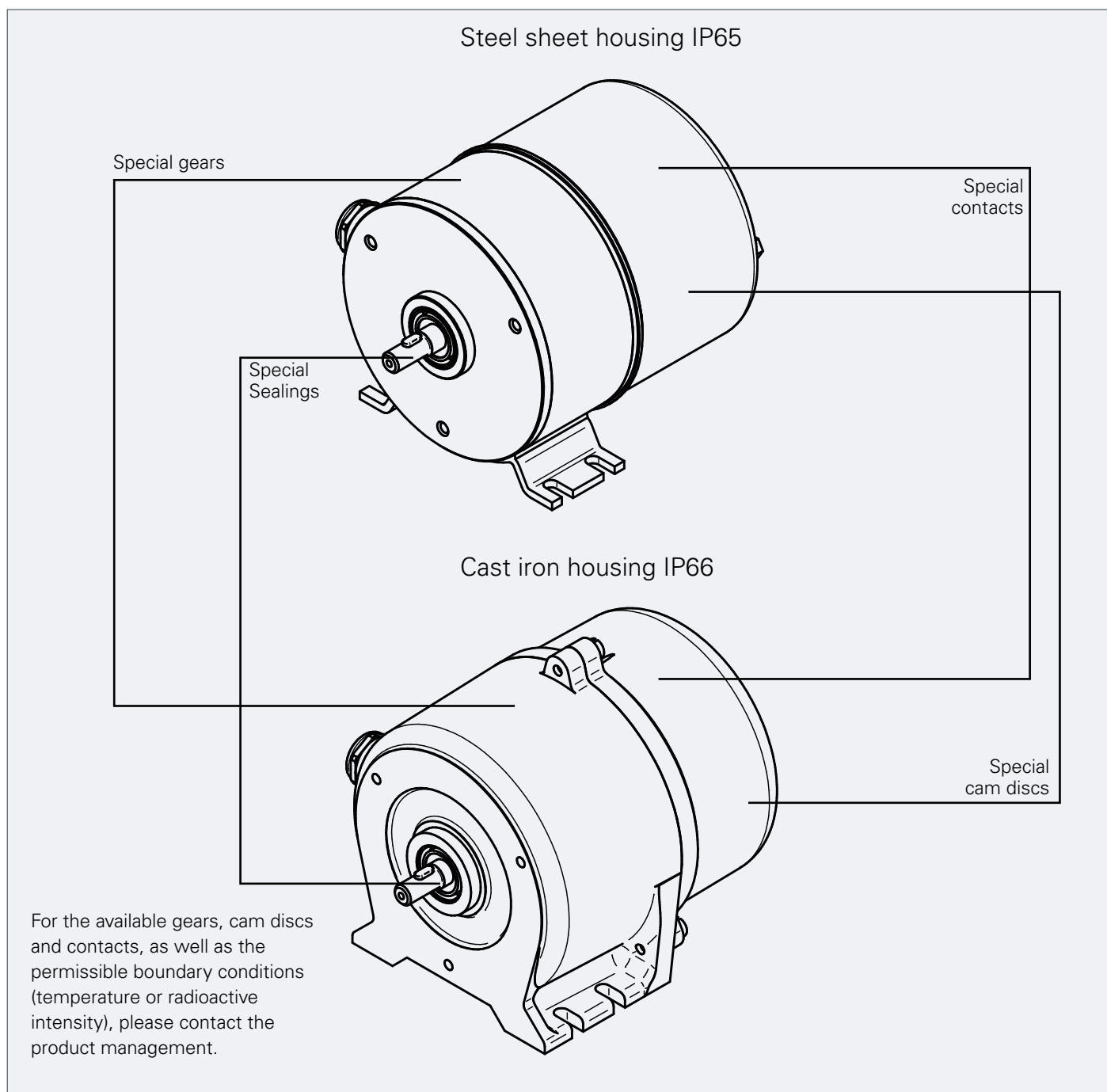
Revision date: 19.11.2019

### Features

- Usable for temperatures up to + 120°C with contact 51 and 54
- Contact 52 and 53 for radioactive application

