Incremental encoders

Insulated blind hollow shaft ø12...16 mm, cone shaft ø17 mm

500...5000 pulses per revolution

HOG 86

HOG 86.2 T

Features

- **Robust, compact housing**
- **Two bearings with large distance, one at each end**
- **High shaft load up to 450 N**
- **Shock resistant up to 250 g**
- **Shaft insulation up to 2.8 kV**
- **Highest operating speed 10000 rpm**
- **Terminal box, turn by 180°**

Optional

- **Hybrid bearing for extended lifetime**
- **Function control (EMS)**

Technical data - electrical ratings

Voltage supply	9...30 VDC 5 VDC ±5 %
Consumption w/o load	≤100 mA
Pulses per revolution	500...5000
Phase shift	90° ±20°
Scan ratio	45...55 % (40...60 % >3072 pulses per revolution)
Reference signal	Zero pulse, width 90°
Sensing method	Optical
Output frequency	≤120 kHz ≤300 kHz (on request)
Output signals	K1, K2, K0 + inverted Error output (only EMS)
Output stages	HTL-P (power linedriver) TTL/RS422
Shaft insulation	2.8 kV
Transmission length	≤350 m at 100 kHz (HTL-P) ≤550 m at 100 kHz (TTL)
Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-3
Approvals	CE, UL/ CSA approval / E256710

Technical data - mechanical design

Size (flange)	ø99 mm
Shaft type	ø12...16 mm (blind hollow shaft) ø17 mm (cone shaft 1:10)
Admitted shaft load	≤350 N axial ≤450 N radial
Motor shaft tolerance	0.2 mm radial
Protection DIN EN 60529	IP 66
Operating speed	≤10000 rpm (mechanical)
Operating torque	≤6 Ncm
Rotor moment of inertia	160 gcm²
Materials	Housing: aluminium, coated Shaft: stainless steel
Operating temperature	-40...+100 °C -40...+90 °C (fixed cable) -25...+100 °C (>3072 pulses per revolution)
Resistance	IEC 60068-2-6 Vibration 15 g, 10-2000 Hz IEC 60068-2-27 Shock 250 g, 6 ms
Corrosion protection	IEC 60068-2-52 Salt mist Complies to ISO 12944-5:1998 Protective paint systems (C4)
Explosion protection	II 3 G Ex nA IIC T4 Gc (gas) II 3 D Ex tc IIIC T135°C Dc (dust)
Connection	Terminal box Flange connector M23, 12-pin Cable 1 m
Weight approx.	1.3 kg

Subject to modification in technic and design. Errors and omissions excepted.

Combination

Encoder with integrated programmable, digital speed switch
Blind hollow shaft ø16 mm
512…2500 pulses per revolution

HOG 86 + DSL

HOG 86 + DSL - picture similar

Features

- **Robust, compact housing**
- **Hybrid bearing for extended lifetime**
- **3 switching outputs speed controlled (independent transistor outputs)**
- **Freely programmable on and off switching speed**
- **Programming via included software (RS485 interface)**
- **Logic level HTL or TTL**

Optional

- **Relay module DS 93 R**

Technical data - electrical ratings

Voltage supply	15...30 VDC
Consumption w/o load	≤200 mA
Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-3
Approval	CE

Technical data - electrical ratings (encoder)

Pulses per revolution	512...2500
Phase shift	90° ±20°
Scan ratio	45...55 %
Reference signal	Zero pulse, width 90°
Output frequency	≤120 kHz
Output signals	K1, K2, K0 + inverted
Output stages	HTL-P (power linedriver) TTL/RS422
Sensing method	Optical
Shaft insulation	2.8 kV
Transmission length	≤350 m at 100 kHz (HTL-P) ≤550 m at 100 kHz (TTL)

Technical data - electrical ratings (speed switches)

Interface	RS485
Switching accuracy	±2 % (or Digit)
Switching outputs	3 outputs, speed control
Output switching capacity	12 VDC; ≤40 mA
Switching delay time	≤40 ms

Technical data - mechanical design

Size (flange)	ø99 mm
Shaft type	ø16 mm (blind hollow shaft)
Admitted shaft load	≤350 N axial ≤450 N radial
Protection DIN EN 60529	IP 66
Speed (n)	≤6000 rpm
Range of switching speed (ns)	Pulses = 512: ±16...6000 rpm Pulses = 1024: ±8...6000 rpm Pulses = 2048: ±4...3500 rpm Pulses = 2500: ±3...2900 rpm
Operating torque	≤6 Ncm
Rotor moment of inertia	160 gcm²
Motor shaft tolerance	0.2mm radial
Materials	Housing: aluminium, coated Shaft: stainless steel
Operating temperature	-30...+85 °C
Resistance	IEC 60068-2-6 Vibration 15 g, 10-2000 Hz IEC 60068-2-27 Shock 250 g, 6 ms
Corrosion protection	IEC 60068-2-52 Salt mist Complies to ISO 12944-5:1998 Protective paint systems (C4)
Connection	2x terminal box
Weight approx.	1.4 kg

Subject to modification in technic and design. Errors and omissions excepted.

Combination

Encoder with integrated programmable, digital speed switch
Blind hollow shaft ø16 mm
512…2500 pulses per revolution

HOG 86 + DSL

Part number

Encoder with digital speed switch

HOG86	T	H	6		DN					+ DSL

Voltage supply / signals
- I 9...30 VDC / output stage HTL with inverted signals
- T 5 VDC / output stage TTL with inverted signals
- R 9...30 VDC / output stage TTL with inverted signals

Pulse number - see table

Output signals
- DN K1, K2, K0

Shaft diameter
- 6 Blind hollow shaft ø16 mm, fit H7

Insulation
- H Hybrid bearing

Connection
- T 2x terminal boxes, radial

Pulse number

512	1024	2048	2500

Other pulse numbers on request.

Accessories

Adapter USB → RS485

Connectors and cables

HEK 8	Sensor cable for encoders

Mounting accessories

11077087	Mounting and dismounting set
11071906	Mounting kit earthing strap
DMS 6	Torque arm size M6
11071850	Support plate mounting kit R63 for torque arm size M6
11082676	Support plate mounting kit R69 for torque arm size M6
11072076	Screw mounting kit for torque arm size M6
11071904	Mounting kit for torque arm size M6

Diagnostic accessories

HENQ 1100	Analyzer for encoders

Relay module

DS 93 R	Relay modul

Subject to modification in technic and design. Errors and omissions excepted.

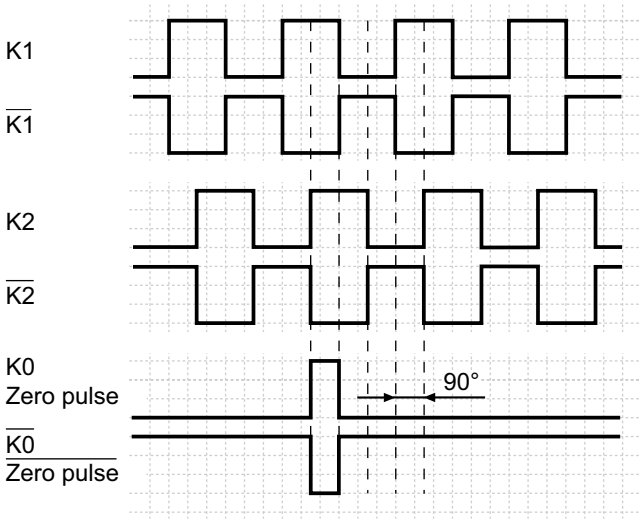
Combination

Encoder with integrated programmable, digital speed switch
Blind hollow shaft ø16 mm
512…2500 pulses per revolution

HOG 86 + DSL

Output signals

At positive rotating direction



Terminal significance

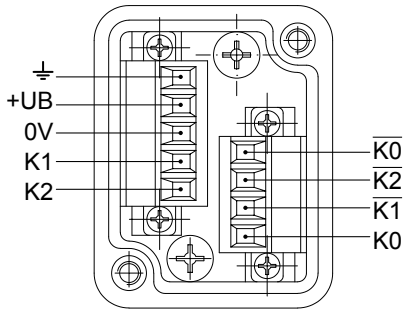
Incremental	
+UB	Voltage supply (for the combination)
⊥; ⏚; GND; 0 V	Ground (for the signals)
⏚; ⏚	Earth ground (chassis)
K1; A; A+	Output signal channel 1
$\overline{K1}$; $\overline{A}$; A-	Output signal channel 1 inverted
K2; B; B+	Output signal channel 2 (offset by 90° to channel 1)
$\overline{K2}$; $\overline{B}$; B-	Output signal channel 2 (offset by 90° to channel 1) inverted
K0; C; R; R+	Zero pulse (reference signal)
$\overline{K0}$; $\overline{C}$; $\overline{R}$; R-	Zero pulse (reference signal) inverted

Speed switch DSL	
R1*	Transistor switching output 1, individually adjustable switching speed, High (12 V), Low (0 V), max. 20 mA
R2*	Transistor switching output 2, individually adjustable switching speed, High (12 V), Low (0 V), max. 20 mA
R3*	Transistor switching output 3, individually adjustable switching speed, High (12 V), Low (0 V), max. 20 mA
GND*	Ground connection
RS 485	Interface for PC or Laptop (adapter required). Programming of the DSL via the included software.

