



► Encoders for extreme loads



GEL 207
with synchronous flange



GEL 208
with clamping flange

► Encoders with a shaft load of up to 500 N



GEL 209
with bearing pedestal



GEL 219
with rectangular flange

Incremental encoders convert rotations into electric signals.

The Lenord + Bauer encoders combine the advantages of a magnetic measuring system and a robust mechanic design. They have proven successful all over the world in many different applications and even under roughest industrial conditions. Their high reliability and a long service life go without saying.

Fields of application

- Heavy industry
- Paper-making and packaging machines
- Filling machines
- Transporting and storing systems
- Machines for processing steel, wood, stone, textiles and plastic, etc.

Main characteristics

- Up to 5,000 pulses per revolution (20,000 with external four-edge evaluation)
- Reference signal
- Cable or connector outlet, axial or radial
- Various shaft diameters, 6 ... 16 mm
- High electromagnetic compatibility (EMC)
- Our extremely flexible modular system makes it possible to offer our customers an express delivery service

Measuring principle

The encoders work with differential sensors depending on magnetic fields and a precision toothed wheel as measure. The sensors scan the tooth structure of the toothed wheel and emit a sine or cosine voltage. The integrated evaluation electronics in ASIC and SMD technology converts the analogue sensor signals into incremental output signals.

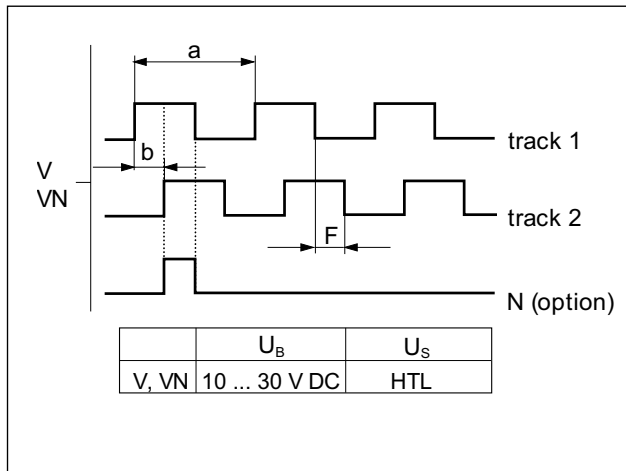
Advantages of the magnetic system

- No adverse effect due to condensed water
- Absolute operational reliability even in case of high humidity (dewing) and frequent change of ambient temperature
- Extremely insensitive to dirt, oil and water
- Extremely shock- and vibration-resistant because the measure is not made of glass nor plastic
- Outstanding operational safety over a very long period of time as it does not suffer from ageing effects as optical systems do

Output signals

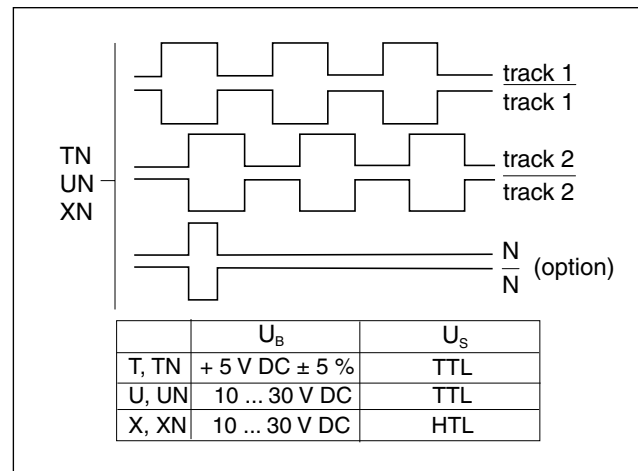
Signal pattern V, VN

Two tracks with square-wave signals offset by 90°. On the third track N (option) a reference signal with defined length is output once per revolution.



Signal pattern T, TN, U, UN, X, XN

Both tracks and the reference signal (option) are additionally output as inverse signals.



