Endress+Hauser
People for Process Automation

Supplementary documentation

Liquiline CM44x, Liquiline CM44xR, Liquiline CM44P, Liquiline System CA80xx, Liquistation CSFxx

Data transmission via PROFIBUS DP®

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1 Note

1.1 About this manual

This supplementary document must only be used in conjunction with a field device Liquiline CM44x PROFIBUS DP, an analyzer Liquiline System CA80xx PROFIBUS DP or a sampler Liquistation CSFxx PROFIBUS DP.
This supplementary document is an integral part of the Operating Instruction and extends it with additional information for use with PROFIBUS DP.

Additional information is contained in the following Operating Instructions:

Operating Instructions	BA00444C
Operating Instructions	BA01225C
Operating Instructions	BA00443C
Operating Instructions	BA01240C
Operating Instructions	BA01570C

This document is aimed at individuals who are integrating the device into a PROFIBUS DP network. It is assumed that the reader has fundamental knowledge of PROFIBUS technology and the PA profile.

Additional information about PROFIBUS technology and the PA profile is available, for example, in the following document:

PROFIBUS® DP/PA Guidelines for Planning and Commissioning: Field Communication

You can download a soft copy of these guidelines from our website free of charge.

Furthermore, various guidelines on the installation and commissioning of a PROFIBUS network are available from the PROFIBUS User Organization (PI) at www.profibus.com.

1.2 Abbreviations

PI	PROFIBUS International (www.profibus.com)
n.a.	Not applicable
NaN	Not a Number (IEEE-754, 7Fh A0h 00h 00h)
ENP	Electronic name plate
I&M	Identification & Maintenance
AI	Analog Input (PA Profile function block)
DI	Discrete Input (PA Profile function block)
AO	Analog Output (PA Profile function block)
DO	Discrete Output (PA Profile function block)

2 Installation and wiring

Installation and wiring is described in detail in the operating instructions of each product.

In addition, please also follow the installation guide supplied by the PROFIBUS User Organization. An electronic copy can be downloaded free of charge from the PROFIBUS website.
http://www.profibus.com/downloads/installation-guide/

3 Commissioning

3.1 Note

The device starts once the supply voltage is applied. This process can take up to 2 minutes depending on the device configuration. PROFIBUS communication with the device is not possible during the start-up process.
When the PROFIBUS interface is ready for operation, this is signaled by the (green) PWR LED on the 485 module. This occurs, at the very latest, 10 to 30 seconds after the measuring screen has been displayed.

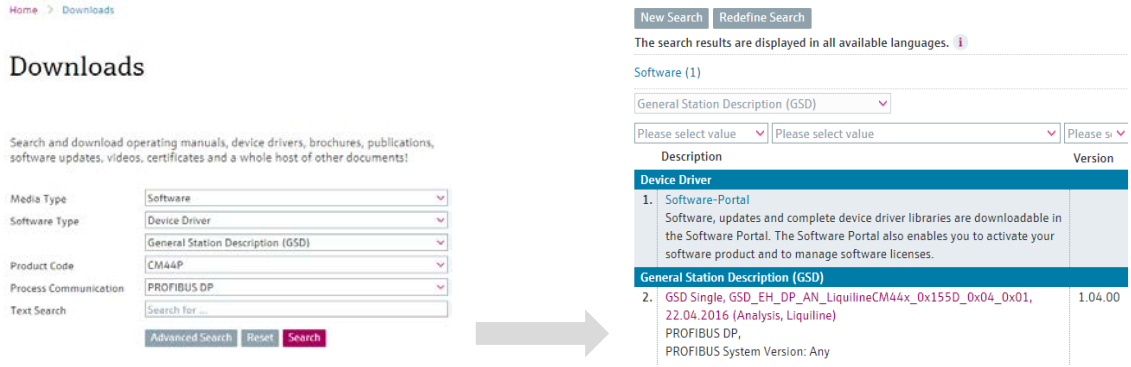
The 485 module provides the option of enabling bus termination via a 4-pin DIL slide switch. Here, the downstream PROFIBUS devices are not separated from the PROFIBUS-DP segment. The 485 module must be removed to activate the bus termination. If the 485 module is installed and supplied with voltage, the bus termination state is indicated by the T LED (yellow).

The user does not assign the process values to the function blocks via the channel parameters of the function blocks. The channel parameters have fixed values and are permanently linked to an IO Transducer Block. This IO transducer contains a device variable for each function block. The process values that are copied to these device variables are selected by the user via the device menu (onsite operation or Web server). This selection is not possible using PDM DD or DTM.

The process values are transmitted with their base unit. The unit can be changed to a unit that is compatible with the base unit via the PDM DD or via the DTM in the IO Transducer Block. It is not possible to change the unit of the PROFIBUS device variables via the device menu.

3.2 GSD file

The GSD file can be obtained from www.endress.com:



The following manufacturer-specific GSD files are available:

EH0155D.GSD	*Liquiline CM44x*
EH0155C.GSD	Liquistation CSFxx

Alternatively you can use the following PA profile GSD from www.profibus.com:

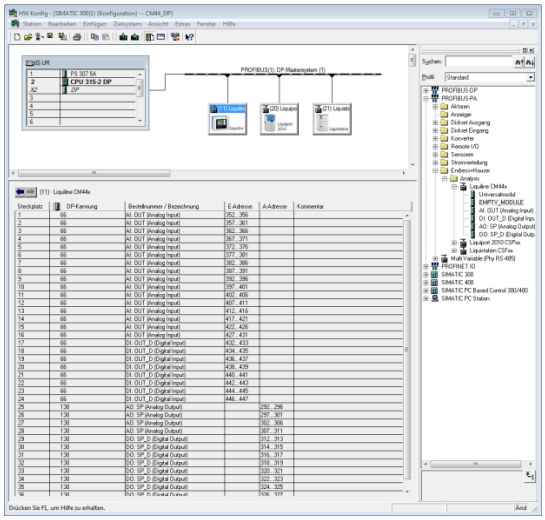
pa039760.gsd	Multi Variable (Phy RS-485)	Liquiline CM44x and Liquistation support these modules: EMPTY_MODULE, Analog Input (AI), SP, SP_D, OUT_D

We recommend you to use the manufacturer-specific GSD file as it is optimally adapted to the properties of the device.

3.2.1 Using the GSD file

The GSD file transmits the maximum number of modules during cyclic data exchange by default. You can remove not needed modules by replacing them with an “EMPTY_MODULE” in each case.

The arrangement and sequence of the modules may not be changed. The device checks the arrangement of the modules when establishing the connection. A change in the arrangement results in a configuration error in the diagnostic response. (Diagnostic telegram: Cfg_Fault).



3.2.2 Ident number

The active ident number defines the GSD file used to operate the device.

The following ident numbers are supported. A GSD file is assigned to each ident number.
The supported ident number is defined by the IDENTNUMBER_SELECTOR parameter in the Physical Block which can have the following values:

Identnumber_Selector	Identnumber	Selection	GSD file
= 128	*	Automatic (factory setting)	Automatic
= 0	9760	PA profile 3.02 (multi variable)	pa039760.gsd
= 1 or = 129	155C	Manufacturer specific (Liquistation CSFxx)	EH01155C.gsd
= 1 or = 128	155D	Manufacturer specific (Liquiline CM44x)	EH01155D.gsd
= 1 or = 131	155E	Manufacturer specific (Liquiline CA80xx)	EH01155E.gsd

The Ident_Number_Selector parameter is set to “Automatic” by default: the device adapts to the used GSD file if the file uses one of the listed ident numbers.

If you want to ensure that the device only works with a specific GSD file, you can change the IDENTNUMBER_SELECTOR parameter to the ident number for this GSD file. This parameter is located in the Physical Block and can also be configured via the Device menu.

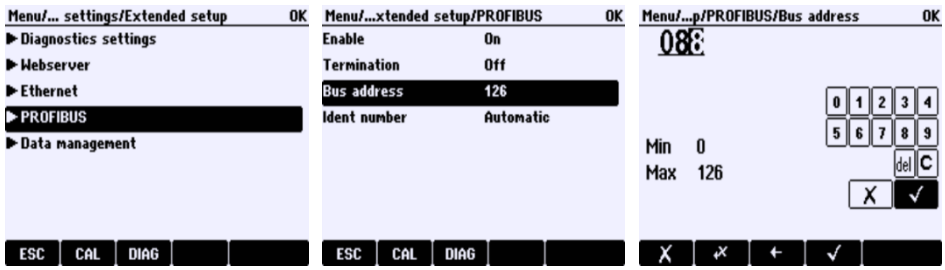
3.3 PROFIBUS address

- Each PROFIBUS device needs a unique address. Valid addresses are in the range between 0 and 126.
- The devices are delivered with software addressing. Address 126 has a special meaning and should be changed during commissioning.
- Addresses 0 to 2 are normally used for PROFIBUS masters.
- Hardware addressing has priority over software addressing.
- Hardware addressing is enabled if a valid address is configured using the DIL switches.
- A change to the DIL switches takes effect after 10 seconds.

The following ways to configure the PROFIBUS address are supported:

1. DIL switch on 485 module — Hardware addressing
2. Device menu — Software addressing
3. By PROFIBUS (Set_Slave_Address) — Software addressing

Example: Setting the address via the Device menu:



3.4 Miscellaneous

This section describes selected parameters that can be of particular interest in the context of commissioning.

3.4.1 Hardware write protection

If the write protection switch on the 485 module is set to ON, PROFIBUS write access via acyclic DPV1 communication is not possible. Cyclic DPV0 communication is not affected by the hardware write protection.

3.4.2 Locking local operation

Local operation of the device via PROFIBUS can be locked via the LOCAL_OP_ENA parameter in the Physical Block. A key symbol on the device display indicates that local operation is actively locked. Device locking is temporarily disabled if the device does not detect any PROFIBUS communication for at least 30 seconds.

0: Off: Local operation is locked.
1: On: Local operation is permitted. This is the default setting.

3.4.3 Reset

Writing the FACTORY_RESET parameter in the Physical Block can trigger a device restart. The following reset commands are supported:

1: Reset to factory defaults and restart. The bus address is not changed.
2506: Restart. The device settings are not changed.
2712: The bus address is changed to the default value 126. The No_Add_Chg_Flag of Set_Slave_Add service is cleared. The other device settings are not changed.

3.5 Local Operation: Menu

Menu item	Parameter	Access	Selection	Description
Diagnostics/System information/PROFIBUS	Termination	Read	On/off	
	Bus Address	Read	0 to 126	
	Ident nummer	Read	Active ident number, see above.	
	Baud rate	Read	Recognized PROFIBUS DP data transmission rate	
	DPV0 state	Read	Wait for param	The device is waiting for the parameterization telegram
			Wait for config	The device is waiting for the configuration telegram
			Data exchange	The device is exchanging data with the PROFIBUS master
	DPV0 fault	Read	No fault	
			Param fault	The parameterization telegram is faulty.
			Config fault	The configuration telegram is faulty.
			Param & config fault	The parameterization and configuration telegrams are faulty.
	DPV0 master addr	Read	0..255	Address of the PROFIBUS master
	DPV0 WDT [ms]	Read	0..65535	Active watchdog time
Setup/General Settings/Extended setup/PROFIBUS	Enable	Write	Off	PROFIBUS protocol can be disabled.
			On	
	Termination	Read	Off	Bus termination status that is indicated by the T LED.
			On	
	Bus Address	Write	0..126	Read only if the address is set via hardware.
	Ident nummer	Write	Automatic	Adapts to GSD file
			PA profile 3.02(9760)	PA Profile operation mode using the PA Profile GSD file.
			Manufacturer specific	The manufacturer specific GSD file is used.
Setup/Outputs/PROFIBUS			See next section	
Setup/Outputs/PROFIBUS assignment view			Displays the active assignment between device variables (function blocks) and measured values.	

3.5.1 Configuration of the PROFIBUS output: device variables

The device platform is based on a modular multi-channel, plug & play sensor concept.
Therefore there is no general relationship between the sensor measured value and a device variable. The device variable acts as a kind of place holder for measured values or actuating values that can be transmitted via PROFIBUS communication. The following device variables are available:

Abbreviation	Name	Info	Example
AI	Analog Input	Device variable that is read by the device	Read measured value
DI	Digital Input	Device variable that is read by the device	Read relay status
AO	Analog Output	Device variable that is written to the device	Setpoint
DO	Digital Output	Device variable that is written to the device	Start cleaning

Selection of the data source (process value) for the AI and DI function block:

Step	Menu	Action
1	Menu: Setup/Outputs/PROFIBUS	Select the AI or DI Block
2	.../AIx or DIx/Source of data	Select a sensor, for example
3	.../Aix or Dix/Measured value	Select a measured value, for example

Selection of the data sink (process value) for the AO and DO function blocks:

The device variables are selected in the menu of the function that uses the actuating value. You can select an AO or DO device variable as the data source for the individual function.

Note that the actuating value is transmitted along with a status via PROFIBUS. The device only accepts the actuating value if it's status has the value 128 (good), e.g. if DO1 is used as trigger for cleaning a sensor set value of DO1 to 1 and Status of DO1 to 128.

3.5.2 AI - Analog input (device → PROFIBUS)

The cyclic value with data type DS-101 is provided to PROFIBUS as output from a AI function block.

Path: Menu/Setup/Outputs/Profibus/AI 1 (Analog Input) ... AI 16 (Analog Input)

Function	Options	Info
Source of data	Options • None • Any data source Factory setting • None	The data sources presented for selection depend on your device version. You can choose from all the sensors connected to the inputs, controllers as well as mathematic functions and current inputs.
Measured value	Options • None • Depends on data source Factory setting • None	The measured value that you can choose depends on the option selected under "Source of data".

Table 1 AI analog values: available selction

Source of data	Selection	Unit
Current input	Current	A
	Parameter	A
Binary input	PFM value	keine
Controller	Bipolar	keine
	Unipolar+	keine
	Unipolar-	keine
pH Glass	Raw value mV	V
	Temperature	℃
	pH	pH
	Impedance glass	Ohm
Oxygen (amp.)	Temperature	℃
	Raw value nA	A
	Partial pressure	Pa
	Liquid concentration	kg/m^3
	Saturation	%
	Gas concentration	%Vol
Oxygen (opt. wastewater)	Temperature	℃
	Partial pressure	Pa
	Liquid concentration	kg/m^3
	Saturation	%
	Raw value µs	s
	Gas concentration	%Vol
pH ISFET	Raw value mV	V
	Temperature	℃
	pH	pH
	Leak current	A
ORP	ORP mV	V
	ORP %	%
	Temperature	℃
Conduct.cond.	Temperature	℃
	Conductivity	S/m
	Resistance	Ohm*m
	TDS	kg/m^3
	Temperature	℃
Induct.cond.	Temperature	℃

Source of data	Selection	Unit
	Conductivity	S/m
	Concentration	%
	TDS	kg/m^3
TU/TS	Turbidity FNU	FNU kg/m^3
TU	Turbidity FNU	FNU kg/m^3
Nitrate	NO3	kg/m^3
	NO3-N	kg/m^3
SAC	Temperature	℃
	SAC	1/m
	Transm.	%
	Absorption	keine
	COD	kg/m^3
	TOC	kg/m^3
	DOC	kg/m^3
	BOD	kg/m^3
ISE	Temperature	℃
	Raw value (1..4)	V
	Concentration (2..4)	kg/m^3
	pH	pH
	ORP mV	V
Ultrasonic interface	Interface	m
Chlorine	Temperature	℃
	Sensor current	A
	Concentration	kg/m^3
Photometer	Measurement value	
	2^{nd} measurement value	
	Raw measurement value	
	Raw meas. current	A
	Raw ref. current	A
	Lamp current	A
	Lamp voltage	V
	Raw meas. value	
	Raw 2^{nd} meas. value	

3.5.3 DI - digital input (device → PROFIBUS)

The cyclic value with data type DS-102 is provided to PROFIBUS as output from a DI function block.