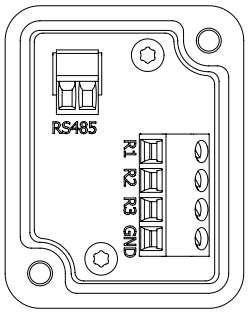
* Connection to relay module possible, for example DS 93 R (accessory)

Terminal assignment

View A
Connecting terminal in terminal box HOG 86

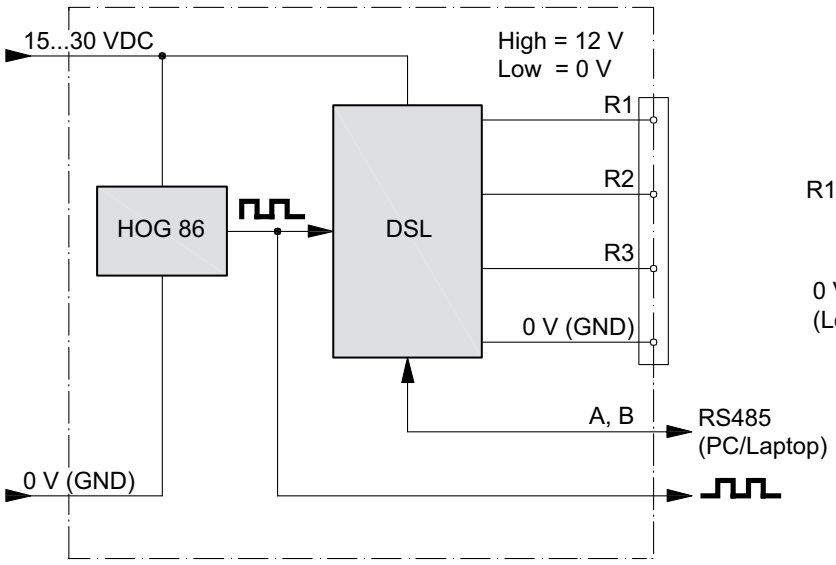


View B
Connecting terminal in terminal box digital speed switch DSL

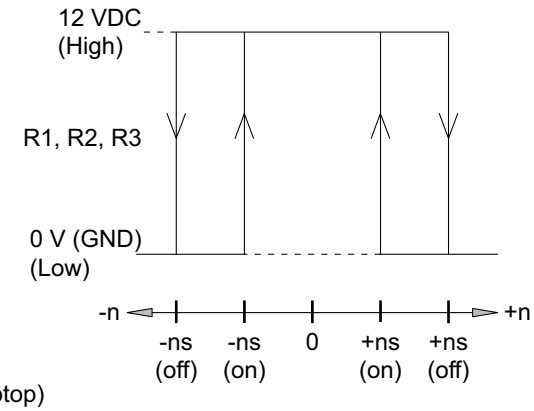


Subject to modification in technic and design. Errors and omissions excepted.

Block circuit diagram



Switching characteristics



n = speed
ns (on) = adjusted switching on speed
ns (off) = adjusted switching off speed

Subject to modification in technic and design. Errors and omissions excepted.

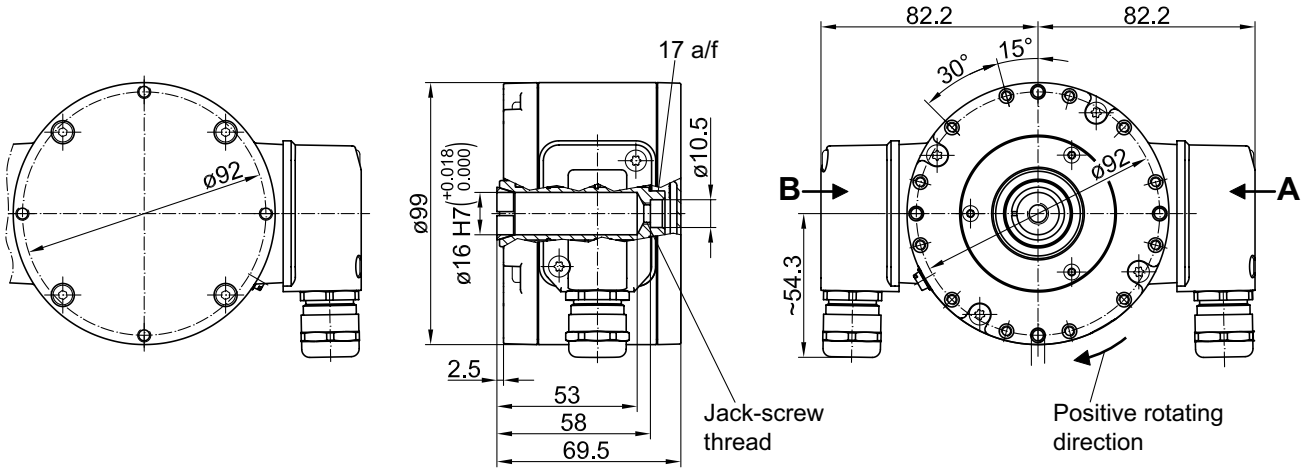
Combination

Encoder with integrated programmable, digital speed switch
Blind hollow shaft ø16 mm
512…2500 pulses per revolution

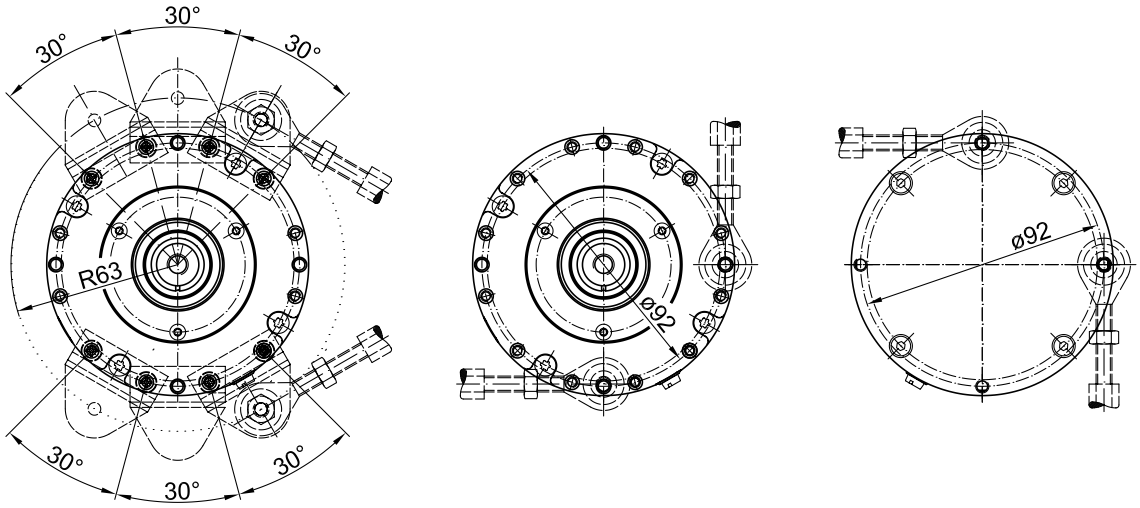
HOG 86 + DSL

Dimensions

Blind hollow shaft



Mounting possibilities



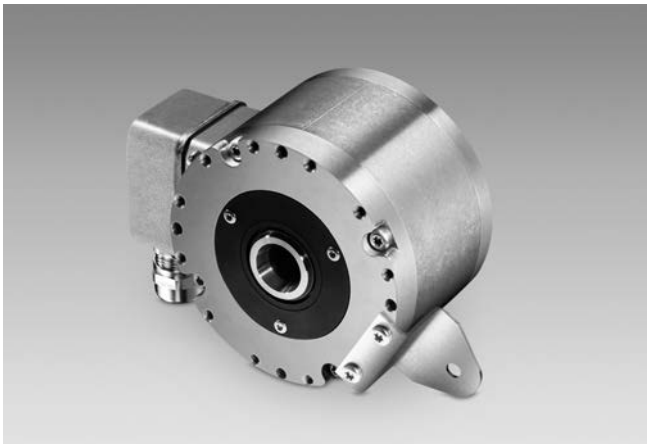
Subject to modification in technic and design. Errors and omissions excepted.

Incremental encoders

Insulated blind hollow shaft ø12...16 mm, cone shaft ø17 mm

500...2500 pulses per revolution

HOG 86E



HOG 86E T

Features

- **Robust, compact housing**
- **Two bearings with large distance, one at each end**
- **High shaft load up to 450 N**
- **Shock resistant up to 250 g**
- **Shaft insulation up to 2.8 kV**
- **Highest operating speed 10000 rpm**
- **TTL output driver for cable length up to 550 m**
- **Terminal box, turn by 180°**

Technical data - electrical ratings

Voltage supply	9...30 VDC 5 VDC ±5 %
Consumption w/o load	≤100 mA
Pulses per revolution	500...2500
Phase shift	90° ±20°
Scan ratio	45...55 %
Reference signal	Zero pulse, width 90°
Sensing method	Optical
Output frequency	≤170 kHz ≤300 kHz (on request)
Output signals	K1, K2, K0 + inverted
Output stages	HTL-P (power linedriver) TTL/RS422
Shaft insulation	2.8 kV
Transmission length	≤350 m at 100 kHz (HTL-P) ≤550 m at 100 kHz (TTL)
Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-3
Approvals	CE, UL/ CSA approval / E256710

Technical data - mechanical design

Size (flange)	ø99 mm
Shaft type	ø12...16 mm (blind hollow shaft) ø17 mm (cone shaft 1:10)
Admitted shaft load	≤350 N axial ≤450 N radial
Motor shaft tolerance	0.2 mm radial
Protection DIN EN 60529	IP 66
Operating speed	≤10000 rpm (mechanical)
Operating torque	≤6 Ncm
Rotor moment of inertia	160 gcm²
Materials	Housing: aluminium Shaft: stainless steel
Operating temperature	-40...+100 °C
Resistance	IEC 60068-2-6 Vibration 15 g, 10-2000 Hz IEC 60068-2-27 Shock 250 g, 6 ms
Corrosion protection	IEC 60068-2-52 Salt mist
Explosion protection	II 3 G Ex nA IIC T4 Gc (gas) II 3 D Ex tc IIIC T135°C Dc (dust)
Connection	Terminal box Flange connector M23, 12-pin
Weight approx.	1.3 kg

· Subject to modification in technic and design. Errors and omissions excepted. ·

HOG 86E

Part number

Incremental encoder

HOG86E		P			DN				

Voltage supply / signals
- I 9...30 VDC / output stage HTL with inverted signals
- T 5 VDC / output stage TTL with inverted signals
- R 9...30 VDC / output stage TTL with inverted signals

Pulse number - see table

Output signals
- DN K1, K2, K0 + inverted

Shaft diameter
- 2 Blind hollow shaft ø12 mm, fit H7
- 6 Blind hollow shaft ø16 mm, fit H7
- 7 Cone shaft ø17 mm (1:10)
- 8 Blind hollow shaft ø16 mm, fit G7
- 9 Blind hollow shaft ø12 mm, fit F6

Insulation
- P PA insulated

Connection
- T 1x terminal box, radial
- F 1x flange connector M23, radial

Pulse number

500	1000	1250	2500
512	1024	2048	

Other pulse numbers on request.

