
SAFETY MODULE ND12DCG



User Manual

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1. INTRODUCTION

This operating instruction is referred to the two-hand devices monitoring relay **ND12DCG** (24 VAC/DC) and to the models supplied with an AC power supply and named **ND12DCGxxx** (where xxx is the AC supply voltage).

The **ND12DCG** name, used in this manual, is referred to all the models (DC and AC supply), if not differently specified.

These instructions are addressed to the following persons:

- Qualified professionals, who plan and develop safety equipment for machines and plants and who are familiar with the safety instructions and safety regulations.
- Qualified professionals, who install safety equipment into machines and plants and put them into operation.

The operating instructions contains several symbols which are used to highlight important information.

WARNING

- √ This word is placed in front of text which has to be absolutely paid attention to.
Nonobservance leads to serious injuries or damage to property.

IMPORTANT

- √ This word is placed in front of

text which contains important information.

ACTIVITY

- √ This word is placed in front of activities.

RESULT

- √ After this word follows a description on how the situation has changed after an activity is performed.

2. PACKAGE CONTENTS

Application

The safety relay **ND12DCG** can be used in applications for Two-Hand control according to EN 574 up to level IIIc.

IMPORTANT

- √ Person and object protection are not guaranteed, if the safety relay is not used according to the defined application.

WARNING

FOR YOUR SAFETY!

Please, note the following points:

- √ The unit should only be installed and operated by persons who are familiar with both these instructions and the current regulations for safety at work and accident prevention.
Electrical works may be executed only by electrical specialist.
- √ Follow local regulations as regards preventative measures.

- √ Starting the machine while standing in the dangerous area must be impossible.
- √ Any guarantee is void following opening of the housing or unauthorized modifications.
- √ Avoid mechanical vibrations greater than 5 g / 33 Hz when transporting and in operations.
- √ The unit should be panel mounted in an enclosure rated at IP 54 or better, otherwise dampness or dust could lead to function impairment.
- √ Adequate fuse protection must be provided on all output safety contacts with capacitive and / or inductive loads.

3. ASSEMBLY AND FUNCTION

3.1 *Power supply terminals*

The supply voltage must be applied to the terminals A1 and A2. The POWER LED illuminates.

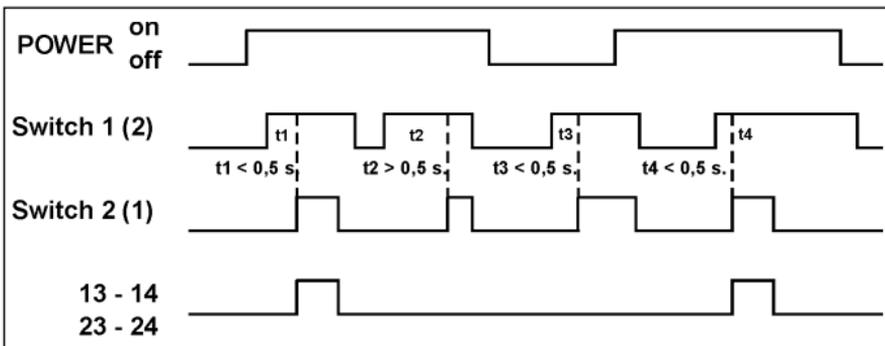


Fig. 1 - Timings

3.2 *Input terminals*

The input terminals S11, S12, S21 and S22 have to be wired up to the two-hand control device as shown in the connection diagrams of this user's manual.

3.3 *Function*

The unit is enabled to start when the two switches S1 & S2 are operated with a delay lower than 0.5 seconds (see Fig. 1). At this time, the safety outputs 13-14, 23-24 and the PNP auxiliary output 34 close immediately, while the auxiliary contact 31-32 opens immediately.

The LEDs CH1 and CH2 illuminate.

If one or both buttons are released, the safety outputs 13-14, 23-24 and the PNP auxiliary output 34 open immediately, while the auxiliary contact 31-32 closes immediately. The LEDs **CH1** and/or **CH2** turn off.

TERMINAL	FUNCTION / CONNECTION
A1	+24 VDC or AC supply
A2	GND or AC supply
S11, S12, S22	First input button (S1)
S21, S12, S22	Second input button (S2)
Y1-Y2	Feedback control loop
34	PNP aux output (collector of a PNP transistor with emitter connected internally to VCC)
13-14	First safety output (NO)
23-24	Second safety output (NO)
31-32	Relay auxiliary output (NC)

