Combination

Encoder and tachogenerator in combination
Solid shaft with EURO flange B10
100…5000 pulses per revolution

FOG 9 + GT 7

FOG 9 + GT 7

Features

- **Compact, robust die-cast housing**
- **Flange connector with metal mating connector**
- **EURO flange B10, solid shaft ø11 mm**
- **Temperature compensation of tacho voltage as standard**
- **Open circuit voltage 10...60 mV per rpm**

Optional

- **Connecting cable**
- **Function control with EMS (Enhanced Monitoring System)**

Technical data - electrical ratings (tachogenerator)

Reversal tolerance	≤0.1 %
Linearity tolerance	≤0.15 %
Temperature coefficient	±0.05 %/K (open-circuit)
Isolation class	B
Calibration tolerance	±5 %
Climatic test	Humid heat, constant (IEC 60068-2-3, Ca)
Armature-circuit time-constant	<4 µs
FOG 9 + GT 7.08	
Performance	0.3 W (speed ≥5000 rpm)
Open-circuit voltage	10...30 mV per rpm
FOG 9 + GT 7.16	
Performance	0.6 W (speed ≥5000 rpm)
Open-circuit voltage	40...60 mV per rpm

Technical data - electrical ratings (encoder)

Voltage supply	9...30 VDC; 5 VDC ±5 %
Consumption w/o load	≤100 mA
Pulses per revolution	100...5000
Phase shift	90° ±20°
Scan ratio	40...60 %
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; TTL/RS422

Technical data - mechanical design

Size (flange)	ø115 mm
Shaft type	ø11 mm solid shaft
Admitted shaft load	≤200 N axial ≤300 N radial
Flange	EURO flange B10
Protection DIN EN 60529	IP 55
Operating speed	≤10000 rpm
Operating torque typ.	6 Ncm
Rotor moment of inertia	160 gcm²
Materials	Housing: aluminium die-cast Shaft: stainless steel
Operating temperature	-30...+100 °C -25...+100 °C (>3072 pulses per revolution)
Resistance	IEC 60068-2-6 Vibration 10 g, 10-2000 Hz IEC 60068-2-27 Shock 100 g, 6 ms
Connection	Flange connector M23, 12-pin Screw terminal connector Connecting cable (option)
Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-3
Approval	CE
FOG 9 + GT 7.08	
Weight approx.	1.3 kg
FOG 9 + GT 7.16	
Weight approx.	1.6 kg

Combination

Encoder and tachogenerator in combination
Solid shaft with EURO flange B10
100…5000 pulses per revolution

FOG 9 + GT 7

Part number

Incremental encoder with tachogenerator

FOG9 [ ] [ ] **DN** [ ] [ ] [ ] [ ] **+ GT7.08L/4** [ ]

Open-circuit voltage
- 10 10 mV per rpm
- 20 20 mV per rpm
- 30 30 mV per rpm

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

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

Pulse number

100	200	400	900	2048
120	250	500	1000	2500
128	256	512	1024	3072
180	300	600	1200	4096
192	360	720	1250	5000

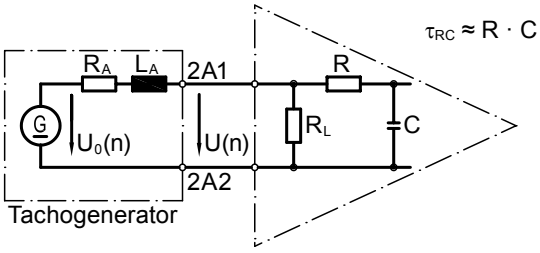
Other pulse numbers on request.

Data according to type

Type	Off-load voltage	Minimum load required depending on speed range [rpm]			Maximum operating speed	Armature resistance	Armature inductance
		0-3000	0-6000	0-n_{max}			
	U_0 [mV/rpm]	R_L [kΩ]	R_L [kΩ]	R_L [kΩ]	n_{max} [rpm]	R_A (20°C) [Ω]	L_A [mH]
GT7.08L/4**10**	10	≥5	≥12	≥27	9000	60	20
GT7.08L/4**20**	20	≥20	≥48	≥108	9000	230	80
GT7.08L/4**30**	30	≥45	≥108	≥243	9000	550	180

Superimposed ripple (for τ_{RC} = 0.3 ms): ≤0.6% (peak-peak) ≤0.25% (rms)

Replacement switching diagram



Polarity for positive rotating direction:
2A1: **+**
2A2: **–** (VDE)

$$U(n) = U_0(n) \frac{R_L}{R_A + R_L} \approx U_0(n) \text{ for } R > R_L \gg R_A$$