Accessories

Connectors and cables	
HEK 8	Sensor cable for encoders
11068577	Mating connector M23, solder version, 12-pin, CCW
Mounting accessories	
11077087	Mounting and dismounting set
11071906	Mounting kit earthing strap
DMS 6	Torque arm size M6
11071904	Mounting kit for torque arm size M6
Diagnostic accessories	
HENQ 1100	Analyzer for encoders

· Subject to modification in technic and design. Errors and omissions excepted. ·

Incremental encoders

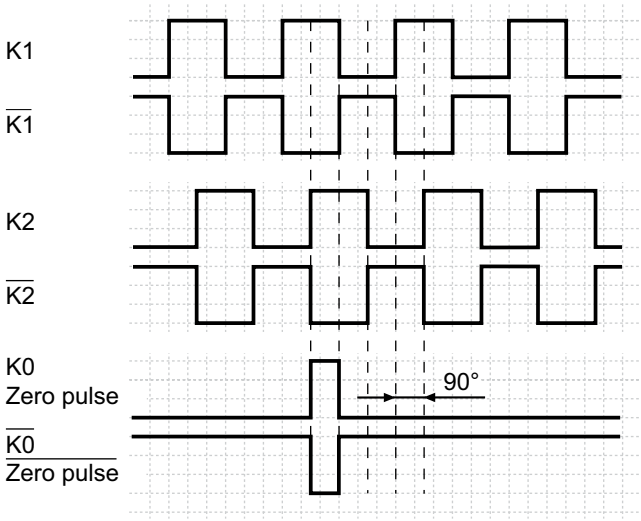
Insulated blind hollow shaft ø12...16 mm, cone shaft ø17 mm

500...2500 pulses per revolution

HOG 86E

Output signals

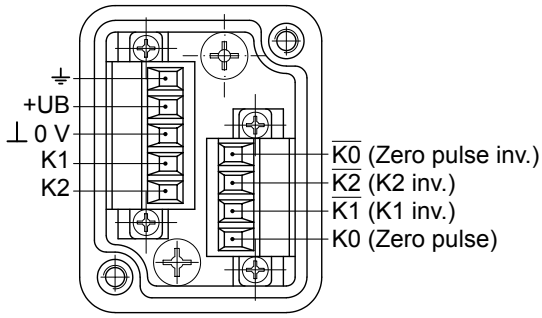
At positive rotating direction



Terminal assignment

HOG 86E T - View A

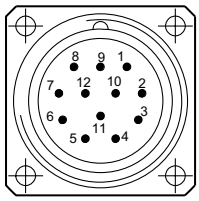
Connecting terminal terminal box



HOG 86E F - View B

Flange connector M23, 12-pin, male, CW

Pin	Assignment
1	$\overline{K2}$ (K2 inv.)
2	Do not use
3	K0 (Zero pulse)
4	$\overline{K0}$ (Zero pulse inv.)
5	K1
6	$\overline{K1}$ (K1 inv.)
7	Do not use
8	K2
9	Do not use
10	0 V ⊥
11	Do not use
12	+UB

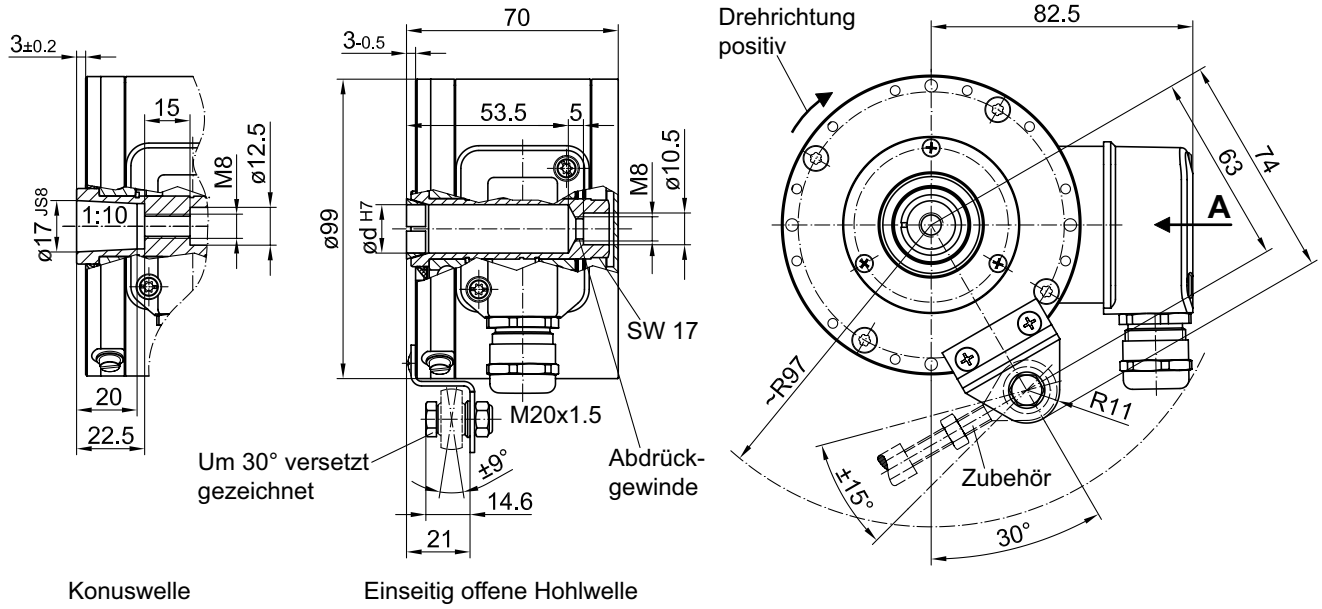


· Subject to modification in technic and design. Errors and omissions excepted.

HOG 86E

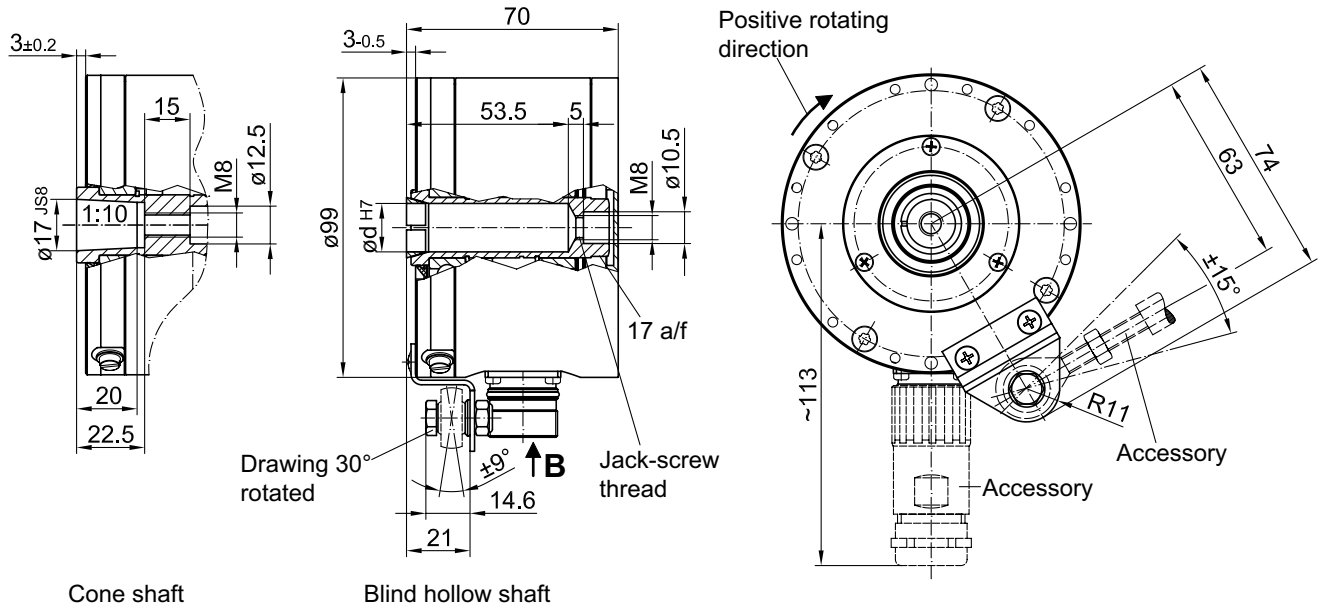
Dimensions

HOG 86E T - Version with radial terminal box



Konuswelle — Einseitig offene Hohlwelle

HOG 86E F - Version with radial connector M23



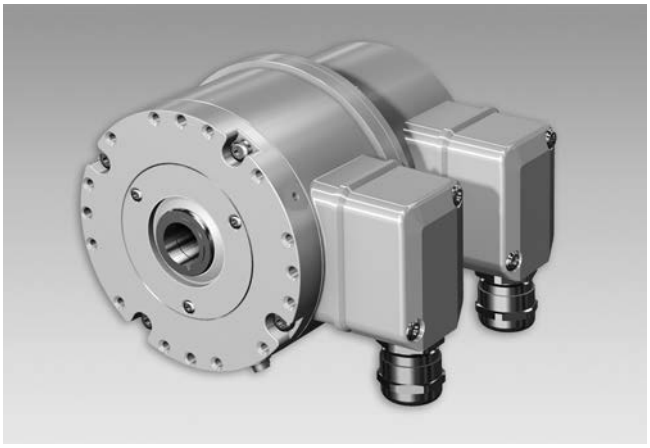
Cone shaft — Blind hollow shaft

· Subject to modification in technic and design. Errors and omissions excepted. ·

