Safety Technique

SAFEMASTER PRO
Configurable Safety System
System Overview

DOLD ®

Short Description

SAFEMASTER PRO is a configurable, modular safety system consisting of a controller and 0-14 extension modules. To optimise the system according to the application input modules, output modules and combination input/output modules are available. These can be used in various combination with max. 4 units of the same type. In addition diagnostic modules allow to connect the system to a fieldbus. The communication between the modules is done via a 5 pole bus in the DIN rail (DOLD IN-RAIL-BUS). To extend the system, the extension modules are just clipped on the DIN rail.
In addition to the mentioned components relay extension modules UG 6912.14 and UG 6912.28 are available with 1 or 2 safety related relay outputs to extend the OSSDs with voltfree contacts. These extension modules are wired to the OSSDs of the output modules (take care of the total current).

Applications

With larger installations and more complex solutions the number of safety related functions is increasing. Also often logic interconnections, e. g. to connect or disconnect parts of a larger system are required. The modular configurable safety system SAFEMASTER PRO monitors all safety related parts of a machine or plant, simple, flexible and safe.

Additional Information about this topic

- Information about the single modules of the SAFEMASTER PRO series (see „System Components") can be found in the User Manual.

- Information about the fieldbus modules of the SAFEMASTER PRO series (see „System Components") can be found in the User Manual Fieldbus modules.

- Configurable, modular safety system with field bus

Advantages of SAFEMASTER PRO

- For safety applications to PLe / cat. 4 and SIL 3
- Less wiring because of configuration software SAFEMASTER PRO Designer
- Easy planning because of Drag & Drop via graphic configuration software
- Safe speed monitoring
- Time and cost saving installation
- Reduced wiring and space saving in cabinets
- Flexible extension with safety input and output modules
- Easy extendable via BUS-Rail
- Comprehensive fault localisation and diagnostic
- Memory card as option for simple maintenance
- Coded connecting blocks for non-interchangeable connection increase assembly reliability.
- Compact design: Base- and extension modules with only 22.5 mm width

Features

- Monitoring of opto electronical sensors, light curtains, magnetic actuated sensors, E-stop buttons, safety mats, mechanical switches, two-hand control
- up to 128 safety, single-channel inputs, dual-channel connection in pairs
- up to 16 separate safety, dual-channel outputs (OSSD),
- up to 32 separate test outputs for sensor monitoring
- 1 Feedback circuit each für every safety output with individual configurable reset
- Configuration by PC via Mini USB Port
- Using of control unit UG 6911 as stand alone unit possible
- Flexible safety logic to create and amend the safety functions
- Safe integrated logic testing
- Communication of the modules via 5 pole DIN-rail bus at the back of the units (In-Rail Bus)
- Indicator outputs, status-LEDs and bus connection via field bus modules for comprehensive diagnostics
- With pluggable terminal block for easy exchange of device

Approvals and Markings

CE   TÜV SÜD *   c UL US LISTED *   *) see separate datasheet
Canada / USA

DOLD In-Rail-Bus
replaces individual wiring
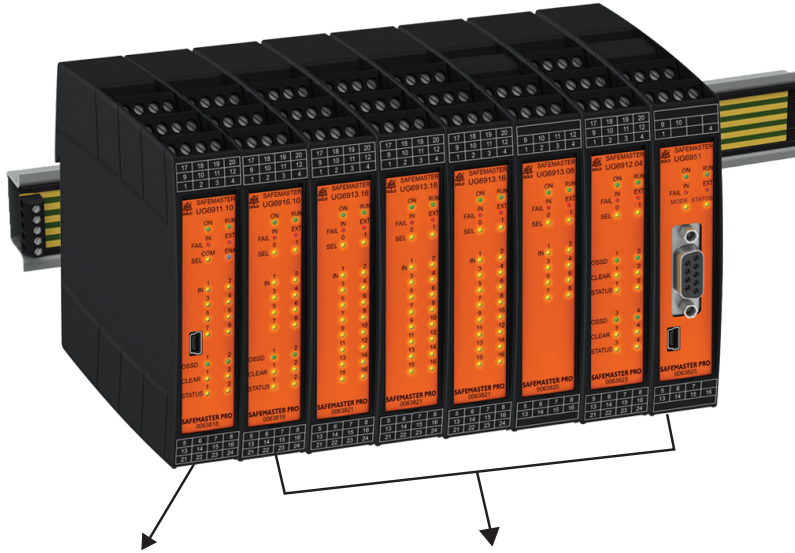
Control Unit
UG 6911.10
8 safety inputs and
2 safety dual-channel
OSSD oututs

Up to 14 extension module, possible:
- Input /Output module UG 6916.10
- Input module UG 6913.08, UG 6913.12 and UG 6913.16
- Output module OSSD UG 6912.02 and UG 6912.04
- Field bus modules for diagnostic-connetcion on field bus systems
  UG 6951 (CANopen), UG 6952 (PROFIBUS DP),
  UG 6954 (PROFINET), UG 6955 (Ethernet/IP), UG 6956 (EtherCAT),
  UG 6957 (USB)
- Output module relay UG 6914.04
- Speed monitor module UG 6917
- Bus extender module UG 6918
- with up to 128 inputs and 16 safety dual-channel outputs

Output Module Relay with 1 e.g.
2 safety relay outputs for volt free contact
multiplication of the OSSDs
UG 6912.14 and UG 6912.28

The Control Unit

The UG 6911.10 can be used as stand alone safety monitor without extensions or as control unit for the flexible system SAFEMASTER PRO. The highly integrated flexibility allows nearly any combination between control unit and extension modules. Up to 72 safety inputs and 8 safety outputs (OSSD) are available. Field bus modules as option offer extensive diagnostic functions and simple integration to the conventional control.