Combination

Encoder and tachogenerator in combination
Solid shaft with EURO flange B10
100…5000 pulses per revolution

FOG 9 + GT 7

Part number

Incremental encoder with tachogenerator

FOG9 [ ] [ ] **DN** [ ] [ ] [ ] [ ] **+ GT7.16L/4** [ ]

Open-circuit voltage
- 40 40 mV per rpm
- 60 60 mV per rpm

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

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

Pulse number

100	200	400	900	2048
120	250	500	1000	2500
128	256	512	1024	3072
180	300	600	1200	4096
192	360	720	1250	5000

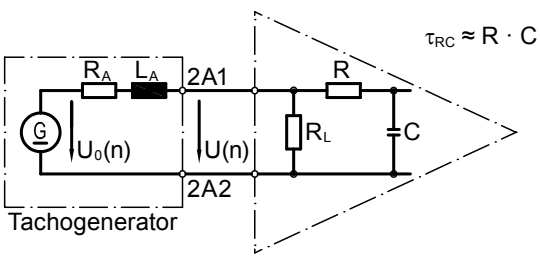
Other pulse numbers on request.

Data according to type

Type	Off-load voltage	Minimum load required depending on speed range [rpm]			Maximum operating speed	Armature resistance	Armature inductance
		0-3000	0-6000	0-n_{max}			
	U_0 [mV/rpm]	R_L [kΩ]	R_L [kΩ]	R_L [kΩ]	n_{max} [rpm]	R_A (20°C) [Ω]	L_A [mH]
GT7.16L/4**40**	40	≥40	≥96	≥216	9000	410	160
GT7.16L/4**60**	60	≥90	≥215	≥223	6100	760	360

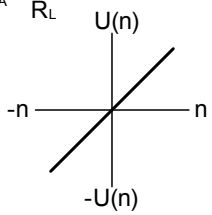
Superimposed ripple (for τ_{RC} = 0.3 ms): ≤0.6% (peak-peak) ≤0.25% (rms)

Replacement switching diagram



$\tau_{RC} \approx R \cdot C$

$\tau_A \approx \frac{L_A}{R_L}$

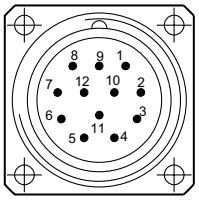


Polarity for positive rotating direction:
2A1: **+**
2A2: **–** (VDE)

$U(n) = U_0(n) \frac{R_L}{R_A + R_L} \approx U_0(n)$ for $R > R_L \gg R_A$

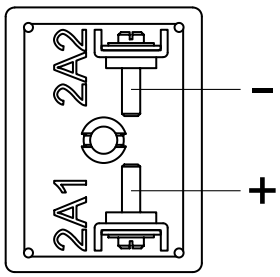
Terminal assignment

View A Flange connector M23 FOG 9, 12 pin, male contacts, CW		Connecting cable assignment
Pin	Assignment	Cable colour
1	$\overline{K2}$ (K2 inv.)	Yellow
2	Do not use	---
3	K0 (Zero pulse)	Grey
4	$\overline{K0}$ (Zero pulse inv.)	Pink
5	K1	White
6	$\overline{K1}$ (K1 inv.)	Brown
7	Do not use (Option EMS: $\overline{Err}$)	---
8	K2	Green
9	Do not use (Option EMS: 0 V)	---
10	0 V	Blue
11	Do not use	---
12	+UB	Red



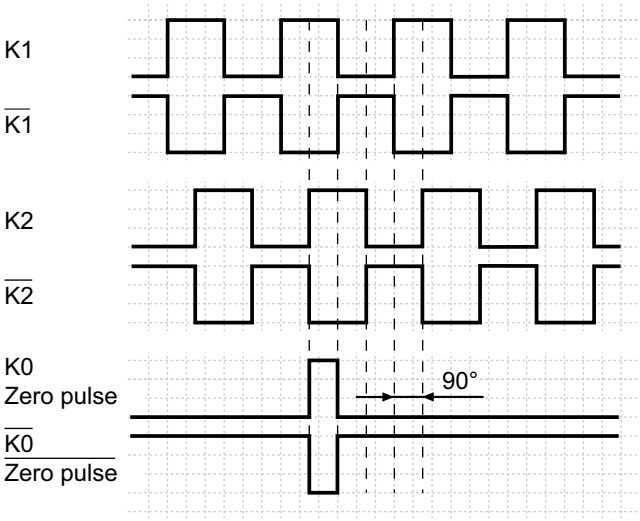
View A - Connecting terminal GT 7

Polarity for positive rotating direction



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

Accessories

Connectors and cables	
HEK 8	Sensor cable for encoders

Mounting accessories	
K 35	Spring washer coupling for solid shaft ø6...12 mm
K 50	Spring washer coupling for solid shaft ø11...16 mm
K 60	Spring washer coupling for solid shaft ø11...22 mm

