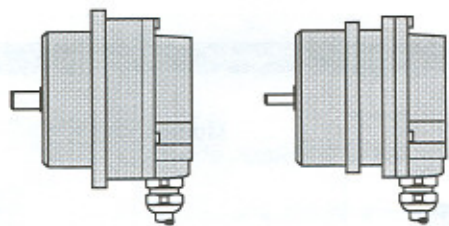# User's Guide Encoders
BWG

No. 719 099 E • Edition 9612.

$C\epsilon$ The CE-Mark certifies that our products have met the requirement of the CE Guideline 89/336/EWG (EMC Guideline):

– EN 50 081-2 (Emission) and
– EN 50 082-2 (Noise Immunity)

Emission Tests:
RF Emission: EN 55011 Group 1, Class A

Immunity Tests:
Static Electricity (ESD):
    IEC 1000-4-2, Severity Level 4

Elektromagnetic Fields (RFI):
    IEC 1000-4-3, Severity Level 3

Fast Transients (BURST):
    IEC 1000-4-4, Severity Level 4

Line-fed disturbances by high-frequency fields
    IEC 1000-4-6, Severity Level 3

Safety Advisory

Series BRG encoders are used for electrical detection of mechanical positions (e.g. tool revolvers, drill heads) and may only be used for these or similar purposes.

Installation and Operation
Installation and operation should be carried out by trained personnel only. Unauthorized handling and use will lead to loss of warranty and liability claims.
When mounting and wiring, carefully read the corresponding sections of this guide.

Use and Checking
Follow all relevant safety procedures when using this product. Take all steps necessary to ensure that failure of this product will not cause danger to persons or equipment (e.g. limit switches, safety devices). Regularly check the functionality of the encoder and all associated components.

Fault Conditions
When it is suspected that the encoder is faulty, take it out of service and take measures to ensure that it is not used.

Scope
This descriptions pertains to encoders in Balluff Series BWG.

Technical Data

Outputs	6, PNP, short circuit protected
Accuracy	$\pm\frac{1}{2}$ bit (at 24 V DC)
Repeatability	$\pm 45°$ el.
Switching frequency	$\leq 1,5$ kHz (LSB)
Supply voltage V_S	15 ... 30 V DC
Ripple	$\leq 10\%$
Output voltage V_O	$\geq V_S - 3$ V (without load)
No-load current I_R	typ. 50 mA (at V_S = 24 V DC)
Output current I_O	< 50 mA (at V_S = 24 V DC)
Load capacitance C	300 nF (incl. cable capacity)
Housing material	aluminum
Mounting method	clamps
Operating temperature	0 to 60 °C
Storage temperature	–20 to +80 °C
Enclosure	IP 67 IEC 529
RPM	max. 6000/min
Shaft loading	$F_{AX} \leq 10$ N; $F_{RAD} \leq 25$ N
Vibration	10 g, 10...150 Hz (IEC 68: 2-6)
Shock	50 g/11ms (IEC 68: Part 2-27)

Identifying the Encoder

Ordering Code

Example: BWG 0-08-04-EP-P-L-03

Type

Version
0, 1, 2

Coding (see truth table)
(upon request)

No. of Positions

Parity
EP   =   even
OP   =   odd
00   =   no

Outputs
P   =   PNP (see Fig. 4)