Path: Menu/Setup/Ausgänge/Profibus/DI 1 (Digital Input) ... DI 8 (Digital Input)

Function	Options	Info
Function	Options • Off • Source value • Diagnostics Factory setting • Off	
If Function = Source value:		
Source of data	Options • None • Limitswitches • Alarmrelay • Relay • Binaryinputs Factory setting • None	The data sources presented for selection depend on your device configuration. For more information see operating manual.
If Function = Diagnostics:		
Operating mode	Options • as assigned • Namur M • Namur S • Namur C • Namur F Factory setting • as assigned	For more information see operating manual.
Hold behavior	Options • Freeze • None Factory setting • None	For more information see operating manual.

3.5.4 AO - Analog output (device ← PROFIBUS)

The cyclic value with data type DS-101 is provided by PROFIBUS as input to a AO function block.

Path: The device variables are selected in the menu of the function that uses the actuating value.

Liquiline CM44x, Liquiline System CA80xx, Liquistation CSFxx:
Menu/Setup/Additional functions/Limit switches/.../Source of data
Menu/Setup/Additional functions/Controllers/.../Controlled variable/Source of data
Menu/Setup/General settings/Logbooks/Data logbooks/Source of data
Menu/Display/User definable screens/.../Source of data

For more information see main operation manual. Basically the same connections for device variables are equivalent to the connections available for analog input and outputs:

A device variable AO corresponds to a current input and typically has the same connection possibilities.

3.5.5 DO - Digital output (device ← PROFIBUS)

The cyclic value with data type DS-102 is provided by PROFIBUS as input to a DO function block.

Path: The device variables are selected in the menu of the function that uses the actuating value.

Liquiline CM44x, Liquiline System CA80xx, Liquistation CSFxx, Liquiline CM44P:

Menu/Setup/Additional functions/Controllers/.../Controller Enable
Menu/Setup/Additional functions/Cleaning/.../Start signal
Menu/Setup/General settings/Hold settings/External hold
Menu/Setup/General settings/Logbooks/Data logbooks/Source of data
Menu/Setup/Inputs/Sensor/Extended setup/External hold/Source
Menu/Display/User definable screens/.../Source of data

Liquistation CSFxx only:

Menu/Sample-Program/Programsetup/Advanced/Startcondition
Menu/Sample-Program/Programsetup/Advanced/Startsignal
Menu/Sample-Program/Programsetup/Advanced/Stopcondition
Menu/Sample-Program/Programsetup/Advanced/Stopsignal
Menu/.../Advanced/Subprogramsetup/Samplemode
Menu/.../Advanced/Subprogramsetup/Samplesignal
Menu/.../Advanced/Subprogramsetup/Bottle change
Menu/.../Advanced/Subprogramsetup/Change signal
Menu/.../Advanced/Subprogramsetup/Subprogram-Activation
Menu/.../Advanced/Subprogramsetup/Activationsignal

Liquiline CM44P only:
Menu/Setup/Inputs/Photometer/Lamp control input
Menu/Setup/Inputs/Photometer/Extended setup/Ext. dataset control
Menu/Setup/Inputs/.../Extended setup/Measurement channel/Calib. settings/input optical zero
Menu/Setup/Inputs/.../Extended setup/Measurement channel/Calib. settings/input manual offset
Menu/Setup/Inputs/.../Extended setup/2nd measurement channel/ Calib. settings/input optical zero
Menu/Setup/Inputs/.../Extended setup/2nd measurement channel/ Calib. settings/input manual offset
For more information see main operation manual. Basically the same connections for device variables are equivalent to the connections available for analog input and outputs:

A device variable DO corresponds to a relay output and typically has the same connection possibilities.

3.5.6 Status

Each process value is linked to a status that provides information about the validity, and thereby the usability, of the particular process value. The status coding follows the definition of the PA profile 3.02 for Condensed Status.

Note:

Check the quality to determine whether the process value can be used. A status >= 128 indicates a usable value.

HEX	DEC	Quality	Substatus	Limits	Description
00	0	Bad	Non specific	OK	This status is only used by proxies to indicate that a device is not communicating.

HEX	DEC	Quality	Substatus	Limits	Description
23	35	Bad	Passivated	OK	This status is set by the device if a process value has not been configured or cannot be made available for other reasons. No diagnostic events are reported via the Slave_Diag service.
24	36	Bad	Maintenance Alarm	OK	The value cannot be used because of an error.
25	37	Bad		LO_LIM	
26	38	Bad		HI_LIM	
27	39	Bad		CONSTANT	
28	40	Bad	Process related	OK	The value cannot be used because of an issue that can be attributed to the process.
29	41	Bad		LO_LIM	
2A	42	Bad		HI_LIM	
2B	43	Bad		CONSTANT	
3C	60	Bad	Function Check	OK	The value cannot be used because of user intervention (e.g. calibration).
3D	61	Bad		LO_LIM	
3E	62	Bad		HI_LIM	
3F	63	Bad		CONSTANT	
4B	75	Uncertain	Substitute set	OK	A substitute value is configured and is used. This status is set by the fail-safe logic of a function block.
4F	79	Uncertain	Initial value	OK	Initial value if a measured value is not available.
68	104	Uncertain	Maintenance demanded	OK	The usability of the value depends on the application and must be assessed by the user.
69	105	Uncertain		LO_LIM	
6A	106	Uncertain		HI_LIM	
6B	107	Uncertain		CONSTANT	
73	115	Uncertain	Simulated value, Start	OK	Signals the start of the simulation of the output value of a function block.
74	116	Uncertain	Simulated value, End	OK	Signals the end of the simulation of the output value of a function block. The status remains active up to 10 seconds after the end of the simulation. The value cannot be used while the status is active.
75	117	Uncertain		LO_LIM	
76	118	Uncertain		HI_LIM	
77	119	Uncertain		CONSTANT	
78	120	Uncertain	Process related	OK	The process conditions are outside the operating range of the device. The value can have a limited quality or accuracy.
79	121	Uncertain		LO_LIM	
7A	122	Uncertain		HI_LIM	
7B	123	Uncertain		CONSTANT	

HEX	DEC	Quality	Substatus	Limits	Description
80	128	Good		OK	
81	129	Good		LO_LIM	
82	130	Good		HI_LIM	
83	131	Good		CONSTANT	
84	132	Good	Update event	OK	The value can be used. The function block triggered an update event, i.e. a parameter of the block with a static storage class has been changed.
85	133	Good		LO_LIM	
86	134	Good		HI_LIM	
87	135	Good		CONSTANT	
88	136	Good	Active advisory	OK	The value can be used and the block has an active alarm, e.g. if the OUT value of an AI Block exceeds the HI_LIM.
89	137	Good		LO_LIM	
8A	138	Good		HI_LIM	
8B	139	Good		CONSTANT	
8C	140	Good	Active critical	OK	The value can be used and the block has an active alarm.
8D	141	Good		LO_LIM	
8E	142	Good		HI_LIM	
8F	143	Good		CONSTANT	
A0	160	Good	Initiate fail safe	OK	
A1	161	Good		LO_LIM	
A2	162	Good		HI_LIM	
A3	163	Good		CONSTANT	
A4	164	Good	Maintenance required	OK	
A5	165	Good		LO_LIM	
A6	166	Good		HI_LIM	
A7	167	Good		CONSTANT	
A8	168	Good	Maintenance demanded	OK	
A9	169	Good		LO_LIM	
AA	170	Good		HI_LIM	
AB	171	Good		CONSTANT	
BC	188	Good	Function check	OK	The value can be used. The device is setting this status when the measurement value simulation is active.
BD	189	Good		LO_LIM	
BE	190	Good		HI_LIM	
BF	191	Good		CONSTANT	

4 Diagnostics

Diagnostic information for the device is provided through various mechanisms:

- LEDs of the 485 module
- Diagnostic telegram (DPV0)
- Parameter (DPV1)
- Status byte of cyclically transmitted process values

4.1 LED displays

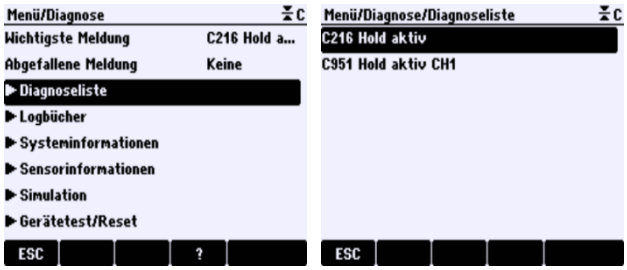
LED	Name	State	Description
PWR	Power	off	Not operational, during initialization
		green	Operational, PROFIBUS communication is possible
BF	Bus failure	off	
		red	No communication
		red, flashing	Diagnostics telegram reports Prm_Fault or Cfg_Fault
SF	System failure	off	
		red	Diagnostics telegram: EXT_DIAG = 1 is set. This bit is set if at least 1 diagnostic with the status "F" (Failure) is active.
COM	Communication	yellow	PROFIBUS request received (LED remains active for 1 second)
T	Termination	off	Bus termination is switched off.
		yellow	Bus termination is switched on.

PWR	BF	SF	Description	Remedy
off	off	off	No power supply or initialization	Check the power supply, check the diagnostics list.
on	off	on	NE107 status signal = F (Failure)	Check the diagnostics list.
on	on	off	No communication	Wrong address; Slave is not configured.
on	on	on	No communication NE107 status signal = F (Failure)	Wrong address; Slave is not configured. Check the diagnostics list.
on	flashing	off	Prm_Fault or Cfg_Fault	Check the configuration of the GSD file.
on	flashing	on	Prm_Fault or Cfg_Fault NE107 status signal = F (Failure)	Check the configuration of the GSD file. Check the diagnostics list.

4.2 Diagnostics parameters (DPV1)

The device displays the active diagnostic messages in a diagnostic list in the device menu. The diagnostic messages are ordered by priority.

Example:



The diagnostic with the highest priority for the device and for each of the sensor channels (up to eight) is mapped to PROFIBUS parameters. In addition to the active diagnostic message with the highest priority, the last withdrawn diagnostic message is also mapped to PROFIBUS parameters.
The device related diagnostic is assigned to the Physical Block. The sensor related diagnostics are assigned to the sensor transducer X pertaining to the channel.

Parameter Mnemonic	Description			
DIAGNOSIS				
DIAGNOSIS_EXTENSION	This parameter shows which sensors have active diagnose. Diagnose which is not connected to a sensor sets the Bit "General".			
	Byte	Bit	Message	Detailed information
	0	0	Sensor Channel 0	Sensor-Transducer 0
	0	1	Sensor Channel 1	Sensor-Transducer 1
	0	2	Sensor Channel 2	Sensor-Transducer 2
	0	3	Sensor Channel 3	Sensor-Transducer 3
	0	4	Sensor Channel 4	Sensor-Transducer 4
	0	5	Sensor Channel 5	Sensor-Transducer 5
	0	6	Sensor Channel 6	Sensor-Transducer 6
	0	7	Sensor Channel 7	Sensor-Transducer 7
	1	0	General	Physical Block
	1	1..7	Reserved	
	2..5		Reserved	
CURRENT_DIAG_SOURCETYPE	Source/Component which has diagnostics			
CURRENT_DIAG_MODUL	Module slot which reports this diagnostics			
CURRENT_DIAG_PORT	Port-Number at the module which reports this diagnostics			
CURRENT_DIAG_NE107_STATUS	Status signal according NAMUR NE107			
CURRENT_DIAG_CODE	Diagnostic code			
CURRENT_DIAG_TIMESTAMP	Timestamp			
NUMBER_ADDITIONAL_DIAG	Number of additional diagnostics events with lower priority			
LAST_DIAG_SOURCETYPE	Last withdrawn diagnostic CURRENT_DIAG_TYPE			
LAST_DIAG_MODUL	Last withdrawn diagnostic CURRENT_DIAG_MODUL			
LAST_DIAG_PORT	Last withdrawn diagnostic CURRENT_DIAG_PORT			
LAST_DIAG_NE107_STATUS	Last withdrawn diagnostic CURRENT_DIAG_CLASS			
LAST_DIAG_CODE	Last withdrawn diagnostic CURRENT_DIAG_CODE			
LAST_DIAG_TIMESTAMP	Last withdrawn diagnostic CURRENT_DIAG_OVERFLOW			

5 PROFIBUS telegrams

5.1 Configuration telegram

Octet	Name	Bit	Name	Description
1	Station_status	0..2	Reserved	
		3	WD_On	Watchdog active
		4	Freeze_Req	Freeze active
		5	Sync_Req	Sync active
		6	Unlock_Req	Unlock (has higher priority than Lock)
		7	Lock_Req	Lock
2	*WD_Fact_1*			*$T_{Watchdog}$ = 10 ms * WD_Fact_1 * WD_Fact_2* *After $T_{Watchdog}$ without communication the measuring devices detects a communication loss and leaves the data exchange with PROFIBUS.*
3	WD_Fact_2			
4	TSDR			Defines the time in T_{Bit} the slave has to wait until sending a reply to any request from a DP master. The value must be less than specified in the GSD for the selected baud rate.
5	Identnumber		High byte	CM44x = 15_h , CSFxx = 15_h
6	Identnumber		Low byte	CM44x = $5D_h$, CSFxx = $5C_h$
7	Group_Ident	0	Group 1	
		1	Group 2	
		2	Group 3	
		3	Group 4	
		4	Group 5	
		5	Group 6	
		6	Group 7	
		7	Group 8	
8	DPV1_Status_1			Fixed at 0x00
9	DPV1_Status_2			Fixed at 0x00
10	DPV1_Status_3			Fixed at 0x00
11				Fixed at 0x05
12				Fixed at 0x41
13				Fixed at 0x00
14				Fixed at 0x00
15				Fixed at 0x01
16				Fixed at 0xE1
...				Fixed at 0x00
240				Fixed at 0x00

Typically the configuration telegram is configured by the tool (e.g. TIA-Portal). The information of this chapter is only needed in case the configuration telegram needs to be constructed programmatically.