Diagnostic accessories	
HENQ 1100	Analyzer for encoders

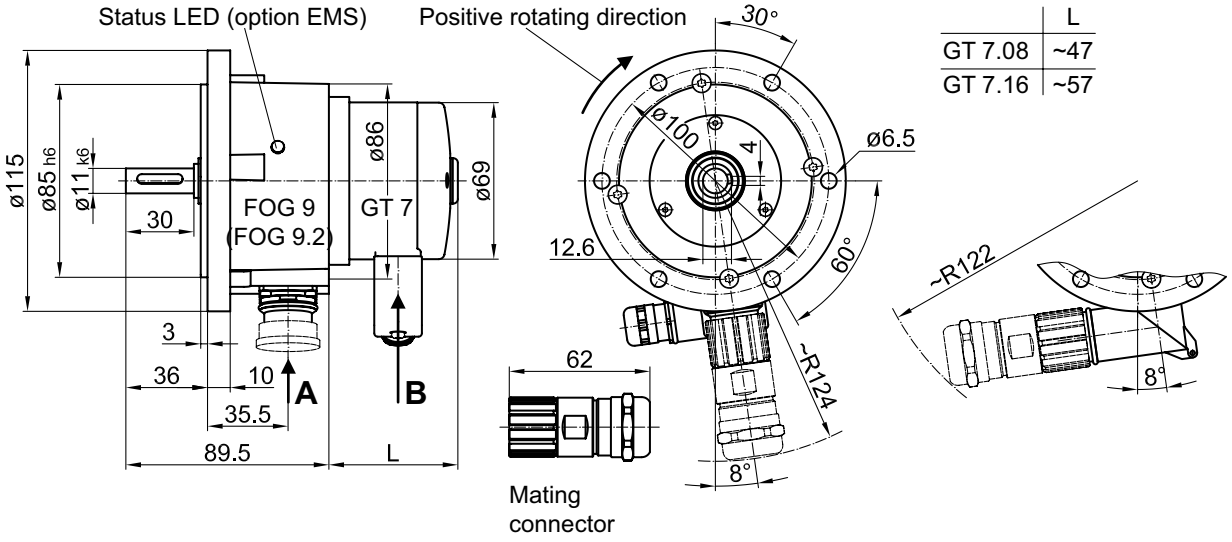
Combination

Encoder and tachogenerator in combination
Solid shaft with EURO flange B10
100…5000 pulses per revolution

FOG 9 + GT 7

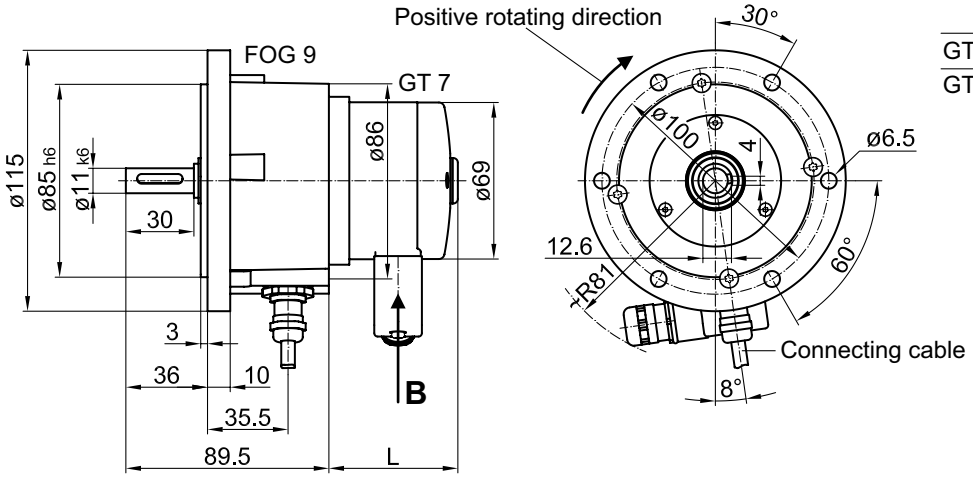
Dimensions

FOG 9 + GT 7 (FOG 9.2 + GT 7) - Version with flange connector



	L
GT 7.08	~47
GT 7.16	~57

FOG 9 + GT 7 - Version with connecting cable



	L
GT 7.08	~47
GT 7.16	~57