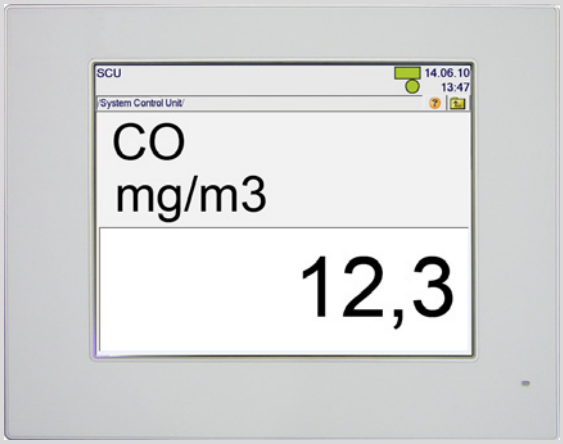
OPERATING INSTRUCTIONS

SCU

Control Unit

Description, Start-up, Operation

SICK
Sensor Intelligence.



Product
Product name: SCU
Version: SCU-P100

Manufacturer
SICK AG
Erwin-Sick-Str. 1 · 79183 Waldkirch · Germany
Phone: +49 7641 469-0
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Legal information

Original document
This document is an original document of SICK AG.

Contents

1 About this Document

1.1 Symbols and document conventions

1.1.1 Warning symbols

Symbol	Significance
	Hazard (general)
	Hazard by voltage

1.1.2 Warning levels and signal words

Danger

Risk or hazardous situation which *will* result in severe personal injury or death.

Warning

Risk or hazardous situation which *could* result in severe personal injury or death.

Caution

Hazard or unsafe practice which *could* result in personal injury or property damage.

NOTICE

Hazard with possible risk of damage.

1.1.3 Information symbols

Symbol	Significance
	Important technical information for this product
	Important information on electrical or electronic functions

1.2 Intended use

The SCU (System Control Unit) is a control unit for comfortable and efficient control of analyzers.

1.3 Responsibility of user

Correct use

- ▶ Use the SCU only as described in these Operating Instructions. The manufacturer bears no responsibility for any other use.
- !▶ No components may be removed, added or changed on the SCU unless described and specified in the official manufacturer information.
  Otherwise:
  - The SCU could become dangerous to use.
  - Any warranty by the manufacturer becomes void.

Retention of documents

These Operating Instructions:

- ▶ Must be available for reference.
- ▶ Must be passed on to new owners.

1.4 Additional documentation/information

Additional instructions:

- Technical Information SCU (for programmers)
- Operating Instructions for the connected analyzer/sensor
- Operating Instructions “Modular I/O System”

1.5 Data integrity

SICK AG uses standardized data interfaces such as, for example, standard IP technology, in its products. The focus here is on product availability and features. SICK AG always assumes that the customer is responsible for the integrity and confidentiality of data and rights involved in connection with using the products. In all cases, the customer is responsible for the implementation of safety measures suitable for the respective situation, e.g., network separation, firewalls, virus protection and patch management.

2 Description of the SCU

2.1 Product identification

Product name	SCU
Version	SCU-P100
Part No.	2056275
Manufacturer	SICK AG Erwin-Sick-Str. 1 · 79183 Waldkirch · Germany

The identification number (type plate/device plate) is located on the rear of the operator panel.

2.2 Overview of the SCU

The SCU (System Control Unit) is a control unit for comfortable and efficient control of analyzers.
The following actions can be performed on the analyzers via the SCU:

- Control, parameter setting and display.
- Measured value processing.
- Remote diagnosis.

The SCU is connected with the analyzers via a System bus.

The SCU has digital and analog I/O interfaces for peripheral connections.

The SCU is operated via the built-in screen (operator panel) or a PC.

2.2.1 The SCU controls an own analyzer

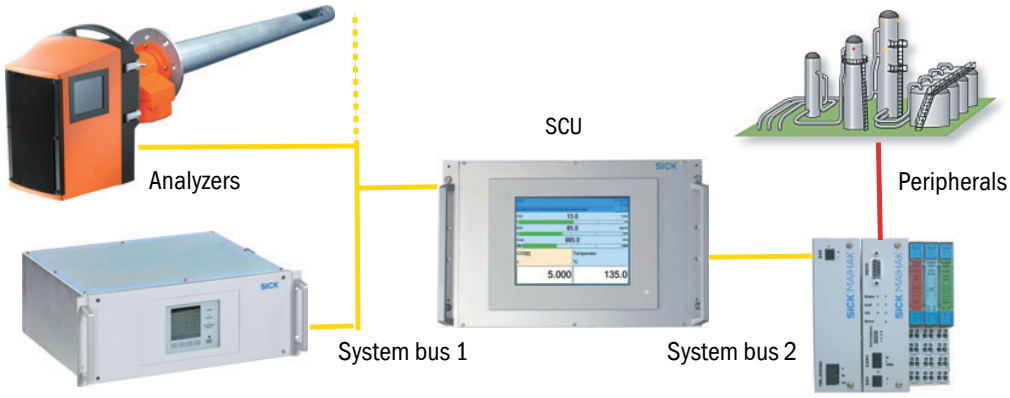
Fig. 1: SCU in analyzer

When the SCU controls an own analyzer, the SCU is then typically in the analyzer. The analyzer is operated via the SCU.

In the simplest case, the interfaces to the process peripherals and to the System bus are also in the analyzer (see Operating Instructions of analyzer).

2.2.2 The SCU controls several analyzers (remote control)

Fig. 2: SCU on the System bus



When remote control or joint control of several analyzers is used, the analyzers are connected to the SCU via a System bus. All connected analyzers are operated via the SCU.

In this case, interfaces to the process peripherals are located on the SCU and additionally on the System bus (depending on the configuration).

2.3 Features of the SCU

2.3.1 Control, parameter setting and display

- Numeric and/or graphic display of measured values in variable combinations.
- Setting parameters of connected analyzers.
- Control of sequences such as check cycles and relay switching.
- Generation of status messages and logbook entries.

2.3.2 Processing, saving and output of measured values

- Comprehensive calculation options; input of formulas in the Formula editor.
- Data smoothing through averaging.
- Monitoring and signaling limit values.
- Scaling of measured values by conversion to standard physical conditions with default values or measured values of connected analyzers.
- Control of processes by logical linking.
- Export of logbook entries.
- Activation of I/O interfaces.

2.3.3 Data interfaces

- Access to SCU communication with analyzers via System bus (CAN bus).
  - CAN1 (System bus to analyzer); 125 kBaud (default setting).
  - CAN2 (System bus to remote I/O interface (option)); 50 kBaud.

  Cable length:
  - Max. 500 m for 125 kbaud
  - Max. 1000 m for 50 kbaud
    (longer lengths for lower transfer rates).
- Data transfer from maximum 16 analyzers.
- Interfaces
  - RS485 (Modbus RTU)
  - Ethernet (Modbus TCP/IP)
    OPC (option)
    SOPAS ET
- Modular I/O system

2.3.4 SOPAS ET engineering tool

Operator menus and measured value displays are also available on an external PC via the Ethernet connection with the SOPAS ET engineering tool (see “SOPAS Engineering Tool (SOPAS ET)”, page 47).

2.4 Method of operation of the SCU

The SCU searches for (“scans”) analyzers via the System bus. The analyzers found are displayed and can then be operated from the SCU.

When modular system I/O (see “Subassemblies associated with the SCU”, page 12) is connected, the SCU checks the position and function of the connected I/O module.

2.5 SOPAS system concept

The SICK *O*pen *P*ortal for *A*pplications and *S*ystems (SOPAS) is an engineering tool for communication with analyzers and sensors.

SOPAS is based on the following techniques:

- Device communication via Ethernet (TCP/IP).
- A common engineering tool for the various product lines.
- Universal device description file as the data source for all relevant device data and parameters required for communication and display.
- Interfaces for direct communication with the analyzers or SCU.

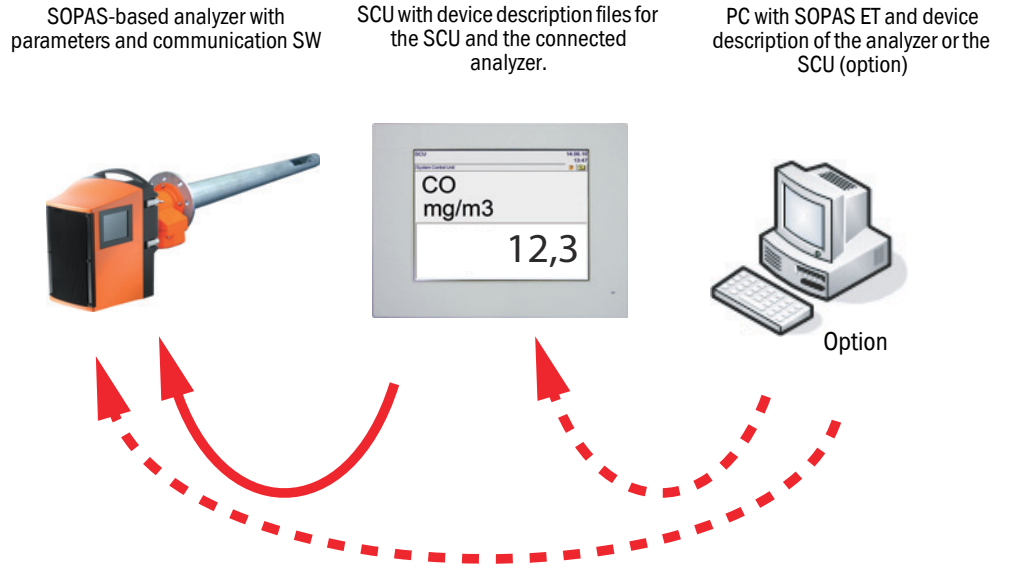
Access paths to SOPAS-based analyzers

- Via the SCU control unit.
- Via a PC with the program (Engineering Tool) SOPAS ET (see “SOPAS Engineering Tool (SOPAS ET)”, page 47)

The menu structure and presentation are principally identical on the SCU and on the PC with SOPAS ET. The presentation on the SCU is adapted to the smaller monitor.

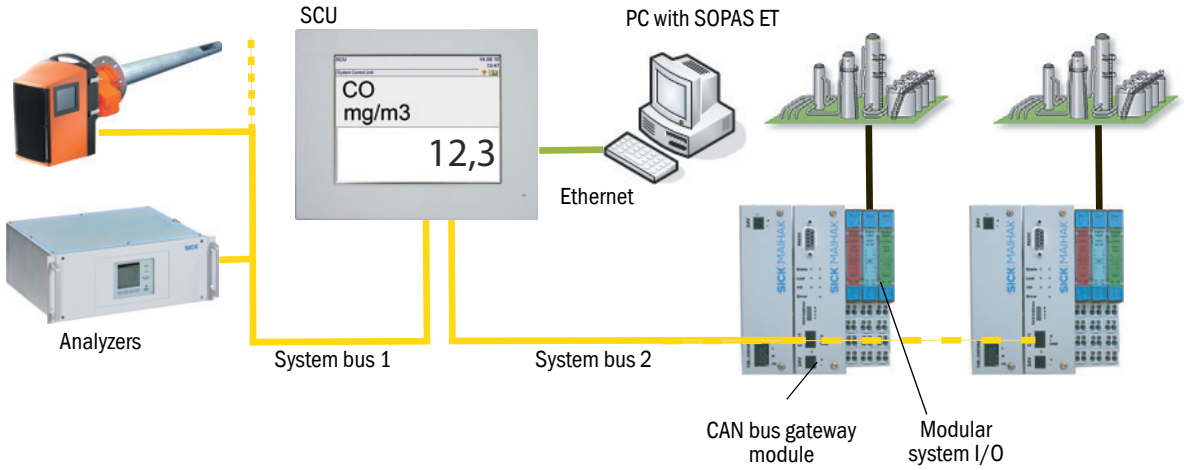
For more information on the SOPAS concept, see the Help menu of SOPAS ET.