### Additional information

- Only cast iron housing for radioactive environment
- Radiation in gray has to be told to evaluate the usability



## Series 100 / 110 – Key of Types

Revision number: 3.1.3.19-01

Revision date: 19.11.2019

|                                                                                      |       |                                                     |   |
|--------------------------------------------------------------------------------------|-------|-----------------------------------------------------|---|
| <b>Stromag GmbH</b>                                                                  |       | Hansastr.120,D 59425 Unna<br>Tel. +49 (0)2303 102-0 |   |
| Made in Germany<br>Getriebeendschalter                                               |       | 德国制造<br>凸轮开关                                        |   |
| CE                                                                                   |       |                                                     |   |
| TYP 型号                                                                               |       |                                                     |   |
| Auftr.-Nr.                                                                           |       | Nr.                                                 |   |
| Ref-Nr:                                                                              |       |                                                     |   |
| U <sub>i</sub>                                                                       | V~    | I <sub>the</sub>                                    | A |
| IP                                                                                   | Bauj. |                                                     |   |
|  |       |                                                     |   |

| Switch type: GCLS Series 100/110 |                           |                       |                                                                          |
|----------------------------------|---------------------------|-----------------------|--------------------------------------------------------------------------|
| 100                              | Type of housing           | 100                   | Series 100 Limit Switch (metal housing)                                  |
|                                  |                           | 110                   | Series 110 Limit Switch (synthetic housing)                              |
| 166                              | Usable revolutions        | Suitable for GNE, HNE | 0                                                                        |
|                                  |                           | Suitable for 100/110  | 0.153, 0.45, 0.76, 0.91, 1; 1.69, 5, 6.4, 8.3, 16, 24, 37, 51, 92, 166,  |
|                                  |                           |                       | 353, 420, 761, 1335, 1612, 3414, 5049, 7229, 15309                       |
| NE                               | Type of limit switch      | NE                    | Geared Cam Limit Switch                                                  |
|                                  |                           | GNE                   | Counterweight switch                                                     |
|                                  |                           | HNE                   | Lever switch                                                             |
| 4                                | Number of contacts fitted | 110 (NE)              | 1 - 12                                                                   |
|                                  |                           | 100 (NE)              | 1 - 14                                                                   |
|                                  |                           | 100 (GNE, HNE)        | 1 - 4                                                                    |
| 51                               | Type of contacts fitted   | 80                    | Contact (changeover) with screw connections, contact material: Silver Ü  |
|                                  |                           | 81                    | Contact (push action) with screw connections, contact material: Silver Ü |
|                                  |                           | 88                    | Contact (double action) with screw connections, contact material: Gold Ü |
|                                  |                           | 90                    | Contact (changeover) with screw connections, contact material: Silver Ü  |
|                                  |                           | 90G                   | Contact (changeover) with screw connections, contact material: Gold Ü    |
|                                  |                           | 51                    | Snap-action with screw-terminals, contact material: gold                 |
|                                  |                           | 52                    | Contact (changeover) with screw connections, contact material: Gold Ü    |
|                                  |                           | 53                    | Contact (push action) with screw connections, contact material: Gold Ü   |
| FV                               | Type of cam discs fitted  | FV                    | Precise adjustable points of actuation                                   |
|                                  |                           | DV                    | Adjustable points of actuation, cam material: Brass                      |
|                                  |                           | DFV                   | Precise, double-adjustable points of actuation                           |

# Stromag Geared Cam Limit Switches

## Limit Switch Control Current

### Series 100 – Special Type ATEX

Revision number: 3.1.3.20-01

Revision date: 19.11.2019

- ATEX marking

II 2G Ex h IIC T4 Gb

II 2D Ex h IIIB T125°C Db

<-- Marking for gas atmosphere

<-- Marking for dust atmosphere

II 3D Ex h IIIB T125°C Dc

<-- Marking for dust atmosphere

- Explanation of markings

II

Group II, devices for use above ground

2G/2D/3D

2G: Device category (for use in Zone 1 and 2)

2D: Device category (for use in Zone 21 and 22)

3D: Device category (for use in Zone 22)

h

Type of protection h, protection constructional safety "c" (EN 80079-37)

