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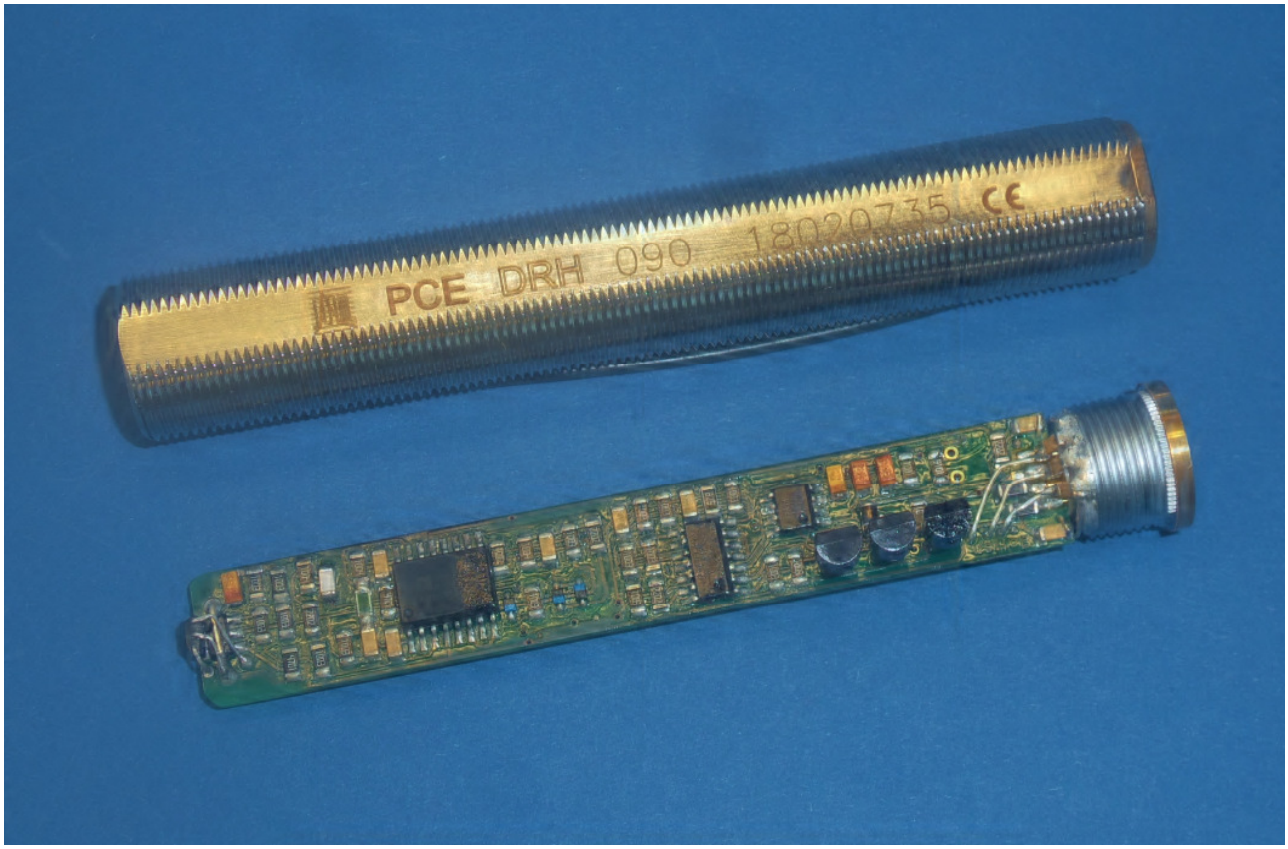
PCE Process Control Electronic GmbH

Technical description

Rotational direction sensor version 6.0
with output for speed measurement



1. Description

The rotational direction sensor is able to contactless detect a direct current motor`s direction of rotation. The rotational direction is detected as soon as the motor is started (the magnetic field changes when the motor is swichtched on) and is evaluated logically.