Combination

Encoder with integrated centrifugal switch
Insulated blind hollow shaft ø16 mm, cone shaft ø17 mm
500…5000 pulses per revolution

HOG 86E + FSL



HOG 86E T + FSL

Features

- **Mechanical speed monitoring based on centrifugal force**
- **Robust, compact housing**
- **Two bearings with large distance, one at each end**
- **High shaft load up to 450 N**
- **Shaft insulation up to 2.8 kV**
- **TTL output driver for cable length up to 550 m**
- **Terminal box, turn by 180°**

Technical data - electrical ratings

Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-3

Technical data - electrical ratings (encoder)

Voltage supply	9...30 VDC 5 VDC ±5 %
Consumption w/o load	≤100 mA
Pulses per revolution	500...5000
Phase shift	90° ±20°
Scan ratio	45...55 % (40...60 % >3072 pulses per revolution)
Reference signal	Zero pulse, width 90°
Output frequency	≤120 kHz ≤300 kHz (on request)
Output signals	K1, K2, K0 + inverted
Output stages	HTL-P (power linedriver) TTL/RS422
Sensing method	Optical
Shaft insulation	2.8 kV
Transmission length	≤350 m at 100 kHz (HTL-P) ≤550 m at 100 kHz (TTL)

Technical data - electrical ratings (centrifugal switch)

Switching accuracy	±4 % (Δn = 2 rpm/s); = +20 % (Δn = 1500 rpm/s)
Switching deviation	≤3 % (cw-ccw rotation)
Switching hysteresis	~40 % of switching speed
Switching outputs	1 output, speed control
Output switching capacity	≤6 A / 230 VAC ≤1 A / 125 VDC
Minimum switching current	50 mA

Technical data - mechanical design

Size (flange)	ø105 mm
Shaft type	ø16 mm (blind hollow shaft) ø17 mm (cone shaft 1:10)
Admitted shaft load	≤350 N axial ≤450 N radial
Protection DIN EN 60529	IP 66
Speed (n)	≤1.25 · ns
Range of switching speed (ns)	850...4500 rpm (Δn = 2 rpm/s)
Operating torque	≤6 Ncm
Rotor moment of inertia	200 gcm²
Motor shaft tolerance	0.2mm radial
Materials	Housing: aluminium die-cast Shaft: stainless steel
Operating temperature	-40...+100 °C -25...+100 °C (>3072 pulses per revolution)
Resistance	IEC 60068-2-6 Vibration 5 g, 10-2000 Hz IEC 60068-2-27 Shock 50 g, 11 ms
Corrosion protection	IEC 60068-2-52 Salt mist
Connection	2x terminal box
Weight approx.	1.7 kg
Approvals	CE, UL/ CSA approval / E256710

Subject to modification in technic and design. Errors and omissions excepted.

Combination

Encoder with integrated centrifugal switch
Insulated blind hollow shaft ø16 mm, cone shaft ø17 mm
500…5000 pulses per revolution

HOG 86E + FSL

Part number

Incremental encoder with centrifugal force switch FSL

HOG86E	T				DN					+ FSL	

Switching speed (ns)
- 6 850...949 rpm (Δn = 2 rpm/s)*
- 5 950...1099 rpm (Δn = 2 rpm/s)*
- 4 1100...1299 rpm (Δn = 2 rpm/s)*
- 3 1300...1799 rpm (Δn = 2 rpm/s)*
- 2 1800...2499 rpm (Δn = 2 rpm/s)*
- 1 2500...4500 rpm (Δn = 2 rpm/s)*

Voltage supply / signals
- I 9...30 VDC / output stage HTL with inverted signals
- T 5 VDC / output stage TTL + inverted signals
- R 9...30 VDC / output stage TTL with inverted signals

Pulse number - see table

Output signals
- DN K1, K2, K0

Shaft diameter
- 6 Blind hollow shaft ø16 mm, fit H7
- 7 Cone shaft ø17 mm (1:10)

Insulation
- P PA insulated
- H Hybrid bearing

Connection
- T 1x terminal box, radial

Pulse number

500	1000	1250	2500	4096
512	1024	2048	3072	5000

Other pulse numbers on request.
* Please specify the exact switching speed in addition to the part number (factory setted threshold).

Subject to modification in technic and design. Errors and omissions excepted.

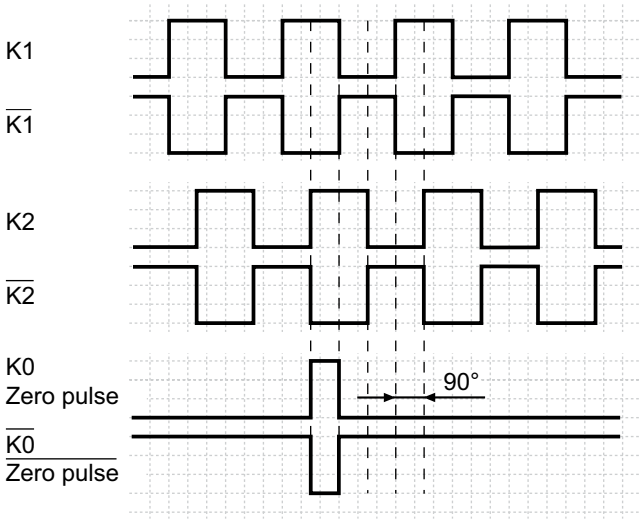
Combination

Encoder with integrated centrifugal switch
Insulated blind hollow shaft ø16 mm, cone shaft ø17 mm
500…5000 pulses per revolution

HOG 86E + FSL

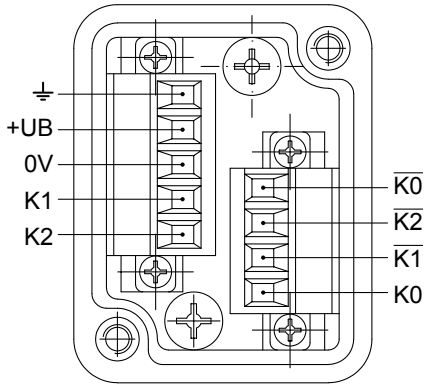
Output signals

At positive rotating direction

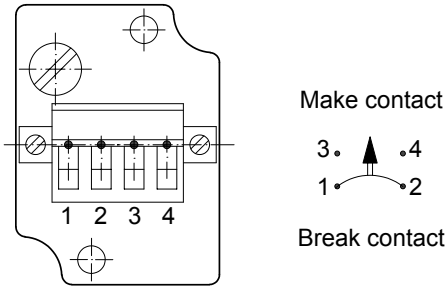


Terminal assignment

View A
Connecting terminal in terminal box HOG 86E



View B
Connecting terminal mechanical centrifugal switch FSL



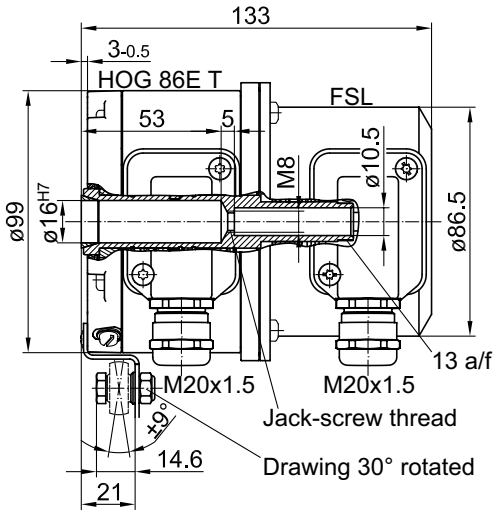
Accessories

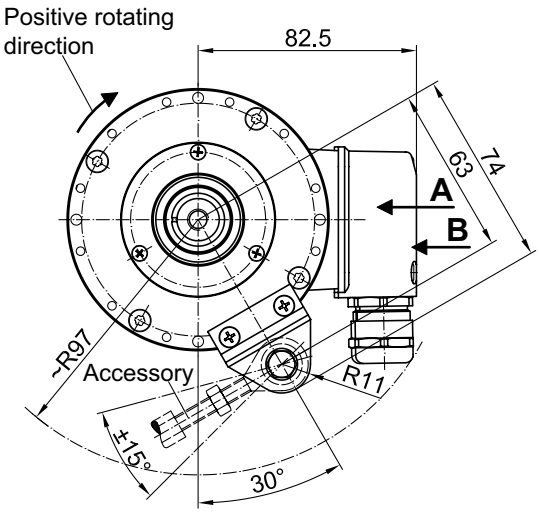
Connectors and cables	
HEK 8	Sensor cable for encoders
Mounting accessories	
11077087	Mounting and dismounting set
11071906	Mounting kit earthing strap
DMS 6	Torque arm size M6
11071904	Mounting kit for torque arm size M6
Diagnostic accessories	
HENQ 1100	Analyzer for encoders

Subject to modification in technic and design. Errors and omissions excepted.

