



control4log Functions

control4log
Software
Functions

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1 Description

The control4log device is a data logger that allows the end user to use a defined parameter set to control the device...

- configuration
- read/review of stored data

... .. and can create a direct connection or SSH tunnel to the device with TCP/IP. The data logger is based on the GPIO connections of a Raspberry Pi 4 Model B; further information on the Raspberry Pi can be found at <https://www.raspberrypi.org/documentation>.

2 Scope of Services

2.1 Hardware

The hardware provides the following connections...

- 4 x digital inputs on terminals
- 4 x digital relay outputs on terminals
- 2 x analog inputs on terminals
- 2 x analog outputs on terminals
- 1 x Ethernet 1000BASE-T interface RJ45 port
- 2 x Ethernet 10BASE-T interface RJ45 ports
- 2 x USB 2 Typ A ports
- 2 x USB 3 Typ A ports
- 1 x 24 VDC power supply
- 2 x HDMI Micro Typ D
- 1 x USB-C port
- 1 x Audio output 3.5mm - 4 pole port
- 1 x MicroSD card for operating system

2.2 Operating System

The Raspberry Pi OS 10 is installed with desktop on the control4log device.

2.3 Functions

The control4log data logger device offers the following functions:

- Data logger
- Database for events, variables and digital / analogue inputs and outputs
- Configuration via ETH interface or USB storage medium using a parameter list
- SMTP relay for alarms
- Event memory with 500 messages
- Synchronization of device time via NTP

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3 Functions

3.1 Cycle Time

Since Raspberry Pi OS is not a real-time operating system, ...

- a cycle time of 100 ms (with no counting function activated)
- a cycle time of 10 ms (with at least one counter function activated)

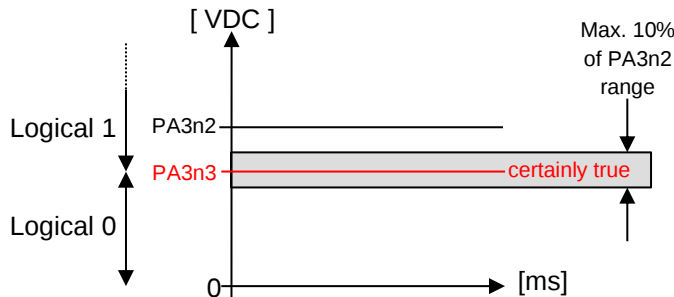
... is aspired to, but adherence to the cycle time cannot be guaranteed. Depending on the utilization of the Raspberry Pi resources, the cycle time may vary.

3.2 Digital Inputs

The digital inputs can work seamlessly from 0 to 24 VDC, i.e. the logical 1 (true) level can be set via parameters. To make this possible, the digital inputs are analog inputs with a 12-bit resolution. Each digital input can also be configured as a counter with a maximum of 30Hz.

3.2.1 Workspace

The range is set using two parameters as shown in the figure below. The parameter PA3n2 is the desired range to be measured, for example 24 VDC. The set value is "only" an auxiliary value to be able to understand what is being measured. The operating point from which a logical 1 is to be recognized can be set with the parameter PA3n3, but +/- 5% of the set PA3n2 is always defined as an unsafe range on the software side.



3.2.2 Resolution

The resolution is 12 bits at 24VDC. This means that the range can be set arbitrarily, but that means the resolution is only evaluated in the corresponding set range.

Example for a 0-5 VDC range:

- 24 VDC corresponds to 12 bits, meaning 4,096 intermediate values with 5.86mV each
- 0-5 VDC therefore corresponds to $4'096 / 24 \times 5 = 853$ intermediate values with a 5.86mV accuracy

3.2.3 Pulse

At 30 Hz the pulse duration is 33.3 ms, which means that in order for the device to be able to detect the pulse it must be at least:

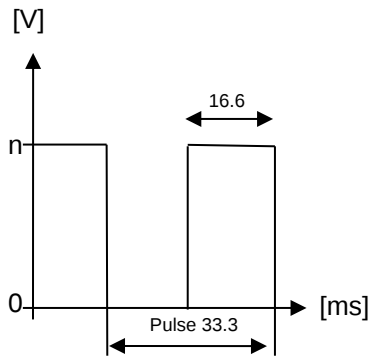
- 16.6 ms above the level PA3n3 (certainly true)
- 16.6 ms below the level PA3n3 (certainly true)

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3.2.4 Parameters

The mode of operation in which each input is to be evaluated is set via a parameter set.

3.2.5 Notifications

Each digital input can generate the following events:

- DIN true
- DIN false

Each of these events can be used via parameters to deliver an SMTP.

3.2.6 Data Log

The data log can be activated via parameters for each digital input, whereby the events are saved in the data point list.

3.3 Relay Outputs

The digital outputs each control a changeover contact from a relay.

3.3.1 Workspace

The switching capacity of the relay changeover contacts is a maximum of 100mA at 24VDC

3.3.2 Pulse Generator

The relay output can also be configured as a pulse via a parameter that can switch at a maximum of 1 Hz.

At 1 Hz, a pulse duration of 1 s with a...

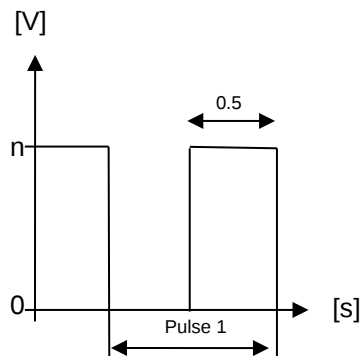
- 0.5 s switch changeover contact
- 0.5 s nonswitch changeover contact

... is possible.

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3.3.3 Parameters

The mode of operation in which each relay contact is to be switched is configured via a parameter set.

3.3.4 System Startup

When starting the hardware, the changeover contacts are not activated. When the startup process is complete and the operating system knows which state (true / false) the changeover contact must have according to the parameter list, they are set to the correct state (true / false).

3.3.5 Following the Digital Input

Each changeover contact can follow a digital input via a set parameter and can thus be used as a signal duplicator. The parameters following a digital input can also be inverted.

During the start process, digital outputs drop out and are only activated again when this is completed, depending on the states of the digital inputs and the settings of the parameters.

3.3.6 Notifications

Each relay contact can generate the following events:

- DIN true
- DIN false

Each of these events can be used via parameters to deliver an SMTP.

3.3.7 Data Log

The data log for each relay contact can be activated via parameters, whereby the events are saved in the data point list.

3.4 Analog Inputs

There are two analogue inputs available. Via a jumper, each analog input can process either "0 to 20 mA" or "0 to 10 VDC".

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3.4.1 Range

The range is defined using parameters and is designed by the hardware for the values 0 to 20mA and 0 to 10 VDC.

3.4.2 Resolution

The resolution is 16 bits at 0 to 20mA and 0 to 10 VDC. Thus, for example, a range for current from ...

- 0 to 20mA
- 4 to 20mA

... or for the voltage from ...

- 0 to 2 VDC
- 0 to 5 VDC
- 0 to 10 VDC
- 1 to 10 VDC

... can be adjusted.

The range can be set arbitrarily, but the resolution is only evaluated in the corresponding set range.

Example for a 4-20 mA range:

- 20 mA corresponds to 16 bits, meaning 65,536 intermediate values with 0.305 uA each
- 4-20 mA therefore corresponds to $65'536 / 20 \times 16 = 52'428$ intermediate values

Example for a 1-3V range:

- 10V corresponds to 16 bits, meaning 65,536 intermediate values with 24.4 uV each
- 1-3V therefore corresponds to $65,536 / 10 \times 2 = 13,107$ intermediate values

3.4.3 Damping

A damping with averaging is freely adjustable via a specific parameter. Since the operating system is not a real-time operating system, the sample number / time may not correspond to the parameter specifications, especially if the time is set too low.

In this case, however, there is always a pause before a sample is made so that the output value is not 0.

3.4.4 Parameters

The mode of operation in which each analog input should work is configured via a parameter set.

3.4.5 Notifications

Each analog input can generate the following events:

- AIn too high
- AIn high
- AIn low
- AIn too low

Each of these events can be used via parameters to deliver an SMTP.

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3.4.6 Data Log

The data log for each analogue input can be activated via parameters, whereby the events are saved in the data point list.

3.5 Analog Outputs

There are two analog outputs. Via a jumper, each analog input can process either "0 to 20 mA" or "0 to 10 VDC".

3.5.1 Resolution

The resolution is 14 bits at 0 to 20mA and 0 to 10 VDC. Thus, for example, a range for current from ...

- 0 to 20mA
- 4 to 20mA

... or for the voltage from ...

- 0 to 2 VDC
- 0 to 5 VDC
- 0 to 10 VDC
- 1 to 10 VDC

... can be adjusted.

The range can be set arbitrarily, but the resolution is only evaluated in the corresponding set range.

