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SIMA Master Station

for
AC.2 / AC.1 / AUMA MATIC
MODBUS RTU and MODBUS Loop

with
MODBUS RTU, MODBUS TCP/IP to DCS

Rev. 5.00 – 02-12

Operation Instructions

Table of Contents

1.   Introduction

Scope of these instructions

These instructions are valid for SIMA Master Stations based on Compact PCI technology with Actuator Software SimaSoft, version 1.06 to **2.10** (current version).

Please note that from ver. 2.00 on SIMA distinguishes for some field busses between **protocol 1** and **protocol 2** in the communication to DCS. This regards the maximum number of actuators, 127 (protocol 1) and 247 (protocol 2). The used protocol is selected in SIMA.INI, see clause 1.1, p.30. If there are no advices about protocols in this chapter, the used field bus to DCS does not have this restriction.

New actuator type AC.2:
If not explicitly differentiated, does the term AUMATIC refer to both control variants: **AC.1** and **AC.2**

Outline of the product
The actuator control system SIMA enables easy integration of AUMA actuators into various host system solutions. System integrators do not have to take care of the field bus communication to the actuators distributed in the field, this is done by SIMA.

SIMA has a modular design based on industrial personal computer technology. SIMA offers various interfaces to communicate with its environment.
- It may function as black box to collect all information from AUMA actuators distributed in the field and to place these information in a concentrated form at the disposal of a high-level-control systems.
- Furthermore, SIMA can operate as standalone master providing higher-ranking functionality to control AUMA actuators in the field.
A combination of both working as the client of a DCS and autonomously is also possible.

Since there are various fieldbus systems supported a system integrator can select the most suitable way of communication and integration.

About SIMA operation instructions
For each combination of fieldbus to host and field, ie. actuators, a separate operation instruction is available. There is also a separate instruction for customer specific implementations.
Regardless of which configuration will be delivered, every manual describes our complete well coordinated redundancy concept (see 4.2, p. 9 or 6.1, p. 12).
Note: Differences or restriction regarding the various configurations are indicated by remarks or footnotes. Chapter 7, SIMA Interfaces, however considers the SIMA station delivered and referred to and therefore changes according, eg. the ordered fieldbus configuration.

Remarks on Text Formatting

In the following certain notations are used to help you to comprehend the meaning of the text fast and easily:

SMALL CAPITALS	Menus, dialog windows and commands or labels and identifiers of the SimaSoft, eg. SIMA/COMMUNICATION SETTINGS, or ACTUATOR COMMUNICATION
Bold type	Important key words, terms or how to use the SIMA, eg. **Restart**
CAPITAL LETTERS	Directories or file names, eg. C:\WINNT or SIMA.INI
`Type letters`	All user inputs like the SIMA password `sima`. Also messages from the operation system
Pictographs	Safety relevant pictographs see below, clause 2

1.1.   Scope of Supply

General

- This User Manual is delivered with each SIMA Master Station or pair of Master and Stand-by Station with **Windows XP embedded** single user OEM license (CF-Card)

- Single user licence of **SimaSoft** (subdirectory of encl. CF-Card)

- Connection equipment depending of the applied fieldbus (connection plug, external bus termination module)

- For SIMA Master Station with integral touch screen: Touch screen user manual
Remark: Peripheral devices (monitor, keyboard or mouse) are not within the scope of supply.

Project specific

- The SIMA System is **scaled** (see also clause 4, p. 8)

  from
  one SIMA basic version without touch screen and one single bus line to the field devices and to the host system, resp.

  up to
  two SIMAs touch screen version (Master and Stand-by) in Hot-Stand-by with full redundancy, ie. two separate bus lines or a bus loop to the field and also two bus lines to the host system.

- SIMA **wiring diagram** corresponding to delivered configuration
(See a representative set of wiring diagrams under Appendix C)

- Furthermore does Auma provide special software and hardware configurations exaclty customized to the needs of the project related.

The finally delivered scope of supply concerning the SIMA Master Stations in your project is specified in the documents form the Auma Sales department.

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2.   Safety Instructions

2.1.   *Range of application*

SIMA is designed to communicate with AUMA actuators equipped with fieldbus interfaces.
For other applications please contact us. AUMA is not liable for any possible damage resulting from use in other than the designated applications. Such risk lies entirely with the user.

Observance of these operation instructions is considered as part of the SIMA's designated use.

2.2.   *Commissioning (electrical connection)*

During electrical operation certain parts inevitably carry lethal voltages.
Be sure to use a power outlet or connector equipped with a PE (protective earth) terminal.
Work on the electrical system or equipment must only be carried out by a skilled electrician himself or by specially instructed personnel under the control and supervision of such an electrician and in accordance with the applicable electrical engineering rules.

2.3.   *Maintenance*

The maintenance instructions (see clause 10, p. 49) must be observed, otherwise a safe operation of the SIMA is no longer guaranteed.

2.4.   *Warnings and notes (pictograph information)*

In this manual, pictographs are used to designate important information or that caution should be taken, whose definition are as follows:

Indicates an **important Note** which marks activities or procedures which have major influence on the consequential damage.

Indicates a **Warning** of a potentially or even imminently hazardous situation, which, if not avoided, will affect the safety of persons or material.

Non-observance of the warnings and notes may lead to serious injuries or damage. Qualified personnel must be thoroughly familiar with all warnings and notes in these operation instructions. Correct transport, proper storage, mounting and installation, as well as careful commissioning are essential to ensure a trouble-free and safe operation.

3.   Transport and Storage

**ATTENTION   You received a sensitive electronic device, which has to be handled with the
                necessary carefulness.**

- Transport to place of installation in sturdy packing.

- Store in well-ventilated, dry room

- Protect against floor dampness by storage on a shelf or on a wooden pallet.

- Cover to protect against dust and dirt.

- Store all the accessories adequately.

<u>**Recommendation:**</u>

Keep the original packing in which you have received the SIMA at least until commissioning or better
until warranty period of two years is over.

4.   SIMA System Configuration

4.1.   Standard Configuration – System Chart

A standard setup consists of the host system, eg. a DCS, of at least one SIMA Master Station and the actuators (or other field devices), each connected by a **standardized** fieldbus.
SIMA itself is based on standard industrial PC hardware equipped with all necessary fieldbus interfaces according to the required environmental conditions.
The **SIMA basic version** will be operated by means of peripheral devices (monitor, keyboard, or mouse)
The **SIMA touch screen version** displays the HMI (actuator overview, actuator faceplates, settings etc.) on the integral screen and can be operated by it (touch sensitive). More details s. below.

System charts for two example SIMA configurations:

Minimal configuration	*Full redundancy in Hot-Stand-by*
SIMA basic version with a single bus version to field (chA) and Host (DCSA)	SIMA touch screen version with to bus lines to field (chA, B) and host (DCS A,B) synchronized to a Stand-by-SIMA
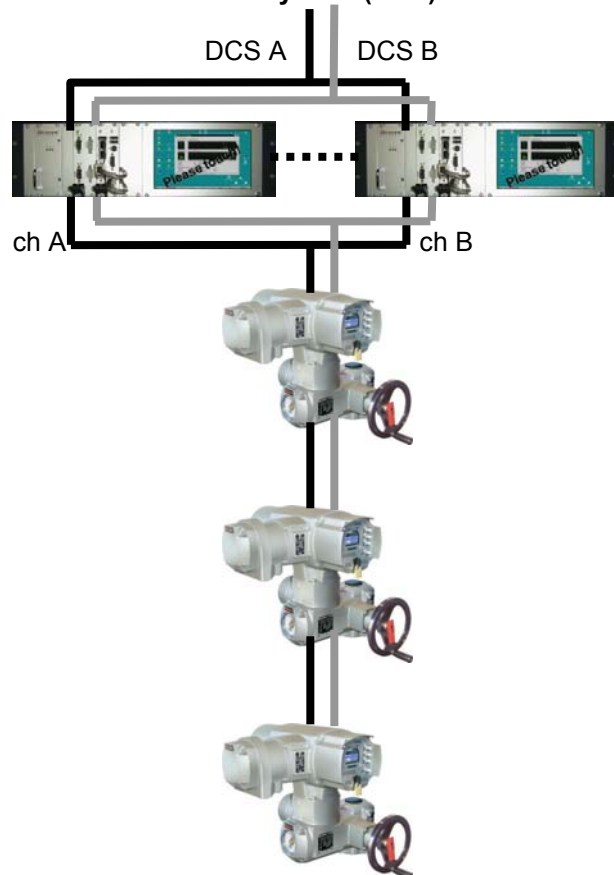
SIMA collects all necessary information from the actuators by using a standardized fieldbus protocol such as Modbus or Profibus DP and makes this information available to the host system in a concentrated form. In addition, SIMA operates and controls the whole fieldbus communication to the actuators.
In case the host system is not yet available or not necessary at all it is possible to operate all connected AUMA actuators with SIMA for test purposes or to bridge the time until the host system is ready for operation.
Moreover this **stand-alone** operation (without a DCS, or others) is an outstanding feature of SIMA, particularly useful for projects at medium complexity.

4.2.   SIMA Options

SIMA offers various options to adapt to the requirements of the plant system. The standard setup described above shows the **SIMA basic version**: Small housing, one fieldbus line to actuators (field) and DCS (host), standard SIMAsoft. The necessary peripheral devices (monitor, keyboard), eg. For commissioning, are not within the scope of supply. This additional peripheral equipment is also useful when setting up a **SIMA touch screen version**.

This SIMA, whether in basic or in touch screen version, can be upgraded or expanded by various **options**:
- redundant field wiring (see clause 7.1, p.26)
  two separate lines (for the two channels A and B)
- a redundant interface towards the host system by separate PCB
  (see clause 1.1, p. 30)   and even …
- second, separate SIMA Master Station; **"Hot Stand-by"**
  (see clause 7.2, p. 28)

Additional hardware configuration and/or software solutions finally make a **customized system**:
- interface cards (eg. IOs) for additional functions with the integration in (SIMA-) software
- special interfaces to the host:
  - customer specific functionality via the standard protocols
  - other communication platform and/or protocol (Ethernet, RS232…)

4.3.   SIMA HMI

There is no need to permanently provide monitor and keyboard for a SIMA, because under normal operation conditions the systems automatically takes care of the fieldbus communication to the actuators, collects all the field information and makes these data available for the host system (DCS). The host system again issues via SIMA control information for the actuators. So there is no need to have an additional HMI-interface connected to SIMA.
As mentioned above this HMI may be very useful during commissioning, parameterizing or monitoring

4.4.   Description of the SIMA Master Station

4.4.1.   Front View with Touchscreen Housing[*]
(Example configuration: redundant RS485/Modbus to Host and Field)

Celeron-CPU

COM 3/ COM 4
RS485-interfaces
to actuators (field)

COM 5/ COM 6
RS485-interfaces
to host

External display
(instead of touchscreen)

COM 1
Interface for SIMA-SIMA
communication

Touch Sreen

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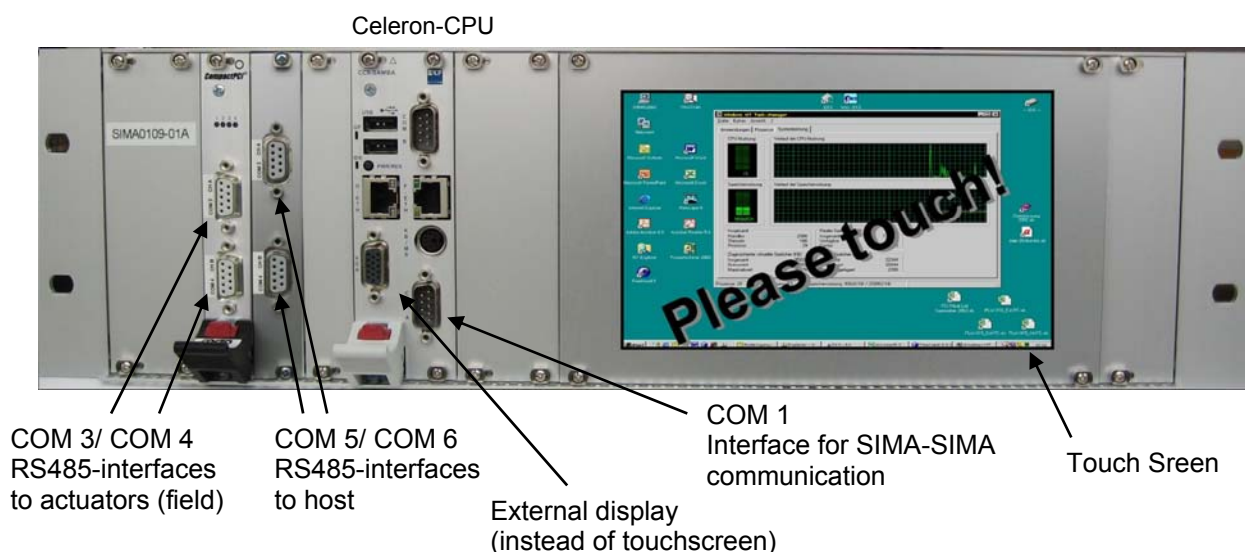
[*] The front view of SIMA Master Station in basic version without touch screen see Appendix

4.4.2.   Rear View

Rear panel with power supply plug and type plates.
Remark: On request there are different designs available, eg. with the power supply plug (and the type plates) on one of the side panels.

4.4.3.   SIMA Start Screen

After booting the IPC and loading the operation system the standard SimaSoft screen with the full sized **ACTUATOR OVERVIEW** window is displayed (see clause 6.2, SIMA status window, p.12). This is so in both the touch screen version and the basic version configuration with standard PC components (monitor, keyboard).

4.4.4.   Calibration of Touch Screen (only Touch version)

On delivery the SIMA integral touch screen is optimal adjusted. If necessary the touch sensitive display can be adjusted again. For this please follow the SIMA supplement instruction "Calibration integral Touch Screen". You find this PDF-document and the corresponding calibration utility (exe file) either in the windows menu (of SIMA computer) START → PROGRAMS →TOUCHKIT or in the windows directory C:\SIMASOFT\TOUCHKIT.

4.5.   Data Communication to host (DCS)

This refers to the data exchange between the Host and the SIMA Master Station (Stand-by Station, resp.)

4.5.1.   Communication data – actuators

Process data to actuators (Output command signals)	- OPEN - CLOSE - Setpoint value
Process data from actuator (General indications)	- Running CLOSE - Running OPEN - Setpoint reached - CLOSED position - OPEN position - TSC (DSR); Torque fault in direction CLOSE - TSO (DOEL); Torque fault in direction OPEN - LSC (WSR); Limit switch in direction CLOSE - LSO (WOEL); Limit switch in direction OPEN - Selector switch in REMOTE - Selector switch in LOCAL - Position feedback of actuator (0-1000 per mil)
Process data from actuator (Fault indications)	- Fault indication - Warning indication - Not ready indication (only with AUMATIC actuator controls) - Loss of phase - Thermal fault

4.5.2.   Communication data – SIMA

Process data to SIMA (Output command signals)	- No. of slaves - High station address - Force scan - Registers for simulation purposes
Process data from SIMA (General indications)	- Live list of MASTER and STAND-BY SIMA channel A and B - Feedback of communication status

5.   Electrical Connection

Work on the electrical system or equipment must only be carried out by a skilled electrician himself or by specially instructed personnel under the control and supervision of such an electrician and in accordance with the applicable electrical engineering rules.

5.1.1.   Connection of SIMA

SIMA can be supplied with different voltages. Before inserting the power supply plug ensure that the mains switch is in position OFF and verify that the existing power supply on site is equivalent to the power supply of the SIMA Master Station.

Insert all required plugs according to the connectors diagram (clause 12.4, p. 58).
It is recommended that the shielding of all interface cables is properly connected to the ground potential in the control cabinet (use shielding clamps).

5.1.2.   Connection of actuator / controls

Perform the connection of the actuator / controls according to the **operation instructions** enclosed with the delivered AUMA actuator.

For more details, observe the complete operation instructions of AUMA actuator controls, see

5.1.3.   Connection of additional field devices

As SIMA is based on standard fieldbus communications, other field devices may be integrated in the scope of control **on request**.

If repeaters are used, be sure to take care of the power supply, as a loss of this energy supply will lead to a complete failure of the repeater and therefore to a loss of communication to all succeeding actuators.

6.   User Interface

6.1.   Languages of User Interface

SIMAsoft is available in the languages English, German and Spanish. For each version there is an own setup (no change of language while running!). The language of the installed WindowXP operation system normally corresponds with that of the SIMAsoft (as specified at ordering).

For the following be sure, that the commissioned devices are connected to SIMA.

6.2.   SIMA status window

After booting the system the SimaSoft starts with the main window ACTUATOR OVERVIEW which displays status information about all identified actuators. With the buttons shown at the bottom of the screen the displayed range of actuators may be selected. The range is defined by the ID (eg. Modbus or Profibus DP address) of the actuators. Each view contains a maximum of 17 actuators.