Key

- U_B = operating voltage
- U_S = signal voltage
- a = 360° electrical
- b = 90° phase shift
- F = edge distance (for an output frequency of 200 kHz the edge distance is $F > 0.6 \mu$)

Signal pattern = shown for clockwise rotation (view on top of the encoder shaft)

Reference signals with other lengths upon request.

Output level

The signal patterns V, VN, X and XN have HTL level, the signal patterns T, TN, U and UN have TTL level (for the output voltage see electrical data).

All outputs have a push-pull power amplifier and are short-circuit-proof. The peak output current for recharging the cable capacity is 100 mA.

Technical data according to DIN 32878

Description		GEL 207/208/209/219	
measuring step from ... to ¹⁾		36 ... 0.018°	
pulse number per revolution ¹⁾		10 ... 20 000 number of pulses	
accuracy	error limit ²⁾	0.14°	
	incremental deviation ²⁾	0.02°	
	repeatability ²⁾	0.009°	
electrical data	power consumption $R_L = \infty, U_B = 10...30 \text{ V DC}$ $R_L = \infty, U_B = 5 \text{ V DC}$	$\leq 1.3 \text{ W}$ $\leq 1.0 \text{ W}$	
	max. output frequency	0 ... 200 kHz	
	output level for signal pattern T/TN (logic level TTL)	high signal: $\geq U_B - 1.00 \text{ V}$ at $I = 10 \text{ mA}$; low signal: $\leq 0.75 \text{ V}$ at $I = 10 \text{ mA}$;	$\geq U_B - 1.20 \text{ V}$ at $I = 30 \text{ mA}$ $\leq 1.00 \text{ V}$ at $I = 30 \text{ mA}$
	output level for signal pattern U/UN (logic level TTL)	high signal: $\geq 4.00 \text{ V}$ at $I = 10 \text{ mA}$; low signal: $\leq 0.75 \text{ V}$ at $I = 10 \text{ mA}$;	$\geq 3.85 \text{ V}$ at $I = 30 \text{ mA}$ $\leq 1.00 \text{ V}$ at $I = 30 \text{ mA}$
output level for signal pattern V/VN and X/XN (logic level HTL)	high signal: $\geq U_B - 1.80 \text{ V}$ at $I = 10 \text{ mA}$; low signal: $\leq 1.15 \text{ V}$ at $I = 10 \text{ mA}$;	$\geq U_B - 2.20 \text{ V}$ at $I = 30 \text{ mA}$ $\leq 1.55 \text{ V}$ at $I = 30 \text{ mA}$	

¹⁾ max. value with external edge evaluation of the signal pattern. See page 6 for possible pulse numbers (resolutions).

²⁾ value for highest resolutions. Values for low resolutions on request.