Example for 4-20 mA range:

- 20 mA corresponds to 14 bits, meaning 16,384 intermediate values with 1.22 uA each
- 4-20 mA therefore corresponds to $16,384 / 20 \times 16 = 13,107$ intermediate values

Example for range 1-3V:

- 10V corresponds to 14 bits, meaning 16,384 intermediate values with 610 uV each
- 1-3V therefore corresponds to $16,384 / 10 \times 2 = 3,276$ intermediate values

3.5.2 Damping

A damping with averaging is freely adjustable via a specific parameter. Since the operating system is not a real-time operating system, the sample number / time may not correspond to the parameter specifications, especially if the time is set too low.

In this case, however, there is always a pause before a sample is made so that the output value is not 0.

3.5.3 Parameters

The mode of operation in which each analog input should work is set via a parameter set.

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3.5.4 System Startup

Upon startup, after connecting the power supply to the hardware, the analog outputs are not activated. When the startup process is complete, and the operating system knows what value the analog outputs must have according to the parameter list, it is then set to the correct value.

When restarting via the function commands or loading a configuration with the USB stick, the analog outputs will remain in the value they had before the restart. When the start-up process is complete and the operating system knows what value the analog output has to be brought to according to the parameter list, these will drop briefly and then be adjusted to the correct value.

3.5.5 Following the Digital Input

Each analogue output can follow a digital input via a parameter set and can thus be used as a signal doubler. The following of a digital input is controlled based on the current status of the linked digital input.

3.5.6 Following the Analog Input

Each analog output can follow an analog input via a parameter set and can thus be used as a signal doubler. The following of an analog input is controlled based on the current value of the linked analog input.

3.5.7 Notifications

Each more analog input can generate the following events:

- AIn too high
- AIn high
- AIn low
- AIn too low

Each of these events can be used via parameters to deliver an SMTP.

3.5.8 Data Log

The data log for each analogue input can be activated via parameters, whereby the events are saved in the data point list.

3.6 Ethernet Interface RJ45 Socket

The three Ethernet interfaces can be configured via parameters. The two 10BASE-T interfaces can be used either as an unmanaged switch or each independently as an Ethernet interface.

3.6.1 Protocol

The following protocols are on the respective interfaces

Protocol:	Ethernet 0	Ethernet 1	Ethernet 2
c4l:	X	X	X
SMTP:	X	N/A	N/A
NTP:	X	N/A	N/A

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3.6.2 Protocol c4l

The c4l protocol is serial and ASCII codes on TCP/IP. With each creation of the client TCP-Socket (maintenance software), the server TCP-Socket on the control4log device is automatically closed after 5 seconds of inactivity. If this is not done automatically, the client TCP-Socket (maintenance software) must first be disconnected after 5 seconds of inactivity. Only then can a new connection be established from the client TCP-Socket (maintenance software) to the server TCP-Socket from the control4log device.

3.7 USB Typ A Port

All USB interfaces can be attached and used on the Raspberry Pi OS.

3.8 System Time and Date

The system time and date are assigned to the operating system either locally or via a freely parameterizable NTP server.

The system time and the date are automatically written in three different variables and can be queried using function commands.

3.9 Database for Data Point Lists of the Digital and Analogue Inputs and Outputs

Each data point list is configured with a parameter set. There is a table in the database for each digital and analogue input and output (=data point). Each data point must be able to be activated and deactivated via a parameter. An activated data point must be saved in the register. The DB table must be able to hold at least 1,000,000 entries, with the most recent value always being at the top. As soon as the maximum size is reached, the oldest value is deleted before a new value is inserted. A sampling time can be set for each data point.

3.10 SMTP Relay for Alerts

Events can start the SMTP sending process by activating a parameter.

The installed SMTP relay can be used with the free email services and their SMTP interface.

Configuration of SMTP via parameter settings is as follows:

m <Mode>

0 , Function OFF

1, Function ON once

f <mail from Address>

the sender address in SMTP (Ex. N0579@example.net)

t <mail to Address>

the recipient address in SMTP (Ex. service@example.net)

s <SMTP Server IP or URL Address>

the IP address or URL of the SMTP server (Ex. 10.20.30.40 or smtp.example.net)

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u <username>

Username for SMTP account

p <password>

Password for SMTP account

e <encryption>

Encryption for login SMTP account

0, OFF

1, TLS

2, SSL

The text in the "subject" and "message body" corresponds to the freely editable text for each event, which consists of a text parameter according to the parameter list. The strings are stored in various text parameters. The following control characters must be used in the text parameters.

- HT (\t): Horizontal Tab
- VT (\v): Vertical Tab
- LF (\n): Line Feed
- CR (\r): Carrier Return

Only the assigned text parameter can be activated, i.e. with parameter PA140 only text parameter TPn140 works, therefore the parameter must be PA140.140. If the value is not equal to 140, the parameter is disabled. This applies to all parameters (PA) that are linked to a text parameter (TP).

If the password should not be stored in Cleartext in the configuration file /etc/msmtprc, it can also be stored in a key. For the exact procedure, see description PA138 and the following Wiki article:

<https://gitlab.com/techdock/c4l/-/wikis/How-to-encrypt-SMTP-password>.

3.11 Update via Git Client

A clone of the control log repository is present on the device, which is used to update the control4log applications.

3.12 Configuration via USB Interfaces

So that no additional display is necessary, as soon as a USB mass storage device with FAT32 file system is detected, the following options are possible using a text file:

- Download (from device) Data List
- Download (from device) Parameter
- Upload (to device) Parameter (configure device)
- Download (from device) Text Parameter
- Upload (to device) Text Parameter

3.12.1 Folder Names and Service Mode

The name for "Folder Name" and the "Password" for the service mode from the USB mass storage device is taken from parameters PA51 and PA52.

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An upload to the device is only carried out if the correct password from the PA52 is contained in the "passwd.csv" file.

3.12.2 Reading Parameters

If the USB mass storage device contains the correct folder according to the parameters, and the "paradown" file is also within the folder, the "confdown.csv" file with the parameters is downloaded from the device.

3.12.3 Setting Parameters

If the USB mass storage device contains the correct folder according to the parameters, and the "paraup" file is also within the folder, the device is configured according to the "confup.csv" file.

3.12.4 Reading Texts

If the USB mass storage device contains the correct folder according to the parameters and the "textdown" file is also within the folder, the "textdown.csv" file with the text is downloaded from the device.

3.12.5 Writing Texts

If the USB mass storage device contains the correct folder according to the parameters and the "textup" file is also within the folder, the device is configured according to the "textup.csv" file.

3.12.6 Reading the Data Points List (Data Log)

If the USB mass storage device contains the correct folder according to the parameters and the "data" file is also within the folder, the device downloads according to the "dataXY.csv" file. XY stands for DI1 to -4, DO1 to -4, AI1 to 2 and AO1 to -2, VA1 to -n.

3.12.7 Notifications

Each USB interface can generate the following events:

- Download from device
- Upload to device

3.13 Configuration via Ethernet Interfaces

3.13.1 Protocol control4log

The control4log communication protocol via Ethernet is an ASCII protocol. Every data exchange consists of a command from the DTE (external application) and a response from the DCE (control4log).

As confirmation, the protocol always sends the entire telegram back. This shows that the command was accepted by control4log.

'@' is used as the start character. A message always consists of a start character, command code, data, and end character. The command code and data are separated by a period.

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The command code always consists of at least two capital letters. The data can consist of several values, which are then always separated by a delimiter.

At minimum, a message consists of one command code and, at maximum, a command code and the data.

Minimum overall length:	256 characters including start character, command code, separator, etc.
Error behavior:	If an error occurs during transmission or an invalid command is sent, no response will be returned.

ETH0	PA111 to PA122
ETH1	PA211 to PA222
ETH2	PA261 to PA272

- SC: Write time
- DO: Write Digital Outputs
- AO: Write Analog Outputs
- PA: Write Parameter (also applies to reading the configuration via the USB file "confup.csv")
- PT: Write Parameter Texts (also applies to importing texts via USB file "textup.csv")

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- FC30: Initialize event list
- FC32: Initialize parameters
- FC33: Initialize ETH settings, system restart required
- FC34: Initialize NTP settings, system restart required
- FC99: System Restart

As soon as the service mode is activated with FC01, the writing of control4log application of the ...

- DO
- AO

...is stopped. The remaining processes continue to run in the background, but adjusted parameters are not yet applied.

Only exiting the service mode with FC99 results in the parameters being read again and only then are the new parameters actually applied.

3.13.4 Reading Parameters

A parameter is read with an ASCII string @PA<No.><CR><>LF>. If the command is valid, the control4log sends back the ASCII string @PA<No.>.<Data><CR><>LF> as an answer.

3.13.5 Setting Parameters

A parameter is written with an ASCII string @PA<No.>.<Data><<CR><>LF>. The control4log only sends back the ASCII string @PA<No.>.<Data><CR><>LF> if the command is valid and the service mode is activated.

3.13.6 Reading Texts

A text parameter is read with an ASCII string @TP<Nr.><CR><>LF>. If the command is valid, the control4log sends back the ASCII string @TP<Nr.>.<Daten><CR><>LF> as an answer.

3.13.7 Writing Texts

A text parameter is written with an ASCII string @TP<No.>.<Data><<CR><>LF>. If the command is valid and the service mode is activated, the control4log sends back the ASCII string @TP<Nr.>.<Daten><CR><>LF> as an answer.