ACTUATOR OVERVIEW for Cable Redundancy:
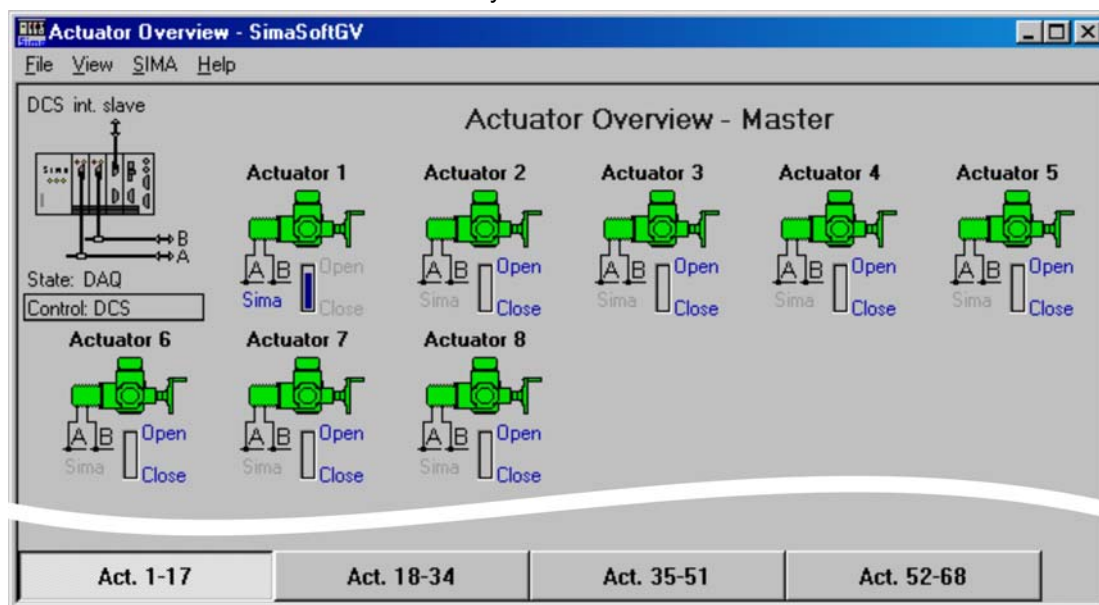
Global DCS/SIMA switch

The source of control for the actuators is either the DCS or the SIMA itself. This is indicated like this in ACTUATOR OVERVIEW:

- Global parameter "Control" below the SIMA symbol(s):
  - DCS* = Control via remote control system
    * or "SCADA, depending on project
  - SIMA = Control local control by SIMA

- For both, control by DCS and by SIMA, parameter "State" shows the status of SIMA and fieldbus. Values are: init, get master state, idle, listen, scan init, scan AB, scan CD (Master redundancy), stop, check master state, init DAQ, **DAQ** (cyclic data exchange OK), wait AT (during auto configuration), wait ready. Parameter "DCS" above shows communication state to DCS, Values here: init, idle, int. slave, ext. slave, init int. slave, init ext. slave, wait ready.

- Individual setting directly below the symbol for each single actuator:
  - "SIMA", in grey – valid for this actuator is the global setting (see above)
  - "SIMA", in blue type: this actuator has been "uncoupled" of the system. Control only via SIMA

This parameter is set in Window ACTUATOR: (see clause 6.4, p. 17)
How switching between DCS and SIMA mode works

Attention: If for an actuator x the individually set source of control is "SIMA", the SIMA takes over control of this actuator x, regardless the global setting.

⇒ By this concept it is, e.g., possible to uncouple a single actuator from the system.

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General All actuators with the individual setting "DCS" can be switched in one step between control via "DCS" or "SIMA" by click on the SIMA icon. A short dialog "Change Global Control" is displayed. Default setting after system boot is "DCS".
This settings will be applied both for the Master Station and the Stand-by Station.

ACTUATOR OVERVIEW for Loop Redundancy *(Not available for Profibus DP to the field devices!)*:
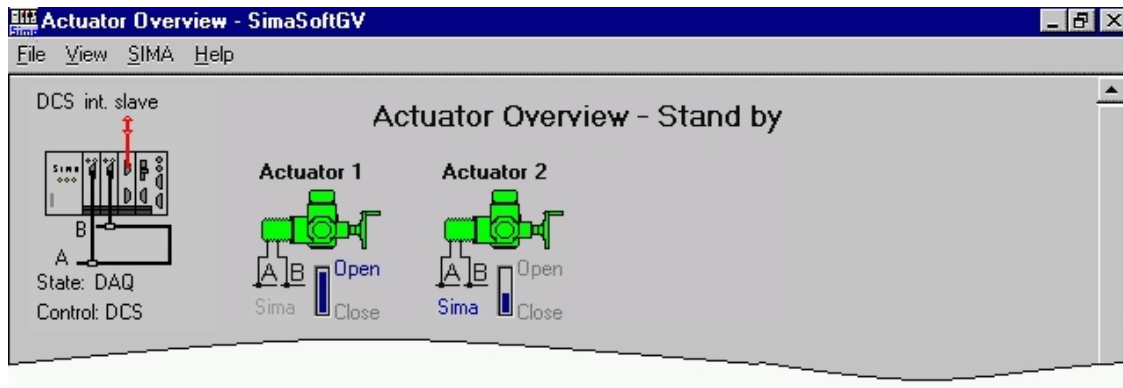
Interpretation of the symbols:

 Green actuator bitmap: actuator ready for remote operation over fieldbus
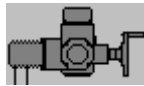
 Grey actuator bitmap: actuator not ready for remote operation over fieldbus (selector switch not remote or external control over hardwired signals or emergency operation active)

 Red cross, grey actuator bitmap: actuator has *no communication* with SIMA Master Station
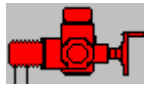
 Red actuator bitmap: actuator has a failure and is *not ready* (torque fault, phase failure, thermal fault etc.)

 Line symbols: actuator communication via channel A/B
black: communication with actuator(s)

 red: no communication with any actuator

 for Loop Redundancy:
black: loop-communication with actuators via both channels A and B

 red with break: cable break or short circuit between the indicated actuator positions in loop

Master Redundancy (Hot-Standby) for cable redundancy

The Fig. shows the display off the STAND-BY SIMA:
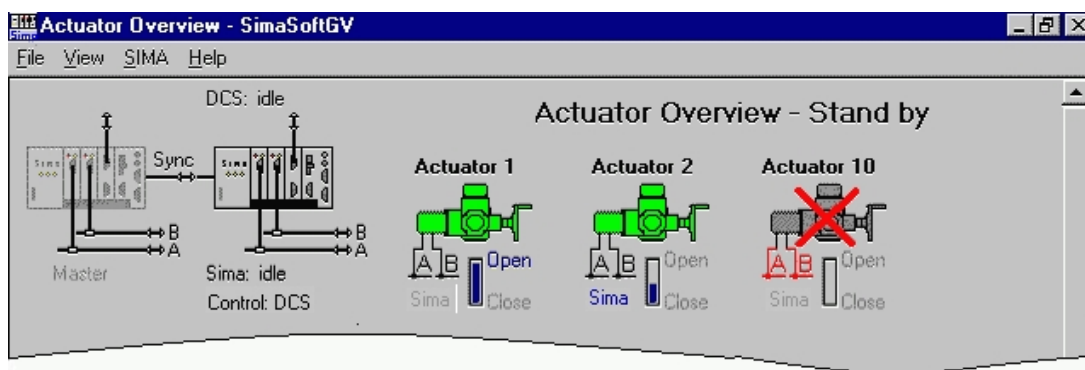
In Master redundancy configuration the ACTUATOR OVERVIEW window shows two SIMA symbols, above left the MASTER SIMA, right aside the STAND-BY SIMA. The figure above illustrates Master redundancy with each SIMA running without failure and synchronised.

Scenario for typical MASTER-SIMA failures:

•	Communication to field broken	line A (of Master) red. Master holds control via STAND-BY SIMA
•	Communication to field **and** host broken	line A red. Master holds control via STAND-BY SIMA
•	Communication to field, host **and** Sync broken, ie. MASTER-SIMA fails completely	STAND-BY SIMA takes over control without interrupt As the Master is down, display an operation will performed via the Stand-by system.

The SIMA comes with additional interfaces for commissioning purposes (see clauses 1.1):
• COM 1 SUB-D9 male connection for additional RS232 interface (with touch screen: this port is used for touch screen communication)
• PS2 connection for keyboard / mouse
• 3 x USB 2.0 ports for universal serial communication purposes
• 2x 100 Mbit/s - Ethernet connection for communication via crossover patch cable

The SIMA system is delivered pre-configured; therefore there is no need to set up the system during the commissioning stage.

The following settings can be changed using the host communication interface:
• No. of slaves (see clause 7.3.5.2, p. 34)
• Highest station address (see clause 7.3.5.4, p. 35)

6.3.   Touch Screen Input

The SIMA with touch screen can be operated without additional keyboard or mouse. Wherever text or number inputs are requested, a dialog window is displayed. The dialog window gets active with a double click on the input box.
The following dialog window will be opened if an input box for alphanumeric values (ie. actuator tags) is double clicked:

For the input of numeric values a numeric dialog box will be shown:
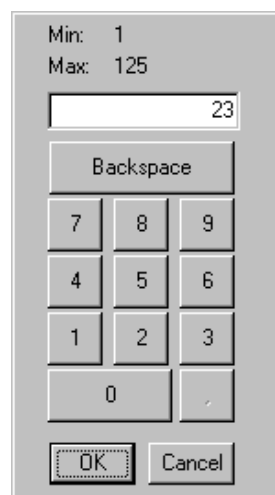
The allowed numeric range (minimum and maximum value, ie. for highest station address, timeout values, …) is displayed as an additional information

6.4.   SIMA Login Dialog

After start of SimaSoft only monitoring of SIMA and actuator status is possible. To enable further actions such as operating actuators or changing SIMA settings, a login is necessary.
The login menu is displayed in the menu command FILE/LOGIN. The default password for all operations is `sima`. Please change this password when first using the SimaSoft.
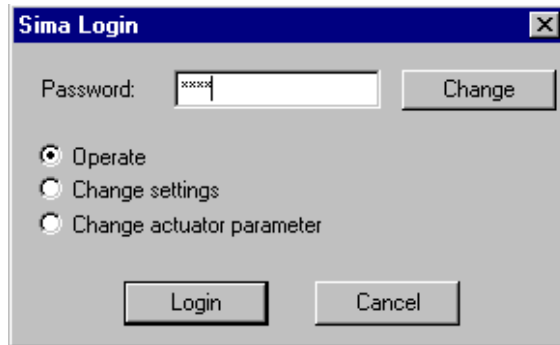
Password levels:

Password	Entitles the user …
OPERATE	to control the actuators by sending commands and setpoint.
CHANGE SETTINGS	to control the actuators by sending commands and setpoint and to change the SIMA settings
CHANGE ACTUATOR PARAMETERS	- for future use -

Using the CHANGE button any password may be altered:

Note carefully any password changes – there are no "super passwords" available to outplay a forgotten password !

6.5. Actuator faceplate

When selecting an actuator its faceplate is displayed:

The displayed information in the window title depends on:

	act. tag Y/N	content of window title	example
"non" loop redundancy	without	"Actuator address no"	"Actuator 47"
	with	"<act. Tag> - Actuator address no.	"MOV123/3A – Actuator 47"
loop redundancy	without	"Actuator pos. in loop (address no.)"	"Actuator 45 (Addr.47)"
	with	"<act. Tag> - Actuator pos. in loop (address no.)"	"MOV123/3A – Actuator 45 (Addr.47)"

The parameter group **CURRENT STATE** shows the input information from the actuator:

CLOSE / OPEN   At the top of CURRENT STATE the actual position is displayed as a bar graph and in per cent of total travel

POSITION   Display whether the actuator is in an endposition (open position / close position) or has reached its setpoint

TORQUE SW   Display the torque switch

LIMIT SW   Display the limit switch

SELECTOR SW   Display the position of the selector switch of the local control unit (Local / Off / Remote)

"Message window"   in this window a more detailed actuator status information is displayed

   Check box (×)   indicates active messages of the type besides

   FAULT(S)   Fault messages of the actuator, like torque or temperature error
   NOT READY   The actuator cannot be operated by the SIMA: Selector not remote, actuator locked, wrong commands, etc.

   WARNING(S)   Warnings signals: signal break, travelling time error, etc.

For more details about messages see operation instructions, Appendix F.

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CONTROL: (see also above, clause 6.1)

DCS (DEFAULT)	Source of control for the actuator is the DCS. Control via SIMA is not possible. SIMA continues to receives status and monitoring information
SIMA	Source of control for the actuator is the SIMA. Control via DCS is not possible. The DCS continues to receives status and monitoring information

NEW POSITION:

The function of the "local control" is provided here. To use "New Position" the control over this actuator has to be "Sima" (see above) and the actuator itself has to be "Remote ready"

CLOSE, SET POINT, OPEN and the SETPOINT slider…	Commands are only allowed with a correct login (see clause 6.4, p. 16). Click on one of the buttons CLOSE, SET POINT, OPEN leads to the accordingly action. By moving the slider to a definite position and click on SETPOINT the actuator travels to this position.
RESET[1]	This command regards faults that could be **reset**, eg. reset of torque faults or motor temperature faults (explosion proof only).

ANALOG/DIGITAL INPUTS:

With the button INPUTS -> a separate area showing the analog or digital inputs will be display below.
Button INPUTS <- scales down the actuator window again.

ANALOG 1, ANALOG 2	The actual implementation supports 2 analog inputs, e.g. from the actuator or a separate source. The values given are the *percentage of the standard settings* 4..20mA or 0..20mA resp. E.g. means 50% 12mA or 10mA of analog signal 'Threshold': Changing analog inputs are only updated, e.i. transmitted to DCS if the absolute difference is *equal or greater 0,3%** ** avoiding permanently high data transfer*

4 sets of digital inputs:	The actual implementation supports 4 digital inputs, e.g. from the actuator or separate sources. For AC and AM actuator controls the signal level is +24VDC. Indication by signal lamps: green = logical '1'
	                          grey = logical '0'
	 Settings for **AC.1**:
	 Which of the for sets below is the active one, is defined in AC.1, AM menu: **Main Menu (M)**
	    → **Configuration (M4)**
	        → **Setup (M41)**
	            → **External Inputs Bus (M410G)**

Set				
0: STANDARD	DIGITALIN 1	DIGITALIN 2	DIGITALIN 3	DIGITALIN 4
1:OPEN-CLOSE-CONTROL	MODE	CLOSE	OPEN	BUS/REMOTE
2: OPEN-CLOSE-ESD	EMERGENCY	CLOSE	OPEN	BUS/REMOTE
3: OPEN-CLOSE-STOP	STOP	CLOSE	OPEN	BUS/REMOTE

EXIT	Closes the actuator window and returns to main screen

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[1] not with AUMA MATIC

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6.6.   SIMA settings window

Within the menu item SIMA/SIMA SETTINGS information for the SIMA referring to the type and number of connected actuators may be displayed and changed.
This is the corresponding window:

HIGHEST STATION ADDRESS	(abbr. HSA) SIMA scans from address 1 up to HSA for actuators
NUMBER OF ACTUATORS	The number of actuators in the live list has to match the NUMBER OF ACTUATORS
MASTER STATE	For master redundancy only select MASTER or STAND BY
ACTUATOR TYPE	AC.1, AC.2, AM.1

ACT. REDUNDANCY TYPE (if applicable)	NO REDUNDANCY	If there is only one line to actuators
	In case of **one** fieldbus board and two lines to actuators:	
	CABLE REDUNDANCY TX1	Setting for redundant Profibus DP network with AUMA MATIC
	CABLE REDUNDANCY TX2	Setting for redundant Modbus RTU network with AC.1 and AUMA MATIC having a single Modbus RTU interface board installed
	FULL REDUNDANCY	Setting for redundant Profibus DP or Modbus RTU network with AUMATIC having two separate Profibus DP or Modbus RTU interface boards installed
	LOOP REDUNDANCY	if there is a closed loop from the SIMA over all actuators and back to the SIMA again. Only for AC.1 and AC.2 (auto-configuration)

PASSIVE CHANNEL	Applicable only for Auma Matic an Profibus DP: With TEST PASSIVE CHANNEL you can switch on/off the cyclic observation of the second channel (**passive actuator bus**).

By changing the settings, the file SIMA.INI will be modified, too.

Please *restart* the SimaSoft to activate the modifications.