IIC/IIIB

Gas group IIC (includes group IIB and IIA)

Dust group IIIB, non-conductive dust (includes group IIIA)

T125°C

Maximum permitted surface temperature

Gb/Db/Dc

Equipment protection level (EPL) as per EN 80079-36

- Technical details

Temperature range:

-20°C to 60°C

-40°C to 60°C (Cold Climate Version)

Number of contacts:

1-8 Contacts

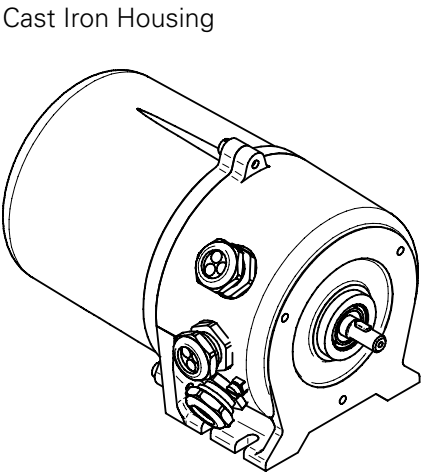
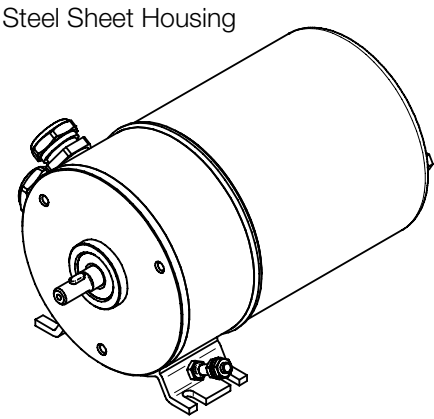
IP Protection class:

IP64: Steel Sheet Housing

IP66: Cast Iron Housing

Rotation speed:

max. 1500 rpm (depending on chosen gear reduction)



#### Available Switches for device categories 2G, 2D and 3D

| Switching contact |                         |                          | Contact material |                        | Switching system   |                    | Connection                 | Electrical data                        |                                              |                             |                          | Additional data     |                                               |                       |
|-------------------|-------------------------|--------------------------|------------------|------------------------|--------------------|--------------------|----------------------------|----------------------------------------|----------------------------------------------|-----------------------------|--------------------------|---------------------|-----------------------------------------------|-----------------------|
| Designation       | Circuit as a changeover | Circuit as an NC contact | Silver           | Gold (PLC-Application) | Snap action switch | Push action switch | Cable, with wires 0,75 mm² | Utilization category acc. to IEC 60947 | Conventional thermal current I <sup>th</sup> | Rated Insulation Voltage Ui | Short circuit protection | Mechanical Lifetime | Positive opening acc. to EN 60947-5-1 Annex K | Operating Temperature |
| EX                | •                       |                          | •                |                        | •                  |                    | •                          | AC-15: 400V, 2A<br>DC-13: 250V, 0,15A  | 5A                                           | 400V                        | *1                       | 2x106               |                                               | -40°C ... +60°C *     |
| EXZ               |                         | •                        | •                |                        |                    | •                  | •                          | AC-15: 400V, 2A<br>DC-13: 250V, 0,15A  | 5A                                           | 400V                        | *1                       | 2x106               | •                                             | -40°C ... +60°C       |

\* 1) The short-circuit protection for the EX and EXZ contacts must be designed according to the information in the EC Type Examination and the output of the user.

Switches for device category 3D: AI standard switches (see chapter 3.1.3.13)