The measuring result is available as h-level at the digital outputs OUT ROTATIONAL DIRECTION 1 or OUT ROTATIONAL DIRECTION 2. These outputs are short circuit-, overload- and induction peak-protected.

The sensor detects the direction of rotation before thr rotor starts to turn. For the measurement, an h-level is required at the input START. After that, the output OUT START MOTOR is activated. With this signal, the sensor is ready for measurement and the motor can be started. Once the motor has been started, the rotational direction is indicated by an h-level at output OUT ROTATIONAL DIRECTION 1 or OUT ROTATIONAL DIRECTION 2. This h-level will be stored up until the next START.

<u>The following faults are recognized:</u>

1.1 Rotational direction fault due to swapped cables
1.2 Rotational direction fault due to polarity reversal of magnets

2. Electric data

Min. operating voltage	13 V-
Max. operating voltage	30 V-
Max. output current of digital outputs - OUT ROTATIONAL DIRECTION 1 - OUT ROTATIONAL DIRECTION 2 - OUT START MOTOR	100 mA
Max. output current - MEASURING INSTRUMENT	4 mA
Max. output current - LINEAR OUT	4 mA

Characteristic values at 24 V operating voltage:

Supply current (unloaded)	68 mA
h-level output voltage (digital outputs)	operating voltage –2V = 22V
l-level output voltage (digital outputs)	0.7V
Signal threshold h-level input START	(operating voltage –1V) / 2 = 11.5 V

3. Pin assignment

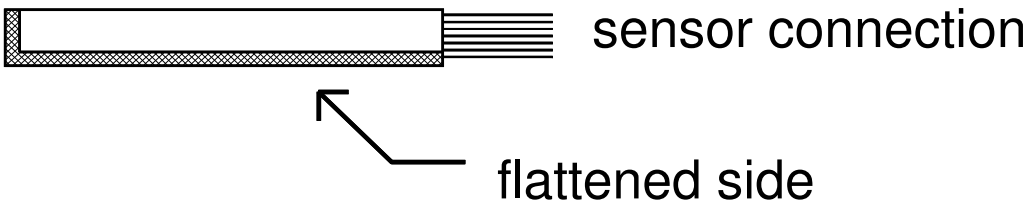
Pin No.	Designation	Connection cable, old	Connection cable, 7-pin, new
1	LINEAR OUT	grey-pink	brown
2	EXTERNAL NULL BALANCE	white-yellow	
3	MEASURING INSTRUMENT+	white	
4	MEASURING INSTRUMENT-	purple	
5	NULL BALANCE 10 V	red-blue	
6	CHANGE-OVER SWITCH	yellow-brown	
7	NC	brown-green	
8	0 V	blue	blue
9	24 V	pink	pink
10	START (=RESET Sensor)	white-green	white
11	NC	brown	
12	Feedback “START” recognized	grey	grey
13	OUT ROTATIONAL DIRECTION 1	yellow	yellow
14	OUT ROTATIONAL DIRECTION 2	green	green
Enclosure	SHIELDING	black	

