

DK Sikkerhedsstyrekredse skal overholde bestemmelserne i Maskindirektivet 2006/42/EF.

Sikkerhedsrelæet type NST-3000DI opfylder disse bestemmelser og er endvidere konstrueret efter specifikke normkrav om dublering og overvågning af sikkerhedsstyrekredse jf. europæisk norm om sikkerhedskrav til elektrisk materiel på maskiner, EN 60 204-1 (stærkstrømsbekendtgørelsen afsnit 204-1).

CE-mærket i overensstemmelse med MD, EMC og LVD.

NST-3000DI er blevet valideret af TÜV Nord.

GB Safety control circuits must fulfill the requirements of the Machine Directive 2006/42/EC.

The safety relay NST-3000DI fulfills these requirements and further it is designed according to specific standard requirements on doubling and monitoring of safety control circuits cf. European standard on safety requirements for electrical equipment on machines, EN 60 204-1.

CE-marked according to MD, EMC and LVD.

NST-3000DI has been validated by TÜV Nord.

DK FUNKTIONSBESKRIVELSE
Manuel Start

Ved manuel start, overvåges startknappen. OSSD'erne bliver aktive, når indgangsspændingen skifter fra HØJ til LAV. En defekt, kontinuerlig høj eller kontinuerlig lav ved startindgangen, kan således ikke føre til en farlig situation.

Automatisk start

Under automatisk start overvåges startknappen ikke, så det er også muligt, at bruge en kontakt eller en bro. OSSD'erne bliver aktive, når de skifter fra LAV til HØJ ved startindgangen (ved tryk på knappen). Med et permanent HØJ signal ved startindgangen, bliver udgangene straks HØJE, hvis triggerindgangene også er aktiveret. Ikke egnet til E-stop applikationer!

GB OPERATION
Manual Start

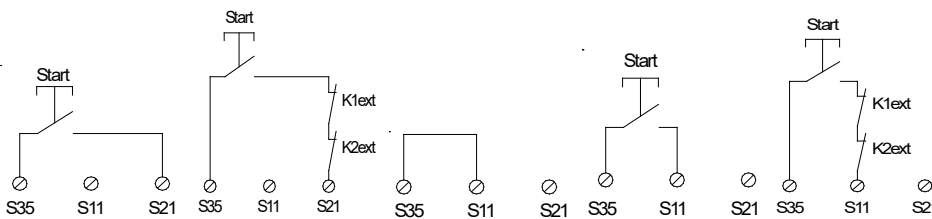
In manual start mode, the start button is monitored. The OSSDs become active when the input voltage changes from HIGH to LOW. Thus a faulty continuous high or continuous low at the start input cannot lead to a dangerous situation.

Automatic Start

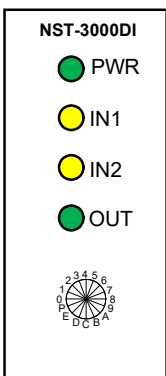
During automatic start, the start button is not monitored, so it is also possible to use a switch or a bridge. The OSSDs become active when changing from LOW to HIGH at the start input (pressing the button). With a permanent HIGH signal at the start input, the outputs immediately become HIGH if the trigger inputs are also activated. Not valid for E-stop applications!

Reset configuration

R1	R2	R3	R4	R5
Manual Start Start button monitored	Manual Start with monitoring of external contactors	Automatic Start	Automatic Start without monitoring of the start button	Automatic Start without monitoring of the start button and with monitoring of external contactors



Display



PWR-LED (green)

ON: is switched on and working.
Slowly flashing: A failure occurred.

IN1-LEDs, IN2-LED (yellow)

These two LEDs reflect the state of the trigger inputs S12 and S22, independent of the state of the relay

OUT-LED (green)

OFF: The trigger elements are not active (the NO contacts are switched off and the NC contacts are switched on), at least one input channel is open or not active.

Slowly flashing: The trigger elements are active, waiting for a start pulse.

Fast flashing 1: OFF delay is active, the undelayed outputs (O1, O2) are switched off, and the delayed outputs are still switched on (O3, O4).

Fast flashing 2: (Only dual channel applications) The trigger elements are both active, but they were not inactive in a valid way, for this a start is not possible (i.e. only one e-stop-contact was opened).

It may be corrected by regularly open both triggers.

ON: The outputs (OSSDs) are activated (the NO contacts are switched on and the NC contacts are switched off).

Flashing irregularly: Output of an error code - see there.

Dansk Teknisk data NST-3000DI	English Technical data NST-3000DI	
Strømforsyning	Power supply	19.2 - 28.8 VDC
Indgange	Inputs	
Kanaler	Channels	2
Trigger indgange	Trigger inputs	2
Input spænding	Input voltage	HIGH: >12V LOW: <2V
Input strøm	Input current	>6mA (typ. 8mA)
Udgange	Outputs	
Nummer og type	Number and Type	See output configuration
Udgangsspænding	Output voltage	24 VDC
Udgangsstrøm (max)	Output current (max)	400 mA (UL: 350 mA)
Driftstemperatur	Operating temperature	0..55°C

Data according to standards	
ISO 13849-1 Performance Level	PL _e
IEC 61508 Safety Integrity Level	SIL 3
IEC 62061 Safety Integrity Level (Claim)	SIL _{CL} 3
MTTF ₀	2403a
PFH / PFH ₀ (1/h)	1,89E-9
SFF	99%
DCavg	99%
β	2,00E-2
β ₀	1,00E-2
MTTR	8h
MRT	8h
Life time	20 a

Safety configurations (SC)

	Function	Option	Wiring
1	E-stop Safety gate monitor	2 channels 4-wires	
		2 channels 3-wires	
		1 channel 2-wires	
4	ESPE Type 4*)	2 channels 3-wires	
		1 channel, testable 2-wires	
6	Safety Mat	2 channels 4 wires	

*) in the configuration 4 a 1ms filter is activated for the inputs S12, S22.
**) several ESPE type 2 can be cascaded.

