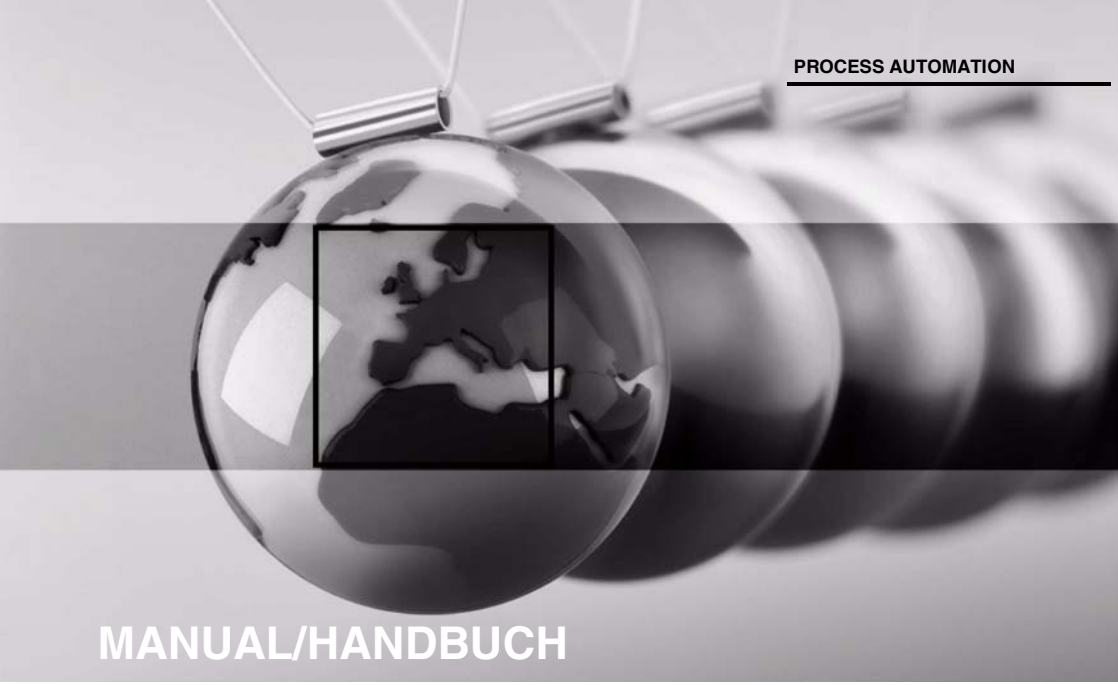

MANUAL/HANDBUCH

2/208

EN TRIP AMPLIFIER

DE GRENZWERTSCHALTER

ISO9001

CE 0102

PEPPERL+FUCHS
PROTECTING YOUR PROCESS

EN

With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship"

DE

Es gelten die Allgemeinen Lieferbedingungen für Erzeugnisse und Leistungen der Elektroindustrie, herausgegeben vom Zentralverband Elektroindustrie (ZVEI) e.V. in ihrer neusten Fassung sowie die Ergänzungsklausel: "Erweiterter Eigentumsvorbehalt".

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1 Safety information

Target group: experienced skilled electricians

The trip amplifier must not be converted or altered in any way.

The trip amplifier must be installed outside the hazardous area. Installation in housings with min. IP 20 (as per IEC Publication 529 (144) or enclosed switching cabinets.

The measuring circuit is be securely galvanically separated from all other circuits up to a crest working line voltage of 375 V.

Attention

When working on the trip amplifier, always comply with national safety and accident prevention regulations and the safety information given in this operating instruction, which are printed in italics like this and marked with that warning symbol see beside.

2 Technical data

Input	0/4 mA ... 20 mA, 0 V ... 5 V, 0 V ... 10 V
Input impedance	50 Ω (mA), 10 kΩ (V)
Resolution	1000 points for 0 mA ... 22 mA
Output	
Relay	
Voltage rating	250V AC/250V DC
Current rating	1.25 A AC/DC
Power rating	60 VA/30 W
Mechanical life	20 mio. operations
Electrical life	0.5 mio. operations
Response time> 20 ms (variable)	
Transistor	max. 30 V 24 V DC/100 mA
Voltage drop	2 V
Response time	> 10 ms (variable)
Temperature drift	< 0.1 %/10 K
Power supply	20 V AC ... 26.4 V AC 20 V DC ... 30 V DC
Power consumption	2 VA/1.5 W
Dimension (E card)	100 mm x 160 mm, 4 uw
Mass	300 g
Ambient temperature	-10 °C ... 60 °C
Relative humidity	< 75 % (annual mean)
No condensation	< 90 % (30 d/year)

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3 Mounting

3.1 Place for mounting

19" plug-in unit, E-card, 4 uw. racks or housings as card holders with guide rails and plug connectors to accept the plug-in units, see D807.

