SAFEMASTER PRO

The configurable safety system
– versatile and etendable

(Translation of the original manual)

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CONTENT

INTRODUCTION

This handbook describes how to use the SAFEMASTER PRO programmable safety integrated controller and its expansion units;

UG 6951	Fieldbus module (CANopen)
UG 6952	Fieldbus module (PROFIBUS DP-V1)
UG 6954	Fieldbus module (PROFINET I/O)
UG 6955	Fieldbus module (Ethernet IP)
UG 6956	Fieldbus module (EtherCAT)
UG 6957	Fieldbus module (USB)
UG 6958	Fieldbus module (MODBUS TCP/IP)
UG 6959	Fieldbus module (MODBUS RTU)

The fieldbus module exports the system status and the status and diagnostics elements of all I/Os configured on the SAFEMASTER PRO system.

> ℹ️ Info — These fieldbus modules have no influence on the safety functions of the configurable safety system SAFEMASTER PRO

IMPORTANT SAFETY INSTRUCTIONS

> ⚠️ WARNUNG — This safety alert symbol indicates a potential **personal safety hazard**. Failure to comply with instructions bearing this symbol could pose a very serious risk to personnel.

> ℹ️ Info — This symbol indicates an important instruction.

> ⚠️ WARNUNG — SAFEMASTER PRO is built to the following safety levels: SIL 3, SILCL 3, PL e, Cat. 4, Type 4 in accordance with the applicable standards. However, the definitive SIL and PL of the application will depend on the number of safety components, their parameters and the connections that are made, as per the risk analysis.
>
> ⚠️ WARNUNG — Read the "Applicable Standards" section carefully.
>
> ⚠️ WARNUNG — Perform an in-depth risk analysis to determine the appropriate safety level for your specific application, on the basis of all the applicable standards.
>
> ⚠️ WARNUNG — Programming/configuration of the SAFEMASTER PRO system is the sole responsibility of the installer or user.
>
> ⚠️ WARNUNG — The device must be programmed/configured in accordance with the application-specific risk analysis and all the applicable standards.
>
> ⚠️ WARNUNG — Always test the complete system whenever new safety components are added
> (see the "TESTING the system" section).
>
> ⚠️ WARNUNG — Reference should be made to the handbooks and the relative product and/or application standards to ensure correct use of devices connected to the SAFEMASTER PRO system within the specific application.
>
> ⚠️ WARNUNG — The ambient temperature in the place where the system is installed must be compatible with the operating temperature parameters stated on the product label and in the specifications.
>
> ⚠️ WARNUNG — For all matters concerning safety, if necessary, contact your country's competent safety authorities or the competent trade association.

ABBREVIATIONS AND SYMBOLS

LL0, LL1 = Logic level 0, logic level 1
OSSD = Output Signal Switching Device: Solid state safety output
$MTTF_d$ = Mean Time to dangerous Failure
PL = Performance Level
PFH_d = Probability of a dangerous Failure per Hour
SIL = Safety Integrity Level
SILCL = Safety Integrity Level Claim Limit
SW = Software
FW = Firmware

APPLICABLE STANDARDS

SAFEMASTER PRO complies with the following European Directives:
• 2006/42/EC „Machinery Directive"
• 2014/30/EU „Electromagnetic Compatibility Directive"
• 2011/65/EU „RoHS Directive

and is built to the following standards

EN 61131-2	Programmable controllers – Part 2: Equipment requirements and tests
EN ISO 13849-1	Safety of machinery – Safety related parts of control systems – Part 1: General principles for design
EN 61496-1	Safety of machinery – Electro-sensitive protective equipment – Part 1: General requirements and tests
EN 61508-1	Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 1: General requirements
EN 61508-2	Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 2: Requirements for electrical/electronic/programmable electronic safety-related systems
EN 61508-3	Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 3: Software requirements
EN 61508-4	Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 4: Definitions and abbreviations
EN 61784-3	Industrial communication networks – Profiles Part 3: Functional safety fieldbuses – General rules and profile definitions
IEC 62061	Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems
EN 81-20	Safety rules for the construction and installation of lifts – Lifts for the transport of persons and goods – Part 20: Passenger and goods passenger lifts
EN 81-50	Safety rules for the construction and installation of lifts – Examinations and tests – Part 50: Design rules, calculations, examinations and tests of lift components

GENERAL DESCRIPTION

SAFEMASTER PRO is a configurable safety system. It consists of a control unit UG 6911.10 or UG 6911.12/080, which can be configured using the SAFEMASTER PRO DESIGNER graphic interface, and a number of expansion modules connected to the control unit via the proprietary IN-RAIL-BUS.

> **i**nfo For diagnostic over the main fieldbus, following fieldbus modules are available: UG 6951 (CanOpen), UG 6952 (PROFIBUS), UG 6954 (PROFINET), UG 6955 (Ethernet IP), UG 6956 (EtherCAT), UG 6957 (Universal Serial Bus), UG 6958 (MODBUS TCP/IP) and UG 6959 (MODBUS RTU).

SAFEMASTER PRO is capable of monitoring the following safety sensors and commands:
Optoelectronic sensors (safety light curtains, scanners, safety photocells), mechanical switches, safety mats, emergency stops, two-hand controls, all managed by a single flexible and expandable device.

The system must consist of just one control unit UG 6911.10 (or UG 6911.12/080) and a number of electronic expansions that can range from 0 to a maximum of 14, not more than 4 of which of the same type. There is no limit to the number of relay units that can be installed.

With 14 expansions, the system can have up to 128 inputs, 16 dual channel safety outputs and 16 Status outputs. The CONTROL UNIT and its SLAVE units communicate via the 5-pole IN-RAIL-BUS (proprietary bus), physically arranged on the rear panel of each unit.

Furthermore 8 inputs and 16 outputs probe controllable (by Fieldbus) are available.

The SAFEMASTER PRO DESIGNER software is capable of creating complex logics, using logical operators and safety functions such as muting, timer, counters, etc.

All this is performed through an easy and intuitive graphic interface.
The configuration performed on the PC is sent to the control unit UG 6911.10 (or UG 6911.12/080) via USB connection; the file resides in the control unit UG 6911.10 (or UG 6911.12/080) and can also be saved on the proprietary OA 6911 memory chip (accessory). The configuration can therefore quickly be copied to another control unit UG 6911.10 (or UG 6911.12/080) unit.

> **i**nfo The SAFEMASTER PRO system is certified to the maximum safety level envisaged by the applicable industrial safety standards (SIL 3, SILCL 3, PL e, Cat. 4).

FIELDBUS MODULES

The fieldbus modules UG 6951, UG 6952, UG 6954, UG 6955, UG 6956, UG 6957, UG 6958 and UG 6959 permit the connection to the most commonly used industrial fieldbus systems for diagnostics and data transmission. They also offer the option of making 8 non-safety relevant inputs (fieldbus inputs) available to the circuit diagram of the SAFEMASTER PRO system and making the status of 16 points (UG 6911.10) or 32 points (UG 6911.12/080) in the circuit diagram available to the fieldbus as output information.

DESCRIPTION

The UG 695_ communication module gives access to various information related to the SAFEMASTER PRO System and allows to send commands from the PLC..

Each device connected to the SAFEMASTER PRO inputs is characterized by an ON/OFF status and a possible diagnostic. The processing of the inputs according to the program loaded on the SAFEMASTER PRO generates the ON/OFF status of the safety outputs which can also have diagnostics.

PROCESS IMAGE

System status and I/O status are available on the cyclic process image, while I/O diagnostics, system errors and the UG 6911 program CRC are accessible as acyclic data.
The process image has a fixed size with subsections for each information group: there are sections showing the status of the SAFEMASTER PRO -inputs, the status of the safety outputs, the status of the probes and, if the dedicated module is present, the value of the analogue measures.

The Fieldbus inputs allows the PLC to cyclically send up to 32 ON/OFF status and are used as unsafe inputs in the SAFEMASTER PRO program.

The system status bits are described as follows:

 - Bit 0 present SAFEMASTER PRO presence.
 - Bit 1 present diagnostic presence.
 - Bit 2 error presence.

The acyclic sections for diagnostics or errors report significant data if the relative bit is present in the status byte.
The section dedicated to the input status has a size of 16 bytes and allows to know the status of up to 128 inputs.
The priority order of the modules is as follows:
UG 6911.10 / UG 6911.12/080, UG 6916.10, UG 6913.16, UG 6913.08, UG 6913.12, UG 6917, UG 6916.12/080.

The section dedicated to the safety outputs status has a size of 4 bytes and allows to know the status of up to 32 outputs.
The priority order of the modules is as follows:
UG 6911.10/ UG 6911.12/080, UG 6916.10, UG 6912.02, UG 6912.04, UG 6914.04/000, UG 6914.04/008, UG 6912.04/100, UG 6916.12/080.

If two or more modules of the same type are installed the one with the lowest node number is shown first.

Each module with inputs has a number of bits corresponding to the number of physical inputs; thus modules UG 6911.10 / UG 6911.12/080, UG 6913.08, UG 6916.10 and UG 6916.12/080 will use 1 byte and modules UG 6913.12 and UG 6913.16 2 Bytes. The modules UG 6917 use 1 byte each.
The status of the probe is represented with 4 bytes.
In fieldbus where the allocation is important (e.g. PROFIBUS, PROFINET), the Fieldbus input bytes must be mapped before the bytes in output (see configuration example PROFINET).
IIf there is a fieldbus module in the SAFEMASTER PRO -System, SAFEMASTER PRO Designer will include in the report a table with the I/O index for all inputs, fieldbus inputs, probes and safety outputs in the circuit diagram.
For the process data mapping description for the respective fieldbus please refer the Appendix.

INSTALLATION

ELECTRICAL CONNETIONS

Each module is provided with four connectors:
- 5 way IN-RAIL-BUS connector to the system SAFEMASTER PRO
- Micro USB connector to the PC (for SW programming)
- BUS connector to the fieldbus
- Terminal block for power supply

CONNECTION TERMINALS
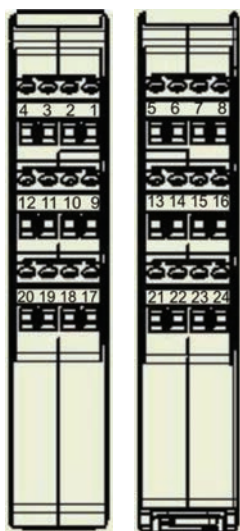
The SAFEMASTER PRO system units are provided with removable terminal blocks for the electrical connections. Each unit can have 8, 16 or 24 terminals.

Each unit also has a rear panel plug-in connector (for communication with the control unit and with the other expansion units).
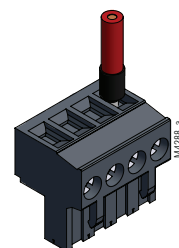
Terminal designation	Signal description
1	+ 24 V DC ± 20 %
2	-
3	-
4	GND

[info] Terminal fixing torque: 5÷7lb-in (0.6÷0.7 Nm)

⚠ WARNUNG Install safety units in an enclosure with a protection class of at least IP54

⚠ WARNUNG Connect and disconnect the module only when it is not powered

⚠ WARNUNG The supply voltage to the units must be 24VDC ± 20% (PELV, in compliance with the standard EN 60204-1 (Chapter 6.4))

⚠ WARNUNG Do not use the SAFEMASTER PRO to supply external devices

⚠ WARNUNG The same power supply connection (24VDC and 0VDC) must be used for all system components

Notes on the connection cables

[info] Wire size range: AWG 12÷30 (solid / stranded) (UL).

[info] Use 60 / 75°C copper (Cu) conductor only

[info] Cables used for connections of longer than 50 m must have a cross-section of at least 1 mm^2 (AWG 16).

[info] We recommend the use of separate power supplies for the safety unit and for other electrical power equipment (electric motors, inverters, frequency converters) or other sources of disturbance.

ENCLOSURE

Description:	Electronic housing max 24 pole, with locking latch mounting
Enclosure material:	Polyamide
Enclosure protection class:	IP 40
Terminal blocks protection class:	IP 20
Fastening:	Quick coupling to rail according to EN 60715
Dimensions mm (H x W x D):	109 x 22.5 x 120.3

Mechanical dimensions
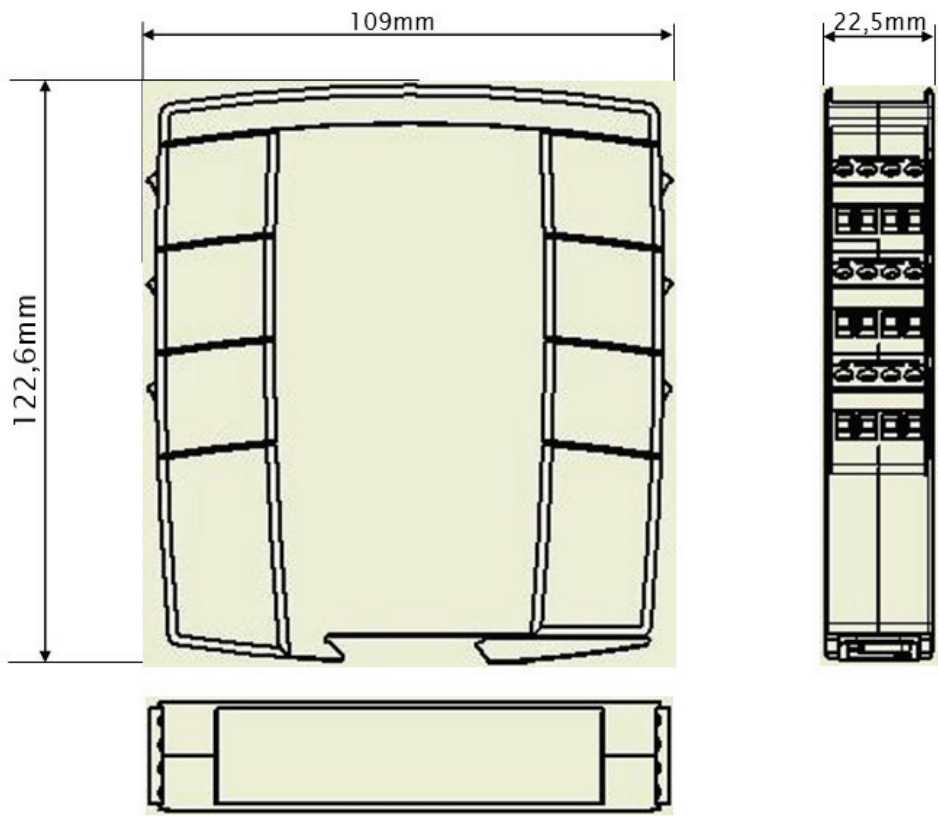
DIAGNOSTICS

Each input and each safety output is associated with a relative diagnostic code. When the I/O is connected correctly, the diagnostic code is OK and is not exported to the fieldbus; if there is a problem on the I/O, the system exports 2 bytes to the fieldbus with:

- **The index of the I/O in question**
- **The relative diagnostic code**

1. BYTE: NUMBER OF INPUT / OUTPUT

This field indicates the number used to identify the I/O with a diagnostic code other than OK.
The I/O index range depends from the system version used.

Refer to the following tables to know these data.

System version in use (UG 6911.10 FW < 5.0)	
Type of signal	**I/O Index**
Input	1-128
Output	192-255

System version in use (UG 6911.12/080 FW ≥ 5.0)	
Type of signal	**I/O Index**
Input	1-128
Output	1-32
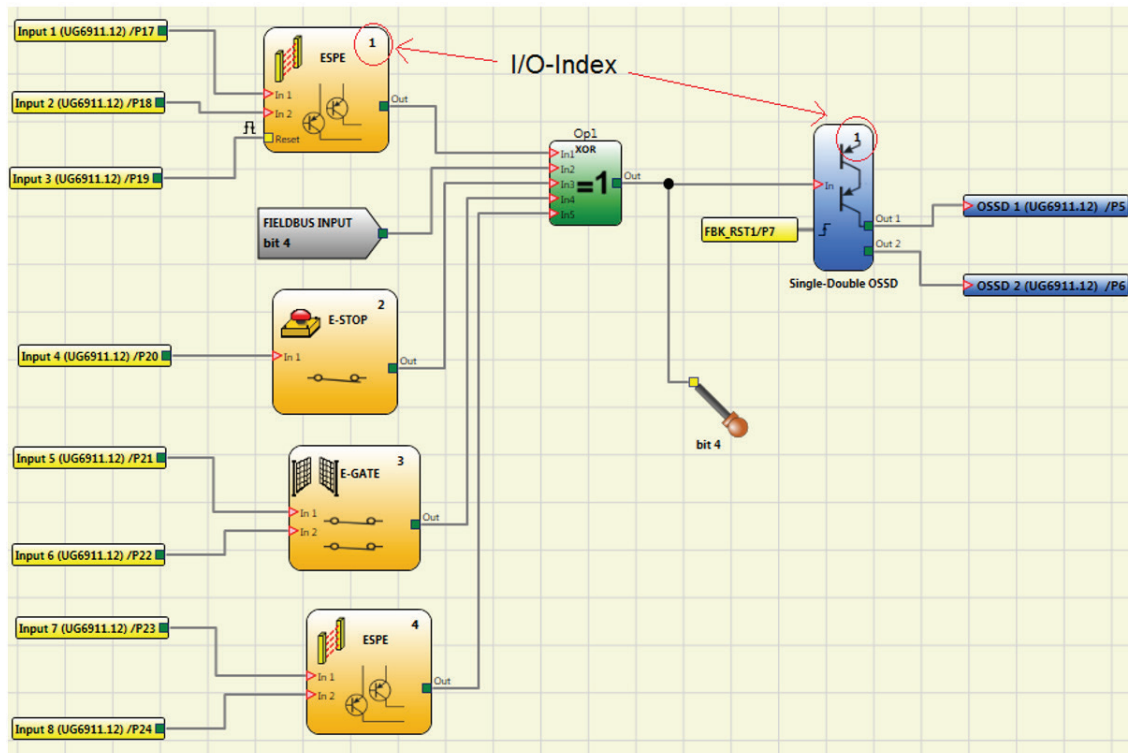
2. BYTE: DIAGNOSTICS

The „Diagnostic code" field indicates the diagnostics fort he I/O. Possible values for this field are shown in the tables below:

Inputs

Input diagnostic		
128 (0x80)	Input diagnostics OK	-
1	Not moved from zero	Both switches have to go to rest condition
2	Concurrent failed	Both switches have to change state simultaneously
3	Concurrent failed hand1	Wrong connection on one side of a two-hands switch
4	Concurrent failed hand2	Wrong connection on one side of a two-hands switch
7	Switch inconsistent	The selector should not have more than one input set
8	Switch disconnected	The selector should have at least one input set
10 (0x0A)	OUT_TEST error	OUT_TEST diagnostics present on this input
11	Second input KO	Redundancy check failed on input
12	UT_TEST diagnostics OK	
13	Output connected to other inputs	Test output not connected tot he right input
14	Output OK but input connected to 24VDC	Stuck input
15	Short circuit between photocell test and photocell input	Photocell response time too low
16	No response from photocell	The test signal on the photocell emitter is not seen on the receiver
17	Short circuit between photocells	The test signal is present on two different photocells
18	Mat disconnected	Wrong mat connection
19	Output inconsistent with feedback	The test signal on the input is present on more than one OUT_TEST
20	Connection incorrect	The test signal is present on more than one input
21	Output stuck	The test signal on the input is not present on the OUT_TEST
22 (0x16)	Second OUT_TEST KO	Redundancy check failed on OUT_TEST
23	UG 6917/xx2 proximity missing	Proximity not present / proximity not working
24	UG 6917/xx2 encoder proximity missing	Encoder not present / encoder unpowered
25	UG 6917/xx2 encoder proximity missing	Device connected incorrectly
26	UG 6917/xx2 proximity 1 and proximity 2 missing	Both proxy must be connected
27	UG 6917/xx2 encoder1, encoder2 missing	Both encoder must be connected
28	UG 6917/xx2 encoder congruence frequencies	Redundancy check failed on the measure
29	UG 6917/xx2 encoder supply missing	Encoder not properly fed
30	UG 6917/xx2 encoder error	Encoder signals with duty cycle and/or phase displacement not correct
133 (0x85)*	TWO-HAND concurrent faileed	Two-hands switch hast o change state simultaneously
134 (0x86)*	Not started	Start test failed
137 (0x89)*	Waiting for restart	The input has manual reset and has not been restarted

* The diagnostic 133, 134 und 137 do not provide visual error message on the LEDs of the SAFEMASTER PRO modules.