6.7.   Communication settings

The menu item SIMA\COMMUNICATION SETTINGS is used for customizing the communication interfaces:

- ACTUATOR COMMUNICATION to the actuators
- SYNC COMMUNICATION to a second SIMA master station (applies only, when master redundancy is available)
- DCS COMMUNICATION to a higher level DCS system.

As an example see below the corresponding window for redundant Modbus RTU to actuators (1) and redundant Modbus RTU or Modbus/TCP to host (3) and SIMA Master redundancy (2):

1	Modbus – Ch A enabled, Ch B enabled
	Maximum baud rates, AC.1: 38.4 kBits/s
	AC.2: 115.2 kBits/s
2	Synchronisation between Master Station and Stand-By SIMA
3	Modbus communication to DCS
	DCS Communication: selection of communication protocol (Modbus RTU (RS-485) or Modbus TCP/IP)
	DCS Serial Communication: settings for Modbus RTU (RS-485), example Ch A enabled, Ch B enabled

By changing the settings, the file SIMA.INI will be changed, too.

Please *restart* the SimaSoft to activate these modifications.

6.8.   View Settings

The menu item SIMA/VIEW SETTING allows to customize the status window of SIMA.

This is the corresponding window:
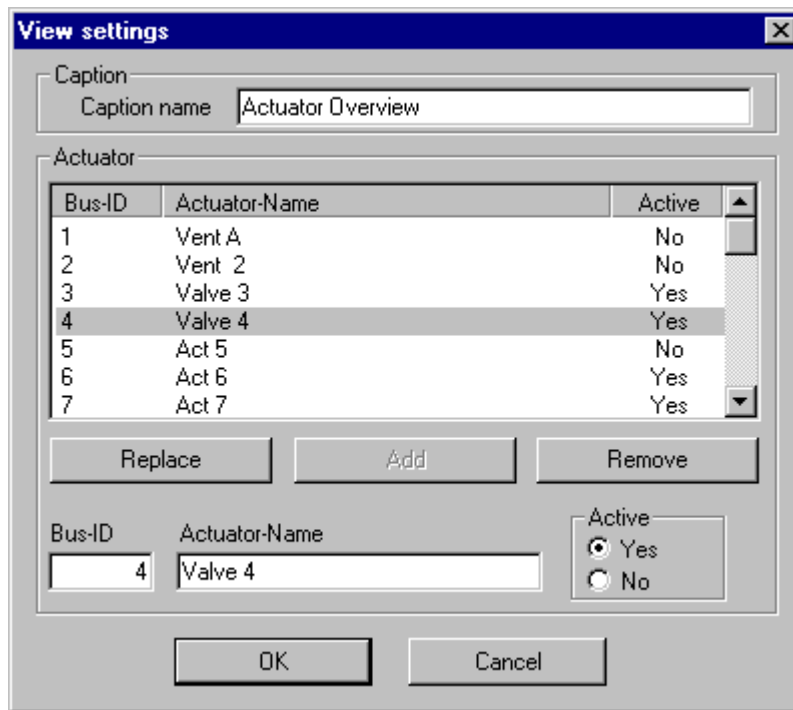
CAPTION NAME	Text on the top of the status window. (Default value: ACTUATOR OVERVIEW)
ACTUATOR-NAME	Text of the actuator pictograms (Default value: Actuator*<xx>*" with *<xx>* = bus address) After modifications press REPLACE button.
BUS-ID	Fieldbus, eg Modbus or Profibus, slave address of the actuator
ACTIVE	YES, the actuator is always shown in the status window. NO, the actuator is only shown if SIMA detects the actuator during a scan
REPLACE	The settings of the actuator will be replaced with the items Bus-ID, Actuator-Name, Active settings below.
ADD	The settings of the actuator will be added with the items Bus-ID, Actuator-Name, Active settings below.
REMOVE	The settings of the selected actuator will be removed.

By changing the settings, the file SIMA.INI will be changed, too.

Please **restart** the SimaSoft to activate the modifications.

6.9.   Transfer of SIMA.INI file

This new function (from SIMAsoft version 2.02 on) simplifies to set-up and commission a system of two SIMAs in master redundancy ("Hot-standby").

The command TRANSFER SETTINGS in the menu SIMA will copy the configuration file SIMA.INI to the other SIMA master station. I.e. if the command is started from the Master station, it will copy its SIMA.INI file to the standby station and vice versa.

This menu item TRANSFER SETTINGS is activated (otherwise it is still visible but grayed-out) if SIMAsoft is running on both SIMA-IPCs, the user is logged in with the authorisation CHANGE SETTINGS (or higher) and the sync-communication (serial cable) between the two stations is working.

After the command is executed and file transfer is finished, a message box is displayed on the other SIMA master station informing the user that there is a new SIMA.INI file on the system which has to be initialized by a restart of the SIMAsoft (on the SIMA to which the file was copied).

This is the corresponding window:
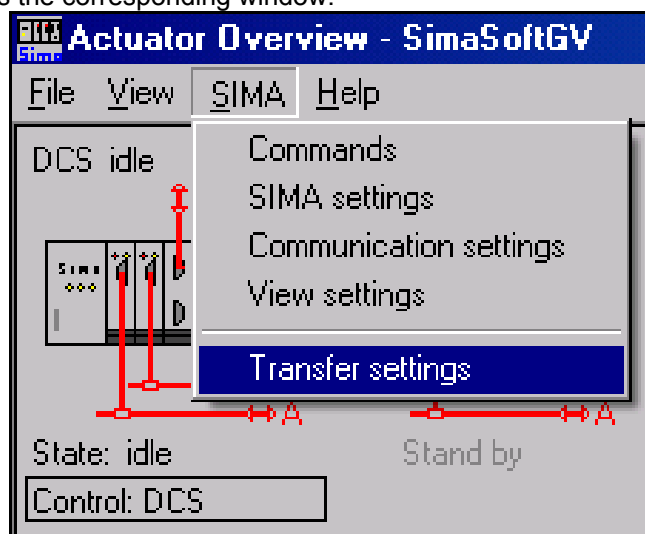
6.10.   SIMA commands

The menu SIMA/SIMA COMMANDS is used to enter specific commands to the SIMA program.
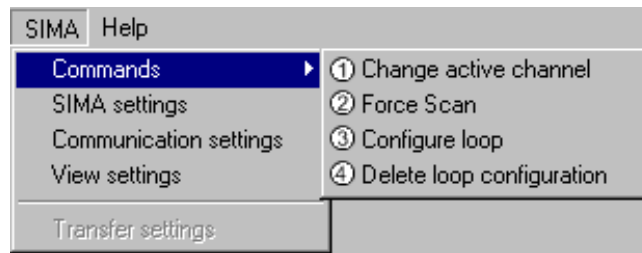
CHANGE ACTIVE CHANNEL

ACTUATOR CH A ACTIVE   When SET ACTIVE the SIMA is
                                         forced to switch to channel **A**

ACTUATOR CH B ACTIVE   When SET ACTIVE the SIMA is
                                         forced to switch to channel **B**
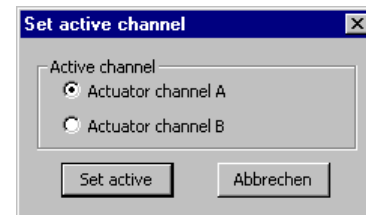
② FORCE SCAN

FORCE SCAN   This SIMA-command scans for actuators within an address range
                                         from "1" up to the highest station address
                                         As this command will probably execute changes in bus configuration, there is a
                                         confirmation dialog:
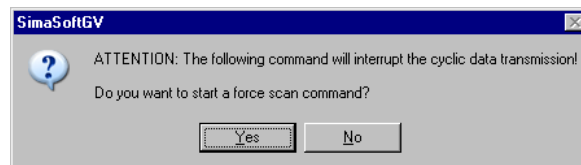
**During a "Force scan" cyclic protocol (data acquisition) is suspended!
Use "Force scan" only when new actuators are added to or removed from a
running system.**

"Force Scan" updates in a message to DSC the "Found actuators Master SIMA ch A/B".

③ CONFIGURE LOOP

Only for actuator type **AC.2!** Necessary pre-settings at the AC.2-units:

- All communication channels connected
- Power supplied to all actuators
- channel A ready for operation and connected
- actuator set to (reserved) address "247"
- baud rate set to "Auto"

The automatic loop configuration is started by the command CONFIGURE LOOP. The command has to
be confirmed by this dialog:
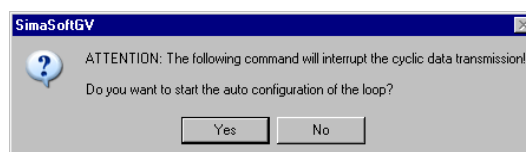
The SIMA then automatically communicates with all connected and switched-on actuators with the
baud rate defined in the Communication Settings, chapter 6.7

The following dialog indicates the process of the auto configuration
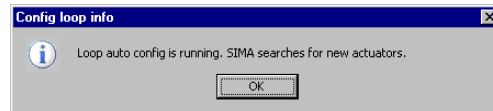
After auto configuration is finished, the number of found actuators is displayed:
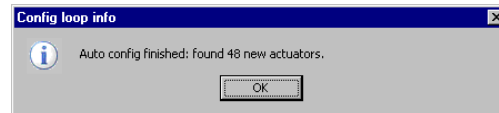
This auto-configuration necessarily assigns free bus-addresses as they follow. This means that the finally order of the addresses does not correspond with the physically order in the ring of the actuators themselves.

④ DELETE LOOP CONFIGURATION

Removes the existing configuration of the loop.

By confirming the dialog:
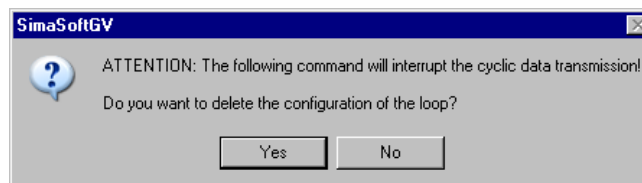
the bus addresses for the actuators will be set back to "247", the baud rates back to "Auto".

Following these two messages:
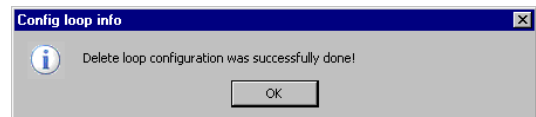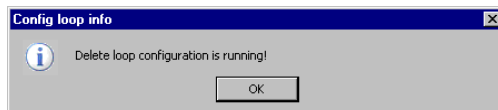
Deleting and *re*-**auto-configuring** the loop structure may be typically necessary after installing a new actuator (or: extending the ring by several new actuators).

After DELETE LOOP CONFIGURATION **no actuators of the ring will be detected by the SIMA. The ring needs to be configured new by** CONFIGURE LOOP.

6.11. Windows XP Remote desktop Observing with standard laptop or PC

By using the Remote Desktop Server of SIMA-Windows an Ethernet connection between laptop/PC (→ remote computer) and SIMA (→ server) for remote commissioning or observing is available.

While in operation, the SIMA screen is displayed as a window on the remote computers' screen and the input devices of this computer can be used to enter data to SIMA.

Requirements:
* Standard laptop or PC with a free Ethernet port. The port has to be configured with a fixed IP-Address which is different from the SIMA IP-address, eg.
  IP-address: 192.168.1.1
  Subnet mask: 255.255.255.0

* *Crossover* Ethernet cable for direct connection

On the SIMA units the Windows XP Remote Desktop is available as a default. The remote computer has to be equipped with the corresponding software. Either again WindowsXP or the Microsoft Remote Desktop Connection Software, a general client for Windows operation systems.
For software download see 12.6 Appendix F – Literature – References

The SIMA units are configured with a fixed IP-address:

IP-addresses	**192.168.1.2 (ETH-1) and 192.168.1.3 (ETH-2)**
Subnet mask	**255.255.255.0 (both)**

**Address for ETH-1 is remarked on the name plate of the SIMA-IPC.
If this address is changed due to site-specific demands, this entry in must be changed using a permanent marker!**

After invoking remote desktop software on PC, the Remote Desktop Connection window is displayed and IP-address of the connected Ethernet-port of the SIMA-IPC is asked, eg. `"192.168.1.2"`:

After pushing **Connect** windows is starting communication with SIMA showing the SIMA login screen. As described in chapter 6.4, p.16, the user is asked for:

- User: `sima`
- Password: `"sima"`   (default settings)

After a correct handshake SIMA's status screen is automatically displayed on the screen of the remote computer. In addition the keyboard and mouse are used to enter data for the SIMA.

The Remote Desktop Connection of WindowsXP doesn't require any specific display settings.
The Remote-PC adapts to any possible display setting of SIMA-IPC

Operating SIMA Master Stations permanently online to intranet / internet could negatively affect or even break down the SIMA-system

7.   SIMA Interfaces

This chapter comprises the interfaces of SIMA. It gives the complete description as it is required for developing such an interface to a Host System (DCS)

The Modbus fieldbus consists of a MASTER device, e.g. the SIMA, and the SLAVEs. The Modbus specification allows up to 247 slave addresses.

To the field, the SIMA is the master and is designed for **maximal 247** slaves, namely the actuators, with the addresses **1 to 247**. Address **'0'** is used for the broadcast signal.

To the host, the SIMA is in case of Modbus RTU a slave with the alterable **default address 10**. For Modbus TCP any IP address can be chosen.

From SIMAsoft 2.00 on SIMA distinguishes for Modbus RTU/TCP between **protocol 1** and **protocol 2** in the Modbus communication to DCS, see clause 7.3.7.

7.1.   Interface and communication to actuators equipped with Modbus

The interface between the SIMA master station and the AUMA actuators is based on the open, international and standardized Modbus protocol (see clause)
). To increase the safety and availability of the field communication, SIMA uses two redundant Modbus lines as means of communication. Therefore one SIMA has up to two Modbus ports to be used for the field communication. The physical layer of the Modbus communication between SIMA and AUMA actuators is based on the RS485 standard.

> **Mounting instructions for RS485 based fieldbus systems must be observed for the field wiring. This applies to all field equipment used!**

SIMA uses a SUB D9 plug as communication port to its environment. For an easy access to the signal of the field wiring, AUMA provides an external cable harness (see appendix 12.2, p.52). The connection to the actuators is done with a cable having not a plug (fan – out type).

Pin assignment of Modbus cable between SIMA and actuators:

cable end to actuators   cable end to SIMA with plug
                                      (male, fig. show soldering side)

Data + (B,P):   brown

Data – (A, N):   white

Pin 8 = Data -

Pin 3 = Data +
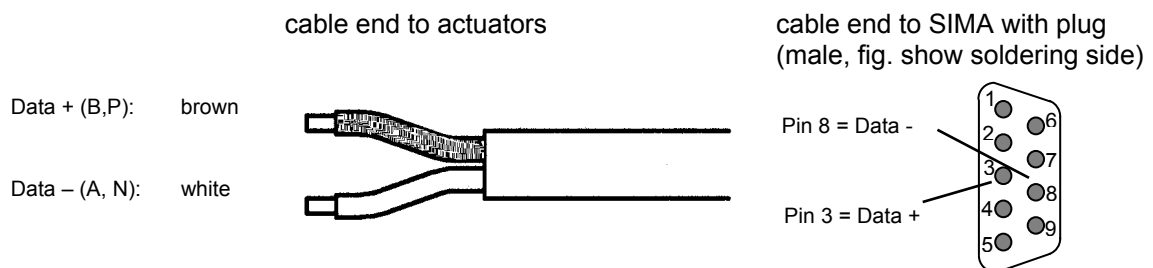
This assignment applies for both communication channels to the actuators.

Either channel A or B is active and the actuators will communicate with SIMA via this line. As soon as there is a problem with the active channel, SIMA will change the channel to maintain the communication to the actuators.

Both channels communicate using the same field bus parameters (such as slave addresses, baud rate, parity and no. of stop bits).
The status of these two channels can be read out of the SIMA (see clause 1.1, p. 30) to inform the higher level host system.

The cycle time to read out all necessary information from each actuator connected depends on the baud rate, on the information required, and on the number of slaves.

Typical cycle times for scanning of the actuator position and the most important status information:

Typical cycle time for Cable Redundancy

No. of Slaves	AC.1, AM			AC.2		
	20	40	60	20	40	60
Baud rate [kBit/s]	Cycle time [ms]			Cycle time [ms]		
9.600	2200	4300	6500	1800	3500	5300
19.200	1100	2300	3400	1100	2300	3400
38.400	650	1300	1900	900	1600	2400
57.600	---	---	---	750	1400	2100
115.200	---	---	---	650	1200	1800

The cycle time is prolonged when output commands are sent to the actuators, however these commands are only sent if the data content has changed.

Typical transmission times for transmission of a output command to one actuator:

Baud rate [kBit/s]	AC.1, AM	AC.2
	Typical output command time [ms] for one actuator	Typical output command time [ms] for one actuator
9.600	115	170
19.200	60	130
38.400	35	100
57.600		90
115.200		80

Default setting of the communication parameters for the fieldbus towards the actuators:

Baud rate: 115.2 kBit/s (AC.1, AM 38,400kBit/s)
Format: 8 data bits, even parity with 1 stop bit

Ensure not to assign Modbus addresses twice and set the baud rate and parity to the above values at all actuators.