Assemble:

1. Racks could be placed in protective enclosures, at walls, in switching panels or in cabinets. In any way mounting is to be done such that the front panels of the plug-in units are arranged vertically when pushed into the rack.
2. The place should be dry and free of dust. Avoid strong vibrations, mechanical treatment and heat. Watch the approved ambient conditions.
3. The plug-in units have to be fixed in racks by screws or by quick catches.

3.2 Remarks for switching cabinets and heat dissipation

Electronical appliances convert a part of the applied power supply to heat. The overtemperature resulted must not influence the function of the appliances. Because of this, watch the approved ambient conditions (see data sheet) when planning the assembly of the switching cabinet. The table below shows an approved overtemperature of 25 K.

According to data sheet, the appliances stand a maximum ambient temperature of 60 °C. You can use the heat dissipation values shows in the table below to calculate the maximum number of appliances per switching cabinet in that case, that you lay down 60 °C as average temperature of the appliances and the ambient temperature in the switching cabinet never rise up more than 40 °C. When meeting those requirements the overtemperature is (60 - 40) K = 20 K.

1. Draught ventilation through self convection: 400 W
2. Draught ventilation with separate ventilator with filter: 800 W
3. Draught ventilation with separate ventilator without filter: 1600 W
4. Self convection without separate ventilation: 160 W
5. Circulation with ventilator on rack floor: 320 W
6. Circulation with heat converter, separate ventilation inside and outside 1500 W

Heat dissipation:

1. If the 19" racks are assembled in open frames, the natural self convection is sufficient. Make sure, that on the upper rack is nothing or if there is a sheet metal, that it has enough ventilation slots to avoid heat dissipation.
2. Avoid continuous operating overvoltages.
3. If there are especially bad ambient conditions, control the ambient temperature near by the appliances (about 1 cm distance of the front panels). In at least badest operating conditions the ambient temperature should not rise up more than 60 °C.

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4. Usually there are appliances of different types assembled within a switching cabinet. Pay attention to the data in the table above. The approved number of appliances per switching cabinet is calculated as:

$$Z = \frac{V}{G}$$

Z = number per appliances in switching cabinet
V = approved power consumption
G = power consumption of the single appliance

When assemble different appliance types, the total consumption could be calculated on base of the single appliance consumptions and compared with the approved consumption.

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3.3 Connection of plug-in units

Connection of the plug-in units is done by male and female connectors as per DIN 41612, series F. Connection demonstrating figures in data sheet (see part "Connection figures plug-in unit"). The male connector is a consituent part of the trip amplifier, the female connector (fixed connector) is to be installed in the 19" rack. We recommend that fixed connectors are soldered. Ensure protection against accidental contact while soldering by covering the soldered points with heat-shrink tubing, e. g. Drakavita Ray, quality H, colour black, supplier: Deutsche Schrumpfschlauch-Gesellschaft.

When installing the electrical appliances and wiring the relevant regulation, e. g. VDE 0100 and the country specific regulations, must be observed.