Safety outputs OSSD

OSSD diagnostic		
0	OSSD diagnostics OK	
1	Enable missing	
2	Waiting for restart OSSD	
3	Feedback K1/K2 missing	
4	Waiting for other micro	Redundancy check failed on OSSD
5	OSSD power supply missing	
6	Exceeded maximum time restart	
7	Feedback K1/K2 external not concruous CAT2	Applicable to modules UG 6914.04/000 and UG 6914.04/008 configured in CAT2
8	Waiting for feedback K1/K2	Feedback K1/K2 in transition
9	Overload OSSD output	
10	OSSD with load set to 24V	

> ℹ️ If there are diagnostics for more than one I/O, the I/O index and diagnostic code signals are sent in turn every 500 ms.

VISUALISATIONS

NORMAL OPERATION AND FAULT STATE
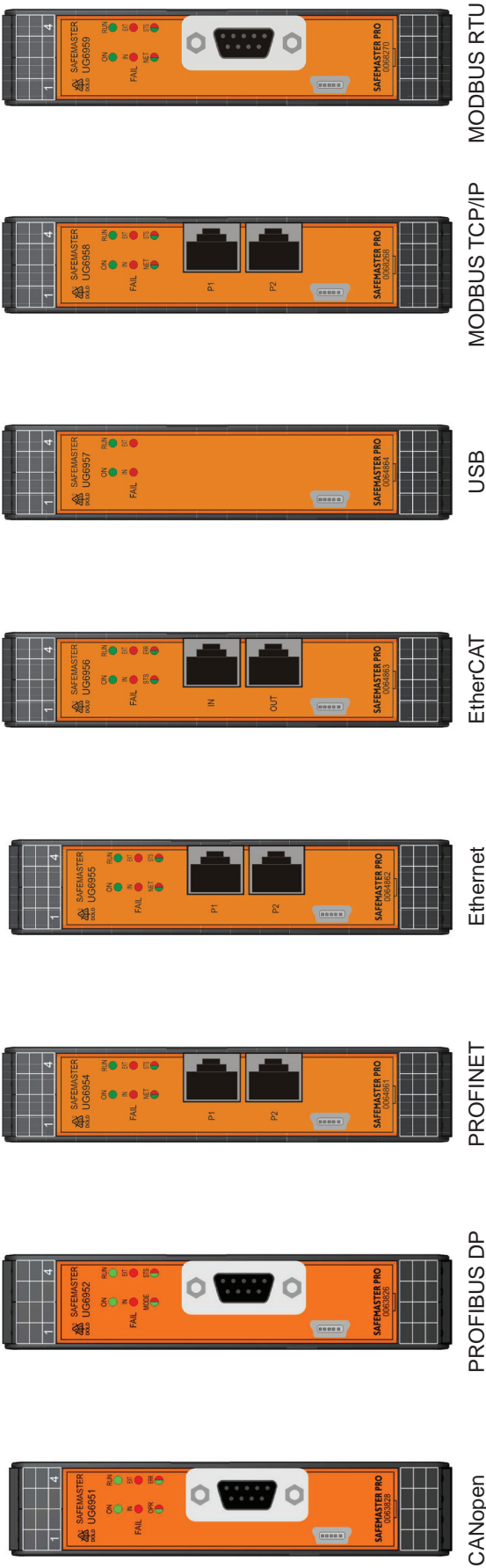
CANopen   PROFIBUS DP   PROFINET   Ethernet   EtherCAT   USB   MODBUS TCP/IP   MODBUS RTU

DESCRIPTION	upper 4 LEDs				LED 1	LED 2
	ON GREEN	RUN GREEN	IN FAIL RED	EXT FAIL RED	RED / GREEN	RED / GREEN
Power on - initial TEST	ON	ON	ON	ON	ON	ON
Waiting for configuration	ON	OFF	OFF	OFF	OFF	OFF
Configuration received	ON	ON	OFF	OFF	See tables of the induvidual modules	

Normal operation

DESCRIPTION	upper 4 LEDs				LED 1	LED 2
	ON GREEN	RUN GREEN	IN FAIL RED	EXT FAIL RED	RED / GREEN	RED / GREEN
Internal fault microcontroller	ON	OFF	Flashing 2 times *)	OFF	See tables of the induvidual modules	
Internal failure	ON	OFF	Flashing 3 times *)	OFF		
Configuration Error	ON	OFF	Flashing 5 times *)	OFF		
BUS communication Error	ON	OFF	Flashing 5 times *)	OFF		
BUS communication interruption	ON	OFF	ON	OFF		
Identical module detected	ON	OFF	Flashing 5 times *)	Flashing 5 times *)		

Fault state

*) The LED frequency of flashing is: ON for 300 ms and OFF for 400 ms, with an interval between two sequences of 1 s.

FIELDBUS MODULE UG 6951 (CANOPEN)

LED 1: OPR			LED 2: ERR		
STATE	MEANING	DESCRIPTION	STATE	MEANING	DESCRIPTION
GREEN	OPERATIONAL	OPERATIONAL	OFF	-	Normal operation
GREEN Slow flashing	PRE-OPERATIONAL	PRE-OPERATIONAL state	RED Flashing 1 times	Warning level	A bus error counter has reached the warning level
GREEN Flashing 1 times	STOPPED	STOPPED state	RED Fast flashing	LSS	LSS service operative
GREEN Fast flashing	Autobaud	Baudrate detection	RED Flashing 2 times	Event Control	Detected Node Guarding (NMT master oder slave) or Heartbeat (Consumer)
RED	EXCEPTION	EXCEPTION status	RED	Missing BUS	BUS not working

Pin	Signal
1	-
2	CAN_L
3	CAN_GND
4	-
5	CAN_SHIELD
6	-
7	CAN_H
8	-
9	-
Housing	CAN_SHIELD

DB9 – male (front view)
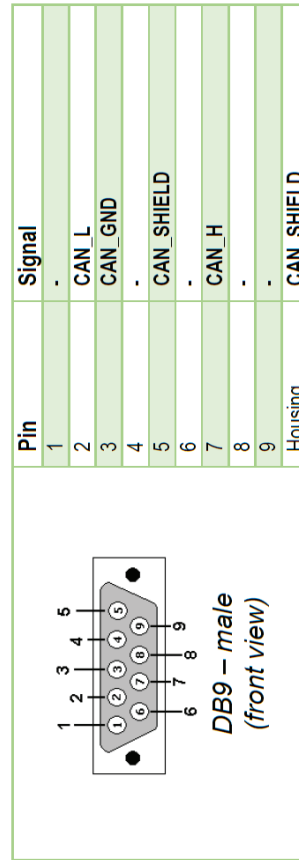
UG 6951 CANopen

FIELDBUS MODULE UG 6952 (PROFIBUS DP V1)

LED 2: STS

STATE	MEANING	DESCRIPTION
OFF	UG 6952 not initialized	State **SETUP** or **NW_INIT**
GREEN	Initialized	End of initialization **NW_INIT**
GREEN Flashing	Initialized with diagnostic active	**EXTENDED DIAGNOSTIC** bit set
RED	Exception error	**EXCEPTION**-State
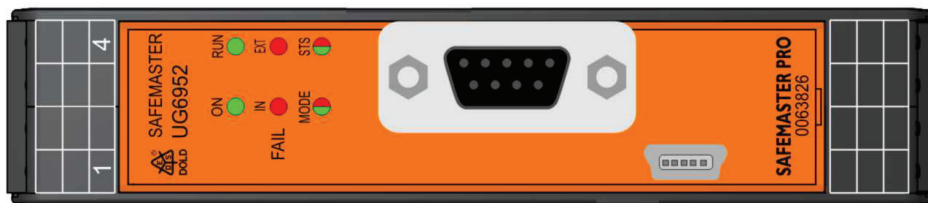
LED 1: MODE

STATE	MEANING	DESCRIPTION
GREEN	Online	Data exchange
GREEN Flashing	Online	CLEAR
RED Flashing 1 times	Parameterization error	see ref. IEC 61158-6
RED Flashing 2 times	PROFIBUS configuration error	Configuration of SAFEMASTER PRO System or UG 6952 wrong

Pin	Signal	Description
1	-	-
2	-	-
3	B-line	Positive RxD/TxD, RS485 level
4	RTS	Request to send
5	GND Bus	0VDC (isolated)
6	5V	+5VDC (isolated/short circuit protected)
7	-	-
8	A-line	Negative RxD/TxD, RS485 level
9	-	-
Housing	Cable shield	Internally connected to the Anybus protective earth via cable shield filters according to the PROFIBUS standard.

DB9 – female (front view)
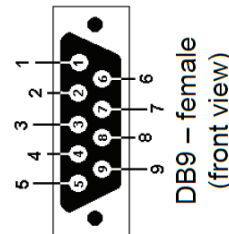
UG 6952 PROFIBUS DP

FIELDBUS MODULE UG 6954 (PROFINET)

LED 1: MODE

STATE	MEANING	DESCRIPTION
OFF	Offline	• No power • Connection with IO controller not presen
GREEN	Online (RUN)	• Established connection with IO controller • IO controller in RUN state
GREEN Flashing 1 times	Online (Stop)	• Established connection with IO Controller • IO Controller in STOP state or IO data bad • IRT synchronization not finished
GRÜN Flashing	Flash	Used to identify the net-work node
RED	Fatal event	Major internal error (combined with a red module STS led)
RED Flashing 1 times	Station name error	Station Name not set
RED Flashing 2 times	IP address error	IP address not set
RED Flashing 3 times	Configuration error	Expected identific. differs from real identification

LED 2: STS

STATE	MEANING	DESCRIPTION
OFF	Not initialized	• No power • Module in SETUP or NW_INIT state
GRÜN	Normal operation	Module has shifted from the NW_INIT state
GREEN Flashing 1 times	Diagnostic event(s)	Diagnostic event(s) present
RED	Exception error	Device in state EXCEPTION
	Fatal event	Major internal error (combined with a red NET led module)
Alternating RED/GREEN	Firmware update	Do NOT power off the module. It could cause a permanent damage

UG 6954
PROFNET

FIELDBUS MODULE UG 6955 (ETHERNET IP)
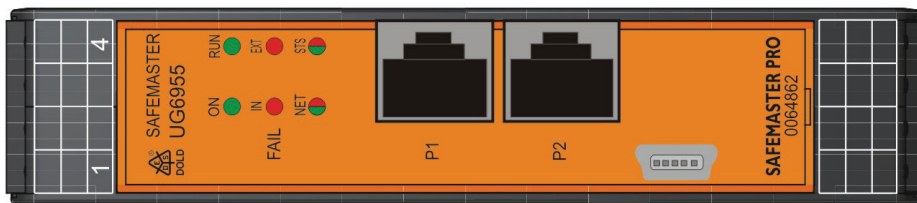
LED 1: NET		LED 2: STS		
STATE	MEANING / DESCRIPTION	STATE	MEANING	DESCRIPTION
OFF	No power or no IP address	OFF	No power	-
GREEN	Online, connected	GREEN	RUN state	-
GREEN Flashing	Online, not connected	GREEN Flashing 1 times	Not configured	-
RED	Duplicate IP address	RED	Fatal error	One or more non-recover-able errors detected
RED Flashing	Connection Time out	RED Flashing	Error	One or more recoverable errors detected

UG 6955
Ethernet IP

FIELDBUS MODULE UG 6956 (ETHERCAT)

LED 1: STS			LED 2: ERR		
STATE	MEANING	DESCRIPTION	STATE	MEANING	DESCRIPTION
OFF	INIT	INIT or no power	OFF	No error	No error or no power
GREEN	OPERATIONAL	OPERATIONAL state	RED Flashing	Configuration not valid	Status change requested by master not possible
GREEN Flashing	PRE-OPERATIONAL	PRE-OPERATIONAL state	RED Flashing 1 times	Unsolicited state change	Slave device application has changed the module state
GREEN Flashing 1 times	SAFE-OPERATIONAL	SAFEOPERATIONAL state	RED Flashing 2 times	Watchdog Timeout	Synch manager watchdog timeout
Flashing	BOOT	Module in BOOT state	RED	Controller fault	Anybus module in EXCEPTION state
RED	Fatal event	System locked	Flashing	Booting error	E.g. due to firmware download failure

UG 6956
EtherCAT

FIELDBUS MODULE UG 6957 (USB)

2 LEDs: connect

STATE	MEANING	DESCRIPTION
GREEN	USB connection	Module connected on PC
OFF	No USB connection	Module not connected

UG 6957
USB

FIELDBUS MODULE UG 6958 (MODBUS TCP/IP)

LED 1: MODE

STATE	MEANING	DESCRIPTION
OFF	No power or no IP address	
GREEN	Module is in Process Active or Idle state	
GREEN Flashing	Waiting for connections	
RED	Duplicate IP address, or fatal event	
RED Flashing	Process Active Timeout	

LED 2: STS

STATE	MEANING	DESCRIPTION
OFF	No power	-
GREEN	RUN state	-
RED	Unrecoverable error	Major fault; Module in state EXCEPTION (or fatal event)
RED Flashing	Error	One or more recoverable errors detected
Alternating RED/GREEN	Firmware update	Do NOT power off the module. It could cause a permanent damage

UG 6958
MODBUS TCP/IP

FIELDBUS MODULE UG 6959 (MODBUS RTU)

LED 1: NET			LED 2: STS		
STATE	MEANING	DESCRIPTION	STATE	MEANING	DESCRIPTION
OFF	No power or no data exchange		OFF	Initializing or no power	
YELLOW	Frame reception or transmission	Data exchange	GREEN	Module initialized	
RED	Fatal error	One or more non-recoverable errors detected	RED	Fatal error	One or more non-recoverable errors detected
-	-	-	RED Flashing 1 times	Communication fault or configuration error	1. Invalid setting in Network Configuration 2. Setting in Network Configuration has been changed during operation
-	-	-	RED Flashing 2 times	Application diagnostic available	

Pin	Direction	Signal	Description
Housing	-	PE	Protective Earth
1	-	GND	Bus polarization 0VDC (isolated)
2	OUT	5V	Bus polarization +5VDC (isolated)
3	IN	PMC	Connect to pin 2 for RS-232 / Leave unconnected for RS-485
4	-	-	-
5	Bidirectional	B-line	RS-485 B-line
6	-	-	-
7	IN	Rx	RS-232 Data Receive
8	OUT	Tx	RS-232 Data Transmit
9	Bidirectional	A-line	RS-485 A-line

DB9 – female
(front view)

UG 6959
MODBUS RTU
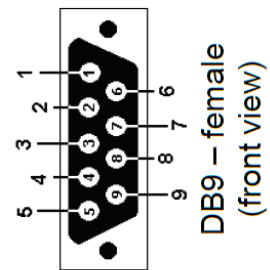
EXAMPLES OF DIAGNOSTICS

Example 1
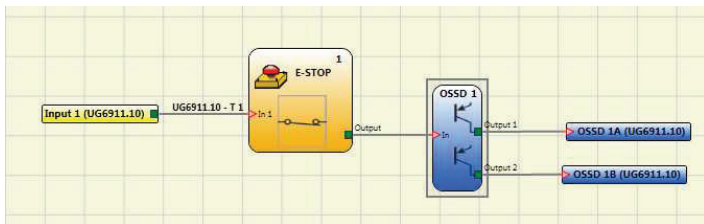
In the example 1 shown in Figure 3, Input 1 (connected to module UG 6911.10) is tested with the UG 6911.10-T1 test signal.
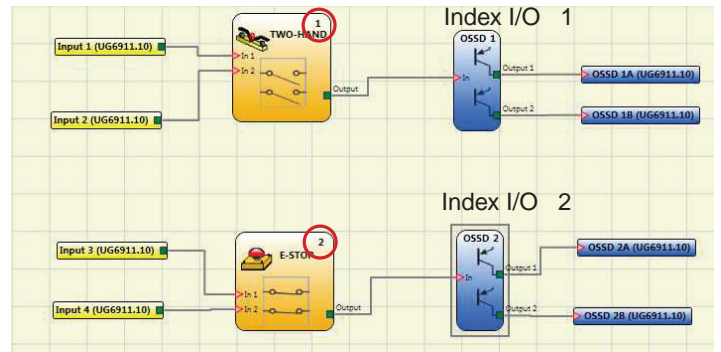
During wiring, the 24 V DC is connected to input 1 instead of the UG 6911.10-T1 test signal.