Technical data according to DIN 32878

continued from page 2		GEL 207/208	GEL 209/219
mechanical data	shaft diameter	GEL 207 = 6 mm GEL 208 = 10 mm 6 mm, 8 mm, 10 mm, 12 mm (option)	16 mm
	material dimensions of housing	steel, electro-galvanized and black-chromized diameter 58 mm	
	flange type	GEL 207 = synchro flange GEL 208 = clamping flange	GEL 209 = bearing pedestal GEL 219 = square flange
	weight	approx. 0.5 kg	approx. 0.7 kg
	max. operating	10,000 r. p. m.	8,000 r.p.m.
	moment of inertia of rotor	$7 \cdot 10^{-5} \text{ kgm}^2$	
	max. acceleration	extremely high as steel wheel and measuring wheel are compressed having positive fit	
	operating torque	0.03 Nm (< 0.01 Nm with ball bearing cover (IP 50) optionally)	
	starting torque	0.05 Nm (0.01 Nm with ball bearing cover (IP 50) optionally)	
	max. shaft load (point of application 15 mm before the contact surface of the flange)	200 N axial 200 N radial	400 N axial 500 N radial
	permissible shaft load	We recommend connection by a radial flexible coupling.	
	bearing life (at half shaft load)	$12,600 \cdot 10^6$ revolutions	$6,600 \cdot 10^6$ revolutions
bearing life (at max. shaft load)	$2,000 \cdot 10^6$ revolutions	$840 \cdot 10^6$ revolutions	
environmental conditions	operating temperature	0 ... + 70 °C (standard); - 20 ... +85 °C (option)	
	ambient temperature	- 20 ... + 85 °C	
	storage temperature	-40 ... +105 °C	
	protection class according to DIN EN 60529	IP 65	
	vibration protection (option) according to DIN EN 60068-2-6	frequency range 10 ... 2,000 Hz; peak acceleration 100 m/s ² ; frequency cycles 10	
	shock protection (option) according to DIN EN 60068-2-27	peak acceleration 1000 m/s ² ; duration 11 ms	
	insulation strength according to VDE 0660 part 500 version 08/00 or DIN EN 60439-1	$R_i > 1\text{M}\Omega$, at a testing voltage of 500 V AC	
electromagnetic compatibility electromagnetic emissions EN 50081-1 electromagnetic immunity EN 61000-6-2	The encoders are in strict conformity with Directive EMC 89/336/EEC of the European Union and are therefore certified by the CE mark.		

Maximum cable lengths

between encoder and secondary electronics. The stated data are standard values referring to cable type LiYCY 6 (10) x 0.25 mm².

		$U_B = 20 \text{ V (VN)}$			
f [kHz]		≤ 20	50	100	200
L_{max} [m]		200	80	40	20

		$U_B = 5 \text{ V (TN, UN)}$	
f [kHz]		≤ 100	200
L_{max} [m]		200	145

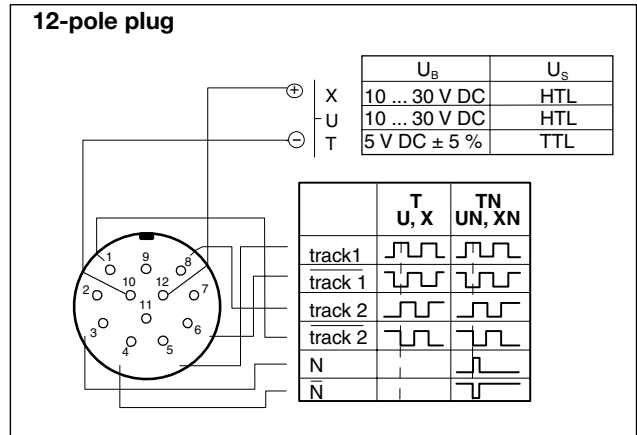
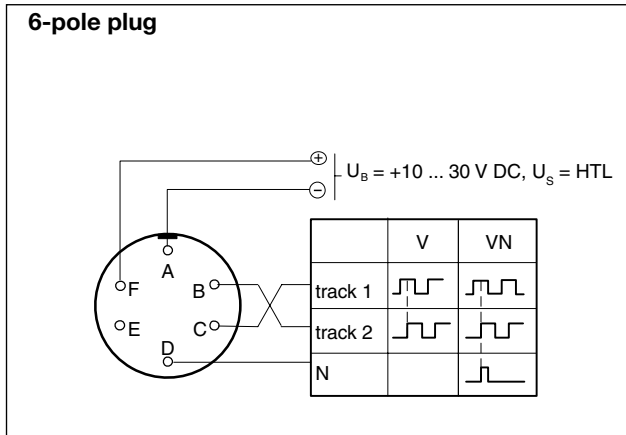
		$U_B = 20 \text{ V (XN)}$			
f [kHz]		≤ 20	50	100	200
L_{max} [m]		100	40	20	10