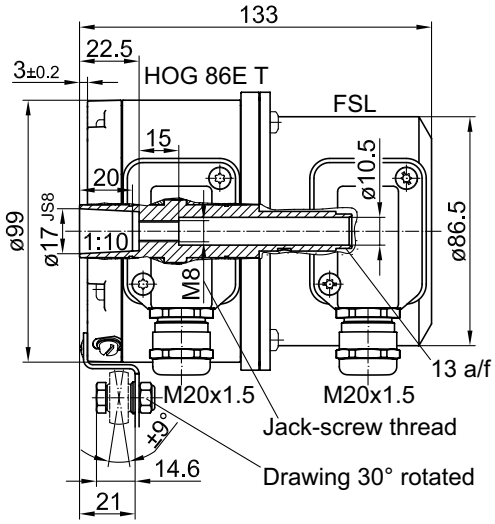
Dimensions

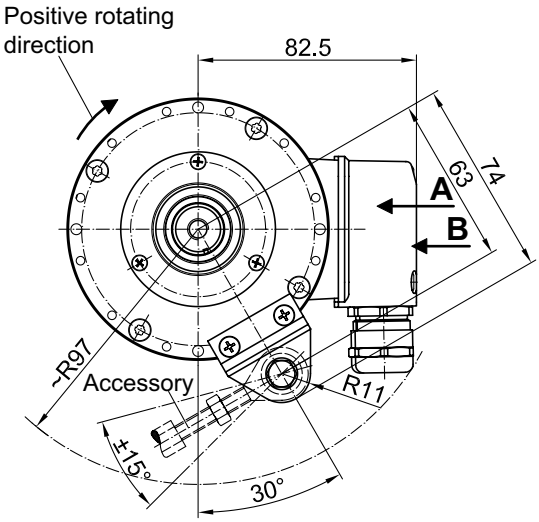
Blind hollow shaft





Cone shaft





Subject to modification in technic and design. Errors and omissions excepted.

Combination

Encoder with integrated centrifugal switch
Insulated blind hollow shaft ø16 mm, cone shaft ø17 mm
500…5000 pulses per revolution

HOG 86 + FSL

HOG 86 + FSL

Features

- **Mechanical speed monitoring based on centrifugal force**
- **Robust, compact housing**
- **Two-sided bearing system with optimal bearing spacing**
- **Shaft load up to 450 N, shaft insulation up to 2.8 kV**
- **Terminal boxes, turn by 180°**

Optional

- **Hybrid bearings for 3 times longer lifetime**
- **Function control with EMS (Enhanced Monitoring System)**
- **Redundant sensing with two terminal boxes**

Technical data - electrical ratings

Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-3

Technical data - electrical ratings (encoder)

Voltage supply	9...30 VDC 5 VDC ±5 %
Consumption w/o load	≤100 mA
Pulses per revolution	500...5000
Phase shift	90° ±20°
Scan ratio	45...55 % (40...60 % >3072 pulses per revolution)
Reference signal	Zero pulse, width 90°
Output frequency	≤120 kHz ≤300 kHz (on request)
Output signals	K1, K2, K0 + inverted Error output (only EMS)
Output stages	HTL-P (power linedriver) TTL/RS422
Sensing method	Optical
Shaft insulation	2.8 kV
Transmission length	≤350 m at 100 kHz (HTL-P) ≤550 m at 100 kHz (TTL)

Technical data - electrical ratings (centrifugal switch)

Switching accuracy	±4 % (Δn = 2 rpm/s); = +20 % (Δn = 1500 rpm/s)
Switching deviation	≤3 % (cw-ccw rotation)
Switching hysteresis	~40 % of switching speed
Switching outputs	1 output, speed control
Output switching capacity	≤6 A / 230 VAC; ≤1 A / 125 VDC
Minimum switching current	50 mA

Technical data - mechanical design

Size (flange)	ø105 mm
Shaft type	ø16 mm (blind hollow shaft) ø17 mm (cone shaft 1:10)
Admitted shaft load	≤350 N axial ≤450 N radial
Protection DIN EN 60529	IP 66
Speed (n)	≤1.25 · ns
Range of switching speed (ns)	850...4500 rpm (Δn = 2 rpm/s)
Operating torque typ.	6 Ncm
Rotor moment of inertia	200 gcm²
Materials	Housing: aluminium, coated Shaft: stainless steel
Operating temperature	-40...+100 °C -25...+100 °C (>3072 pulses per revolution)
Resistance	IEC 60068-2-6 Vibration 5 g, 10-2000 Hz IEC 60068-2-27 Shock 50 g, 11 ms
Corrosion protection	IEC 60068-2-52 Salt mist Complies to ISO 12944-5:1998 Protective paint systems (C4)
Connection	2x terminal box 3x terminal box (with option M)
Weight approx.	1.9 kg, 2 kg (with option M)
Approval	CE

Subject to modification in technic and design. Errors and omissions excepted.

Combination

Encoder with integrated centrifugal switch
Insulated blind hollow shaft ø16 mm, cone shaft ø17 mm
500…5000 pulses per revolution

HOG 86 + FSL

Part number

Incremental encoder with centrifugal force switch FSL

HOG86			T				DN					+ FSL	

Switching speed (ns)
- 6 850...949 rpm (Δn = 2 rpm/s)*
- 5 950...1099 rpm (Δn = 2 rpm/s)*
- 4 1100...1299 rpm (Δn = 2 rpm/s)*
- 3 1300...1799 rpm (Δn = 2 rpm/s)*
- 2 1800...2499 rpm (Δn = 2 rpm/s)*
- 1 2500...4500 rpm (Δn = 2 rpm/s)*

Voltage supply / signals
- I 9...30 VDC / output stage HTL with inverted signals
- T 5 VDC / output stage TTL + inverted signals
- R 9...30 VDC / output stage TTL with inverted signals

Pulse number - see table

Output signals
- DN K1, K2, K0

Shaft diameter
- 6 Blind hollow shaft ø16 mm, fit H7
- 7 Cone shaft ø17 mm (1:10)

Insulation
- H Hybrid bearing
- P PA insulated (not possible at redundant sensing)

Redundant sensing
- Without redundant sensing
- M With redundant sensing

EMS - Enhanced Monitoring System
- Without EMS
- .2 With EMS

Pulse number

500	1000	1250	2500	4096
512	1024	2048	3072	5000

Other pulse numbers on request.
* Please specify the exact switching speed in addition to the part number (factory setted threshold).

Subject to modification in technic and design. Errors and omissions excepted.

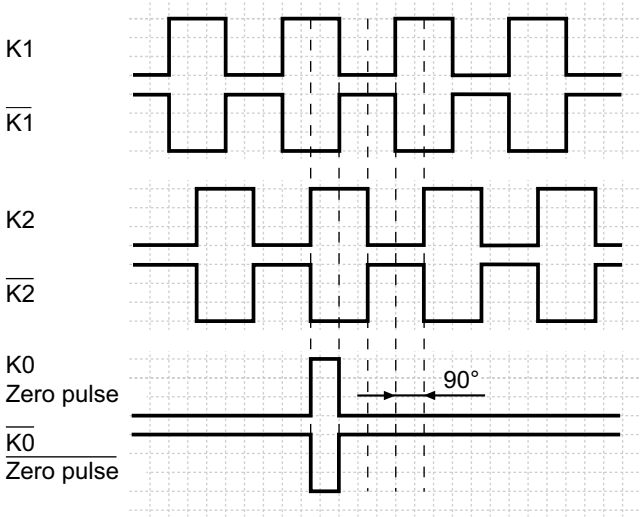
Combination

Encoder with integrated centrifugal switch
Insulated blind hollow shaft ø16 mm, cone shaft ø17 mm
500…5000 pulses per revolution

HOG 86 + FSL

Output signals

At positive rotating direction

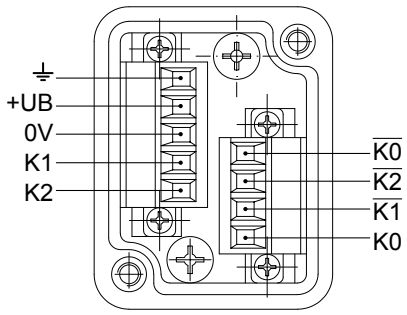


Accessories

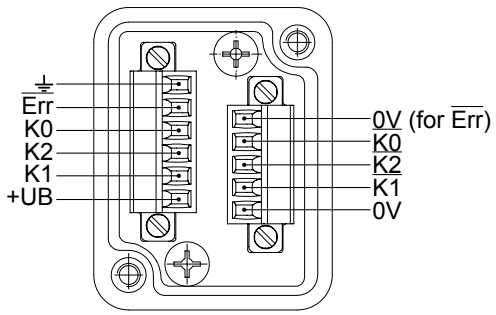
Connectors and cables	
HEK 8	Sensor cable for encoders
Mounting accessories	
11077087	Mounting and dismounting set
11071906	Mounting kit earthing strap
DMS 6	Torque arm size M6
11071850	Support plate mounting kit R63 for torque arm size M6
11082676	Support plate mounting kit R69 for torque arm size M6
11072076	Screw mounting kit for torque arm size M6
11071904	Mounting kit for torque arm size M6
Diagnostic accessories	
HENQ 1100	Analyzer for encoders