- The I/O index and Diagnostic code show the following values: 1 - 20 to indicate the diagnostics on input 1 of module UG 6911.10 (OUT_TEST error).

Example 2

In this example, the I/O index corresponds to the logical block and not to the physical terminal on module UG 6911.10.

The two-hand element connected to the Input 1 and Input 2 physical terminals corresponds to I/O index No. 1 and the emergency stop connected to the Input 3 and Input 4 terminals corresponds to I/O index No. 2.

Example 3
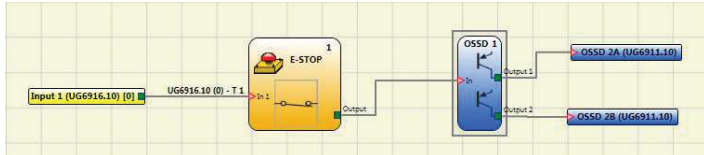
The example 3 is similar to example 1, except in this case Input1 is connected to module UG 6913.16 and is tested with the UG 6913.16-T1 test signal.

During wiring, the 24 V DC is connected to input 1 instead of the UG 6913.16-T1 test signal. Input 1 has diagnostic code 10 (connection error).

- The I/O index and Diagnostic code show the following values: 1 - 20 (OUT_TEST error) to indicate the diagnostics on input 1 of module UG 6913.16.

Example 4
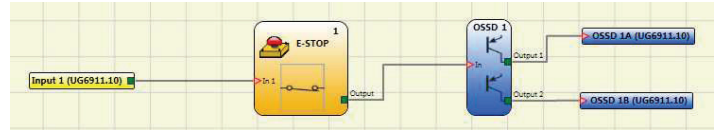
In the example 4 the manual reset function is enabled on OSSD 1.

The E-Stop-button connected to input 1 is operated without sending a reset command.

The I/O index and Diagnostics code show the following values: 192 - 2

- To indicate the OSSD 1A/1B (see table "1. Byte: Number of Input / Output 2": 192 = first output).
- To indicate the diagnostic code (see table " **OSSD diagnostic**": 2 = Waiting for OSSD to restart).

SOFTWARE BUS CONFIGURATOR

The fieldbus module is configured via the micro USB interface on the front panel and using the "BUS CONFIGURATOR" software on the SAFEMASTER PRO Designer CD-ROM.

This software allows configuring all fieldbus modules. It allows also the bi-directional communication of the SAFEMASTER PRO system with a PC (using fieldbus module UG 6957 for USB) or the display of the data, that is transferred on the IN-RAIL-Bus of the SAFEMASTER PRO System (via the USB Port of the fieldbus modules).

The following picture demonstrates the possible connections

It is important to point out the difference in behaviour oft the BUS CONFIGURATOR when communicating with the modules UG 6951 to UG 6959 and the module UG 6957 (USB):
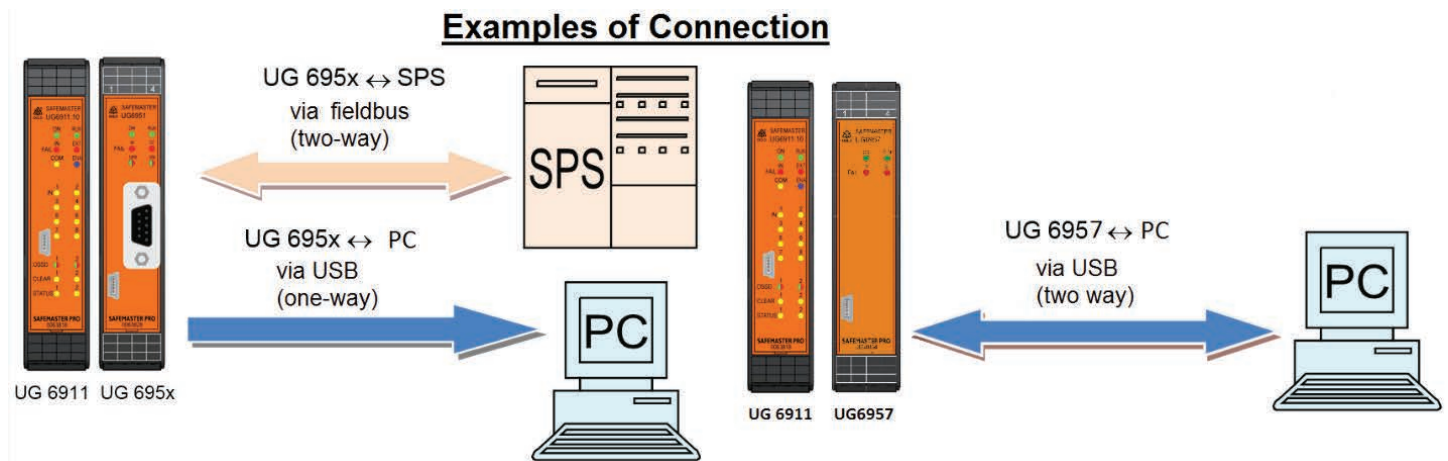
- Module UG 6951 to UG 6959: The software only allows the display of data that is transferred on the IN-RAIL Bus.
- Modul UG 6957: The software allows the bi-directional data transfer. In this case the operator can set the state of the inputs "Fieldbus Input" directly from the computer.

The configuration data depend on the type of the fieldbus module that is connected:
The address field range and the baudrate data will adapt to the fieldbus type.

GRAPHICAL USER INTERFACE

⚠ WARNUNG   The module must be configured with the outputs disabled (outputs OFF)

Module configuration can be queried at any time during module operation.

To configure the fieldbus module, proceed as follows:
1. Connect the module via the IN-RAIL-BUS to the SAFEMASTER PRO system
2. Connect the SAFEMASTER PRO system to the 24VDC +20% voltage power supply via the terminal strip;
   ATTENTION: the master unit UG 6911.10 must be without error state
3. Connect the USB cable to the PC and to the fieldbus module;
4. Start up the "**BUS CONFIGURATOR**" software.

GRAPHICAL USER INTERFACE

Operator can query module configuration at any time while the module is in use. To configure the modules proceed as follows.

The configuration window is displayed:
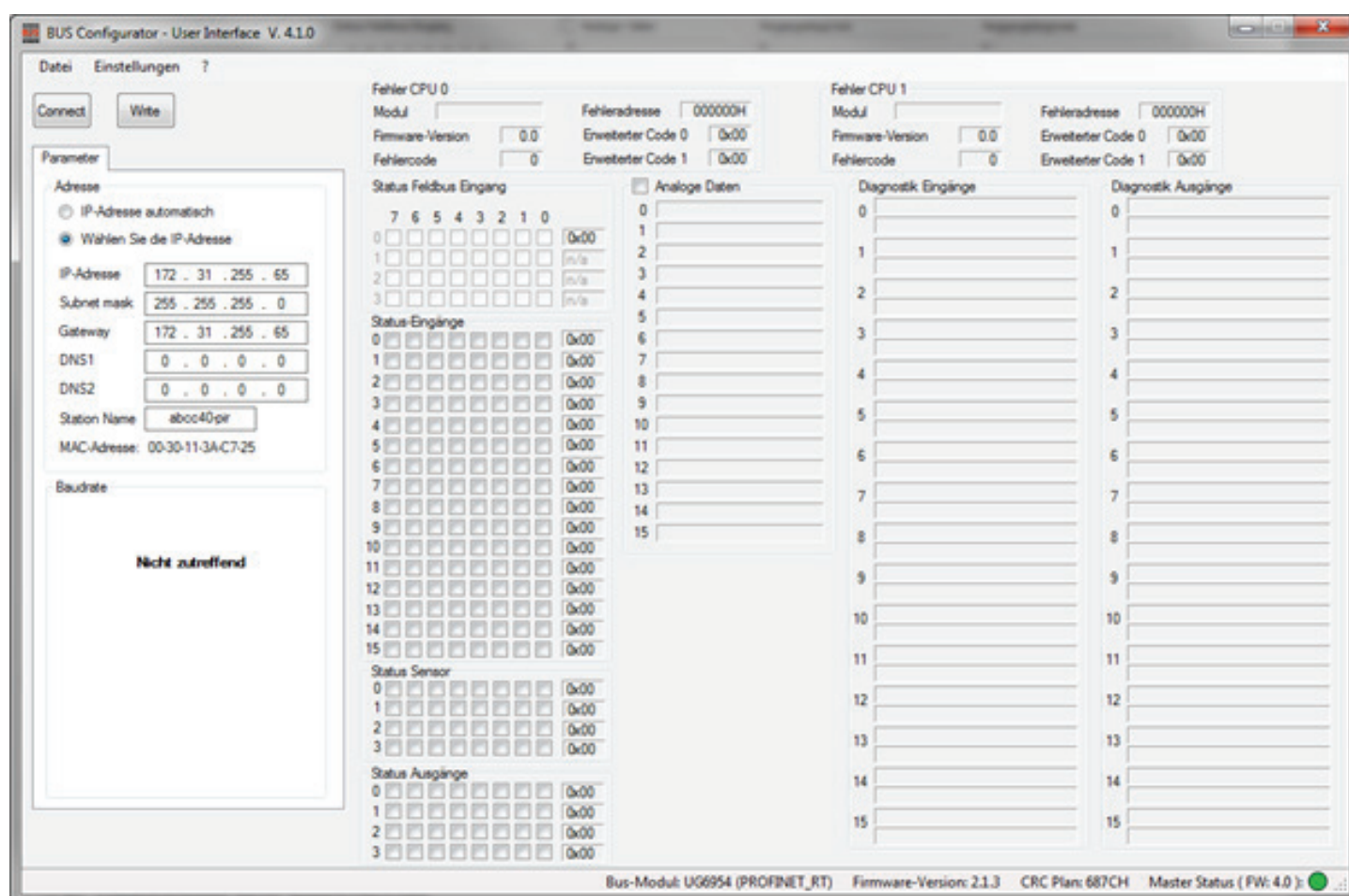
5. Press the **"CONNECT"** button.

The program recognizes that a UG 695x bus module is connected; the status bar shows the the UG 695x fieldbus model, the UG 695x firmware version, the schematic CRC (3) and the Master status and firmware version of the base module:
- ⚪ Gray: the UG 695x is not connected
- 🟠 Orange: the UG 695x is getting/sending the configuration from the Bus configurator
- 🟢 Green: the master UG 6911 is active (RUN)
- 🔴 Red: UG 6911 is not active ((e.g. communication with SAFEMASTER PRO Designer)

Once the module is connected it is recognized and the operator can configure the parameters by selecting the different areas as shown above; press the *WRITE* button to send the configuration data to the module.
As soon as the bus module receives the data, the configurator enters the monitor condition.
The input, output, analog data status and relative diagnostics are illustrated above. Only the first 16 input diagnostics and output diagnostics are shown, if there are more than 16 diagnostics the exceeding one are displayed after the previous one are solved.

The Fieldbus input logical status can be changed by the user only with the UG 6957 module they are in read only mode für all the other fieldbuses and they'll display the status written by the external PLC.

BACKWARD COMPATIBILITY (VERSION FOR UG 6911.10 FW VERSION < 5.0)

Process Image in backward compatibility (version for UG 6911.10 FW Version < 5.0)

The backward compatibility mode allows the Bus module to use the "old" process image mapping, i.e.: it will adapt to the hardware installed on the system. This allows to replace an existing Bus module without changing the PLC program.

> ℹ️ info   The backward compatibility mode works only if the Bus module is connected to an UG 6911.10 master module. If a bus device is set-up in backward compatibility mode and is connected to an UG 6911.12/080 the bus module will go into fault.

System status, I/O status and I/O diagnostics are available on the cyclic process image. The process image has a variable size depending on which modules are installed in the SAFEMASTER PRO-System. In the process image there are subsections for each information group:
There are sections showing the status of the SAFEMASTER PRO inputs, the status of the safety outputs, the status of the probes. The Fieldbus inputs allows the PLC to cyclically send up to 8 ON/OFF status and are used as unsafe inputs in the SAFEMASTER PRO program.

The System status bits are described as follows:
1. Bit 0: present SAFEMASTER PRO presence
2. Bit 1: present diagnostic presence

The section for diagnostics reports significant data if the relative bit is present in the status byte. The section dedicated to the input status has a size of 16 bytes and allows to know the status of up to 128 inputs. The priority order of the modules is as follows:
• UG 6911.10, UG 6916.10, UG 6913.16, UG 6913.08, UG 6913.12, UG 6917.

The section dedicated to the safety outputs status has a size of 1 or 2 bytes and allows to know the status of up to 16 outputs. The priority order of the modules is as follows:
• UG 6911.10, UG 6916.10, UG 6912.02, UG 6912.04, UG 6914.04/000, UG 6914.04/008, UG 6912.04/100.

If two or more modules of the same type are installed the one with the lowest node number is shown first. Each module with inputs has a number of bits corresponding to the number of physical inputs; thus modules UG 6911.10, UG 6913.08, UG 6916.10 and UG 6916.12/080 will use 1 byte and modules UG 6913.12 and UG 6913.16 2 Bytes. Modules UG 6917 uses 1 byte each.

The status of the Fieldbus probes is represented with 2 bytes. In fieldbus where the allocation is important (e.g. PROFIBUS, PROFINET), the Fieldbus input bytes must be mapped before the bytes in output. If there is a fieldbus module in the SAFEMASTER PRO system, SAFEMASTER PRO Designer will include in the report a table with the I/O index for all inputs, fieldbus inputs, probes and safety outputs in the circuit diagram. Diagnostic elements will use 2 bytes which indicate the number of the I/O with the problem and the value of the diagnostic element. If there is more than one diagnostic element, the relative values alternate every 500 ms.

Each set of information:
- input status,
- input diagnostics,
- fieldbus input status,
- probe status,
- safety output status,
- safety output diagnostics
The definition of the process image in the input and output is shown from the point of view of theSAFEMASTER PRO.

Graphical User Interface, backward compatibility (version for UG 6911.10 FW Version < 5.0)

The backward compatibility mode allows the operator to use the software SAFEMASTER PRO by having an UG 6911.10 master module with firmware version lower than 5.0