Pin layouts: plug, cable

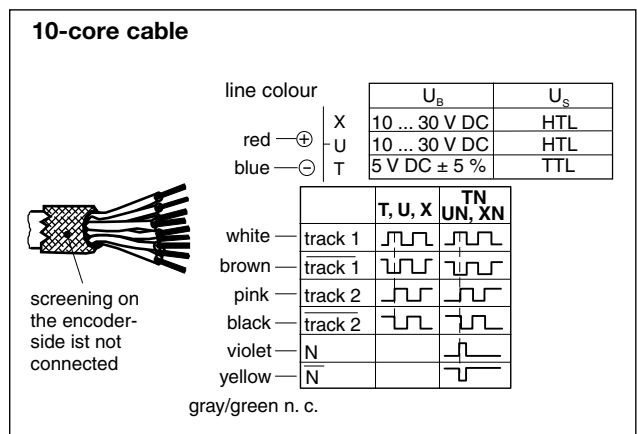
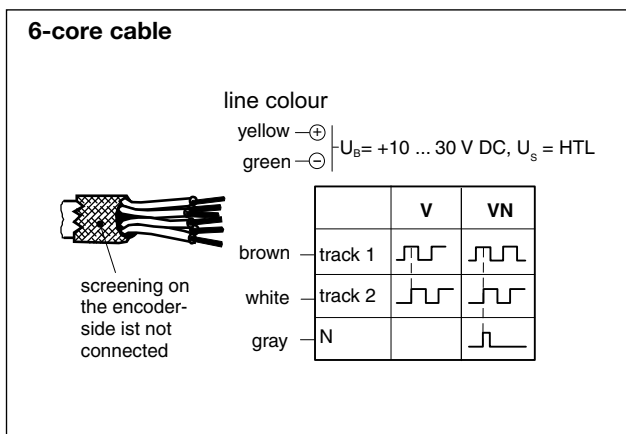
Dimensioned drawings: counter plug

Pin layout: plug

(The counter plug is included in the scope of supply.)



Pin layout: cable



Key

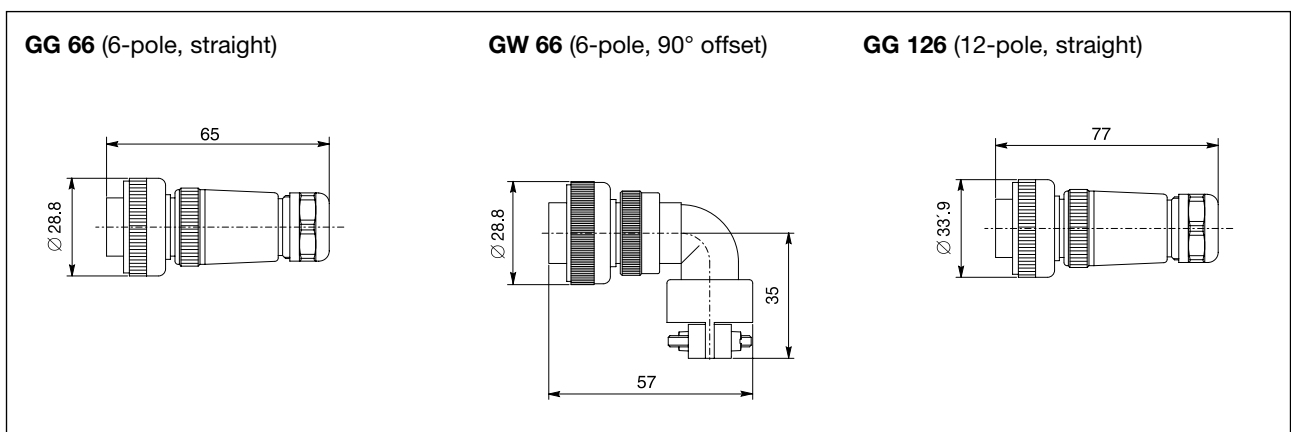
U_B = operating voltage

U_S = signal voltage

Signal patterns shown for clockwise rotation (view on top of the encoder shaft)