3.13.8 Reading Notifications

A message is read with an ASCII string @EV<Nr.><CR><>LF>, where the <Nr> corresponds to the number of the maximum 500 messages in the memory (see chapter Function commands). If the command is valid, the control4log sends back the ASCII string @EV<Nr.>.<Daten><CR><>LF> as an answer.

3.13.9 Reading Data Points List (Data Log)

A data point from a list is read with an ASCII string @DL<Periphery><n><No.><CR><>LF>, where the ...

- <Periphery> corresponds to the input or output as a string such as DI, DO, AI, AO
- <n> corresponds to the number of the input or output
- <Nr> is the number of the maximum 1'000'000 messages in the memory

... (see chapter function commands). If the command is valid, the control4log sends back the ASCII string @DL<periphery><n><no.>.<value>.<date & time><CR><>LF> as an answer.

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4 Supplementary Lists

4.1 Terms

Terms used in the tables:

Term / Character	Description
(*)	Future function, not included with this project but parameter will be created anyway
(**)	The PA7 is the only parameter that can be written outside of service mode
NULL	Corresponds to an empty string with no characters
DP	Data point in the Data Point List
Min	If a value smaller than Min is entered for a parameter, it will not be accepted by the controller, meaning there is no response when the protocol is used
Std	This value is stored as the default value in the factory setting
Max	If a value greater than Max is entered for a parameter, it will not be accepted by the controller, meaning there is no response when the protocol is used.
String[256]	Maximum length of a String is 256 CHAR characters. The following ISO character sets must be able to be processed: • UTF-8
u	unit, for unitless variables
x	Assignment of the list to the hardware, for example DLDI1, DLDO2, DLAI3 or DLAO4
n	Any sequential number in a table in a database, for example
w	Any value returned as a String
dt	Date & Time returned as a string in the format YYYY/MM/DD:hh:mm:ss YYYY = Year MM = Month hh = Hour mm = Minute ss = Second

4.2 Function Commands

Function Command	Description								
PA	Parameter Command code for reading and writing parameters. They are read-only except from the PA7, see also Terms (**). As soon as the service mode is active, all parameters can be adjusted until it is deactivated again with the FC00. <table border="1"> <tr> <td>Command</td><td>PA_n.w : Parameter</td></tr> <tr> <td>Explanation</td><td>Parameter, write and read DTE Request: @PA_n<CR><LF> DCE Answer: @PA_n.w<CR><LF></td></tr> <tr> <td>Number</td><td>n Number of Parameter w Value of Parameter</td></tr> <tr> <td>Data</td><td>String [256]</td></tr> </table>	Command	PA _n .w : Parameter	Explanation	Parameter, write and read DTE Request: @PA _n <CR><LF> DCE Answer: @PA _n .w<CR><LF>	Number	n Number of Parameter w Value of Parameter	Data	String [256]
Command	PA _n .w : Parameter								
Explanation	Parameter, write and read DTE Request: @PA _n <CR><LF> DCE Answer: @PA _n .w<CR><LF>								
Number	n Number of Parameter w Value of Parameter								
Data	String [256]								
TP	Text Parameter Command code for reading and writing texts <table border="1"> <tr> <td>Command</td><td>TP_n.w : Text Parameter</td></tr> <tr> <td>Explanation</td><td>Text Parameter, write and read DTE Request: @TP_n<CR><LF> DCE Answer: @TP_n.w<CR><LF></td></tr> <tr> <td>Number</td><td>n Number of Textparameter w Value of Textparameter</td></tr> <tr> <td>Data</td><td>String [256]</td></tr> </table>	Command	TP _n .w : Text Parameter	Explanation	Text Parameter, write and read DTE Request: @TP _n <CR><LF> DCE Answer: @TP _n .w<CR><LF>	Number	n Number of Textparameter w Value of Textparameter	Data	String [256]
Command	TP _n .w : Text Parameter								
Explanation	Text Parameter, write and read DTE Request: @TP _n <CR><LF> DCE Answer: @TP _n .w<CR><LF>								
Number	n Number of Textparameter w Value of Textparameter								
Data	String [256]								
VA	Variables Scaled command code to read variables. They are read-only protected but can always be read.								

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	<table> <tr> <td>Command</td><td>VAn.w : Value</td></tr> <tr> <td>Explanation</td><td>Read the values generated or created by the application DTE Request: @VAn<CR><LF> DCE Answer: @VAn.w<CR><LF></td></tr> <tr> <td>Number</td><td>n Number of the Variable w Value of the Variable</td></tr> <tr> <td>Data</td><td>String [256]</td></tr> </table>	Command	VAn.w : Value	Explanation	Read the values generated or created by the application DTE Request: @VAn<CR><LF> DCE Answer: @VAn.w<CR><LF>	Number	n Number of the Variable w Value of the Variable	Data	String [256]
Command	VAn.w : Value								
Explanation	Read the values generated or created by the application DTE Request: @VAn<CR><LF> DCE Answer: @VAn.w<CR><LF>								
Number	n Number of the Variable w Value of the Variable								
Data	String [256]								
DI	Digital Input Command code for reading digital inputs. They are read-only protected but can always be read. <table> <tr> <td>Command</td><td>DIn.w : Digital Input</td></tr> <tr> <td>Explanation</td><td>Displays the status of a digital input, reads the value DTE Request: @DIn<CR><LF> DCE Answer: @DIn.w<CR><LF></td></tr> <tr> <td>Number</td><td>n Input number, for example DI1, -2, -3 or -4 w Value 0 or 1 from digital input</td></tr> <tr> <td>Data</td><td>Boolean as a String [1]</td></tr> </table>	Command	DIn.w : Digital Input	Explanation	Displays the status of a digital input, reads the value DTE Request: @DIn<CR><LF> DCE Answer: @DIn.w<CR><LF>	Number	n Input number, for example DI1, -2, -3 or -4 w Value 0 or 1 from digital input	Data	Boolean as a String [1]
Command	DIn.w : Digital Input								
Explanation	Displays the status of a digital input, reads the value DTE Request: @DIn<CR><LF> DCE Answer: @DIn.w<CR><LF>								
Number	n Input number, for example DI1, -2, -3 or -4 w Value 0 or 1 from digital input								
Data	Boolean as a String [1]								
DO	Digital Outputs Command code for reading and writing digital outputs. They can be written if the application is switched to service mode with FC01. Writing is blocked as long as the application is not in service mode. <table> <tr> <td>Command</td><td>DOn.w : Digital Output</td></tr> <tr> <td>Explanation</td><td>Displays the status of a digital output, writes and reads the value DTE Request: @DOn<CR><LF> DCE Answer: @DOn.w<CR><LF></td></tr> <tr> <td>Number</td><td>n Output number, for example DO1, -2, -3 or -4 w Value 0 or 1 from digital input</td></tr> <tr> <td>Data</td><td>Boolean as a String [1]</td></tr> </table>	Command	DOn.w : Digital Output	Explanation	Displays the status of a digital output, writes and reads the value DTE Request: @DOn<CR><LF> DCE Answer: @DOn.w<CR><LF>	Number	n Output number, for example DO1, -2, -3 or -4 w Value 0 or 1 from digital input	Data	Boolean as a String [1]
Command	DOn.w : Digital Output								
Explanation	Displays the status of a digital output, writes and reads the value DTE Request: @DOn<CR><LF> DCE Answer: @DOn.w<CR><LF>								
Number	n Output number, for example DO1, -2, -3 or -4 w Value 0 or 1 from digital input								
Data	Boolean as a String [1]								
AI	Analog Input Command code for reading analog inputs not scaled. They are read-only protected but can always be read. <table> <tr> <td>Command</td><td>AI.n.w : Analog Input</td></tr> <tr> <td>Explanation</td><td>Displays the status of an analog input, reads the value DTE Request: @AI.n<CR><LF> DCE Answer: @AI.n.w<CR><LF></td></tr> <tr> <td>Number</td><td>n Input number, for example AI1, -2, -3 or -4 w Value 0 to 8'191 (13-bit AD converter) from analog input</td></tr> <tr> <td>Data</td><td>Integer or real number as a String [256]</td></tr> </table>	Command	AI.n.w : Analog Input	Explanation	Displays the status of an analog input, reads the value DTE Request: @AI.n<CR><LF> DCE Answer: @AI.n.w<CR><LF>	Number	n Input number, for example AI1, -2, -3 or -4 w Value 0 to 8'191 (13-bit AD converter) from analog input	Data	Integer or real number as a String [256]
Command	AI.n.w : Analog Input								
Explanation	Displays the status of an analog input, reads the value DTE Request: @AI.n<CR><LF> DCE Answer: @AI.n.w<CR><LF>								
Number	n Input number, for example AI1, -2, -3 or -4 w Value 0 to 8'191 (13-bit AD converter) from analog input								
Data	Integer or real number as a String [256]								
AO	Analog Outputs Command code for reading and writing analog outputs. They can be written if the application is switched to service mode with FC01. Writing is blocked as long as the application is not in service mode. <table> <tr> <td>Command</td><td>AOn.w : Analog Output</td></tr> <tr> <td>Explanation</td><td>Displays the status of an analog output, writes and reads the value DTE Request: @AOn<CR><LF> DCE Answer: @AOn.w<CR><LF></td></tr> <tr> <td>Number</td><td>n Output number, for example AO1, -2, -3 or -4 w Value 0 to 8'191 (13-bit A/D converter) from analog output</td></tr> <tr> <td>Data</td><td>Integer or real number as a String [256]</td></tr> </table>	Command	AOn.w : Analog Output	Explanation	Displays the status of an analog output, writes and reads the value DTE Request: @AOn<CR><LF> DCE Answer: @AOn.w<CR><LF>	Number	n Output number, for example AO1, -2, -3 or -4 w Value 0 to 8'191 (13-bit A/D converter) from analog output	Data	Integer or real number as a String [256]
Command	AOn.w : Analog Output								
Explanation	Displays the status of an analog output, writes and reads the value DTE Request: @AOn<CR><LF> DCE Answer: @AOn.w<CR><LF>								
Number	n Output number, for example AO1, -2, -3 or -4 w Value 0 to 8'191 (13-bit A/D converter) from analog output								
Data	Integer or real number as a String [256]								
DL	Data Lists Command code for reading data points in data point lists. They are read-only protected but can always be read.								