Terminal assignment

View A
Connecting terminal in terminal box HOG 86



Option EMS: View A
Connecting terminal in terminal box HOG 86.2

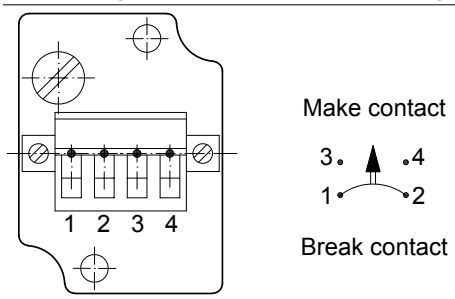


LED status / Error output

Flash light red*	Error of signal sequenze, zero pulse or pulses (Error output = HIGH-LOW alternation)
Red	Overload output driver (Error output = LOW)
Flash light green	Encoder o.k., rotating (Error output = HIGH)
Green	Encoder o.k., stopped (Error output = HIGH)
No light	No output voltage connection or wrong connection (Error output = LOW)

* Only at rotating encoder

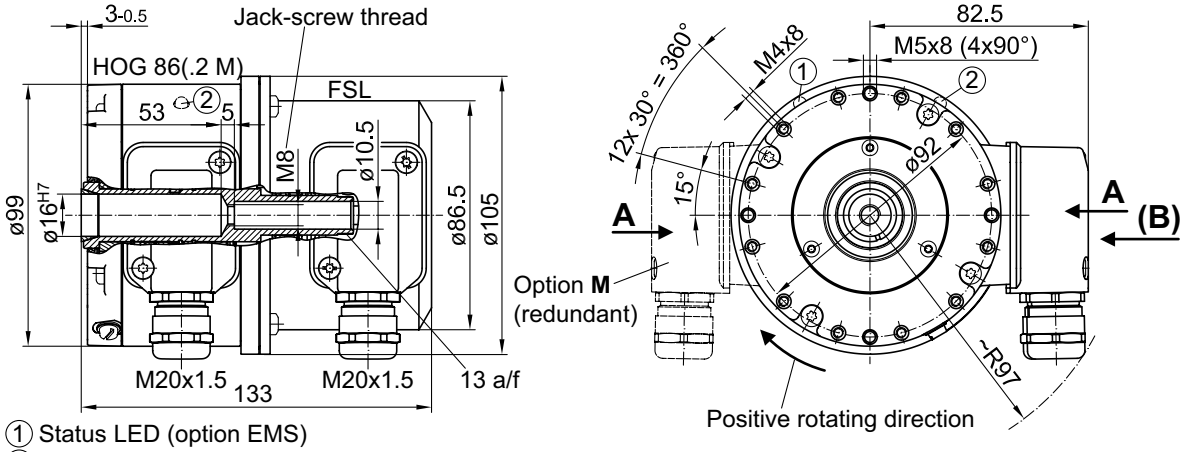
View B
Connecting terminal mechanical centrifugal switch FSL



Subject to modification in technic and design. Errors and omissions excepted.

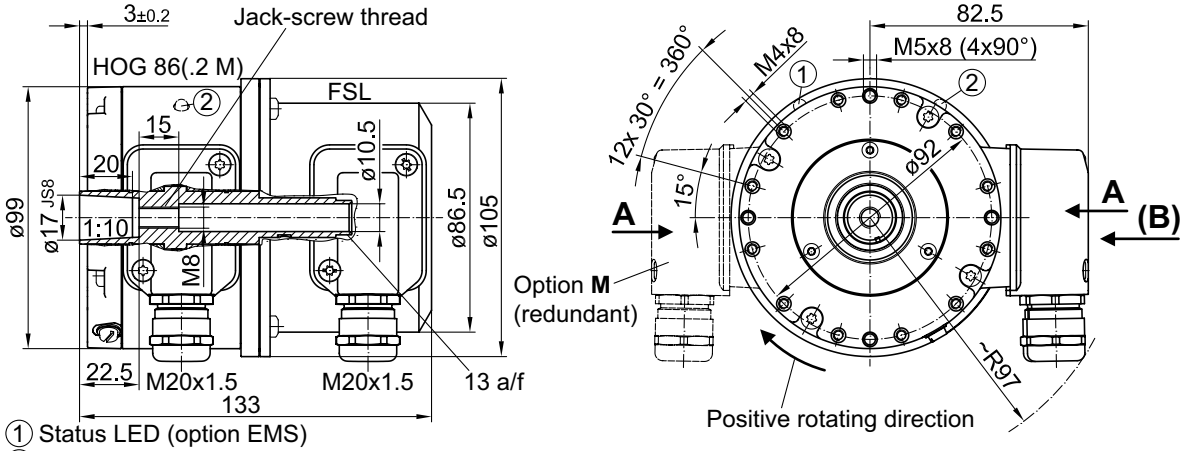
Dimensions

Blind hollow shaft



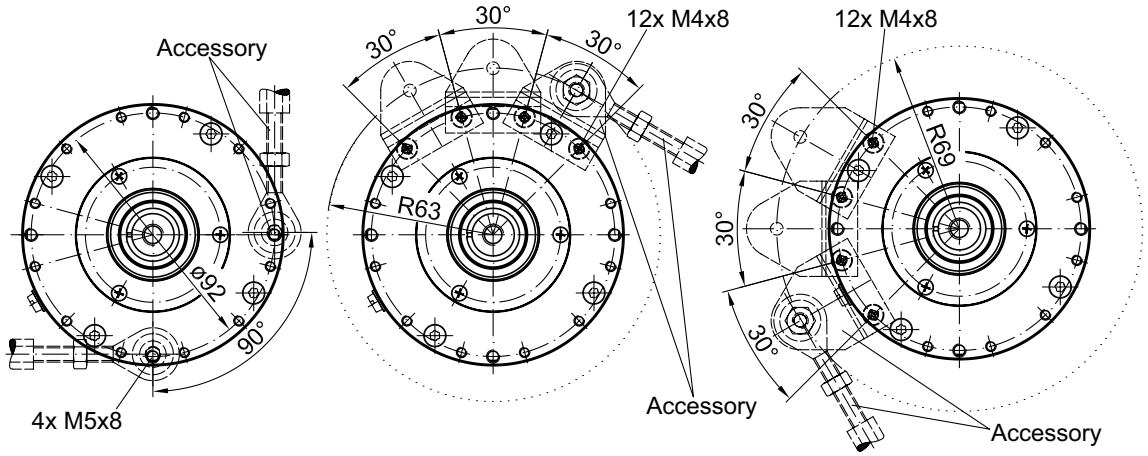
① Status LED (option EMS)
② Status LED (option **M** (redundant) and EMS)

Cone shaft



① Status LED (option EMS)
② Status LED (option **M** (redundant) and EMS)

Mounting possibilities



Subject to modification in technic and design. Errors and omissions excepted.

Incremental encoders

Redundant sensing, isolated blind hollow shaft ø12...16 mm, cone shaft ø17 mm
500...5000 pulses per revolution

HOG 86 M

HOG 86.2 M T

Features

- **Robust, compact housing**
- **Two bearings with large distance, one at each end**
- **High shaft load up to 450 N**
- **Shock resistant up to 250 g**
- **Shaft insulation up to 2.8 kV**
- **Highest operating speed 10000 rpm**
- **Terminal boxes, turn by 180°**
- **Redundant sensing**
- **Hybrid bearing for extended lifetime**

Optional

- **Function control (EMS)**

Technical data - electrical ratings

Voltage supply	9...30 VDC 5 VDC ±5 %
Consumption w/o load	≤100 mA
Pulses per revolution	500...5000
Phase shift	90° ±20°
Scan ratio	45...55 % (40...60 % >3072 pulses per revolution)
Reference signal	Zero pulse, width 90°
Operating principle	Redundant sensing
Sensing method	Optical
Output frequency	≤120 kHz ≤300 kHz (on request)
Output signals	K1, K2, K0 + inverted Error output (only EMS)
Output stages	HTL-P (power linedriver) TTL/RS422
Shaft insulation	2.8 kV
Transmission length	≤350 m at 100 kHz (HTL-P) ≤550 m at 100 kHz (TTL)
Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-3
Approvals	CE, UL/ CSA approval / E256710

Technical data - mechanical design

Size (flange)	ø99 mm
Shaft type	ø12...16 mm (blind hollow shaft) ø17 mm (cone shaft 1:10)
Admitted shaft load	≤350 N axial ≤450 N radial
Motor shaft tolerance	0.2 mm radial
Protection DIN EN 60529	IP 66
Operating speed	≤10000 rpm (mechanical)
Operating torque	≤6 Ncm
Rotor moment of inertia	160 gcm²
Materials	Housing: aluminium Shaft: stainless steel
Operating temperature	-40...+100 °C -25...+100 °C (>3072 pulses per revolution)
Resistance	IEC 60068-2-6 Vibration 15 g, 10-2000 Hz IEC 60068-2-27 Shock 250 g, 6 ms
Corrosion protection	IEC 60068-2-52 Salt mist Complies to ISO 12944-5:1998 Protective paint systems (C4)
Explosion protection	II 3 G Ex nA IIC T4 Gc (gas) II 3 D Ex tc IIIC T135°C Dc (dust)
Connection	2x terminal box
Weight approx.	1.4 kg

· Subject to modification in technic and design. Errors and omissions excepted.