The configuration-telegram has this structure, when using the GSD file with a maximum configuration:

		Cfg_Data		Function Block
Slot	GSD modules	Index	String	Menu/Setup/Outputs/PROFIBUS
1	AI: OUT (Analog Input)	0	0x42,0x84,0x81,0x81,	AI01 (Analog Input)
2	AI: OUT (Analog Input)	4	0x42,0x84,0x81,0x81,	AI02 (Analog Input)
3	AI: OUT (Analog Input)	8	0x42,0x84,0x81,0x81,	AI03 (Analog Input)
4	AI: OUT (Analog Input)	12	0x42,0x84,0x81,0x81,	AI04 (Analog Input)
5	AI: OUT (Analog Input)	16	0x42,0x84,0x81,0x81,	AI05 (Analog Input)
6	AI: OUT (Analog Input)	20	0x42,0x84,0x81,0x81,	AI06 (Analog Input)
7	AI: OUT (Analog Input)	24	0x42,0x84,0x81,0x81,	AI07 (Analog Input)
8	AI: OUT (Analog Input)	28	0x42,0x84,0x81,0x81,	AI08 (Analog Input)
9	AI: OUT (Analog Input)	32	0x42,0x84,0x81,0x81,	AI09 (Analog Input)
10	AI: OUT (Analog Input)	36	0x42,0x84,0x81,0x81,	AI10 (Analog Input)
11	AI: OUT (Analog Input)	40	0x42,0x84,0x81,0x81,	AI11 (Analog Input)
12	AI: OUT (Analog Input)	44	0x42,0x84,0x81,0x81,	AI12 (Analog Input)
13	AI: OUT (Analog Input)	48	0x42,0x84,0x81,0x81,	AI13 (Analog Input)
14	AI: OUT (Analog Input)	52	0x42,0x84,0x81,0x81,	AI14 (Analog Input)
15	AI: OUT (Analog Input)	56	0x42,0x84,0x81,0x81,	AI15 (Analog Input)
16	AI: OUT (Analog Input)	60	0x42,0x84,0x81,0x81,	AI16 (Analog Input)
17	DI: OUT_D (Digital Input)	64	0x42,0x81,0x83,0x81,	DI01 (Digital Input)
18	DI: OUT_D (Digital Input)	68	0x42,0x81,0x83,0x81,	DI02 (Digital Input)
19	DI: OUT_D (Digital Input)	72	0x42,0x81,0x83,0x81,	DI03 (Digital Input)
20	DI: OUT_D (Digital Input)	76	0x42,0x81,0x83,0x81,	DI04 (Digital Input)
21	DI: OUT_D (Digital Input)	80	0x42,0x81,0x83,0x81,	DI05 (Digital Input)
22	DI: OUT_D (Digital Input)	84	0x42,0x81,0x83,0x81,	DI06 (Digital Input)
23	DI: OUT_D (Digital Input)	88	0x42,0x81,0x83,0x81,	DI07 (Digital Input)
24	DI: OUT_D (Digital Input)	92	0x42,0x81,0x83,0x81,	DI08 (Digital Input)
25	AO: SP (Analog Output)	96	0x82,0x84,0x82,0x82,	AO01 (Analog Output)
26	AO: SP (Analog Output)	100	0x82,0x84,0x82,0x82,	AO02 (Analog Output)
27	AO: SP (Analog Output)	104	0x82,0x84,0x82,0x82,	AO03 (Analog Output)
28	AO: SP (Analog Output)	108	0x82,0x84,0x82,0x82,	AO04 (Analog Output)
29	DO: SP_D (Digital Output)	112	0x82,0x81,0x84,0x82,	DO01 (Digital Output)
30	DO: SP_D (Digital Output)	116	0x82,0x81,0x84,0x82,	DO02 (Digital Output)
31	DO: SP_D (Digital Output)	120	0x82,0x81,0x84,0x82,	DO03 (Digital Output)
32	DO: SP_D (Digital Output)	124	0x82,0x81,0x84,0x82,	DO04 (Digital Output)
33	DO: SP_D (Digital Output)	130	0x82,0x81,0x84,0x82,	DO05 (Digital Output)
34	DO: SP_D (Digital Output)	134	0x82,0x81,0x84,0x82,	DO06 (Digital Output)
35	DO: SP_D (Digital Output)	138	0x82,0x81,0x84,0x82,	DO07 (Digital Output)
36	DO: SP_D (Digital Output)	142	0x82,0x81,0x84,0x82	DO08 (Digital Output)

You can reduce the volume of data transmitted cyclically via PROFIBUS by replacing individual modules by a place holder module "EMPTY_MODULE". The place holder module has the string "0x00".

Note:

Retaining the maximum configuration has the advantage that you can connect additional measured values to the AI Blocks at any time via the Device menu and transmit these values without having to change the PROFIBUS configuration.

5.2 Diagnosis response telegram (DPV0)

A PROFIBUS slave reports a changed diagnose state in cyclic data exchange by sending a high priority data telegram. This triggers a Diagnosis request telegram from the PROFIBUS master, which is return replied with the following telegram.

Octet	Name	Bit	Name	Description
1	Station_status_1	0	Station_Non_Existent	Station does not exist
		1	Station_Not_Ready	Slave is not ready for data exchange
		2	Cfg_Fault	Error in the configuration telegram
		3	Ext_Diag	Extended diagnostics occurs in the telegram = 1: Severity = Alarm (Failure / Maintenance Alarm); = 0: Severity = Ok or Status/Warning
		4	Not_Supported	The requested function is not supported by the slave.
		5	Invalid_Slave_Response	Invalid response from slave (is set by the master)
		6	Prm_Fault	Error in parameterization telegram
		7	Master_Lock	Slave is locked by another master
2	Station_status_2	0	Prm_Req	Slave must be parameterized again
		1	Stat_Diag	Static diagnostics
		2	--	Fixed at 1
		3	WD_On	Watchdog on
		4	Freeze_Mode	Freeze command received
		5	Sync_Mode	Sync command received
		6	--	Fixed at 0
		7	Deactivated	Slave is disabled (is set by the master)
3	Station_status_3	0..6	--	Fixed at 0
		7	Ext_Diag_Overflow	Slave has more diagnostics information than can be contained in the telegram.
4	Diag_Master_Add			Address of the master after parameterization Default is 255 (FFh)
5	Ident_Number_High			Ident number high byte
6	Ident_Number_Low			Ident number low byte

Octet	Name	Bit	Name	Description
7	Header_Octet			Fixed at 0x80
8	Status_Type			Fixed at 0x80
9	Slot_Number			Fixed at 0
10	Specifier	0..1		1 = Status is coming 2 = Status is going
	Status_Type	2..7		Fixed at 0xFE
11	Diagnosis[0]			Fixed at 0
12	Diagnosis[1]	0..2	--	Fixed at 0
		3	DIA_WARMSTART	The device has been rebooted.
		4	DIA_COLDSTART	The device has been reset to its factory settings.
		5	DIA_MAINTENANCE NE107: Maintenance Required	The device still measures correctly. Immediate measures are not necessary. However, proper maintenance efforts would prevent a possible malfunction in the future.
		6	--	Fixed 0
		7	IDENT_NUMBER_VIOLATION	The ident number does not match the parameter IDENT_NUMBER_SELECTOR in the Physical Block.
13	Diagnosis[2]	0	DIA_MAINTENANCE_ALARM NE107: Failure	The measured value of the affected channel is no longer reliable. The cause of the problem is to be found in the measuring point. Any controller connected should be set to manual mode.
		1	DIA_MAINTENANCE_DEMANDED	Fixed at 0
		2	DIA_FUNCTION_CHECK NE107: Function Check	Maintenance work is being performed on the device. Wait until the work has been completed.
		3	DIA_INV_PRO_COND NE107: Out of Specification	The measuring point is being operated outside specifications. Operation is still possible. However, you run the risk of increased wear, shorter operating life or lower accuracy levels. The cause of the problem is to be found outside the measuring point.
		4..7	--	Fixed at 0
14	Diagnosis[3]	0..6	--	Fixed at 0
		7	EXTENSION_AVAILABLE	Fixed at 0

6 Plant asset management (PAM)

The following device drivers are available to integrate the device into the process automation system.

PAM Tool	Technology	Functionality
Simatic PDM®	EDD	Configuration of the PA Profile function blocks Display the available measured values Display diagnostic and service-related functionalities Upload/download of the contained parameters
Fieldcare®	FDT/DTM	Configuration of the PA Profile function blocks Display the available measured values Display diagnostic and service-related functionalities Upload/download of the parameters in the DTM
Web server	Browser	Configuration of the device

Note:

Device operation is only possible to a limited extent via the DD or the DTM. Full access to the Device menu is supported via the integrated Web server. You can connect to the Web server via the Ethernet interface of the 485 module or via the service interface of the device.
To access the Web server via the service interface you require the CDI (FXA291) DTM which is part of the Service DTM Library. You can find more information about the Web server in the Web server guideline.

Note:

The function to upload or download the device parameterization is limited to the parameters contained in the DD or DTM. On the device, complete device parameterization backup and restore is possible using an SD card.

6.1 How to acquire the PDM DD

The PDM DD can be downloaded from our homepage via the following link.

www.endress.com

6.2 How to acquire the DTM

The DTM can be downloaded from our homepage via the following link.

www.endress.com

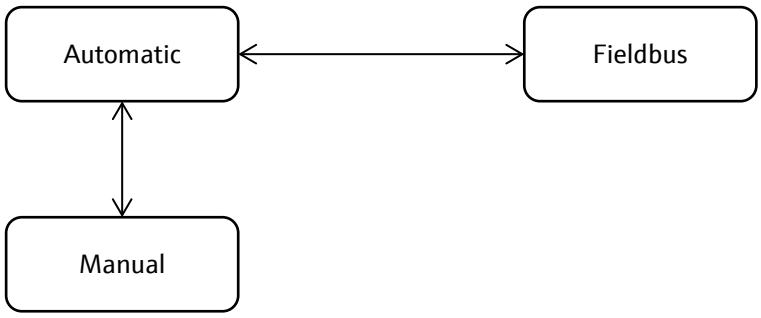
7 Applications

7.1 CA80xx: How to start Measurement, Calibration and Cleaning

This chapter applies only to the Liquiline CA80xx analyzer.

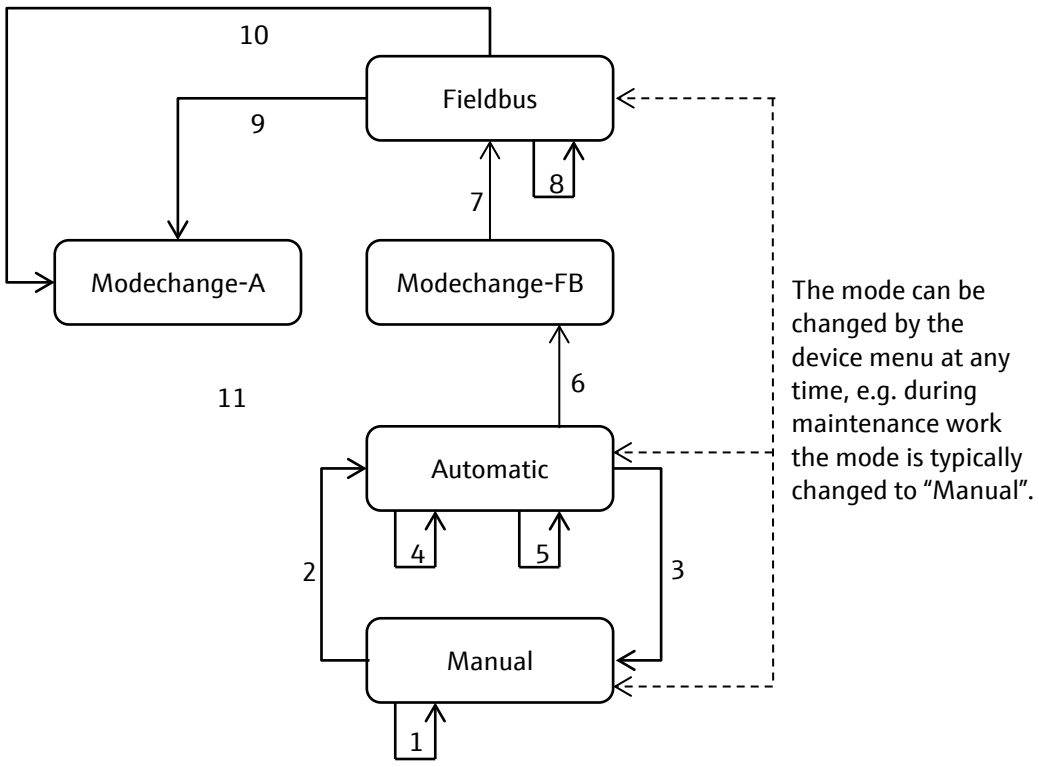
The actions “Measurement”, “Calibration” and “Cleaning” can be controlled by PRFOIBUS DP while the analyzer is in the operation mode “Fieldbus”.

The operation mode “Fieldbus” can be activated either by PROFIBUS DP or the device menu.



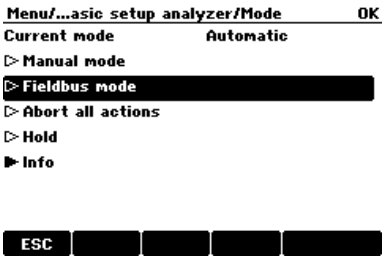
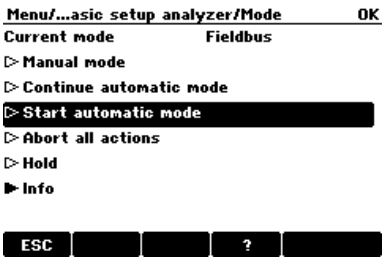
Important:
A change of the operation mode does not interrupt a pending action. A new action can only be started after the pending action has finished or is aborted.

The following state diagram describes the operation mode and state transitions.



#	Current state	Condition -> Action	Next state
1	Manual	-> MODE_CHANGE_STATE:=3 ACTION_REQUEST_STATE:=2	Manual
2	Manual	Mode Automatic -> MODE_CHANGE_STATE:=1 ACTION_REQUEST_STATE:=2	Automatic
3	Automatic	Mode Manual -> MODE_CHANGE_STATE:=3 ACTION_REQUEST_STATE:=2	Manual
4	Automatic	MODE_CHANGE_REQUEST:=0 -> MODE_CHANGE_STATUS:=1, ACTION_REQUEST_STATE:=2	Automatic
5	Automatic	MODE_CHANGE_REQUEST:=1 and mode change is not possible -> MODE_CHANGE_STATE:=3, ACTION_REQUEST_STATE:=2	Automatic
6	Automatic	MODE_CHANGE_REQUEST:=1 and mode change is accepted -> MODE_CHANGE_STATUS:=2, ACTION_REQUEST_STATE:=2	Modechange -FB
7	Modechange-FB	Mode change finished -> ACTION_REQUEST_STATE:=1, ACTION_REQUEST_STATE:=0	Feldbus
8	Feldbus	See “Fieldbus status machine”	Feldbus
9	Feldbus	MODE_CHANGE_REQUEST:=2 -> MODE_CHANGE_STATUS:=2	Modechange -A
10	Feldbus	MODE_CHANGE_REQUEST:=3 -> MODE_CHANGE_STATE:=1, ACTION_REQUEST_STATE:=2, Time-controlled programs are restarted with the current time.	Modechange -A
11	Modechange -A	Mode changed finished -> MODE_CHANGE_STATE:=1 ACTION_REQUEST_STATE:=2	Automatic

7.1.1 Activate “Fieldbus”-mode using the device menu

Step	Action	Result
1	Press the soft key “MODE” to enter the menu in which the operation mode can be selected.	
2	Activate the “Fieldbus mode”.	