7.1.1.   Termination

The cables for the communication between the SIMA and the actuators have to be terminated to avoid signal disturbances. This termination can be realised with external bus termination modules (can be supplied by AUMA).
The external cable harness (see clause 12.2, p. 52) provides a connection for this purpose by offering a cable having not a plug (fan – out type).

Colour assignment of fieldbus cable to the bus termination:

Data + (B, P): brown

Data – (A, N): white
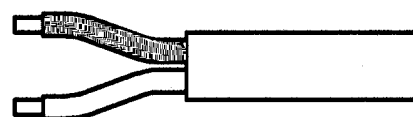
This assignment applies for both communication channels to the bus termination.

7.2.   Internal interface – SIMA Master Station redundancy (optional)

Some applications require a redundant master solution. This will be achieved by using two single SIMA Master Stations. They exchange information about their internal status by means of an internal interface connection.
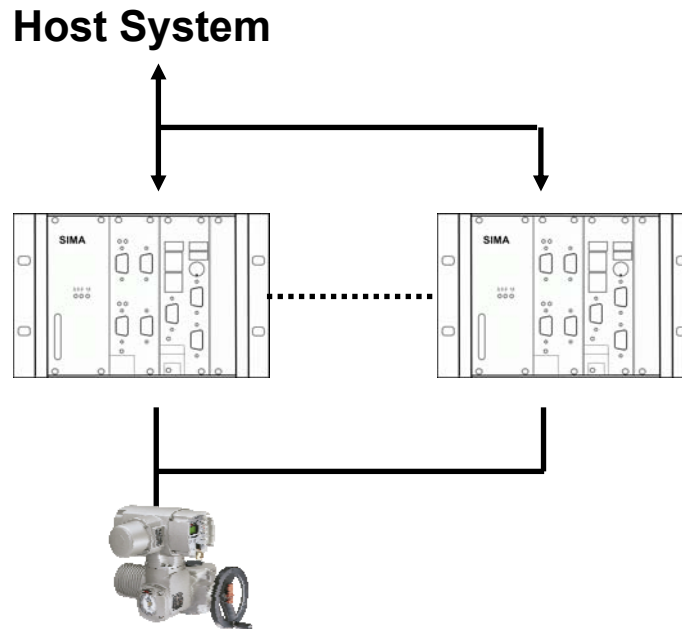
Host System

Both SIMA Master Stations are connected to the same Modbus line towards the actuators and towards the host system. There is always only one SIMA Master Station active; the other one monitors the communication to the actuators and to the host system by means of the internal interface connection.
This internal interface connection is based on a serial RS232 communication.

Pin assignment of SIMA SUB-D9 plug for internal connection:

```
GND
         5
            9
      4
         3    8        RTS
TXD
         2    7        CTS
RXD
            6
      1
```
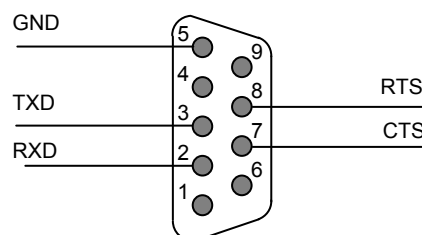
The tags **MASTER SIMA** and **STAND-BY SIMA** distinguish the two SIMA Master Stations.
After switching on, the MASTER SIMA is active, towards the host system as well as towards the actuators. This SIMA will act and respond accordingly to the requests received from the higher-level host system. At the same time the Stand-by SIMA will receive the same request but will neither execute any action nor perform any responses. In this state the STAND-BY SIMA has only a monitoring task.

The STAND-BY SIMA will only become active and will take over the whole functionality of the MASTER SIMA if the MASTER SIMA is not available.

Both SIMA Master Stations have the same Modbus addresses and Modbus parameters (baud rate, parity, stop bit). This makes it very easy to configure a host system for a redundant SIMA Master

Station, because even if the MASTER SIMA is not available the STAND-BY SIMA produces the responses.

The communication parameter for the internal communication is set as follows:

        Baud rate: 115,200kBit/s
        Format: 8 data bits, even parity, 1 stop bit, full duplex.

Both SIMA Master Stations are set to these communication parameters on delivery.

7.3. Interface and communication to Host with Modbus

The communication to the higher-level host system is done with the international standardized Modbus protocol. With this interface SIMA offers a cost effective access to all the desired information from the actuators in the field as well as status information about the SIMA master station itself.

Furthermore SIMA can be equipped with a redundant Modbus interface for communication with the host system. The host system can retrieve information on both channels independently, either by using channel A or channel B.

From SIMAsoft 2.00 on SIMA distinguishes for Modbus between **protocol 1** and **protocol 2** in the communication to DCS. This regards the maximum number of actuators: protocol 1 up to 127 and protocol 2 up to 247. The used protocol is selected in SIMA.INI, section [DCS]:

$$DCS\_protocol = 1 \rightarrow protocol\ 1$$
$$DCS\_protocol = 2 \rightarrow protocol\ 2$$

General remarks above apply for Modbus RTU and Modbus TCP/IP as well
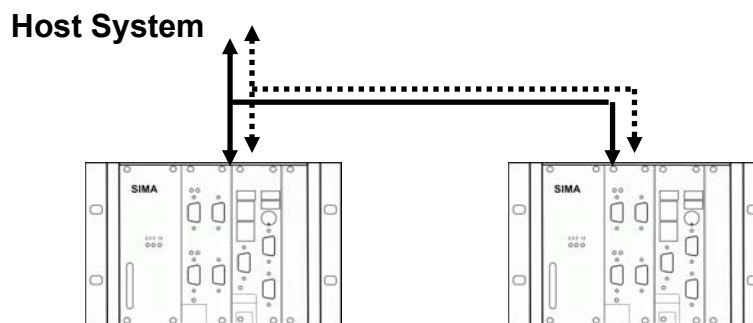
In case of a redundant SIMA master station both lines are connected to both SIMA units enabling the host system to communicate with the actuators via channel A or channel B even if one SIMA is not available.

7.3.1. Modbus RTU / RS485 - connection

SIMA uses a SUB D9 plug as communication port to its environment. Optionally for an easy access to the signal of the host wiring an external cable harness can be supplied. Standard colour assignment of fieldbus cable to the host system:

cable end to DCS   cable end to SIMA with plug
(male, fig. show soldering side)

Data + (B,P):   brown

Pin 8 = Data -

Data – (A, N):   white

Pin 3 = Data +
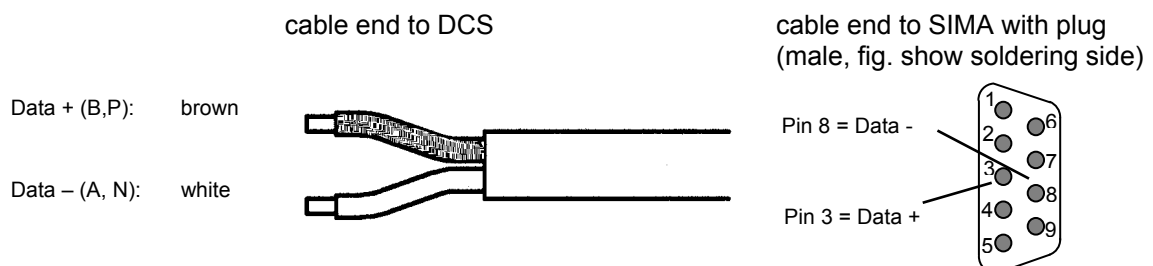
This assignment applies for both communication channels to the host system.

The communication parameter for the Modbus lines towards the host system is preset as follows:

Baud rate:	**57600Bit/s**
Format:	**8 data bits, even parity, 1 stop bit**

**The setting of the baud rate and parity of the host system has to be done according to the above values.
Both SIMA master stations are set to the address 10 on both communication channels.**

7.3.2. Modbus TCP / Ethernet – connection

Pinning: RJ 45 standard

Cable: Type: 2-pair Cat-5
             Max. length: 100m

             directly to DCS or PC ➔ Crossover
             Network, Hub   ➔ Patch cable

Pin No.	Signal Description
1	TX+
2	TX-
3	RX+
4	
5	
6	RX-
7	
8	

The communication parameter for the Modbus lines towards the host system is preset as follows:

Transfer rate: 10/100/1000 MBit/s (automatically selected)

Both via RS485 and via Ethernet a redundant, 2-channel-communication is possible.
Both channels (A or B) can be used for communication with the host system independently. In case of a redundant SIMA master station the STAND-BY SIMA will automatically take over the communication as soon as the MASTER SIMA is not available.
RTU: Both channels communicate with the same fieldbus parameters (such as slave addresses, baud rate, parity and no. of stop bits).
TCP: IP-addresses were detected automatically ➔ Network setting in operating system WinXP emb

7.3.3. Termination

A termination is only necessary for RS485, ie. Modbus RTU. This ensures a stable and reliable idle voltage on the RS 485 lines.
For the communication cables between the SIMA and the host system, this has to be done by external bus terminators (see clause 12.2 Appendix B – Accessories).

7.3.4. Overview of the Modbus communication between SIMA and Host System

SIMA's Modbus interface to the host system is able to control and receive information of up to 247 actuators.
With **SimaSoft version 1.06**, January 2005, the extended Modbus protocol between SIMA and Host is available. This concerns digital and anlog inputs/outputs connected via the actuator controls AUMATIC and AUMA MATIC.

The following Modbus functions are supported for the communication between SIMA and Host:

Function	Function code	Description
Force Single Coil	05	Forces a single coil to either ON or OFF. When broadcast, the function forces the same coil reference in all attached slaves.
Force Multiple Coils	15	Forces each coil in a sequence of coils to either ON or OFF. When broadcast, the function forces the same coil references in all attached slaves.
Read Coil Status	01	Reads the ON/OFF status of discrete outputs in the SIMA. Broadcast is not supported.
Preset Single Register	06	Presets a value into a single holding register. When broadcast, the function presets the same register reference in all attached slaves.
Preset Multiple Registers	16	Presets values into a sequence of holding registers. When broadcast, the function presets the same register references in all attached slaves.
Read Input Registers	04	Reads the binary content of input registers in the SIMA. Broadcast is not supported.

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Read Holding Registers	03	Reads the binary content of holding registers in the SIMA. Broadcast is not supported.
Read Input Status	02	Reads the status of the discrete inputs in the SIMA. Broadcast is not supported.

The following address offsets are valid for the Modbus communication between SIMA and host system

Valid offset addresses (hexadecimal)	Valid offset addresses (decimal)	Valid for function	Remarks
0x0000 - 0x07B7	0 – 1975	Force Single Coil (05) Force Multiple Coils (15) Read Coil Status (01)	Write and read coils to operate the actuators connected to SIMA.
0x0000 – 0x04F5	0 – 1269	Preset Single Register (06) Preset Multiple Registers (16) Read Holding Registers (03)	Write and read holding registers that control the operation of actuators and the SIMA.
0x0000 – 0x0F93	0 – 3987	Read Input Status (02)	Read status of the discrete inputs
protocol 1: 0x0000 – 0x0EB1 **protocol 2**: 0x0000 – 0x0DA5	0 – 3761 0 – 3493	Read Input Register (04)	Read status information of the actuators connected to SIMA and status information of the SIMA itself.

7.3.5.   Output commands to SIMA (access via holding registers)

SimaSoft 1.06 or later: Data set *extended* !

Modbus function	Function code	Offset address	Data content (see descriptions below)
		0	Output command actuator with address 1 part 1
		1	Output command actuator with address 1 part 2
		2	Output command actuator 2 part 1
		3	Output command actuator 2 part 2
		…	…
		252	**Output command actuator 127 part 1**
		253	**Output command actuator 127 part 2**
		…	…
		492	Output command actuator 247 part 1
Preset Single Register	06	493	Output command actuator 247 part 2
Preset Multiple Register	16		
Read Holding Register	03	512	Output command SIMA part 1
		513	Output command SIMA part 2
		514	Output command SIMA part 3
		1024	Output command SIMA simulation mode 1
		1025	Output command SIMA simulation mode 2
		…	…
		…	…
		1269	Output command SIMA simulation mode **246**

> 👉 **SIMA supports up to 247 actuators, all actuator addresses have to be set within 1 – 247.** (Address '0' is reserved for broadcast signal.)

If the slave addresses of the actuators are assigned in an ascending sequence all the actuator information will be placed in a successive order in the Modbus memory of SIMA.
This simplifies the communication between host system and SIMA when using the function "Preset Multiple Registers" and therefore increases the effectiveness of the Modbus telegrams to readout the actuator data.

7.3.5.1.   Description of output command to actuator with address x part 1 and 2

Output command actuator with address x part 1
(first offset address = 0 [for actuator 1])

Bit position	Description
Bit 15	Reserved
Bit 14	Reserved
Bit 13	Reserved
Bit 12	Reserved
Bit 11	RESET[1]
Bit 10	REMOTE SETPOINT
Bit 9	REMOTE CLOSED
Bit 8	REMOTE OPEN
Bit 0 – Bit 7	Reserved

Output command actuator with address x part 2
(first offset address = 1 [for actuator 1])

Bit position	**Description**
Bit 15 – Bit 8, high – byte	Actuator SETPOINT high – byte
Bit 7 – Bit 0, low – byte	Actuator SETPOINT low – byte

---

[1] only with AUMATIC actuators

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Output command actuator with address x part 1 and 2 are holding registers which are used to send operation commands to the designated actuators connected to SIMA.

With the bits 8 – 10 the commands are transmitted to the actuators. Only one of these bits may be set at any given time, otherwise the actuator will respond with the signal "Not ready REMOTE".
With bit 11 certain indications of the actuator (eg. PTC tripping device or torque fault) can be reset.
A change of the data in the output command actuator x part 1 will also change the content of the corresponding coils.

If Remote SETPOINT (remote nominal) is set, the value of the setpoint set with output command actuator part 2 is regarded.
The setpoint has to be transmitted as value between 0 and 1000 per mil.
If this range is exceeded the actuator will respond with the signal "Not ready REMOTE".

7.3.5.2.   Description of output command to SIMA part 1

(offset address = 512)

Bit position	Description
Bit 15 – Bit 8, high – byte	Reserved
Bit 7 – Bit 0, low – byte	No. of slaves

With output command SIMA part 1, the no. of slaves connected has to be defined. This value is stored in a SIMA configuration file.

As soon as more or less slaves are found on the Modbus channels to the actuators the SIMA will show an indication in its status information (see 7.3.7.3, p. 39)

7.3.5.3.   Description of output command SIMA part 2

(offset address = 513)

Bit position	Description
Bit 15	Reserved
Bit 14	Reserved
Bit 13	Reserved
Bit 12	Reserved
Bit 11	Reserved
Bit 10	Reserved
Bit 9	Reserved
Bit 8	Reserved
Bit 7	Reserved
Bit 6	Reserved
Bit 5	Reserved
Bit 4	Reserved
Bit 3	Reserved
Bit 2	Reserved
Bit 1	Reserved
Bit 0	Force scan

As soon as Bit 0, FORCE SCAN is set from "0" to "1", the SIMA creates a new **live list** by scanning for all slave addresses from 1 to HIGHEST STATION ADDRESS (max. 247). All slaves found are then listed in a live list (see clause 7.3.7, p. 37).

Status information about live list:
The number of actuators in this live list has to match the NO. OF ACTUATORS (which is to be set either with output command SIMA part 1 or in SIMA SETTINGS, see clause 6.6, p. 19,). Otherwise the SIMA will indicate this mismatch by setting the bits 10 to 13 of Input Information SIMA part 1 accordingly. Value "0" signals a fault in the live list (see clause 7.3.7.3, p. 39).

In addition to the Bit 0 "Force scan" the SIMA creates a new live list during start-up procedure.

The created live list is used to define the actuators that are scanned for new actuator information.

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7.3.5.4.   Description of output command SIMA part 3

(offset address = 514)

Bit position	Description
Bit 15 – Bit 8, high – byte	Reserved
Bit 7 – Bit 0, low – byte	Highest station address

With output command SIMA part 3, the highest Modbus slave address that is to be found during a FORCE SCAN cycle is defined. The FORCE SCAN cycle can shortened by entering a value which is lower than 247. This value is stored in a SIMA configuration file.

All slaves with a higher Modbus address won't communicate with SIMA.

7.3.5.5.   Description of output command SIMA simulation mode 1 – 246

(first offset address = 1024)

Bit position	Description
Bit 15 – Bit 8, high – byte	DESTINATION address
Bit 7 – Bit 0, low – byte	SOURCE address

Under the condition that at least **one existing** actuator is connected to SIMA, up to **246 further virtual** actuators can be simulated.
The low-byte "SOURCE address" contains the address of *the one*/*one of the* connected actuator(s) which should act (running open/close etc.) for the virtual actuator. The address of this virtual one is given in the high-byte "DESTINATION address".