The user can choose which subsection must be exported in the fieldbus.
Once the conficuration data are selected the operator must press the „WRITE"- key to send tem to the module.
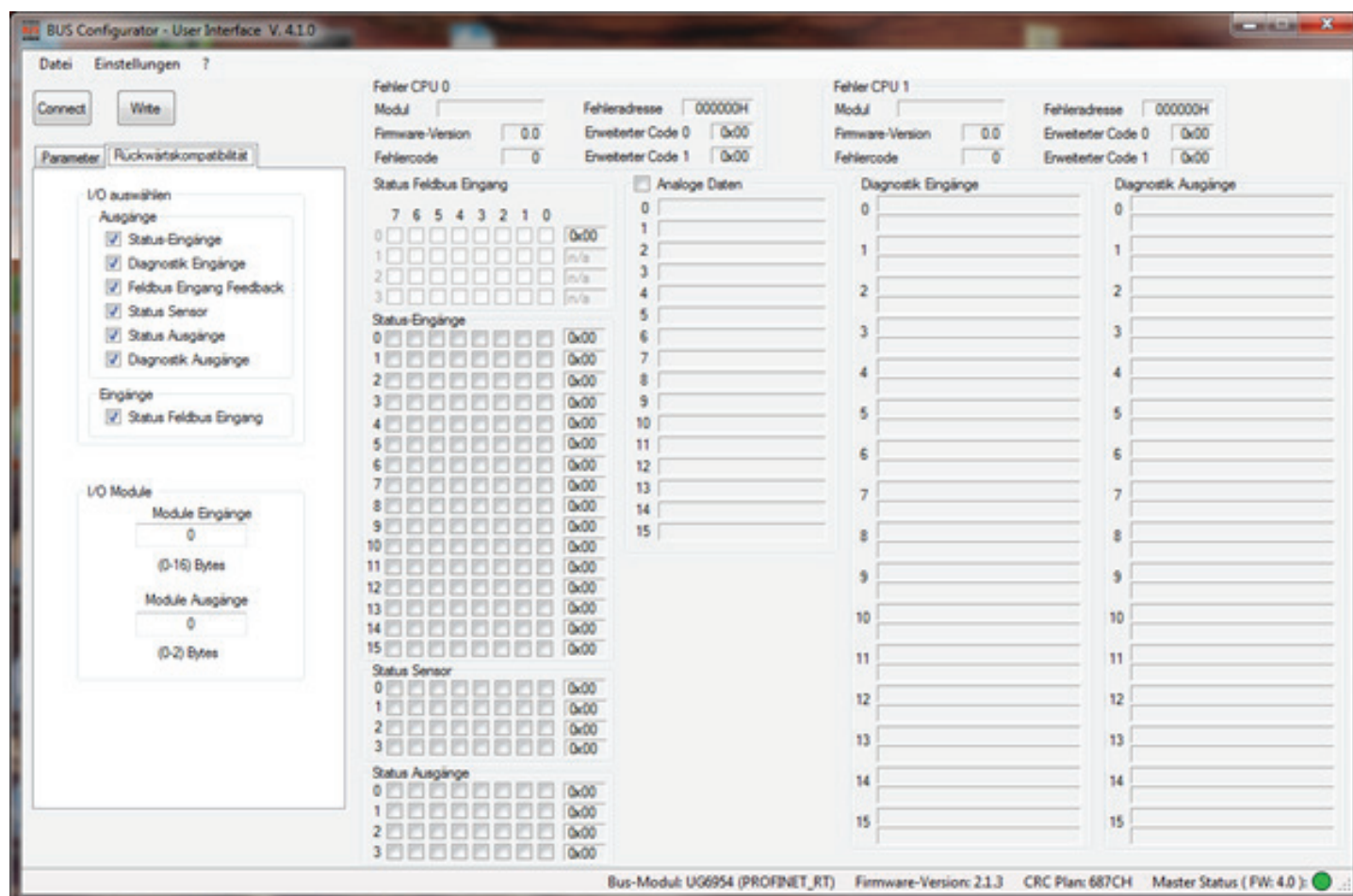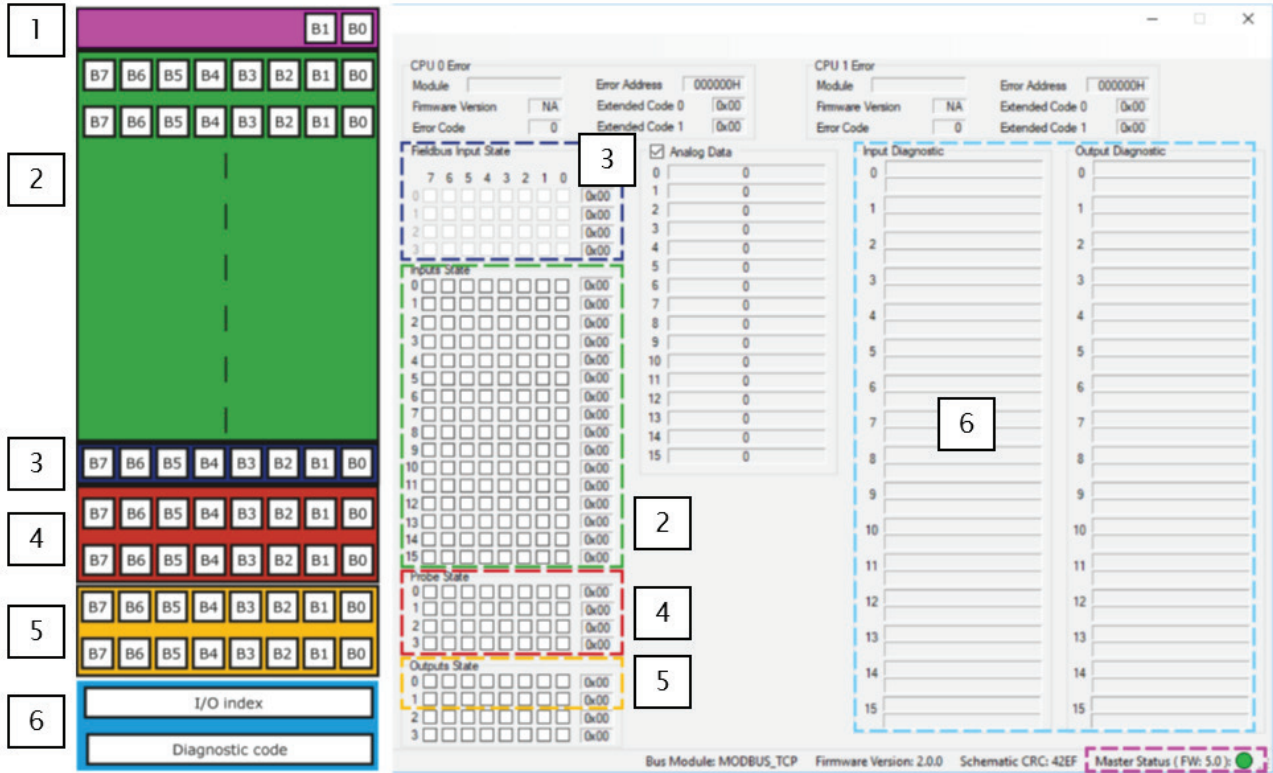
If more than one I/O has some diagnostic the I/O index and diagnostic code data will cycle every 500 ms between all the diagnostics present.

Process image configuration in backward compatibility

The input process image and the output process image can be configured using the Bus Configurator User Interface software.

With this software the user can choose which subsection must be exported in the fieldbus, changing the size of each process image and then the size used in the PLC physical memory. Once the module is connected all the data are showed in the main window of the software.

Examples of SAFEMASTER PRO Designer configuration as presented by the bus configurator

Examples of SAFEMASTER PRO Designer configuration as presented by the bus configurator

- Input 1 E-STOP is connected to screws 6 and 7 on UG 6911.10 / UG 6911.12/080. Its status (zero or one) is shown on bit 5 of byte 0 reserved for inputs. The bit 6 is always set to zero, it is kept busy to signal that the E-STOP occupies two screws.
- Input 2 ENABLE is connected to screw 8 on UG 6911.10 / UG 6911.12/080. Its status (zero or one) is shown on bit 7 of byte 0 reserved for UG 6911.10 / UG 6911.12/080 inputs.
- Input 3 MOD-SEL is connected to screws 1 and 2 on UG 6916.10 with a diagnostic signaling tha the MOD-SEL is disconnected. Its status is shown on bits 0 and 1 of byte 1 reserved for UG 6916.10 inputs. The diagnostic is shown in the section reserved for input diagnostics with the index 2 and the relative diagnostic.
- The probes on bit 6 and bit 16 are green and the relative bits on the Probe section are checked. Probe 16 is shown as bit 0 of the third byte.
- OSSD 1 is ON and connected to the first pair of UG 6911.10 / UG 6911.12/080 outputs. Its status is shown on bit 0 of byte 0 reserved for outputs.
- OSSD2 is OFF, with die diagnostic indicating wait for restart. The OSSD is connected to the first pair of the device UG 6916.10. Its status is shown on bit 2 of byte 0 reserved for outputs. The diagnostic is shown in the section reserved for OSSD diagnostics.
- In the Fieldbus Input section, bit 0 has been selected so the Fieldbus input on bit 0 is green in the MSD project.

Example of the configuration of a UG6954 PROFINET fieldbus module with the Siemens TIA Portal

First, the PROFINET fieldbus module must be assigned an IP address within the network used and a station name with the help of the bus configurator.
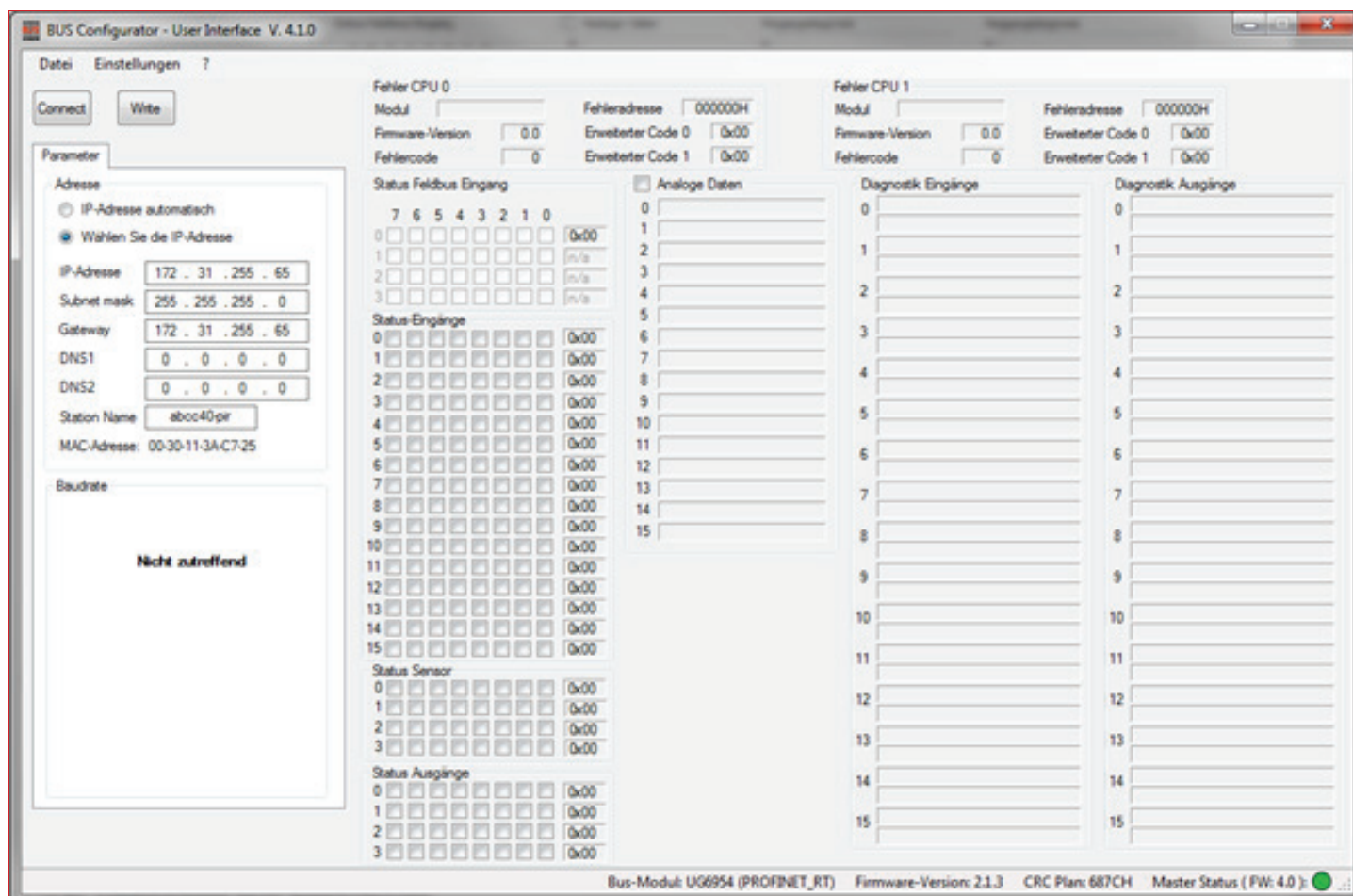
In the TIA-Portal the module is selected via the catalog menu and connected to a suitable controller.
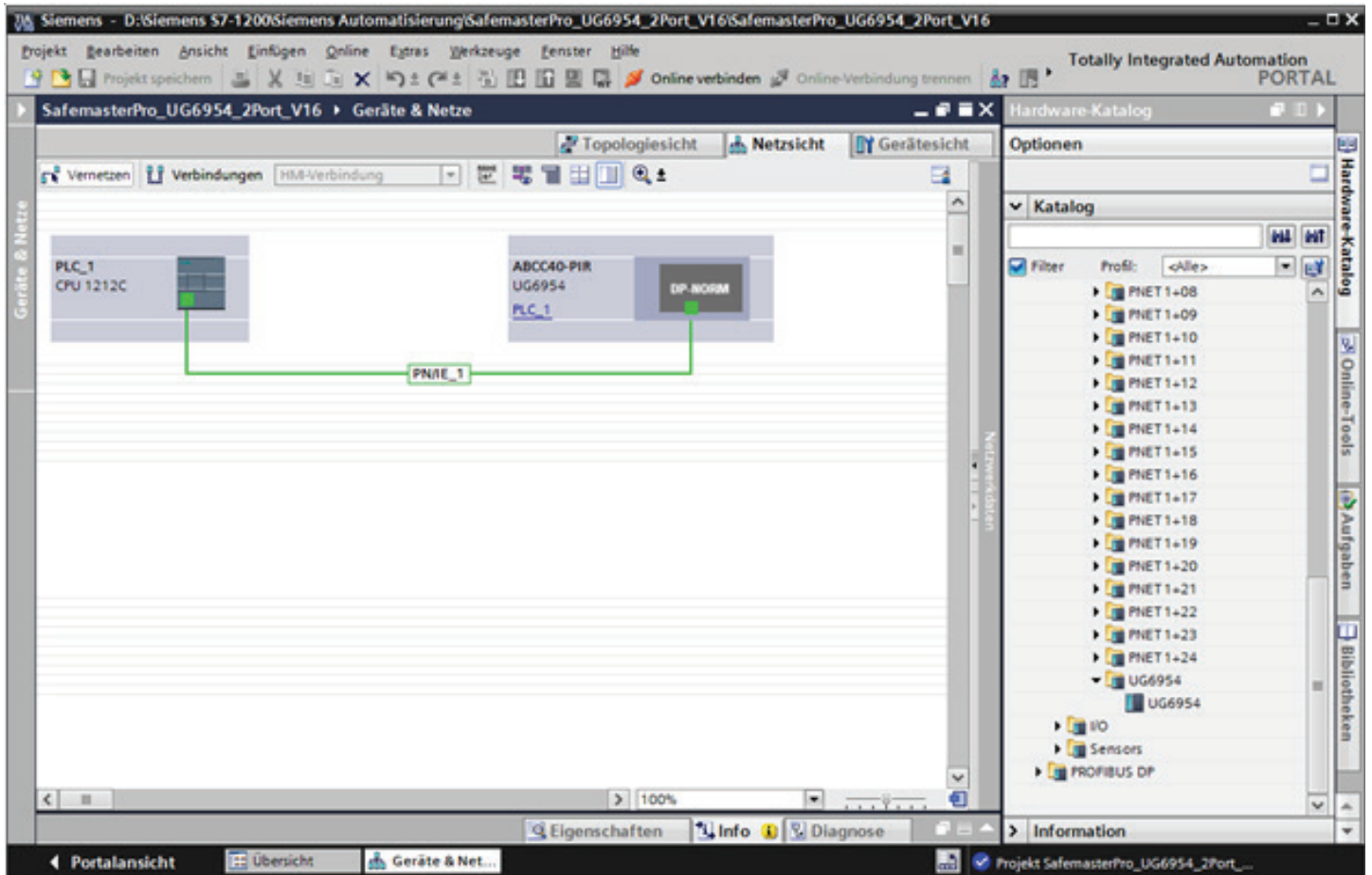
The selected IP address and the station name of the bus module must match the settings in the TIA-Portal.
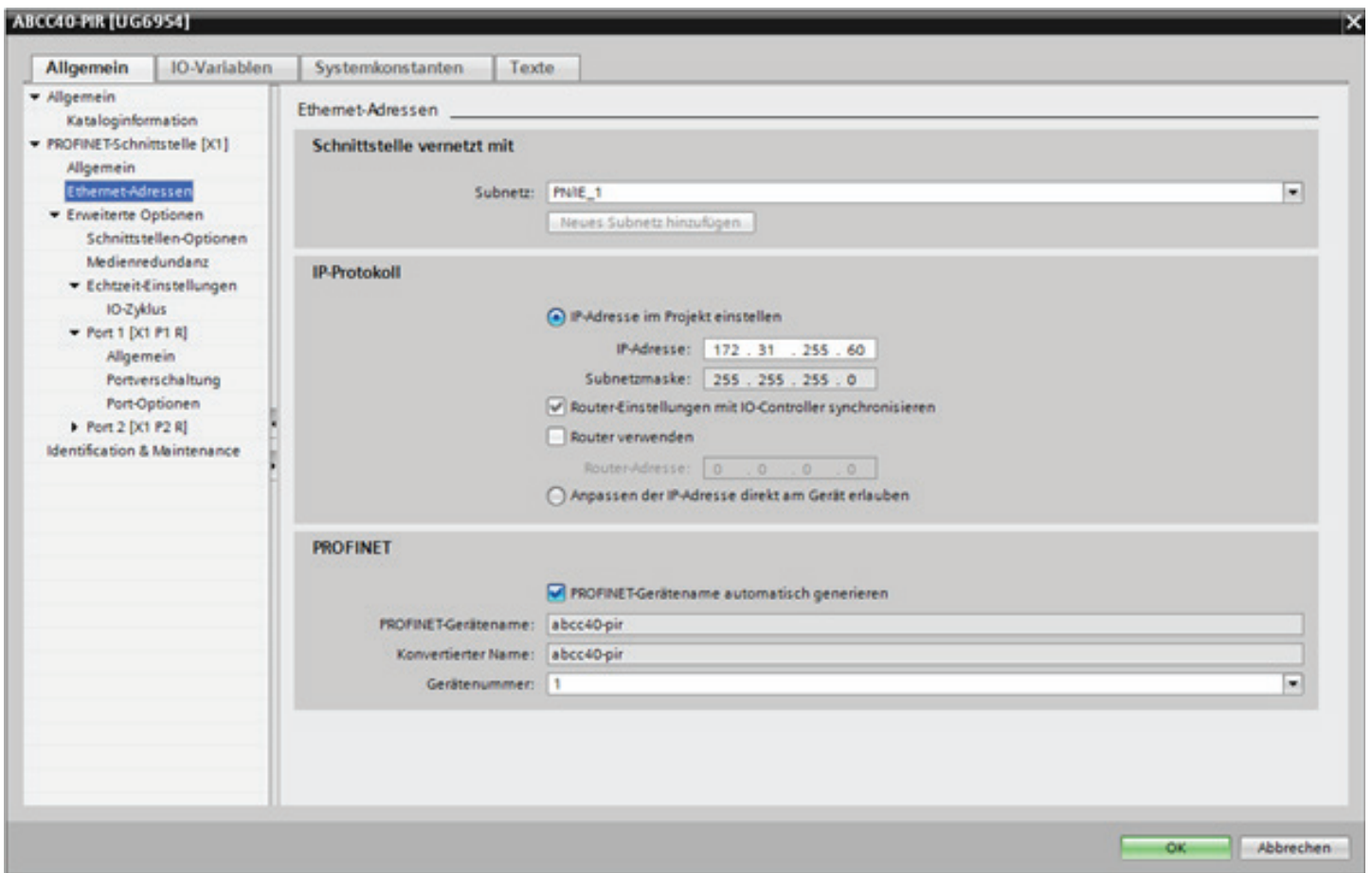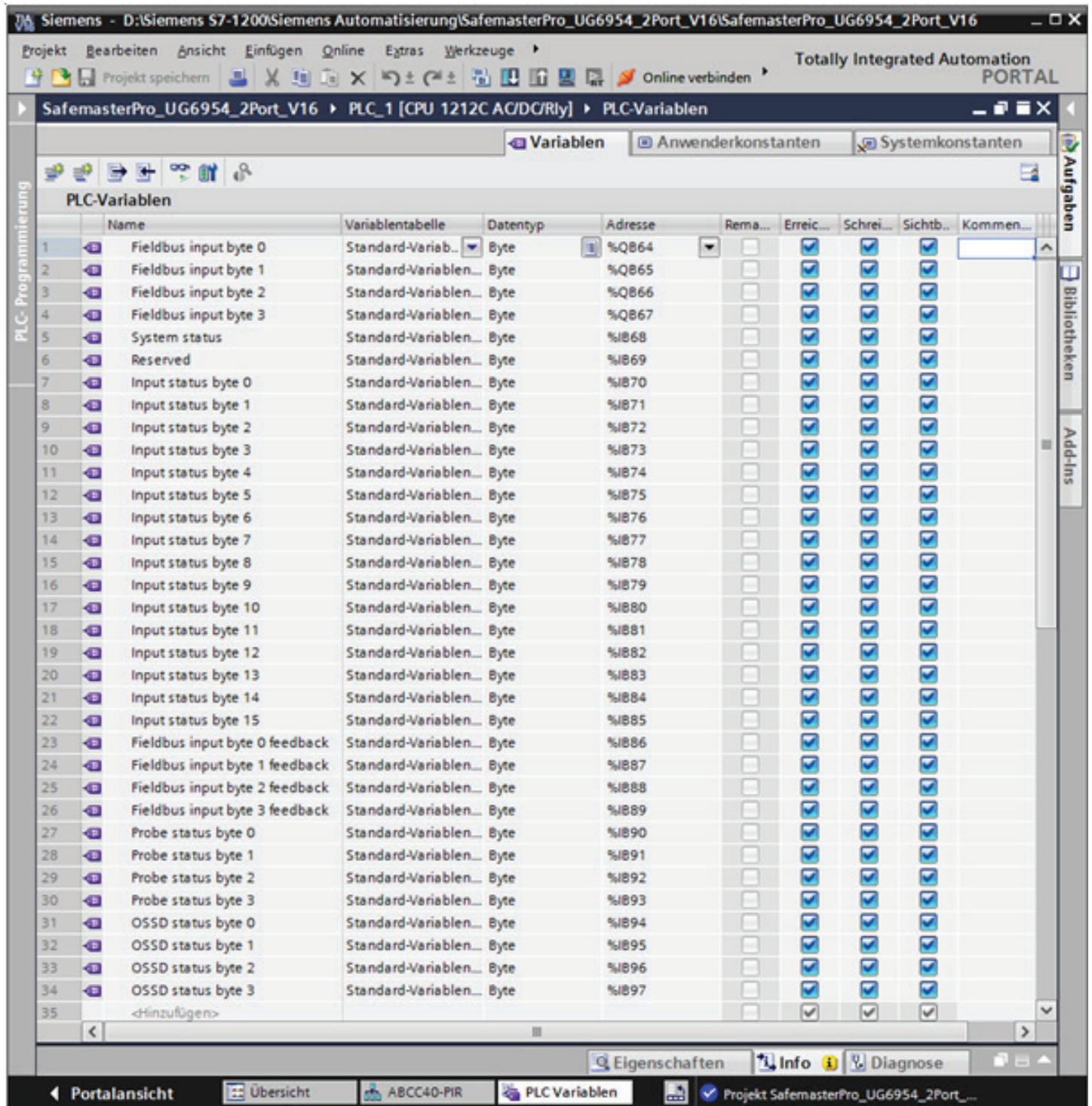
In the next step the process data of the module are assigned. With PROFINET the correct sequence of the input and output data must be taken into account. The process data assignment is described in the appendix of this manual. In the example shown, the fieldbus inputs must be mapped before the system I/OP data. It should also be considered that Safemaster Pro and the TIA Portal use opposite designations for inputs and outputs.
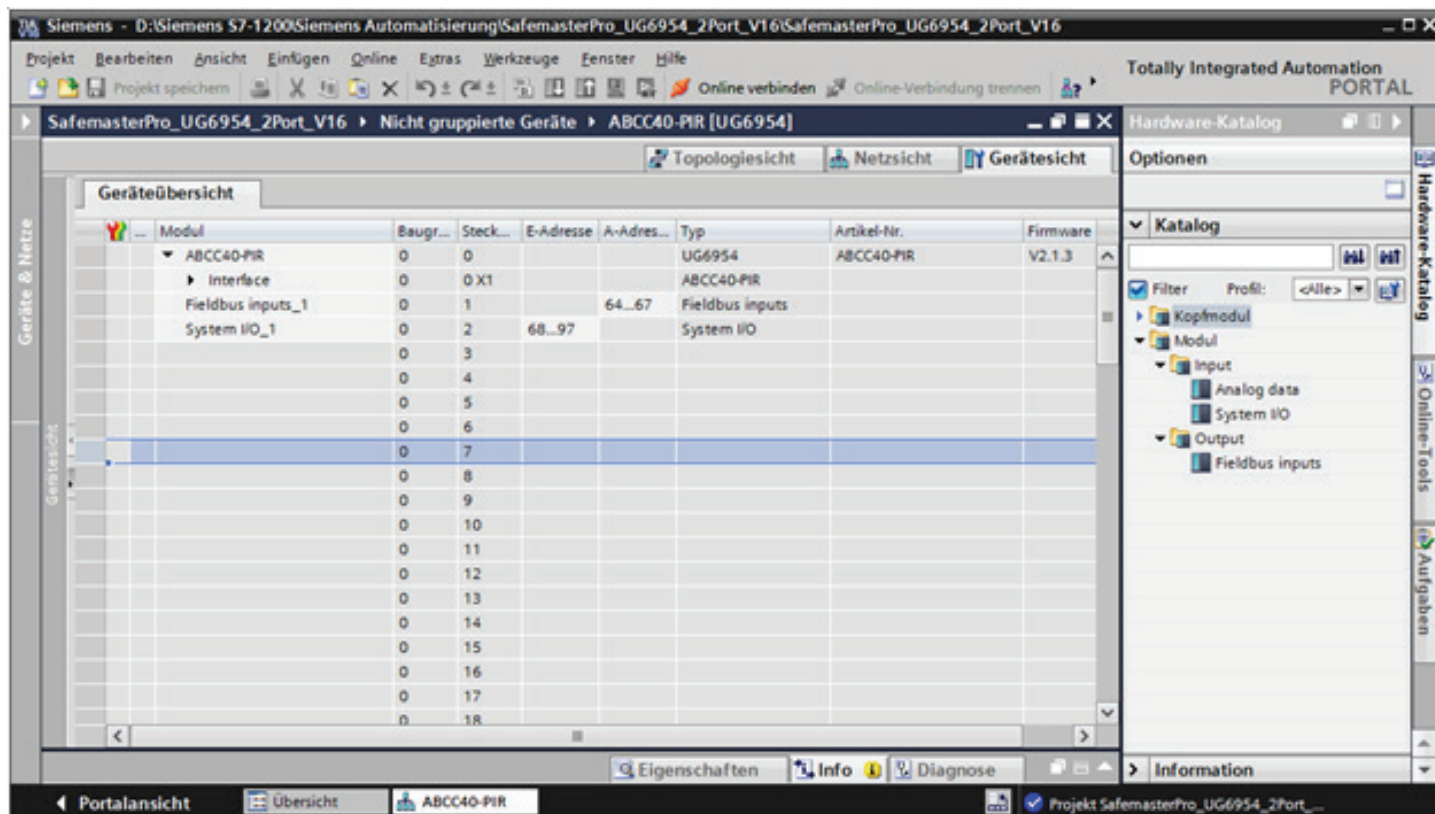
In the last step, the fieldbus inputs and outputs are given names and made available to the controller as PLC variables for further processing.