4. Positioning the sensor

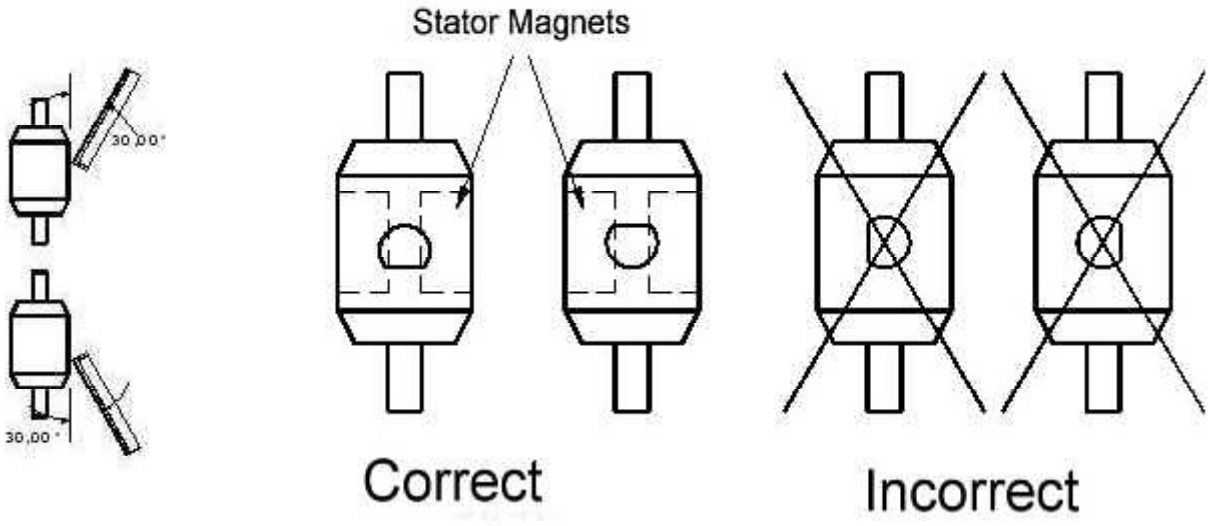
In order for it to reliably detect the motor`s rotational direction, the sensor must be correctly positioned.

In principle, the area between two stator magnets should be chosen.
This results in the following positions for the different models:

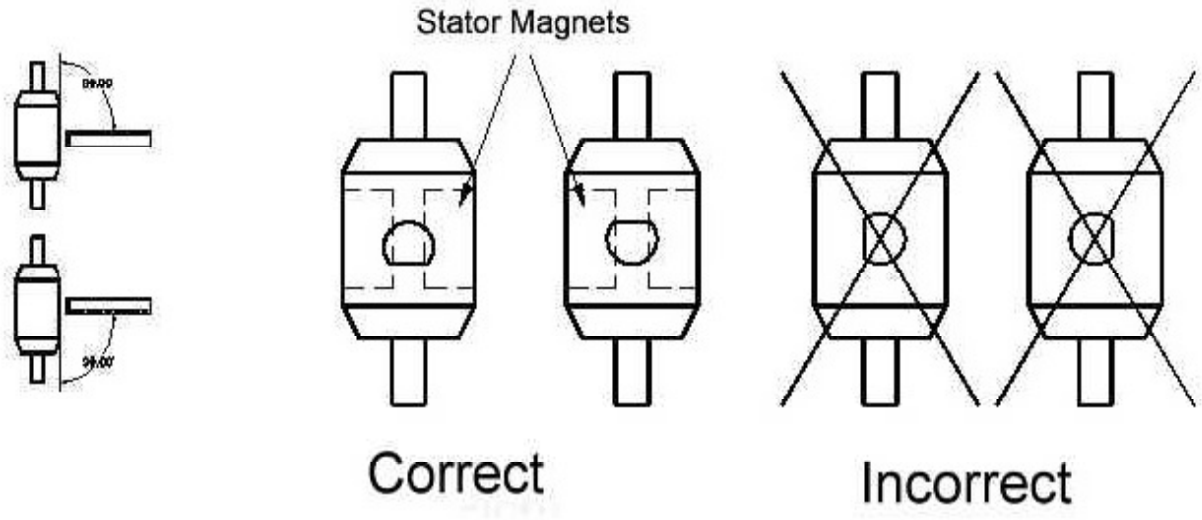
4.1 Picture of rotational direction sensor



