



General

In contrast to incremental rotary transducers, angle encoders supply unambiguous code information in every angle position. The advantage of this method is that even after a power failure, the actual position is sent to the evaluation electronics. Measurement errors caused by missing pulses and cumulative errors are also eliminated.

- Single-turn: 4096 measurement increments per 360 ° (optional: 8192)
- Multi-turn: 4096 measurement increments per 360 ° (optional: 8192) with max. 4096 revolutions
- Permissible shaft load 250 N (axial and radial)

Structure

The flange and housing consist of anodised aluminium. A 12 mm ball bearing with a sealing ring is used for the shaft bearing. We make a distinction between a clamping and synchronous flange.

Measurement principle

The encoder works on the visual measuring principle. The code disk is scanned via GaAlAs diodes. By using a special opt-array with a reference transistor (this keeps the load of the LED controllable) and ASICs developed by the company it has been possible to further improve long-term reliability.

Code types

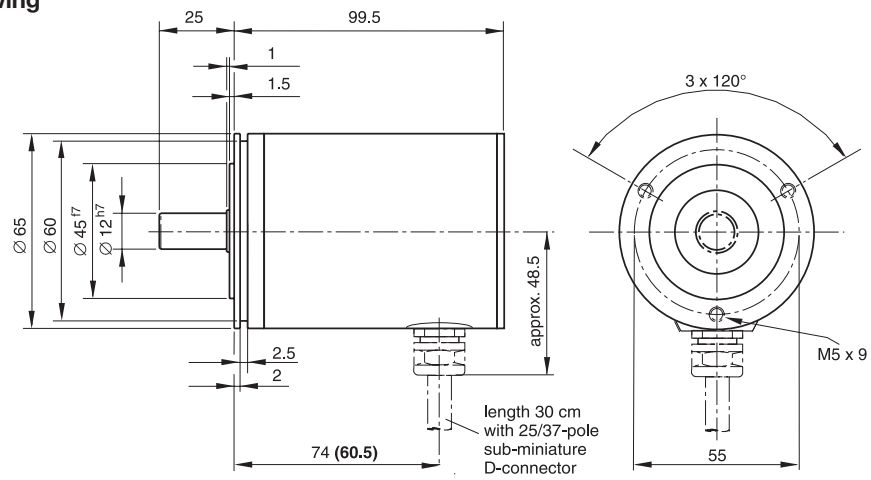
The encoders supply their information in the Gray code.

Technical Data

Electrical data	
Sensor system	GaAlAs diode photo-array, photo-transistor array
Measurement increment deviation	$\leq \pm 2' 38''$
Parallel outputs	ground-switching, positive-switching
Serial outputs (SSI)	RS 422 / 485
Output frequency	max. 10 kHz
Output code	Gray
Signal input E6 (code run)	low signal < 0.8 V , high signal > 3.2 V
Operating voltage range	+ 11 V ... + 30 V DC
Operating current	single-turn: 50 mA, typical, max. 70 mA multi-turn: 60 mA, typical, max. 80 mA
EMC, electromagnetic compatibility	Emitted interference DIN EN 50081-2 Interference immunity DIN EN 50082-2
Mechanical data	
Operating speed	3000 rpm max. (continuous) 4000 rpm max. (short term) at max. shaft load and -20°C ... +60°C operating temperature, higher values are possible at low load.
Angle acceleration	10^5 rad/s^2 max.
Operating torque	$\leq 5 \text{ Ncm}$ at a speed of 1000 rpm 8 Ncm at a speed of 1000 rpm (GEL 154/157)
Starting torque	$\leq 1 \text{ Ncm}$, 4 Ncm (GEL154/157)
Permissible shaft load	250 N axial and radial
Bearing life	10^9 revolutions
Weight	approx. 0.5 kg (GEL 153 /157 /159) approx. 0.7 kg (GEL 152 /154 /158)
Ambient data	
Operating temperature	-20°C ... +60°C (optionally -40°C ... +85°C)
Storage temperature range	-25°C ... +70°C
Permissible relative humidity	85 % without condensation
Shock resistance	200 m/s ² ; 11 ms (DIN IEC 68)
Vibration resistance	5 Hz ... 1000 Hz; 100 m/s ² (DIN IEC 68)
Protection type (DIN 40050)	GEL 152/153/158/159 IP 65 (Nilos ring) GEL 154/157 IP 66 (sealing ring)