Easy "switching off" the simulation mode:
As soon as one mode is found in which both entries are set to zero all succeeding defined simulation modes are ignored and therefore disabled. This behaviour can be used to disable the simulation mode by entering zero digits at the very first offset address for simulation mode.

Simulation mode for **input data** (data which are read using input registers):
The input data of the "SOURCE" slave are copied to the memory addresses of the "DESTINATION" slave for simulation purposes. Therefore both slaves will respond with the same information.

Simulation mode for **output data** (data which are written or read using coils or holding registers):
The "SOURCE" actuator (which is physically connected to SIMA) will execute output commands, which are sent to either the "SOURCE" address or the attached (high-byte) "DESTINATION" address. In doing so always the last received output command is executed and stored in the holding registers of the actuator.
Normally several "DESTINATION" addresses are linked to one "SOURCE" address. This could lead to an error if the host system sends output commands to all DESTINATION addresses in one sequence. So it is better to test the DESTINATION addresses with separate Modbus telegrams for each address.

7.3.6.   Output commands to SIMA (access via coils)

Modbus function	Function code	Offset address	Data content
		0	Output command actuator 1 remote OPEN
		1	Output command actuator 1 remote CLOSE
		2	Output command actuator 1 remote SETPOINT
		3	Output command actuator 1 remote RESET[1]
		4	Reserved
		5	Reserved
		6	Reserved
		7	Reserved
		8	Output command actuator 2 remote OPEN
		9	Output command actuator 2 remote CLOSE
		10	Output command actuator 2 remote SETPOINT
		11	Output command actuator 2 remote RESET[1]
		12 - 15	Reserved
		16	Output command actuator 3 remote OPEN
		17	Output command actuator 3 remote CLOSE
Force Single Coil	05	18	Output command actuator 3 remote SETPOINT
Force Multiple Coils	15	19	Output command actuator 3 remote RESET[1]
Read Coil Status	01	…	…
		1008	**Output command actuator 127 remote OPEN**
		1009	**Output command actuator 127 remote CLOSE**
		1010	**Output command actuator 127 remote SETPOINT**
		1011	**Output command actuator 127 remote RESET[1]**
		1012- 1015	**Reserved**
		…	…
		1968	Output command actuator 247 remote OPEN
		1969	Output command actuator 247 remote CLOSE
		1970	Output command actuator 247 remote SETPOINT
		1971	Output command actuator 247 remote RESET[1]
		1972	Reserved
		1973	Reserved
		1974	Reserved
		1975	Reserved

SIMA supports up to 247 actuators, all actuator addresses have to be set within 1 – 247.

Only one of the coils OPEN, CLOSE and SETPOINT may be set at any given time, otherwise the actuator will respond with the signal "Not ready REMOTE". With coil RESET certain indications of the actuator (e.g. PTC tripping device or torque fault) can be reset.

A change of the data in these coils will also change the content of the holding registers assigned to the corresponding output command actuator x part 1 (see clause 7.3.5.1, p. 33).

If the coil SETPOINT (remote nominal) is set, the value of the setpoint set with output command actuator part 2 is regarded. The setpoint has to be transmitted as value between 0 and 1000 per mil. If this range is exceeded the actuator will respond with the signal "Not ready REMOTE".

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7.3.7.   Input information from SIMA I (access via input registers)

SIMA standard protocol 2 (SIMA protocol 1 **before** SimaSoft 2.00 see chapter 7.3.9, p.44)

Modbus function	Function code	Offset address*	Data content (see descriptions below)
		0	Input information actuator 1 part 1
		1	Input information actuator 1 part 2
		2	Input information actuator 1 part 3
		3	Input information actuator 2 part 1
		4	Input information actuator 2 part 2
		5	Input information actuator 2 part 3
		…	…
		378	**Input information actuator 127 part 1**
		379	**Input information actuator 127 part 2**
		380	**Input information actuator 127 part 3**
		…	…
		738	Input information actuator 247 part 1
		739	Input information actuator 247 part 2
		740	Input information actuator 247 part 3
		…	…
		800	Input information SIMA part 1
		801	Input information SIMA part 2
		…	…
		805	Position (in loop) of 1. act. with break of strip/short circuit channel A**
		806	Position (in Loop) of 1. act. with break of strip/short circuit channel B**
		…	…
Read Input Register	04	820	No. of actuators found MASTER SIMA channel A
		821	No. of actuators found MASTER SIMA channel B
		822	No. of actuators found STAND-BY SIMA channel A
		823	No. of actuators found STAND-BY SIMA channel B
		…	…
		1024	Input information SIMA live list 1
		1025	Input information SIMA live list 2
		…	…
		1270	Input information SIMA live list 247
		*Current position of actuators***:	
		2000	Actual Position actuator 1
		2001	Actual Position actuator 2
		2002	Actual Position actuator 3
		…	…
		2276	Actual Position actuator 247
		…	…
		*Act. connected analog Inputs **AI-1, AI-2** (digital inputs s. 7.3.8):*	
		3000	AI-1 address 1
		3001	AI-2 address 1
		3002	AI-1 address 2
		3003	AI-2 address 2
		…	…
		3492	AI-1 address 247
		3493	AI-2 address 247

*   decimal value
**   only for Loop Redundancy
***   current position of actuator: 0 – 1000 per mil

From software version 2.00 on SIMA supports up to 247 actuators, all actuator addresses have to be set within 1 – 247.

7.3.7.1.   Description of input information actuator x part 1 and part 2

Input information actuator x part 1 (first offset address = 0 [for actuator 1])

Bit position	Description
Bit 15	Fault indication
Bit 14	Warning indication
Bit 13	Running CLOSE
Bit 12	Running OPEN
Bit 11	Not ready indication[1]
Bit 10	Setpoint reached
Bit 9	Closed position
Bit 8	Open position
Bit 7	TSC (DSR)
Bit 6	TSO (DOEL)
Bit 5	LSC (WSR)
Bit 4	LSO (WOEL)
Bit 3	Local switch position
Bit 2	Remote switch position
Bit 1	Loss of phase
Bit 0	Thermal fault

Input information actuator x part 2 (first offset address = 1 [for actuator 1])

Bit position	Description
Bit 15 – Bit 8, high – byte	Actuator position high-byte
Bit 7 – Bit 0, low – byte	Actuator position low-byte

These are the most commonly used parts of input information. A detailed description of these indications can be found in the operation instructions of the actuator.

7.3.7.2.   Description of input information actuator x part 3

(first offset address = 2, [for actuator 1])

Bit position	Description
Bit 4-15	Reserved
Bit 3	DCS / SIMA (set to "1", if the actuator accepts commands from the SIMA interface and "0", if DCS commands are accepted)
Bit 2	Communication channel B (set to "1", if actuator communicates using channel B)*
Bit 1	Communication channel A (set to "1", if actuator communicates using channel A)*
Bit 0	No communication (set to "1", if the actuator can neither be accessed via channel A nor via channel B)

* For Loop Redundancy: When Sima system works without error both Bits 1 and 2 are set to '1', as in case of Loop Redundancy an actuator can be addressed via both channels ("from both sides").

In input information actuator x part 3 the communication status of the connection between SIMA and each actuator is filled and can be read out by the host system.

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7.3.7.3. Description of input information SIMA part 1

The input information SIMA part 1 contains the status of the SIMA communication channels.
Description below is for both, a single Master station and the Master-Stand-by redundancy.

(offset address: protocol 1 = 512 / protocol 2 = 800)

Bit position	Description		Bit set to "1" means:
Bit 15 (only for Loop Redundancy)	Physically line connection (Failure in Modbus loop communication)		Cable breakage or short circuit. (the two actuator positions next to the failure are written into the Input registers 517 and 518)
Bit 14	Communication between MASTER and STAND-BY SIMA ok		the communication between the two SIMA master stations is ok

Status information about Live list from last "(Force) Scan" (interpretation see below)

Bit 13	STAND -BY SIMA	live list channel B ok	number of found actuators on ch B of Stand-by Sima (see 7.3.7.8, p.41) is correct
Bit 12		live list channel A ok	number of found actuators on ch A of Stand-by Sima (see 7.3.7.7, p. 41) is correct
Bit 11	MASTER SIMA	live list channel B ok	number of found actuators on ch B of Master Sima (see 7.3.7.6, p. 40) is correct
Bit 10		live list channel A ok	number of found actuators on ch A of Master Sima (see 7.3.7.5, p. 40) is correct

Status to communication to host (DCS)

Bit 9	STAND-BY SIMA communicates with host system	the STAND-BY SIMA is used for communication with the host system
Bit 8	MASTER SIMA communicates with host system	the MASTER SIMA is used for communication with the host system

Status information about active channels

Bit 7	STAND-BY SIMA	channel B active	the STAND-BY SIMA communicates with the actuators by using channel B
Bit 6		channel A active	the STAND-BY SIMA communicates with the actuators by using channel A
Bit 5	MASTER SIMA	channel B active	the MASTER SIMA communicates with the actuators by using channel B
Bit 4		channel A active	the MASTER SIMA communicates with the actuators by using channel A

Status communication errors to actuators Note: one or more bits equal "0" means that there is no communication to a once found (live list) actuator(s).

Bit 3	STAND-BY SIMA	communication channel B ok	channel B of STAND-BY SIMA has no faults
Bit 2		communication channel A ok	channel A of STAND-BY SIMA has no faults
Bit 1	MASTER SIMA	communication channel B ok	channel B of MASTER SIMA has no faults
Bit 0		communication channel A ok	channel A of MASTER SIMA has no faults

Examples, how to interpret the live list, bits 10 -13 in combination with the number of found actuators:

#	bits 10 to 13	number of found act. (see 7.3.7.5 to 7.3.7.8)	interpretation
1	all bits = "1"	numbers are correct	all actuators were found. If communication is correct or not, show the bits 0 to 3
2	≥ 1 bit (eg., '13') = "0"	no. of found actuators for Stand-by, ch B = 0	no communication at all (eg. Stand-by, ch B) => connection fault at SIMA
3	≥ 1 bit ('13') = "0"	no. of found actuators for Stand-by, ch B ≠ 0	equal to number of ch A (7.3.7.7): ≥ 1 actuators faulty (communication, switched off,…) not equal to number of ch A: error in ch B

7.3.7.4.   Description of input information SIMA part 2

The input information SIMA part 2 contains the status of the SIMA Master and Stand-by stations
and the status of the SIMA communication channels.

(offset address: protocol 1 = 513 / protocol 2 = 801)

Bit position	Description		Bit set to "1" means:
Status of communication to host (DSC)			
Bit 15	STAND -BY SIMA	no communication to DCS channel B	STAND-BY no communication to DCS via channel B
Bit 14		no communication to DCS channel A	STAND-BY no communication to DCS via channel A
Bit 13	MASTER SIMA	no communication to DCS channel B	MASTER no communication to DCS via channel B
Bit 12		no communication to DCS channel A	MASTER no communication to DCS via channel A
Status of communication to the field (actuators)			
Bit 11	STAND-BY SIMA	no communication to actuators channel B	STAND-BY no communication to actuators via channel B
Bit 10		no communication to actuators channel A	STAND-BY no communication to actuators via channel A
Bit 9	MASTER SIMA	no communication to actuators channel B	MASTER no communication to actuators via channel B
Bit 8		no communication to actuators channel A	MASTER no communication to actuators via channel B
Bit 7 to 5	Reserved		
Bit 4	Common fault		System not ready (input part2/bit 2 = 0) Cable breakage, short circuit (input part1/bit 15 = 0) Communication Master – Standby (part1/bit 14 = 0) Communication channel A/B (part1/bit 3, 2, 1, 0 = 0)
"Control via DCS / Sima" ?			
Bit 3	Act. accepts commands from the SIMA		
"Sima system is ready" ?			
Bit 2	SIMA system is ready (SIMA in general ready for operation)		Communication to actuators on chA and/or chB is possible: • via the single Master station • in case of Master redundancy (MASTER and STAND-BY) at least via one of the two
Control status of the SIMA system		Control over the complete Master-Stand-by system (communication and functions) by	
Bit 1	STAND-BY SIMA is active		STAND-BY SIMA
Bit 0	MASTER SIMA is active		MASTER SIMA

7.3.7.5.   No. of actuators found MASTER SIMA channel A

(offset address: protocol 1 = 600 / protocol 2 = 820)

Bit position	Description
Bit 15 – Bit 8, high – byte	Reserved
Bit 7 – Bit 0, low - byte	No. of actuators found by MASTER SIMA on channel A

7.3.7.6.   No. of actuators found MASTER SIMA channel B

(offset address: protocol 1 = 601 / protocol 2 = 821)

Bit position	Description
Bit 15 – Bit 8, high – byte	Reserved
Bit 7 – Bit 0, low - byte	No. of actuators found by MASTER SIMA on channel B

Important Remark:
The „No. of actuators" is set at every *scan*, i.e., when either the SIMA is restarted or the command Force Scan is given. It shows the number of all found actuators.

By this two bytes „No. of actuators channel A/B" is *not indicated* if an actuator is off-line or has a failure!
For this, every actuator has to be checked. By "Input information part 3 / Bit0" will be signalled, if an actuator can be reached or not.

7.3.7.7.   No. of actuators found STAND-BY SIMA channel A

(offset address: protocol 1 = 602 / protocol 2 = 822)

Bit position	Description
Bit 15 – Bit 8, high – byte	Reserved
Bit 7 – Bit 0, low - byte	No. of actuators found by STAND-BY SIMA on channel A

7.3.7.8.   No. of actuators found STAND-BY SIMA channel B

(offset address: protocol 1 = 603 / protocol 2 = 823)

Bit position	Description
Bit 15 – Bit 8, high – byte	Reserved
Bit 7 – Bit 0, low - byte	No. of actuators found by STAND-BY SIMA on channel B

These input registers contain the number of actuators found on each channel of the redundant SIMA master station.
If the field wiring is without faults the value in each register is the same.

7.3.7.9.   Description of input information SIMA live list 1-247

(first offset address = 1024)

Bit position	Description
Bit 15 – Bit 8, high – byte	Reserved
Bit 7 – Bit 0, low - byte	Actuator address low-byte

SIMA will list all actuator addresses that were found during the scan procedure (system boot or command FORCE SCAN) starting with input information SIMA live list 1.
The addresses found are listed without a specific order. Moreover is the list the superset of several scans (up to 4 in the redundant case). Details about the found actuators for each station and channel see 7.3.7.5 to 7.3.7.8.
If the communication to one actuator is lost the forming gap is filled by shifting all succeeding values towards the first entry.

7.3.8.   Input information from SIMA II (Read discrete Inputs)

MODBUS function	Function code	Offset address	Data content *default* setting (see descriptions below)
		0	FAULT indication actuator 1
		1	OPEN position actuator 1
		2	CLOSED position actuator 1
		3	REMOTE switch position actuator 1
		4	TSO (DOEL) Torque switch OPEN operated act. 1
		5	TSC (DSR) Torque switch CLOSE operated act. 1
		6	FAULT indication actuator 2
		7	OPEN position actuator 2
		8	CLOSED position actuator 2
		9	REMOTE switch position actuator 2
		10	TSO (DOEL) Torque switch OPEN operated act. 2
		11	TSC (DSR) Torque switch CLOSE operated act. 2
		…	…
		1476	FAULT indication actuator 247
		1477	OPEN position actuator 247
		1478	CLOSED position actuator 247
Read Input Status	02	1479	REMOTE switch position actuator 247
		1480	TSO (DOEL) Torque switch OPEN operated act. 247
		1481	TSC (DSR) Torque switch CLOSE operated act. 247
		…	…
		Actuator connected Digital Inputs DI-1 to DI-4 *(analog inputs see 7.3.7)*	
		3000	DI-1 address 1
		3001	DI-2 address 1
		3002	DI-3 address 1
		3003	DI-4 address 1
		3004	DI-1 address 2
		3005	DI-2 address 2
		3006	DI-3 address 2
		3007	DI-4 address 2
		…	…
		3984	DI-1 address 247
		3985	DI-2 address 247
		3986	DI-3 address 247
		3987	DI-4 address 247

Description of Data content addresses 0 to 1481 - Feedback indications:

For each actuator there is a set of 6 free configurable one-bit feedback indications. This signals have to be taken out of the following 'pool', which comprises bit 0 to bit 15 of "Input Information actuator x part 1 and part 2", see 7.3.7.1 and other additionally available signals, bits 16 to 21:

Bit	Indication in display	Description
0	Thermal fault	Motor protection has tripped (reset may be necessary)
1	Loss of phase	One phase is missing
2	Remote sw. position	Selector switch in position REMOTE
3	Local sw. position	Selector switch in position LOCAL
4	LSO (WOEL)	Limit switch OPEN operated
5	LSC (WSR)	Limit switch CLOSE operated
6	TSO (DOEL)	Torque switch OPEN operated
7	TSC (DSR)	Torque switch CLOSE operated
8	Open position	Signal LSO (WOEL) or (LSO) WOEL + TSO (DOEL) (according to type of seating)
9	Closed position	Signal LSC (WSR) or LSC (WSR) + TSC (DSR) (according to type of seating)
10	Setpoint reached	Actuator is in nominal position
11	Not ready indication	Selector switch not REMOTE, incorrect run command, Global Control "CLEAR" telegram
12	Running open	Actuator is running logically OPEN
13	Running close	Actuator is running logically CLOSE
14	Warning indication	Warnings, include: Operating time warning, warning starts/run, no reference operation, internal warnings and signal interruptions
15	Fault indication	Faults; include: internal faults (see menu D2),Torque faults, phase failure, thermal faults
16	Torque fault (open)	Torque fault in direction OPEN occurred
17	Torque fault (close)	Torque fault in direction CLOSE occurred
18	Digital input 1	A + 24 DC signal is present at the digital input (1 to 4)
19	Digital input 2	
20	Digital input 3	
21	Digital input 4	

How to code the set of feedback indication:

This is done by in total **6 entries in the SIMA.INI**:
Within the new section **[MapDiscreteInput]** the default setting from above looks as follows:

Entry	Meaning
DI1 = 15	FAULT indication
DI2 = 8	OPEN position
DI3 = 9	CLOSED position
DI4 = 2	REMOTE switch position
DI5 = 6	TSO (DOEL) Torque switch OPEN operated
DI6 = 7	TSC (DSR) Torque switch CLOSE operated

Remark:
- This additional area of the protocol should make programming of certain feddback signal more easily and bring more speed on telegram side.
- The setting is valid for all (max 247) actuators. An actuator specific allocation is not allowed.