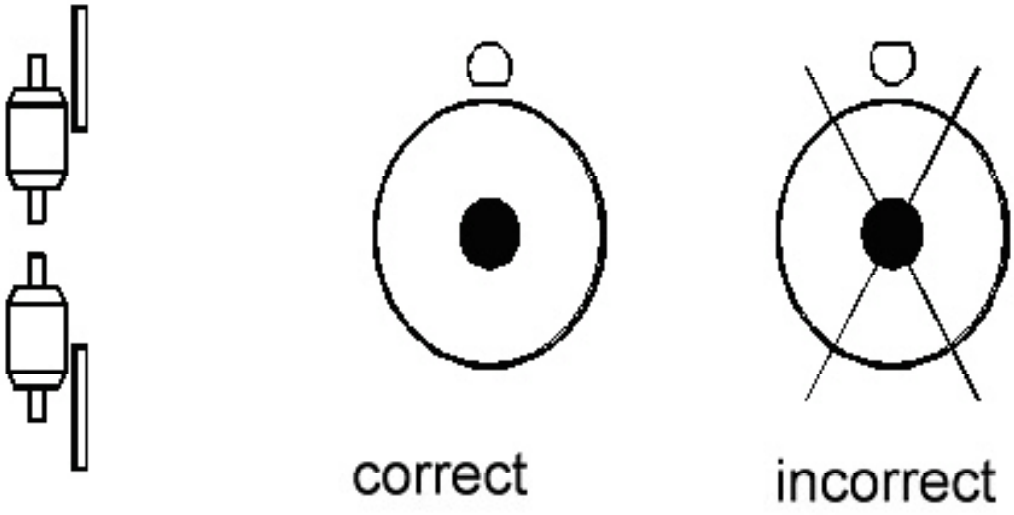
4.2 DRH 030 = 30° setting angle



4.3 DRH 090 = 90° setting angle



4.4 DRH 180 =180° (or0°) setting angle



Caution! Attention must paid to the sensor`s positions relative to the motor.

It is only possible to correctly determine the rotational direction in the gap between the stator magnets.

The starting signal can be read no sooner than the motor being correctly placed. Furthermore the sensor is not to be exposed to mechanical shocks due to the Hall element's habit of emitting signals when receiving strong shocks and thus possibly falsifying the result.