HOG 86 M

Part number

HOG86		M	T	H			DN				

Voltage supply / signals
- I 9...30 VDC / output stage HTL with inverted signals
- T 5 VDC / output stage TTL with inverted signals
- R 9...30 VDC / output stage TTL with inverted signals

Pulse number - see table

Output signals
- DN K1, K2, K0 + inverted

Shaft diameter
- 2 Blind hollow shaft ø12 mm, fit H7
- 9 Blind hollow shaft ø12 mm, fit F6
- 6 Blind hollow shaft ø16 mm, fit H7
- 8 Blind hollow shaft ø16 mm, fit G7
- 7 Cone shaft ø17 mm (1:10)

Insulation
- H Hybrid bearing

Connection
- T 2x terminal boxes, radial

EMS - Enhanced Monitoring System
- Without EMS
- .2 With EMS

Pulse number

500	1000	1250	2500	4096
512	1024	2048	3072	5000

Accessories

Connectors and cables	
HEK 8	Sensor cable for encoders
Mounting accessories	
11077087	Mounting and dismounting set
11071906	Mounting kit earthing strap
DMS 6	Torque arm size M6
11071850	Support plate mounting kit R63 for torque arm size M6
11082676	Support plate mounting kit R69 for torque arm size M6
11072076	Screw mounting kit for torque arm size M6
11071904	Mounting kit for torque arm size M6
Diagnostic accessories	
HENQ 1100	Analyzer for encoders

. Subject to modification in technic and design. Errors and omissions excepted. .

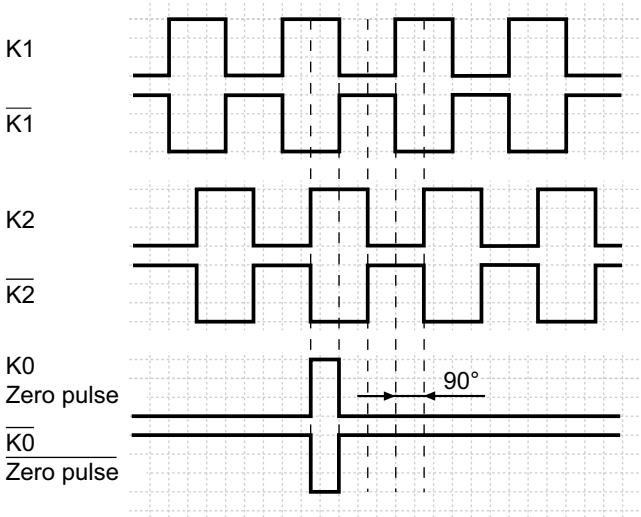
Incremental encoders

Redundant sensing, isolated blind hollow shaft ø12...16 mm, cone shaft ø17 mm
500...5000 pulses per revolution

HOG 86 M

Output signals

At positive rotating direction

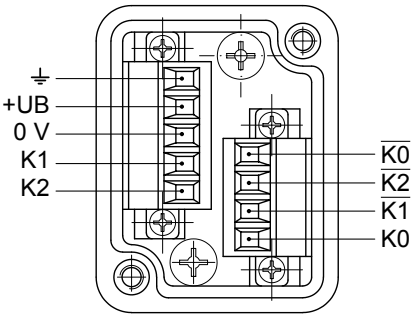


Option EMS: LED status / Error output	
Flash light red*	Error of signal sequenze, zero pulse or pulses (Error output = HIGH-LOW alternation)
Red	Overload output driver (Error output = LOW)
Flash light green	Encoder o.k., rotating (Error output = HIGH)
Green	Encoder o.k., stopped (Error output = HIGH)
No light	No output voltage connection or wrong connection (Error output = LOW)

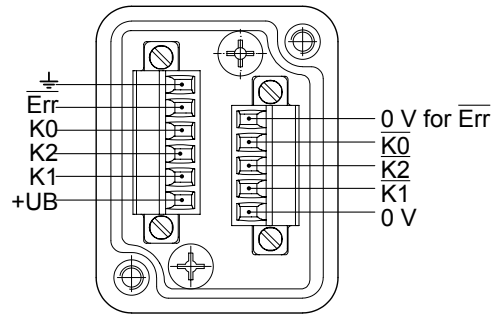
* Only at rotating encoder

Terminal assignment

HOG 86 M T - View A
Connecting terminal in terminal box



HOG 86.2 M T - View A
Connecting terminal in terminal box

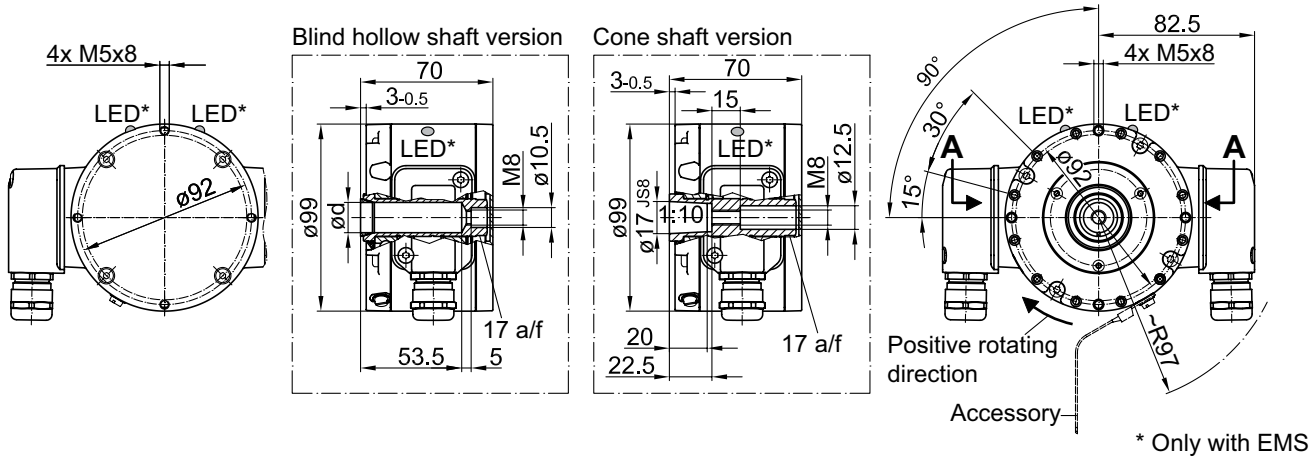


· Subject to modification in technic and design. Errors and omissions excepted. ·

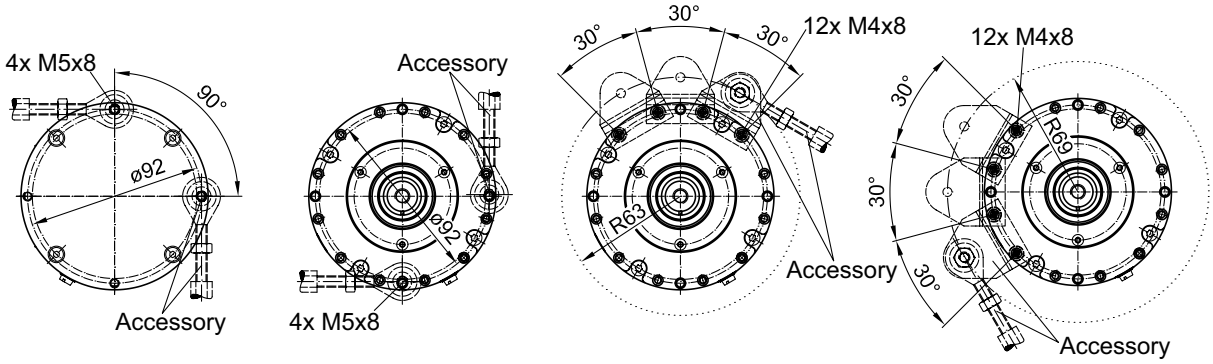
HOG 86 M

Dimensions

HOG 86 M T - Version with radial terminal boxes



HOG 86 M - Mounting possibilities



· Subject to modification in technic and design. Errors and omissions excepted.

HOG 86

Part number

Incremental encoder

HOG86 [ ][ ][ ][ ][ ][ ] **DN** [ ][ ][ ][ ]

Voltage supply / signals
- I 9...30 VDC / output stage HTL with inverted signals
- T 5 VDC / output stage TTL with inverted signals
- R 9...30 VDC / output stage TTL with inverted signals

Pulse number - see table

Output signals
- DN K1, K2, K0 + inverted

Shaft diameter
- 2 Blind hollow shaft ø12 mm, fit H7
- 6 Blind hollow shaft ø16 mm, fit H7
- 7 Cone shaft ø17 mm (1:10)
- 8 Blind hollow shaft ø16 mm, fit G7
- 9 Blind hollow shaft ø12 mm, fit F6

Insulation
- H Hybrid bearing
- P PA insulated

Connection
- T 1x terminal box, radial
- F 1x flange connector M23, radial
- K Cable 1 m, radial

EMS - Enhanced Monitoring System
- Without EMS
- .2 With EMS

Pulse number

500	1000	1250	2500	4096
512	1024	2048	3072	5000

Other pulse numbers on request.

Accessories

Connectors and cables

HEK 8	Sensor cable for encoders
11068577	Mating connector M23, solder version, 12-pin, CCW

Mounting accessories

11077087	Mounting and dismounting set
11071906	Mounting kit earthing strap
DMS 6	Torque arm size M6
11071850	Support plate mounting kit R63 for torque arm size M6
11082676	Support plate mounting kit R69 for torque arm size M6
11072076	Screw mounting kit for torque arm size M6

Mounting accessories

11071904	Mounting kit for torque arm size M6

Diagnostic accessories

HENQ 1100	Analyzer for encoders

Subject to modification in technic and design. Errors and omissions excepted.