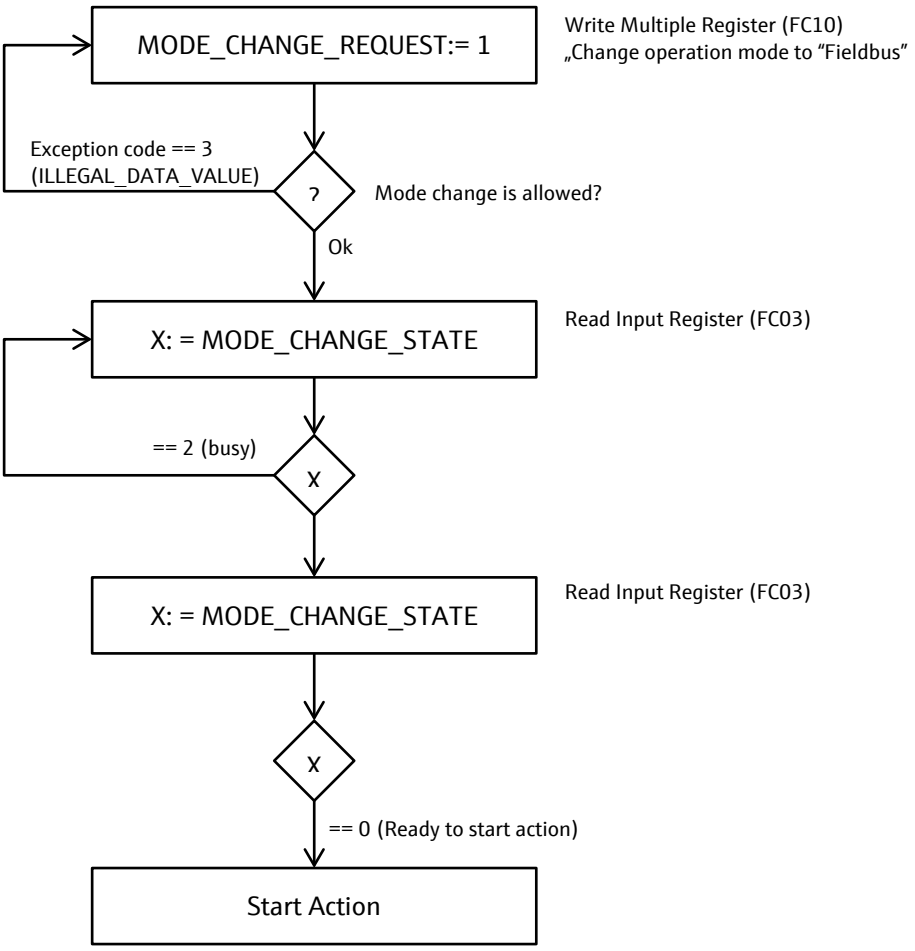
The operation mode can be changed at any time using the device menu. The setting of the device menu has priority over the setting by PROFIBUS DP. This is a safety measure to prevent the start of actions over PROFIBUS DP while the analyzer is in operation mode “Manual” during maintenance work.

Important:
A change from “Manual” directly to “Fieldbus” is now allowed by PROFIBUS DP. PROFIBUS DP can only change from the operation mode “Automatic” to “Fieldbus”.

7.1.2 Activate “Fieldbus”-mode using PROFIBUS DP

The following diagram shows an example sequence without error handling. The application program should at least consider the following additional cases:

- The analyzer is not reachable by PROFIBUS DP communication, e.g. because it is switched off
- A write access to a register fails and an exception code is returned in the PROFIBUS DP reply
- A read access to a registers fails and an exception code is returned in the PROFIBUS DP reply



The following examples in Pseudocode show how a program can access the functionality over PROFIBUS DP.

```
// Example program (Pseudocode)
Write ModeChangeRequest "Fieldbus"
IF Write access returns error
   Abort procedure with error
DO
   Read ModeChangeStatus
WHILE ModeChangeStatus is "Busy"
IF ModeChangeStatus is NOT "WaitingForRequest"
   Abort procedure with error
// now fieldbus mode is active
```

7.1.3 How-to execute actions

7.1.3.1 How-to execute a Measurement

The analyzer has to be in the operation mode "Fieldbus" to start an action. The current operation mode can be verified by pressing the soft-key labeled "MODE" at the device menu or by reading the PROFIBUS DP register MANUAL_CHANGE_STATUS.

```
// execute a measurement
Write AnalyzerRequest "Measurement"
```

```
IF Write access returns error
   Abort procedure with error
DO
   Read FunctionExecutionStatus
WHILE FunctionExecutionStatus is “Busy” OR
    FunctionExecutionStatus is “MeasurementInProgress”
IF FunctionExecutionStatus is NOT “MeasurementFinished”
   Abort procedure with error
// now measurement was successfully executed
```

If the user locally switches to manual or automatic the PROFIBUS DP write requests gets an error response. An error is also, if a measurement shall be executed and another action is running (e.g. a calibration). As the above pseudo code shows, this will be detected as an error.

7.1.3.2 How-to run a Calibration

The analyzer has to be in the operation mode “Fieldbus” to start an action. The current operation mode can be verified by pressing the soft-key labeled “MODE” at the device menu or by reading the PROFIBUS DP register MANUAL_CHANGE_STATUS.

```
// execute a measurement
Write AnalyzerRequest “Measurement”
IF Write access returns error
   Abort procedure with error
DO
   Read FunctionExecutionStatus
WHILE FunctionExecutionStatus is “Busy” OR
    FunctionExecutionStatus is “MeasurementInProgress”
IF FunctionExecutionStatus is NOT “MeasurementFinished”
   Abort procedure with error
// now measurement was successfully executed
```

If the user locally switches to manual or automatic the PROFIBUS DP write requests gets an error response. An error is also, if a measurement shall be executed and another action is running. As the above pseudo code shows, this will be detected as an error.

7.1.3.3 How-to start a Cleaning

The analyzer has to be in the operation mode “Fieldbus” to start an action. The current operation mode can be verified by pressing the soft-key labeled “MODE” at the device menu or by reading the PROFIBUS DP register MANUAL_CHANGE_STATUS.

```
// execute a measurement
Write AnalyzerRequest “Measurement”
IF Write access returns error
   Abort procedure with error
DO
   Read FunctionExecutionStatus
WHILE FunctionExecutionStatus is “Busy” OR
    FunctionExecutionStatus is “MeasurementInProgress”
IF FunctionExecutionStatus is NOT “MeasurementFinished”
   Abort procedure with error
// now measurement was successfully executed
```

If the user locally switches to manual or automatic the PROFIBUS DP write requests gets an error response. An error is also, if a measurement shall be executed and another action is running. As the above pseudo code shows, this will be detected as an error.

7.1.3.4 How-to abort an action

```
// “Abort” can be executed at any time
Write CommonRequest “AbortOfCurrentActivity”
IF Write access returns error
   Abort procedure with error
DO
   Read FunctionExecutionStatus
WHILE FunctionExecutionStatus is “AbortOfCurrentActivityInProgress”
IF FunctionExecutionStatus is NOT “AbortOfCurrentActivityFinished”
   Abort procedure with error
```

7.1.3.5 Error evaluation

The examples in the former chapters show how to detect an error. How to handle an error may dependent from the cause of error.

Two errors can occur:

1. Write access fails and returns fieldbus specific error codes.
   In most cases the analyzer is in a state where it cannot execute the desired function. This can be checked by reading the parameters “OperationMode” and “FunctionExecutionStatus”.

2. The parameter “FunctionExecutionStatus” has not the expected value.
   Since the PLC has already read the function execution status, it can rely on this value to check the cause of error, e.g.:
   a. Other function is running or even finished or failed. So another user accessed the analyzer and started this function.
   b. The desired function failed. In most times a failure is signaled by a diagnosis that can be read via fieldbus specific mechanism, e.g. diagnosis parameters. Remark: The user shall be aware that the diagnosis may not reflect the function error because other diagnosis events might be triggered. All diagnosis events are logged.

Example for a simple error handling is to wait until device is available again:

```
DO
   DO
      Write ModeChangeRequest “Fieldbus”
   WHILE Write access returns error
   DO
      Read ModeChangeStatus
   WHILE ModeChangeStatus is “Busy”
WHILE ModeChangeStatus is NOT “WaitingForRequest”
DO
   Write ResetRequest “ResetOfStatus”
WHILE Write access returns error
```

Of course, such a simple error handling will generated some traffic on PROFIBUS DP.

This procedure is also recommended on startup of a PLC program. To limit traffic on fieldbus, it is sufficient to read or write the fieldbus every 15 seconds or even less frequently.

7.1.4 Attributes

149	MODE_CHANGE_REQUEST	R/W	Unsigned8	1
150	MODE_CHANGE_REQUEST_REV_HIDDEN	R	Unsigned8	1
151	MODE_CHANGE_PROCESSED_REV_HIDDEN	R	Unsigned8	1
152	MODE_CHANGE_REQUEST_STATUS	R	Unsigned8	1
153	COMMON_REQUEST	R/W	Unsigned8	1
154	COMMON_REQUEST_REV_HIDDEN	R	Unsigned8	1
155	ANALYZER_REQUEST	R/W	Unsigned8	1
156	ANALYZER_REQUEST_REV_HIDDEN	R	Unsigned8	1
157	ACTIVITY_PROCESSED_REV_HIDDEN	R	Unsigned8	1

159	ACTIVITY_REQUEST_STATUS	R	Unsigned8	1

7.1.4.1 Analyzer Manual Actions

The following parameters are available to switch into fieldbus mode, which enables the remote control over PROFIBUS DP function, and to start an action and read back its progress.

Slot	Index	Attribute	Data Type	Access	Description
36	149	ModeChangeRequest (MODE_CHANGE_REQUEST)	UINT8	R/W	This parameter is used to control the active operation mode and can be written with the following values. 0: None 1: Enter fieldbus mode. The CA80xx changes from automatic mode to fieldbus mode. 2. Continue automatic mode: The CA80xx changes from fieldbus mode to automatic mode continuing with the time schedule as it was calculated when entering automatic mode the first time. 3. Restart automatic mode: The system changes from fieldbus mode to automatic mode and restarts the time schedule with the current time as starting point.
36	153	AbortActionRequest (COMMON_REQUEST)	UINT8	R/W	The parameter is used to abort the current activity and can be written with the following values: 0: None 1: Abort current action

Slot	Index	Attribute	Data Type	Access	Description
36	155	ManualActionRequest (ANALYZER_REQUEST)	UINT8	R/W	This parameter is used to start an action and can be written with the following values: 0: None 1: Start measurement 2: Start calibration 3: Start cleaning

7.1.4.2 Analyzer manual actions state

The parameters in the register block "Analyzer manual actions state" are used to read the status of the status machine.

Slot	Index	Attribute	Data Type	Access	Description
36	152	ModeChangeState (MODE_CHANGE_REQUEST_STATUS)	UINT8	R	This parameter reads the status of the mode change. Allowed values: 1: Waiting for Request: The analyzer is waiting for a request. 2: Busy: Writing the parameter "Mode change request" was accepted. Mode change is in progress. 3: Mode Change not allowed: The analyzer is in operation mode that the fieldbus is not allowed to change (like manual mode).
36	159	ActionRequestState (ACTIVITY_REQUEST_STATUS)	UINT8	R	This parameter reads the status of processing the requested <function> (Measurement, Calibration or Cleaning). Allowed values: 0: Ready to start action No procedure is running. This state is entered, if the analyzer enters fieldbus mode, while nothing is running that disturbs the start of any function via fieldbus. 1: Action request accepted The request was accepted, but the requested function is not started yet. 2: Fieldbus not active The analyzer is not in fieldbus mode and cannot accept action requests. 32: Current action abort in progress 33: Measurement started 34: Calibration started 35: Cleaning started 64: Current activity aborted 65: Measurement finished 66: Calibration finished

Slot	Index	Attribute	Data Type	Access	Description
					67: Cleaning finished 97: Measurement not successful 98: Calibration not successful 99: Cleaning not successful

8 Appendix

8.1 Technical data

This section provides you with an overview of the PROFIBUS functionality of the product. Additional information is available in the Technical Information TI00444C.

8.1.1 PROFIBUS DP

Signal encoding	EIA/TIA-485, PROFIBUS-DP-compliant as per IEC61158 / IEC61784
Data transmission rate	9.6 kBd / 19.2 kBd / 45.45 kBd / 93.75 kBd / 187.5 kBd / 500 kBd / 1.5 MBd / 3 MBd / 6 MBd / 12 MBd
Galvanic isolation	Yes
Connector	Spring terminal (max. 1.5 mm), plug jumpered internally (T-function), optional M12
Bus termination	Internal slide switch with LED display

8.1.2 PA profile 3.02

Manufacturer ID	0x11
Device type (CM44x)	0x155D (manufacturer-specific) 0x9760 (profile for multivariable PA devices)
Device type (CSFxx)	0x155C (manufacturer-specific) 0x9760 (profile for multivariable PA devices)
PA profile	3.02
GSD	www.products.endress.com/profibus Device Integration Manager (DIM)
Output variables	16 AI blocks 8 DI blocks
Input variables	4 AO blocks 8 DO blocks
Status	Condensed status
Supported features	1 MSCY0 connection (cyclic communication, master class 1 to slave) 1 MSAC1 connection (acylic communication, master class 1 to slave) MSAC2 connections (acyclic communication, master class 2 to slave) Device lock: The device can be locked via the hardware or software. Addressing with DIL switches or via software GSD, PDM DD, DTM
Special points to note	The data sources and data sinks for the function blocks are configured via the Device menu. The channel parameters of the function blocks are set to fixed values. In standard configurations, the base unit of the process value is the unit of the process values.

8.2 Data Types

8.2.1 DS-37: Mode structure

This data structure consists of elements for actual, permitted and normal modes.

E	Element Name	Data Type	Size	Description
1	Actual	Unsigned8	1	
2	Permitted	Unsigned8	1	
3	Normal	Unsigned8	1	

8.2.2 DS-42: Alarm Summary structure

This data structure consists of data that summarize 16 alarms.

E	Element Name	Data Type	Size	Description
1	Current	OctetString	2	
2	Unacknowledged	OctetString	2	
3	Unreported	OctetString	2	
4	Disabled	OctetString	2	

8.2.3 DS-50: Simulation - Floating Point structure

This data structure consists of the Simulation parameters.

E	Element Name	Data Type	Size	Description
1	Simulate_Status	Unsigned8	1	
2	Simulate_Value	Float	4	
3	Simulate_Enabled	Unsigned8	1	

8.2.4 DS-60: Result structure

E	Element Name	Data Type	Size	Description
1	PV	Float	4	Process value
2	Measurement_Status	Unsigned8	1	Status
3	PV_Time	BinaryDate	7	Not used. Reads 0.

8.2.5 DS-61: Measurement Range structure

This data structure contains the structure of the measurement range.

E	Element Name	Data Type	Size	Description
1	Begin_of_Range	Float	4	
2	End_of_Range	Float	4	

8.2.6 DS-67: Batch structure

This data structure contains the structure of the Batch parameter.

E	Element Name	Data Type	Size	Description
1	Batch_ID	Unsigned32	4	
2	Rup	Unsigned16	2	
3	Operation	Unsigned16	2	
4	Phase	Unsigned16	2	

8.2.7 DS-68: Feature structure

This data structure consists of 2 elements describing the supported and currently enabled features.

E	Element Name	Data Type	Size	Description
1	Supported	OctetString	4	
2	Enabled	OctetString	4	

8.2.8 DS-101: Value & Status (Floating Point structure)

This data structure consists of the values and the state of the Floating Point parameters. These parameters can be inputs or outputs.

E	Element Name	Data Type	Size	Description
1	Value	Float	4	
2	Status	Unsigned8	1	

8.2.9 DS-102: Value & Status (Discrete structure)

This data structure consists of the value and state of the discrete value parameters.

