Control Relays and Timers



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easySafety

Product Description

The easySafety control relay for safety-related applications monitors all commonly used safety devices and also takes over the required control tasks for the machine. Packed with a host of conventional safety relays in the form of safety function blocks, easySafety not only features integrated safety functions but also standard functions in a single device-all in one.

In addition to the safety circuit diagram containing the safety configuration, the safety control relay also contains a standard circuit diagram. This circuit diagram can be used for standard tasks, such as the processing of diagnostics signals or general control tasks of a machine.

Application Description

Because of the large number of safety function blocks, the user can tackle a large number of application options with only one device. The user can also respond directly to future and changing application requirements. This saves financial resources and offers future investment security. Last but not least, it reduces the stock-keeping required for special safety relays. The easySafety meets the requirements of Category 4 to EN 954-1, PL e to EN ISO 13849-1, SILCL 3 to EN IEC 62061 and SIL 3 to EN IEC 61508. With easySafety, it is possible to implement applications meeting the most stringent safety requirements.

Safety function blocks:

- · Emergency stop
- Guard door monitoring with and without interlock/ guard locking
- Two-hand control (EN 574)
- Electro-sensitive protective devices (light curtains) •
 - Light curtain muting
- Enable switch
- Start device
- Operating mode selector
- Safety timing relay
- Overspeed monitoring Feedback loop monitoring • (EDM)
- Zero speed monitoring

Features

- All-in-one: Safety and control functions combined in one device
- Simple configuration through prefabricated and tested safety components
- Direct state display and ٠ increased machine availability due to fast error diagnosis through integrated display
- Multistep password concept prevents unwanted manipulation

Standards and Certifications

- Product standards: CE marked; UL 508; CSA C22.20.4-04; CSA 22.2 No. 142-MI1987
- UL CCN: NRAQ
- CSA File No. 012528
- CSA Class No. 2252-81 and 2252-01
- TÜV Rhineland certified
- Degree of Protection IEC: • IP20



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Product Selection

easySafety Relays 1 easySafety



Inputs (Safety) Digital	Outputs (Safety) 6A Relay	Outputs (Safety) Transistor	Outputs (Safety) Test Signal	Display + Keypad	Catalog Number
14	1 (redundant)	4	4	_	ES4P-221-DMXX1
14	1 (redundant)	4	4	Yes	ES4P-221-DMXD1
14	4	_	4	_	ES4P-221-DRXX1
14	4	—	4	Yes	ES4P-221-DRXD1

Accessories



Programming	Software	
Description		Catalog Number

easySoft-Safety ESP-SOFT (including easySoftPro) 2

Memory Card	I
A	

Input/Output Simulator

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00000 11 Innonnon III seeds 00 00 00 00 00 00 AL AA AA AA AA AA iai

Memory Card

Input/Output Simulator

With plug-in power supply unit 100–240 Vac/24 Vdc

Description 256 kB module

Description

Catalog Number ES4A-MEM-CARD1

Catalog Number

ES4A-221-DMX-SIM

Programming Cables

	Description	Catalog Number
SUB-D Cable	SUB-D, nine-pole, serial, 2m	EASY800-PC-CAB
USB Cable	USB, 2m	EASY800-USB-CAB

Notes

 EN 954-1: 1996, Category 4.
EN ISO 13849-1: 2006, PL e (Performance Level). IEC 61508: 1998, SIL 3 (Safety Integrity Level). IEC 62061: 2005, SILCL 3 (Safety Integrity Level Claim Limit). Expandable: standard inputs/outputs and standard bus systems. 24 Vdc supply voltage.

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② Operating systems: Windows[®] 2000 SP4, Windows XP SP1, Windows Vista (32 bit).

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Technical Data and Specifications

easySafety Relay

Description		Unit	ES4P_
General			
Standards			EN 55011, EN 55022, IEC/EN 61000-4, IEC 60068-2-6,
			IEC 60068-2-27, EN 954-1: Category 4,
			EN ISU 13849-1. PL 0, EN IEU 02001. SILUE 3, EN IEU 01308. SIL 3
		ITIITI	Tor, bet reit/FC/FN C071E_2E mm or every fining using fining breekets 7D4 101_CE1 (accessories)
			IOP-Hat fail IEC/EN 60715, 35 min of screw fixing using fixing brackets 2B4-101-oFT (accessories)
Maximum duration of external test pulse		ms	1
Semi-conductor output		ma	4
		ma	<
		ms	<0.15
			0.0.4 (ANAIC 20.40)
		2 mm ²	U.Z=4 (AWG ZZ=1Z)
		mm²	U.Z-Z.5 (AWG ZZ-12)
Standard screwdriver		mm	3.5 X U.8
		Nm	υ.Ե
Ambient Climatic Conditions			
Uperating ambient temperature		°(;	-25 to +55, low temperatures to IEC 60068-2-1, high temperatures to IEC 60068-2-2
			Prevent condensation by means of suitable measures
LCD display (clearly legible)		°C	0 to +55
Storage		°C	-40 to +70
Relative humidity, noncondensing (IEC/EN 60068-2-30)		%	5 to 95
Air pressure (in operation)		hPa	795 to 1080
Ambient Mechanical Conditions			
Protection type, IEC/EN 60529			IP20
Vibrations (IEC/EN 60068-2-6)			
Constant amplitude 0.15 mm		Hz	10 to 5/
Constant acceleration, 2g		Hz	5/ to 150
Mechanical shock resistance (IEC/EN 60068-2-27) semi-sinusoidal 15g/11 ms	Shocks		18
Drop to IEC/EN 60068-2-31	Drop	mm	50
Mounting position			Horizontal/vertical
Electromagnetic Compatibility (EMC) According to IEC/EN 61000-6-2			
Electrostatic discharge (IEC/EN 61000-4-2, Level 3, ESD)			
Air discharge		kV	8
Contact discharge		kV	6
Radio interference suppression (EN 55011)			EN 55011 Class B, EN 55022 Class B
Power pulses (surge) (IEC/EN 61000-4-5, Level 2)		kV	1 (supply cables, symmetrical)
Insulation Resistance			
Overvoltage category/pollution degree			111/2
Clearance in air and creepage distances			EN 50178, UL 508, CSA C22.2, No. 142, EN 60664-1:2003
Insulation resistance			EN 50178
Backup/Accuracy of the Real-Time Clock			
Accuracy of the real-time clock		s/day	Normally ±5 (±0.5 h/year)
Repetition Accuracy of Timing Relays in Standard Circuit			
Accuracy of timing relay (of value)		%	±0.02
Resolution			
Hange "S"		ms	5
Range "M:S"		S	1
Retentive Memory			
Write cycles of the retentive memory (minimum)			10,000,000 (1010) (read/write cycles)