		Name	Variablentabelle	Datentyp	Adresse	Rema...	Erreic...	Schrei...	Sichtb...	Kommen...
1		Fieldbus input byte 0	Standard-Variab...	Byte	%QB64	☐	☑	☑	☑	
2		Fieldbus input byte 1	Standard-Variablen...	Byte	%QB65	☐	☑	☑	☑	
3		Fieldbus input byte 2	Standard-Variablen...	Byte	%QB66	☐	☑	☑	☑	
4		Fieldbus input byte 3	Standard-Variablen...	Byte	%QB67	☐	☑	☑	☑	
5		System status	Standard-Variablen...	Byte	%IB68	☐	☑	☑	☑	
6		Reserved	Standard-Variablen...	Byte	%IB69	☐	☑	☑	☑	
7		Input status byte 0	Standard-Variablen...	Byte	%IB70	☐	☑	☑	☑	
8		Input status byte 1	Standard-Variablen...	Byte	%IB71	☐	☑	☑	☑	
9		Input status byte 2	Standard-Variablen...	Byte	%IB72	☐	☑	☑	☑	
10		Input status byte 3	Standard-Variablen...	Byte	%IB73	☐	☑	☑	☑	
11		Input status byte 4	Standard-Variablen...	Byte	%IB74	☐	☑	☑	☑	
12		Input status byte 5	Standard-Variablen...	Byte	%IB75	☐	☑	☑	☑	
13		Input status byte 6	Standard-Variablen...	Byte	%IB76	☐	☑	☑	☑	
14		Input status byte 7	Standard-Variablen...	Byte	%IB77	☐	☑	☑	☑	
15		Input status byte 8	Standard-Variablen...	Byte	%IB78	☐	☑	☑	☑	
16		Input status byte 9	Standard-Variablen...	Byte	%IB79	☐	☑	☑	☑	
17		Input status byte 10	Standard-Variablen...	Byte	%IB80	☐	☑	☑	☑	
18		Input status byte 11	Standard-Variablen...	Byte	%IB81	☐	☑	☑	☑	
19		Input status byte 12	Standard-Variablen...	Byte	%IB82	☐	☑	☑	☑	
20		Input status byte 13	Standard-Variablen...	Byte	%IB83	☐	☑	☑	☑	
21		Input status byte 14	Standard-Variablen...	Byte	%IB84	☐	☑	☑	☑	
22		Input status byte 15	Standard-Variablen...	Byte	%IB85	☐	☑	☑	☑	
23		Fieldbus input byte 0 feedback	Standard-Variablen...	Byte	%IB86	☐	☑	☑	☑	
24		Fieldbus input byte 1 feedback	Standard-Variablen...	Byte	%IB87	☐	☑	☑	☑	
25		Fieldbus input byte 2 feedback	Standard-Variablen...	Byte	%IB88	☐	☑	☑	☑	
26		Fieldbus input byte 3 feedback	Standard-Variablen...	Byte	%IB89	☐	☑	☑	☑	
27		Probe status byte 0	Standard-Variablen...	Byte	%IB90	☐	☑	☑	☑	
28		Probe status byte 1	Standard-Variablen...	Byte	%IB91	☐	☑	☑	☑	
29		Probe status byte 2	Standard-Variablen...	Byte	%IB92	☐	☑	☑	☑	
30		Probe status byte 3	Standard-Variablen...	Byte	%IB93	☐	☑	☑	☑	
31		OSSD status byte 0	Standard-Variablen...	Byte	%IB94	☐	☑	☑	☑	
32		OSSD status byte 1	Standard-Variablen...	Byte	%IB95	☐	☑	☑	☑	
33		OSSD status byte 2	Standard-Variablen...	Byte	%IB96	☐	☑	☑	☑	
34		OSSD status byte 3	Standard-Variablen...	Byte	%IB97	☐	☑	☑	☑	
35		<Hinzufügen>				☐	☑	☑	☑	

STATUS OF THE INPUTS OF THE MODULES FOR SPEED CONTROL

All states occupy 4 bits: 0÷3 or 4÷7 in the "State Inputs" of the Process Image will follow the diagram:
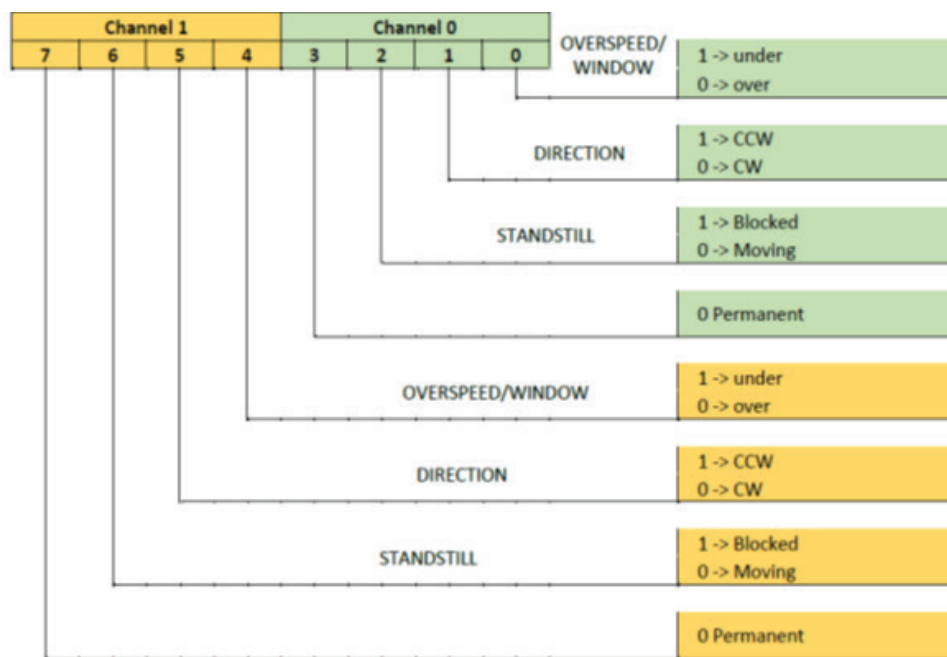
TECHNICAL DATA

Nominal voltage:	24 V DC ± 20 % / Remote Class III Source or limited voltage limited current
Nominal consumption:	Max. 3 W
Connection to SAFEMASTER PRO:	Via 5-pole IN-RAIL-BUS
Connection to PC:	USB 2.0 (Hi Speed) – front connector USB Max. cable length: 3 m
Connection to Fieldbus:	Via 2. front connector
Abnehmbare Klemmenblöcke mit Schraubklemmen Anschluss Querschnitt:	1 x 0.25 ... 2.5 mm^2 solid or stranded ferruled (isolated) or 2 x 0.25 ... 1 mm^2 solid or stranded ferruled (isolated) or
Insulation of wires or sleeve length:	7 mm
Wire fixing:	Captive slotted screw M3
Fixing torque:	0.5 ... 0.6 Nm
Max. connection length:	100 m
Operating temperature:	- 10 ÷ 55 °C
Storage temperature:	- 20 ÷ 85 °C
Relative air humidity:	10 % ÷ 95 %
Altitude:	2000 m
Enclosure:	Electronic housing max. 4 terminals, DIN-Rail mounting
Enclosure material:	Polyamide
Enclosure protection class:	IP 40
Terminal blocks protection class:	IP 20
Fastening:	Quick fixing to rail according to EN 60715
Dimensions (H x W x D):	109 x 22.5 x 120.3
Weight:	150 g
UL-Data:	The safety functions were not evaluated by UL. Listing is accomplished according to requirements of Standard UL 508, "general use applications"
UL-Note:	For use in Pollution degree 2, overvoltage category II environment only
Max surrounding air temperature:	55 °C
Wire connection:	60 °C / 75 °C copper conductors only AWG 30 ÷ 12 (solid/stranded) Torque 5-7 lb-in

ATTACHMENT

Process data mapping
for UG 695_ Feldbus expansion modules V1.2.8

General Notes

1. The process data size is fixed, this means that the size and mapping of the process data image of the bus communication devices does not change depending on how many input or output modules are connected to the configurable safety controller.

2. "Reserved"-Bytes are allocated as variables where necessary (e.g., to maintain the inner sub-index structure of the CANopen user defined objects when an object in enlarged beyond 1 byte size)

3. Some data are available only if the communication module is used in a system where the UG 6911 firmware version is greater that a miminum value (i.e., Errors data are only available if UG 6911 firmware version is greater than 5.0. Project CRC data are available only with UG 6911 firmware greater than 3.0).

4. The Analog data section is optional: it can be turned on or off using the Bus configurator software; if the Analog data checkbox in the software is selected then the bytes are present in the process image, if the box is unchecked the bytes are not present; the process image size will adapt to the actual number of bytes.