E	Element Name	Data Type	Size	Description
1	Value	Unsigned8	1	
2	Status	Unsigned8	1	

8.2.10 EDDL_DATE_AND_TIME

E	Element Name	Data Type	Size	Description
1	Millisecond, low byte	Unsigned8	1	0..59999
2	Millisecond, high byte	Unsigned8	1	
3	Minute	Unsigned8	1	0..59
4	Hour	Unsigned8	1	0..59
5	Day of month	Unsigned8	1	1..31
6	Month	Unsigned8	1	1..12
7	Year	Unsigned8	1	0..255 / 0 = 1900

8.2.11 EDDL_DURATION

E	Element Name	Data Type	Size	Description

E	Element Name	Data Type	Size	Description
1	Millisecond Bit 31 to 24	Unsigned8	1	Number of milliseconds (of one day)
2	Millisecond Bit 23 to 16	Unsigned8	1	
3	Millisecond Bit 15 to 8	Unsigned8	1	
4	Millisecond Bit 0 to 7	Unsigned8	1	
5	Number of days Bit 15 to 8	Unsigned8	1	Number of days
6	Number of days Bit 7 to 0	Unsigned8	1	

8.2.12 Units

The process values are transmitted with their base unit. It is not possible to change the unit of the PROFIBUS device variables via the device menu or device driver.

Code	Hex code	Description	Unit
1000	3E8	Kelvins	K
1001	3E9	Degrees Celsius	°C
1002	3EA	Degrees Fahrenheit	°F
1005	3ED	Degree	°
1010	3F2	Meters	m
1034	40A	Cubic meters	m^3
1038	40E	Liters	l
1040	410	Milliliters	ml
1054	41E	Seconds	s
1056	420	Milliseconds	ms
1057	421	Microseconds	µs
1058	422	Minutes	min
1059	423	Hours	h
1060	424	Days	d
1061	425	Meters per second	m/s
1062	426	Millimeters per second	mm/s
1063	427	Meters per hour	m/h
1066	42A	Inch per second	in/s
1067	42B	Foot per second	ft/s
1069	42D	Inch per minute	in/min
1072	430	Inch per hour	in/h
1077	435	Hertz	Hz
1097	449	Kilograms per cubic meter	kg/m^3
1103	44F	Kilogram per liter	kg/l
1104	450	Grams per milliliter	g/ml
1105	451	Grams per liter	g/l
1130	46A	Pascals	Pa
1136	470	Hectopascals	hPa

Code	Hex code	Description	Unit
1138	472	Millibars	mbar
1209	4B9	Amperes	A
1211	4BB	Milliamperes	mA
1212	4BC	Microamperes	µA
1213	4BD	Nanoamperes	nA
1214	4BE	Picoamperes	pA
1221	4C5	Ampere hour	Ah
1240	4D8	Volts	V
1243	4DB	Millivolts	mV
1244	4DC	Microvolts	µV
1281	501	Ohms	Ω
1282	502	Gigaohms	GΩ
1283	503	Megaohms	MΩ
1284	504	Kiloohms	kΩ
1285	505	Milliohms	mΩ
1287	507	Siemens	S
1289	509	Millisiemens	mS
1290	50A	Microsiemens	µS
1291	50B	Ohmmeters	Ωm
1292	50C	Gigaohmmeters	GΩm
1293	50D	Megaohmmeters	MΩm
1294	50E	Kiloohmmeters	kΩm
1295	50F	Ohmcentimeters	Ωcm
1296	510	Milliohmmeters	mΩm
1297	511	Microohmmeters	µΩm
1298	512	Nanoohmmeters	nΩm
1299	513	Siemens per meter	S/m
1300	514	Megasiemens per meter	MS/m
1301	515	Kilosiemens per meter	kS/m
1302	516	Millisiemens per centimeter	mS/cm
1303	517	Microsiemens per millimeter	µS/mm
1342	53E	Percent	%

Code	Hex code	Description	Unit
1347	543	Cubic meters per second	m^3/s
1348	544	Cubic meters per minute	m^3/min
1349	545	Cubic meters per hour	m^3/h
1350	546	Cubic meters per day	m^3/d
1351	547	Liters per second	l/s
1352	548	Liters per minute	l/min
1353	549	Liters per hour	l/h
1354	54A	Liters per day	l/d
1356	54C	Cubic feet per second	(cu ft)/s
1357	54D	Cubic feet per minute	(cu ft)/min
1358	54E	Cubic feet per hour	(cu ft)/h
1359	54F	Cubic feet per day	(cu ft)/d
1362	552	Gallons per second	gal/s
1363	553	Gallons per minute	gal/min
1364	554	Gallons per hour	gal/h
1365	555	Gallons per day	gal/d
1366	556	Megagallons per day	Mgal/d
1397	575	Mol per cubic meter	mol/m^3
1399	577	Mol per liter	mol/l
1422	58E	pH	pH
1551	60F	Siemens per centimeter	S/cm
1552	610	Microsiemens per centimeter	µS/cm
1553	611	Millisiemens per meter	mS/m
1554	612	Microsiemens per meter	µS/m
1562	61A	Percent volume	%Vol
1995	7CB	Textual unit definition	
1997	7CD	None unit	
1998	7CE	Unknown unit	
34000	84D0	Delta Kelvins	K
34001	84D1	Delta degrees Celsius	°C
34002	84D2	Delta degrees Fahrenheit	°F
34003	84D3	Percent per Kelvin	%/K

Code	Hex code	Description	Unit
34004	84D4	Conductivity temperature compensation unit	1/K
34005	84D5	Per meter	1/m
34006	84D6	Volts per pH	V/pH
34007	84D7	Percent per volt	%/V
34008	84D8	Volts per percent	V/%
34009	84D9	Pascals per ampere	Pa/A
34010	84DA	Amperes per pascal	A/Pa
34011	84DB	Month	month
34012	84DC	Amperes per kilogram per cubic meter	$A/(kg/m^3)$
34013	84DD	Formazine nephelometric units	FNU
34014	84DE	rH	rH
34015	84DF	Grams per kilogram	g/kg
34016	84E0	Practical salinity unit	psu
34017	84E1	Kilobytes	kB
34018	84E2	Dough	Dough
34019	84E3	Nano ampere per milligram per liter	nA/(mg/l)
34020	84E4	Pico ampere per milligram per liter	pA/(mg/l)
34021	84E5	European Breqing Convention	EBC
34022	84E6	American Society of Breqing Chemists	ASBC
34023	84E7	Turbidity Formazine	TeF
34024	84E8	Formazine turbidity unit	FTU
34025	84E9	Milligram per liter	mg/l
34026	84EA	Absorbance unit	AU
34027	84EB	Percent transmission	%T
34028	84EC	Optical density	OD
34029	84ED	NTU equivalent	NTUeq
34030	84EE	Equivalent	eq
34031	84EF	Equivalent per cubic meter	eq/m^3
34032	84F0	Equivalent per liter	eq/l
34033	84F1	Equivalent per gallon	eq/gal
34034	84F2	Part per million	ppm-dens
34035	84F3	part per billion	ppb-dens

9 Parameter tables

9.1.1 Physical Block, Slot 0

Index	Parameter	R/W	Data Type	Bytes	Description
17	ST_REV	R	Unsigned16	2	
18	TAG_DESC	R/W	Visible String	32	
19	STRATEGY	R/W	Unsigned16	2	
20	ALERT_KEY	R/W	Unsigned8	1	
21	TARGET_MODE	R/W	Unsigned8	1	Selection: 1: Remote-Output (ROut) 2: Remote-Cascade (RCas) 4: Cascade (Cas) 8: Automatic (Auto) 16: Manual (Man) 32: Local Override (LO) 64: Initialization Manually (IMan) 128: Out of service (OOS)
22	MODE_BLK	R	DS-37	3	
23	ALARM_SUM	R	DS-42	8	
24	SOFTWARE_REVISION	R	Visible String	16	
25	HARDWARE_REVISION	R	Visible String	16	
26	DEVICE_MAN_ID	R	Unsigned16	2	
27	DEVICE_ID	R	Visible String	16	
28	DEVICE_SER_NUM	R	Visible String	16	
29	DIAGNOSIS	R	Octet String	4	
30	DIAGNOSIS_EXTENSION	R	Octet String	6	
31	DIAGNOSIS_MASK	R	Octet String	4	
32	DIAGNOSIS_MASK_EXTENSION	R	Octet String	6	
33	DEVICE_CERTIFICATION	R	Visible String	32	
34	WRITE_LOCKING	R	Unsigned16	2	
35	FACTORY_RESET	R/W	Unsigned16	2	Selection: 1: Set parameter to default values + restart device 2712: Set Busaddress to 126 + restart device 2506: Restart device 0: Select
36	DESCRIPTOR	R/W	Visible String	32	
37	DEVICE_MESSAGE	R/W	Visible String	32	
38	DEVICE_INSTAL_DATE	R/W	Visible String	16	
39	LOCAL_OP_ENA	R/W	Unsigned8	1	
40	IDENT_NUMBER_SELECTOR	R/W	Unsigned8	1	Selection: 0: Automatic 1: PA-Profile 3.02 (0x9760) 2: Liquiline CM44x (0x155D) 3: Liquistation CSFxx (0x155C) 5: Manufacturer specific 6:

Index	Parameter	R/W	Data Type	Bytes	Description
41	HW_WRITE_PROTECTION	R	Unsigned8	1	Selection: 0: Unprotected (write access allowed) 1: Protected (manually operation permitted) 2: Protected (no manually operation)
42	FEATURE	R	DS-68	8	
43	COND_STATUS_DIAG	R/W	Unsigned8	1	
64	CURRENT_ERROR	R	Unsigned16	2	
69	LAST_ERROR	R	Unsigned16	2	
74	DEVICE_BUS_ADDRESS	R	Unsigned8	1	
75	PROFILE_REVISION	R	Octet String	32	
76	CLEAR_LAST_ERROR	R/W	Unsigned8	1	Selection: 0: No 1: Yes
77	IDENT_NUMBER	R	Unsigned16	2	
83	ORDER_CODE	R	Visible String	32	
85	ENP_VERSION	R	Visible String	16	
86	EXTENTED_ORDER_CODE	R	Visible String	60	
87	DEVICE_DIAGNOSIS	R	Octet String	58	
88	SERVICE_LOCKING	R/W	Unsigned16	2	
92	DPV0_MASTER	R	Unsigned8	1	
93	DPV0_WATCHDOG_TIMEOUT	R	Unsigned32	4	
94	BUS_ADDRESS_SW_HW	R	Unsigned8	1	
95	DPV0_FAULT	R	Unsigned8	1	Selection: 0: No fault 1: Param fault 2: Config fault 3: Param & config fault
96	BAUDRATE	R	Unsigned8	1	Selection: 0: Not detected 1: 9.6 kBit/s 2: 19.2 kBit/s 3: 31.25 kBit/s 4: 45.45 kBit/s 5: 93.75 kBit/s 6: 187.5 kBit/s 7: 500 kBit/s 8: 1.5 MBit/s 9: 3 MBit/s 10: 6 MBit/s 11: 12 MBit/s
97	DPV0_STATE	R	Unsigned8	1	Selection: 0: Wait for param 1: Wait for config 2: Data exchange
98	EXECUTION_INTERVAL	R	Unsigned16	2	

Index	Parameter	R/W	Data Type	Bytes	Description
99	GLOBAL_STATUS	R	Unsigned8	1	Selection: 0: OK 1: Failure 2: Function Check 4: Maintenance required 8: Out of specification
100	CURRENT_DIAG_SOURCETYPE	R	Unsigned8	1	Selection: 0: General 1: Temperature Input 2: Binary Input 3: Binary Output 4: Current Input 5: Current Output 6: Relay 7: Memosens Sensor 8: PID Controller 9: Cleaning 10: Limit Switch 11: Mathematic Function 12: Binary Input Module 13: Binary Output Module 14: Sample preparation
101	CURRENT_DIAG_MODUL	R	Unsigned8	1	Selection: 0: Slot 1 1: Slot 1 2: Slot 2 3: Slot 3 4: Slot 4 5: Slot 5 6: Slot 6 7: Slot 7 8: Sampler 9: Software 10: Analyzer
102	CURRENT_DIAG_PORT	R	Unsigned8	1	Connector
103	CURRENT_DIAG_NE107_STATUS	R	Unsigned8	1	Status signal acc. NE107
105	CURRENT_DIAG_TIMESTAMP	R	Date_and_Time	7	Timestamp
106	NUMBER_ADDITIONAL_DIAG	R	Unsigned8	1	Number of add. diagnostics

Index	Parameter	R/W	Data Type	Bytes	Description
107	LAST_DIAG_SOURCETYPE	R	Unsigned8	1	Selection: 0: General 1: Temperature Input 2: Binary Input 3: Binary Output 4: Current Input 5: Current Output 6: Relay 7: Memosens Sensor 8: PID Controller 9: Cleaning 10: Limit Switch 11: Mathematic Function 12: Binary Input Module 13: Binary Output Module 14: Sample preparation
108	LAST_DIAG_MODUL	R	Unsigned8	1	Selection: 0: Slot 1 1: Slot 1 2: Slot 2 3: Slot 3 4: Slot 4 5: Slot 5 6: Slot 6 7: Slot 7 8: Sampler 9: Software 10: Analyzer
109	LAST_DIAG_PORT	R	Unsigned8	1	Connector
110	LAST_DIAG_NE107_STATUS	R	Unsigned8	1	Status signal acc. NE107
112	LAST_DIAG_TIMESTAMP	R	Date_and_Time	7	Timestamp
132	DISPLAY_SER_NUM	R	Visible String	16	Serial number display
133	POWER_SUPPLY_SER_NUM	R	Visible String	16	Serial number power supply
134	CPU_SER_NUM	R	Visible String	16	Serial number CPU
135	BASE_MODUL_SER_NUM	R	Visible String	16	Serial number BASE
136	FMSY1_MODUL_SER_NUM	R	Visible String	16	Serial number FMSY1
137	EXTENSION_MODUL_1_SER_NUM	R	Visible String	16	Serial number extension module 1
138	EXTENSION_MODUL_2_SER_NUM	R	Visible String	16	Serial number extension module 2
139	EXTENSION_MODUL_3_SER_NUM	R	Visible String	16	Serial number extension module 3
140	EXTENSION_MODUL_4_SER_NUM	R	Visible String	16	Serial number extension module 4
141	EXTENSION_MODUL_5_SER_NUM	R	Visible String	16	Serial number extension module 5
142	EXTENSION_MODUL_6_SER_NUM	R	Visible String	16	Serial number extension module 6
143	EXTENSION_MODUL_7_SER_NUM	R	Visible String	16	Serial number extension module 7
144	EXTENSION_MODUL_8_SER_NUM	R	Visible String	16	Serial number extension module 8
145	SENSOR_1_SER_NUM	R	Visible String	16	Serial number sensor 1
146	SENSOR_2_SER_NUM	R	Visible String	16	Serial number sensor 2
147	SENSOR_3_SER_NUM	R	Visible String	16	Serial number sensor 3
148	SENSOR_4_SER_NUM	R	Visible String	16	Serial number sensor 4