For further detail regarding transmitted signals or values or its range see Auma operation instructions, 0

7.3.9.   Supplement to "Input information from SIMA I" (input registers) - Protocol 1

SIMA protocol 1 - **before** SimaSoft 2.00

Modbus function	Function code	Offset address	Data content (see descriptions below)
		0	Input information actuator 1 part 1
		1	Input information actuator 1 part 2
		2	Input information actuator 1 part 3
		3	Input information actuator 2 part 1
		4	Input information actuator 2 part 2
		5	Input information actuator 2 part 3
		.	.
		.	.
		378	Input information actuator 127 part 1
		379	Input information actuator 127 part 2
		380	Input information actuator 127 part 3
		512	Input information SIMA part 1
		513	Input information SIMA part 2
		517	Address of 1. act. with break of strip/short circuit channel A*
		518	Address of 1. act. with break of strip/short circuit channel B*
		600	No. of actuators found MASTER SIMA channel A
		601	No. of actuators found MASTER SIMA channel B
		602	No. of actuators found STAND-BY SIMA channel A
		603	No. of actuators found STAND-BY SIMA channel B
		1024	Input information SIMA live list 1
		1025	Input information SIMA live list 2
Read Input Register	04	.	.
		.	.
		1150	Input information SIMA live list 127
		*Actuator connected Digital **(DI)** and analog **(AI-1 to AI-4)** Inputs:*	
		3000	DI-1 address 1
		3001	DI-1 address 2
		…	…
		3126	DI-1 address 127
		3127	DI-2 address 1
		…	…
		3253	DI-2 address 127
		3254	DI-3 address 1
		…	…
		3381	DI-4 address 1
		…	…
		3507	DI-4 address 127
		3508	AI-1 address 1
		3509	AI-1 address 2
		…	…
		3634	AI-1 address 127
		3635	AI-2 address 1
		…	…
		3761	AI-2 address 127

* only for Loop Redundancy

Please concern the different offset address for protocol 1 resp. protocol 2 explicitly named in various data set descriptions above

If the slave addresses of the actuators are assigned in an ascending sequence all the actuator information will be placed in a successive order in the Modbus memory of SIMA. This simplifies the communication between host system and SIMA and increases the effectiveness of the Modbus telegrams to read out the actuator data.

8.   Commissioning

8.1.   Installation of SIMA

8.1.1.   Notes before mounting SIMA

SIMA is designed for installation in a control cabinet.
Before mounting ensure the following:

- There has to be sufficient space for the SIMA housing
  (see clause 12.5, p. 59)
- SIMA needs additional space for the plugs at the front (approx. 70 mm)
- SIMA needs additional space for the plug of the power supply at the side (approx. 90 mm).
- Note: In case of a redundant SIMA Master Station system this space is required at the outer sides!
- Ensure there is sufficient ventilation or air conditioning so that the operation temperature limits are not exceeded (see clause 11, Technical Data)
- It is recommended that the shielding of all interface cables is properly connected to the ground potential in the control cabinet (use shielding clamps).

8.1.2.   Mounting SIMA

If the SIMA has the flanges on the back side, prepare the mounting plate of the control cabinet with 4 holes either with or without threads to fix the SIMA at the flanges fitted at the back (see 12.5 for a drilling jig)
If a redundant SIMA Master Station is required mount the two SIMA units side by side.

8.1.3.   Electrical connection of SIMA

Observe the notes of clause 5, p. 11. Pay attention to the operation instructions of other devices used in a SIMA system.

Perform the electrical connection to actuators and to host system according to the wiring diagram (see clause 12.3 Appendix C – Wiring diagrams (representative set).

8.1.4.   Switching on SIMA

SIMA is switched on with the power supply switch at the side of the SIMA housing (near the power supply plug).

The SIMA program is automatically started, if commissioning devices are connected a window with SIMA status information will be displayed.

SIMA automatically starts to scan for connected actuators in the following order:
Channel A of MASTER SIMA
Channel B of MASTER SIMA (option line redundancy)

In case of a redundant SIMA Master Station:
Channel A of STAND-BY SIMA
Channel B of STAND-BY SIMA (option line redundancy)

SIMA then starts to communicate with the actuators connected by using the channel with the most actuators found.
The status of each channel is reported in input information SIMA part 1 (see sub clause7.3.7.3, p. 39)

8.2.   Configuration of SIMA

Prior to normal operation, SIMA has to be configured according to the requirements of its environment in order to obtain fault-free input information.
Although SIMA will be delivered in a pre-configured state it may be necessary to modify this configuration during commissioning if there are changes of the requirements.
This modification can be done either by using the communication interface to the host system or within the dialogs (see clause 6.6).

8.2.1.   Number of actuators

The number of actuators connected has to be set in SIMA to get a correct indication about the status of the live list of each channel (see clause 7.3.7.3, p. 39).
This setting is done by using the output command SIMA part 1 (see clause 7.3.5.2) or with the commissioning interface SIMA SETTINGS WINDOW (see clause 6.6).

> **The number of actuators is stored in a SIMA configuration file ("Sima.Ini") and therefore has to be set only once during commissioning.**

8.2.2.   Highest station address

To optimise the FORCE SCAN cycle it is possible to set this value to the highest slave address connected to SIMA. This setting is done by using the output command SIMA part 3 (see sub-clause 7.3.5.4) or with the commissioning interface (see clause 6.6).

> **The highest station address is stored in a SIMA configuration file ("Sima.Ini") and therefore has to be set only once during commissioning.**

8.2.1.   Command CONFIGURE LOOP (Auto configuration)

The SIMA will build up logical model of the ring-structure by automatically communicating with all connected and switched-on actuators and assigning free bus-addresses as they follow.
This means that the finally order of the addresses does not correspond with the physically order in the ring of the actuators themselves (see clause 6.9, p. 22 and 7.3.5.3, p. 34).

8.2.2.   Command FORCE SCAN

SIMA communicates with all actuators that were found on the ports during the start-up phase. SIMA will use the port with the most actuators found. As soon as actuators are added or removed from the line, a new FORCE SCAN cycle has to be executed (see clause 6.9, p. 22 and 7.3.5.3, p. 34).

8.2.3.   Simulation mode

Ensure to switch off the simulation mode by entering zero digits into the first offset address of the simulation registers (see clause 7.3.5.5).

9.   Checking of SIMA Functions

In the event that the SIMA System does not work correctly, please check the following functions and possible solutions before calling for repair.

9.1.   Live list

The live list of found actuators is available as SIMA input function (see clause 7.3.7.9, p. 41). This information may be useful during commissioning.
The number of actuators found is available for each SIMA communication channel separately (see clauses **7.3.7.5**, p. 40 to 7.3.7.8).

9.2.   Diagnostic LED's

9.2.1.   Power supply

SIMA is equipped with 3 LED's mounted at the front panel of the power supply board. They indicate a faultless internal voltage for the internal power supply of 3.3 V DC, 5 V DC and 12 V DC.General function test

1. Ensure an error-free setting of the addresses of all actuators.

2. Ensure an error-free RS485 wiring

3. Ensure an error-free setting of the baud rate and parity of the host system

4. Ensure that the SIMA system is set correctly (see clause 6 User Interface)

5. Ensure that the power supply for the SIMA Master Stations and the actuators is available

6. Check the number of actuators found at each communication channel

7. Check the live list created by SIMA

8. Check the electrical operation of the actuators with the push-buttons of the local controls in selector switch position LOCAL

9. Check selector switch feedback indication

10. Put selector switches of the connected actuators in position REMOTE

11. Check selector switch feedback indication

12. Operate actuators from host system in direction OPEN and CLOSE

13. Check actuator indications in end position OPEN and CLOSE

14. Check actuator's behaviour and feedback while issuing a setpoint command

9.3.   SIMA Master Station redundancy test

1. Switch off the power supply of the STAND-BY SIMA

2. Check input information SIMA part 1 and part 2

3. Switch on the power supply of the STAND-BY SIMA

4. Check input information SIMA part 1 and part 2

5. Switch off the power supply of the MASTER SIMA

6. STAND-BY SIMA becomes active; check with general function test; check input information SIMA part 1 and part 2

7. Switch on the power supply of the MASTER SIMA

8. STAND-BY SIMA will still be active; check input information SIMA part 1 and part 2

9. Switch off the power of the STAND-BY SIMA

10. MASTER SIMA becomes active; check with general function test; check input information SIMA part 1 and part 2

11. Switch on the power supply of the STAND-BY SIMA

12. MASTER SIMA will still be active; check input information of SIMA part 1 and part

9.4.   Field communication test

(only with option redundancy to actuator)
The reaction of the system depends on the settings, see clause 6.6

1. Simulate a faulty line to actuators by removing channel B from SIMA
2. Check input information SIMA part 1
3. Insert channel B plug at SIMA and then remove channel A plug from SIMA (option redundancy)
4. SIMA will use the channel B line to the actuators; check with general function test, check input information of SIMA part 1 and input information actuators part 3
5. Insert channel A plug at SIMA
6. Check input information SIMA part 1
7. Remove channel B plug from SIMA
8. SIMA will use the channel A for communication to the actuators; check with general function test, check input information SIMA part 1 and actuator part 3
9. Insert channel B plug at SIMA
10. Check input information of SIMA part 1

9.5.   Host communication test

1. Check communication to SIMA via channel A (RS485) or ETH-1 (TCP) with general function test
2. In case of host line redundancy: Check communication to SIMA via channel B (RS485) or ETH-2 (TCP) with general function test

10.   Maintenance

The units are not suitable for field repair.

The CPU-board contains a lithium cell for Real Time Clock (RTC, NV-RAM based) with a lifetime of more than 8 years. However, even in case of battery breakdown the SIMA software will operate without errors (only date/time entries in internal log file affected).

Fuse:

Fixing	shockproof
Dimensions	5x20 mm
Rating	250 V / 2 A or 125 V / 4 A
Tripping characteristics	slow-blow type
Location	near the power supply plug

11.   Technical Data

General technical data SIMA Master Station

Fieldbus communication between SIMA and field units	EIA-485 (RS-485) galvanically isolated (Copper cable, screened, twisted pair) • Profibus DP Baud rates from 9.6 – 1500 kBit/s • Modbus RTU Baud rates from 9.6 – 38.4 kBit/s
Communication between SIMA and host system	EIA-485 (RS-485) galvanically isolated (Copper cable, screened, twisted pair) • Profibus DP Baud rates from 9.6 – 1500 kBit/s • Modbus RTU Baud rates from 9.6 – 115.2 kBit/s RS-232 • SIMA protocol Baud rates from 9.6 – 57.6 kBit/s Ethernet Modbus TCP/IP
Network topology	Linear structure. Active bus termination on both ends. Loop-structure to field units (only MODBUS, *loop redundancy*) Coupling and uncoupling of field units (actuators) during operation is possible without affecting other stations.
Redundancy options **Master Station redundancy**	Two fieldbus interfaces (channel A, B) to host system Two fieldbus interfaces (channel A, B) to field units (actuators) Loop redundancy towards field units (actuators) with *one* cable Second redundant SIMA parallel to Master Station for Hot-Stand-by applications
Number & addresses of field units	32 stations without repeater, with repeaters expandable up to PROFIBUS-DP: 125, addresses 1 to 125 ('0' for Master = SIMA) MODBUS RTU: 247, addresses 1 to 247 ('0' for broadcast signal)
Operating system	Windows XP embedded
User interface	Standard software "SimaSoft" Operation, e.g. during commissioning, with external monitor and keyboard/mouse (optionally) Touch screen version: operation via internal touch screen.
Data connection	SUB-D plug/socket connectors (RS-485, RS-232, VGA) 3x USB, 2x RJ45 Ethernet, 1x PS/2
Power supply	90 – 260 V AC, 47-63 Hz, wide range or 24 V DC (18 – 36 VDC) Power consumption: max 80 W

Environmental conditions:
   Temperature
   Humidity
	
	0 °C to +50 °C (Observe at least 10 cm space over and below SIMA for sufficient cooling)
	5% to 95% non condensing

Industrial enclosure	19" industrial housing with EMI protection, mounting flanges at the front or on the back side Desktop housing with EMI protection (option)
Enclosure protection according to EN 60529	Standard: IP 20 Optional: IP 55
Dimensions (width x height x depth)	198 mm (=28 TE) x 133 mm x 302 mm 483 mm (=84 TE) x 133 mm x 302 mm (touch screen version)
Weight	Approx. 3,5 kg (without touch screen) Approx. 7.5 kg (with integrated touch screen)

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12.   APPENDIX

12.1. Appendix A – Special Functions

Communication to Actuators (OPTIONS)

1. **Fibre Optic Cable (external converter required)**

2. **Analog and digital Inputs**
   Access to data in the field (sensors or others) without additional components

Functions independent of actuator type

1. **Switch-over between control by DCS or Sima** (done in Sima actuator face plate)