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	Command	DLDIx.n.w.dt : Data Tables DLDOx.n.w.dt DLAIx.n.w.dt DLAOx.n.w.dt DLVAX.n.w.dt
	Explanation	Displays the status of a single value in a table, reads the value <i>DTE Request:</i> @DLDIn<CR><LF> <i>DCE Answer:</i> @DLDIn.w<CR><LF>
	Number	x Assignment of the list to the hardware, for example DLDI1, DLDO2, DLAI3 or DLAO4 n Entry number, Chronology 1 = most recent event w Value in the saved data point dt Date & Time in YYYY/MM/DD:HH:MM:SS format
	Data	Integer or real number as a String [256]
EV	Event Command code for reading messages. They are read-only protected but can always be read.	
	Command	EVn.w.dt : Event
	Explanation	Displays the status of a single value in a table, reads the value <i>DTE Request:</i> @EVn<CR><LF> <i>DCE Answer:</i> @EVn.w<CR><LF>
	Number	n Entry number, Chronology 1 = most recent event w Value in the saved data point dt Date & Time in YYYY/MM/DD:HH:MM:SS format
	Data	Integer or real number as a String [256]
FC	Function Code Command code to write function commands	
	Command	FCn : Function Code
	Explanation	Sending a command code Command code overview: FC00 Service Mode Off <i>DTE Request:</i> @FC00<CR><LF> <i>DCE Answer:</i> @FC00<CR><LF> FC01 Service Mode On <i>DTE Request:</i> @FC01<CR><LF> <i>DCE Answer:</i> @FC01<CR><LF> FC30 Initialize Event List (Caution: only possible if service mode FC01 is on) <i>DTE Request:</i> @FC30<CR><LF> <i>DCE Answer:</i> @FC30<CR><LF> FC32 Initialize parameters, set everything to Std (Caution: only possible if service mode FC01 is on.) IMPORTANT: It is ALWAYS necessary to restart the system with FC33, FC34 and FC99, because ETH and NTP settings are reset! <i>DTE Request:</i> @FC32<CR><LF> <i>DCE Answer:</i> @FC32<CR><LF> FC33 Apply ETH and SMTP settings at next boot

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	(Caution: only possible if service mode FC01 is on, system start with FC99 required) <i>DTE Request:</i> @FC33<CR><LF> <i>DCE Answer:</i> @FC33<CR><LF> FC34 Apply NTP settings at next system start (Caution: only possible if service mode FC01 is on, system start with FC99 required) <i>DTE Request:</i> @FC34<CR><LF> <i>DCE Answer:</i> @FC34<CR><LF> FC99 System Restart (Caution: only possible if service mode FC01 is on) <i>DTE Request:</i> @FC34<CR><LF> <i>DCE Answer:</i> @FC34<CR><LF>								
SC	Set Clock Command code for reading and writing the system time. <table border="1"> <tr> <td>Command</td><td>SC :Set Clock</td></tr> <tr> <td>Explanation</td><td> Output and writing the system time <i>DTE Request:</i> @SC<CR><LF> <i>DCE Answer:</i> @SC. E.FFF.II.JJJJ/MM/DD.W:HH:MM:SS<CR><LF> </td></tr> <tr> <td>Number</td><td>Entry number, Chronology 1 = most recent event</td></tr> <tr> <td>Data</td><td> String [256] YYYY = Year MM = Month DD = Day W = Weekday (1==Mon / 7 == Sun) HH = Hour MM = Minute SS = Second </td></tr> </table>	Command	SC :Set Clock	Explanation	Output and writing the system time <i>DTE Request:</i> @SC<CR><LF> <i>DCE Answer:</i> @SC. E.FFF.II.JJJJ/MM/DD.W:HH:MM:SS<CR><LF>	Number	Entry number, Chronology 1 = most recent event	Data	String [256] YYYY = Year MM = Month DD = Day W = Weekday (1==Mon / 7 == Sun) HH = Hour MM = Minute SS = Second
Command	SC :Set Clock								
Explanation	Output and writing the system time <i>DTE Request:</i> @SC<CR><LF> <i>DCE Answer:</i> @SC. E.FFF.II.JJJJ/MM/DD.W:HH:MM:SS<CR><LF>								
Number	Entry number, Chronology 1 = most recent event								
Data	String [256] YYYY = Year MM = Month DD = Day W = Weekday (1==Mon / 7 == Sun) HH = Hour MM = Minute SS = Second								

4.3 Ethernet Interface Notifications

In addition to responses to function commands, the Ethernet interface returns the following messages.

Notification	Description
off	The function that is queried is deactivated, for example the value of DI1 is queried but PA301 is set to .0
error.cmd_invalid	An unknown command was sent
error.value_invalid	A value outside the limits was sent
error.db_read	Failed to read database
error.db_write	Failed to write database
error.unknown	For all remaining errors
error.value_protected	If an attempt is made to write a read-only value without first switching off the read-only protection using the service mode
error.access_denied	An attempt is made to read via one of three ETHs on a command without the authorization given for... • ETH0: PA112 to 122 • ETH1: PA212 to 222 • ETH2: PA262 to 272

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4.4 PA Parameters

4.4.1 System (0 to 50)

No.	Function	Min	Std	Max	Scaling		
	Basic Functions (Parameter adjustments need FC99, except PAs marked with (**)) which can be adjusted without FC01)						
0	Software version (https://gitlab.com/techdock/c4l)	0.00	1.10	999.99			
	Version					Commit	Remarks
	1.00					3380568e	Launch
	1.01					6687501b	New PA10
	1.09					7d7ea556	Add scripts for installation
1.10	a3c798e7	Variables VA9-VA16					
1	Project Number	NULL	control4log	String[256]			
(2)	Reserve Parameter						
3	Device Time	0	0	1			
	0 → Operating System						
	1 → NTP-Server						
(4)	Reserve Parameter	0	0	0			
5	Language	1	1	2			
	1 → Language 1 (TP 1001 to 2000)						
	2 → Language 2 (TP 2001 to 3000)						
(6)	Reserve Parameter	0	0	0			
7(**)	Winter / Summer Time	0	0	1			
	0 → CET						
	1 → CEST (+1h)						
(8)	Reserve Parameter	0	0	0			
9	Serial No.	NULL	C4L0-YYMM-nnnn-nnnn	String[256]			
10	Station ID	NULL	NULL	String[256]			
11	vUSB-Storage	0	0	1			
	0 → off						
	1 → on, can be used by broker software						
12	GMP	0	0	1			
	0 → off						
	1 → on, only usable with M2M-Cloud because because user authentication from cloud needed						
(13-20)	Reserve Parameter						
	CPU-Temperatur (future option)						
21	VA8 activate function	0	0	1			
	0 = off						
	1 = on						
22	Time interval	1	10	60	[s]		
23	Name of DP Register How should the Y-axis be named (ex. TT60-1, PT01A, etc.)	NULL	CPU Temp.	String[256]			
24	Unit of the DP register What is the unit of the Y-axis (ex. Bar, °C, etc.)	NULL	gradC	String[256]			
25	SMTP Activation too Low	0	25	1000	[EV]		
	0 → off						
	>0 → on, Number corresponds to the text from TP + offset Language setting PA5						
26	SMTP Value Low	-1000000	-10	1000000			
27	SMTP Activation Low	0	27	1000	[EV]		
	0 → off						

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	>0 → on, Number corresponds to the text from TP + offset Language setting PA5				
28	SMTP Value high	-1000000	0	1000000	
29	SMTP Activation high 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	29	1000	[EV]
30	SMTP Value too high	-1000000	75	1000000	
31	SMTP Activation too high 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	31	1000	[EV]
32	SMTP Value too Low	-1000000	85	1000000	
(33-50)	Reserve Parameter				