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Description		Unit	ES4P_
Power Supply			
Rated operational voltage	U _e	V	24 Vdc (-15/+20%)
Permissible range		Vdc	20.4 to 28.8
Ripple		%	≤5
Interfaces			
EASYNet (CAN-based)			
Bus termination (first and last station)			Yes
Control operating mode EASYNet			
Number of users			Maximum 8
NET Network			
Stations	Number		Maximum 8
Data transfer rate/distance			1000 Kbit/s, 6m 500 Kbit/s, 25m 250 Kbit/s, 60m 125 Kbit/s, 125m 50 Kbit/s, 300m 20 Kbit/s, 700m 10 Kbit/s, 1000m Bus lengths greater than 40m can only be achieved with enhanced cross-section conductors and terminal adapters
Potential isolation			
From power supply			Yes
From the inputs			Yes
From the outputs			Yes
From the PC interface, memory card, NET network, EASYLink			Yes
Bus termination (first and last station)			Yes
Terminal type			RJ45
Digital Inputs 24 Vdc			
Number			14
Inputs can be used as analog inputs			_
Status display			LCD display (if provided)
Potential isolation			
From power supply			No
Between digital inputs			No
From the outputs			Yes
From PC interface, memory card, EASYLink			No
From network EASYNet			Yes
Rated operational voltage	U _e	Vdc	24
At signal "O"	U _e	Vdc	<5
At signal "1"	U _e	Vdc	>15
Clock Outputs			
Number			4
Voltage		Vdc	24
Electrical isolation			No

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Control Relays and Timers

easySafety Relay, continued

Description		Unit	ES4P_
Relay Outputs			
Number			4 for ES4PDR_, 1 redundant for ES4PDM_
Outputs in groups of			1
Parallel switching of outputs to increase power			Not permissible
Protection of an output relay			Fuse: 6A gG, circuit breaker with characteristic C: 24 Vdc 4A, Short-circuit current <250A
Potential isolation			
From power supply			Yes
From the inputs			Yes
From PC interface, memory card, EASYNet, EASYLink			Yes
Safe isolation according to EN 50178		Vac	300
Basic insulation		Vac	600
Lifespan, mechanical	Operations	x 10 ⁶	10
Contacts			
Conventional thermal current		А	6
Rated impulse withstand voltage Uimp contact coil		kV	6
Rated operational voltage	U _e	Vac	250
Rated insulation voltage	Ui	Vac	250
Safe isolation to EN 50178 between coil and contact		Vac	300
Making capacity			
AC-15, 230 Vac, 3A	Operations		80,000
DC-13, 24 Vdc, 5A, 0.1 Hz	Operations		40,000
Switching frequency			
Mechanical operations		x 10 ⁶	10
Switching frequency		Hz	10
UL/CSA			
UL 508			B300/R300
Transistor Outputs			
Number			4
Rated operational voltage	U _e	Vdc	24
Permissible range	U _e	Vdc	20.4–28.8
Ripple		%	≤5
Protection against polarity reversal			Yes (Caution: A short-circuit will result if 0V or GND is applied to the outputs in the event that the supply voltage is connected to the wrong poles.)
Potential isolation			
From power supply			Yes
From the inputs			Yes
From PC interface, memory card, network, EASYNet, EASYLink			Yes
Rated operational current at signal "1" DC	l _e	А	Maximum 0.5
At signal "1" with I _e = 0.5A		V	$U = U_e - 1 V$
Short-circuit protection			Yes, thermal
Short-circuit tripping current for $RA \le 10 \text{ m ohms}$		А	$0.7 \le I_e \le 2$ per output
Total short-circuit current		А	8
Peak short-circuit current		А	16
Thermal cutout			Yes
Maximum operating frequency at constant resistive load RL $<\!100\mbox{ kO}$ (dependant on program and load)		Ops/h	40,000
Parallel connection of outputs			No
Status indication of the outputs			LCD display (if provided)
Inductive load			
Without external suppressor circuit			
Duty factor			$I_{0.95} \approx 3 \times I_{0.65} = 3 \times L/H I_{0.95} = 1$ ime in ms, until 95% of the steady-state current has been reached
With external suppressor circuit			
Utilization factor		a	1
Duty factor		9 % DF	100
Maximum switching frequency, maximum duty factor	Operations	70 01	Depending on the suppressor circuit

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Dimensions

Approximate Dimensions in Inches (mm)