5. Order details

30° version: DRH-030

90° version: DRH-090

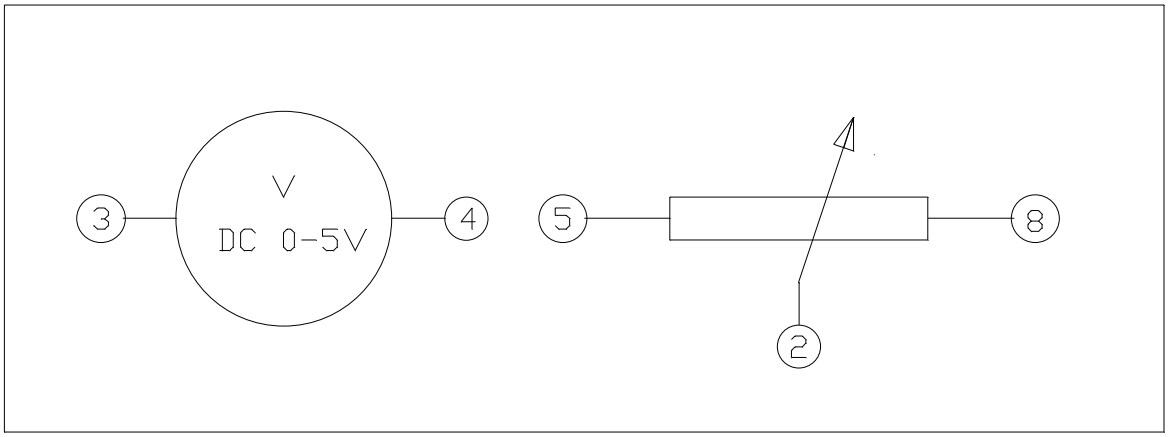
180° version: DRH-180

6. Calibration

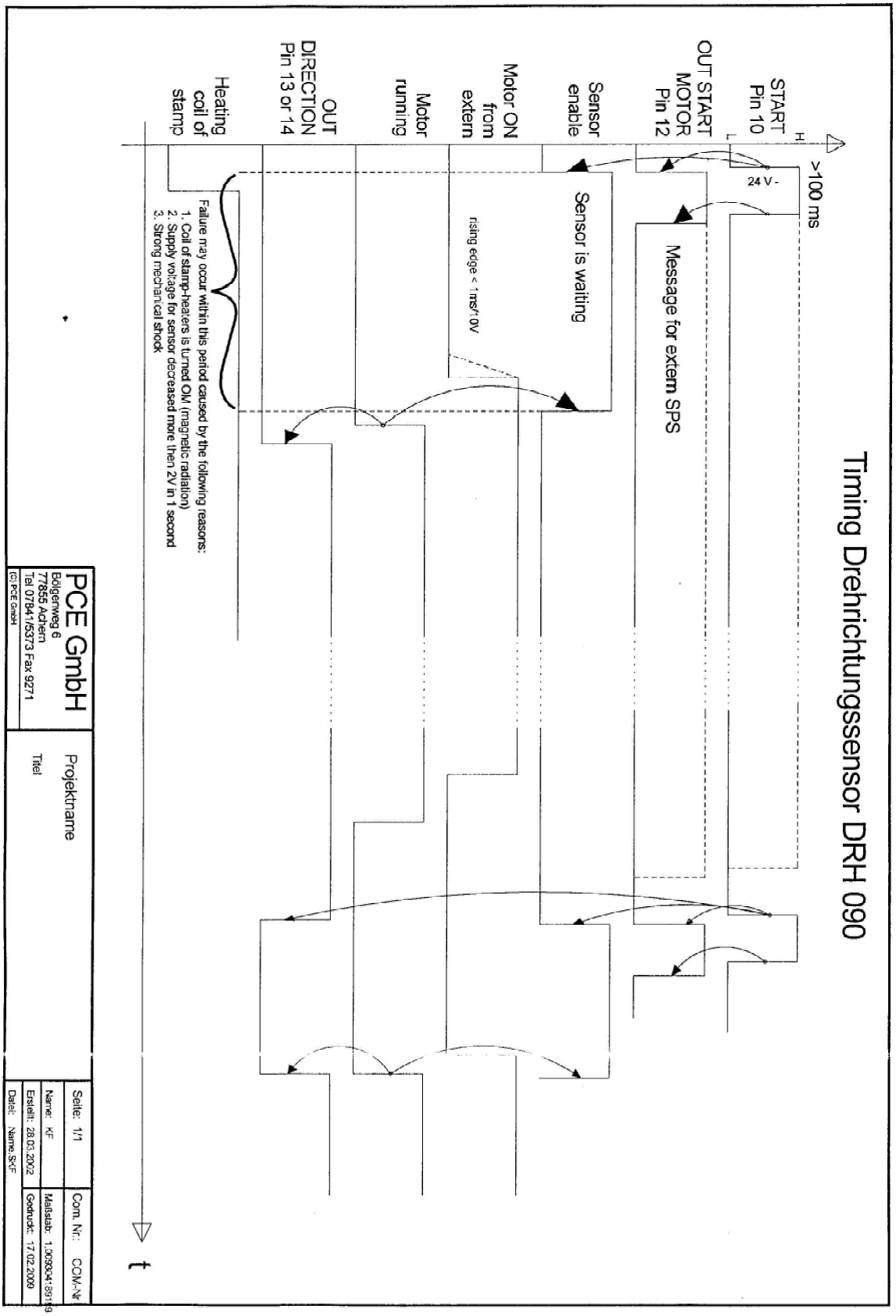
null balance:

An external null balance only needs to be carried out on installation if an existing basic magnetic field needs to be compensated for A voltmeter is sufficient to carry out the null balance (MEASURING INSTRUMENT+ and MEASURING INSTRUMENT-). As a standart, the sensor is internally balanced by means of fixed resistors to a maximum of 10 mV. An automatic null balance during operation is possible via computer and D/A-converter if a 14-core connection cable is used (pin2, external null balance).

Positioning:
A reliable detection of the rotational direction is possible if the sensor is positioned in the gap between the stator magnets. A voltmeter is sufficient to carry out thr positioning (MEASURING INSTRUMENT+ and MEASURING INSTRUMENT-). The highest voltage indicates the best sensor position.