4.4.2 USB Mass Storage Interface (51 to 100)

No.	Function	Min	Std	Max	Scaling
	USB-Configuration (Parameter adjustments require FC99)				
51	Folder names for USB	NULL	control4log	String[256]	
52	Password for USB parameter upload	NULL	456852	String[256]	
53	Enable SMTP for parameter upload 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5	0	53	1000	[EV]
54	Enable SMTP for parameter download 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5	0	54	1000	[EV]
55	Enable SMTP for text parameter upload 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5	0	55	1000	[EV]
56	Enable SMTP for text parameter download 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5	0	56	1000	[EV]
(57-100)	Reserve Parameter				

4.4.3 Ethernet Interface 0 (101 to 200) from Raspberry Host

No.	Function	Min	Std	Max	Scaling
	Ethernet 0 (Parameter adjustments require FC33 and FC99)				
101	IPv4	0.0.0.0	192.168.19.77	255.255.255.255	
102	Subnet Mask	0.0.0.0	255.255.255.0	255.255.255.255	
103	Default Gateway	0.0.0.0	192.168.19.1	255.255.255.255	
104	Ethernet Speed 1 → Auto 2 → 10Mbps/Full duplex	1	1	7	

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	3 → 10Mbps/Halfduplex 4 → 100Mbps/Fullduplex 5 → 100Mbps/Halfduplex 6 → 1Gbps/Fullduplex 7 → 1Gbps/Halfduplex				
(105-110)	Reserve Parameter				
	Application (Trimada Software) (Parameter adjustments require FC99)				
111	Application Port (Trimada Software) 0 → off, no communication possible via port >0 → on, port for communication	0	10000	65535	
112	Activate PA reading and writing 0 → off 1 → on, read 2 → on, read & write	0	2	2	
113	Activate TP reading and writing 0 → off 1 → on, read 2 → on, read & write	0	2	2	
114	Activate VA reading 0 → off 1 → on, read	0	1	1	
115	Activate DI reading 0 → off 1 → on, read	0	1	1	
116	Activate DO reading and writing 0 → off 1 → on, read 2 → on, read & write	0	2	2	
117	Activate AI reading 0 → off 1 → on, read	0	1	1	
118	Activate AO reading and writing 0 → off 1 → on, read 2 → on, read & write	0	2	2	
119	Activate EV reading 0 → off 1 → on, read	0	1	1	
120	Activate DL reading 0 → off 1 → on, read	0	1	1	
121	Activate FC writing 0 → off 1 → on, write	0	1	1	
122	Activate SC reading and writing 0 → off 1 → on, read 2 → on, read & write	0	2	2	
(123-130)	Reserve Parameter				
	SMTP (Parameter adjustments require FC99)				
131	SMTP Port 0 → off, no communication possible via port >0 → on, port for communication	0	587	65535	
132	SMTP m <Mode> 0 → Funktion OFF 1 → Funktion ON	0	0	2 1	[EV]
133	SMTP f <mail from Address>	NULL	NULL	String[256]	

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134	SMTP t <mail to Address> <i>Info: It is also possible to string several email addresses together as follows!</i> <i>Example: one@domain.com, two@domain.com</i>	NULL	NULL	String[256]	
135	SMTP s <SMTP Server IP or URL Address>	NULL	NULL	String[256]	
(136)	Reserve Parameter	0	0	0	
137	SMTP u <username>	NULL	NULL	String[256]	
138	SMTP p <password> <i>Info:</i> - If the keyword <u>gpg –decrypt</u> is not included in the PA138, the password is written in clear text to the file /etc/msmtprc. - If the PA138 contains the keyword <u>gpg –decrypt</u>, the string <u>passwordeval <text from PA138></u> is written to the file /etc/msmtprc instead of <u>password <text from PA138></u>. In this case, there must be no additional text before the keyword <u>gpg –decrypt</u>.	NULL	NULL	String[256]	
139	SMTP e <encryption> 0 → off 1 → TLS (tunnel the session through TLS) 2 → STARTLS (start TLS from within the session)	0	0	2	
140	SMTP Text <subject> → Number corresponds to text from TP + Offset Language setting PA5 <i>Info: if smtp.office365.com is used, the control character <\n> (line feed) must be appended to the end of the text TP1140 and TP2140, otherwise the body will not be recognized.</i>	0	140	1000	
141	Failed to enable SMTP for SMTP send 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5	0	141	1000	[EV]
(142-144)	Reserve Parameter				
	NTP (Parameter adjustments require FC34 and FC99)				
145	NTP Port 0 → off, no communication possible via port >0 → on, port for communication (Info: SC does not work)	0	0	65535	
146	NTP Host	NULL	NULL	String[256]	
(147-150)	Reserve Parameter				
	Web-Server (Parameter adjustments require FC99, however all PAs with (*) have no function at the moment and are only placeholders for a future version)				
151(*)	Web-Server Port 0 → off, no communication possible via port >0 → on, port for communication	0	0	65535	
152(*)	Web-Server u <username>	NULL	NULL	String[256]	
153(*)	Web-Server p <password>	NULL	NULL	String[256]	
154(*)	Switch Web-Server DO's u <username>	NULL	NULL	String[256]	
155(*)	Switch Web-Server DO's p <password>	NULL	NULL	String[256]	
156(*)	Activation of the DI-Lists download B ³ b ² b ¹ b ⁰ DI4 DI3 DI2 DI1 0 → off >0 → on	0	0	4	
157(*)	Activation of the DO-Lists download	0	0	4	

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	B^3 b^2 b^1 b^0 DO4 DO3 DO2 DO1 0 → off >0 → on				
158(*)	Activation of the AI-Lists download b^1 b^0 AI2 AI1 0 → off >0 → on	0	0	2	
159(*)	Activation of the AI-Lists download b^1 b^0 AO2 AO1 0 → off >0 → on	0	0	2	
160(*)	Activation of the Event List 0 = OFF 1 = ON	0	0	1	
(161-200)	Reserve Parameter				

4.4.4 Ethernet Interface 1 (201 to 250)

No.	Function	Min	Std	Max	Scaling
	Ethernet 1 (Parameter adjustments require FC33 and FC99)				
201	IPv4	0.0.0.0	192.168.78.78	255.255.255.255	
202	Subnet Masks	0.0.0.0	255.255.255.0	255.255.255.255	
203	Default Gateway	0.0.0.0	192.168.78.1	255.255.255.255	
204	Speed & Communication Technology 1 → Auto 2 → 10Mbps/Full duplex 3 → 10Mbps/Half duplex	1	1	3	
(205-210)	Reserve Parameter				
	Application (Trimada Software) (Parameter adjustments require FC99)				
211	Application Port (Trimada Software) 0 → off, no communication possible via port >0 → on, port for communication	0	10000	65535	
212	Activate PA reading and writing 0 → off 1 → on, read 2 → on, read & write	0	2	2	
213	Activate TP reading and writing 0 → off 1 → on, read 2 → on, read & write	0	2	2	
214	Activate VA reading 0 → off 1 → on, reading	0	1	1	
215	Activate DI reading 0 → off 1 → on, read	0	1	1	
216	Activate DO reading and writing 0 → off 1 → on, read 2 → on, read & write	0	2	2	
217	Activate AI reading 0 → off 1 → on, read	0	1	1	
218	Activate AO reading and writing 0 → off	0	2	2	

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	1 → on, read 2 → on, read & writing				
219	Activate EV reading 0 → off 1 → on, read	0	1	1	
220	Activate DL reading 0 → off 1 → on, read	0	1	1	
221	Activate FC writing 0 → off 1 → on, writing	0	1	1	
222	Activate SC reading and writing 0 → off 1 → on, read 2 → on, read & write	0	2	2	
(223-230)	Reserve Parameter				
	Web-Server (Parameter adjustments require FC99, however all PAs with (*) have no function at this time and are only placeholders for a future version)				
231(*)	Web-Server Port 0 → off, no communication possible via port >0 → on, port for communication	0	0	65535	
(232-240)	Reserve Parameter				
	Modbus-TCP (Parameter adjustments require FC99, however all PAs with (*) have no function at the moment and are only placeholders for a future version)				
241(*)	Modbus-TCP 0 → off, no communication possible via port >0 → on, port for communication	0	0	65535	
(242-250)	Reserve Parameter				

4.4.5 Ethernet Interface 2 (251 to 300)

No.	Function	Min	Std	Max	Scaling
	Ethernet 2 (Parameter adjustments require FC33 and FC99)				
251	IPv4	0.0.0.0	192.168.92.92	255.255.255.255	
252	Subnet Masks	0.0.0.0	255.255.255.0	255.255.255.255	
253	Default Gateway	0.0.0.0	192.168.92.1	255.255.255.255	
254	Speed & Communication Technology 1 → Auto 2 → 10Mbps/Full duplex 3 → 10Mbps/Half duplex	1	1	3	
(255-260)	Reserve Parameter				
	Application (Trimada Software) (Parameter adjustments require FC99)				
261	Application Port (Trimada Software) 0 → off, no communication possible via port >0 → on, port for communication	0	10000	65535	
262	Activate PA reading and writing 0 → off 1 → on, read 2 → on, read & write	0	2	2	
263	Activate TP reading and writing 0 → off 1 → on, read 2 → on, read & write	0	2	2	