### Series 100 / 110 – Encoder device

Revision number: 3.1.3.21-01

Revision date: 19.11.2019

#### Features

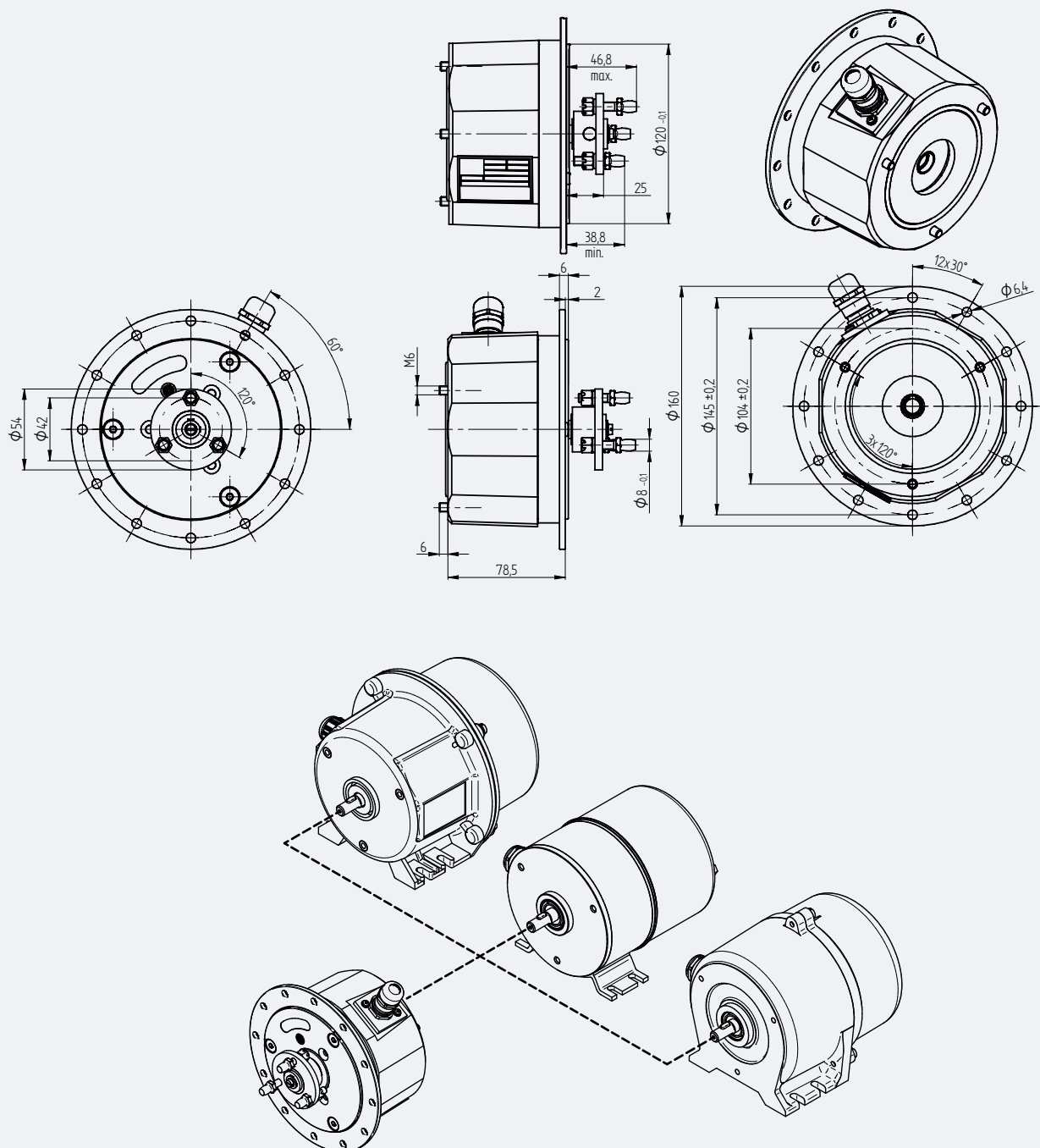
- Additional housing for installation of special hollow shaft multiturn encoders

#### Application

- Cranes

#### Additional information

- No standard application.  
Please contact our Product Management Department  
[info@stromag.com](mailto:info@stromag.com)