Fig. 3: SOPAS system concept



2.6 Subassemblies associated with the SCU

Fig. 4: Overview of subassemblies associated with the SCU



▶ Description of the “CAN bus gateway” and “Modular system I/O” see Operating Instructions “Modular system I/O”.

3 Start-up

3.1 Scope of delivery

- SCU
- 2 CAN plugs with switchable CAN bus termination
- CD-ROM with:
  - License conditions
  - Operating Instructions SCU
  - Operating Instructions “Modular I/O System”
  - SOPAS ET (program)
  - SCU installation package

▶ Pay attention to the license conditions (see CD-ROM).

3.2 Start-up

The SCU is pre-installed and ready for operation.

It contains a CompactFlash card and all driver programs required for operation.

It does not contain the device descriptions for the specific analyzers (.sdd) for visualization.

Installing programs on the SCU see “Technical Information of the SCU”

Fig. 5: Connections on the back of the panel

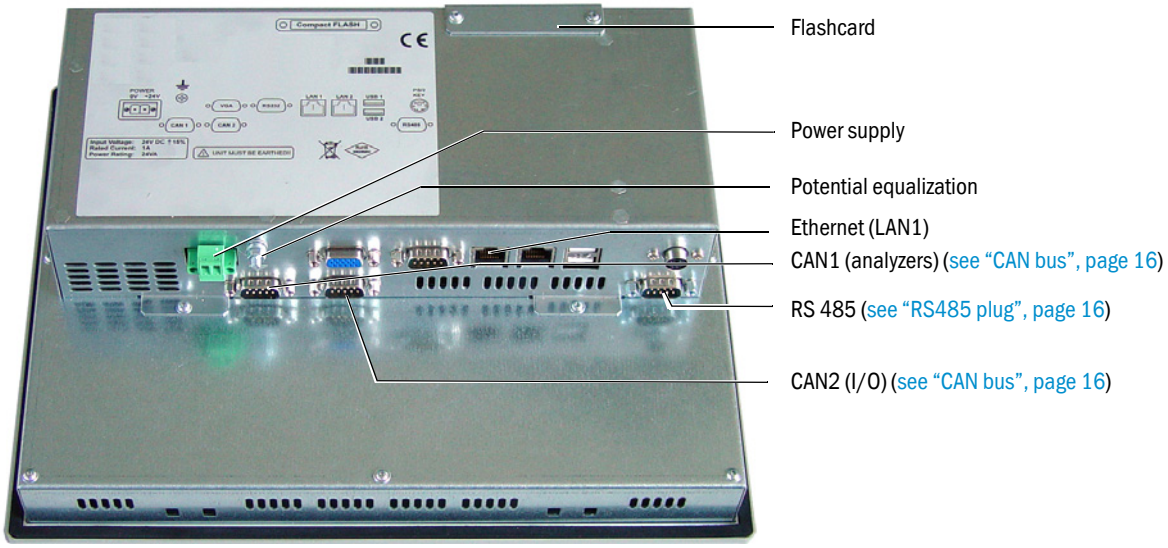
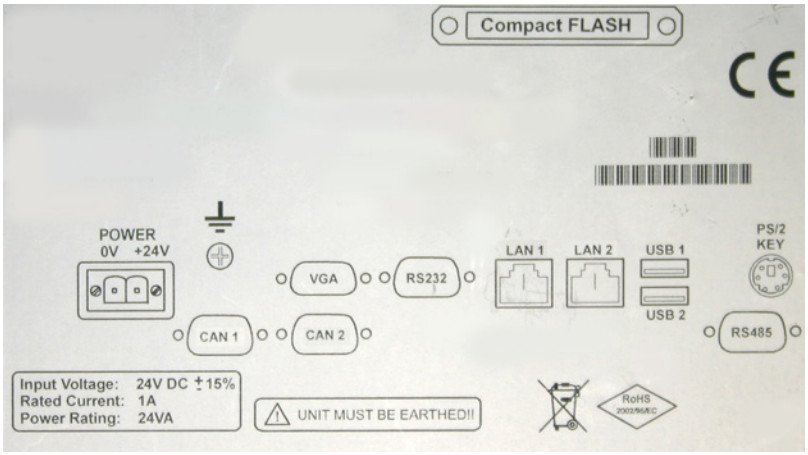


Fig. 6: Designation of connections on the back of the panel



The connections and terminal assignment for power supply (24 V) are shown on the back of the SCU.

Start-up procedure

1 Install the panel (fitting opening, see “Dimensions and fitting opening”, page 51).
2 Connect potential equalization (see “Connections on the back of the panel“, page 13).
3 CAN1: Connect the System bus to the analyzers.
Observe CAN bus termination (see “CAN bus”, page 16).
4 CAN2: Connect the System bus to the “Modular I/O system”.
Observe CAN bus termination (see “CAN bus”, page 16).
5 Install the modular I/O system, see Operating Instructions “Modular I/O System”.
6 Connect the power supply (24 V DC) (plug provided).
7 Connect Ethernet when available (see “Ethernet interface”, page 18)

- Operation of SCU, see “Operation”, page 20
- Operation of SCU via SOPAS ET (option), see “SOPAS Engineering Tool (SOPAS ET)”, page 47

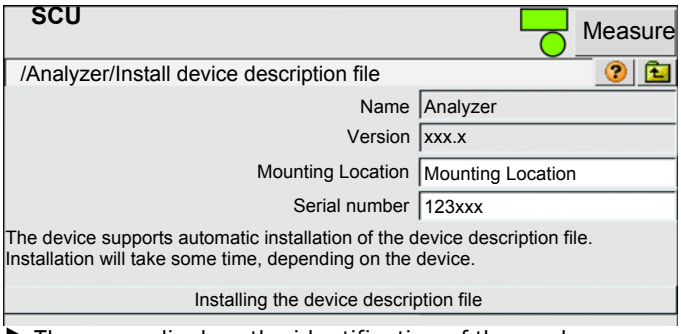
3.2.1 Registering an analyzer

The SCU recognizes connected analyzers automatically.

A so-called device description file is installed during installation of the analyzer.

3.2.1.1 *Automatic installation of device description file*

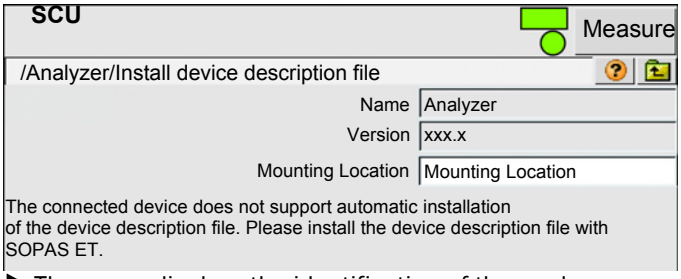
The following screen message is displayed when the analyzer supports automatic installation:



- ▶ The menu displays the identification of the analyzer connected.
- ▶ To install the device description file, touch the “Install Device description file” field. The device description file is then loaded automatically.
- ▶ “Restart the user interface” (see “Selecting analyzers and general setup”, page 24).

3.2.1.2 *Installing the device description file, manual/automatic*

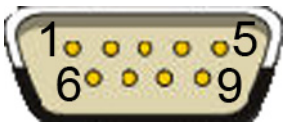
The following screen message is displayed when the analyzer does *not* support automatic installation:



- ▶ The menu displays the identification of the analyzer connected.
- ▶ Install the device description file (*.sdd) with SOPAS ET.
  1 Open SOPAS ET
  2 Menu *SCU_P100/Parameter/Device*
  3 Enter the name of the desired device description file (*.sdd) and download the file.

3.3 RS485 plug

Fig. 7: PIN assignment of RS485 plug for Modbus



Pin assignment of plug SUB-D 9-pole:
2 - Data -
7 - Data +
8 - GND

The RS485 interface is not electrically isolated.

To use the interface outside of the housing containing the SCU: Use the kit for galvanic isolation (Part No.: 2071639).

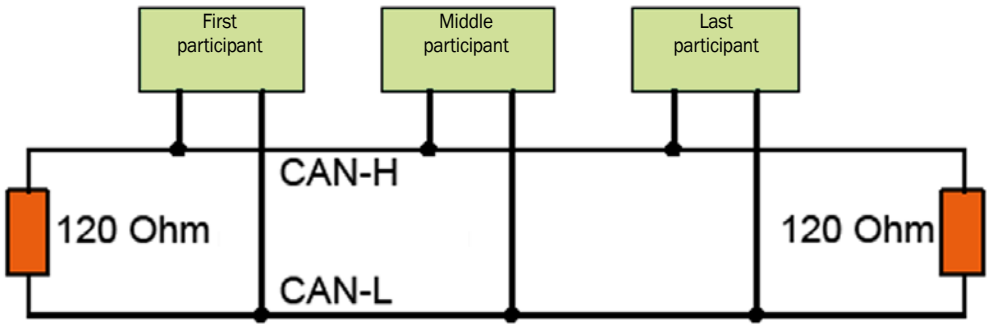
3.4 CAN bus

The CAN bus is a serial 2-wire bus system to which all bus participants are connected parallel (i.e. with short stub lines).

The CAN bus is a line structure.
Do not use star topology here.

- Each end of the CAN bus must be closed off with a 120 ±10% Ohm terminating resistor (prevents reflections).
  This is also required for very short line lengths.

Fig. 8: CAN bus principle



- Terminating resistors for the first and last bus participants must be *activated*.
- The terminating resistor for middle bus participants must be *deactivated*.

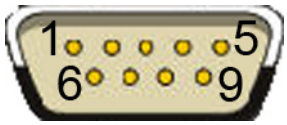
The following is valid for the SCU:

- Stub lines lead to reflections on the bus, therefore:
  Avoid stub lines whenever possible, otherwise limit these to max. 10 m.
- Max. CAN bus length:
  - 500 m for 125 kbaud
  - 1000 m for 50 kbaud

3.4.1 CAN interface on the SCU

The SCU does not contain an internal terminating resistor.

Fig. 9: PIN assignment of interfaces CAN1 and CAN2



Pin assignment of plug SUB-D 9-pole:
2 - CAN low
3 - GND
7 - CAN high

3.4.1.1 *Plug with terminating resistor*

Two plugs are enclosed with the SCU to switch the respective terminating resistor (CAN1 or CAN2) on and off.

These plugs can be connected to interface CAN1 or CAN2.

Fig. 10: Plug with slide switch for terminating resistor

The plugs have a slide switch for switching the terminating resistor on or off:

Position	Terminating resistor	Bus participant
ON	Switched on	Terminal equipment
OFF	Switched off	First or middle device

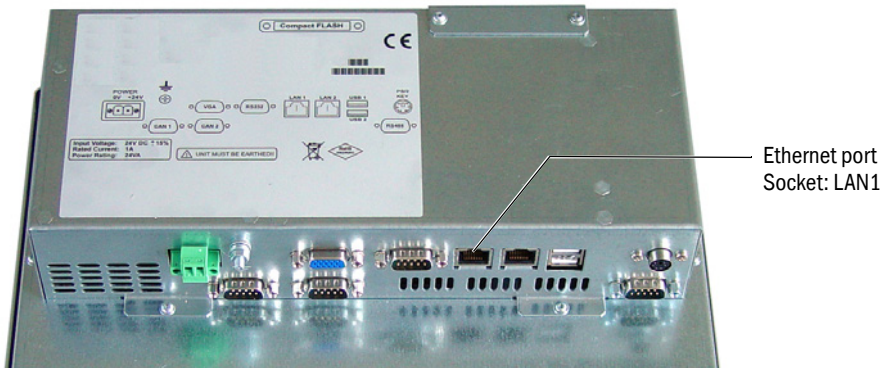
Terminating resistor: 120 Ohm.

Connecting the CAN line

1 Unscrew the plug.
2 Connect the CAN line inside the plug (the connecting diagram is inside the plug). Specification of CAN line, see “Data lines”, page 53.
3 Connect the shield across the complete bus and only ground galvanically at one location (prevents ground loops).
4 Screw the plug in again.
5 Set the switch to the desired position.
6 Insert the plug in the CAN1 or CAN2 port and screw tight.