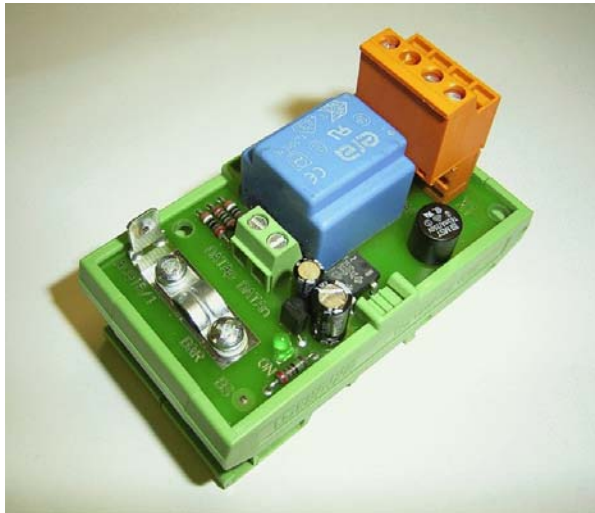## 12.2. Appendix B – Accessories

According to the fieldbus configuration the **necessary number of**:
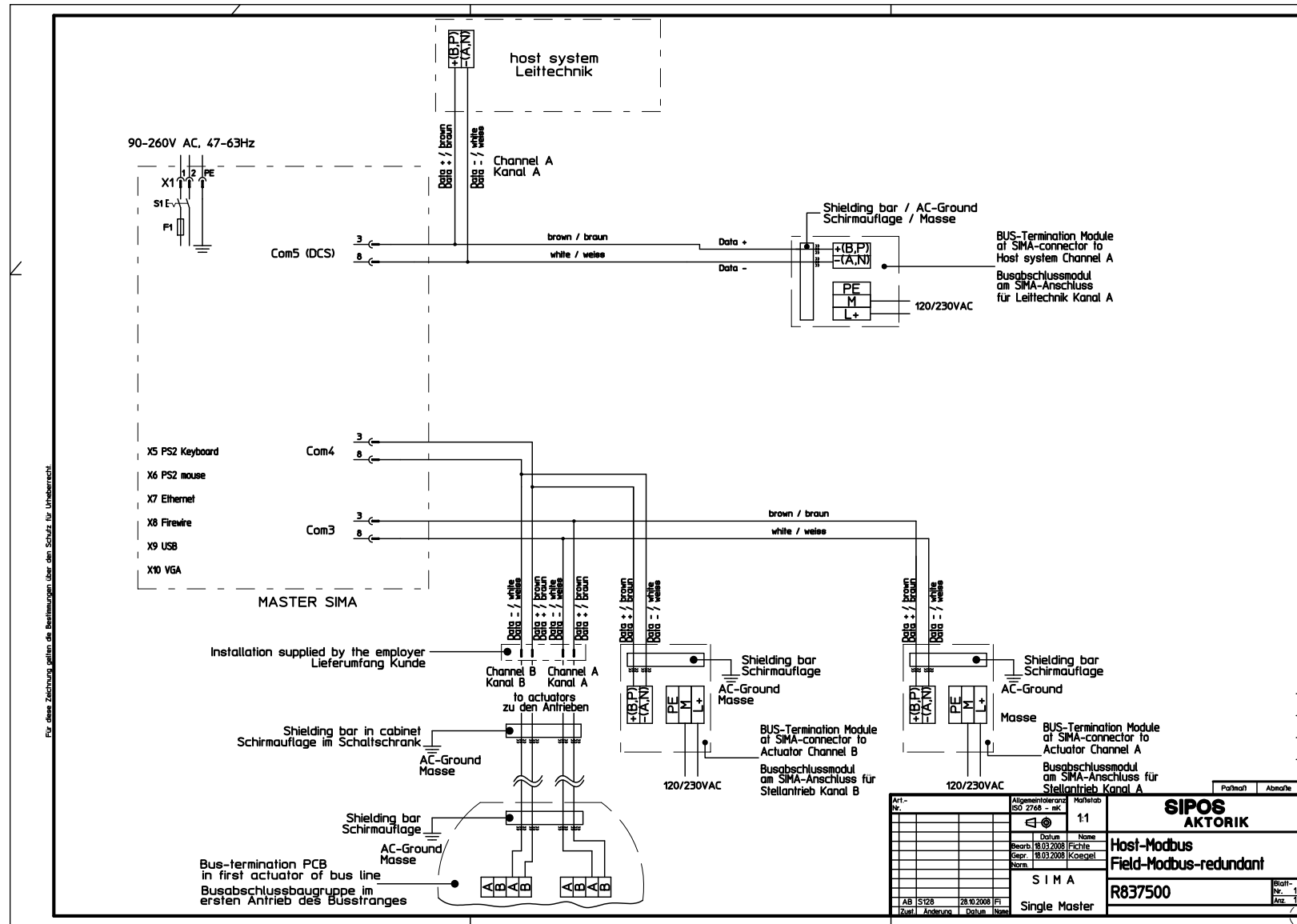
… Wiring harness

… Bus-terminators

Please be advised: Possibly necessary repeaters are not included. They must be supplied separately!

12.3. Appendix C – *Wiring diagrams (representative set)* – **Project specific diagram in delivery**

Wiring diagram for 1-channel (A) Modbus to DCS and 2-channel (A, B) Modbus to actuators (FULL REDUNDANCY) and a single SIMA Master

Wiring diagram for 2-channel (A, B) Modbus to DCS *and* to actuators (FULL REDUNDANCY) and two SIMA Master Stations in HOT-STAND-BY
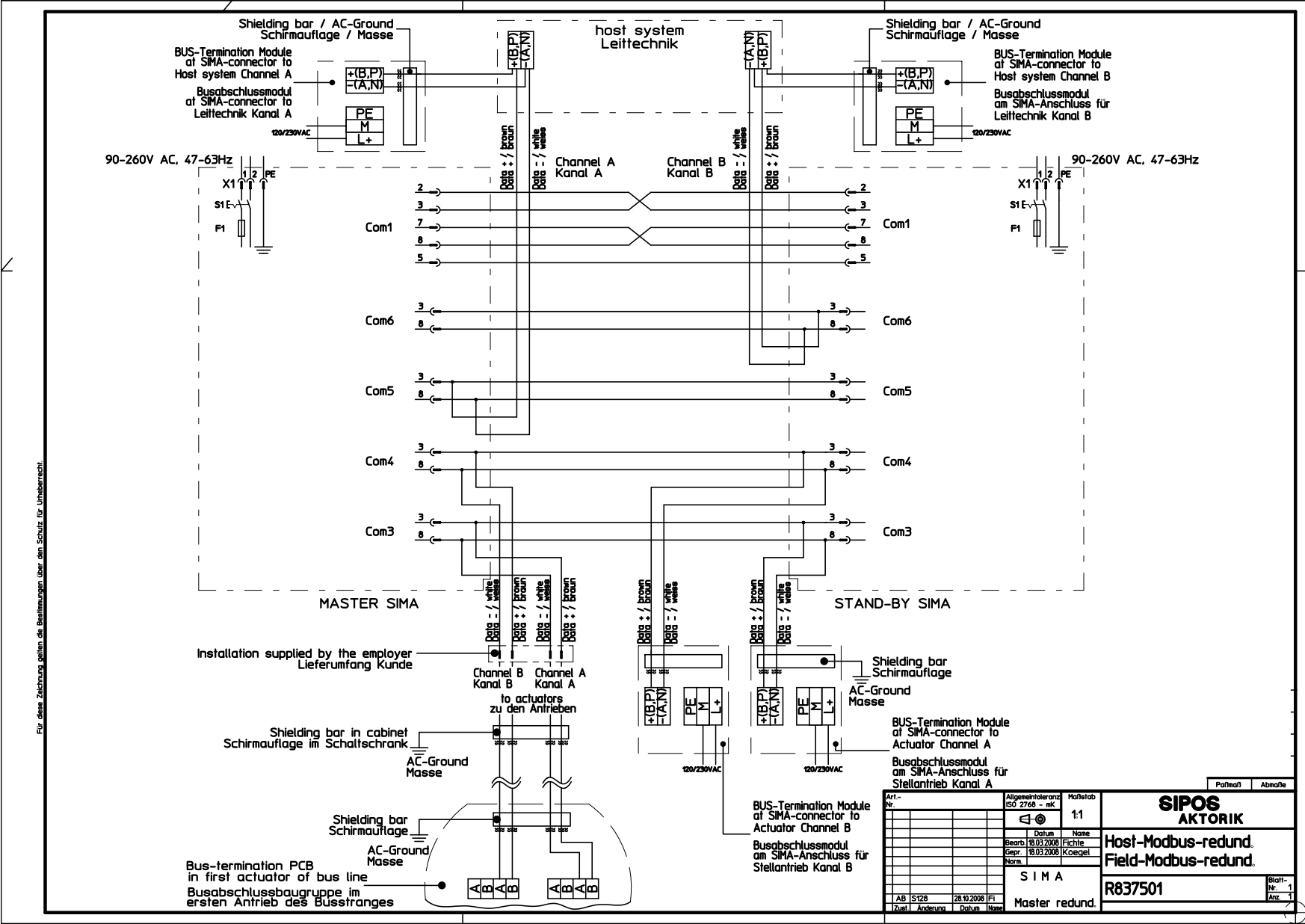
Wiring diagram for 2-channel (A, B) Modbus to DCS and LOOP REDUNDANCY (closed loop from chA to chB) to the actuators and a single SIMA Master
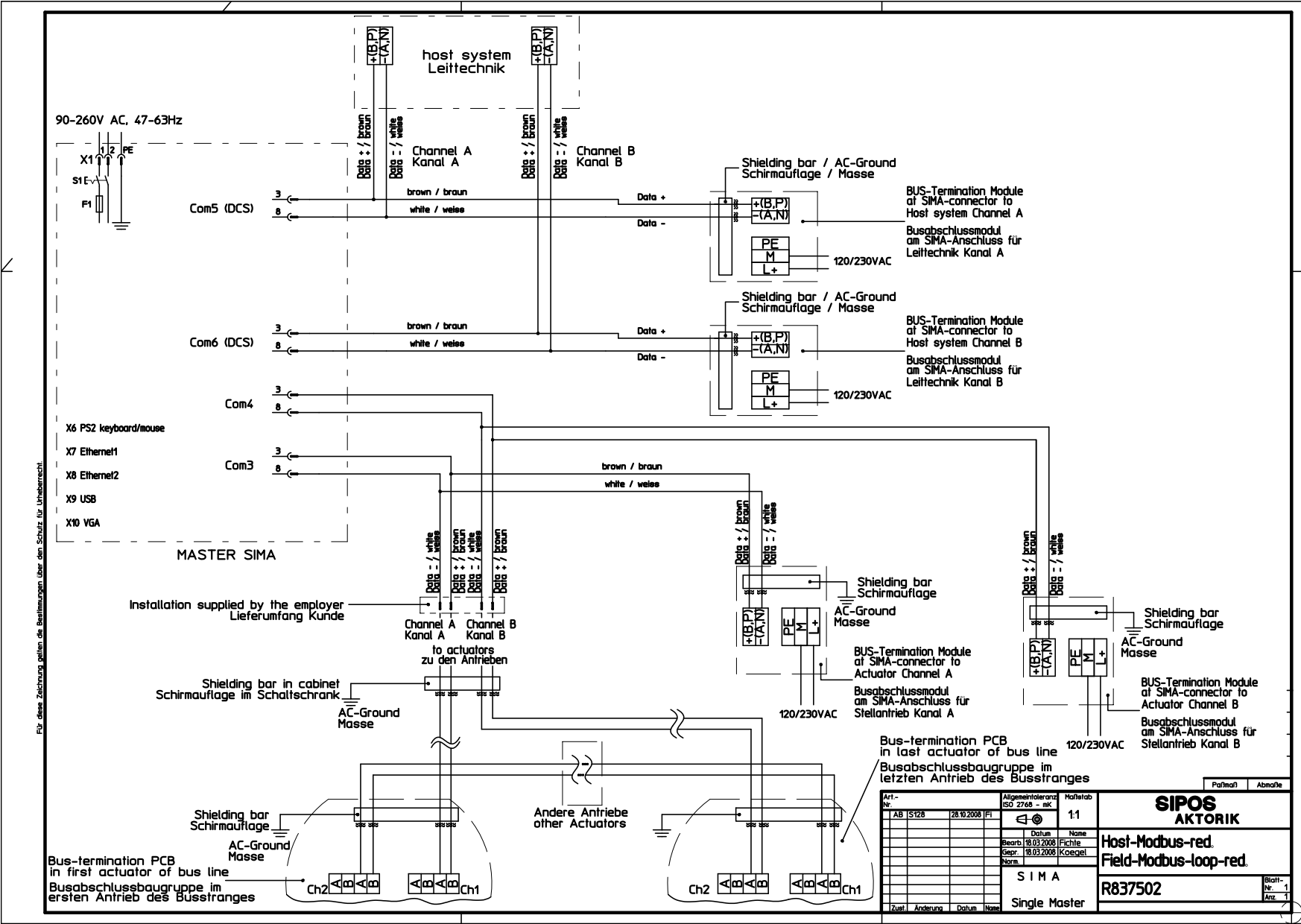
Wiring diagram for 2-ch (A, B) Modbus to DCS, LOOP REDUNDANCY (loop from chA to chB) to actuators and two SIMA Master Stations in HOT-STAND-BY
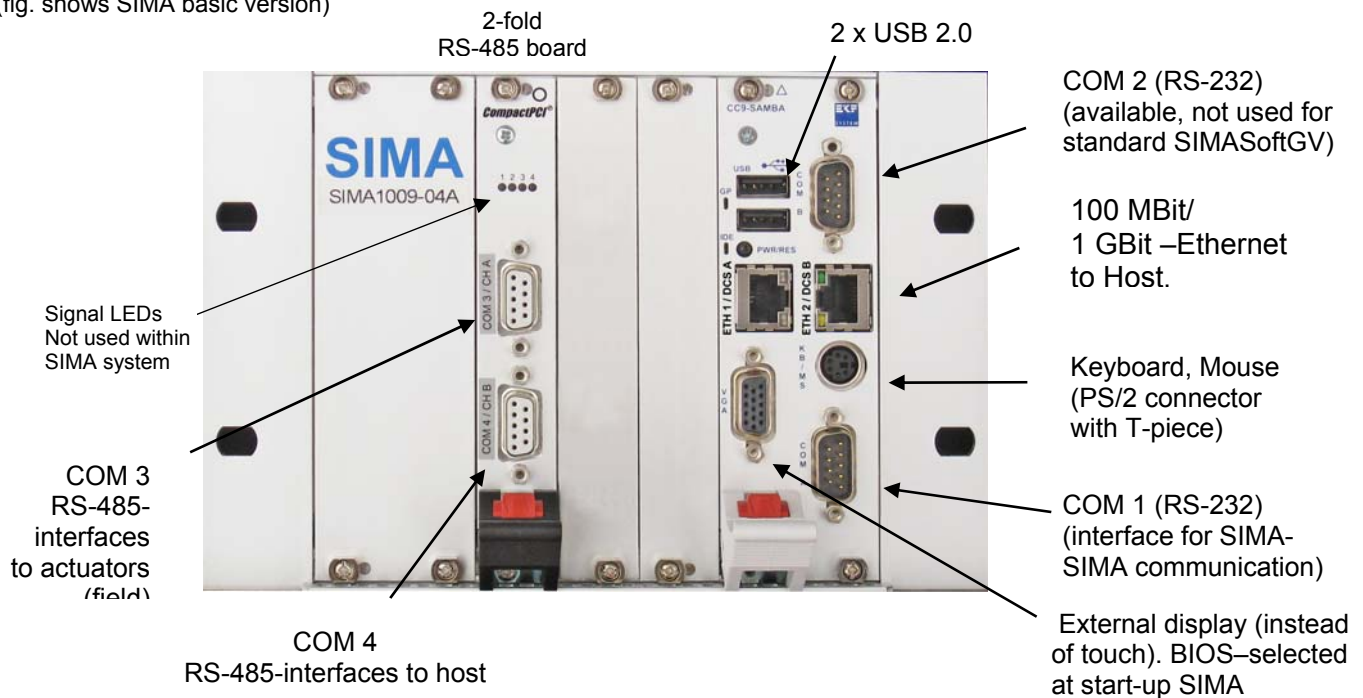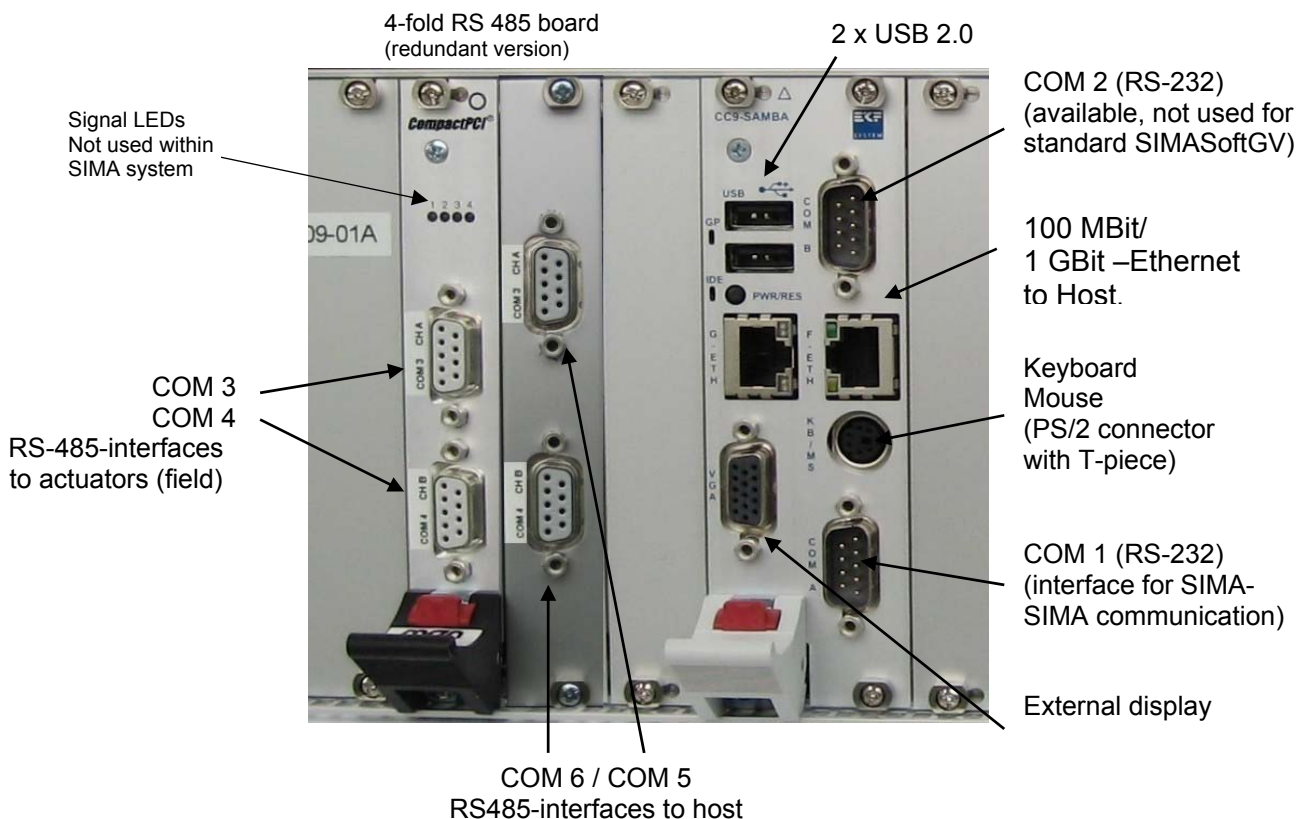
Wiring diagram for 2-ch Modbus TCP/IP to DCS, LOOP REDUNDANCY (loop from chA to chB) to actuators and two SIMA Master Stations in HOT-STAND-
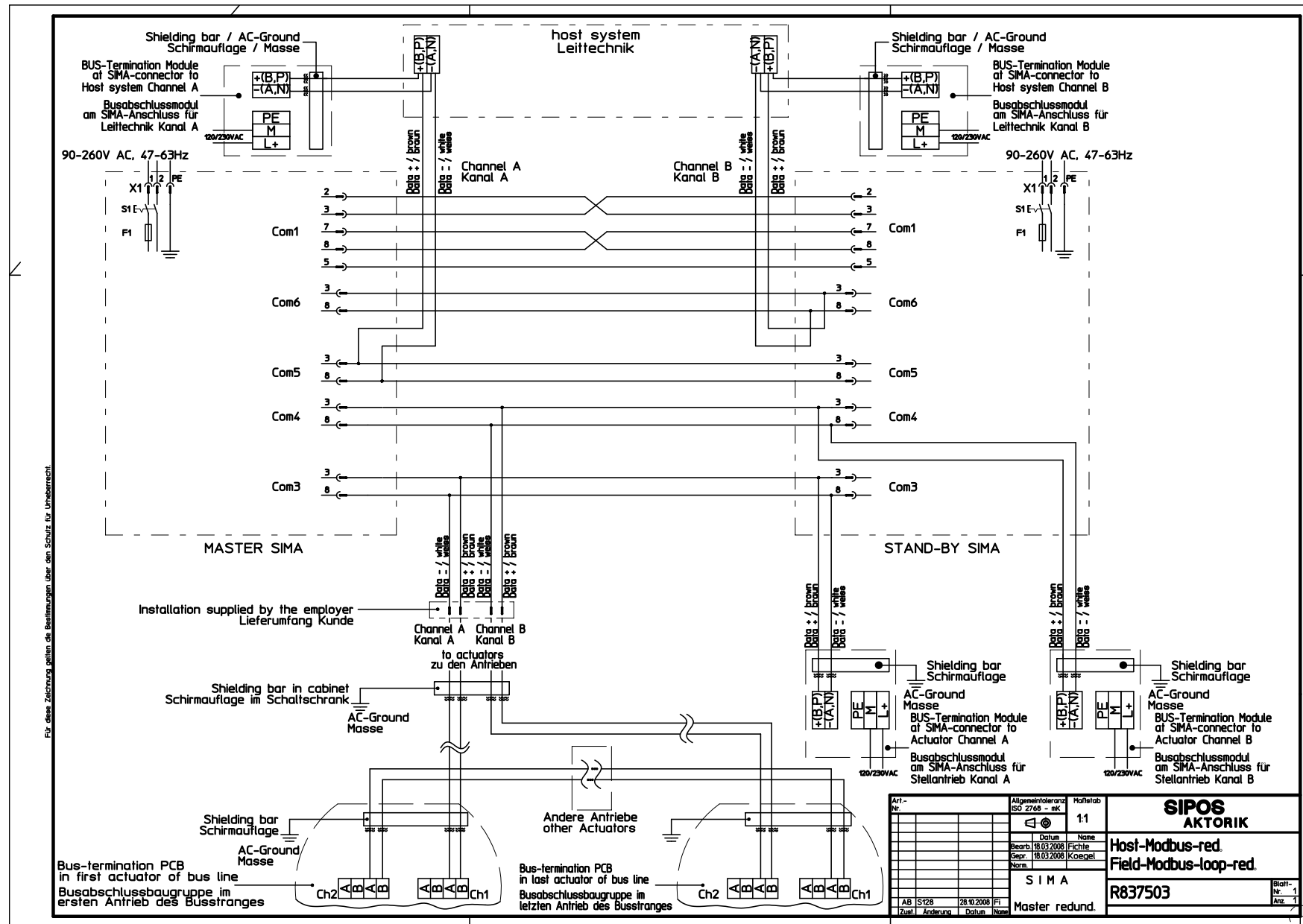
12.4.   Appendix D – SIMA connectors