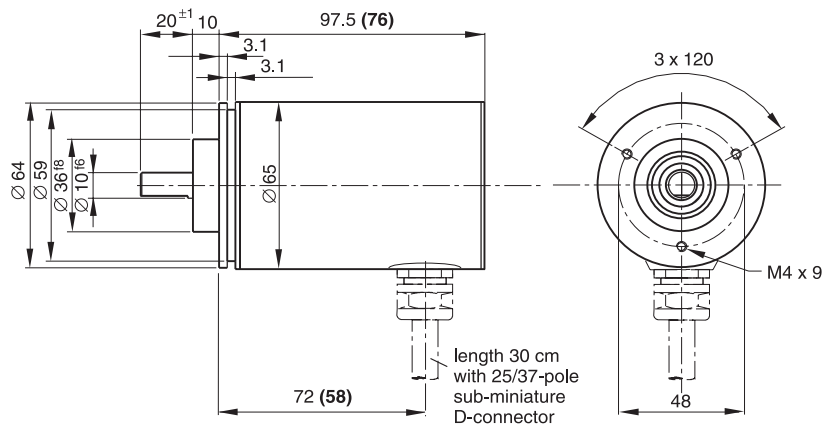
Dimensioned Drawings

**Dimensioned drawing
GEL 152 / 153**



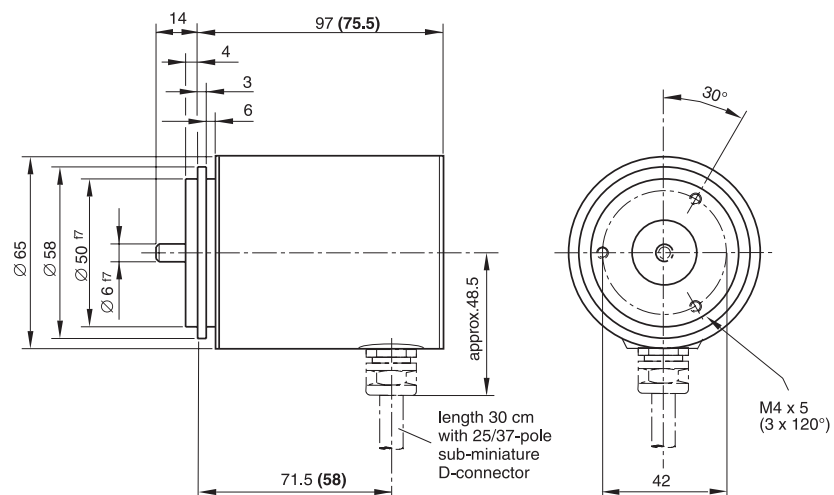
B-0351

**Dimensioned drawing
GEL 154/157**



B-0304

**Dimensioned drawing
GEL 158/159**



B-0350

Available versions Input and output circuits

Available versions Single-turn encoders

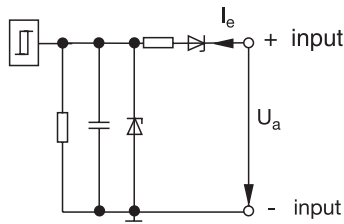
Type	Output circuit	Scope of delivery contains
GEL 153 G 4096 A 05	0 (ground-switching)	25-pole D-sub-miniature mating connector
GEL 157 G 4096 A 05		
GEL 159 G 4096 A 05		
GEL 153 G 4096 A 25	2 (positive-switching)	
GEL 157 G 4096 A 25		
GEL 159 G 4096 A 25		

Available versions Multi-turn encoders

Type	Output circuit	Scope of delivery contains
GEL 152 G 4096 N 05	0 (ground-switching)	37-pole D-sub-miniature mating connector
GEL 154 G 4096 N 05		
GEL 158 G 4096 N 05		
GEL 152 G 4096 N 25	2 (positive-switching)	
GEL 154 G 4096 N 25		
GEL 158 G 4096 N 25		