3.5 Ethernet interface

Fig. 11: Ethernet port on the back of the panel

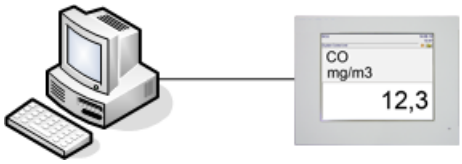


- Plug: RJ 45
- Transfer parameter: 100 Mbit/s

Address settings: see “Technical Information SCU” Manual

3.5.1 Connection to a PC

Fig. 12: SCU on the PC



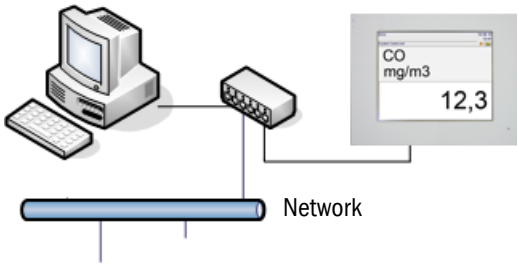
- Cable: Crossover

Procedure

▶ Connect the Ethernet cable.

3.5.2 Connection to a switch or a hub

Fig. 13: SCU on hub/switch



A PC and a network can be connected simultaneously to the SCU using a switch (multiple distributor) or hub.

- Port on the switch: Optional.
- Cable: 1:1 (no crossover).
  Crossover cable possible, depending on switch or hub.

Procedure

▶ Connect the Ethernet cable.

3.6 Modbus

A menu is available to configure the inputs and outputs.

▶ It is *possible* to set whether Modbus TCP (Ethernet) or Modbus RTU (RS485) is used via menu *System Control Unit/Configuration/Modbus* (see “Technical Information SCU” Manual).
▶ The inputs and outputs can be configured via menu *System Control Unit/Configuration/I/O/Data/Modbus outputs* (see “Technical Information SCU” Manual).

Pin assignment plug: see “RS485 plug”, page 16

3.7 OPC

▶ The OPC outputs can be configured via menu *System Control Unit/Configuration/I/O/data/OPC outputs* (see “Technical Information SCU” Manual).

4 Operation

4.1 Operator panel (screen)

The SCU is operated via its operator panel (with touchscreen).

4.1.1 Starting the SCU

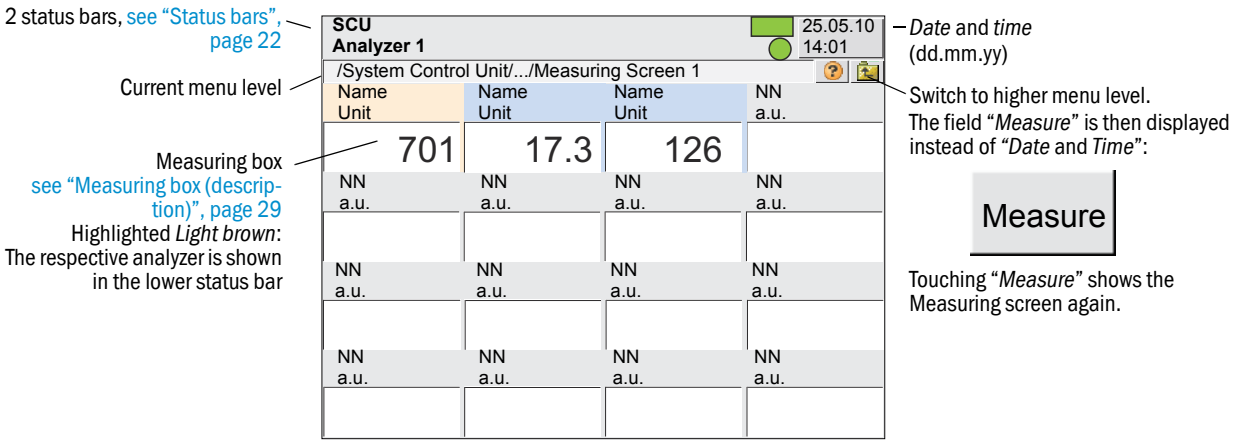
1 After the power supply is switched on (see “Start-up”, page 13):
   – The SICK logo appears after a few seconds
   – The *green* LED “POWER” goes on after a few more seconds.
2 A brown progress bar is shown.
3 The display goes off for a few seconds.
4 A blue progress bar, a gray status bar and a clock symbol with rotary segments are shown.
   This process runs for a few minutes (depending on the number and type of analyzers connected).

Fig. 14: Operator panel

5 The Start screen is displayed with the Measuring screen (see “Measuring screen”, page 21).
   (Start screen default: see “Start screen”, page 27.)

4.1.2 Measuring screen

Typical Measuring screen:



Further information on the Measuring screen, see “Measuring box (description)”, page 29

- To exit the menu: Touch .
- Set the Measuring screen parameters: see “Measuring screen”, page 27

4.1.2.1 *Set time and date*

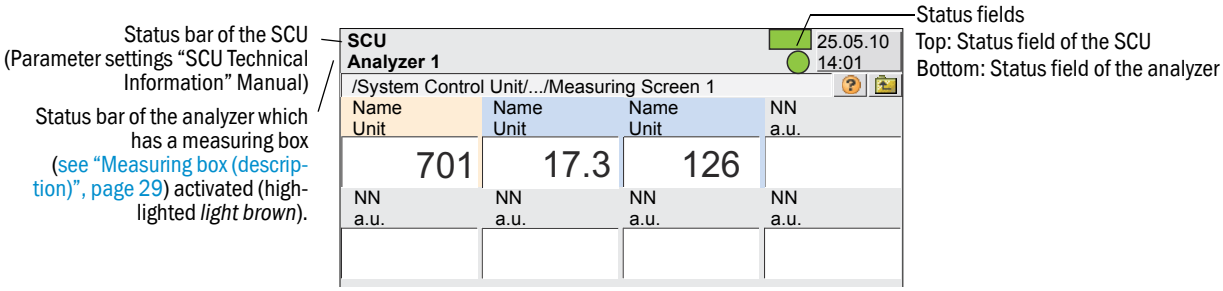
Set time and date, see “Incorrect display of date and/or time”, page 48

4.1.3 Status bars

The SCU has 2 status bars:

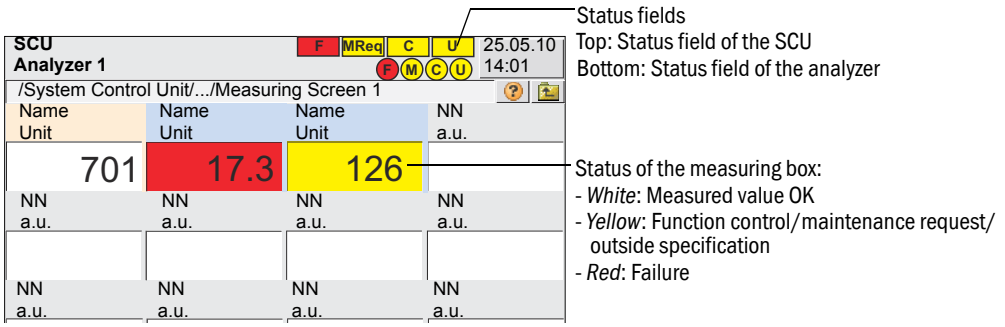
- Upper status bar: Status bar of the SCU (host control unit).
- Lower status bar: Status bar of the analyzer currently selected.

The status bars have status fields (according to parameter settings) to show the respective device status.



Significance of the status fields

Code	Color	Significance	Cause
none	green	Correct operation	---
MReq, M	Yellow	Maintenance	A device function will soon be restricted.
C		Check	Internal functional check is running.
U		Outside specification	Measured values are outside the specification.
F	red	Failure	Failure.



Existence and logic of the status field are dependent on the parameter setting of the SCU (see “Technical Information SCU” Manual) or the analyzer.

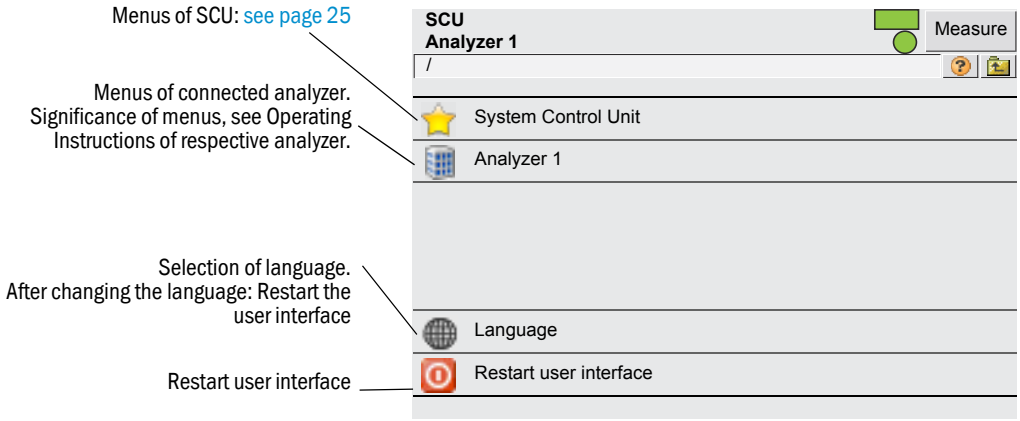
The following can be done if a status field is *yellow* or *red*:

- ▶ Touch the colored measuring box: The lower status bar will display the respective analyzer.
  If no analyzer displays a failure: The failure is caused by the SCU.
- ▶ Touch  repeatedly until the menu selection (see “Selecting analyzers and general setup”, page 24) appears and then go to the menu of the respective analyzer or of the SCU.
- ▶ Go to the *Diagnosis* menu (depending on the analyzer).

Usually, the status bar of the SCU is parameterized as “Group alarm”.
This means that the error message of an analyzer which is *not* displayed will appear as status message in the status bar of the SCU.

4.2 Selecting analyzers and general setup

▶ To position to the top menu line: Touch (several times).



4.3 Entering text

When you touch a line requiring a text input: A screen is displayed to enter the text:

- *"CAPS"* button: Toggle between lower and upper case letters.
  - The "*CAPS*" LED goes on: Upper case letters are switched on.
- Button *"12?"*: Switches to number pad and special characters

You can also enter texts using SOPAS ET (see "SOPAS Engineering Tool (SOPAS ET)", page 47).

4.4 SCU menu tree

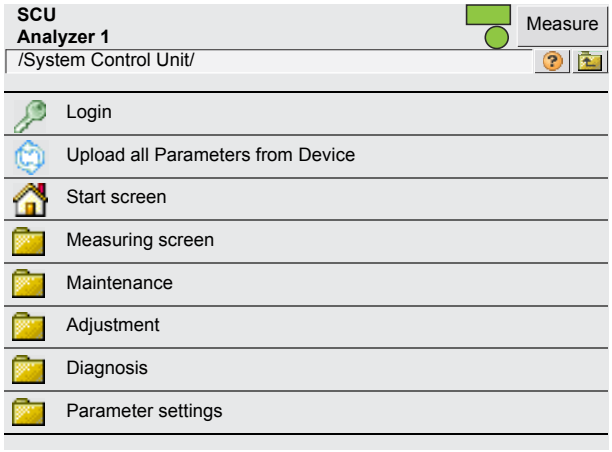
The menus for user levels “user” and “authorized operator” are shown.