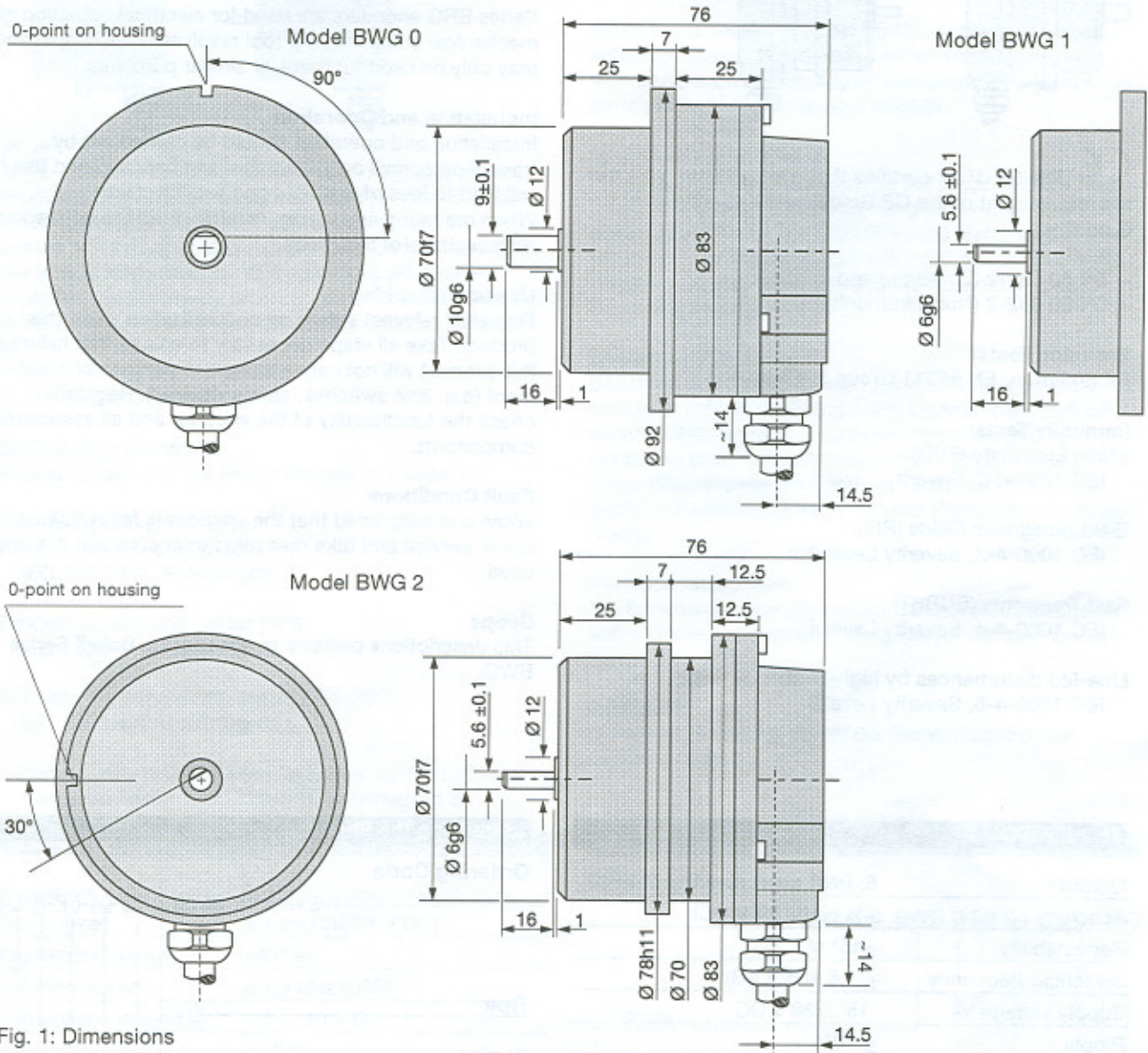Rotation (looking at shaft end)
L   =   left (CCW)
R   =   right (CW)

Cable lenght
i.e 03 =   3 m
    00.5=   0.5 m

## Installation

Fig. 1: Dimensions

Please note the following:
- Never use force (e.g. hammer or blows) to install or align the encoder.
- Do not exceed the load tolerances given for the encoder shaft (see technical data).
- Never step on the encoder, cord seal, or connector.

Using the coupling:
- Attach the encoder to the drive rigidly at one point only: either flange to flange or shaft to shaft. Use the couplings.
- Be sure that the encoder shaft and the drive are on the same axis. Check the data sheet for the coupling to find the permissible axial or radial offset and the maximum angle error of the two shafts.
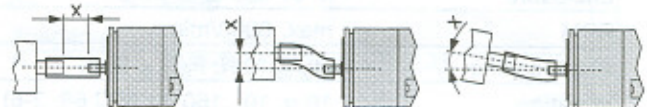
Axial Offset   Radial Offset   Angle Error

- Be sure not to damage or bend the coupling excessively while installing and aligning it.
- Tighten all mounting screws very carefully.

Electrical Connections

Note the following:
- Connect all cable according to the table at lower right.

- Isolate all unused grounds (to avoid short circuit).

- Make sure that self-wired connectors are sealed properly. Oil or water entering along the cable can enter the electronics area and destroy the unit.

- The IP 67 rating can be assured only if your connections, especially in the case of short cables, meet the IP 67 specification also.

- Do not route the BRG encoder cable parallel to AC lines, in order to avoid noise coupling.

- Use shielded cable only, in order to avoid noise coupling.

- Ground the shield on the control side only.

- Disconnect or connect the cable only after power has been turned off.

- Turn power on and off to the encoder and the input device at the same time only.
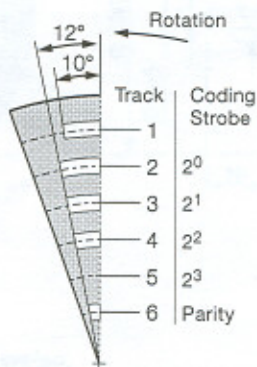
Output Driver
An overloaded output will shut off separately and then back on automatically after the fault has been removed:

Turn-on Delay
- Trip current typical   125 mA
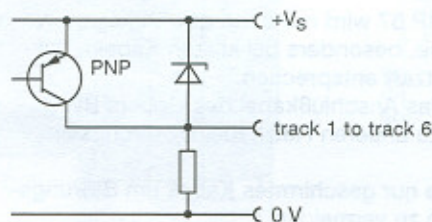- Cool-down time typ.   15 sec

Fig. 4: Output circuit

Configuration

Track	Cable	
$+V_S$	BN	brown
0 V	BU	blue
1	BK	black
2	WH	white
3	YE	yellow
4	GN	green
5	VI	violet
6	PK	pink

Track	Coding
1	Strobe
2	2^0
3	2^1
4	2^2
5	2^3
6	Parity

Fig. 3: Example of a code disc