
SAFETY RELAY

ND1/2-D



User's Manual



CARLO GAVAZZI

SAIET Elettronica S.p.A. - A Member of CARLO GAVAZZI Group
via Serenari, 1 - 40013 Castel Maggiore (BO), Italy
Tel. +39 051 4178811 - Fax +39 051 4178800
<http://www.saiet.it/elettronica> E-mail: sales.el@saiet.it



Index

1. INTRODUCTION.....	3
2. SAFETY INDICATIONS	3
3. ASSEMBLY AND FUNCTION.....	4
3.1 <i>Power supply terminals</i>	4
3.2 <i>Input terminals</i>	4
3.3 <i>Function</i>	4
4. MOUNTING AND OPENING	5
5. ELECTRONIC CONNECTION.....	6
5.1 <i>Power supply</i>	6
5.2 <i>Close the feedback control loop and the input circuit</i>	6
5.3 <i>PNP auxiliary output</i>	6
6. MAINTENANCE AND REPAIR	7
7. FAULT DIAGNOSIS.....	8
8. WIRING HINTS FOR OUTPUT TERMINALS	8
9. TECHNICAL DATA	8

1. INTRODUCTION

This operating instruction is referred to the two-hand devices monitoring relay **ND1/2-D** (24 Vac/dc) and to the models supplied with an AC power supply and named **ND1/2-D/xxx** (where xxx is the AC supply voltage).

The **ND1/2-D** 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. SAFETY INDICATIONS

Application

The safety relay **ND1/2-D** 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.

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 **Channel 1** and **Channel 2** 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

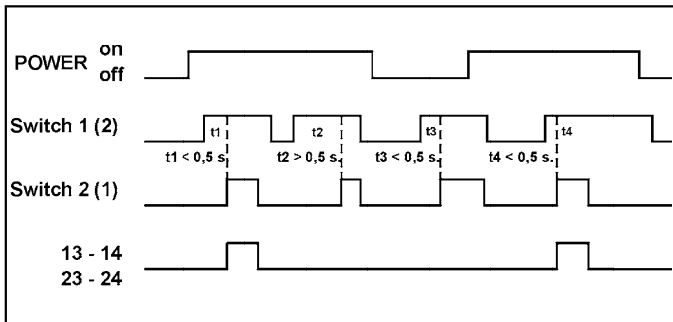


Fig. 1 - Timings

Terminal	Function / Connection
A1	+24VDC 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 (N.O.)
23-24	Second safety output (N.O.)
31-32	Relay auxiliary output (N.C.)

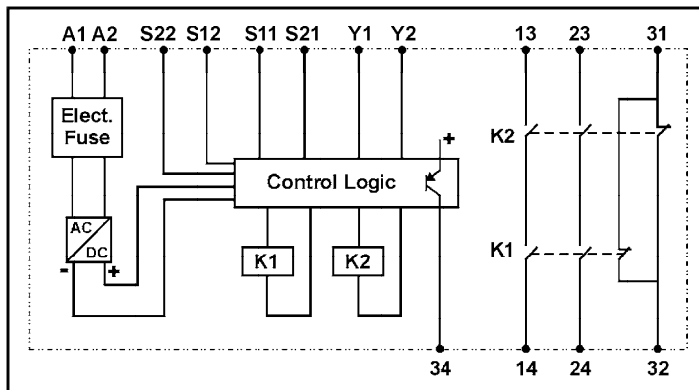


Fig. 2 - Functional circuit diagram of ND1/2-D relay

immediately. The LEDs **Channel 1** and/or **Channel 2** turn off.

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

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.

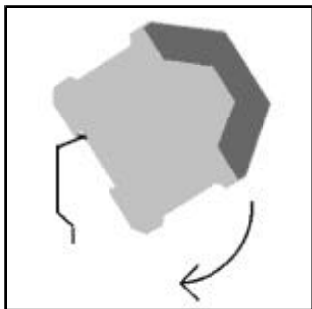


Fig. 3 - DIN-Rail mounting

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 N.C. 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 PNP auxiliary output

The PNP output is internally

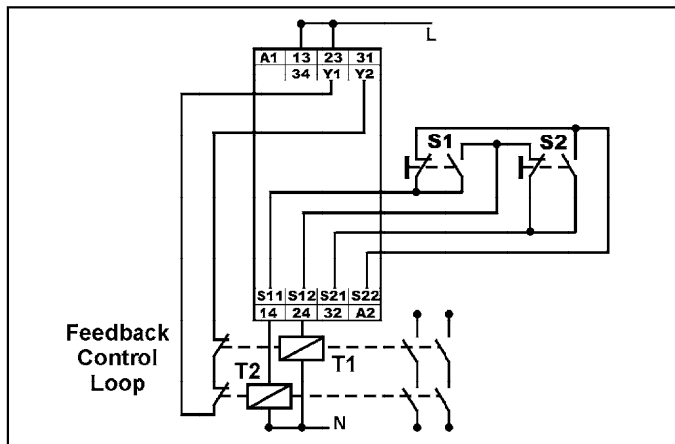


Fig. 4 - ND1/2-D Connection diagram

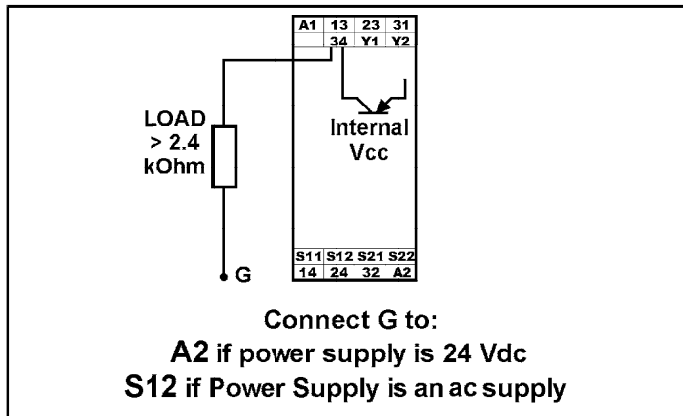


Fig. 5 - Connection of the auxiliary PNP output

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 $R \geq 2400 \text{ Ohm}$ (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.

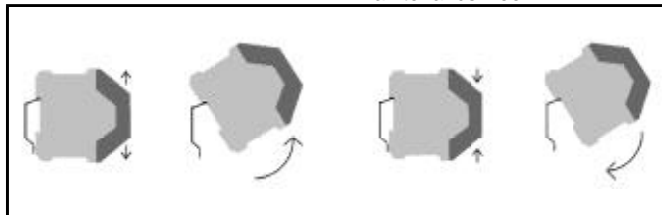


Fig. 6 - Change of the **ND1/2-D** safety relay

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 SAIET Elettronica.

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.

9. TECHNICAL DATA

See the following tables.

ELECTRICAL DATA	VALUES
Power supply voltage (Uv)	24 VDC (Elec.fuse protect) or AC supply
Voltage range	0.85 ... 1.1 Uv
Frequency (AC Type)	50 - 60 Hz
Power Consumption (Approx.)	2 VA / 2 W
CONDUCTORS DATA	VALUES
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
CONTACTS DATA	VALUES
Safety Contacts	2 N.O.
Aux. Contact	1 N.C. Relay output 1 N.O. 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
Creeping distance and clearance (DIN VDE 0160) (DIN VDE 0110)	<u>Pollution degree: 2.</u> <u>Basis insulation: Overvoltage</u> <u>Category: 3/250 V</u> <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



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

Mod. 3224 - X/II/02