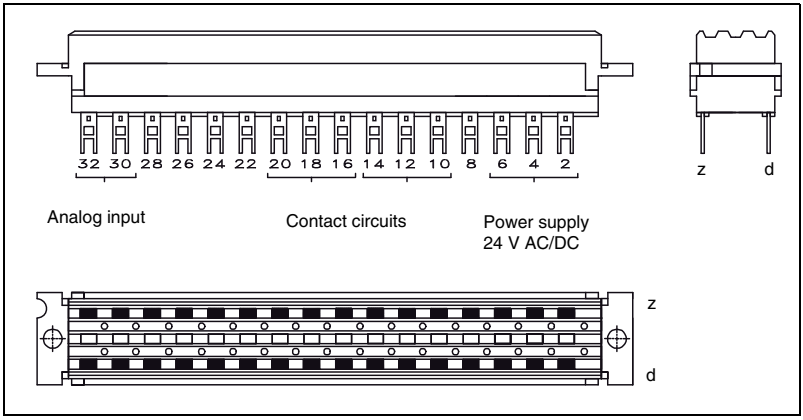

Figure 1: Connections

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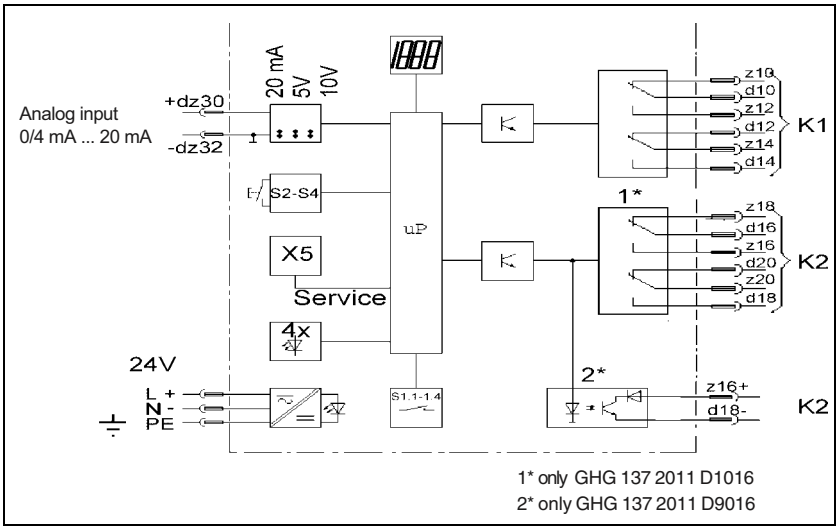

Figure 2: Block diagram

3.4 Electromagnetic compatibility

Based on the valid EMC regulations of 1992 and the NAMUR recommodation AK EMC the appliances are controlled and free from interference. In any case the place for mounting should not be near by strong electromagnetic fields and high frequencies. Installing rules to minimize electromagnetic influences must be observed. As example, keep separate the wiring for measurement signals and power supply. Advantageous is to use screened wires or at least to twist unscreened wires.

3.5 Ground connection PE

Attention

*The RFI (**R**adio **F**requency **I**nterference) immunity could be increased when connecting the "PE". The appliances functions are made sure even if the PE is not connected. On the other side it is better when interferences could be shunted to "ground". The RFI immunity written in data sheet could only be reached, when the ground connection is done and the installations remarks above (see "electromagnetic compatibility") are observed. The galvanical separation to "ground" is made sure. A connection to the ground of the switching cabinet and the screen of the wiring is necessary.*

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4 Commissioning

4.1 Introduction

The appliances have a galvanically separated AC/DC power supply with own fuses. The approved operation voltage range is written in data sheet. Check the trip amplifier for correct functioning and wiring as per the following check list and technical data in data sheet before commissioning:

- Are the operating conditions as approved in technical data?
- Are all polarities of connection correct?
- Is there a guarantee that an unacceptably high voltage will not be fed into the relay circuits on commissioning?
- Is the load for the relays in acceptable range?
- Control of the power supply and the operating range.

4.2 Checking the accuracy

After those checks (see section 4.1) the appliance can plugged into the rack. The appliances parameters are factory calibrated. A new calibration within commissioning is usually not necessary. When switching on the power supply the appliance is immediately working. Depending on the commissioning conditions the appliance could have the specified accuracy immediately or you have to wait for a certain time to warm up the appliance. Usually the appliance works with an accuracy of 0.2 %, relating to the measuring range, independent of the accidental ambient conditions. The best accuracy is reached after an operating time of about 2 hours, when the ambient conditions are within the ranges specified in data sheet. The quality of the components built up the appliance make sure, that there is no necessity to recalibrate in periodical times. An only annual check is recommended.