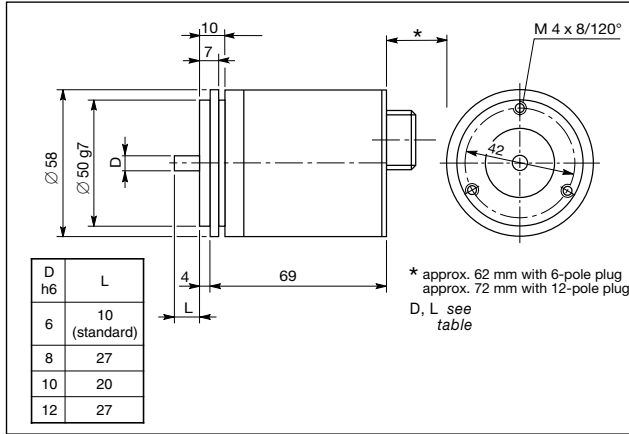
Dimensioned drawing: counter plugs

(GG 66 or GG 126 are included in the scope of supply, if you wish the optional GW 66 type please state in your order.)

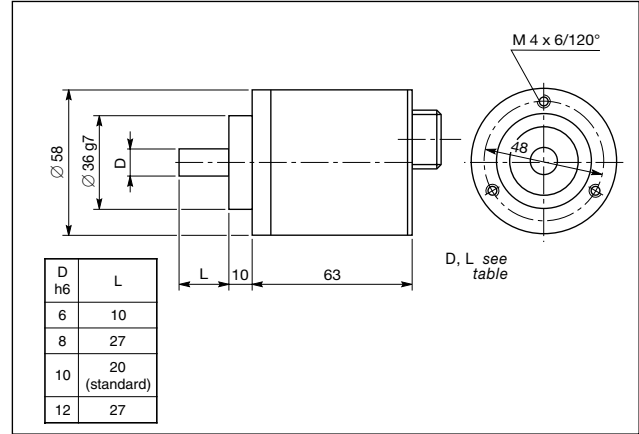


Dimensioned drawing

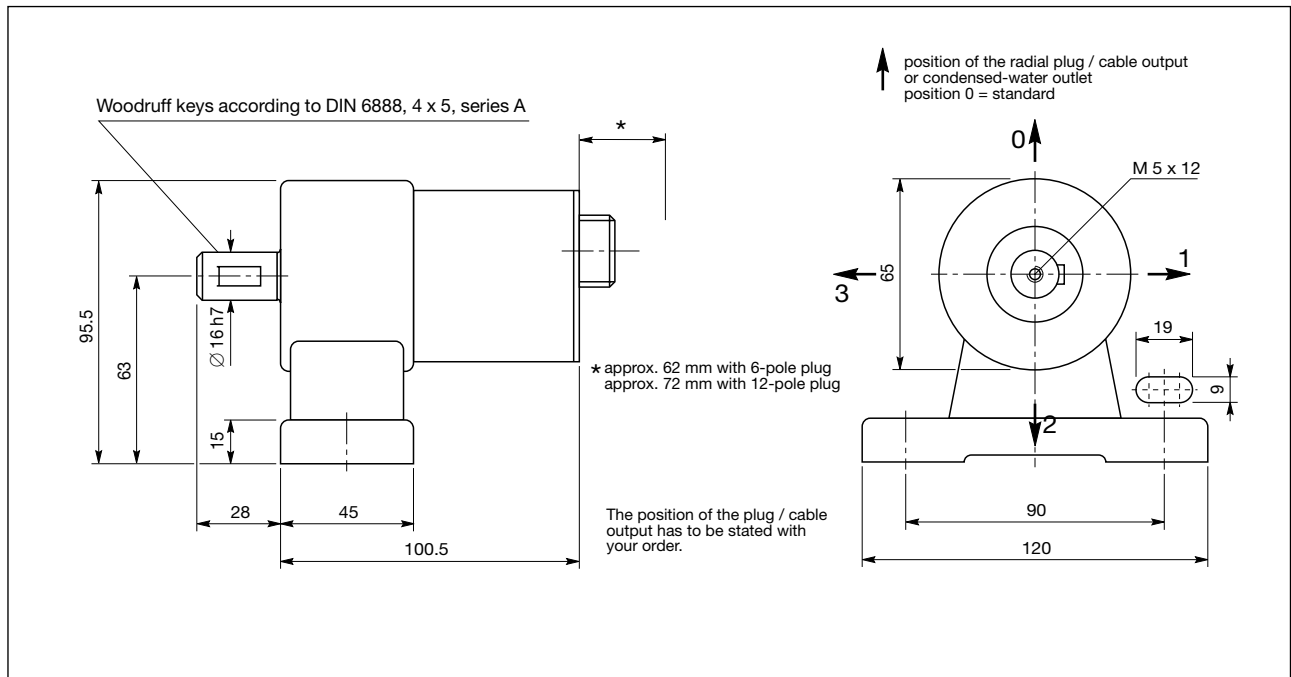
Dimensioned drawing GEL 207
(synchro flange)