EtherCAT (UG 6956)

PDO Overview

PDO Designation	Name	Length	Mapping Object
RxPDO 1	RxPDO 1	4 Byte	1600h
TxPDO 1	TxPDO 1	94 Byte	1A00h

Process data mapping (PDO)

RxPDO		Mapped object		Name
Index	Subindex	Index	Subindex	
1600h	01h	2101h	01h	Feldbus input byte 0
1600h	02h	2101h	02h	Feldbus input byte 1
1600h	03h	2101h	03h	Feldbus input byte 2
1600h	04h	2101h	04h	Feldbus input byte 3

TxPDO		Mapped object		Name
Index	Subindex	Index	Subindex	
1A00h	01h	2001h	01h	System Status
1A00h	02h	2001h	02h	Reserved_2001_02
1A00h	03h	2001h	03h	Reserved_2001_03
1A00h	04h	2001h	04h	Reserved_2001_04
1A00h	05h	2201h	01h	Input status byte 0
1A00h	06h	2201h	02h	Input status byte 1
1A00h	07h	2201h	03h	Input status byte 2
1A00h	08h	2201h	04h	Input status byte 3
1A00h	09h	2201h	05h	Input status byte 4
1A00h	0Ah	2201h	06h	Input status byte 5
1A00h	0Bh	2201h	07h	Input status byte 6
1A00h	0Ch	2201h	08h	Input status byte 7
1A00h	0Dh	2201h	09h	Input status byte 8
1A00h	0Eh	2201h	0Ah	Input status byte 9
1A00h	0Fh	2201h	0Bh	Input status byte 10
1A00h	10h	2201h	0Ch	Input status byte 11
1A00h	11h	2201h	0Dh	Input status byte 12
1A00h	12h	2201h	0Eh	Input status byte 13
1A00h	13h	2201h	0Fh	Input status byte 14
1A00h	14h	2201h	10h	Input status byte 15
1A00h	15h	2181h	01h	Fieldbus input byte 0 feedback
1A00h	16h	2181h	02h	Fieldbus input byte 1 feedback
1A00h	17h	2181h	03h	Fieldbus input byte 2 feedback
1A00h	18h	2181h	04h	Fieldbus input byte 3 feedback
1A00h	19h	2203h	01h	Probe status byte 0
1A00h	1Ah	2203h	02h	Probe status byte 1
1A00h	1Bh	2203h	03h	Probe status byte 2
1A00h	1Ch	2203h	04h	Probe status byte 3
1A00h	1Dh	2202h	01h	OSSD status byte 0
1A00h	1Eh	2202h	02h	OSSD status byte 1
1A00h	1Fh	2202h	03h	OSSD status byte 2
1A00h	20h	2202h	04h	OSSD status byte 3
1A00h	21h	2204h	01h	Analog data float 0
1A00h	22h	2204h	02h	Analog data float 1
1A00h	23h	2204h	03h	Analog data float 2
1A00h	24h	2204h	04h	Analog data float 3
1A00h	25h	2204h	05h	Analog data float 4
1A00h	26h	2204h	06h	Analog data float 5
1A00h	27h	2204h	07h	Analog data float 6
1A00h	28h	2204h	08h	Analog data float 7
1A00h	29h	2204h	09h	Analog data float 8
1A00h	2Ah	2204h	0Ah	Analog data float 9
1A00h	2Bh	2204h	0Bh	Analog data float 10
1A00h	2Ch	2204h	0Ch	Analog data float 11
1A00h	2Dh	2204h	0Dh	Analog data float 12
1A00h	2Eh	2204h	0Eh	Analog data float 13
1A00h	2Fh	2204h	0Fh	Analog data float 14
1A00h	30h	2204h	10h	Analog data float 15

Vendor specific Objects

Object Index 2001h – System status
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	System status
02h	UNSIGNED8	Reserved_2001_02
02h	UNSIGNED8	Reserved_2001_03
02h	UNSIGNED8	Reserved_2001_04

Object Index 2003h – Errors data CPU 0
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Module name
02h	UNSIGNED8	Error code
03h	UNSIGNED8	Error address byte 0
04h	UNSIGNED8	Error address byte 1
05h	UNSIGNED8	Error address byte 2
06h	UNSIGNED8	Error address byte 3
07h	UNSIGNED8	CPU firmware version
08h	UNSIGNED8	Extended code 0
09h	UNSIGNED8	Extended code 1

Object Index 2004h – Errors data CPU 1
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Module name
02h	UNSIGNED8	Error code
03h	UNSIGNED8	Error address byte 0
04h	UNSIGNED8	Error address byte 1
05h	UNSIGNED8	Error address byte 2
06h	UNSIGNED8	Error address byte 3
07h	UNSIGNED8	CPU firmware version
08h	UNSIGNED8	Extended code 0
09h	UNSIGNED8	Extended code 1

Object Index 2005h – Input diagnostics
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Diagnostic index 0
02h	UNSIGNED8	Diagnostic code 0
03h	UNSIGNED8	Diagnostic index 1
04h	UNSIGNED8	Diagnostic code 1
05h	UNSIGNED8	Diagnostic index 2
06h	UNSIGNED8	Diagnostic code 2
07h	UNSIGNED8	Diagnostic index 3
08h	UNSIGNED8	Diagnostic code 3
09h	UNSIGNED8	Diagnostic index 4
0Ah	UNSIGNED8	Diagnostic code 4
0Bh	UNSIGNED8	Diagnostic index 5
0Ch	UNSIGNED8	Diagnostic code 5
0Dh	UNSIGNED8	Diagnostic index 6
0Eh	UNSIGNED8	Diagnostic code 6
0Fh	UNSIGNED8	Diagnostic index 7
10h	UNSIGNED8	Diagnostic code 7
11h	UNSIGNED8	Diagnostic index 8
12h	UNSIGNED8	Diagnostic code 8
13h	UNSIGNED8	Diagnostic index 9
14h	UNSIGNED8	Diagnostic code 9
15h	UNSIGNED8	Diagnostic index 10
16h	UNSIGNED8	Diagnostic code 10
17h	UNSIGNED8	Diagnostic index 11
18h	UNSIGNED8	Diagnostic code 11
19h	UNSIGNED8	Diagnostic index 12
1Ah	UNSIGNED8	Diagnostic code 12
1Bh	UNSIGNED8	Diagnostic index 13
1Ch	UNSIGNED8	Diagnostic code 13
1Dh	UNSIGNED8	Diagnostic index 14
1Eh	UNSIGNED8	Diagnostic code 14
1Fh	UNSIGNED8	Diagnostic index 15
20h	UNSIGNED8	Diagnostic code 15

A maximum of 16 Input diagnostics are transferred, if more diagnostics are present on the system, only the first 16 are available on the fieldbus.

Object Index 2006h – OSSD diagnostics
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Diagnostic index 0
02h	UNSIGNED8	Diagnostic code 0
03h	UNSIGNED8	Diagnostic index 1
04h	UNSIGNED8	Diagnostic code 1
05h	UNSIGNED8	Diagnostic index 2
06h	UNSIGNED8	Diagnostic code 2
07h	UNSIGNED8	Diagnostic index 3
08h	UNSIGNED8	Diagnostic code 3
09h	UNSIGNED8	Diagnostic index 4
0Ah	UNSIGNED8	Diagnostic code 4
0Bh	UNSIGNED8	Diagnostic index 5
0Ch	UNSIGNED8	Diagnostic code 5
0Dh	UNSIGNED8	Diagnostic index 6
0Eh	UNSIGNED8	Diagnostic code 6
0Fh	UNSIGNED8	Diagnostic index 7
10h	UNSIGNED8	Diagnostic code 7
11h	UNSIGNED8	Diagnostic index 8
12h	UNSIGNED8	Diagnostic code 8
13h	UNSIGNED8	Diagnostic index 9
14h	UNSIGNED8	Diagnostic code 9
15h	UNSIGNED8	Diagnostic index 10
16h	UNSIGNED8	Diagnostic code 10
17h	UNSIGNED8	Diagnostic index 11
18h	UNSIGNED8	Diagnostic code 11
19h	UNSIGNED8	Diagnostic index 12
1Ah	UNSIGNED8	Diagnostic code 12
1Bh	UNSIGNED8	Diagnostic index 13
1Ch	UNSIGNED8	Diagnostic code 13
1Dh	UNSIGNED8	Diagnostic index 14
1Eh	UNSIGNED8	Diagnostic code 14
1Fh	UNSIGNED8	Diagnostic index 15
20h	UNSIGNED8	Diagnostic code 15

A maximum of 16 OSSD diagnostics are transferred, if more diagnostics are present on the system, only the first 16 are available on the fieldbus

Object Index 2007h – Project CRC
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Project CRC High byte
02h	UNSIGNED8	Project CRC Low byte

Object Index 2101h – Fieldbus inputs
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Fieldbus input byte 0
02h	UNSIGNED8	Fieldbus input byte 1
03h	UNSIGNED8	Fieldbus input byte 2
04h	UNSIGNED8	Fieldbus input byte 3

Object Index 2181h – Fieldbus inputs feedback
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Fieldbus input byte 0 feedback
02h	UNSIGNED8	Fieldbus input byte 1 feedback
03h	UNSIGNED8	Fieldbus input byte 2 feedback
04h	UNSIGNED8	Fieldbus input byte 3 feedback

Object Index 2201h – Input status
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Input status byte 0
02h	UNSIGNED8	Input status byte 1
03h	UNSIGNED8	Input status byte 2
04h	UNSIGNED8	Input status byte 3
05h	UNSIGNED8	Input status byte 4
06h	UNSIGNED8	Input status byte 5
07h	UNSIGNED8	Input status byte 6
08h	UNSIGNED8	Input status byte 7
09h	UNSIGNED8	Input status byte 8
0Ah	UNSIGNED8	Input status byte 9
0Bh	UNSIGNED8	Input status byte 10
0Ch	UNSIGNED8	Input status byte 11
0Dh	UNSIGNED8	Input status byte 12
0Eh	UNSIGNED8	Input status byte 13
0Fh	UNSIGNED8	Input status byte 14
10h	UNSIGNED8	Input status byte 15

Object Index 2202h – OSSD status
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	OSSD status byte 0
02h	UNSIGNED8	OSSD status byte 1
03h	UNSIGNED8	OSSD status byte 2
04h	UNSIGNED8	OSSD status byte 3

Object Index 2203h – Probe status
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Probe status byte 0
02h	UNSIGNED8	Probe status byte 1
03h	UNSIGNED8	Probe status byte 2
04h	UNSIGNED8	Probe status byte 3

Object Index 2204h - Analog data
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	REAL32	Analog data float 0
02h	REAL32	Analog data float 1
03h	REAL32	Analog data float 2
04h	REAL32	Analog data float 3
05h	REAL32	Analog data float 4
06h	REAL32	Analog data float 5
07h	REAL32	Analog data float 6
08h	REAL32	Analog data float 7
09h	REAL32	Analog data float 8
0Ah	REAL32	Analog data float 9
0Bh	REAL32	Analog data float 10
0Ch	REAL32	Analog data float 11
0Dh	REAL32	Analog data float 12
0Eh	REAL32	Analog data float 13
0Fh	REAL32	Analog data float 14
10h	REAL32	Analog data float 15

CANopen (UG 6951)

PDO predefined connection set

PDO	Name	Length	Parameter	Mapping	Remarks
RxPDO 1	Fieldbus inputs	8 Byte	1400h	1600h	Part of the standard communication set
RxPDO 2	Dummy	8 Byte	1401h	1601h	Part of the standard communication set; not used; disabled by default
RxPDO 3	Dummy	8 Byte	1402h	1602h	Part of the standard communication set; not used; disabled by default
RxPDO 4	Dummy	8 Byte	1403h	1603h	Part of the standard communication set; not used; disabled by default
TxPDO 1	Status, Fieldbus inputs feedback	8 Byte	1800h	1A00h	Part of the standard communication set
TxPDO 2	Inputs status 1	8 Byte	1801h	1A01h	Part of the standard communication set
TxPDO 3	Inputs status 2	8 Byte	1802h	1A02h	Part of the standard communication set
TxPDO 4	Outputs & probes status	8 Byte	1803h	1A03h	Part of the standard communication set
TxPDO 5	Analog data 1	8 Byte	1804h	1A04h	
TxPDO 6	Analog data 2	8 Byte	1805h	1A05h	
TxPDO 7	Analog data 3	8 Byte	1806h	1A06h	
TxPDO 8	Analog data 4	8 Byte	1807h	1A07h	
TxPDO 9	Analog data 5	8 Byte	1808h	1A08h	
TxPDO 10	Analog data 6	8 Byte	1809h	1A09h	
TxPDO 11	Analog data 7	8 Byte	180Ah	1A0Ah	
TxPDO 12	Analog data 8	8 Byte	180Bh	1A0Bh	

Process data mapping (PDO)

RxPDO		Mapped object		Name
Index	Subindex	Index	Subindex	
1600h	01h	2101h	01h	Fieldbus input byte 0
1600h	02h	2101h	02h	Fieldbus input byte 1
1600h	03h	2101h	03h	Fieldbus input byte 2
1600h	04h	2101h	04h	Fieldbus input byte 3
1600h	05h	0005h	05h	Dummy entry
1600h	06h	0005h	06h	Dummy entry
1600h	07h	0005h	07h	Dummy entry
1600h	08h	0005h	08h	Dummy entry
1601h	01h	0005h	01h	Dummy entry
1601h	02h	0005h	02h	Dummy entry
1601h	03h	0005h	03h	Dummy entry
1601h	04h	0005h	04h	Dummy entry
1601h	05h	0005h	05h	Dummy entry
1601h	06h	0005h	06h	Dummy entry
1601h	07h	0005h	07h	Dummy entry
1601h	08h	0005h	08h	Dummy entry
1602h	01h	0005h	01h	Dummy entry
1602h	02h	0005h	02h	Dummy entry
1602h	03h	0005h	03h	Dummy entry
1602h	04h	0005h	04h	Dummy entry
1602h	05h	0005h	05h	Dummy entry
1602h	06h	0005h	06h	Dummy entry
1602h	07h	0005h	07h	Dummy entry
1602h	08h	0005h	08h	Dummy entry
1603h	01h	0005h	01h	Dummy entry
1603h	02h	0005h	02h	Dummy entry
1603h	03h	0005h	03h	Dummy entry
1603h	04h	0005h	04h	Dummy entry
1603h	05h	0005h	05h	Dummy entry
1603h	06h	0005h	06h	Dummy entry
1603h	07h	0005h	07h	Dummy entry
1603h	08h	0005h	08h	Dummy entry

TxPDO		Mapped object		Name
Index	Subindex	Index	Subindex	
1A00h	01h	2001h	01h	System Status
1A00h	02h	0005h	00h	Dummy entry
1A00h	03h	0005h	00h	Dummy entry
1A00h	04h	0005h	00h	Dummy entry
1A00h	05h	2181h	01h	Fieldbus input byte 0 feedback
1A00h	06h	2181h	02h	Fieldbus input byte 1 feedback
1A00h	07h	2181h	03h	Fieldbus input byte 2 feedback
1A00h	08h	2181h	04h	Fieldbus input byte 3 feedback
1A01h	01h	2201h	01h	Input status byte 0
1A01h	02h	2201h	02h	Input status byte 1
1A01h	03h	2201h	03h	Input status byte 2
1A01h	04h	2201h	04h	Input status byte 3
1A01h	05h	2201h	05h	Input status byte 4
1A01h	06h	2201h	06h	Input status byte 5
1A01h	07h	2201h	07h	Input status byte 6
1A01h	08h	2201h	08h	Input status byte 7
1A02h	01h	2201h	09h	Input status byte 8
1A02h	02h	2201h	0Ah	Input status byte 9
1A02h	03h	2201h	0Bh	Input status byte 10
1A02h	04h	2201h	0Ch	Input status byte 11
1A02h	05h	2201h	0Dh	Input status byte 12
1A02h	06h	2201h	0Eh	Input status byte 13
1A02h	07h	2201h	0Fh	Input status byte 14
1A02h	08h	2201h	10h	Input status byte 15
1A03h	01h	2203h	01h	Probe status byte 0
1A03h	02h	2203h	02h	Probe status byte 1
1A03h	03h	2203h	03h	Probe status byte 2
1A03h	04h	2203h	04h	Probe status byte 3
1A03h	05h	2202h	01h	OSSD status byte 0
1A03h	06h	2202h	02h	OSSD status byte 1
1A03h	07h	2202h	03h	OSSD status byte 2
1A03h	08h	2202h	04h	OSSD status byte 3
1A04h	01h	2204h	01h	Analog data float 0
1A04h	02h	2204h	02h	Analog data float 1
1A05h	01h	2204h	03h	Analog data float 2
1A05h	02h	2204h	04h	Analog data float 3
1A06h	01h	2204h	05h	Analog data float 4
1A06h	02h	2204h	06h	Analog data float 5
1A07h	01h	2204h	07h	Analog data float 6
1A07h	02h	2204h	08h	Analog data float 7
1A08h	01h	2204h	09h	Analog data float 8
1A08h	02h	2204h	0Ah	Analog data float 9
1A09h	01h	2204h	0Bh	Analog data float 10
1A09h	02h	2204h	0Ch	Analog data float 11
1A0Ah	01h	2204h	0Dh	Analog data float 12
1A0Ah	02h	2204h	0Eh	Analog data float 13
1A0Bh	01h	2204h	0Fh	Analog data float 14
1A0Bh	02h	2204h	10h	Analog data float 15

Vendor specific Objects

Object Index 2001h – System status
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	System status
02h	UNSIGNED8	Reserved
03h	UNSIGNED8	Reserved
04h	UNSIGNED8	Reserved

Object Index 2003h – Errors data CPU 0
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Module name
02h	UNSIGNED8	Error code
03h	UNSIGNED8	Error address byte 0
04h	UNSIGNED8	Error address byte 1
05h	UNSIGNED8	Error address byte 2
06h	UNSIGNED8	Error address byte 3
07h	UNSIGNED8	CPU firmware version
08h	UNSIGNED8	Extended code 0
09h	UNSIGNED8	Extended code 1

Object Index 2004h – Errors data CPU 1
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Module name
02h	UNSIGNED8	Error code
03h	UNSIGNED8	Error address byte 0
04h	UNSIGNED8	Error address byte 1
05h	UNSIGNED8	Error address byte 2
06h	UNSIGNED8	Error address byte 3
07h	UNSIGNED8	CPU firmware version
08h	UNSIGNED8	Extended code 0
09h	UNSIGNED8	Extended code 1

Object Index 2005h – Input diagnostics
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Diagnostic index 0
02h	UNSIGNED8	Diagnostic code 0
03h	UNSIGNED8	Diagnostic index 1
04h	UNSIGNED8	Diagnostic code 1
05h	UNSIGNED8	Diagnostic index 2
06h	UNSIGNED8	Diagnostic code 2
07h	UNSIGNED8	Diagnostic index 3
08h	UNSIGNED8	Diagnostic code 3
09h	UNSIGNED8	Diagnostic index 4
0Ah	UNSIGNED8	Diagnostic code 4
0Bh	UNSIGNED8	Diagnostic index 5
0Ch	UNSIGNED8	Diagnostic code 5
0Dh	UNSIGNED8	Diagnostic index 6
0Eh	UNSIGNED8	Diagnostic code 6
0Fh	UNSIGNED8	Diagnostic index 7
10h	UNSIGNED8	Diagnostic code 7
11h	UNSIGNED8	Diagnostic index 8
12h	UNSIGNED8	Diagnostic code 8
13h	UNSIGNED8	Diagnostic index 9
14h	UNSIGNED8	Diagnostic code 9
15h	UNSIGNED8	Diagnostic index 10
16h	UNSIGNED8	Diagnostic code 10
17h	UNSIGNED8	Diagnostic index 11
18h	UNSIGNED8	Diagnostic code 11
19h	UNSIGNED8	Diagnostic index 12
1Ah	UNSIGNED8	Diagnostic code 12
1Bh	UNSIGNED8	Diagnostic index 13
1Ch	UNSIGNED8	Diagnostic code 13
1Dh	UNSIGNED8	Diagnostic index 14
1Eh	UNSIGNED8	Diagnostic code 14
1Fh	UNSIGNED8	Diagnostic index 15
20h	UNSIGNED8	Diagnostic code 15

A maximum of 16 Input diagnostics are transferred, if more diagnostics are present on the system, only the first 16 are available on the fieldbus.