Input:	Apply the input circuit of the appliance to a current/voltage power supply.
Relay output:	Check the function of the relay circuit by measuring the inductivity.
Zero point:	Set an input value of 10 % of the total range to the input (with an current/voltage power supply) and check the indicated value.
Full scale value:	Set an input value of 100 % of the total range to the input (with a current/voltage power supply) and check the indicated value.
Accuracy:	The appliances comes with the specified accuracy in data sheet. Laboratory work should only take place if there are precision measurement instruments, e. g. mA-meter of class 0, 1 for an expected measurement accuracy of 0.2 %.

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4.3 Operation and trip setting

Usually the operation of the appliance is done per keys and digital display at its front. The trip settings are locked against unintensional changes.

To activate the keys Up and Down both SET keys must be pushed simultaneously. As result the display is flashing. With ">" you can higher the trip point, with "<" you lower the trip point. To get fasten to the desired setting, push down the key and hold.

By STEP key you confirm the new setting. Only when doing so, the new trip point becomes valid. The STEP key also switches the display to the next parameter value.

If you do not like to store the new settings, the old setting could be reactivated by pushing Up and Down key simultaneously (ESC).

The status display indicates the actual value:

- E01 = Input 1
- G01= Trip point 1
- G02= Trip point 2
- Y01 = Hysteresis

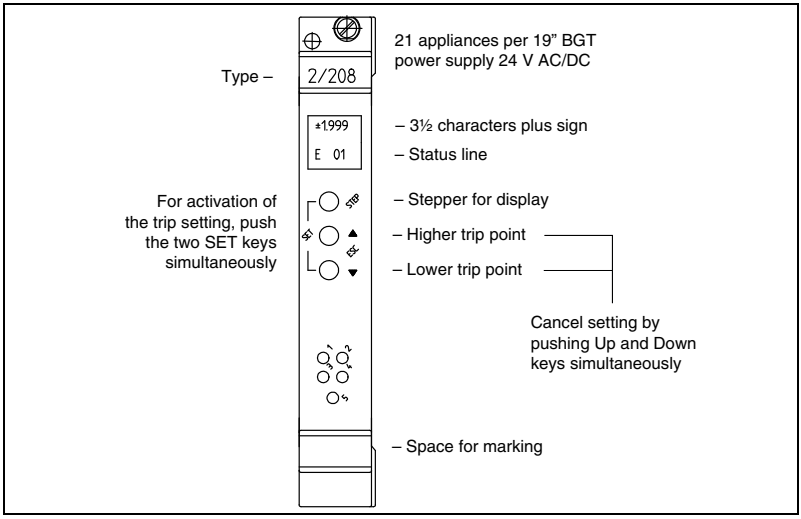

Figure 3: Frontal sheet

The frontal setting for trip point could be locked by an appliance internal jumper (see section 4.4, figure 4). In that case the measuring values and the trip points could be indicated at the digital display during operation, but changes are not possible.

The basic function of the appliance is described in shortened form on an exchangeable sheet at the space for marking. The exchangeable sheet can be new marked if changing the appliance function. Take off the exchangeable sheet from the appliance socket by cautious levering with thumb and forefinger. The position of the exchangeable sheet is shown in section 4.4, figure 4.

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4.4 Operating Modes

The appliance functions could be selected by the switches S1 to S4 accordingly to figure 4:

	Relay 1	Relay 2
Low contact	S1 = 0	S2 = 0
High contact	S1 = 1	S2 = 1
	LED 1	LED 2

Both relays operate in relay normally activated principle (relay energized in normal mode). A relay normally deactivated principle (relay de-energized in normal mode) is to realize by converting the high/low contact. You can replace a relay by an optocoupler.

Line monitoring at input can be activated. Line monitoring influences both relays.

S3 = 0	Line monitoring off (recommended for 0 mA ... 20 mA, 0 V ... 5 V, 0 V ... 10 V)
S3 = 1	Line monitoring only if measuring value fall short of limit (< 3.5 mA, < 0.875 V, < 1.75 V) or if measuring value cross limit > 106.5 %
LED 3	on, if measuring value fall short of limit
LED 4	on, if measuring value cross limit

Converting the input signals Live/Dead Zero:

S4 = 0	Input signals 0 mA ... 20 mA, 0 V ... 5 V, 0 V ... 10 V (Dead Zero)
S4 = 1	Input signals 4 mA ... 20 mA, 1 V ... 5 V, 2 V ... 10 V (Live Zero)

Pay attention to the jumper setting as shown in figure 4.