Password: see “Login (user level)”, page 26

Menu tree	Explanation
SCU	
Login	see page 26
Upload all Parameters from Device	see page 27
Start screen	see page 27
Measuring screen	see page 27
Measuring screen 1 .. 16	see page 27 ←Measuring screen
Maintenance	see page 31
Restart SCU	see page 31
Data backup - Parameter settings	see page 31
Tests	see page 32
Adjustment	see page 37
Test Gas Table	see Technical Information SCU
Manual adjust	see page 37
Diagnosis	see page 39
Logbook	see page 39
Device state data	see page 42
Cyclic Trigger	see page 42
- Device	see page 43
Validation results[1]	see page 44
Adjustment results[1]	see page 45
System overview	see page 46
Parameter settings	see Technical Information SCU
Measuring screen	see Technical Information SCU
I/O	see Technical Information SCU
Modbus	see Technical Information SCU
OPC outputs (OPCOi)	see Technical Information SCU
Device	see Technical Information SCU

[1] Only appears when an analyzer is connected

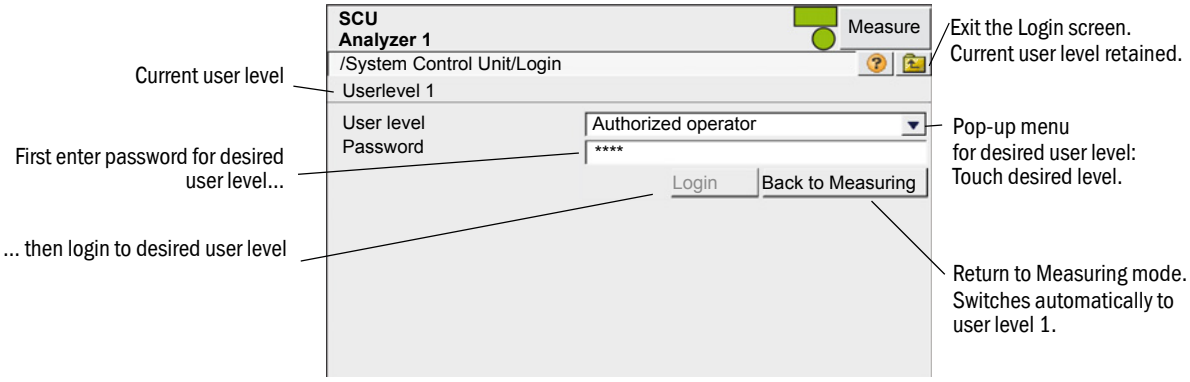
5 SCU Menus (Representation)



see page 26
see page 27
see page 27
see page 27
see page 31
see page 37
see page 39
see Technical Information SCU

5.1 Login (user level)

Menu: System Control Unit/Login



User level	Designation	Allowed actions	Password[1][2]
1	User	Viewing measured values and parameters.	No password
3	Authorized operator	Starting actions and changing parameters	HIDE[3]

[1] The password cannot be changed.
[2] Capital letters.
[3] The password is valid for the operator panel and SOPAS ET

- If there is no input at user level 3 for a period of 30 minutes, a dialog window is shown where you can confirm that you want to remain at this user level.
- At user level 1, the menus of user level 3 are not shown or are blocked for inputs. The blocked fields are then *grayed out*.

The menus for user levels “user” and “authorized operator” are described in this Manual.

5.2 Upload all parameters from device

Menu: System Control Unit

The current parameters from the SCU memory are loaded to the SCU operating unit.

There is no further query, touching the Menu item will start parameter loading.

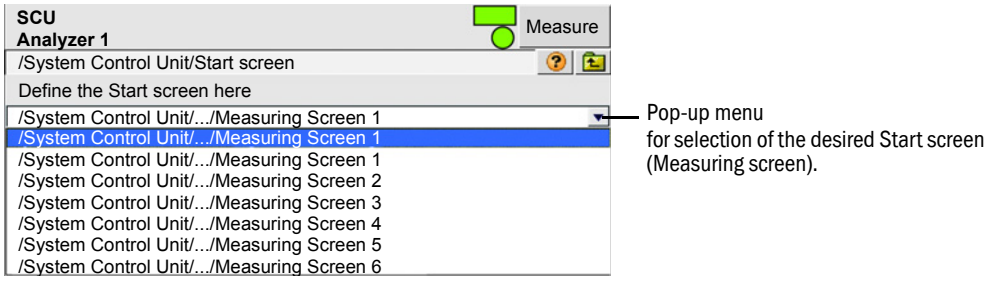
If it is possible that parameters were changed in the SCU via the Ethernet (e.g. via SOPAS ET):
▶ Perform *"Upload all Parameters from Device"* before changing parameters.

5.3 Start screen

Menu: System Control Unit/Start screen

The Start screen is automatically displayed after the start of the SCU or after touching "Measure".

You can select the desired Start screen from the displayed list of Measuring screens (see "Measuring screen", page 27).



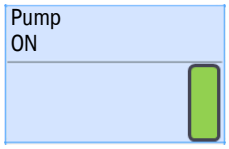
5.4 Measuring screen

Menu: System Control Unit/Measuring

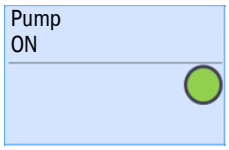
Select the desired parametrized Measuring screen from the list shown.

- The Measuring screens comprise:
  - Measuring box (see page 29)
  - Bargraph (see page 30)
  - LineWriter (see page 30)
- Signal, switch and button in the measuring screen

– Signal
Display of a single signal:

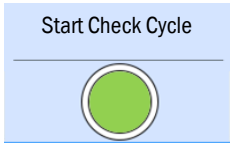


Display of a switch signal:



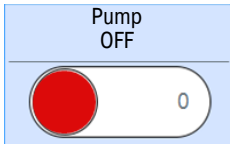
In case of an error, the signal blinks.

– Button



By pressing the button, the function stated in the button field is started.
An acknowledgement appears (when set).
Example: The button blinks during function execution.

– Switch



By pressing the switch, the function in the switch field is changed.
An acknowledgement appears (when set).
Example: The color of the switch changes and the switch blinks until the function is terminated (e.g.: a pump started).

- Parameter setting of the Measuring screen (see “Technical Information SCU” Manual)

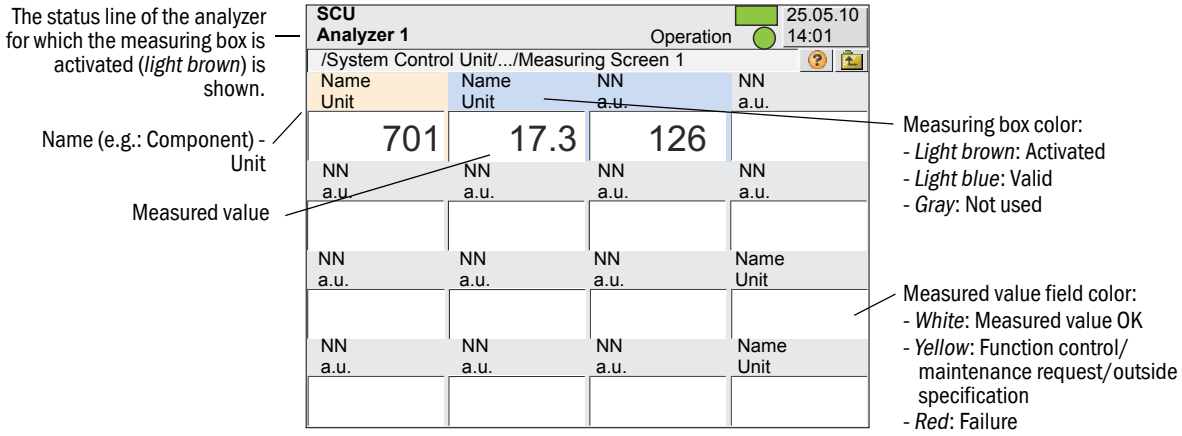
Refresh interval for display: Approx. 1 second

5.4.1 Measuring box (description)

A measuring box shows the measured value in *numeric* representation.

(Default setting of the measuring box: see “Technical Information SCU” Manual)

Measured value display example with 16 measuring boxes:

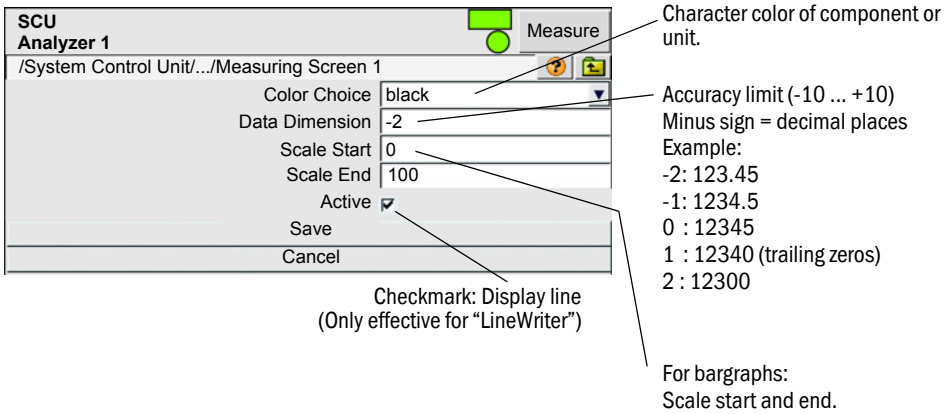


Touching a measuring box *activate*s the touched box.

- The activated box is highlighted in *light brown*.
  - *If NN* (instead of the component) or *a.u.* (instead of the unit) is displayed:
    -No measured value has been assigned.
  - The measuring box is highlighted in *gray*:
    The measuring box is not used (see “Technical Information SCU” Manual).
- The status of the analyzer to which the activated (*light brown*) box is assigned is shown in the Status bar.

Scaling (measuring box, bargraph, line writer)

Touching an *activated* measuring box calls up a screen to scale the measuring box:

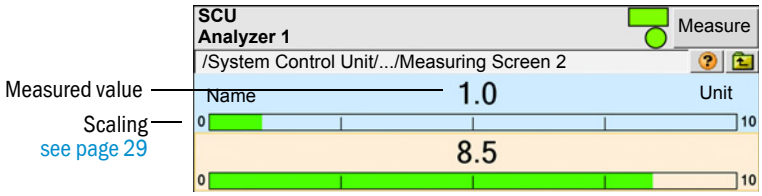


5.4.2 Bargraph representation (description)

The bargraph representation shows the measured value as a graphic bar.

(Default setting of the measuring box: see “Technical Information SCU” Manual)

Typical bar chart representation:



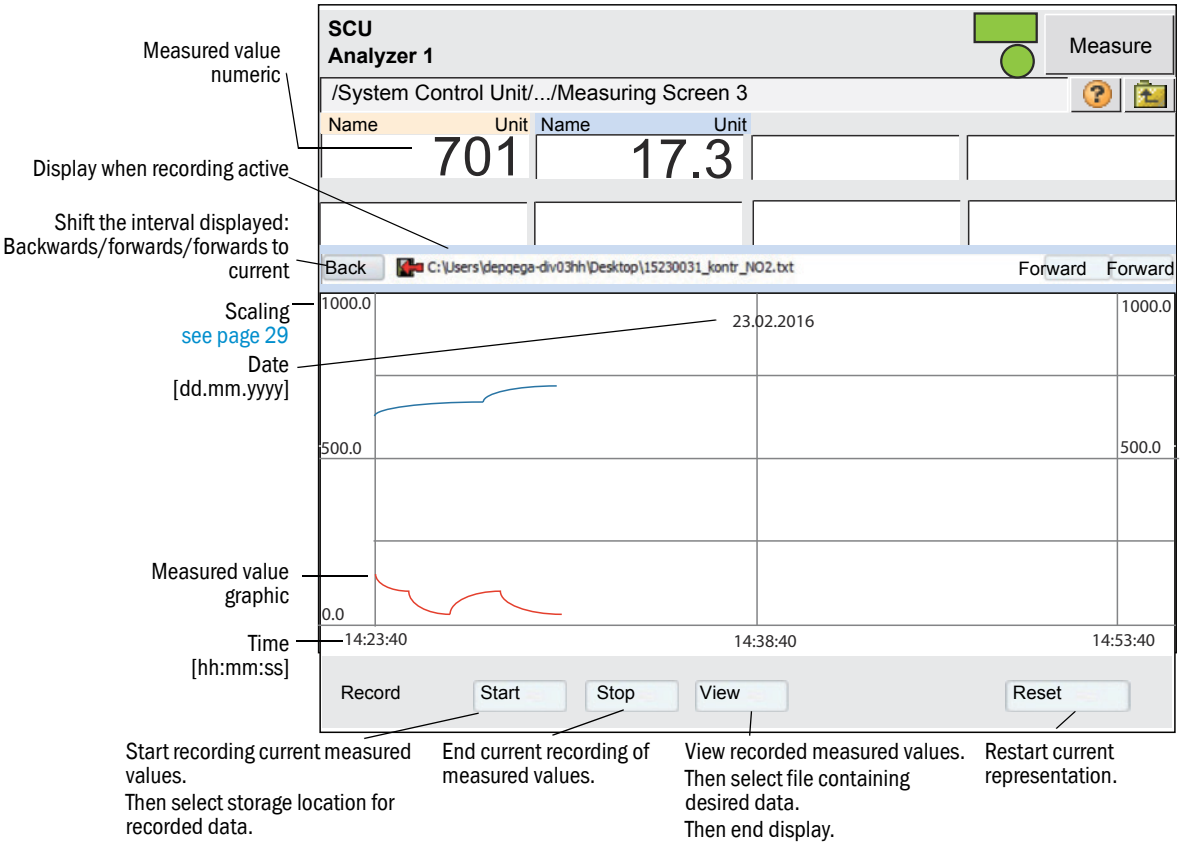
Significance and settings: see Measuring box (see “Measuring box (description)”, page 29)

5.4.3 Line writer (description)

The line writer shows a maximum of 8 measured values in an y-t diagram.