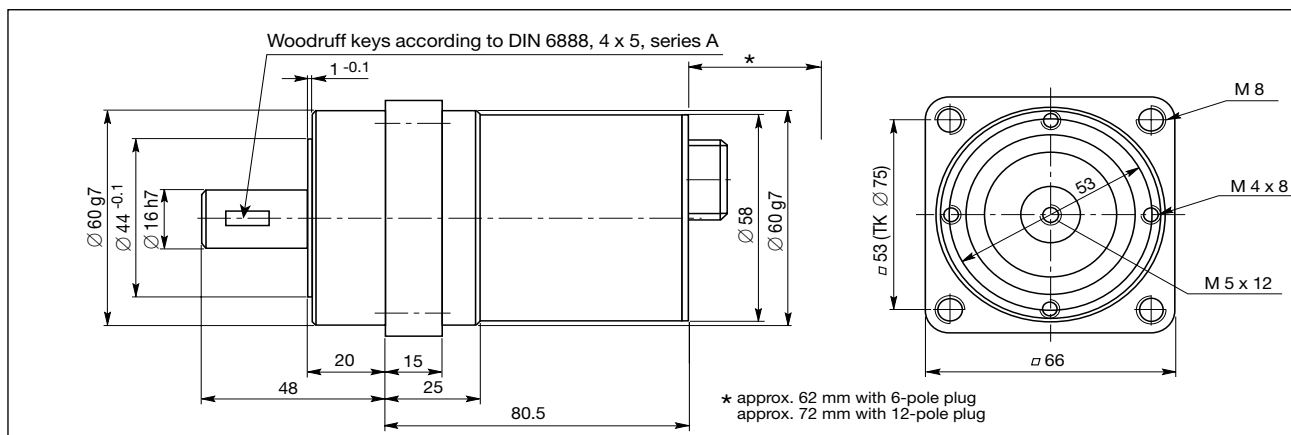
Dimensioned drawing GEL 208
(clamp flange)



Dimensioned drawing GEL 209
(bearing pedestal)



Dimensioned drawing GEL 219
(rectangular flange)



Protection of the electronics, Possible pulse numbers

Protection of the electronics (option)