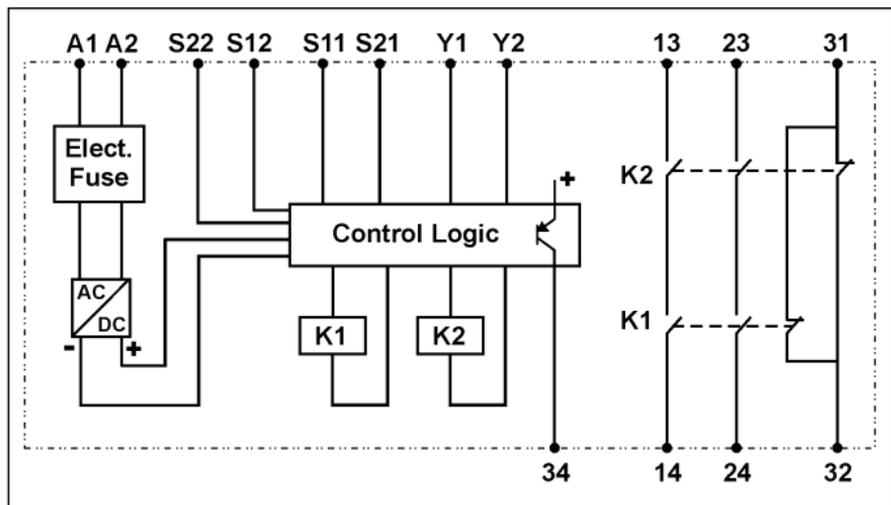


Fig. 2 - Functional circuit diagram of **ND12DCG** relay

A new cycle can be started only after releasing both S1 & S2 switches and if the feedback control loop contacts are closed (external contactors deenergized).

4. **MOUNTING AND OPENING**

The unit should be panel mounted in an enclosure rated at IP 54 or better, dust and humidity protected, because dampness or dust could lead to function impairment.

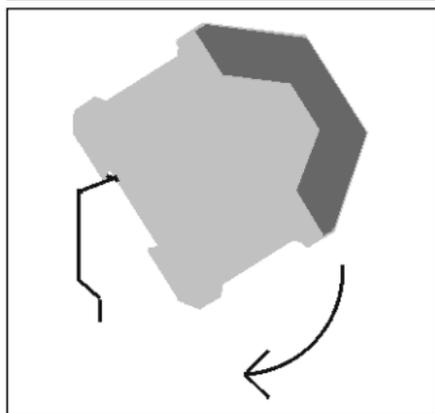


Fig. 3 - DIN-Rail mounting

ACTIVITY

✓ There is a notch on the rear of the unit for DIN-Rail mounting.

Carry out the wire appropriate to the use of the unit, according to the technical data of this user's

manual.

5. ELECTRONIC CONNECTION

5.1 *Power supply*

Connect the power supply to A1 and A2 terminals.

5.2 *Close the feedback control loop and the input circuit.*

Connect the NC Feedback contacts of the external contactors to the Y1-Y2 terminals.

Connect the two-hand control device as shown in Fig. 4 (Connection Diagram)

5.3 *Installation examples*

The PNP output is internally con-

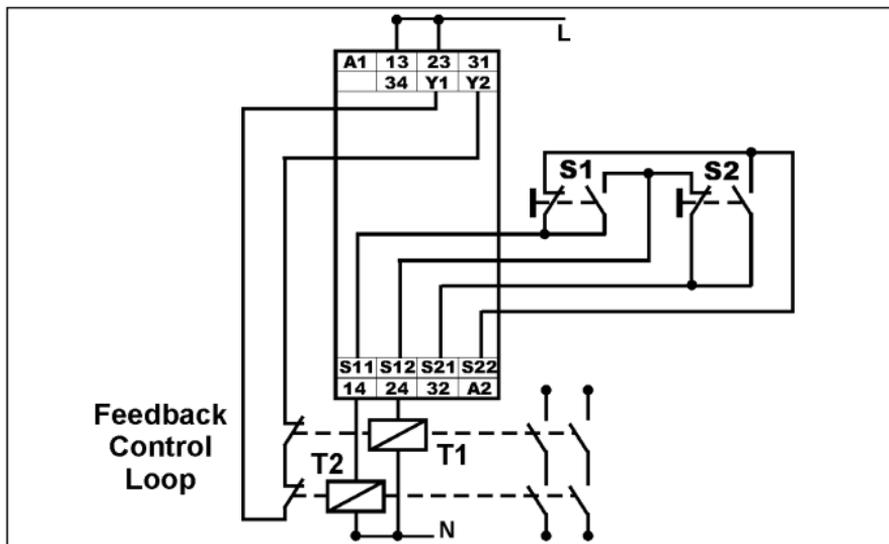
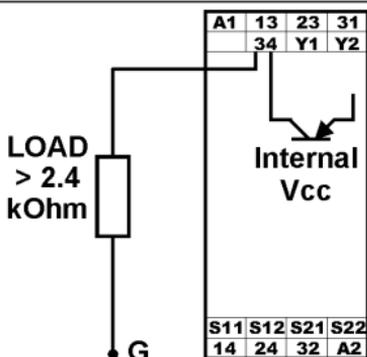


Fig. 4 - ND12DCG Connection diagram



Connect G to:
A2 if power supply is 24 Vdc
S12 if Power Supply is an ac supply

Fig. 5 - Connection of the auxiliary PNP output

connected to the +24 VCC. On terminal 34 is available the collector of the PNP transistor.