Index	Parameter	R/W	Data Type	Bytes	Description
149	SENSOR_5_SER_NUM	R	Visible String	16	Serial number sensor 5
150	SENSOR_6_SER_NUM	R	Visible String	16	Serial number sensor 6
151	SENSOR_7_SER_NUM	R	Visible String	16	Serial number sensor 7
152	SENSOR_8_SER_NUM	R	Visible String	16	Serial number sensor 8
153	SENSOR_1_SOFTWARE_REVISION	R	Visible String	16	Software sensor 1
154	SENSOR_2_SOFTWARE_REVISION	R	Visible String	16	Software sensor 2
155	SENSOR_3_SOFTWARE_REVISION	R	Visible String	16	Software sensor 3
156	SENSOR_4_SOFTWARE_REVISION	R	Visible String	16	Software sensor 4
157	SENSOR_5_SOFTWARE_REVISION	R	Visible String	16	Software sensor 5
158	SENSOR_6_SOFTWARE_REVISION	R	Visible String	16	Software sensor 6
159	SENSOR_7_SOFTWARE_REVISION	R	Visible String	16	Software sensor 7
160	SENSOR_8_SOFTWARE_REVISION	R	Visible String	16	Software sensor 8
171	UDL_FEATURE	R	Unsigned16	2	Up/download Function
172	UDL_REVISION	R	Unsigned16	2	Up/download Function
173	UDL_OP_CODE	R/W	Unsigned16	2	Up/download Function
174	UDL_STATUS	R	Unsigned16	2	Up/download Function
175	UDL_VERI_DELAY	R	Unsigned16	2	Up/download Function
176	UTC_ZONE	R	Unsigned8	1	Selection: 0: Baker Island 1: Midway Island, Samoa 2: Hawaii 3: Alaska 4: Los Angeles, Vancouver 5: Denver, Phoenix 6: Chicago, Mexico City 7: New York, Toronto 8: Caracas, La Paz 9: Newfoundland 10: Buenos Aires, Brasilia 11: Mid Atlantic 12: Kap Verde 13: London, Lisbon 14: None 15: Berlin, Rome, Paris 16: Athens, Cairo, Kiew 17: Kuwait, Moscow 18: Abu Dhabi, Tiflis 19: Kabul 20: Islamabad, Karatsch 21: New Delhi 22: Kathmandu 23: Astana, Dhaka 24: Pyinmana, CoconutIsland 25: Bankok, Jakarta 26: Singapur, Peking 27: Seoul, Tokio 28: Adelaide, Darwin 29: Brisbane, Canberra 30: Magadan, Salomon Islands 31: Norfolk Island 32: Auckland, Wellington 33: Chatham Islands 34: Nuku Alofa 35: Christmans Island
177	DAYLIGHT_SAVING_ACTIVE	R	Unsigned8	1	Daylight saving time active
178	BUS_ADDRESS_LOCKED	R	Unsigned8	1	Bus address locked

Index	Parameter	R/W	Data Type	Bytes	Description
179	BUS_TERMINATION	R	Unsigned8	1	Selection: 0: Off 1: On
180	PROFIBUS_ENABLED	R	Unsigned8	1	Selection: 0: Off 1: On
181	DEVICE_ID_NUM	R	Unsigned8	1	Selection: 0: Liquiline CM442 1: Liquiline CM448 2: Liquiport CSP44 3: Liquistation CSF48 4: Liquistation CSF22 5: Liquistation CSF33 6: Liquiline System CA80 7: Liquistation CSF34 8: Liquistation CSF39
182	INTERNAL_PARAMETER_1	R	Octet String	16	
183	ORDER_CODE_AS_DELIVERED	R	Visible String	60	Order code at delivery
184	RTC_DATETIME	R	EDDL_DATE_AND_TIME	7	See 7.2.10
185	RTC_SETDATETIME	R/W	EDDL_DATE_AND_TIME	7	See 7.2.10

9.1.2 Funktionblocks

9.1.2.1 Analog Input (AI1-16), Slot 1-16

Index	Parameter	R/W	Data Type	Bytes	Description
17	ST_REV	R	Unsigned16	2	
18	TAG_DESC	R/W	Visible String	32	
19	STRATEGY	R/W	Unsigned16	2	
20	ALERT_KEY	R/W	Unsigned8	1	
21	TARGET_MODE	R/W	Unsigned8	1	Selection: 1: Remote-Output (ROut) 2: Remote-Cascade (RCas) 4: Cascade (Cas) 8: Automatic (Auto) 16: Manual (Man) 32: Local Override (LO) 64: Initialization Manually (IMan) 128: Out of service (OOS)
22	MODE_BLK	R	DS-37	3	
23	ALARM_SUM	R	DS-42	8	
24	BATCH	R/W	DS-67	10	
26	OUT	R	DS-101	5	
27	PV_SCALE	R/W	DS-61	8	
28	OUT_SCALE	R/W	DS-36	11	
29	LIN_TYPE	R/W	Unsigned8	1	Selection: 0: No Linearisation
30	CHANNEL	R/W	Unsigned16	2	

Index	Parameter	R/W	Data Type	Bytes	Description
32	PV_FTIME	R/W	Float	4	
33	FSAFE_TYPE	R/W	Unsigned8	1	Selection: 0: Value FSAFE_VALUE is used as Output Value 1: Last stored valid Output Value is used 2: The Output Value has the wrong calculated value and status
34	FSAFE_VALUE	R/W	Float	4	
35	ALARM_HYS	R/W	Float	4	
37	HI_HI_LIM	R/W	Float	4	
39	HI_LIM	R/W	Float	4	
41	LO_LIM	R/W	Float	4	
43	LO_LO_LIM	R/W	Float	4	
50	SIMULATE	R/W	DS-50	6	
51	OUT_UNIT_TEXT	R/W	Octet String	16	

9.1.2.2 Discrete Input (DI1-8), Slot 17-23

Index	Parameter	R/W	Data Type	Bytes	Description
17	ST_REV	R	Unsigned16	2	
18	TAG_DESC	R/W	Visible String	32	
19	STRATEGY	R/W	Unsigned16	2	
20	ALERT_KEY	R/W	Unsigned8	1	
21	TARGET_MODE	R/W	Unsigned8	1	Selection: 1: Remote-Output (ROut) 2: Remote-Cascade (RCas) 4: Cascade (Cas) 8: Automatic (Auto) 16: Manual (Man) 32: Local Override (LO) 64: Initialization Manually (IMan) 128: Out of service (OOS)
22	MODE_BLK	R	DS-37	3	
23	ALARM_SUM	R	DS-42	8	
24	BATCH	R/W	DS-67	10	
26	OUT_D	R	DS-102	2	
30	CHANNEL	R/W	Unsigned16	2	
31	INVERT	R/W	Unsigned8	1	
36	FSAFE_TYPE	R/W	Unsigned8	1	Selection: 0: Value FSAFE_VALUE is used as Output Value 1: Last stored valid Output Value is used 2: The Output Value has the wrong calculated value and status
37	FSAFE_VALUE_D	R/W	Unsigned8	1	
40	SIMULATE_D	R/W	DS-51	3	

9.1.2.3 Analog Output (AO1-4), Slot 24-27

Index	Parameter	R/W	Data Type	Bytes	Description
17	ST_REV	R	Unsigned16	2	
18	TAG_DESC	R/W	Visible String	32	
19	STRATEGY	R/W	Unsigned16	2	
20	ALERT_KEY	R/W	Unsigned8	1	
21	TARGET_MODE	R/W	Unsigned8	1	Selection: 1: Remote-Output (ROut) 2: Remote-Cascade (RCas) 4: Cascade (Cas) 8: Automatic (Auto) 16: Manual (Man) 32: Local Override (LO) 64: Initialization Manually (IMan) 128: Out of service (OOS)
22	MODE_BLK	R	DS-37	3	
23	ALARM_SUM	R	DS-42	8	
24	BATCH	R/W	DS-67	10	
25	SP	R/W	DS-101	5	
27	PV_SCALE	R/W	DS-36	11	
28	READBACK	R	DS-101	5	
30	RCAS_IN	R	DS-101	5	
37	IN_CHANNEL	R/W	Unsigned16	2	
38	OUT_CHANNEL	R/W	Unsigned16	2	
39	FSAFE_TIME	R/W	Float	4	
40	FSAFE_TYPE	R/W	Unsigned8	1	Selection: 0: Fail Safe Value is used as control regulator input 1: Storing last valid setpoint 2: Actuator goes to fail-safe position
41	FSAFE_VALUE	R/W	Float	4	
43	RCAS_OUT	R	DS-101	5	
47	POS_D	R	DS-102	2	
48	SETP_DEVIATION	R	Float	4	
49	CHECK_BACK	R	Octet String	3	
50	CHECK_BACK_MASK	R	Octet String	3	
51	SIMULATE	R/W	DS-50	6	
52	INCREASE_CLOSE	R/W	Unsigned8	1	
53	OUT	R/W	DS-101	5	
54	OUT_SCALE	R/W	DS-36	11	

9.1.2.4 Discrete Output (DO1-8), Slot 28-36

Index	Parameter	R/W	Data Type	Bytes	Description
17	ST_REV	R	Unsigned16	2	
18	TAG_DESC	R/W	Visible String	32	
19	STRATEGY	R/W	Unsigned16	2	

Index	Parameter	R/W	Data Type	Bytes	Description
20	ALERT_KEY	R/W	Unsigned8	1	
21	TARGET_MODE	R/W	Unsigned8	1	Selection: 1: Remote-Output (ROut) 2: Remote-Cascade (RCas) 4: Cascade (Cas) 8: Automatic (Auto) 16: Manual (Man) 32: Local Override (LO) 64: Initialization Manually (IMan) 128: Out of service (OOS)
22	MODE_BLK	R	DS-37	3	
23	ALARM_SUM	R	DS-42	8	
24	BATCH	R/W	DS-67	10	
25	SP_D	R/W	DS-102	2	
26	OUT_D	R/W	DS-102	2	
28	READBACK_D	R	DS-102	2	
30	RCAS_IN_D	R	DS-102	2	
33	IN_CHANNEL	R/W	Unsigned16	2	
34	INVERT	R/W	Unsigned8	1	
35	FSAFE_TIME	R/W	Float	4	
36	FSAFE_TYPE	R/W	Unsigned8	1	Selection: 0: Fail Safe Value is used as control regulator input 1: Storing last valid setpoint 2: Actuator goes to fail-safe position
37	FSAFE_VAL_D	R/W	Unsigned8	1	
38	RCAS_OUT_D	R	DS-102	2	
40	SIMULATE_D	R/W	DS-51	3	
49	CHECK_BACK	R	Octet String	3	
50	CHECK_BACK_MASK	R	Octet String	3	
51	OUT_CHANNEL	R/W	Unsigned16	2	

9.1.3 IO-Transducer, Slot 33

Index	Parameter	R/W	Data Type	Bytes	Description
78	OUT_01	R	DS-60	12	
79	OUT_01_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
80	OUT_01_RANGE	R	DS-61	8	
81	OUT_01_DESCR	R	Visible String	60	
82	OUT_02	R	DS-60	12	
83	OUT_02_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
84	OUT_02_RANGE	R	DS-61	8	
85	OUT_02_DESCR	R	Visible String	60	
86	OUT_03	R	DS-60	12	
87	OUT_03_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
88	OUT_03_RANGE	R	DS-61	8	

Index	Parameter	R/W	Data Type	Bytes	Description
89	OUT_03_DESCR	R	Visible String	60	
90	OUT_04	R	DS-60	12	
91	OUT_04_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
92	OUT_04_RANGE	R	DS-61	8	
93	OUT_04_DESCR	R	Visible String	60	
94	OUT_05	R	DS-60	12	
95	OUT_05_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
96	OUT_05_RANGE	R	DS-61	8	
97	OUT_05_DESCR	R	Visible String	60	
98	OUT_06	R	DS-60	12	
99	OUT_06_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
100	OUT_06_RANGE	R	DS-61	8	
101	OUT_06_DESCR	R	Visible String	60	
102	OUT_07	R	DS-60	12	
103	OUT_07_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
104	OUT_07_RANGE	R	DS-61	8	
105	OUT_07_DESCR	R	Visible String	60	
106	OUT_08	R	DS-60	12	
107	OUT_08_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
108	OUT_08_RANGE	R	DS-61	8	
109	OUT_08_DESCR	R	Visible String	60	
110	OUT_09	R	DS-60	12	
111	OUT_09_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
112	OUT_09_RANGE	R	DS-61	8	
113	OUT_09_DESCR	R	Visible String	60	
114	OUT_10	R	DS-60	12	
115	OUT_10_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
116	OUT_10_RANGE	R	DS-61	8	
117	OUT_10_DESCR	R	Visible String	60	
118	OUT_11	R	DS-60	12	
119	OUT_11_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
120	OUT_11_RANGE	R	DS-61	8	
121	OUT_11_DESCR	R	Visible String	60	
122	OUT_12	R	DS-60	12	
123	OUT_12_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
124	OUT_12_RANGE	R	DS-61	8	
125	OUT_12_DESCR	R	Visible String	60	
126	OUT_13	R	DS-60	12	
127	OUT_13_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
128	OUT_13_RANGE	R	DS-61	8	
129	OUT_13_DESCR	R	Visible String	60	
130	OUT_14	R	DS-60	12	
131	OUT_14_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
132	OUT_14_RANGE	R	DS-61	8	

Index	Parameter	R/W	Data Type	Bytes	Description
133	OUT_14_DESCR	R	Visible String	60	
134	OUT_15	R	DS-60	12	
135	OUT_15_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
136	OUT_15_RANGE	R	DS-61	8	
137	OUT_15_DESCR	R	Visible String	60	
138	OUT_16	R	DS-60	12	
139	OUT_16_UNIT	R/W	Unsigned16	2	see chapter: Unit codes
140	OUT_16_RANGE	R	DS-61	8	
141	OUT_16_DESCR	R	Visible String	60	
142	OUT_D_01	R	DS-102	2	
143	OUT_D_01_DESCR	R	Visible String	60	
144	OUT_D_02	R	DS-102	2	
145	OUT_D_02_DESCR	R	Visible String	60	
146	OUT_D_03	R	DS-102	2	
147	OUT_D_03_DESCR	R	Visible String	60	
148	OUT_D_04	R	DS-102	2	
149	OUT_D_04_DESCR	R	Visible String	60	
150	OUT_D_05	R	DS-102	2	
151	OUT_D_05_DESCR	R	Visible String	60	
152	OUT_D_06	R	DS-102	2	
153	OUT_D_06_DESCR	R	Visible String	60	
154	OUT_D_07	R	DS-102	2	
155	OUT_D_07_DESCR	R	Visible String	60	
156	OUT_D_08	R	DS-102	2	
157	OUT_D_08_DESCR	R	Visible String	60	
158	SP_01	R/W	DS-101	5	
159	SP_01_UNIT	R	Unsigned16	2	see chapter: Unit codes
160	SP_01_RANGE	R	DS-61	8	
161	SP_01_DESCR	R/W	Visible String	32	
162	SP_02	R/W	DS-101	5	
163	SP_02_UNIT	R	Unsigned16	2	see chapter: Unit codes
164	SP_02_RANGE	R	DS-61	8	
165	SP_02_DESCR	R/W	Visible String	32	
166	SP_03	R/W	DS-101	5	
167	SP_03_UNIT	R	Unsigned16	2	see chapter: Unit codes
168	SP_03_RANGE	R	DS-61	8	
169	SP_03_DESCR	R/W	Visible String	32	
170	SP_04	R/W	DS-101	5	
171	SP_04_UNIT	R	Unsigned16	2	see chapter: Unit codes
172	SP_04_RANGE	R	DS-61	8	
173	SP_04_DESCR	R/W	Visible String	32	
174	SP_D_01	R/W	DS-102	2	
175	SP_D_01_DESCR	R/W	Visible String	32	
176	SP_D_02	R/W	DS-102	2	