Object Index 2006h – OSSD diagnostics
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Diagnostic index 0
02h	UNSIGNED8	Diagnostic code 0
03h	UNSIGNED8	Diagnostic index 1
04h	UNSIGNED8	Diagnostic code 1
05h	UNSIGNED8	Diagnostic index 2
06h	UNSIGNED8	Diagnostic code 2
07h	UNSIGNED8	Diagnostic index 3
08h	UNSIGNED8	Diagnostic code 3
09h	UNSIGNED8	Diagnostic index 4
0Ah	UNSIGNED8	Diagnostic code 4
0Bh	UNSIGNED8	Diagnostic index 5
0Ch	UNSIGNED8	Diagnostic code 5
0Dh	UNSIGNED8	Diagnostic index 6
0Eh	UNSIGNED8	Diagnostic code 6
0Fh	UNSIGNED8	Diagnostic index 7
10h	UNSIGNED8	Diagnostic code 7
11h	UNSIGNED8	Diagnostic index 8
12h	UNSIGNED8	Diagnostic code 8
13h	UNSIGNED8	Diagnostic index 9
14h	UNSIGNED8	Diagnostic code 9
15h	UNSIGNED8	Diagnostic index 10
16h	UNSIGNED8	Diagnostic code 10
17h	UNSIGNED8	Diagnostic index 11
18h	UNSIGNED8	Diagnostic code 11
19h	UNSIGNED8	Diagnostic index 12
1Ah	UNSIGNED8	Diagnostic code 12
1Bh	UNSIGNED8	Diagnostic index 13
1Ch	UNSIGNED8	Diagnostic code 13
1Dh	UNSIGNED8	Diagnostic index 14
1Eh	UNSIGNED8	Diagnostic code 14
1Fh	UNSIGNED8	Diagnostic index 15
20h	UNSIGNED8	Diagnostic code 15

A maximum of 16 OSSD diagnostics are transferred, if more diagnostics are present on the system, only the first 16 are available on the fieldbus.

Object Index 2007h – Project CRC
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Project CRC Low byte
02h	UNSIGNED8	Project CRC High byte

Object Index 2101h – Fieldbus inputs
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Fieldbus input byte 0
02h	UNSIGNED8	Fieldbus input byte 1
03h	UNSIGNED8	Fieldbus input byte 2
04h	UNSIGNED8	Fieldbus input byte 3

Object Index 2181h – Fieldbus inputs feedback
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Fieldbus input byte 0 feedback
02h	UNSIGNED8	Fieldbus input byte 1 feedback
03h	UNSIGNED8	Fieldbus input byte 2 feedback
04h	UNSIGNED8	Fieldbus input byte 3 feedback

Object Index 2201h – Input status
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Input status byte 0
02h	UNSIGNED8	Input status byte 1
03h	UNSIGNED8	Input status byte 2
04h	UNSIGNED8	Input status byte 3
05h	UNSIGNED8	Input status byte 4
06h	UNSIGNED8	Input status byte 5
07h	UNSIGNED8	Input status byte 6
08h	UNSIGNED8	Input status byte 7
09h	UNSIGNED8	Input status byte 8
0Ah	UNSIGNED8	Input status byte 9
0Bh	UNSIGNED8	Input status byte 10
0Ch	UNSIGNED8	Input status byte 11
0Dh	UNSIGNED8	Input status byte 12
0Eh	UNSIGNED8	Input status byte 13
0Fh	UNSIGNED8	Input status byte 14
10h	UNSIGNED8	Input status byte 15

Object Index 2202h – OSSD status
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	OSSD status byte 0
02h	UNSIGNED8	OSSD status byte 1
03h	UNSIGNED8	OSSD status byte 2
04h	UNSIGNED8	OSSD status byte 3

Object Index 2203h – Probe status
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	UNSIGNED8	Probe status byte 0
02h	UNSIGNED8	Probe status byte 1
03h	UNSIGNED8	Probe status byte 2
04h	UNSIGNED8	Probe status byte 3

Object Index 2204h – Analog data
Object Type: Array

Subindex	Type	Name
00h	UNSIGNED8	Number of Entries
01h	REAL32	Analog data float 0
02h	REAL32	Analog data float 1
03h	REAL32	Analog data float 2
04h	REAL32	Analog data float 3
05h	REAL32	Analog data float 4
06h	REAL32	Analog data float 5
07h	REAL32	Analog data float 6
08h	REAL32	Analog data float 7
09h	REAL32	Analog data float 8
0Ah	REAL32	Analog data float 9
0Bh	REAL32	Analog data float 10
0Ch	REAL32	Analog data float 11
0Dh	REAL32	Analog data float 12
0Eh	REAL32	Analog data float 13
0Fh	REAL32	Analog data float 14
10h	REAL32	Analog data float 15

EtherNet/IP (UG 6955)

Process data mapping (Class 1 Connection)

Assembly instance 96h (Connection point O→T Consuming Instance)

Byte offset	Size	Name
0	USINT	Fieldbus input byte 0
1	USINT	Fieldbus input byte 1
2	USINT	Fieldbus input byte 2
3	USINT	Fieldbus input byte 3

O→T connection type: Point-to-point

Assembly instance 64h (Connection point T->O Producing Instance)

Byte offset	Size	Name
0	USINT	System Status
1	USINT	Reserved
2	USINT	Input status byte 0
3	USINT	Input status byte 1
4	USINT	Input status byte 2
5	USINT	Input status byte 3
6	USINT	Input status byte 4
7	USINT	Input status byte 5
8	USINT	Input status byte 6
9	USINT	Input status byte 7
10	USINT	Input status byte 8
11	USINT	Input status byte 9
12	USINT	Input status byte 10
13	USINT	Input status byte 11
14	USINT	Input status byte 12
15	USINT	Input status byte 13
16	USINT	Input status byte 14
17	USINT	Input status byte 15
18	USINT	Fieldbus input byte 0 feedback
19	USINT	Fieldbus input byte 1 feedback
20	USINT	Fieldbus input byte 2 feedback
21	USINT	Fieldbus input byte 3 feedback
22	USINT	Probe status byte 0
23	USINT	Probe status byte 1
24	USINT	Probe status byte 2
25	USINT	Probe status byte 3
26	USINT	OSSD status byte 0
27	USINT	OSSD status byte 1
28	USINT	OSSD status byte 2
29	USINT	OSSD status byte 3
30	REAL	Analog data float 0
34	REAL	Analog data float 1
38	REAL	Analog data float 2
42	REAL	Analog data float 3
46	REAL	Analog data float 4
50	REAL	Analog data float 5
54	REAL	Analog data float 6
58	REAL	Analog data float 7
62	REAL	Analog data float 8
66	REAL	Analog data float 9
70	REAL	Analog data float 10
74	REAL	Analog data float 11
78	REAL	Analog data float 12
82	REAL	Analog data float 13
86	REAL	Analog data float 14
90	REAL	Analog data float 15

O→T connection type: Point-to-point, Multicast

Assembly instance 05h (Configuration Data)

Set this instance to size 0

Supported trigger types: Cyclic

Explicit messaging[1]

To access Errors data, Input diagnostics, OSSD diagnostic and Project CRC the service 0x0E
(Get attribute single) shall be used.

Name	Class	Instance	Attribute	Length(byte)	Access type
Fieldbus inputs	A2h	101h	05h	4	Set/Get
System I/O	A2h	01h	05h	30	Get
Analog data	A2h	204h	05h	64	Get
Errors data CPU 0	A2h	03h	05h	9	Get
Errors data CPU 1	A2h	04h	05h	9	Get
Input diagnostics	A2h	05h	05h	32	Get
OSSD diagnostics	A2h	06h	05h	32	Get
Project CRC	A2h	07h	05h	2	Get

[1]See Acyclic data format for more information

Modbus TCP/IP (UG 6958)

Modbus Serial (UG 6959)

Register Mapping

Holding Registers (4x)

Register(s)	Size	Name
000h Low byte	UINT8	Fieldbus input byte 0
000h High byte	UINT8	Fieldbus input byte 1
001h Low byte	UINT8	Fieldbus input byte 2
001h High byte	UINT8	Fieldbus input byte 3
800h Low byte	UINT8	System status
800h High byte	UINT8	Reserved
801h Low byte	UINT8	Input status byte 0
801h High byte	UINT8	Input status byte 1
802h Low byte	UINT8	Input status byte 2
802h High byte	UINT8	Input status byte 3
803h Low byte	UINT8	Input status byte 4
803h High byte	UINT8	Input status byte 5
804h Low byte	UINT8	Input status byte 6
804h High byte	UINT8	Input status byte 7
805h Low byte	UINT8	Input status byte 8
805h High byte	UINT8	Input status byte 9
806h Low byte	UINT8	Input status byte 10
806h High byte	UINT8	Input status byte 11
807h Low byte	UINT8	Input status byte 12
807h High byte	UINT8	Input status byte 13
808h Low byte	UINT8	Input status byte 14
808h High byte	UINT8	Input status byte 15
809h Low byte	UINT8	Fieldbus input feedback byte 0
809h High byte	UINT8	Fieldbus input feedback byte 1
80Ah Low byte	UINT8	Fieldbus input feedback byte 2
80Ah High byte	UINT8	Fieldbus input feedback byte 3
80Bh Low byte	UINT8	Probe status byte 0
80Bh High byte	UINT8	Probe status byte 1
80Ch Low byte	UINT8	Probe status byte 2
80Ch High byte	UINT8	Probe status byte 3
80Dh High byte	UINT8	OSSD status byte 0
80Dh Low byte	UINT8	OSSD status byte 1
80Eh High byte	UINT8	OSSD status byte 2
80Eh Low byte	UINT8	OSSD status byte 3

Register(s)	Size	Name
80Fh-810h	FLOAT	Analog data float 0
811h-812h	FLOAT	Analog data float 1
813h-814h	FLOAT	Analog data float 2
815h-816h	FLOAT	Analog data float 3
817h-818h	FLOAT	Analog data float 4
819h-81Ah	FLOAT	Analog data float 5
81Bh-81Ch	FLOAT	Analog data float 6
81Dh-81Eh	FLOAT	Analog data float 7
81Fh-820h	FLOAT	Analog data float 8
821h-822h	FLOAT	Analog data float 9
823h-824h	FLOAT	Analog data float 10
825h-826h	FLOAT	Analog data float 11
827h-828h	FLOAT	Analog data float 12
829h-82Ah	FLOAT	Analog data float 13
82Bh-82Ch	FLOAT	Analog data float 14
82Dh-82Eh	FLOAT	Analog data float 15

Register(s)	Size	Name
1030h Low byte	UINT8	Error CPU0 – Module
1030h High byte	UINT8	Error CPU0 – Error Code
1031h - 1032h	UINT32	Error CPU0 – Error address
1033h Low byte	UINT8	Error CPU0 – Firmware Version
1033h High byte	UINT8	Error CPU0 – Extended code 0
1034h Low byte	UINT8	Error CPU0 – Extended code 1
1040h Low byte	UNIT8	Error CPU1 – Module
1040h High byte	UINT8	Error CPU1 – Error Code
1041h - 1042h	UINT32	Error CPU1 – Error address
1043h Low byte	UINT8	Error CPU1 – Firmware Version
1043h High byte	UINT8	Error CPU1 – Extended code 0
1044h Low byte	UINT8	Error CPU1 – Extended code 1

Register(s)	Size	Name
1050h Low byte	UINT8	Input diagnostics index 1
1050h High byte	UINT8	Input diagnostics code 1
1051h Low byte	UINT8	Input diagnostics index 2
1051h High byte	UINT8	Input diagnostics code 2
1052h Low byte	UINT8	Input diagnostics index 3
1052h High byte	UINT8	Input diagnostics code 3
1053h Low byte	UINT8	Input diagnostics index 4
1053h High byte	UINT8	Input diagnostics code 4
1054h Low byte	UINT8	Input diagnostics index 5
1054h High byte	UINT8	Input diagnostics code 5
1055h Low byte	UINT8	Input diagnostics index 6
1055h High byte	UINT8	Input diagnostics code 6
1056h Low byte	UINT8	Input diagnostics index 7
1056h High byte	UINT8	Input diagnostics code 7
1057h Low byte	UINT8	Input diagnostics index 8
1057h High byte	UINT8	Input diagnostics code 8
1058h Low byte	UINT8	Input diagnostics index 9
1058h High byte	UINT8	Input diagnostics code 9
1059h Low byte	UINT8	Input diagnostics index 10
1059h High byte	UINT8	Input diagnostics code 10
105Ah Low byte	UINT8	Input diagnostics index 11
105Ah High byte	UINT8	Input diagnostics code 11
105Bh Low byte	UINT8	Input diagnostics index 12
105Bh High byte	UINT8	Input diagnostics code 12
105Ch Low byte	UINT8	Input diagnostics index 13
105Ch High byte	UINT8	Input diagnostics code 13
105Dh Low byte	UINT8	Input diagnostics index 14
105Dh High byte	UINT8	Input diagnostics code 14
105Eh Low byte	UINT8	Input diagnostics index 15
105Eh High byte	UINT8	Input diagnostics code 15
105Fh Low byte	UINT8	Input diagnostics index 16
105Fh High byte	UINT8	Input diagnostics code 16

Register(s)	Size	Name
1060h Low byte	UINT8	Output diagnostics index 1
1060h High byte	UINT8	Output diagnostics code 1
1061h Low byte	UINT8	Output diagnostics index 2
1061h High byte	UINT8	Output diagnostics code 2
1062h Low byte	UINT8	Output diagnostics index 3
1062h High byte	UINT8	Output diagnostics code 3
1063h Low byte	UINT8	Output diagnostics index 4
1063h High byte	UINT8	Output diagnostics code 4
1064h Low byte	UINT8	Output diagnostics index 5
1064h High byte	UINT8	Output diagnostics code 5
1065h Low byte	UINT8	Output diagnostics index 6
1065h High byte	UINT8	Output diagnostics code 6
1066h Low byte	UINT8	Output diagnostics index 7
1066h High byte	UINT8	Output diagnostics code 7
1067h Low byte	UINT8	Output diagnostics index 8
1067h High byte	UINT8	Output diagnostics code 8
1068h Low byte	UINT8	Output diagnostics index 9
1068h High byte	UINT8	Output diagnostics code 9
1069h Low byte	UINT8	Output diagnostics index 10
1069h High byte	UINT8	Output diagnostics code 10
106Ah Low byte	UINT8	Output diagnostics index 11
106Ah High byte	UINT8	Output diagnostics code 11
106Bh Low byte	UINT8	Output diagnostics index 12
106Bh High byte	UINT8	Output diagnostics code 12
106Ch Low byte	UINT8	Output diagnostics index 13
106Ch High byte	UINT8	Output diagnostics code 13
106Dh Low byte	UINT8	Output diagnostics index 14
106Dh High byte	UINT8	Output diagnostics code 14
106Eh Low byte	UINT8	Output diagnostics index 15
106Eh High byte	UINT8	Output diagnostics code 15
106Fh Low byte	UINT8	Output diagnostics index 16
106Fh High byte	UINT8	Output diagnostics code 16

Register(s)	Size	Name
1070h Low byte	UINT8	Project CRC High byte
1070h High byte	UINT8	Project CRC Low byte

PROFINET (UG 6954)

Process data mapping

Module Fieldbus input

Byte offset	Data direction[1]	Size	Name
0	In	UINT8	Fieldbus input byte 0
1	In	UINT8	Fieldbus input byte 1
2	In	UINT8	Fieldbus input byte 2
3	In	UINT8	Fieldbus input byte 3

Module System I/O

Byte offset	Data direction[1]	Size	Name
0	Out	UINT8	System status
1	Out	UINT8	Reserved
2	Out	UINT8	Input status byte 0
3	Out	UINT8	Input status byte 1
4	Out	UINT8	Input status byte 2
5	Out	UINT8	Input status byte 3
6	Out	UINT8	Input status byte 4
7	Out	UINT8	Input status byte 5
8	Out	UINT8	Input status byte 6
9	Out	UINT8	Input status byte 7
10	Out	UINT8	Input status byte 8
11	Out	UINT8	Input status byte 9
12	Out	UINT8	Input status byte 10
13	Out	UINT8	Input status byte 11
14	Out	UINT8	Input status byte 12
15	Out	UINT8	Input status byte 13
16	Out	UINT8	Input status byte 14
17	Out	UINT8	Input status byte 15
18	Out	UINT8	Fieldbus input byte 0 feedback
19	Out	UINT8	Fieldbus input byte 1 feedback
20	Out	UINT8	Fieldbus input byte 2 feedback
21	Out	UINT8	Fieldbus input byte 3 feedback
22	Out	UINT8	Probe status byte 0
23	Out	UINT8	Probe status byte 1
24	Out	UINT8	Probe status byte 2
25	Out	UINT8	Probe status byte 3
26	Out	UINT8	OSSD status byte 0
27	Out	UINT8	OSSD status byte 1
28	Out	UINT8	OSSD status byte 2
29	Out	UINT8	OSSD status byte 3