# Stromag Geared Cam Limit Switches

## Limit Switch Control Current

### Series 100 / 110 – Option: Analog Encoder

Revision number: 3.1.3.22-01

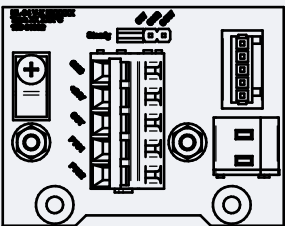
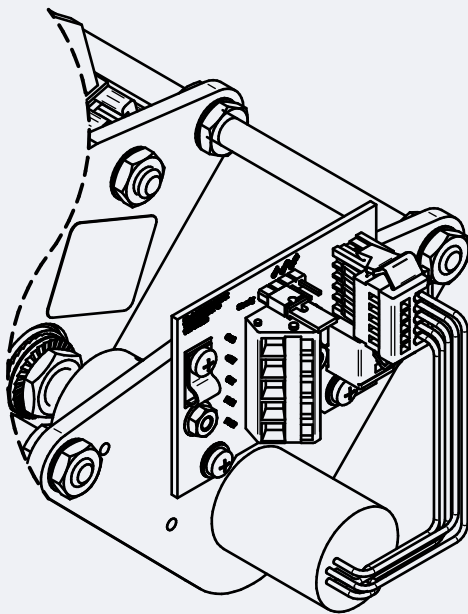
Revision date: 19.11.2019

#### Features

- Singleturn absolute encoder up to 12 Bit
- Turns synchronously with the cam discs

#### Application

- For measurement of the absolute position



| Connector                |                                  |
|--------------------------|----------------------------------|
| Multi-stranded conductor | 0.08 ... 2.5 mm² / 28 ... 12 AWG |
| Fine-stranded conductor  | 0.08 ... 2.5 mm² / 28 ... 12 AWG |
| With end sleeve          | 0.25 ... 1.5 mm²                 |
| Strip length             | 5 ... 6 mm / 0.2 ... 0.24 Inch   |

| Pin Assignment |                          |
|----------------|--------------------------|
| GND            | Ground                   |
| +24 V          | Supply voltage           |
| Out            | Output signal            |
| PTC1           | For optional PTC-heating |
| PTC2           | For optional PTC-heating |

| Technical data                          |                                   |                                   |
|-----------------------------------------|-----------------------------------|-----------------------------------|
|                                         | Current output                    | Voltage output                    |
| Drive                                   | Coupling „N“ (1:1 with cam discs) | Coupling „N“ (1:1 with cam discs) |
| Measuring range*                        | 360°                              | 360°                              |
| Output Signal                           | 4 ... 20 mA                       | 0 ... 10 V                        |
| Turning direction                       | programmable                      | programmable                      |
| Resolution                              | 14 Bit                            | 14 Bit                            |
| Indep. Linearity                        | ± 0.1 % of measuring range        | ± 0.1 % of measuring range        |
| Supply Voltage                          | 18 ... 35 V DC                    | 18 ... 35 V DC                    |
| Current consumption without load (typ.) | 20 mA                             | 20 mA                             |
| Ohmic load at output                    | 0 ... 500 Ohm                     | > 10 kOhm                         |
| Max. capacitive load at output          | 100 nF                            | 100 nF                            |
| Lifetime                                | 360 mio. movements                | 360 mio. movements                |
| Operating Temperature                   | -40°C ... +85 °C                  | -40°C ... +85 °C                  |