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264	Activate VA reading 0 → off 1 → on, read	0	1	1	
265	Activate DI reading 0 → off 1 → on, read	0	1	1	
266	Activate DO reading and writing 0 → off 1 → on, read 2 → on, read & write	0	2	2	
267	Activate AI reading 0 → off 1 → on, read	0	1	1	
268	Activate AO reading and writing 0 → off 1 → on, read 2 → on, read & write	0	2	2	
269	Activate EV reading 0 → off 1 → on, read	0	1	1	
270	Activate DL reading 0 → off 1 → on, read	0	1	1	
271	Activate FC writing 0 → off 1 → on, writing	0	1	1	
272	Activate SC reading and writing 0 → off 1 → on, read 2 → on, read & writing	0	2	2	
(273-280)	Reserve Parameter				
	Web-Server (Parameter adjustments require FC99, however all PAs with (*) have no function at this time and are only placeholders for a future version)				
281(*)	Web-Server Port 0 → off, no communication possible via port >0 → on, port for communication	0	0	65535	
(282-290)	Reserve Parameter				
	Modbus-TCP (Parameter adjustments require FC99, however all PAs with (*) have no function at this time and are only placeholders for a future version)				
291(*)	Modbus-TCP 0 → off, no communication possible via port >0 → on, port for communication	0	0	65535	
(292-299)	Reserve Parameter				
	Switch (Parameter adjustments require FC99)				
300	Mode of Operation Ethernet 2 0 → off, Ethernet 2 works together with Ethernet 1 as a switch, meaning that settings PA201 to PA299 are ignored. 1 → on, Ethernet 2 is independent with its own IPv4, meaning settings PA201 to PA300 are valid.	0	0	1	

4.4.6 Digital Inputs (301 to 400)

No.	Function	Min	Std	Max	Scaling
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	Digital Input 1 (Parameter adjustments require FC99)				
301	Activate Function 0 → Switched Off 1 → Input that records state changes 2 → Counter that makes defined packets <i>Info: If the value is 2, a cycle time of 10 ms is used.</i>	0	0	2	
302	Level true	0	18000	24000	[mV]
303	Level false	0	10000	24000	[mV]
304	Turn on DP Register Recording 0 → Switched Off 1 → Recording Enabled	0	0	1	
305	Name of DP Register How should the Y-axis be named (ex. TT60-1, PT01A, etc.)	NULL	DI1	String[256]	
306	Unit of the DP register What is the unit of the Y-axis (ex. Bar, °C, etc.)	NULL	bar g	String[256]	
307	Define Counter Packets How many minutes should be accumulated before storing the packet as a DP	1	60	65535	[min]
308	Enable SMTP to switch from false to true 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5 <i>Info: If service mode is activated with FC01, SMTP will still be sent.</i>	0	308	1000	[EV]
309	Enable SMTP to switch from true to false 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5 <i>Info: If service mode is activated with FC01, SMTP will still be sent.</i>	0	309	1000	[EV]
(310)	Reserve Parameter				
	Digital Input 2 (Parameter adjustments require FC99)				
311	Activate Function 0 → Switched Off 1 → Input that records state changes 2 → Counter that makes defined packets <i>Info: If the value is 2, a cycle time of 10 ms is used.</i>	0	0	2	
312	Level true	0	18000	24000	[mV]
313	Level false	0	10000	24000	[mV]
314	Turn on DP Register Recording 0 → Switched Off 1 → Recording Enabled	0	0	1	
315	Name of DP Register How should the Y-axis be named (ex. TT60-1, PT01A, etc.)	NULL	DI1	String[256]	
316	Unit of the DP register What is the unit of the Y-axis (ex. Bar, °C, etc.)	NULL	bar g	String[256]	
317	Define Counter Packets How many minutes should be accumulated before storing the packet as a DP	1	60	65535	[min]
318	Enable SMTP to switch from false to true 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5 <i>Info: If service mode is activated with FC01, SMTP will still be sent.</i>	0	318	1000	[EV]

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319	Enable SMTP to switch from true to false 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5 <i>Info: If service mode is activated with FC01, SMTP will still be sent.</i>	0	319	1000	[EV]
(320)	Reserve Parameter				
	Digital Input 3 (Parameter adjustments require FC99)				
321	Activate Function 0 → Switched Off 1 → Input that records state changes 2 → Counter that makes defined packets <i>Info: If the value is 2, a cycle time of 10 ms is used.</i>	0	0	2	
322	Level true	0	18000	24000	[mV]
323	Level false	0	10000	24000	[mV]
324	Turn on DP Register Recording 0 → Switched Off 1 → Recording Enabled	0	0	1	
325	Name of DP Register How should the Y-axis be named (ex. TT60-1, PT01A, etc.)	NULL	DI1	String[256]	
326	Unit of the DP register What is the unit of the Y-axis (ex. Bar, °C, etc.)	NULL	bar g	String[256]	
327	Define Counter Packets How many minutes should be accumulated before storing the packet as a DP	1	60	65535	[min]
328	Enable SMTP to switch from false to true 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5 <i>Info: If service mode is activated with FC01, SMTP will still be sent.</i>	0	328	1000	[EV]
329	Enable SMTP to switch from true to false 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5 <i>Info: If service mode is activated with FC01, SMTP will still be sent.</i>	0	329	1000	[EV]
(330)	Reserve Parameter				
	Digital Input 4 (Parameter adjustments require FC99)				
331	Activate Function 0 → Switched Off 1 → Input that records state changes 2 → Counter that makes defined packets <i>Info: If the value is 2, a cycle time of 10 ms is used.</i>	0	0	2	
332	Level true	0	18000	24000	[mV]
333	Level false	0	10000	24000	[mV]
334	Turn on DP Register Recording 0 → Switched Off 1 → Recording Enabled	0	0	1	
335	Name of DP Register How should the Y-axis be named (ex. TT60-1, PT01A, etc.)	NULL	DI1	String[256]	
336	Unit of the DP register What is the unit of the Y-axis (ex. Bar, °C, etc.)	NULL	bar g	String[256]	
337	Define Counter Packets	1	60	65535	[min]

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	How many minutes should be accumulated before storing the packet as a DP				
338	Enable SMTP to switch from false to true 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5 <i>Info: If service mode is activated with FC01, SMTP will still be sent.</i>	0	338	1000	[EV]
339	Enable SMTP to switch from true to false 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5 <i>Info: If service mode is activated with FC01, SMTP will still be sent.</i>	0	339	1000	[EV]
(340-400)	Reserve Parameter				

4.4.7 Digital Outputs (401 to 500)

No.	Function	Min	Std	Max	Scaling
	Digital Output 1 (Parameter adjustments require FC99)				
401	Activate Function 0 → Switched Off 1 → Switch Closer 2 → Switch Opener 3 → Button key Closer 4 → Button key Opener 5 → Pulse Generator	0	0	4	
402	Turn on DP Register Recording 0 → Switched Off 1 → Recording Enabled	0	0	1	
403	Name of DP Register How should the Y-axis be named (ex. TT60-1, PT01A, etc.)	NULL	DO1	String[256]	
404	Unit of the DP register What is the unit of the Y-axis (ex. Bar, °C, etc.)	NULL	bar g	String[256]	
405	Sampling time for button key function or pulse generator How long is the button key pressed	1	2	60	[s]
406	Following the digital input 0 → Switched Off, switching possible with FC01 1 → Follow DI1 2 → Follow DI2 3 → Follow DI3 4 → Follow DI4 <i>Info: If service mode is activated with FC01, SMTP will still be sent. In addition, the status set with the DO function command in the service mode is retained after exiting the service mode.</i>	0	0	4	
407	Enable SMTP to switch from false to true 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5	0	407	1000	[EV]
408	Enable SMTP to switch from true to false 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5	0	408	1000	[EV]
(409-410)	Reserve Parameter				

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	Digital Output 2 (Parameter adjustments require FC99)				
411	Activate Function 0 → Switched Off 1 → Switch Closer 2 → Switch Opener 3 → Button key Closer 4 → Button key Opener 5 → Pulse Generator	0	0	4	
412	Turn on DP Register Recording 0 → Switched Off 1 → Recording Enabled	0	0	1	
413	Name of DP Register How should the Y-axis be named (ex. TT60-1, PT01A, etc.)	NULL	DO2	String[256]	
414	Unit of the DP register What is the unit of the Y-axis (ex. Bar, °C, etc.)	NULL	bar g	String[256]	
415	Sampling time for button key function or pulse generator How long is the button key pressed	1	2	60	[s]
416	Following the digital input 0 → Switched Off, switching possible with FC01 1 → Follow DI1 2 → Follow DI2 3 → Follow DI3 4 → Follow DI4 <i>Info: If service mode is activated with FC01, SMTP will still be sent. In addition, the status set with the DO function command in the service mode is retained after exiting the service mode.</i>	0	0	4	
417	Enable SMTP to switch from false to true 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5	0	417	1000	[EV]
418	Enable SMTP to switch from true to false 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5	0	418	1000	[EV]
(419-420)	Reserve Parameter				
	Digital Output 3 (Parameter adjustments require FC99)				
421	Activate Function 0 → Switched Off 1 → Switch Closer 2 → Switch Opener 3 → Button key Closer 4 → Button key Opener 5 → Pulse Generator	0	0	4	
422	Turn on DP Register Recording 0 → Switched Off 1 → Recording Enabled	0	0	1	
423	Name of DP Register How should the Y-axis be named (ex. TT60-1, PT01A, etc.)	NULL	DO3	String[256]	
424	Unit of the DP register What is the unit of the Y-axis (ex. Bar, °C, etc.)	NULL	bar g	String[256]	
425	Sampling time for button key function or pulse generator How long is the button key pressed	1	2	60	[s]
426	Following the digital input	0	0	4	