Input circuit E1

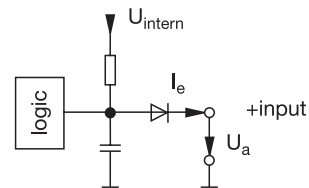
Function active „high" input



log 0 < 5 V DC or not connected
log 1 = 11 ... 30 V DC

Input circuit E2

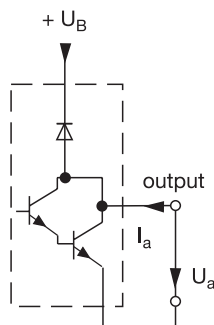
Function active „low" input



log 0 < 0.8 V DC
log 1 > 3.2 V DC or not connected

Output circuit 0

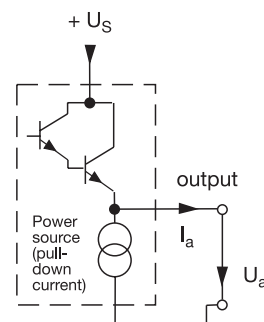
Open Collector
Darlington
(ground-switching)



$I_A \leq 50 \text{ mA}$

Output circuit 2

Open Emitter
Darlington
(positive-switching)

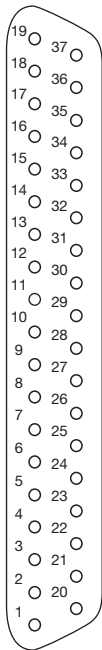


$I_A \leq 20 \text{ mA}$

Multi-turn encoder

Connection assignment 37-pole, sub-miniature connector (IP 30)

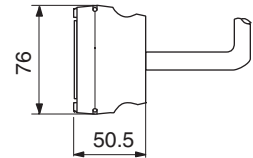
Soldered side
(socket part)



1 to 24	<i>Bit 1</i> <i>Bit 24</i>	least significant bit most significant bit
25	<i>Bit 25</i>	MSB with option 8192 increments / revolution
26	<i>Not occupied</i>	
27	<i>Not occupied</i>	
28	<i>Not occupied</i>	
29	<i>Not occupied</i>	
30	<i>Not occupied</i>	
31	<i>Latch</i>	input circuit E1
32	<i>Enable</i>	input circuit E1
33	<i>Code direction</i>	input circuit E2
34	<i>0 V</i>	reference potential
35	<i>Signal voltage</i>	5 ... 30 V (+U _S) only with output circuit 2
36	<i>Supply voltage</i>	11 ... 30 V (+U _B)
37	<i>Supply voltage</i>	0 V (-U _B) jumpered with Pole 34

DB 37S

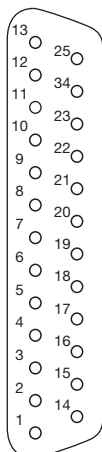
depth of
connector
approx. 15



Single-turn encoder

Connection assignment 25-pole, sub-miniature connector (IP 30)

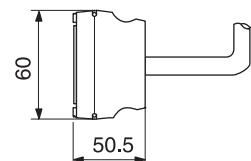
Soldered side
(socket part)



1	<i>Bit 1</i>	least significant bit
2	<i>Bit 2</i>	
3 to 10	<i>Bit n</i>	
11	<i>Bit 11</i>	
12	<i>Bit 12</i>	most significant bit
13 to 18	<i>Bit 13</i> <i>Not occupied</i>	MSB with option 8192 increments / revolution
19	<i>Latch</i>	input circuit E1
20	<i>Enable</i>	input circuit E1
21	<i>CW / CCW</i>	input circuit E2
22	<i>0 V</i>	reference potential
23	<i>Signal voltage</i>	5 ... 30 V (+U _S) only with output circuit 2
24	<i>Supply voltage</i>	11 ... 30 V (+U _B)
25	<i>Supply voltage</i>	0 V (-U _B) jumpered with contact 22

DB 25S

depth of
connector
approx. 15



Subject to technical modifications and typographical errors.