\* Referring to encoder shaft

### Series 100 / 110 – Option: Incremental Encoder

Revision number: 3.1.3.23-02

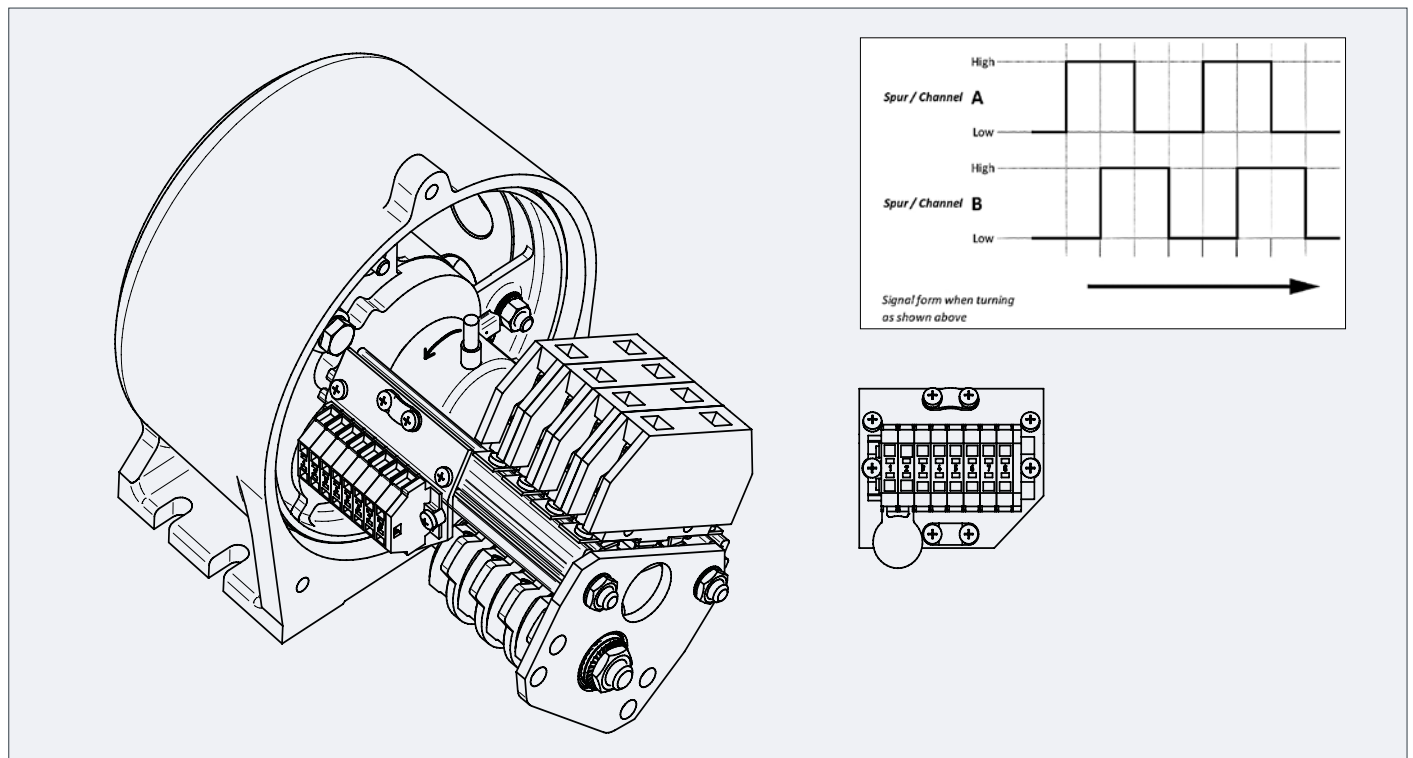
Revision date: 14.06.2021

#### Features

- Up to 3600 increments available
- Turns synchronously with the drive shaft

#### Application

- For measuring of position and speed



| Technical Data                   | RS422                              | Push-Pull     |
|----------------------------------|------------------------------------|---------------|
| Power Supply UB                  | 5 V $\pm$ 5% or 8...30 V           | 8 ... 30 V DC |
| Pulses / 360°                    | 5 ... 3600                         |               |
| Power consumption (without load) | Typ. 40 mA<br>Max. 90 mA           | < 40 mA       |
| Permissible load                 | $\pm$ 20 mA                        | $\pm$ 50 mA   |
| Signal level „high“              | > 2,5 V                            | > Vcc - 3 V   |
| Signal level „low“               | < 0,5 V                            | < 2,5 V       |
| Max. frequency                   | 300 kHz                            | 200 kHz       |
| Operating temperature            | -40°C ... +85 °C (5...1024 pulses) |               |
|                                  | -30°C ... +85 °C (>1024 pulses)    |               |

| Assignment         | Pin | Color  |
|--------------------|-----|--------|
| Ground             | 1   | white  |
| Supply-Voltage VCC | 2   | brown  |
| A - Signal         | 3   | green  |
| B - Signal         | 4   | yellow |
| 0 - Signal         | 5   | gray   |
| A-Inv. - Signal    | 6   | pink   |
| B-Inv. - Signal    | 7   | blue   |
| 0-Inv. - Signal    | 8   | red    |

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