Connect to the 34 terminal an external resistive load with $R \geq 2400$ Ohm (see fig. 3).

Connect the ground of the PNP external circuit to:

- A2 terminal, if the safety relay is powered with 24 Vdc supply;

- S12 (internal ground) terminal if the relay is powered with an AC supply.

WARNING

√ Please, note the maximum length of the cables!

6. MAINTENANCE AND REPAIR

The safety relay ND1/2-D is maintenance-free.

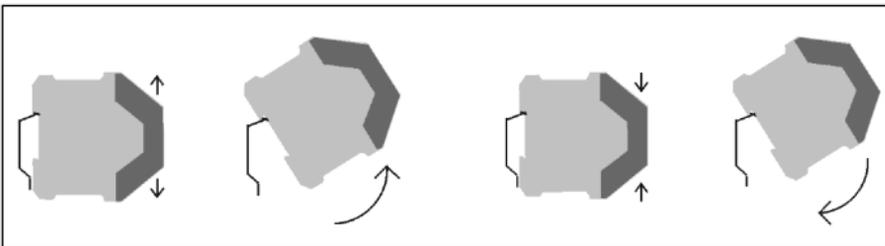


Fig. 6 - Change of the ND12DCG safety relay

In event of failure, it is possible to change the defective device with a new one following the steps described below:

- √ Switch off the relay and remove the wiring from the device.
- √ Take off the defective device from the DIN-Rail.
- √ Mount the new device on the DIN-Rail.
- √ Insert and fix the cables on the new device.

7. FAULT DIAGNOSIS

Earth Fault (AC/DC version with electronic fuse protection).

An electronic fuse forces the output contacts to open. As soon as the fault cause is removed, and the rated power supply is applied, the device is ready for new operations.

Faulty contact condition

In the event of welded contacts, further activation is not possible following the opening of the input circuit.

Only one or no LED illuminates

External wiring or internal fault is present.

Check the external wiring and restart the safety relay.

If the fault is still present, contact Carlo Gavazzi.

8. WIRING HINTS FOR OUTPUT TERMINALS

The positive power supply voltage (for example L or 24 VDC, but not GND) should be routed via the output terminals. This will help to recognize shorts to GND or Earth.

Using R-C combination in parallel with inductive loads (for example coils of the external contactors) can reduce the wearing out of the output contacts.

10. TECHNICAL DATA

<i>ELECTRICAL DATA</i>	<i>VALUES</i>
Power supply voltage (U _v)	24 VDC (Elec.fuse protect) or AC supply
Voltage range	0.85 ... 1.1 U _v
Frequency (AC Type)	50 - 60 Hz
Power Consumption (Approx.)	2 VA / 2 W
<i>CONDUCTORS DATA</i>	<i>VALUES</i>
Conductor connection	0.14 + 2.5 mm ² Rigid Wire 0.14 + 2.5 mm ² Flexible Wire
Max Conductor Length (input circuit, cross-section = 1.5 mm ²)	4x150 m (@+55°C)
Max. capacity of input cables	150 nF/km
<i>CONTACTS DATA</i>	<i>VALUES</i>
Safety Contacts	2 NO
Aux. Contact	1 NC Relay output 1 NO PNP output
Safety & N.C.Aux.Contact type	Forced Guided Relays
Contact Material	AgSnO ₂ or comparable
Switching voltage	250 VAC , 24 VDC
Switching current	6A
Max switching capacity	1500 VA (ohms load)
Mechanical lifetime	10 ⁷ cycles
Electrical lifetime	10 ⁵ cycles (2A, 24 VDC)
Creeping distance and clearance (DIN VDE 0160) (DIN VDE 0110)	<u>Pollution degree: 2.</u> <u>Basis insulation: Overtoltage</u> Category: 3/250 V <u>Protective Separation: Ov. Cat. 2</u>
Contact security (DIN VDE 0660 - Part 200)	6 A fast or 4 A slow
Voltage at S11 terminal	24 VDC
Delay on de-energization	< 30 ms
Max delay between inputs	0.5 sec.

AUXILIARY PNP OUTPUT	VALUES
Supply voltage of the relay	> 18 VDC
Resistive load	≥ 2400 Ohm
MECHANICAL DATA	VALUES
Housing Material	Polyamid PA6.6
Dimensions (WxHxP)	22.5 x 114.5 x 99
Fastening	Click-fastening for DIN-rail
ENVIRONMENTAL DATA	VALUES
Operating Temperature	-25°C + 55°C
Max. Humidity	Alt. Cycle: 95% / 0-50 °C
Terminal type (DIN VDE 0470 Part 1)	IP 20
Housing type (DIN VDE 0470 Part 1)	IP 40
Shock resistance (DIN VDE 0160)	5g, 33 Hz

NOTE



CARLO GAVAZZI reserves the right to make improvements or changes without prior notice.