Protection against humidity

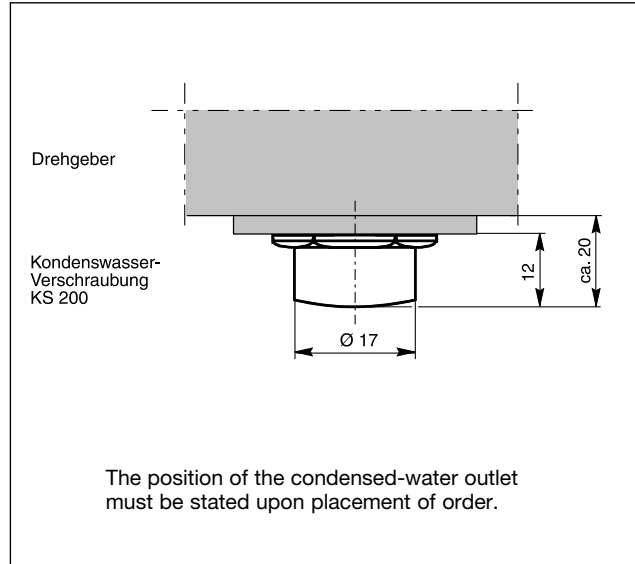
The encoders' electronic unit is coated with a highly effective protection against humidity, salt-water atmosphere and corrosive vapours to ensure their proper functioning during years even under roughest conditions.

Condensed-water outlet

Water may accumulate in the encoder if it is exposed to multiple dewing. The water can drain off through the condensed-water outlet. When mounting the encoder the outlet must show downward. The protection class drops to IP 64.

Protection against vibration

The additional fixing of mechanical parts with special plastic prevents the electronics and the connections inside the encoder from vibrating. Thus the proper and continuous operation of the encoder - even if exposed to extreme vibration and shock - is guaranteed.



Possible pulse numbers GEL 207/208/209/219

10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77
78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	128	130
132	134	136	138	140	142	144	146	148	150	152	154	156	158	160	162	164
166	168	170	172	174	176	178	180	182	184	186	188	190	192	194	196	198
200	202	204	206	208	210	212	214	216	218	220	222	224	226	228	230	232
234	236	238	240	242	244	246	248	250	252	256	258	260	264	268	270	272
276	280	282	284	288	292	294	296	300	304	306	312	318	320	324	328	330
332	336	340	342	344	348	352	354	356	360	364	366	368	370	372	376	378
380	384	388	390	392	396	400	402	404	408	410	412	414	416	420	424	426
428	430	432	436	438	440	444	448	450	452	456	460	462	464	468	470	472
474	476	480	484	486	488	490	492	496	498	500	504	510	512	516	520	522
528	530	534	536	540	544	546	550	552	558	560	564	568	570	576	580	582
584	588	590	592	594	600	606	608	610	612	616	618	620	624	630	632	636
640	642	648	650	654	656	660	664	666	670	672	678	680	684	688	690	696
700	702	704	708	710	712	714	720	726	728	730	732	736	738	740	744	750
752	756	760	768	770	776	784	784	790	792	800	804	808	810	816	820	824
828	830	832	840	848	850	852	856	860	864	870	872	876	880	888	890	896
900	904	910	912	920	924	928	930	936	940	944	948	950	952	960	968	970
972	976	980	984	990	992	996	1000	1008	1010	1020	1024	1030	1032	1040	1044	1050
1056	1060	1068	1070	1072	1080	1088	1090	1092	1100	1104	1110	1116	1120	1128	1130	1136
1140	1150	1152	1160	1164	1168	1170	1176	1180	1184	1188	1190	1200	1210	1212	1216	1220
1224	1230	1236	1240	1248	1250	1260	1264	1272	1280	1284	1296	1300	1308	1312	1320	1328
1332	1340	1344	1356	1360	1368	1376	1380	1392	1400	1404	1408	1416	1420	1424	1428	1440
1452	1456	1460	1464	1472	1476	1480	1488	1500	1504	1512	1520	1536	1540	1552	1560	1568
1580	1584	1600	1608	1616	1620	1632	1640	1648	1656	1660	1664	1680	1696	1700	1704	1712
1720	1728	1740	1744	1752	1760	1776	1780	1792	1800	1808	1820	1824	1840	1848	1856	1860
1872	1880	1888	1896	1900	1904	1920	1936	1940	1944	1952	1960	1968	1980	1984	1992	2000
2016	2020	2040	2048	2060	2064	2080	2088	2100	2112	2120	2136	2140	2144	2160	2176	2180
2184	2200	2208	2220	2232	2240	2256	2260	2272	2280	2300	2304	2320	2328	2336	2340	2352
2360	2368	2376	2380	2400	2420	2424	2440	2448	2460	2464	2472	2480	2496	2500	2520	2528
2544	2560	2568	2592	2600	2616	2640	2656	2664	2680	2688	2712	2720	2736	2752	2760	2784
2800	2808	2816	2832	2840	2848	2856	2880	2904	2912	2920	2928	2944	2952	2960	2976	3000
3008	3040	3072	3080	3104	3136	3160	3168	3200	3232	3240	3264	3296	3320	3328	3360	3392
3400	3424	3440	3456	3480	3488	3520	3552	3560	3584	3600	3616	3640	3648	3680	3712	3720
3744	3760	3776	3800	3808	3840	3872	3880	3904	3920	3936	3960	3968	4000	4040	4080	4120
4160	4200	4240	4280	4320	4360	4400	4440	4480	4520	4560	4600	4640	4680	4720	4760	4800
4840	4880	4920	4960	5000												