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Output configuration (OSSDs)

Output	NST-3000DI
O1	NO
O2	NO
O3	C, NO, NOD *
O4	C, NO, NC, NOD *

* - Depending on the selected mode (see programming?)
C - Configurable
NO - Normally open direct
NC - Normally closed direct
NOD - Normally open off-delayed

Controls

Safety Configurations (SC)	Cross circuit	Short against Vcc	Short against Ground	Time monitoring	Change of the configuration	Change of the start configuration	Max. reachable safety category	Max. reachable PL	Max. reachable SIL	Fallback time	Remark
1	√	√	√		√	√	4	e	3	20ms	
2		√	√		√	√	3	d	2	20ms	
3		√	√		√	√	2	c	1	20ms	
4	√ ¹	√ ¹	√		√	√	4	e	3	20ms	1) by driving device
5		√	√	√	√	√	2	c	1	25ms ²	While testing 2) Outside testing otherwise +220ms
6	√ ³	√	√		√	√	3	e	2	20ms	3) correlates with an entering of the mat

Programming

Position hex switch	Output configuration (OSSD)	Delay s
0	3 NO / 1 NC – direct	0
1	4 NO – direct	0
2	2 NO direct / 2 NO delayed	0.1
3	2 NO direct / 2 NO delayed	0.5
4	2 NO direct / 2 NO delayed	1
5	2 NO direct / 2 NO delayed	1,5
6	2 NO direct / 2 NO delayed	2
7	2 NO direct / 2 NO delayed	3
8	2 NO direct / 2 NO delayed	4
9	2 NO direct / 2 NO delayed	5
A	2 NO direct / 2 NO delayed	10
B	2 NO direct / 2 NO delayed	15
C	2 NO direct / 2 NO delayed	20
D	2 NO direct / 2 NO delayed	25
E	2 NO direct / 2 NO delayed	30
P	Prog	

NST-3000DI

- PWR
- IN1
- IN2
- OUT

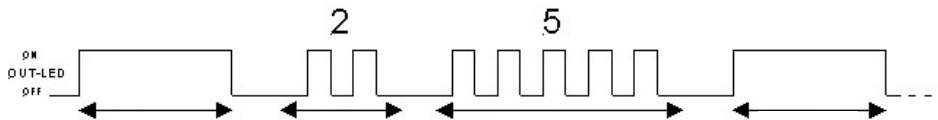


1. Device needs to be switched off
2. Put hex switch in position "P"
3. Switch device on and wait app. 6s until the OUT-LED blink alternately.
4. Rotate the hex switch clockwise until it's desired position.
5. Wait app. 2 seconds
6. The PWR-LED and the OUT-LED blink alternately fast which means that the new configuration is overtaken.
7. Switch device off and on again, the device will now work with the new configuration.

Display of the error code

At the same time, the OUT-LED flashes permanently an error code. The error code output is repeated infinitely.

The draft shows an example with code 25.



The FAILSAFE state can only be cancelled by switching the device off and on.

Faults resulting from faulty wiring may not be detected, but it is ensured that the release circuits do not become activated.

Error code	Description
17	Error recognizing a valid configuration, please check the wiring
18	
21	OSSD error, possibly cross circuited or circuited against Gnd or Vcc
22	
23	S11 error (cross circuit, circuit against Gnd or Vcc)
24	S21 error (cross circuit, circuit against Gnd or Vcc)
25	Failure on an input wired to S11 (cross circuit, circuit against Gnd or Vcc) check wiring
26	Failure on an input wired to S21 (cross circuit, circuit against Gnd or Vcc) check wiring
27	Mat failure, at least one circuit is open
28	Error S36 has changed
29	Failure in start configuration, most probably changed
32	Failure in configuration recognition (different results)
33	
34	Failure Hex switch does not match internal memory (hex switch changed?)
35	Failure in communication with ESPD type 2
36	Failure in S21-S22 bridge
75	Failure not programming position
76	
78	Failure in hex switch
79	

EC Declaration of Conformity

NST-3000DI

The manufacturer

**Duelco A/S
Systemvej 8
DK-9200 Aalborg SV**

hereby declares in sole responsibility that the following product

Product description Multifunctional Safety Relay

Type designation **NST-3000DI**

is conform to all relevant regulations of the directive **Machinery (2006/42/EC)**.

The safety component conforms additionally the directives **Low Voltage Directive (2014/35/EU)** and **Electromagnetic Compatibility (2014/30/EU)** as well as **RoHS Directive (2011/65/EU)**.

The following standards were applied:

EN 61508:2010	Functional Safety of safety-related electrical/electronic/programmable electronic control systems
EN 62061:2005 + Cor.:2010 + A1:2013 + A2:2015	Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems
EN ISO 13849-1:2015	Safety of machinery - Safety-related parts of control systems – Part 1: General principles for design
EN 50581:2012	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

The safety component was validated by the following testing institutes:

TÜV NORD CERT GmbH
Langemarckstraße 20
45141 Essen
www.tuev-nord-cert.de
Notified Body: 0044

No. of EC Type Examination Certificate

44 205 15176923

In response to a reasoned request by national authorities, relevant information of the safety component will be sent electronically or postally. Person that is authorized to compile the relevant technical documentation is:

Dipl. El.-Ing. Teidt Due – Systemvej 8, DK-9200 Aalborg SV

Date	Signature
Aalborg, 30.07.2020	Teidt Due Managing Director 