(Default setting of the line writer: see “Technical Information SCU” Manual)

Line writer example:



Significance and settings: see Measuring box (see “Measuring box (description)”, page 29)

5.5 Maintenance

5.5.1 Restart SCU

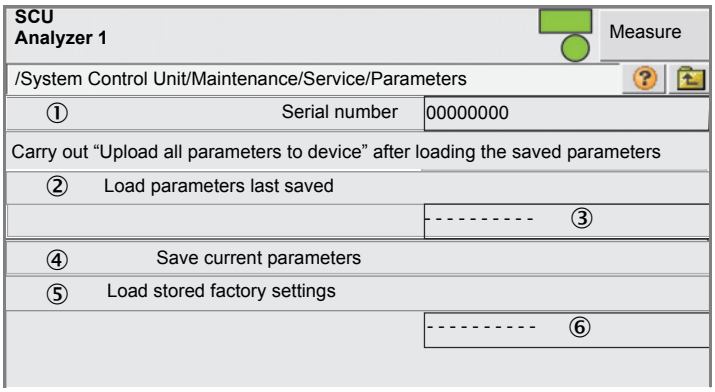
Menu: System Control Unit/Maintenance/Restart SCU
This menu serves to perform an SCU restart.

NOTE:
During a restart of the SCU, the analog and digital outputs have an undefined state for a short time.

5.5.2 Data backup - parameter settings

Activate saved parameters. 3 options are available:

- Save the current configuration
- Activate the parameter set last saved
- Reset to factory configuration



1 Software serial number
2 Button to load the parameter set last saved[1]
3 Date of the parameter set last saved
4 Button to save the current parameter set.
Caution: This will overwrite an existing saved parameter set
5 Loads the parameter set configured at the factory.
6 Date when the factory settings were created

[1] The timestamp remains empty when no data records exist or the software version and the saved data records do not match. This is typical during a software update. Any existing data records are kept so that these can be accessed when the matching version is restored.

Restart the SCU after restoring a saved parameter set.

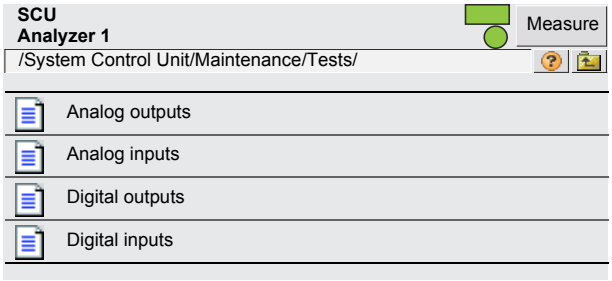
Loading saved data records or the factory settings is recorded in the logbook.

5.5.3 Tests

Menu: System Control Unit/Maintenance/Tests

This menu serves to test the analog and digital interfaces.

Required: “Service” user level.

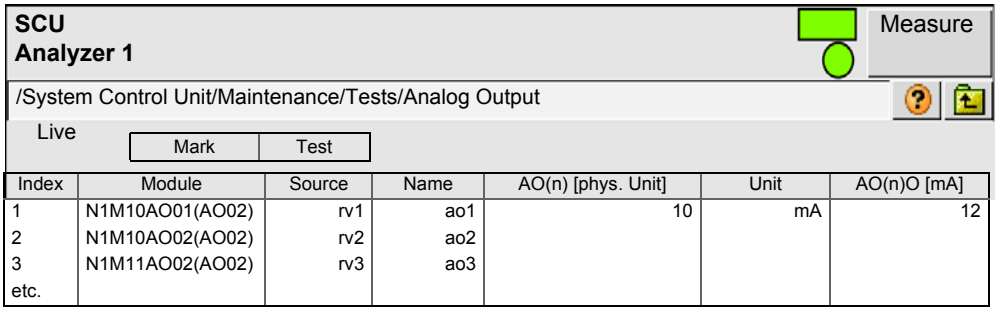


see page 33
see page 34
see page 35
see page 36

Explanation of the interface menu: see “Technical Information SCU” Manual

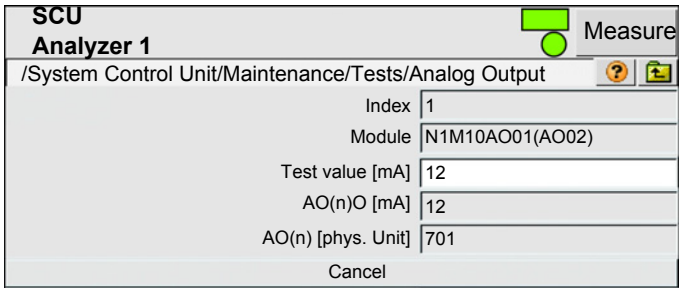
5.5.3.1 *Analog outputs*

Menu: System Control Unit/Maintenance/Tests/Analog Output



Index	Module	Source	Name	AO(n) [phys. Unit]	Unit	AO(n)O [mA]
1	N1M10AO01(AO02)	rv1	ao1	10	mA	12
2	N1M10AO02(AO02)	rv2	ao2			
3	N1M11AO02(AO02)	rv3	ao3			
etc.						

Test menu:

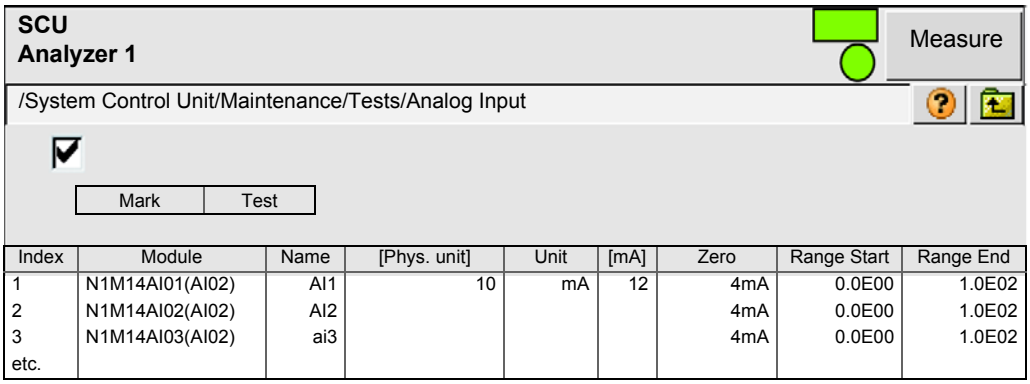


Designation	Remark
Live	Checkmark: The states are updated continuously. Deactivate “*Live*” before performing “*Test*”.
Mark	Mark line(s)
Test	Perform a test. Deactivate “*Live*” before performing “*Test*”.
Index	Number of the selected output. Appears automatically.
Module	Topographic addressing (see “Technical Information SCU” Manual). Appears automatically.
Source	Tag of source.
Name	Name of output. Appears automatically.
Test value [mA]	Input: Setpoint value of the current to be output. (Available only at “Service” user level).
AO(n)O [mA]	Actual value of the current output.
Unit	Unit.
AO(n) [phys. Unit]	Output value converted to the physical unit.

5.5.3.2 *Analog inputs*

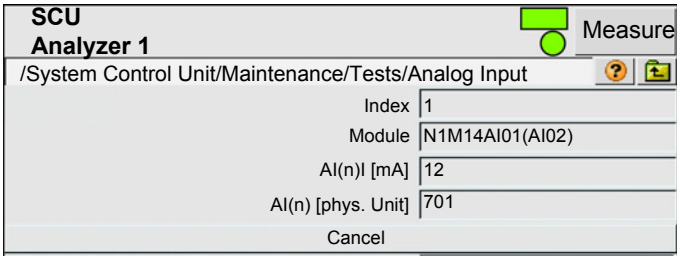
Menu: System Control Unit/Maintenance/Tests/Analog Input

Live



Index	Module	Name	[Phys. unit]	Unit	[mA]	Zero	Range Start	Range End
1	N1M14AI01(AI02)	AI1	10	mA	12	4mA	0.0E00	1.0E02
2	N1M14AI02(AI02)	AI2				4mA	0.0E00	1.0E02
3	N1M14AI03(AI02)	ai3				4mA	0.0E00	1.0E02
etc.								

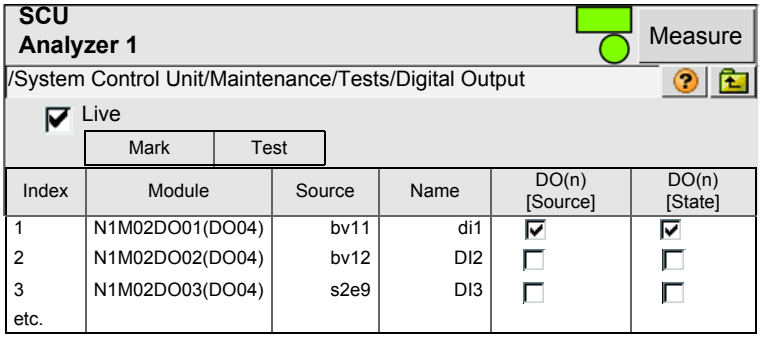
Test menu:



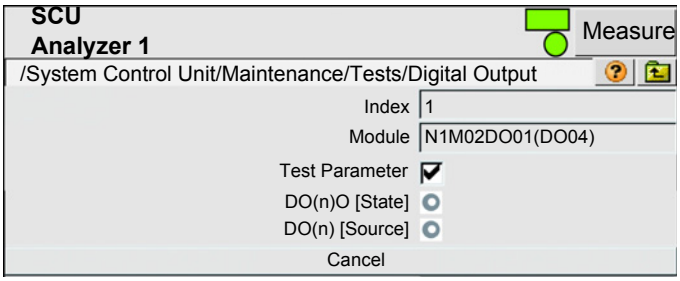
Designation	Remark
Live	Checkmark: The states are updated continuously. Deactivate “*Live*” before performing “*Test*”.
Mark	Mark line(s)
Test	Perform a test. Deactivate “*Live*” before performing “*Test*”.
Index	Number of the selected input. Appears automatically.
Module	Topographic addressing (see “Technical Information SCU” Manual). Appears automatically.
Name	Name of input. Appears automatically.
AI(n) [phys. Unit]	Converted physical measured value.
Unit	Unit of variable read in.
AI(n)I [mA]	Current measured on the analog input.
Zero	0/4 mA current at zero point.
Range Start	Measuring range start.
Range End	Measuring range end.

5.5.3.3 *Digital outputs*

Menu: System Control Unit/Maintenance/Tests/Digital Output.