A quadruple resolution is achieved by external four-edge evaluation.
The pulse numbers printed in bold-face are standard pulse numbers.

Order details GEL 207/208/209/219

Type code

								description
								temperature range 1 0°C ... +70°C 3 -20°C ... +85°C (option)
								protection of the electronics 0 without any additional protection 1 moisture-proof 2 vibration-proof 3 moisture- and vibration-proof 4 moisture-proof of incl. condensed-water outlet 5 moisture- and vibration-proof and condensed-water outlet
								shaft diameter, length 0 ∅ = 6 mm L = 10 mm standard (only GEL 207) ∅ = 10 mm L = 20 mm standard (only GEL 208) ∅ = 16 mm L = 28 mm standard (only GEL 209/219) 1 ∅ = 6 mm L = 10 mm (only GEL 208) 2 ∅ = 8 mm L = 27 mm (only GEL 207/208) 4 ∅ = 10 mm L = 20 mm (only GEL 207) 5 ∅ = 10 mm L = 20 mm Woodruff key (only GEL 207/208) 6 ∅ = 12 mm L = 27 mm (only GEL 207/208) 7 ∅ = 12 mm L = 27 mm Woodruff key (only GEL 207/208)
								plug / cable outlet A 6-pole plug, axial B 6-pole plug, radial C 12-pole plug, axial D 12-pole plug, radial F 6-core cable, axial G 6-core cable, radial H 10-core cable, axial I 10-core cable, radial
								pulse number per revolution (see previous page)
								reference signal – without reference signal (standard) N incl. reference signal (option)
								signal pattern (see page 2) T $U_B = 5$ V DC, logic level TTL U $U_B = 10 \dots 30$ V DC, logic level TTL V $U_B = 10 \dots 30$ V DC, logic level HTL X $U_B = 10 \dots 30$ V DC, logic level HTL
								typ 207 GEL 207 with synchro flange 208 GEL 208 with clamping flange 209 GEL 209 with bearing pedestal and increased shaft load 219 GEL 219 with rectangular flange and increased shaft load

Order details

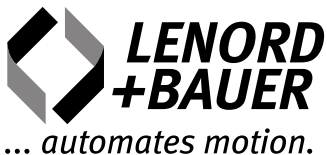
Standard cable length: 1metre. Please state in your order, if you wish other cable lengths. GG 66 or GG 126 are included in the scope of supply; if you wish GG 66 (option), please state in your order.

Order example

208 V N 01000 A 0 3 3 or **207 T N 01024 H 4 0 1** with 3-m cable length.

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