Index	Parameter	R/W	Data Type	Bytes	Description
177	SP_D_02_DESCR	R/W	Visible String	32	
178	SP_D_03	R/W	DS-102	2	
179	SP_D_03_DESCR	R/W	Visible String	32	
180	SP_D_04	R/W	DS-102	2	
181	SP_D_04_DESCR	R/W	Visible String	32	
182	SP_D_05	R/W	DS-102	2	
183	SP_D_05_DESCR	R/W	Visible String	32	
184	SP_D_06	R/W	DS-102	2	
185	SP_D_06_DESCR	R/W	Visible String	32	
186	SP_D_07	R/W	DS-102	2	
187	SP_D_07_DESCR	R/W	Visible String	32	
188	SP_D_08	R/W	DS-102	2	
189	SP_D_08_DESCR	R/W	Visible String	32	

9.1.4 Sensor 1-8, Slot 1-8

Index	Parameter	R/W	Data Type	Bytes	Description
78	SENSOR_ENABLE	R	Unsigned8	1	Selection: 0: On 1: Off
79	ACTIVE_SENSOR_TYPE	R	Unsigned8	1	Selection: 0: None 1: Oxygen (amp.) 2: Oxygen (opt. WW) 3: pH Glass 4: pH/ORP 5: pH ISFET 6: Cond c 7: Cond i 8: ORP 9: TU/TS 10: Nitrate 11: ISE 12: SAC 13: Ultrasonic interface 14: Chlorine 15: reserved 16: reserved 17: reserved 18: pH/ORP 19: Cond c 4-pol 20: Oxygen (opt. Process) 21: TU

Index	Parameter	R/W	Data Type	Bytes	Description
80	CONNECTED_SENSOR_TYPE	R	Unsigned8	1	Selection: 0: None 1: Oxygen (amp.) 2: Oxygen (opt. WW) 3: pH Glass 4: pH/ORP 5: pH ISFET 6: Cond c 7: Cond i 8: ORP 9: TU/TS 10: Nitrate 11: ISE 12: SAC 13: Ultrasonic interface 14: Chlorine 15: reserved 16: reserved 17: reserved 18: pH/ORP 19: Cond c 4-pol 20: Oxygen (opt. Process) 21: TU
81	SENSOR_TAG	R	Visible String	32	Sensor description/TAG
82	SENSOR_SERIAL	R	Visible String	16	Serial number of the sensor
83	SENSOR_HW_VERSION	R	Visible String	16	Hardware version of connected sensor
84	SENSOR_SW_VERSION	R	Visible String	16	Software version of connected sensor
85	CURRENT_DIAG_SOURCETYPE	R	Unsigned8	1	Selection: 0: General 1: Temperature Input 2: Binary Input 3: Binary Output 4: Current Input 5: Current Output 6: Relay 7: Memosens Sensor 8: PID Controller 9: Cleaning 10: Limit Switch 11: Mathematic Function 12: Binary Input Module 13: Binary Output Module 14: Sample preparation
86	CURRENT_DIAG_MODUL	R	Unsigned8	1	Selection: 0: Slot 1 1: Slot 1 2: Slot 2 3: Slot 3 4: Slot 4 5: Slot 5 6: Slot 6 7: Slot 7 8: Sampler 9: Software 10: Analyzer
87	CURRENT_DIAG_PORT	R	Unsigned8	1	Current sensor-diagnosis : port
88	CURRENT_DIAG_NE107_STATUS	R	Unsigned8	1	Current sensor-diagnosis : status according to NAMUR NE107 Bit 0: Failure (F) Bit 1: Function check (C) Bit 2: Maintenance (M) Bit 3: Out of specification (S) Bit 4-7: Reserved = 0
89	CURRENT_DIAG_CODE	R	Unsigned16	2	Current sensor-diagnosis : diagnosis code

Index	Parameter	R/W	Data Type	Bytes	Description
90	CURRENT_DIAG_TIMESTAMP	R	Date_and_Time	7	Current sensor-diagnosis : time of diagnosis apperance
91	NUMBER_ADDITIONAL_DIAG	R	Unsigned8	1	Number of additional active sensor diagnosis
92	LAST_DIAG_SOURCETYPE	R	Unsigned8	1	Selection: 0: General 1: Temperature Input 2: Binary Input 3: Binary Output 4: Current Input 5: Current Output 6: Relay 7: Memosens Sensor 8: PID Controller 9: Cleaning 10: Limit Switch 11: Mathematic Function 12: Binary Input Module 13: Binary Output Module 14: Sample preparation
93	LAST_DIAG_MODUL	R	Unsigned8	1	Selection: 0: Slot 1 1: Slot 1 2: Slot 2 3: Slot 3 4: Slot 4 5: Slot 5 6: Slot 6 7: Slot 7 8: Sampler 9: Software 10: Analyzer
94	LAST_DIAG_PORT	R	Unsigned8	1	Past sensor-diagnosis : port
95	LAST_DIAG_NE107_STATUS	R	Unsigned8	1	Past sensor-diagnosis : status according to NAMUR NE107 Bit 0: Failure (F) Bit 1: Function check (C) Bit 2: Maintenance (M) Bit 3: Out of specification (S) Bit 4-7: Reserved = 0
96	LAST_DIAG_CODE	R	Unsigned16	2	Past sensor-diagnosis : diagnosis code
97	LAST_DIAG_TIMESTAMP	R	Date_and_Time	7	Past sensor-diagnosis : time of diagnosis apperance
98	OP_TIME_TOTAL	R	Float	4	Operating hours of connected sensor
99	OP_TIME_ABOVE_SPEC_TEMP	R	Float	4	Operating hours above maximal operating temperature
100	OP_TIME_BELOW_SPEC_TEMP	R	Float	4	Operating hours below minimal operating temperature
101	OP_TIME_LAMP_LIFE	R	Float	4	Operating hours of lamp, uint seconds [s]
102	OP_TIME_STERILISATIONS	R	Unsigned16	2	Number of sterilisation cycles
103	OP_TIME_CIP_CYCLES	R	Unsigned16	2	Number of clean in place cycles
104	OP_TIME_CAP_CALIBRATIONS	R	Unsigned16	2	Number of sensor-cap calibrations
105	OP_TIME_CAP_CALIB_TIMER	R	Float	4	Calibration timer of sensor cap
106	OP_TIME_CAP_STERILISATIONS	R	Unsigned8	1	Number of sterilisation cycles
107	OP_TIME_CAP_FILTER_CHANGED	R	Float	4	Number of filter changes
108	CAL_COUNT_0	R	Unsigned16	2	Number of calibrations
109	CAL_COUNT_1	R	Unsigned16	2	Number of calibrations
110	CAL_COUNT_2	R	Unsigned16	2	Number of calibrations
111	CAL_COUNT_3	R	Unsigned16	2	Number of calibrations

Index	Parameter	R/W	Data Type	Bytes	Description
112	CAL_DATETIME_0	R	EDDL_DATE_AND_TIME	7	Time stamp of last calibration
113	CAL_DATETIME_1	R	EDDL_DATE_AND_TIME	7	Time stamp of last calibration
114	CAL_DATETIME_2	R	EDDL_DATE_AND_TIME	7	Time stamp of last calibration
115	CAL_DATETIME_3	R	EDDL_DATE_AND_TIME	7	Time stamp of last calibration
116	CAL_COUNT_ZERO	R	Unsigned16	2	Number of zero point calibrations
117	CAL_DATETIME_ZERO	R	EDDL_DATE_AND_TIME	7	Time stamp of last zero point calibration
118	CAL_COUNT_TEMP	R	Unsigned16	2	Number of temperature calibrations
119	CAL_DATETIME_TEMP		EDDL_DATE_AND_TIME		Time stamp of last temperature calibration

9.1.4.1 Conductivity 1-8, Slot 9-17

Index	Parameter	R/W	Data Type	Bytes	Description
128	COND_MEAS_PARAM	R	Unsigned8	1	Selection: 0: Conductivity 1: Concentration 2: Resistance 3: TDS
144	COND_CELL_CONSTANT	R	Float	4	

9.1.4.2 Turbidity 1-8, Slot 17-25

Index	Parameter	R/W	Data Type	Bytes	Description
173	TURBIDITY_SWITCHDATASET	R/W	Unsigned8	1	Selection: 0: Formazine 1: Kaolin 2: SiO2 3: TiO2 4: Excess sludge 5: Digested sludge 6: Activated sludge 7: Dataset1 8: Dataset2 9: Dataset3 10: Dataset4 11: Dataset5 12: undefined 13: Thin sludge 14: PSL 15: Diatomite 16: Dataset6

9.1.4.3 ISE 1-8, Slot 25-33

Index	Parameter	R/W	Data Type	Bytes	Description
78	ISE_MEAS_MODE_ELECTRODE_0	R	Unsigned8	1	Selection: 0: reserved 1: NH4-N 2: NH4 3: NO3-N 4: NO3 5: NO2-N 6: NO2 7: PO4-P 8: PO4 9: K 10: Cl 11: reserved 12: mV 13: user defined
79	ISE_MEAS_MODE_ELECTRODE_1	R	Unsigned8	1	Selection: 0: reserved 1: NH4-N 2: NH4 3: NO3-N 4: NO3 5: NO2-N 6: NO2 7: PO4-P 8: PO4 9: K 10: Cl 11: reserved 12: mV 13: %0V
80	ISE_MEAS_MODE_ELECTRODE_2	R	Unsigned8	1	Selection: 0: reserved 1: NH4-N 2: NH4 3: NO3-N 4: NO3 5: NO2-N 6: NO2 7: PO4-P 8: PO4 9: K 10: Cl 11: reserved 12: mV 13: %0V

Index	Parameter	R/W	Data Type	Bytes	Description
81	ISE_MEAS_MODE_ELECTRODE_3	R	Unsigned8	1	Selection: 0: reserved 1: NH4-N 2: NH4 3: NO3-N 4: NO3 5: NO2-N 6: NO2 7: PO4-P 8: PO4 9: K 10: Cl 11: reserved 12: mV 13: %0V
121	ISE_SLOPE_0	R	Float	4	
122	ISE_SLOPE_1	R	Float	4	
123	ISE_SLOPE_2	R	Float	4	
124	ISE_SLOPE_3	R	Float	4	
125	ISE_ZEROPOINT_0	R	Float	4	
126	ISE_ZEROPOINT_1	R	Float	4	
127	ISE_ZEROPOINT_2	R	Float	4	
128	ISE_ZEROPOINT_3	R	Float	4	
129	ISE_MEAS_TYPE_ELECTRODE_0	R	Unsigned8	1	Selection: 0: disabled 1: Nitrate 2: Ammonium 3: Potassium 4: Chloride 5: pH 6: ORP 7: user defined
130	ISE_MEAS_TYPE_ELECTRODE_1	R	Unsigned8	1	Selection: 0: disabled 1: Nitrate 2: Ammonium 3: Potassium 4: Chloride 5: pH 6: ORP 7: %0V
131	ISE_MEAS_TYPE_ELECTRODE_2	R	Unsigned8	1	Selection: 0: disabled 1: Nitrate 2: Ammonium 3: Potassium 4: Chloride 5: pH 6: ORP 7: %0V

Index	Parameter	R/W	Data Type	Bytes	Description
132	ISE_MEAS_TYPE_ELECTRODE_3	R	Unsigned8	1	Selection: 0: disabled 1: Nitrate 2: Ammonium 3: Potassium 4: Chloride 5: pH 6: ORP 7: %0V

9.1.4.4 Chlorine 1-8, Slot 17-25

Index	Parameter	R/W	Data Type	Bytes	Description
138	CHLOR_SLOPE	R	Float	4	
139	CHLOR_ZERO_POINT	R	Float	4	

9.1.4.5 Oxygen 1-8, Slot 9-17

Index	Parameter	R/W	Data Type	Bytes	Description
158	OXYGEN_MAIN_MEAS	R	Unsigned8	1	Selection: 0: Concentration liquid 1: Concentration gaseous 2: Saturation 3: Partial pressure 4: Raw value nA 5: Raw value µs
180	OXYGEN_SLOPE	R	Float	4	
181	OXYGEN_ZERO_POINT	R	Float	4	

9.1.4.6 pH 1-8, Slot 9-17

Index	Parameter	R/W	Data Type	Bytes	Description
102	SLOPE	R	Float	4	
103	ZERO_POINT	R	Float	4	

9.1.4.7 Regulator 1-2, Slot 35-36

Index	Parameter	R/W	Data Type	Bytes	Description
78	CONTROL_MODE	R	Unsigned8	1	Selection: 0: PID 1-sided 1: PID 2-sided
88	SETPOINT	R/W	Float	4	
89	P_PART	R/W	Float	4	
90	I_PART	R/W	Float	4	
91	D_PART	R/W	Float	4	

9.1.4.8 Nitrate 1-8, Slot 9-17

Index	Parameter	R/W	Data Type	Bytes	Description
207	NITRATE_SWITCHDATASET	R/W	Unsigned8	1	Selection: 0: Factory calib. 1: Dataset1 2: Dataset2 3: Dataset3 4: Dataset4 5: Dataset5 6: Dataset6 7: undefined

9.1.4.9 SAC 1-8, Slot 17-25

Index	Parameter	R/W	Data Type	Bytes	Description
105	SAC_SWITCHDATASET	R/W	Unsigned8	1	Selection: 0: Factory calib. 1: Dataset1 2: Dataset2 3: Dataset3 4: Dataset4 5: Dataset5 6: Dataset6 7: undefined

9.1.4.10 Sludge Level 1-8, Slot 17-25

Index	Parameter	R/W	Data Type	Bytes	Description
198	UIS_TURBIDITY_MEAS	R	Unsigned8	1	Selection: 0: Off 1: On

9.1.4.11 Photometer 1-8, Slot 48-55 (only Liquiline CM44P)

Index	Parameter	R/W	Data Type	Bytes	Description
93	PEM_MEAS_DATASET_MC	R/W	Unsigned8	1	Selection: 0: Dataset1 1: Dataset2 2: Dataset3 3: Dataset4 4: Dataset5
94	PEM_MEAS_DATASET_RC	R	Unsigned8	1	Selection: 0: Dataset1 1: Dataset2 2: Dataset3 3: Dataset4 4: Dataset5