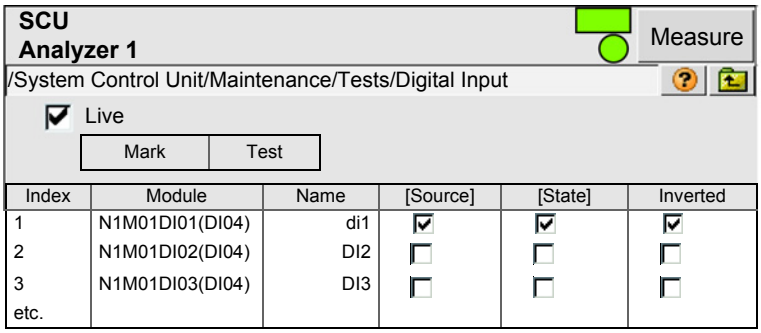
Test menu:



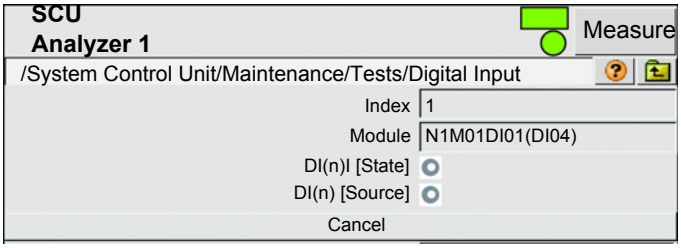
Designation	Remark
Live	Checkmark: The states are updated continuously. Deactivate “*Live*” before performing “*Test*”.
Mark	Mark line(s).
Test	Perform a test. Deactivate “*Live*” before performing “*Test*”.
Index	Number of the selected output. Appears automatically.
Module	Topographic addressing (see “Technical Information SCU” Manual). Appears automatically.
Source	Tag of source
Name	Name of output. Appears automatically.
Test Parameter	The checkmark shows the state of the source. The output signal is not considered. No checkmark: Physical contact should be open. Checkmark: Physical contact should be closed. (Available only at “Service” user level).
DO(n)O [State]	No checkmark or LED off: Relay open. Checkmark or LED on: Relay closed.
DO(n) [Source]	LED off: Program specification: Physical contact should be open. LED on: Program specification: Physical contact should be closed.

5.5.3.4 *Digital inputs*

Menu: System Control Unit/Maintenance/Tests/Digital Input



Test menu:



Designation	Remark
Live	Checkmark: The states are updated continuously. Deactivate "*Live*" before performing "*Test*".
Mark	Mark line(s).
Test	Perform a test. Deactivate "*Live*" before performing "*Test*".
Index	Number of the selected input. Appears automatically.
Module	Topographic addressing (see "Technical Information SCU" Manual). Appears automatically.
Name	Name of input. Appears automatically.
DI(n)I [Source]	No checkmark or LED off: Physical contact open. Checkmark or LED on: Physical contact closed.
DI(n) [State]	Computed value of [Source] ("Inverted" is taken into consideration).
Inverted	Checkmark: Inverted.

5.6 Adjustment

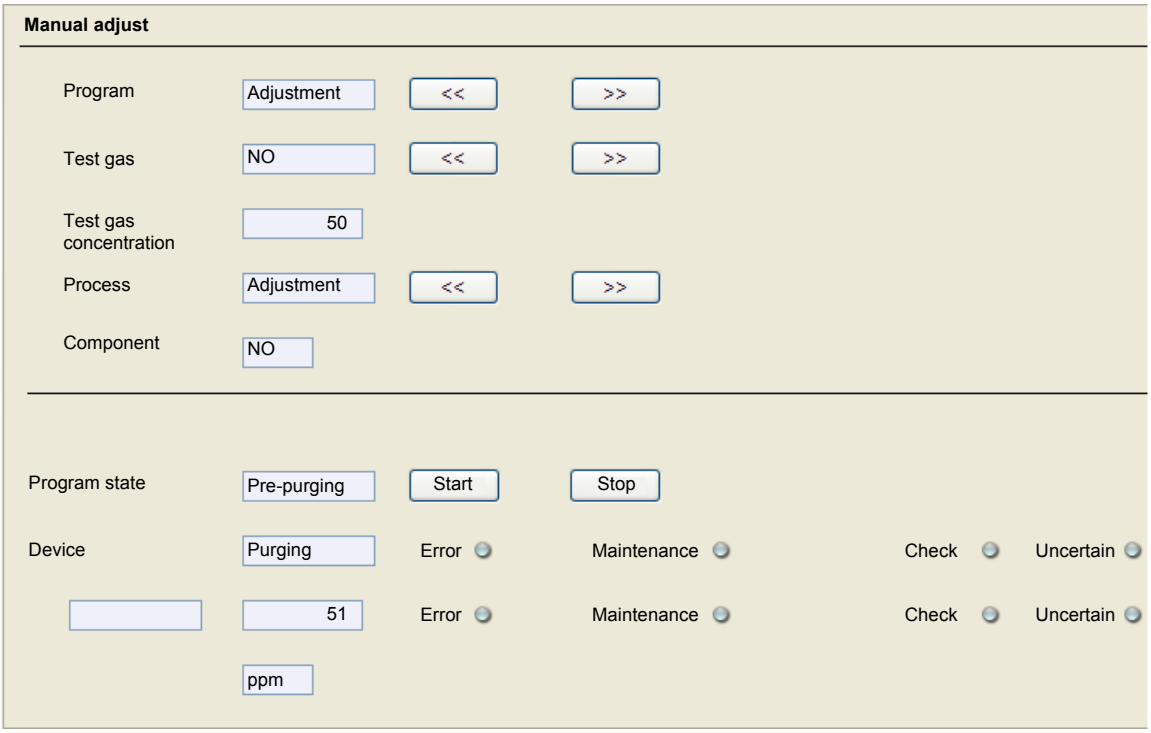
5.6.1 Manual Adjust

Menu: System Control Unit/Adjustment/Manual Adjust

Triggers an adjustment on an analyzer with a test gas.

Prerequisites:

- Parameters set for selection of a sequence control program (*Parameter/Sequence Controls/Manual Adjust*).
- Parameters set for the sequence control program specified there (*Parameter/Sequence Controls*).
- Optionally, parameters set for a Test Gas Table (*Parameter/Test Gas Table*).
- Optionally, an analyzer supporting tasks specific to measured values.



(For a better overview, this menu is displayed in “SOPAS ET” view.)

Designation	Remark
Program	This line accesses the parametrized sequence control program from the *Sequence Controls/Manual Adjust* Table. The identifier entered in the MAL list (see “Technical InformationSCU” Manual) is used as identifier. If an identifier is not entered there, the identifier of the selected SCU is used
Test gas	Selection of test gas name.
Test gas concentration	Test gas concentration inlet
Process	State control (e.g. pre-purging).
Component	Measuring component selection from the Test Gas Table, 'Usage' column. The selected entry also shows the measured value identifier, dimension identifier and the current value. A connection to the analyzer must exist in this case.
Program state (Start)	Adjustment start. The Start button creates the Formula interpreter command from the selected data to start a sequence control program with parameters P0..P5 and then starts the sequence control program with this command (see Manual Technical Information of the SCU): '!+SCi[P0\P1\P2\P3\P4\P5] = !+SCi[<MALj/Name>\TGk\Sm\SmMVn\SmMVnTAo\<MAk>] “SCi” is taken from the left box in the first line. – P0: Adjustment identifier from the first line; if empty, the parameter is also left empty. – P1: “TGi”, as specified in the left box in the second line. If empty, the parameter is also empty. The test gas can be opened or closed off during the sequential control. See the commandos !+TGi and !-TGi. – P2: "Si", sensor as shown in the left box in the 4th line. Read out and set the sensor state in the sequence control program. P2=Si: P3=SiMVj: Access the original measured value in the sequence control program. – P3: "SiMVj", Measured value reference as shown in the left box in the fourth line. P2=Si: P3=SiMVj: Access the original measured value in the sequence control program. – P4: "SiMVjTAk", Task reference as shown in the left box in the fourth line. Trigger a task in the sequence control program (see SiMVjTAkS=n) and query state (see x=SiMVjTAk). – P5: Selected line index from Sequence Controls/Manual Adjust. Can be used, e.g. for a GOTO instruction in the sequence control program (example, SCiS=#5\). The command !+SCi[\\\\\P3] is executed in minimum.
(Stop)	Stop executes “!-SCi”. The sequence control program terminates without executing further actions.
Device	Shows the task state of measured value processing (see SiMVj).
Empty fields	Status of the measured values. - Measuring component - Measured value - Unit

5.7 Diagnosis

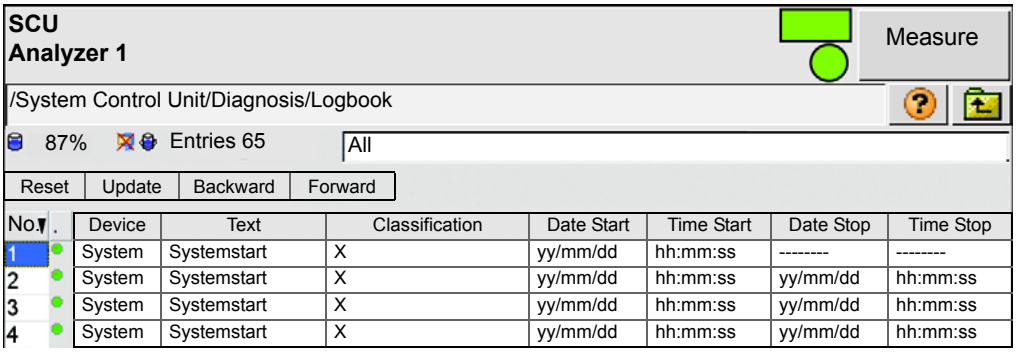
Menu: System Control Unit/Diagnosis

5.7.1 Logbook

Menu: System Control Unit/Diagnosis/Logbook

- The status of the following sources is entered in the logbook:
  - Connected analyzer
  - SCU itself
  - I/O of peripherals
- Max. number of entries: Approx. 5000.

(Representation: Uncompressed data storage)



Designation	Remark
	Fill level of logbook in %. When the characters are *red*: The logbook is full. Warning mode: Further entries are not accepted. Circular buffer mode: Oldest entries are overwritten.
	Data storage: Symbol *not crossed out*: Compressed. Symbol *crossed out*: Uncompressed. Significance and default setting: see “Technical Information SCU” Manual.
	Circular buffer mode Warning mode Significance and default setting: see “Technical Information SCU” Manual
Entries	Number of entries of selected filter.
Filter for messages	Only the filtered messages are shown. - Show active failures - Show all failures - Show active valuations - Show all valuations - Show active uncertain - Show all uncertain - Show active extended messages - Show all extended messages - Show active messages - Show all messages Classification see further on in this Table.
Reset	Clear all entries.

Designation	Remark
Export (Only in SOPAS ET)	All entries selected via the filter (see further back in this Table) are saved on the PC as .log file. Format: CSV (comma-separated list). Can be read in EXCEL, for example.
Update	Update display of logbook entries.
Backward	Scroll back.
Forward	Scroll forward.
▲▼	Sort in ascending/descending order. To switch sorting or change sequence: Touch column header.
	Consecutive message number. *Red* LED: Message still pending. *Green* LED: Message no longer pending.
Device	Triggering unit. Examples: – GM32(S2): Analyzer 2 (GM32) – P/GM32(S2MV6): Analyzer 2, measured value 6 – T/GM32(S2MV5): Analyzer 2, measured value 5 List of all tags: see “Technical Information SCU”. CO2 = measured component P = pressure value of GM32 T = temperature value of GM32 The names are equivalent to the measured variables provided by the analyzers.
Entries[1]	Number of times errors have occurred. Significance and default setting: see “Technical Information SCU” Manual.
Text	Logbook message. – Messages from SCU – Messages from connected analyzers
Classification	Classification according to NAMUR: – F = Failure – M = Maintenance – C = Check – U = Outside specification / Uncertain – E = Extended Some sensors provide additional statuses with classification “E”. These serve for internal control tasks, diagnosis etc. As standard, these statuses are not taken over into the logbook (see Manual “Technical Information SCU”, menu “Parameter/Logbook”).
Date Start	Format: yy/mm/dd For “*Uncompressed*”: Occurrence of message. For “*Compressed*”: Last occurrence of message.
Time Start	Format: hh:mm:ss For “*Uncompressed*”: Occurrence of message. For “*Compressed*”: Last occurrence of message.
Date Stop	Format: yy/mm/dd For “*Uncompressed*”: Clearing of message. For “*Compressed*”: Last clearing of message.
Time Stop	Format: hh:mm:ss For “*Uncompressed*”: Clearing of message. For “*Compressed*”: Last clearing of message.