It is possible to detect e.g. the speed or an interrupted winding with theanalogue output LINEAR OUT (in each case with additional electronic equipment). The changing magnetic field is superimposed as alternating voltage on a 5V referenc voltage.


Timing Drehrichtungssensor DRH 090
START Pin 10
OUT START MOTOR Pin 12
Sensor enable
Motor ON from extern
Motor running
OUT DIRECTION Pin 13 or 14
Heating coil of stamp
H
L
>100 ms
24 V -
Sensor is waiting
Message for extern SPS
rising edge < 1ms/ 0V
Failure may occur within this period caused by the following reasons:
1. Coil of stamp-heaters is turned ON (magnetic radiation)
2. Supply voltage for sensor decreased more then 2V in 1 second
3. Strong mechanical shock
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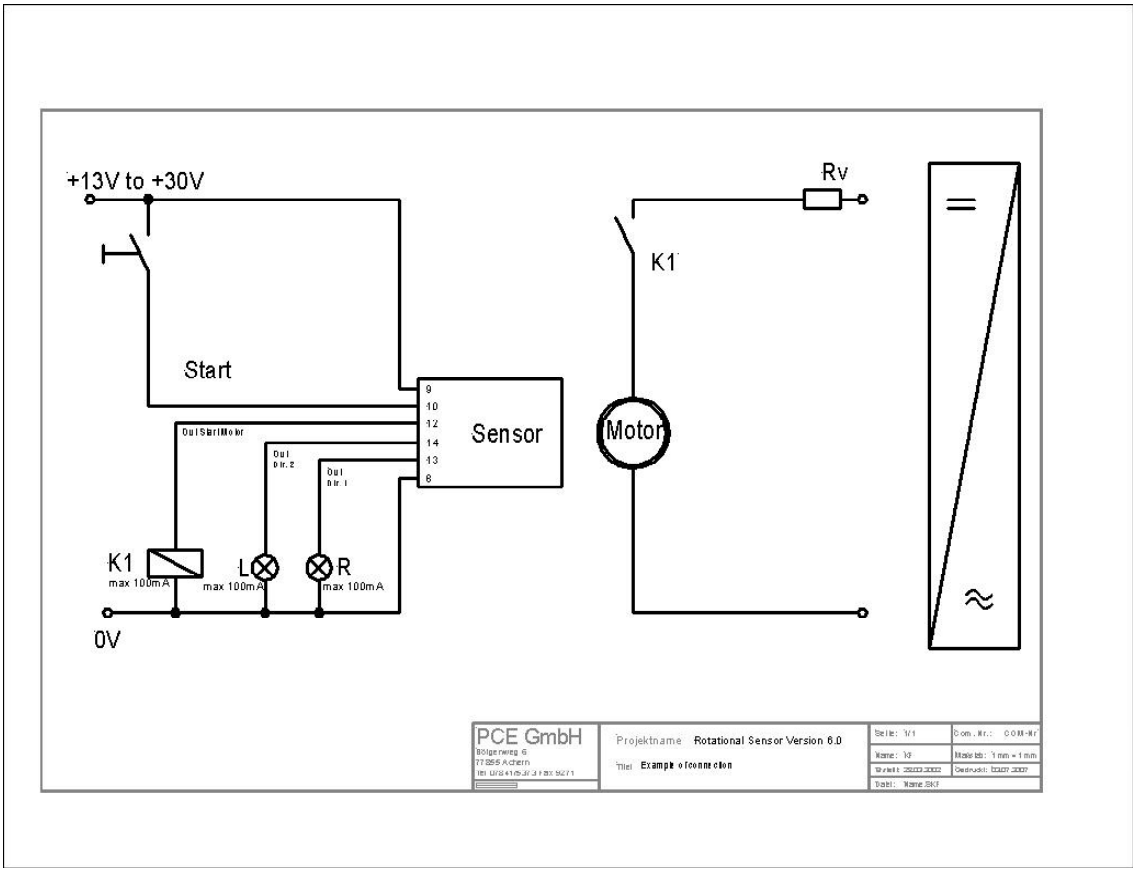

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