Module Analog data

Byte offset	Data direction[1]	Size	Name
0	Out	FLOAT	Analog data float 0
4	Out	FLOAT	Analog data float 1
8	Out	FLOAT	Analog data float 2
12	Out	FLOAT	Analog data float 3
16	Out	FLOAT	Analog data float 4
20	Out	FLOAT	Analog data float 5
24	Out	FLOAT	Analog data float 6
28	Out	FLOAT	Analog data float 7
32	Out	FLOAT	Analog data float 8
36	Out	FLOAT	Analog data float 9
40	Out	FLOAT	Analog data float 10
44	Out	FLOAT	Analog data float 11
48	Out	FLOAT	Analog data float 12
52	Out	FLOAT	Analog data float 13
56	Out	FLOAT	Analog data float 14
60	Out	FLOAT	Analog data float 15

Record Data read/write services[2]

Name	Slot	Index	Length(byte)	Access type
Fieldbus inputs	01h	01h	4	Set/Get
System I/O	00h	00h	30	Get
Analog data	02h	05h	64	Get
Errors data CPU0	00h	02h	9	Get
Errors data CPU1	00h	03h	9	Get
Input diagnostics	00h	04h	32	Get
OSSD diagnostics	00h	05h	32	Get
Project CRC	00h	06h	2	Get

[2]See Acyclic data format   [1]Direction from the SAFEMASTER PRO point of view

PROFIBUS DP (UG 6952)

Process data mapping

Module 1 (with Analog data)

Byte offset	Data direction[1]	Size	Name
0	Out	UINT8	System status
1	Out	UINT8	Reserved
2	Out	UINT8	Input status byte 0
3	Out	UINT8	Input status byte 1
4	Out	UINT8	Input status byte 2
5	Out	UINT8	Input status byte 3
6	Out	UINT8	Input status byte 4
7	Out	UINT8	Input status byte 5
8	Out	UINT8	Input status byte 6
9	Out	UINT8	Input status byte 7
10	Out	UINT8	Input status byte 8
11	Out	UINT8	Input status byte 9
12	Out	UINT8	Input status byte 10
13	Out	UINT8	Input status byte 11
14	Out	UINT8	Input status byte 12
15	Out	UINT8	Input status byte 13
16	Out	UINT8	Input status byte 14
17	Out	UINT8	Input status byte 15
18	Out	UINT8	Fieldbus input byte 0 feedback
19	Out	UINT8	Fieldbus input byte 1 feedback
20	Out	UINT8	Fieldbus input byte 2 feedback
21	Out	UINT8	Fieldbus input byte 3 feedback
22	Out	UINT8	Probe status byte 0
23	Out	UINT8	Probe status byte 1
24	Out	UINT8	Probe status byte 2
25	Out	UINT8	Probe status byte 3
26	Out	UINT8	OSSD status byte 0
27	Out	UINT8	OSSD status byte 1
28	Out	UINT8	OSSD status byte 2
29	Out	UINT8	OSSD status byte 3
30-33	Out	FLOAT	Analog data float 0
34-37	Out	FLOAT	Analog data float 1
38-41	Out	FLOAT	Analog data float 2
42-45	Out	FLOAT	Analog data float 3
46-49	Out	FLOAT	Analog data float 4
50-53	Out	FLOAT	Analog data float 5
54-57	Out	FLOAT	Analog data float 6
58-61	Out	FLOAT	Analog data float 7
62-65	Out	FLOAT	Analog data float 8
66-69	Out	FLOAT	Analog data float 9
70-73	Out	FLOAT	Analog data float 10
74-77	Out	FLOAT	Analog data float 11
78-81	Out	FLOAT	Analog data float 12
82-85	Out	FLOAT	Analog data float 13
86-89	Out	FLOAT	Analog data float 14
90-93	Out	FLOAT	Analog data float 15
0	In	UINT8	Fieldbus input byte 0
1	In	UINT8	Fieldbus input byte 1
2	In	UINT8	Fieldbus input byte 2
3	In	UINT8	Fieldbus input byte 3

Module 2 (without Analog data)

Byte offset	Data direction[1]	Size	Name
0	Out	UINT8	System status
1	Out	UINT8	Reserved
2	Out	UINT8	Input status byte 0
3	Out	UINT8	Input status byte 1
4	Out	UINT8	Input status byte 2
5	Out	UINT8	Input status byte 3
6	Out	UINT8	Input status byte 4
7	Out	UINT8	Input status byte 5
8	Out	UINT8	Input status byte 6
9	Out	UINT8	Input status byte 7
10	Out	UINT8	Input status byte 8
11	Out	UINT8	Input status byte 9
12	Out	UINT8	Input status byte 10
13	Out	UINT8	Input status byte 11
14	Out	UINT8	Input status byte 12
15	Out	UINT8	Input status byte 13
16	Out	UINT8	Input status byte 14
17	Out	UINT8	Input status byte 15
18	Out	UINT8	Fieldbus input byte 0 feedback
19	Out	UINT8	Fieldbus input byte 1 feedback
20	Out	UINT8	Fieldbus input byte 2 feedback
21	Out	UINT8	Fieldbus input byte 3 feedback
22	Out	UINT8	Probe status byte 0
23	Out	UINT8	Probe status byte 1
24	Out	UINT8	Probe status byte 2
25	Out	UINT8	Probe status byte 3
26	Out	UINT8	OSSD status byte 0
27	Out	UINT8	OSSD status byte 1
28	Out	UINT8	OSSD status byte 2
29	Out	UINT8	OSSD status byte 3
0	In	UINT8	Fieldbus input byte 0
1	In	UINT8	Fieldbus input byte 1
2	In	UINT8	Fieldbus input byte 2
3	In	UINT8	Fieldbus input byte 3

[1]Direction from the SAFEMASTER PRO point of view

Record Data read/write services[2]

Name	Slot	Index	Length(byte)	Access type
Fieldbus inputs	01h	01h	4	Set/Get
System I/O	00h	00h	30	Get
Analog data	02h	05h	64	Get
Errors data CPU0	00h	02h	9	Get
Errors data CPU1	00h	03h	9	Get
Input diagnostics	00h	04h	32	Get
OSSD diagnostics	00h	05h	32	Get
Project CRC	00h	06h	2	Get

[2]See Acyclic data format   [1]Direction from the SAFEMASTER PRO point of view

Acyclic data format

Errors data CPUx format

Name	Size
Module	UINT8
Error code	UINT8
Error address	UINT32
Firmware version (x.y in hexadecimal format)	UINT8
Extended code 0 (optional)	UINT8
Extended code 1 (optional)	UINT8

The Module field is defined as follows:

B7-B2	B1-B0
Module name	Node

The subfield Module name is defined as follows:

Name	Code	Name	Code
UG6916.10	2	UG6917/xx2	10
UG6912.02	3	UG6914.04/000	11
UG6913.16	4	UG6914.04/008	12
UG6913.08	5	UG6915/008	13
UG6912.04	6	UG6915/016	14
UG6913.12	7	UG6912.04/100	15
UG6917/002	8	-	16
UG6917/x02	9	UG6916.12/080	17

For the Error code field please refer to the SAFEMASTER PRO manual.
The optional Extended codes are only meaningful to DOLD

Input diagnostics format

Name	Size
Diagnostic index	UINT8
Diagnostic code	UINT8

A maximum of 16 Input diagnostics are transferred, if more diagnostics are present on the system only the first 16 are available on the fieldbus.

OSSD diagnostics format

Name	Size
Diagnostic index	UINT8
Diagnostic code	UINT8

A maximum of 16 OSSD diagnostics are transferred, if more diagnostics are present on the system only the first 16 are available on the fieldbus.

Project CRC format

Name	Size
CRC byte 0	UINT8
CRC byte 1	UINT8

ACCESSORIES AND SPARE PARTS

Type	Description	Art.-number
UG 6911.10	Control unit (8 Input / 2 dual channel OSSD), with software SAFEMASTER PRO DESIGNER	0063818
UG 6911.12/080	Control unit (8 Input / 4 single channel OSSD), with software SAFEMASTER PRO DESIGNER	0068574
UG 6916.10	Input/Output module (8 Input / 2 dual channel OSSD)	0063819
UG 6916.12/080	Input/Output module (8 Input / 4 single channel OSSD)	0068590
UG 6913.08	Input module (8 inputs)	0063820
UG 6913.12	Input module (12 inputs)	0064865
UG 6913.16	Input module (16 inputs)	0063821
UG 6912.02	Output module OSSD (2 dual channel OSSD)	0063822
UG 6912.04	Output module OSSD (4 dual channel OSSD)	0063823
UG 6912.04/100	Output module OSSD (4 high current safety outputs)	0068286
UG 6912.14	Output module relay (1 safety relay output)	0063824
UG 6912.28	Output module relay (2 safety relay output)	0063825
UG 6914.04/000	Output module relay (4 safety relay output)	0066057
UG 6914.04/008	Output module relay (4 safety relay output + 8 status outputs)	0065990
UG 6915/008	Output module signal (8 signal outputs)	0068282
UG 6915/016	Output module signal (16 signal outputs)	0068284
UG 6917/002	Speed monitoring module (for 2 proximity switches)	0066059
UG 6917/102	Speed monitoring module (for 2 proximity switches + 1 TTL encoder)	0066060
UG 6917/112	Speed monitoring module (for 2 proximity switches + 2 TTL encoder)	0066061
UG 6917/202	Speed monitoring module (for 2 proximity switches + 1 HTL encoder)	0066062
UG 6917/222	Speed monitoring module (for 2 proximity switches + 2 HTL encoder)	0066063
UG 6917/302	Speed monitoring module (for 2 proximity switches + 1 Sin/Cos encoder)	0066064
UG 6917/332	Speed monitoring module (for 2 proximity switches + 2 Sin/Cos encoder)	0065992
UG 6918	BusExtender	0064866
UG 6951	Fieldbus module CANopen	0063828
UG 6952	Fieldbus module PROFIBUS DP	0063826
UG 6954	Fieldbus module PROFINET	0064861
UG 6955	Fieldbus module Ethernet IP	0064862
UG 6956	Fieldbus module EtherCAT	0064863
UG 6957	Fieldbus module Universal Serial Bus (USB)	0064864
UG 6958	Fieldbus module MODBUS TCP/IP	0068268
UG 6959	Fieldbus module MODBUS RTU	0068270
OA 6911	Memory chip	0063829
OA 6920	USB-connection cable for PC	0064160
BU 6921	Mounting set IN-RAIL-Bus 250 mm for DIN 7.5 mm Rail	0064244
BU 6922	Mounting set IN-RAIL-Bus 250 mm for DIN 15 mm Rail	0064245
PN 6919	Software SAFEMASTER PRO DESIGNER	0064246

Please, visit the website www.dold.com for the list of the authorized representative of each Country

LIABILITY

Precise, complete compliance with all standards, instructions and warnings in this handbook is essential for the correct operation of the device. E. DOLD & Söhne KG therefore declines any responsibility for all and anything resulting from failure to comply with all or some of the aforesaid instructions.

DOLD takes no responsibility for the solutions created by customers concerning the circuits, the electrical diagrams and the chosen configuration parameters for their application. The implemented circuits and electrical diagrams and the system configuration parameter values, including those of SAFEMASTER PRO, are fully under the responsibility of the user..

Characteristics are subject to change without prior notice.
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DECLARATION OF CONFORMITY

EG - Konformitätserklärung

Declaration of Conformity

Déclaration de conformité européenne

DOLD

Hersteller: *Manufacturer: / Fabricant:*	**E. Dold & Söhne GmbH & Co. KG**
Anschrift: *Address: / Adresse:*	Bregstraße 18 78120 Furtwangen Germany

Produktbezeichnung:	konfigurierbares Sicherheitssystem	**SAFEMASTER PRO**	mit:
Product description:	*configurable safety system*		with:
Désignation du produit:	*système de sécurité configurable*		avec:

gemäß Anhang
in accordance with annex
selon l'annexe

Das bezeichnete Produkt stimmt mit den Vorschriften folgender europäischer Richtlinien überein:
The indicated product is in conformance with the regulations of the following european directives:
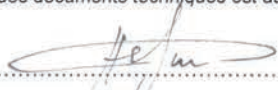Le produit désigné est conforme aux instructions des directives européennes:

Maschinenrichtlinie: *Machinery directive: / Directives Machines:*	2006/42/EG	EU-Abl. L157/24, 09.06.2006
EMV - Richtlinie: *EMC - Directive: / Directives- CEM::*	2014/30/EU	EU-Abl. L96/79, 29.03.2014
RoHS - Richtlinie *RoHS -Directive: / Directives - RoHS:*	2011/65/EU	EU-Abl. L174/88, 01.07.2011

Prüfgrundsätze: *Basis of Testing:* *Lignes de contrôle:*	EN ISO 13849-1:2015 IEC 62061:2021 EN 81-50:2020 EN 61131-2	EN IEC 61496-1:2020 EN 81-20:2020 EN 61508 Parts 1,3 :2010

Die Übereinstimmung eines Baumusters des bezeichneten Produktes mit der oben genannten Maschinenrichtlinie wurde bescheinigt durch:
Consistency of a production sample with the marked product in accordance to the above machiney directive has been certified by:
La conformité d'un échantillon du produit désigné aux directives machines susmentionnées a été certifiée par:

Benannte Stelle: *Certification office: / l'organisme notifié:*	TÜV Süd Product Service GmbH Ridlerstraße 65, 80339 München
Nummer der benannten Stelle: *Number of certification office:/ Numéro de l'organisme notifié:*	0123
Nummer der Bescheinigung: *Certification number: / Numéro de certificat:*	Z10 040066 0019 Rev. 01
Ausstelldatum : *Date of issue: / Date de délivrance:*	16.03.2022

Für die Zusammenstellung der technischen Unterlagen ist bevollmächtigt:
For the compilation of technical documents is authorized:
Pour la composition des documents techniques est autorisé:

Rechtsverbindliche Unterschrift:
Signature of authorized person:
Signature autorisée :

....

ppa. *Ch. Dold*

....

Gamal Hagar, Entwicklungsleiter / R&D Manager

Christian Dold, Produktmanagement / Productmanagement

Ort, Datum :
Place, Date: / Lieu, date: Furtwangen, 17.03.2022

Diese Original - Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der Produktdokumentation sind zu beachten.
This original declaration confirms the conformity of the mentioned directives but does not comprise any guarantee of the product characteristics. The safety directives of the product documentation are to be considered.
Cette déclaration originale certifie la conformité des directives nommées mais ne comprend aucune garantie des caractéristiques du produit. Les directives de sécurité de la documentation du produit sont à considérer.

DECLARATION OF CONFORMITY

EG - Konformitätserklärung

Declaration of Conformity

Déclaration de conformité européenne

DOLD

Anhang zur EG-Konformitätserklärung Safemaster PRO - 17.03.2022 :
Annex to the declaration of conformity Safemaster PRO - 17.03.2022 :
l'annexe à la déclaration de conformité SAFEMASTER PRO - 17.03.2022 :

mögliche Produkte des Systems :
possible products of system :
produits possibles du système :

UG6911.10 UG6911.12/080	Steuereinheit Control unit Unité de contrôle		
UG6912.kk UG6912.04/vvv	Ausgangsmodul Output module Module de sortie	mit : with : avec :	kk = 02, 04, 14, 28 vvv = 100
UG6913.kk	Eingangsmodul Input module Module d'entré	mit : with : avec :	kk = 08, 12, 16
UG6914.kk/vvv	Ausgangsmodul Relais Output module relay Module de sortie relais	mit : with : avec :	kk = 04 vvv = 000, 008
UG6915/vvv	Ausgangsmodul Signal Output module signal Module de sortie signalisation	mit : with : avec :	vvv = 008, 016
UG6916.10 UG6916.12/080	Ein- / Ausgangsmodul Input / Output module Module d'entrée / - sortie		
UG6917/vvv	Drehzahlüberwachungsmodul Speed monitoring module Module de contrôle de vitesse de rotation	mit : with : avec :	vvv = 002, 102, 112, 202, 222, 302, 332
UG6918	Bus Extender Bus extender Module d'extension bus		
UG6951	Feldbusmodul CANopen Fieldbus module CANopen Module bus de terrain CANopen		
UG6952	Feldbusmodul Profibus DP-V1 Fieldbus module Profibus DP-V1 Module bus de terrain Profibus DP-V1		
UG6953	Feldbusmodul DeviceNet Fieldbus module DeviceNet Module bus de terrain DeviceNet		
UG6954	Feldbusmodul PROFINET Fieldbus module PROFINET Module bus de terrain PROFINET		
UG6955	Feldbusmodul Ethernet-IP Fieldbus module Ethernet-IP Module bus de terrain Ethernet-IP		
UG6956	Feldbusmodul EtherCAT Fieldbus module EtherCAT Module bus de terrain EtherCAT		
UG6957	Feldbusmodul USB Fieldbus module USB Module bus de terrain USB		
UG6958	Feldbusmodul Modbus TCP/IP Fieldbus module Modbus TCP/IP Module bus de terrain Modbus TCP/IP		
UG6959	Feldbusmodul Modbus RTU Fieldbus module Modbus RTU Module bus de terrain Modbus RTU		

NOTICE

NOTICE

NOTICE

DOLD

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