[1]Only for compressed data storage

5.7.2 Logbook entries

Logbook entry	Description	Possible cause/ clearance[1]
Failure “F” classification in logbook, status field on operator panel (see “Measuring screen”, page 21) lights *red*		
DeviceOff	CAN bus connection failure.	Check: Address settings, baud rate, parameter records, lines and connections, allowable line lengths.
Mismatched	Analyzer software does not match the SCU data set.	Switch the SCU off and on again.
Maintenance Request “M” classification in logbook, status field on operator panel (see “Measuring screen”, page 21) lights *yellow*		
Extended “X/E” classification in logbook, no display of further information		
Status of IO modules	---	---
CONF (Config.Err)	Found modules do not comply with defaults.	Wrong module?: Adjust module with defaults.
COM (I2C-Communication)	Communication failure on node N0.	Check firm seating of I/O modules.
OVx	OV0 = 1. terminal, OV1 = 2. terminal, etc.	
	Input range of nth analog input was exceeded.	Check external power source.
	Desired current on nth analog output was not reached.	Check external load.
PFO (PowerFault)	Fault in internal voltages.	Check voltages on the CAN nodes.
Uncertain “U” classification in logbook, status field on operator panel (see “Measuring screen”, page 21) lights *yellow*		
Check “C” classification in logbook, status field on operator panel (see “Measuring screen”, page 21) lights *yellow*		

[1]If fault persists: Contact SICK Customer Service.

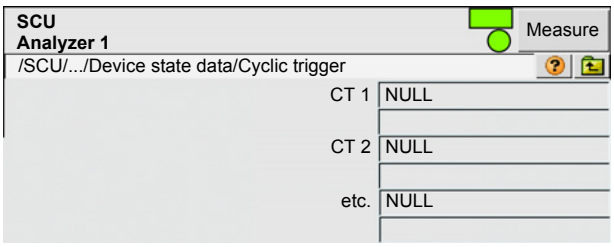
5.7.3 Device state data

5.7.3.1 *Cyclic trigger (CTi)*

Menu: System Control Unit/Diagnosis/Device state data/Cyclic Trigger

List of the next start timepoints.

Parameter settings of the cyclic trigger: see “Technical Information SCU” Manual.



Designation	Remark
CTi	Cyclic trigger name

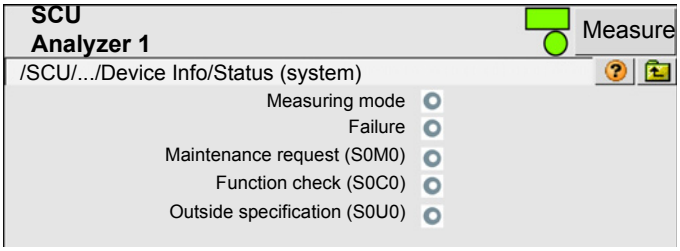
5.7.4 Device information

5.7.4.1 *Status (system)*

Menu: System Control Unit/Diagnosis/Device Info/Status (system)

This menu shows the system status.

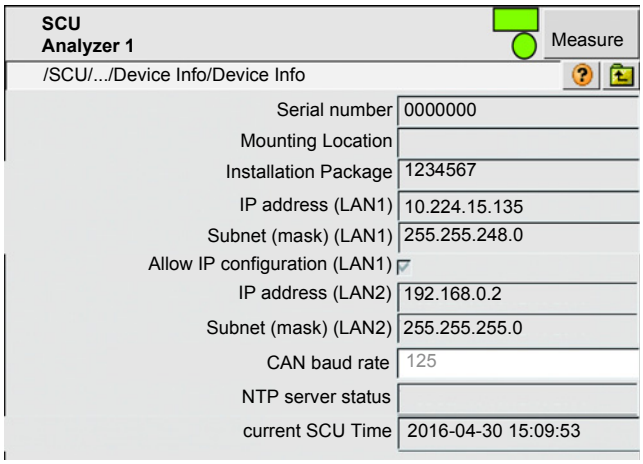
Significance of status: see “Status bars”, page 22



5.7.4.2 *Device information*

Menu: System Control Unit/Diagnosis/Device Info/Device Info

This menu shows device information of the SCU.



Have these numbers available when you have a service request concerning the SCU.

5.7.5 Validation results

Menu: System Control Unit/Diagnosis/Validation results

NOTE:
This menu only appears when an analyzer is connected.

“Validation” is equivalent to “drift check”.

The results of the last validation are shown here.

These values can be used for example for QAL3.

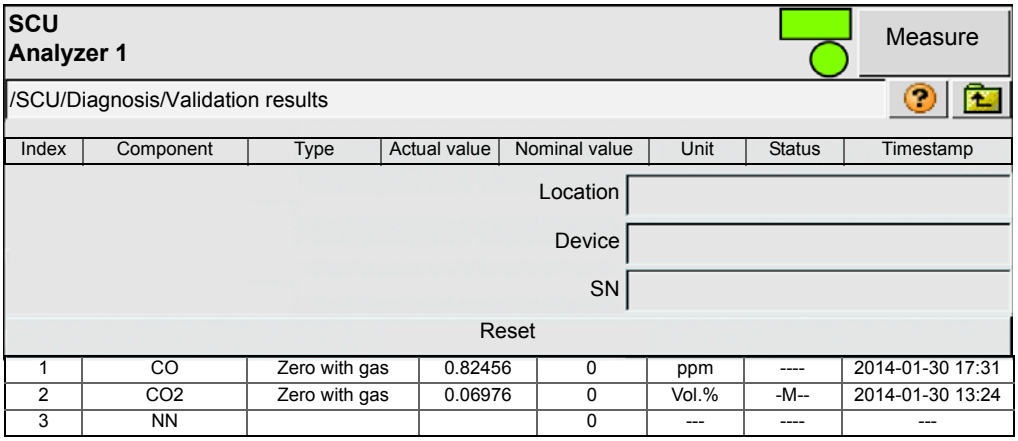
The validation serves to check deviations of a measured variable at different span points. The value of the respective span point is shown as nominal value and the result of the validation as actual value.

A validation can be performed with internal or external test media (e.g. test gas). Normally, at least the zero point and the 70% point (relative to the measuring range) of a component are checked.

The connected analyzer must support sending the values.

The validation can be performed:

- Internally or externally (test gas)
- Checking the zero value or a reference value



Index	Component	Type	Actual value	Nominal value	Unit	Status	Timestamp
1	CO	Zero with gas	0.82456	0	ppm	----	2014-01-30 17:31
2	CO2	Zero with gas	0.06976	0	Vol.%	-M--	2014-01-30 13:24
3	NN			0	---	----	---

Designation	Remark
Location	Name of measuring location (read out from analyzer).
Device	Device (read out from analyzer).
SN	Serial number (read out from analyzer).
Reset	Deletion of all table entries (for example after maintenance).
Index	Consecutive number
Component	Measured component
Type	Specification which value was determined with which test medium. Zero = zero gas or reference gas (test gas) external (with gas) or internal (without gas) (This information is always shown in English)
Actual value	Actual value
Nominal value	Nominal value
Unit	Unit (read out from analyzer).
Status	Classification according to NAMUR: – F = Failure – M = Maintenance – C = Check – U = Outside specification / Uncertain
Timestamp	Date and time when the drift value was registered. Date and time originate from the analyzer or, if the analyzer does not send them, from the SCU. Format: YYYY-MM-DD hh:mm

Tags for processing and exporting the file: see Manual “Technical Information SCU”

5.7.6 Adjustment results

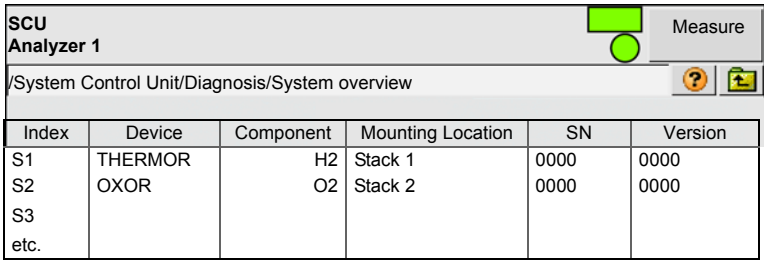
Menu: System Control Unit/Diagnosis/Adjustment results

“Adjustment results” is identical with “Validation results” (see above), however, the measuring results are adjusted to the nominal values.

5.7.7 System overview

Menu: System Control Unit/Diagnosis/System overview

This menu serves to display the analyzers connected to the SCU.



Index	Device	Component	Mounting Location	SN	Version
S1	THERMOR	H2	Stack 1	0000	0000
S2	OXOR	O2	Stack 2	0000	0000
S3					
etc.					

Designation	Remark
Index	Connected device. Index can be used in formulas.
Device	Name of connected device.
Component	Measuring component of connected device.
Mounting Location	Name of installation location.
SN	Serial number of connected device.
Version	Version number of connected device.

5.8 Parameter settings

Parameter settings see Manual “SCU Technical Information”

6 SOPAS Engineering Tool (SOPAS ET)

The SCU and the connected analyzers can also be operated via a PC with the SOPAS ET Engineering Tool.

SOPAS ET can be downloaded free of charge from the SICK website.

The menu structure and the representation of the menus are principally identical on the control unit and on SOPAS ET.

SOPAS ET offers more operating comfort than the operator panel when:

- Setting parameters of the SCU and connected analyzers.
- Displaying measured values of the analyzer directly or converted measured values from the SCU.

6.1 Installing SOPAS ET on the PC

1 Insert the installation CD in the PC.
2 If the installation does not start automatically: Call up “*setup.exe*”.
3 Follow the operating instructions of the program.

- For more information on SOPAS ET, see the Help menus of SOPAS ET and documents in the Installation directory of SOPAS ET.

7 Clearing Malfunctions

7.1 Faults on the monitor

Error	Possible cause	Remarks[1]
Monitor is blank. - "*POWER*" LED not on.	No voltage supply.	Check voltage supply (power supply unit) and supply lines.
- "*POWER*" LED on.	Monitor is defective.	SCU itself is ready for operation.
Monitor illuminates.	Program not running.	Switch the voltage supply (power supply unit) off and on.
Touch operation not possible.	Monitor is dirty.	When the monitor is dirty: Clean with a moist cloth, and liquid detergent if necessary.
Monitor too bright or too dark.	Monitor is defective.	Setting is not possible. Please contact SICK Customer Service.

[1]If fault persists: Contact SICK Customer Service.

7.2 Incorrect display of date and/or time

- ▶ Set time: *Menu: System Control Unit/Parameter/Device*: see "Technical Information SCU" Manual.
  The date is then automatically set.
- If the time is incorrect each time the unit is switched on:
  The battery in the SCU is empty.
  Have the battery replaced by SICK Customer Service.

7.3 A status field lights *yellow* or *red*

see "Status bars", page 22

7.4 Menu level line is highlighted *red*

The connection to the connected device (SCU or analyzer) is interrupted.

1 Go to the top menu level by touching  (see "Selecting analyzers and general setup", page 24).
2 Touch the *red* highlighted line of the SCU or analyzer: The SCU and the analyzer are connected again.
  If the connection is not established:
  – Check connection between the analyzer and SCU.
  – Restart SCU and analyzer and touch the line that is highlighted *red* again.