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	0 → Switched Off, switching possible with FC01 1 → Follow DI1 2 → Follow DI2 3 → Follow DI3 4 → Follow DI4 <i>Info: If service mode is activated with FC01, SMTP will still be sent. In addition, the status set with the DO function command in the service mode is retained after exiting the service mode.</i>				
427	Enable SMTP to switch from false to true 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5	0	427	1000	[EV]
428	Enable SMTP to switch from true to false 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5	0	428	1000	[EV]
(429-430)	Reserve Parameter				
	Digital Output 4 (Parameter adjustments require FC99)				
431	Activate Function 0 → Switched Off 1 → Switch Closer 2 → Switch Opener 3 → Button key Closer 4 → Button key Opener 5 → Pulse Generator	0	0	4	
432	Turn on DP Register Recording 0 → Switched Off 1 → Recording Enabled	0	0	1	
433	Name of DP Register How should the Y-axis be named (ex. TT60-1, PT01A, etc.)	NULL	DO4	String[256]	
434	Unit of the DP register What is the unit of the Y-axis (ex. Bar, °C, etc.)	NULL	bar g	String[256]	
435	Sampling time for button key function or pulse generator How long is the button key pressed	1	2	60	[s]
436	Following the digital input 0 → Switched Off, switching possible with FC01 1 → Follow DI1 2 → Follow DI2 3 → Follow DI3 4 → Follow DI4 <i>Info: If service mode is activated with FC01, SMTP will still be sent. In addition, the status set with the DO function command in the service mode is retained after exiting the service mode.</i>	0	0	4	
437	Enable SMTP to switch from false to true 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5	0	437	1000	[EV]
438	Enable SMTP to switch from true to false 0 → off >0 → on, Number corresponds to text from TP+Offset Language setting PA5	0	438	1000	[EV]
(439-500)	Reserve Parameter				

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4.4.8 Analog Inputs (501 to 600)

No.	Function	Min	Std	Max	Scaling
	Analog Input 1 (Parameter adjustments require FC99)				
501	Activate AI1 Function 0 = Switched Off 1 = Activated	0	0	1	
502	Turn on scaled DP Register Recording 0 = Switched Off 1 = Recording Activated	0	0	1	
503	Level Low	0	0	20000	[mV] / [uA]
504	Level High	0	10000	20000	[mV] / [uA]
505	Mode of Operation 0 → Current 1 → Voltage	0	1	1	
506	Damping for averaging 0 → off >0 → on, Number corresponds to the number of 100 ms cycles in which the samples are collected. The number of samples is added, and an average is calculated.	0	5	600	[0.1s]
507	Name scaled to DP register How should the Y-axis be named (ex. TT60-1, PT01A, etc.)	NULL	AI1	String[256]	
508	Unit scaled to DP register What is the unit of the Y-axis (ex. Bar, °C, etc.)	NULL	bar g	String[256]	
509	Total range scaled to VA from DP register Determines the height of the Y axis	0	400	1000000	
510	Offset minus scaled to VA from DP register Determines the negative range of the Y-axis	-1000000	0	1000000	
511	Cycle time to save current value. Determines in which second interval the value is read out, and the average value will be written into the DP register.	1	3600	86400	[s]
512	SMTP Activation too Low 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	512	1000	[EV]
513	Relational Operator too Low 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
514	SMTP Value too Low	-1000000	0	1000000	
515	SMTP Activation Low 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	515	1000	[EV]
516	Relational Operator Low 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller)	1	4	6	

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	5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.				
517	SMTP Value Low	-1000000	0	1000000	
518	SMTP Activation High 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	518	1000	[EV]
519	Relational Operator High 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
520	SMTP Value High	-1000000	0	1000000	
521	SMTP Activation too High 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	521	1000	[EV]
522	Relational Operator too High 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
523	SMTP Value too High	-1000000	0	1000000	
(523-550)	Reserve Parameter				
	Analog Input 2 (Parameter adjustments require FC99)				
551	Activate AI2 Function 0 = Switched Off 1 = Activated	0	0	1	
552	Turn on scaled DP Register Recording 0 = Switched Off 1 = Recording Activated	0	0	1	
553	Level Low	0	0	20000	[mV] / [uA]
554	Level High	0	10000	20000	[mV] / [uA]
555	Mode of Operation 0 → Current 1 → Voltage	0	1	1	
556	Damping for averaging 0 → off >0 → on, Number corresponds to the number of 100 ms cycles in which the samples are collected. The number of samples is added, and an average is calculated.	0	5	600	[0.1s]
557	Name scaled to DP register How should the Y-axis be named (ex. TT60-1, PT01A, etc.)	NULL	AI2	String[256]	
558	Unit scaled to DP register	NULL	bar g	String[256]	

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	What is the unit of the Y-axis (ex. Bar, °C, etc.)				
559	Total range scaled to VA from DP register Determines the height of the Y axis	0	400	1000000	
560	Offset minus scaled to VA from DP register Determines the negative range of the Y-axis	-1000000	0	1000000	
561	Cycle time to save current value. Determines in which second interval the value is read out, and the average value will be written into the DP register.	1	3600	86400	[s]
562	SMTP Activation too Low 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	562	1000	[EV]
563	Relational Operator too Low 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
564	SMTP Value too Low 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	-1000000	0	1000000	
565	SMTP Activation Low 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	565	1000	[EV]
566	Relational Operator Low 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
567	SMTP Value Low 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	-1000000	0	1000000	
568	SMTP Activation High 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	568	1000	[EV]
569	Relational Operator High 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal)	1	3	6	

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	Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.				
570	SMTP Value High	-1000000	0	1000000	
571	SMTP Activation too High 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	571	1000	[EV]
572	Relational Operator too High 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
573	SMTP Value too High	-1000000	0	1000000	
(574-600)	Reserve Parameter				

4.4.9 Analog Outputs (601 to 800)

No.	Function	Min	Std	Max	Scaling
	Analog Output 1 (Parameter adjustments require FC99)				
601	Activate AO1 Function 0 = Switched Off 1 = Activated as an AO	0	0	1	
602	Turn on scaled DP Register Recording 0 = Switched Off 1 = Recording Activated	0	0	1	
603	Level Low	0	0	20000	[mV] / [uA]
604	Level High	0	10000	20000	[mV] / [uA]
605	Mode of Operation 0 → Current 1 → Voltage	0	1	1	
606	Damping for averaging 0 → off >0 → on, Number corresponds to the number of 100 ms cycles in which the samples are collected. The number of samples is added, and an average is calculated.	0	5	600	[0.1s]
607	Name scaled to DP register How should the Y-axis be named (ex. TT60-1, PT01A, etc.)	NULL	AO1	String[256]	
608	Unit scaled to DP register What is the unit of the Y-axis (ex. Bar, °C, etc.)	NULL	bar g	String[256]	
609	Total range scaled to VA from DP register Determines the height of the Y axis	0	400	1000000	
610	Offset minus scaled to VA from DP register Determines the negative range of the Y-axis	-1000000	0	1000000	
611	Cycle time to save current value. Determines in which second interval the value is read out, and the average value will be written into the DP register.	1	3600	86400	[s]
612	Dependence on DI (if active as PID) or AI (if signal doubling). The AO is only activated if the corresponding DI = 1 0 → Switched off, switching possible with FC01	0	0	6	

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	1 → Follow DI1 2 → Follow DI2 3 → Follow DI3 4 → Follow DI4 5 → Follow AI1 6 → Follow AI2 <i>Info: If service mode is activated with FC01, the SMTP will still be sent. In addition, the status set with the DO function command in the service mode is retained after exiting the service mode.</i>				
613	SMTP Activation too Low 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	613	1000	[EV]
614	Relational Operator too Low 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) <i>Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.</i>	1	4	6	
615	SMTP Value too Low	-1000000	0	1000000	
616	SMTP Activation Low 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	616	1000	[EV]
617	Relational Operator Low 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) <i>Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.</i>	1	4	6	
618	SMTP Value Low	-1000000	0	1000000	
619	SMTP Activation High 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	619	1000	[EV]
620	Relational Operator High 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) <i>Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.</i>	1	3	6	
621	SMTP Value High	-1000000	0	1000000	
622	SMTP Activation too High 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	622	1000	[EV]