9.1.5 Sampler, Slot 7 (only Liquistation CSFxx)

Index	Name Parameter	Access	Data Type	Bytes	Description
158	RUNNING_PROGRAM_NAME	R	VisibleString	16	Program name
159	PROGRAM_NAME	R	VisibleString	16	Name of current active program
160	PROGRAM_STATE	R	Unsigned8	1	Program state Selection: 0: Inactive 1: Active 2: Pause 3: Waiting for pause
161	PROGRAM_BOTTLE_POSITION	R	Unsigned8	1	Current bottle position
162	BOTTLE_CONFIGURATION	R/W	Unsigned8	1	Bottle assignement Selection: 0: 1x - PE Direct distribution 1: 2x - PE Direct distribution 2: 4x - PE Direct distribution 3: 4x - Glass Direct distribution 4: 12x - PE Direct distribution 5: 12x - PE/Glass Plate distribution 6: 24x - PE Direct distribution 7: 24x - PE/Glass Plate distribution 8: 6x+1x - PE/Glass Plate distribution 9: 6x+2x - PE+PE Plate distribution 10: 6x+2x - PE+Glass Plate distribution 11: 12x+1x - PE/Glass Plate distribution 12: 12x+2x - PE+PE Plate distribution 13: 12x+2x - PE+Glass Plate distribution 14: 12x+6x - PE Direct distribution 15: 12x+6x - PE/Glass Plate distribution 16: 4x - Glass Schott GLS80 Direct distribution
163	PROGRAM_SAMPLING_MODE	R	Unsigned8	1	Mode of sampling Selection: 0: Time paced CTCV 1: Flow paced VTCV 2: Time/flow paced CTVV 3: Single sample 4: Sampling table 5: External signal 6: Manual Factory default: 0
164	DATETIME_NEXT_SAMPLING	R	EDDL_DATE _AND_TIME	7	Date and time of next sampling
165	FLOW_NEXT_SAMPLING	R	Float	4	Dosing volume of last sample taking
166	SAMPLING_STATE	R	Unsigned8	1	Sampling progress Selection: 0: Waiting 1: Reference run 2: Dist. arm positioned 3: Purge process 4: Suction process 5: Medium detected 6: Dose process 7: sampling Ok 8: sampling nOk 9: Sampling delay 10: Sampling 11: Pre rinsing 12: Post rinsing 13: Launch bottle 14: Sample bottling

Index	Name Parameter	Access	Data Type	Bytes	Description
					15: Emptying bottle 16: Rinsing bottle 17: Draining bottle
167	MAN_SAMPLING_COMMAND	R/W	Unsigned8	1	Manual sampling command Selection: 0: None 1: Start 2: Stop
168	MAN_SAMPLING_VOLUME_PERIST	R/W	Float	4	Sample volume of manual sampling with peristaltic pump
169	MAN_SAMPLING_BOTTLE_POS	R/W	Unsigned8	1	Manual sampling bottle position Selection: 0: Front 1: Bottle 1 2: Bottle 2 3: Bottle 3 4: Bottle 4 5: Bottle 5 6: Bottle 6 7: Bottle 7 8: Bottle 8 9: Bottle 9 10: Bottle 10 11: Bottle 11 12: Bottle 12 13: Bottle 13 14: Bottle 14 15: Bottle 15 16: Bottle 16 17: Bottle 17 18: Bottle 18 19: Bottle 19 20: Bottle 20 21: Bottle 21 22: Bottle 22 23: Bottle 23 24: Bottle 24 25: Back
170	SAMPLING_VOLUME_VACUUM	R/W	Float	4	Dosing volume of vacuum- or inline-sampler
171	BOTTLE_VOLUME_LEFT	R/W	Float	4	Bottle volume
172	BOTTLE_VOLUME_RIGHT	R/W	Float	4	Bottle volume of the right bottle box
173	CURRENT_BOTTLE_FILL_LEVEL	R	Float	4	Liquid level of selected bottle
174	SAMPLING_TECHNIQUE	R	Unsigned8	1	Sampling mode Selection: 0: Peristaltic 1: Vacuum 2: Inline
175	MANUAL_SAMPLING_PARK_POS	R/W	Unsigned8	1	Distribution arm park position Selection: 0: None 1: Back
176	LAST_SAMPLING_START_TIME	R	EDDL_DATE_AND_TIME	7	Start time of last sampling
177	CAL_COUNT_DISTLEVER	R	Unsigned32	4	Number of distribution lever calibrations
178	CAL_DATETIME_DISTLEVER	R	EDDL_DATE_AND_TIME	7	Time stamp of last distribution lever calibration
179	CAL_COUNT_PERISTVOLUME	R	Unsigned32	4	Number of peristaltic sampling volume calibrations
180	CAL_DATETIME_PERISTVOLUME	R	EDDL_DATE_AND_TIME	7	Time stamp of last peristaltic sampling volume calibration

Index	Name Parameter	Access	Data Type	Bytes	Description
181	CAL_METHOD_PERISTVOLUME	R	Unsigned8	1	Calibration method of last peristaltic sampling volume calibration Selection: 0: None 1: 1-point 2: 2-point

9.1.6 Analyzer, Slot 36 (only Liquiline CA80xx)

Index	Name Parameter	Access	Data Type	Bytes	Description
116	ACTUATORMODULE_INFO_HW_VERSION	R	VisibleString	16	
117	ACTUATORMODULE_INFO_SW_VERSION	R	VisibleString	16	
118	PHOTOMETER_INFO_HW_VERSION	R	VisibleString	16	
119	PHOTOMETER_INFO_SW_VERSION	R	VisibleString	16	
120	MODE	R	Unsigned8	1	
121	CURRENT_ACTIVITY	R	Unsigned8	1	
122	CURRENT_ACTIVITY_REMAINING_TIME	R	EDDL_DURATION	6	
123	PHOTOMETER_TEMPERATURE	R	Float	4	
124	OPHOURS_PHOTOMETER	R	Float	4	
125	OPHOURS_FILTER_MAT	R	Float	4	
126	OPHOURS_PELTIER	R	Float	4	
127	POWER_FAIL_REACTION	R/W	Unsigned8	1	
128	SAMPLE_COLLECTOR_SENSOR	R	Unsigned8	1	
129	ACTIVE_SAMPLINGPOINT	R	Unsigned	1	
130	MEASURED_VALUE_UNIT	R/W	Unsigned8	1	
131	MEASURED_VALUE_ACTIVE_INX	R/W	Unsigned8	1	
132	MEASURED_VALUE_LIST_SIZE	R	Unsigned8	1	
133	MEASURED_VALUE_LIST_01	R	VisibleString	16	
134	MEASURED_VALUE_LIST_02	R	VisibleString	16	
135	MEASURED_VALUE_LIST_03	R	VisibleString	16	
136	MEASURED_VALUE_LIST_04	R	VisibleString	16	
137	MEASURED_VALUE_LIST_05	R	VisibleString	16	
138	MEASURED_VALUE_LIST_06	R	VisibleString	16	
139	MEASURED_VALUE_LIST_07	R	VisibleString	16	
140	MEASURED_VALUE_LIST_08	R	VisibleString	16	
141	MEASUREMENT_DILUTION_FACTOR	R/W	Float	4	
142	MEASUREMENT_OFFSET	R/W	Float	4	
143	CALIBRATION_RETRIES	R/W	UNSIGNED8	1	
144	CALIBRATION_FACTOR	R/W	Float	4	
145	CALIBRATION_CONCENTRATION	R/W	Float	4	
146	CALIBRATION_FACTOR_DELTA	R/W	Float	4	
147	CALIBRATION_FACTOR_MAX	R/W	Float	4	
148	CALIBRATION_FACTOR_MIN	R/W	Float	4	
149	MODE_CHANGE_REQUEST	R/W	Unsigned8	1	
150	MODE_CHANGE_REQUEST_REV_HIDDEN	R	Unsigned8	1	

Index	Name Parameter	Access	Data Type	Bytes	Description
151	MODE_CHANGE_PROCESSED_REV_HIDDEN	R	Unsigned8	1	
152	MODE_CHANGE_REQUEST_STATUS	R	Unsigned8	1	
153	COMMON_REQUEST	R/W	Unsigned8	1	
154	COMMON_REQUEST_REV_HIDDEN	R	Unsigned8	1	
155	ANALYZER_REQUEST	R/W	Unsigned8	1	
156	ANALYZER_REQUEST_REV_HIDDEN	R	Unsigned8	1	
157	ACTIVITY_PROCESSED_REV_HIDDEN	R	Unsigned8	1	
158	ACTIVITY_STATE_HIDDEN	read only	Unsigned8	1	
159	ACTIVITY_REQUEST_STATUS	R	Unsigned8	1	
160	RESET_REQUEST	R/W	Unsigned8	1	
161	PHOTOMETER_RAW_VALUE	R	DS60	12	
162	PHOTOMETER_RAW_VALUE_UNIT	R	Unsigned16	2	
163	PHOTOMETER_RAW_VALUE_RANGE	R	DS61	8	
164	SAMPLEPREPARATIONS_INSTALLATIONTYPE	R	Unsigned8	1	
165	MEASPARAM_ACTIVE_TEXT	R	VisibleString	32	
166	MEASRANGE_ACTIVE_TEXT	R	VisibleString	32	
167	AUTOMEAS_RANGE_CHANGE	R	Unsigned8	1	
168	CALIBRATION_ZEROPOINT_DELTA	R/W	Float	4	
169	CALIBRATION_ZEROPOINT_MAX	R/W	Float	4	
170	CALIBRATION_ZEROPOINT_MIN	R/W	Float	4	
171	CAL_COUNTER	R	UNSIGNED32	4	
172	CAL_DATETIME	R	EDDL_DATE_AND_TIME	7	
173	CAL_METHOD	R	Unsigned8	1	
174	TURBID_SAMPLE_MODE	R	Unsigned8	1	
175	SP_FOR_FIELDBUS_ACTIVITIES	R/W	Unsigned8	1	
176	SP0_OUT	R	DS60	12	
177	SP0_OUT_UNIT	R	Unsigned16	2	
178	SP0_OUT_RANGE	R	DS61	8	
179	SP1_OUT	R	DS60	12	
180	SP1_OUT_UNIT	R	Unsigned16	2	
181	SP1_OUT_RANGE	R	DS61	8	
182	SP2_OUT	R	DS60	12	
183	SP2_OUT_UNIT	R	Unsigned16	2	
184	SP2_OUT_RANGE	R	DS61	8	
185	SP3_OUT	R	DS60	12	
186	SP3_OUT_UNIT	R	Unsigned16	2	
187	SP3_OUT_RANGE	R	DS61	8	
188	SP4_OUT	R	DS60	12	
189	SP4_OUT_UNIT	R	Unsigned16	2	
190	SP4_OUT_RANGE	R	DS61	8	
191	SP5_OUT	R	DS60	12	
192	SP5_OUT_UNIT	R	Unsigned16	2	

Index	Name Parameter	Access	Data Type	Bytes	Description
193	SP5_OUT_RANGE	R	DS61	8	

9.1.7 Sample preparation 1-2, Slot 34-35 (only Liquiline CA80xx)

Index	Name Parameter	Access	Data Type	Bytes	Description
128	SP_INFO_TYPE	R	VisibleString	16	None
129	SP_INFO_HW_VERSION	R	VisibleString	16	None
130	SP_INFO_SW_VERSION	R	VisibleString	16	None
131	SP_INFO_SERIAL	R	VisibleString	16	None
132	SP_INFO_ORDER_CODE	R	VisibleString	32	None
133	SP_INFO_ORDER_CODE_EXTENDED	R	VisibleString	32	None
134	CONTROL_MODE	R	Unsigned8	1	None
135	CURRENT_STATE	R	Unsigned8	1	None
136	MEMOSENS_CONTROL_MODE	R	Unsigned8	1	None
137	OPHOURS_FILTER	R	EDDL_DURATION	6	None
138	OPHOURS_HOSE	R	EDDL_DURATION	6	None
139	OPHOURS_MEMBRANE_PUMP	R	EDDL_DURATION	6	None
140	HOUSING_HEATING_AVAILABLE	R	Unsigned8	1	None
141	FILTER_TUBE_HEATING_AVAILABLE	R	Unsigned8	1	None
142	ANALYZER_TUBE_HEATING_AVAILABLE	R	Unsigned8	1	None
143	AMBIENT_TEMPERATURE_SENSOR_AVAILABLE	R	Unsigned8	1	None
144	MEASUREMENT_ITERATIONS	R/W	Unsigned	1	None
145	CLEANING_TRIGGER	R/W	Unsigned	1	None
146	CLEANING_STARTDATE	R/W	EDDL_DATE	3	None
147	CLEANING_STARTTIME	R/W	EDDL_TIME	6	None
148	CLEANING_INTERVAL	R/W	EDDL_DURATION	6	None
149	CLEANING_DURATION	R/W	EDDL_DURATION	6	None
150	MAXIMUM_TRANSPORT_TIME	R/W	EDDL_DURATION	6	None
151	HOUSING_HEATING_TRIGGER_TEMPERATURE	R/W	Float	4	Celsius
152	HOUSING_HEATING_TRIGGER_TEMPERATURE_INLET_SP	R/W	Float	4	Celsius
153	TUBE_HEATING_TRIGGER_TEMPERATURE	R/W	Float	4	Celsius
154	TIMEOUT_SAMPLING	R/W	EDDL_DURATION	6	None
155	TIMEOUT_SAMPLING_PPS	R/W	EDDL_DURATION	6	None
156	FILTER_CHANGE_WARN_LEVEL	R/W	EDDL_DURATION	6	None
157	FILTER_CHANGE_ACTIVATION	R/W	Unsigned8	1	None
158	HOSE_CHANGE_WARN_LEVEL	R/W	EDDL_DURATION	6	None
159	HOSE_CHANGE_ACTIVATION	R/W	Unsigned8	1	None
160	HOUSING_TEMPERATURE	R/W	DS60	12	Celsius
161	HOUSING_TEMPERATURE_UNIT	R/W	Unsigned16	2	None
162	HOUSING_TEMPERATURE_RANGE	R/W	DS61	8	None
163	AMBIENT_TEMPERATURE	R/W	DS60	12	Celsius
164	AMBIENT_TEMPERATURE_UNIT	R/W	Unsigned16	2	None
165	AMBIENT_TEMPERATURE_RANGE	R/W	DS61	8	None
166	OUT_ANALYZER	R/W	DS60	12	None
167	OUT_ANALYZER_UNIT	R/W	Unsigned16	2	None
168	OUT_ANALYZER_RANGE	R/W	DS61	8	None
169	ACTIVITY_REQUEST	R/W	Unsigned8	1	None
170	ACTIVITY_REQUEST_REV_HIDDEN	R	UNSIGNED8	1	None
171	CLEANING_DISCARD_TIME	R/W	EDDL_DURATION	6	None
172	SAMPLEPREPARATION_TYPE	R	Unsigned8	1	None
173	PRESSURIZED_AIR_AVAILABLE	R	Unsigned8	1	None
174	FILTER_AIRCLEANING_DURATION	R/W	EDDL_DURATION	6	Seconds
175	FILTER_AIRCLEANING_INTERVAL	R/W	EDDL_DURATION	6	None
176	FILTER_AIRCLEANING_MODE	R/W	Unsigned8	1	None
177	PPS_CLEANING_VALVE_INSTALLED	R	Unsigned8	1	None
178	PPS_CLEANING_DURATION	R/W	EDDL_DURATION	6	Seconds
179	PPS_CLEANING_DISCARD_TIME	R/W	EDDL_DURATION	6	Seconds
180	PPS_CLEANING_INTERVAL	R/W	EDDL_DURATION	6	None
181	PPS_CLEANING_TRIGGER	R/W	Unsigned8	1	None

Index	Name Parameter	Access	Data Type	Bytes	Description
182	PPS_CLEANING_DETERGENT_RESIDENCE_TIME	R/W	EDDL_DURATION	6	None
183	OUT_ANALYZER_SAMPLEREQUIRED	R	DS102	2	None
184	OUT_ANALYZER_MEASUREMENTACTIVE	R	DS102	2	None

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