The Input Modules

If the 8 inputs of the control unit are not sufficient an extension with input modules of 8, 12 or 16 inputs can be made. as alternative to only input modules a module with 8 inputs and 2 OSSD outputs is available. Depending on the input configuration all sorts of safety actuators can be connected. These could be optoelectronic safety scanners, light curtains, magnetic coded sensors, e-stop buttons, safety mats, mechanical switches, 2-hand controls etc.

The Output Modules OSSD

To extend the 2 safety outputs of the controller output modules with 2 or 4 dual channel semiconductor outputs are available. Also the combination input/output module with 8 safety inputs and 2 OSSD outputs can extend the number of outputs. The output modules also provide a feed back circuit input per safety output. This allows to monitor external contacts e.g. of relay modules UG 6912.14 or UG 6912.28.

The Output Modules Relay

For simple realization of relay outputs and for potential-free contact multiplication of the OSSDs, output module relays UG 6912.14 and UG 6912.28 are available. These optionally provide 1 or 2 relay outputs, each with 2 safety-related NO contacts and one NC contact as an indicator output.

The inputs of the output module relays are wired to the OSSDs of SAFEMASTER PRO. In order to monitor the relay contacts, these are bridged across into the feedback circuits of the relevant OSSD output module.

If more relay outputs are needed, output module relays UG 6914.04 are available. These have 4 independent safe relay outputs, each of which has an NO contact. Each of the 4 safety relays is also equipped with an input for the external feedback contacts (EDM). Depending on the version, up to 8 programmable non-safe semiconductor outputs can also be used for status indication.

The bus extender module
The UG 6918 is an extension module with which a SAFEMASTER PRO system consisting of the UG 6911.10 control unit and its extension modules, can be divided up into several module groups over longer distances (up to 50m between 2 groups).
The individual groups are each connected via 2 UG 6918 bus extender modules and a shielded cable (with 4 twisted-pair lines). Each bus extender module has 2 independent connecting channels Ch1 and Ch2.
2 bus extender modules are connected using either of these 2 channels.

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The Diagnostic Modules

3 different field bus modules for diagnostic-connetcion on field bus systems are available: UG 6951 (CANopen), UG 6952 (PROFIBUS DP), UG 6954 (PROFINET), UG 6955 (Ethernet/IP) and UG 6956 (EtherCAT). The connection between the modules is done by snapping the units on the DIN rail bus of SAFEMASTER PRO.

System Configuration

The configuration of the TUEV approved system is done very simple on a PC with the free configuration software SAFEMASTER PRO Designer. Using complex logic circuits can be designed with logic operators and safety functions like muting, timer, counter etc. This is handled by a simple graphic configuration tool.

The configuration designed on the PC is transferred via USB connection to the control unit UG 6911. Using the optional memory card OA 6911 (accessory) easy transfer of the configuration to a replacement unit is possible.
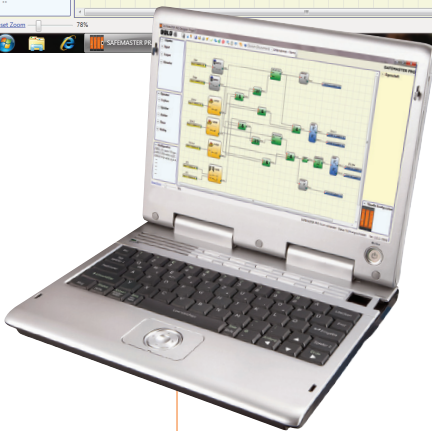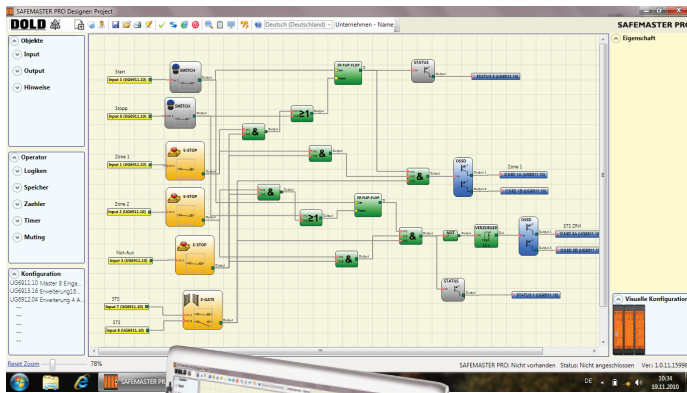
Mini USB-Port