7.5 CAN communication interrupted

Check whether the terminating resistor is set correctly: see "CAN bus", page 16

8 Technical Documentation

8.1 Compliances

The technical design of this device complies with the following EU directives and EN standards:

- LVD 73/23/EEC
- EMC 89/336/EEC

- EN 61010-1, Safety requirements for electrical equipment for measurement, control and laboratory use
- EN 61326, Electrical equipment for measurement, control and laboratory use - EMC requirements
- EMC 92/31 /EC
- 93/68 / EC
- 93 /465 / EC
- EN61326 / A1 / A2 / A3

8.1.1 Electrical protection

- Insulation: Protection class 1 according to EN 61010-1.
- Contamination: The device operates safely in an environment up to degree of contamination 2 according to EN 61010-1 (usual, nonconductive contamination and temporary conductivity by occasional moisture condensation).
- Electrical energy: The wiring system to the supply voltage of the system must be installed and fused according to the relevant regulations.

8.2 Licenses

Exclusion of liability

The firmware for this device has been developed using Open Source Software. Any changes to the Open Source components are in the general responsibility of the user. All warranty claims are excluded in this case.

The following exclusion of liability applies to the GPL components in relation to the rights holders: This program is distributed in the hope that it will be of use, but with no guarantee of this; neither is there any implied guarantee of marketability or suitability for a particular purpose. Refer to the GNU General Public License for details.

With regard to the other Open Source components, we refer to the liability disclaimers of the copyright holders in the license texts on the CD delivered.

Software licenses

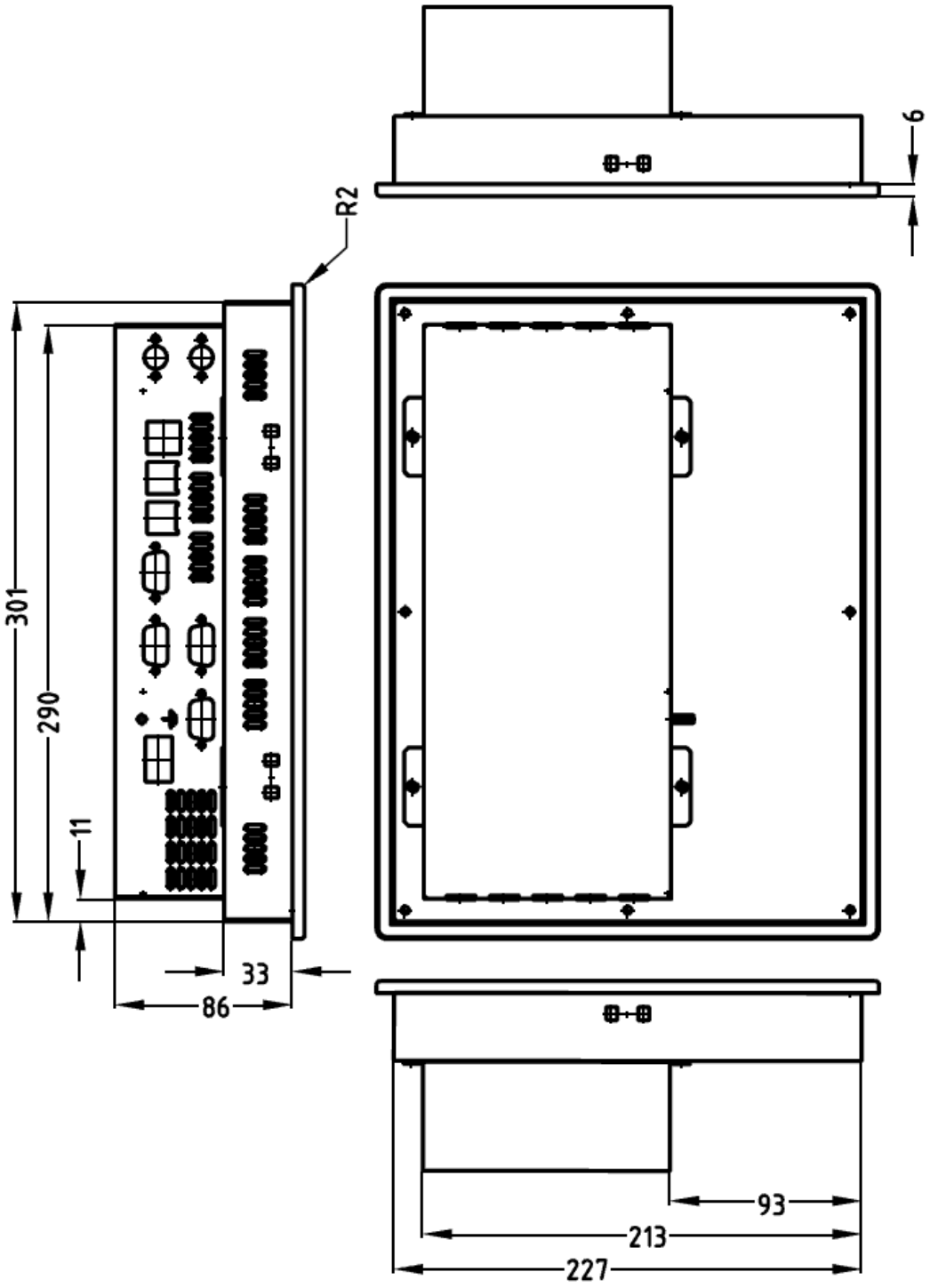
In this product, SICK uses unchanged and, as far is necessary and in compliance with relevant licence conditions, changed Open Source Software.

The firmware of this device is therefore subject to the copyrights listed on the CD delivered. Please refer to the CD delivered for a complete list of the Open Source programs used as well as the relevant license conditions.

Source codes

The source codes for the Open Source programs used in this device can be requested using the following e-mail address: Please enter as subject “Open Source Software”.

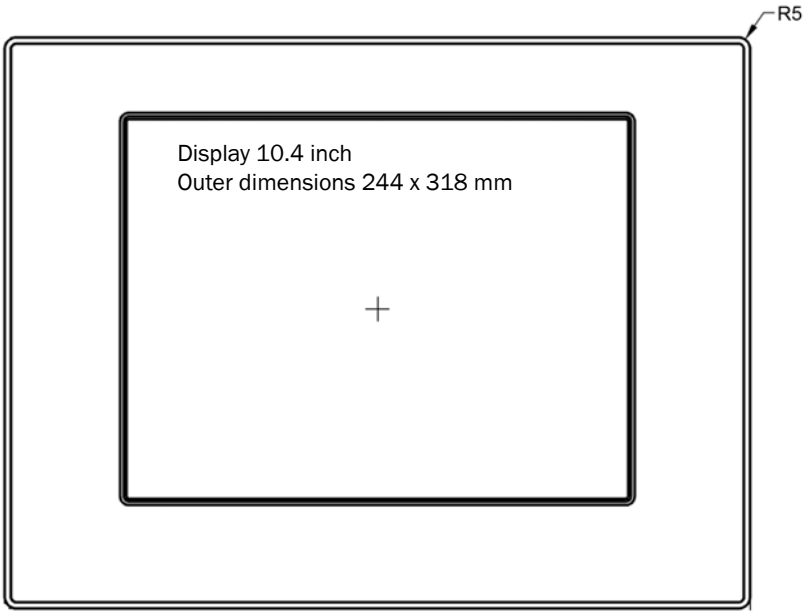
8.3 Dimensions and fitting opening

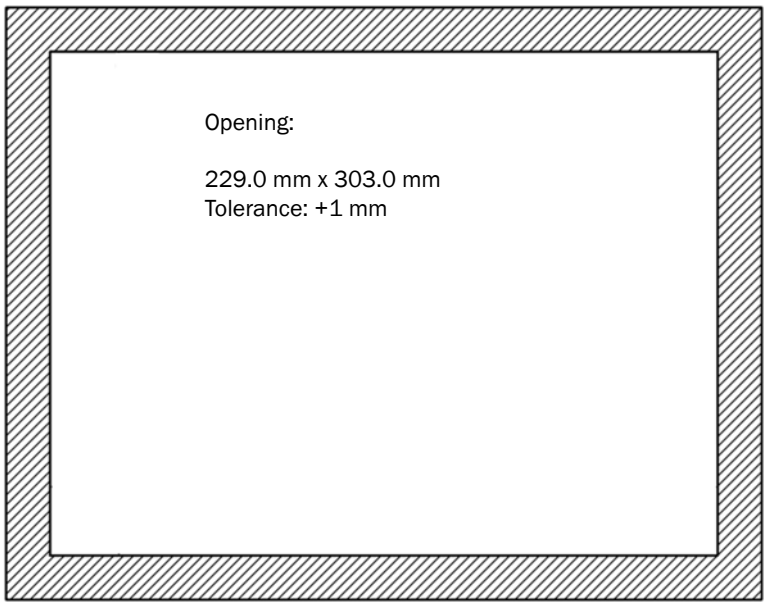


8.3.1 Fastening

- Opening: 303.0 mm x 229.0 mm (W x H)
- Tolerance: +1 mm
- Room for screws: 15 mm (around)
- Space required: 333.0 mm x 259.0 mm

▶ Fastening the operator panel:
Hang the delivered hooks in at the edge and use these to screw the operator panel tight.





8.4 Technical data

8.4.1 Panel

Part No.:	2056275
Touchscreen:	Touch-sensitive 10.4” color monitor, 262T colors, 800x600 pixels Front: Acid-resistant polyester foil
Operating temperature:	0 °C ... +50 °C (32...122 °F)
Storage temperature:	-20 °C ... +60 °C (0...140 °F)
Degree of protection:	IP 65 front-side
Storage medium:	2 GB CompactFlash-Card[1]
Weight:	Approx. 2.8 kg (60 lb)
Voltage supply:	24 V DC ± 20%
Power consumption:	Approx. 1.0 ... 1.5 A
Interfaces:	2 x Ethernet RJ45 1 x RS 485 SUB-D (Modbus) 2 x CAN ports, electrically isolated 2 x USB[2] 1 x PS2 (keypad)[2]

[1]Only use CompactFlash-Card from SICK (Part No.: 2056276, programmed)
[2]Not used

8.4.2 Data lines

Ethernet

Ethernet:	100 MBit/s line (100 BASE-T), plug: RJ45 Max. line length: 100 m Part No.: 6026084 (3 m)

RS485

Type:	ANSI/TIA/EIA-485-A-98
Impedance:	100 Ohm ± 20%
Loop resistance:	<100 Ohm/km
Capacitance per unit length:	< 80nF/km
Type:	Twisted pairs, shielded
Terminating resistor:	390 -220 - 390 Ohm

CAN bus

Overall length:	500 m (longer lengths available on request)
Surge impedance:	135 ... 165 Ohm (3 ... 20) MHz
Impedance:	120 Ohm ± 15%
Loop resistance:	<100 Ohm/km
Capacitance per unit length:	< 80nF/km
Type:	ISO 11898, twisted pair, shielded
Pin assignment Plug SUB-D 9-pole:	2 - CAN low, 3 - GND, 7 - CAN high Plug for terminating resistor (120 Ohm): see “CAN bus”, page 16

9 Glossary

CAN bus	Control Area Network. Field bus.
CompactFlash®-Card	Memory card.
Ethernet	Computer network technology. Basis for network protocols, e.g. TCP/IP.
Firewall	Safety concept of software and hardware components to restrict access to computer networks.
Modbus®:	Fieldbus communication protocol.
PROFIBUS®:	Fieldbus communication protocol.
OLE	Object Linking and Embedding. Standardized data Interface (Microsoft Corporation).
OPC	OLE (object link) for Process Control. Standardized data interface (OPC-FoundationTM).
SOPAS	(SICK Open Portal for Applications and Systems): SICK Parameter Setting and Data Calculation Software.
SOPAS ET	SOPAS PC Engineering Tool. Configuration protocol.
Tag	Identifier. How to program tags is described in the “SCU Technical Information” (for programmers).
TCP/IP	Network protocol.

10 Index

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