If status line indicates "Y01", the hysteresis could be setted by the frontal keys. The trip is on mid hysteresis.

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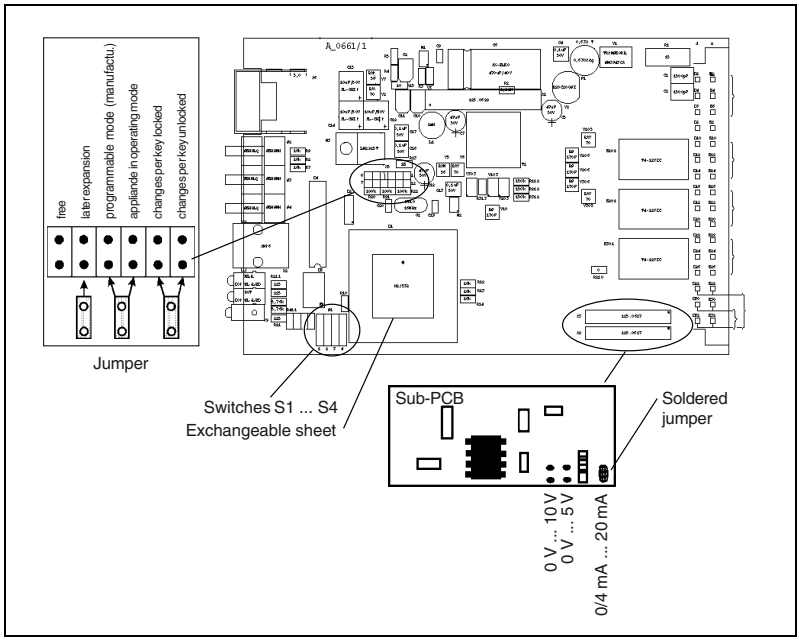

Figure 4: Layout print

The basic setting is factory setted (if not otherwise ordered) as the following:

Relay 1:	Relay de-energized high contact
Relay 2:	Relay de-energized low contact
Line monitoring:	On
Input signals:	Live-Zero (4 mA ... 20 mA, 1 V ... 5 V, 2 V ... 10 V)
Hysteresis:	approx. 1 %
Position of switches:	S1 = 1
	S2 = 0
	S3 = 1
	S4 = 1

The soldered jumper on the Sub-**P**rinted **C**ircuit **B**oard (PCB) are for selection of the input ranges. For changes cautious remove the soldered jumper between the two solder points (solder-sucker) and solder the desired input ranges through connecting the solder points to another solder jumper (figure 4).

During doing so, do not destroy or loose another components.

Attention

5 Maintenance and Service

5.1 Maintenance

Only high-quality components are used. If you normal operate and pay attention to the installation remarks, no periodical maintenance is necessary. The long-term stability of these appliances means that an annual check of the zero point and the full scale value is sufficient. The relay´s life time must be observed (see technical data sheet).

5.2 Service information

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If doubtful measuring results are achieved, the correct state of all external connecting parts and the output load must be checked. Make sure, that there is no overload. Check the fusible elements. The fuse is marked by its rated value and the covering sheet is also marked.

It is a fuse regulated in IEC 127-3, 250 V with the following rated value:

F1 = 400 mA, inert

When replacing components, always use new components of the same quality.

If there are any other faults, a laboratory standard test must be carried out. If reserve appliances are available, we recommend that the faulty appliance is given to our service department for inspection or for any repairs.

6 Safety Concept

The appliances are developed on base of lots of safety rules. Hardware and software fulfil that catalogue of safety criterion. This trip amplifier is developed for standard applications. The sister-type 2/209 is available with TÜV certificate for safety applications in category SIL3 according to IEC 61508.

The configurable appliances have remarkable advantages in comparison to conventional trip amplifiers:

- Continuous comparation of the analogue inputs with the reference values (conventional not possible).
- Self-monitoring with dynamical dead man´s circuit) (conventional not possible).
- Non-volatile EEPROM for data storage. Storage of operating system with EPROM (conventional not possible).
- Check-back signal for relay status and continuous supervision of the coils as well as forced disconnection per watchdog (conventional not possible).
- Simple RAM-test to check the store.
- Lock against operations from outside (conventional not possible).
- A fault switches into safe status.
- CE declaration from manufacturer.

Technical changings possible.

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