Simple configuration in only 3 steps:

1 Select and configure safety functions

2 Assign in- and outputs and connect them comfortably on the PC

3 Test safety logic and transfer it via USB cable to the safety module - ready!

Safety Related Data

Values according to EN ISO 13849-1:

Category:	4	
PL:	e	
$MTTF_d$:	30 ... 100	a
DC_{avg}:	high	
Service life:	20	a (year)

Values according to IEC EN 62061 / IEC EN 61508:

SIL CL:	3	IEC EN 62061
SIL	3	IEC EN 61508
DC_{avg}:	high	
PFH_D:	10^{-8} ... 10^{-7}	h^{-1}

UL-Data

The safety functions were not evaluated by UL. Listing is accomplished according to requirements of Standard UL 508, "general use applications"

Nominal voltage U_N:	DC 24 V ± 20 % / current supply class II or voltage and current limits.
Nominal consumption:	max. 3 W
Switching capacity:	
OSSD semiconductor outputs:	24Vdc, 400mA
OSSD relay output:	6A 250Vac, resistive
Status output:	24Vdc, 100 mA
Wire connection:	60°C / 75°C copper conductors only 0,5 ... 2,5 mm² AWG 12 - 30 Sol/Str Torque 5-7 lb-in
Note:	For use in pollution degree 2 overvoltage category II environment only

info **Technical data that is not stated in the UL-Data, can be found in the technical data section.**

General Technical Data

Inputs max.	128		
OSSD-outputs max.	16 2-channel-outputs		
Indicator output max.	16		
Extension modules max. (not UG 6912.14 - UG 6912.28)	14		
Extension modules of the same type (not UG 6912.14 - UG 6912.28)	4		
Nominal voltage	DC 24 V ± 20%		
Digital INPUTS	„Type B" according to EN 61131-2; I_N: 7...10 mA at DC 24 V		
OSSD (UG 6911.10, UG 6916.10, UG 6912.02, UG 6912.04)	PNP active high – max. 400mA at 24VDC		
Indicator outputs (UG 6911.10, UG 6916.10, UG 6912.02, UG 6912.04, UG 6914.04)	PNP active high – max. 100mA at 24VDC		
Relay output (UG 6912.14, UG 6912.28, UG 6914.04)	250 V, 6 A, resistive (ohmic)		
Reaktionszeit	UG 6911.10	10 ms	+ T_{Filter}_Input
	UG 6911.10 + 1 extension	19,5 ms	+ T_{Filter}_Input
	UG 6911.10 + 2 extensions	22 ms	+ T_{Filter}_Input
	UG 6911.10 + 3 extensions	24 ms	+ T_{Filter}_Input
	UG 6911.10 + 4 extensions	26 ms	+ T_{Filter}_Input
	UG 6911.10 + 5 extensions	28 ms	+ T_{Filter}_Input
	UG 6911.10 + 6 extensions	30,5 ms	+ T_{Filter}_Input
	UG 6911.10 + 7 extensions	32,5 ms	+ T_{Filter}_Input

System Components for SAFEMASTER PRO and Accessories

Type	Safety inputs	Safety semicond. outputs	Safety relay outputs	Unit	Article number
Control unit with Designer Software	8	2		UG 6911.10	0063818
Input module	8			UG 6913.08	0063820
Input module	12			UG 6913.12	0064865
Input module	16			UG 6913.16	0063821
Output module OSSD		2		UG 6912.02	0063822
Output module OSSD		4		UG 6912.04	0063823
Input / Output module	8	2		UG 6916.10	0063819
Output module Relay			1 x 2 NO, 1 NC	UG 6912.14	0063824
Output module Relay			2 x 2 NO, 2 x 1 NC	UG 6912.28	0063825
Output module Relay			4 independend NO	UG 6914.04/000	0066057
Output module Relay			4 independend NO	UG 6914.04/008	0065990
Speed monitor module				UG 6917/002	0066059
Speed monitor module				UG 6917/102	0066060
Speed monitor module				UG 6917/112	0066061
Speed monitor module				UG 6917/202	0066062
Speed monitor module				UG 6917/222	0066063
Speed monitor module				UG 6917/302	0066064
Speed monitor module				UG 6917/332	0065992
Bus Extender				UG 6918	0064866
Fieldbus module PROFIBUS DP				UG 6952	0063826
Fieldbus module CANopen				UG 6951	0063828
Fieldbus module PROFINET				UG 6954	0064861
Fieldbus module Ethernet/IP				UG 6955	0064862
Fieldbus module EtherCAT				UG 6956	0064863
Fieldbus module USB				UG 6957	0064864
Memory chip				OA 6911	0063829
USB-cable for PC connection				OA 6920	0064160
Mounting kit IN-RAIL-Bus 250 mm for DIN-rail 7.5 mm				BU 6921	0064244
Mounting kit IN-RAIL-Bus 250 mm for DIN-rail 15 mm				BU 6922	0064245