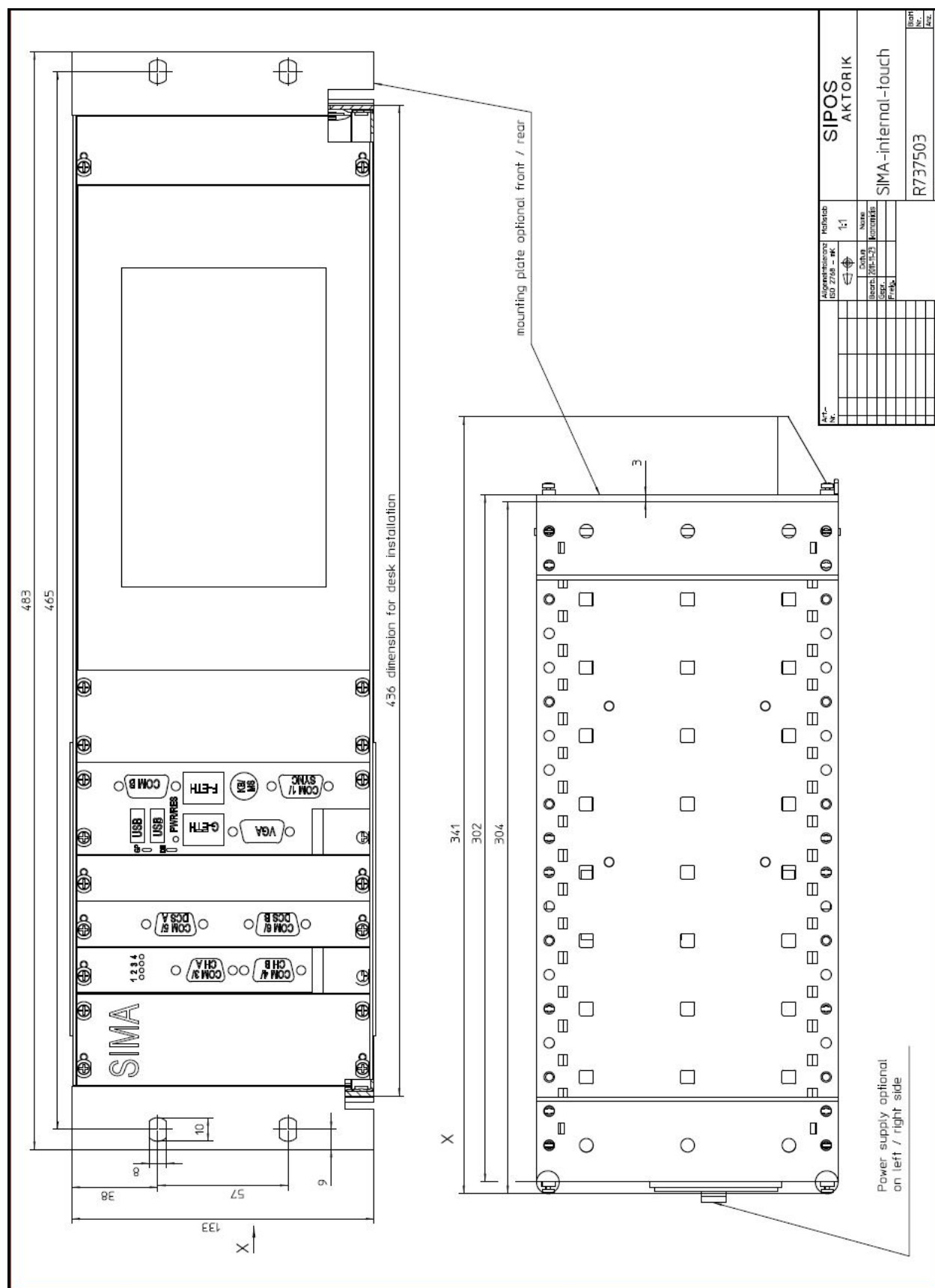**Example configuration, to *Host*: Ethernet/Modbus-TCP/IP, to *Field*: redundant Modbus RTU/RS-485**
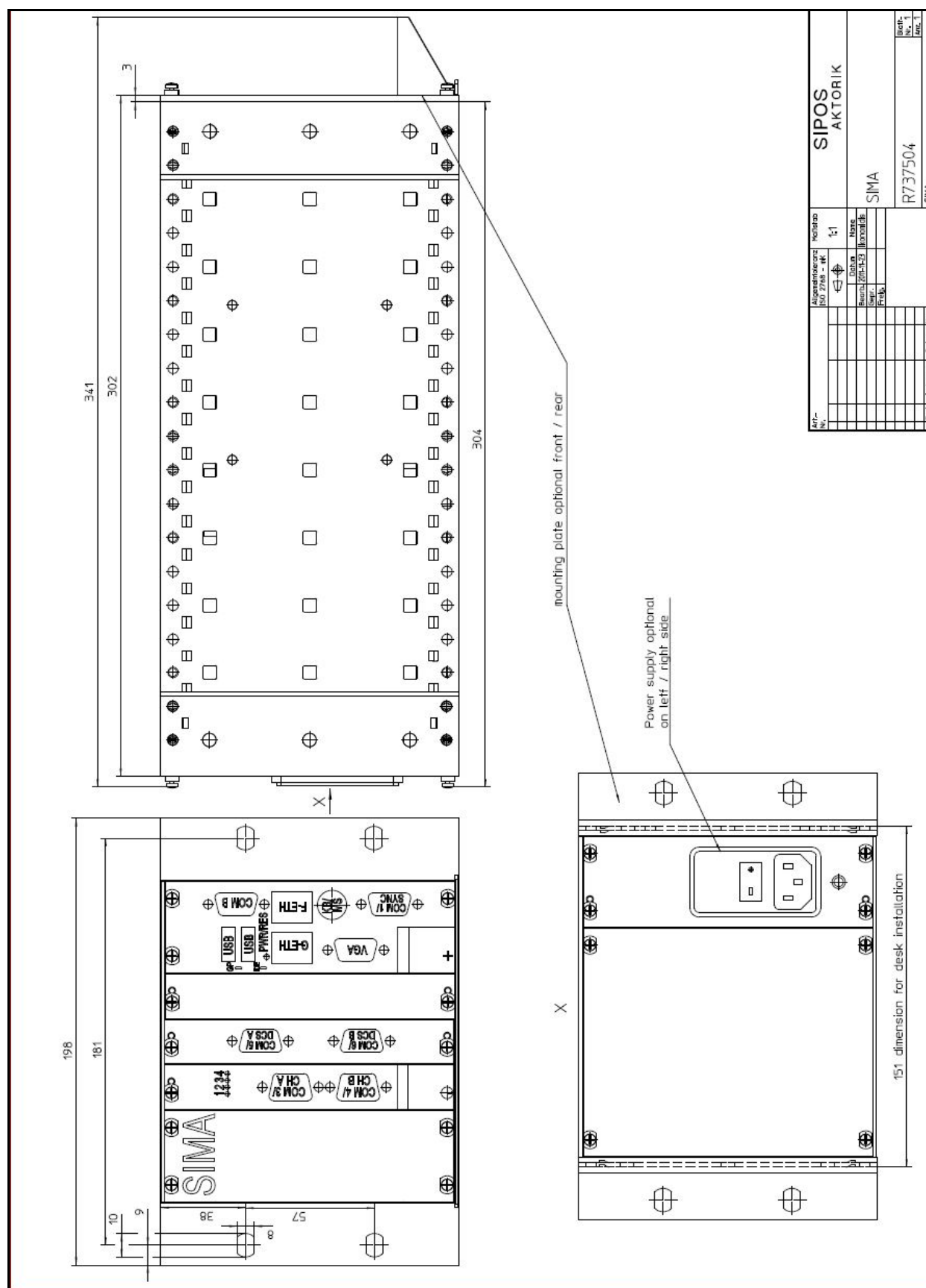(fig. shows SIMA basic version)

2-fold
RS-485 board

2 x USB 2.0

COM 2 (RS-232)
(available, not used for
standard SIMASoftGV)

100 MBit/
1 GBit –Ethernet
to Host.

Signal LEDs
Not used within
SIMA system

Keyboard, Mouse
(PS/2 connector
with T-piece)

COM 3
RS-485-
interfaces
to actuators
(field)

COM 1 (RS-232)
(interface for SIMA-
SIMA communication)

External display (instead
of touch). BIOS–selected
at start-up SIMA

COM 4
RS-485-interfaces to host

Example configuration, to *Host* and *Field*: redundant Modbus RTU/RS-485
(fig. shows part of SIMA touch screen version)

4-fold RS 485 board
(redundant version)

2 x USB 2.0

Signal LEDs
Not used within
SIMA system

COM 2 (RS-232)
(available, not used for
standard SIMASoftGV)

100 MBit/
1 GBit –Ethernet
to Host.

COM 3
COM 4
RS-485-interfaces
to actuators (field)

Keyboard
Mouse
(PS/2 connector
with T-piece)

COM 1 (RS-232)
(interface for SIMA-
SIMA communication)

External display

COM 6 / COM 5
RS485-interfaces to host

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12.5. Appendix E – Outline dimensions

12.6.   Appendix F – Literature – References

SIMA documentation

- Operation instruction, document Y004.469/003/en/<rev> - This manual!

- Technical data, dimension drawings, wiring diagrams on www.auma.com

Documentation AUMA actuator controls

Up-to-date documents on www.auma.com. See under

- Manual

- Operation instruction

- Short instruction

- Technical data

Links for more information

- Modbus   www.modbus.org

                          Modicon Modbus Protocol Reference Guide www.modicon.com

- Profibus DP   www.profibus.com

- Remote Desktop Connection Software download
  http://www.microsoft.com/windowsxp/downloads/tools/rdclientdl.mspx

13.   Declaration of Conformity

SIPOS
AKTORIK

EG-Konformitätserklärung
EC declaration of conformity

| Hersteller: | SIPOS Aktorik GmbH |
| Manufacturer: | Elektrische Stellantriebe |

Anschrift:	Im Erlet 2
Address:	90518 Altdorf
	Bundesrepublik Deutschland

Produktbezeichnung:	Antriebssteuerungssystem
Product name:	Actuator Control System
	Typ/Type **2SM2**

Das bezeichnete Produkt stimmt mit den Vorschriften folgender Europäischer Richtlinien überein:
The named product is in conformity with the requirements of the following European Directive:

2004/108/EG Richtlinie des Europäischen Parlaments und des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit (EMV Richtlinie).
2004/108/EC Directive of the European Parliament and of the Council on the approximation of the laws of the Member States relating to electromagnetic compatibility (RFI Guideline).

2006/95/EG Richtlinie 2006/95/EG des Europäischen Parlaments und des Rates vom 12. Dezember 2006 zur Abgleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen (kodifizierte Fassung).
2006/95/EC Directive 2006/95/EC of the European Parliament and of the Council of 12 December 2006 on the harmonisation of the laws of the Member States relating to electrical equipment for use within certain voltage limits (codified version).

Die Übereinstimmung mit den Vorschriften dieser Richtlinien wird nachgewiesen durch die vollständige Einhaltung folgender Normen:
Conformity with the requirements of this Directive is testified by complete adherence to the following standards:

Harmonisierte Europäische Normen:
Harmonized European Standards:

DIN EN 55022   **DIN EN 55024**   **DIN EN 60950**

Anbringung der CE-Kennzeichnung: 2008
Attachment of the CE label: 2008

SIPOS Aktorik GmbH
Altdorf, 22.07.2008

_____
Dr. Matthias Rebhan
Geschäftsführer
Managing Director

_____
Jörg Bleibinhaus
Qualitätsmanagement
Quality Management

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Zusicherung von Eigenschaften im Sinne des Produkthaftungsgesetzes.
This Declaration certifies conformity with the above-mentioned Directive, but gives no assurance of properties within the meaning of the Law Concerning Product Liability.

Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
The safety instructions issued in the supplied product documentation are to be observed.

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