Incremental encoders

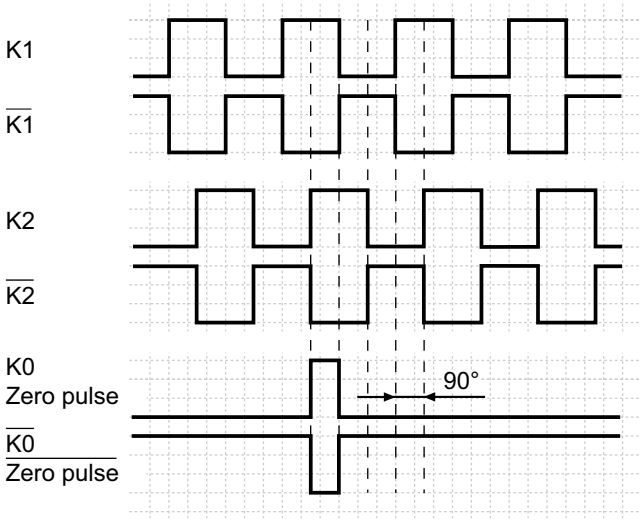
Insulated blind hollow shaft ø12...16 mm, cone shaft ø17 mm

500...5000 pulses per revolution

HOG 86

Output signals

At positive rotating direction



Option EMS: LED status / Error output	
Flash light red*	Error of signal sequenze, zero pulse or pulses (Error output = HIGH-LOW alternation)
Red	Overload output driver (Error output = LOW)
Flash light green	Encoder o.k., rotating (Error output = HIGH)
Green	Encoder o.k., stopped (Error output = HIGH)
No light	No output voltage connection or wrong connection (Error output = LOW)

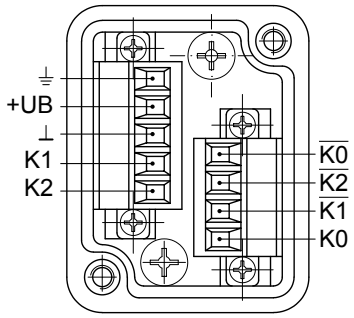
* Only at rotating encoder

Terminal significance

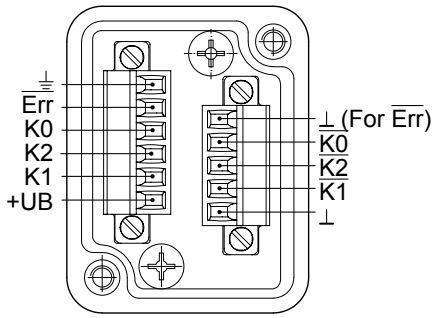
+UB	Voltage supply (for the encoder)
⊥; ⏚; GND; 0 V	Ground (for the signals)
⏚;	Earth ground (chassis)
K1; A; A+	Output signal channel 1
$\overline{K1}$; $\overline{A}$; A-	Output signal channel 1 inverted
K2; B; B+	Output signal channel 2 (offset by 90° to channel 1)
$\overline{K2}$; $\overline{B}$; B-	Output signal channel 2 (offset by 90° to channel 1) inverted
K0; C; R; R+	Zero pulse (reference signal)
$\overline{K0}$; $\overline{C}$; $\overline{R}$; R-	Zero pulse (reference signal) inverted
$\overline{Err}$; Err-	Error output

Terminal assignment

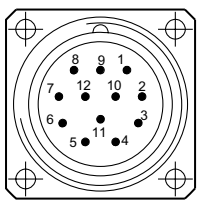
HOG 86 T - View A
Connecting terminal terminal box



HOG 86.2 T - View A
Connecting terminal terminal box



HOG 86(.2) F - View B Pin	Assignment	HOG 86(.2) K Wire colour
1	$\overline{K2}$	Yellow
2	Do not use	-
3	K0	Grey
4	$\overline{K0}$	Pink
5	K1	White
6	$\overline{K1}$	Brown
7	Do not use (With EMS: $\overline{Err}$)	Black
8	K2	Green
9	Do not use (With EMS: ⊥)	Violet
10	⊥	Blue
11	Do not use	-
12	+UB	Red



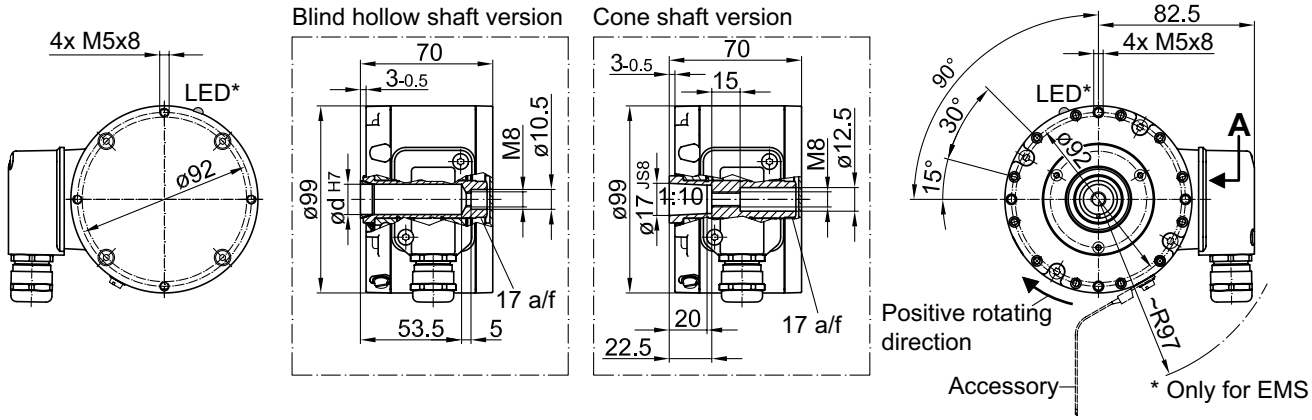
Flange connector M23, 12-pin, male, CW

Subject to modification in technic and design. Errors and omissions excepted.

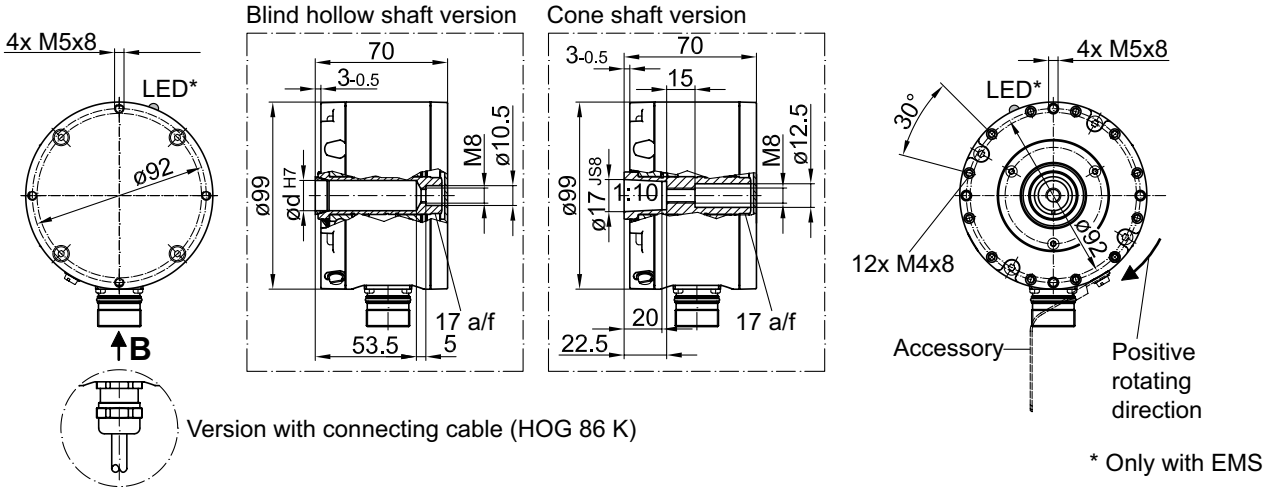
HOG 86

Dimensions

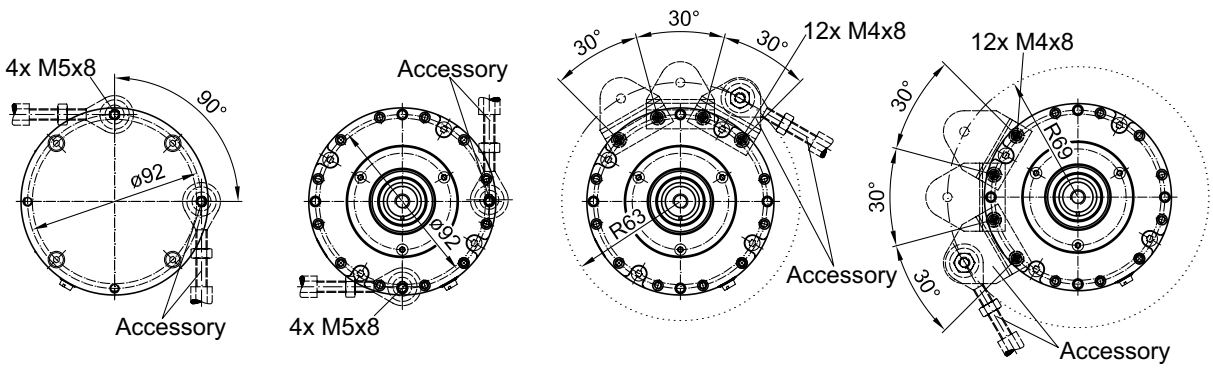
HOG 86 T - Version with radial terminal box



HOG 86 F - Version with radial connector M23, HOG 86 K - Version with radial connecting cable



HOG 86 - Mounting possibilities



Subject to modification in technic and design. Errors and omissions excepted.