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623	Relational Operator too High 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
624	SMTP Value too High	-1000000	0	1000000	
(631-650)	Reserve Parameter				
	Analog Output 2 (Parameter adjustments require FC99)				
651	Activate AO2, Function 0 = Switched Off 1 = Activated as an AO	0	0	1	
652	Turn on scaled DP Register Recording 0 = Switched Off 1 = Recording Activated	0	0	1	
653	Level Low	0	0	20000	[mV] / [uA]
654	Level High	0	10000	20000	[mV] / [uA]
655	Mode of Operation 0 → Current 1 → Voltage	0	1	1	
656	Damping for averaging 0 → off >0 → on, Number corresponds to the number of 100 ms cycles in which the samples are collected. The number of samples is added, and an average is calculated.	0	5	600	[0.1s]
657	Name scaled to DP register How should the Y-axis be named (ex. TT60-1, PT01A, etc.)	NULL	AI2	String[256]	
658	Unit scaled to DP register What is the unit of the Y-axis (ex. Bar, °C, etc.)	NULL	bar g	String[256]	
659	Total range scaled to VA from DP register Determines the height of the Y axis	0	400	1000000	
660	Offset minus scaled to VA from DP register Determines the negative range of the Y-axis	-1000000	0	1000000	
661	Cycle time to save current value. Determines in which second interval the value is read out, and the average value will be written into the DP register.	1	3600	86400	[s]
662	Dependence on DI (if active as PID) or AI (if signal doubling). The AO is only activated if the corresponding DI = 1 0 → Switched off, switching possible with FC01 1 → Follow DI1 2 → Follow DI2 3 → Follow DI3 4 → Follow DI4 5 → Follow AI1 6 → Follow AI2 Info: If service mode is activated with FC01, the SMTP will still be sent. In addition, the status set with the DO function command in the service mode is retained after exiting the service mode.	0	0	6	
663	SMTP Activation too Low 0 → off	0	663	1000	[EV]

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	>0 → on, Number corresponds to the text from TP + offset Language setting PA5				
664	Relational Operator too Low 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
665	SMTP Value too Low	-1000000	0	1000000	
666	SMTP Activation Low 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	666	1000	[EV]
667	Relational Operator Low 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
668	SMTP Value Low	-1000000	0	1000000	
669	SMTP Activation High 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	669	1000	[EV]
670	Relational Operator High 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
671	SMTP Value High	-1000000	0	1000000	
672	SMTP Activation too High 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	672	1000	[EV]
673	Relational Operator too High 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
674	SMTP Value too High	-1000000	0	1000000	
(675-700)	Reserve Parameter				

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4.4.10 Free values, start- or hour counter (701 bis 900)

No.	Function	Min	Std	Max	Scaling
No.	VA8 (Free value, start- or hour counter) (Parameter adjustments require FC99)				
701	Activate function 0 = Switched Off 1 = Activated, adjustments require FC99 2 = Activated, adjustments do not require FC99	0	0	2	
702	Counter type 0 = no counter 1 = hour counter 2 = start counter	0	0	2	
703	Name scaled to VA How should the Y-axis be named (ex. Machine A, Machine B, etc.)	NULL	VA9	String[256]	
704	Unit scaled to DP register What is the unit of the Y-axis (ex. h, starts-stop, etc.)	NULL	h	String[256]	
705	Connection to ... 1 = DI1 2 = DI2 3 = DI3 4 = DI4 5 = DO1 6 = DO2 7 = DO3 8 = DO4 9 = VA1 10 = VA2 11 = VA3 12 = VA4	0	1	12	
706	Counter start condition 1 >= PAnn4 2 <= PAnn4	1	1	2	
707	Counter value condition If PAnn5 true, then counter is running	-10000000	0	10000000	
708	Hysteresis If condition PAnn6 is true, then this value is used at PAnn5 as hysteresis + or –	-10000000	0	10000000	
709	SMTP Activation value 1 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	708	1000	[EV]
710	Relational Operator value 1 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
711	SMTP Value value 1	-1000000	0	1000000	
712	SMTP Activation value 2 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	711	1000	[EV]
713	Relational Operator value 2 1 → == (equal)	1	4	6	

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	2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.				
714	SMTP Value value 2	-1000000	0	1000000	
715	SMTP Activation value 3 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	714	1000	[EV]
716	Relational Operator value 3 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
717	SMTP Value value 3	-1000000	0	1000000	
718	SMTP Activation value 4 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	717	1000	[EV]
719	Relational Operator value 4 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
720	SMTP Value value 4	-1000000	0	1000000	
No.	VA9 (Free value, start- or hour counter) (Parameter adjustments require FC99)	Min	Std	Max	Scaling
721	Activate function 0 = Switched Off 1 = Activated, adjustments require FC99 2 = Activated, adjustments do not require FC99	0	0	2	
722	Counter type 0 = no counter 1 = hour counter 2 = start counter	0	0	2	
723	Name scaled to VA How should the Y-axis be named (ex. Machine A, Machine B, etc.)	NULL	VA9	String[256]	
724	Unit scaled to DP register What is the unit of the Y-axis (ex. h, starts-stop, etc.)	NULL	h	String[256]	
725	Connection to ... 1 = DI1 2 = DI2 3 = DI3 4 = DI4 5 = DO1 6 = DO2 7 = DO3	0	1	12	

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	8 = DO4 9 = VA1 10 = VA2 11 = VA3 12 = VA4				
726	Counter start condition 1 >= PAnn4 2 <= PAnn4	1	1	2	
727	Counter value condition If PAnn5 true, then counter is running	-10000000	0	10000000	
728	Hysteresis If condition PAnn6 is true, then this value is used at PAnn5 as hysteresis + or –	-10000000	0	10000000	
729	SMTP Activation value 1 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	708	1000	[EV]
730	Relational Operator value 1 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
731	SMTP Value value 1	-10000000	0	10000000	
732	SMTP Activation value 2 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	711	1000	[EV]
733	Relational Operator value 2 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
734	SMTP Value value 2	-10000000	0	10000000	
735	SMTP Activation value 3 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	714	1000	[EV]
736	Relational Operator value 3 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
737	SMTP Value value 3	-10000000	0	10000000	
738	SMTP Activation value 4 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	717	1000	[EV]
739	Relational Operator value 4	1	3	6	

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	1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.				
740	SMTP Value value 4	-1000000	0	1000000	
No.	VA10 (Free value, start- or hour counter) (Parameter adjustments require FC99)	Min	Std	Max	Scaling
741	Activate function 0 = Switched Off 1 = Activated, adjustments require FC99 2 = Activated, adjustments do not require FC99	0	0	2	
742	Counter type 0 = no counter 1 = hour counter 2 = start counter	0	0	2	
743	Name scaled to VA How should the Y-axis be named (ex. Machine A, Machine B, etc.)	NULL	VA9	String[256]	
744	Unit scaled to DP register What is the unit of the Y-axis (ex. h, starts-stop, etc.)	NULL	h	String[256]	
745	Connection to ... 1 = DI1 2 = DI2 3 = DI3 4 = DI4 5 = DO1 6 = DO2 7 = DO3 8 = DO4 9 = VA1 10 = VA2 11 = VA3 12 = VA4	0	1	12	
746	Counter start condition 1 >= PAnn4 2 <= PAnn4	1	1	2	
747	Counter value condition If PAnn5 true, then counter is running	-10000000	0	10000000	
748	Hysteresis If condition PAnn6 is true, then this value is used at PAnn5 as hysteresis + or –	-10000000	0	10000000	
749	SMTP Activation value 1 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	708	1000	[EV]
750	Relational Operator value 1 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
751	SMTP Value value 1	-1000000	0	1000000	

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752	SMTP Activation value 2 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	711	1000	[EV]
753	Relational Operator value 2 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
754	SMTP Value value 2	-1000000	0	1000000	
755	SMTP Activation value 3 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	714	1000	[EV]
756	Relational Operator value 3 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
757	SMTP Value value 3	-1000000	0	1000000	
758	SMTP Activation value 4 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	717	1000	[EV]
759	Relational Operator value 4 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
760	SMTP Value value 4	-1000000	0	1000000	
No.	VA11 (Free value, start- or hour counter) (Parameter adjustments require FC99)	Min	Std	Max	Scaling
761	Activate function 0 = Switched Off 1 = Activated, adjustments require FC99 2 = Activated, adjustments do not require FC99	0	0	2	
762	Counter type 0 = no counter 1 = hour counter 2 = start counter	0	0	2	
763	Name scaled to VA How should the Y-axis be named (ex. Machine A, Machine B, etc.)	NULL	VA9	String[256]	
764	Unit scaled to DP register What is the unit of the Y-axis (ex. h, starts-stop, etc.)	NULL	h	String[256]	
765	Connection to ... 1 = DI1	0	1	12	

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	2 = DI2 3 = DI3 4 = DI4 5 = DO1 6 = DO2 7 = DO3 8 = DO4 9 = VA1 10 = VA2 11 = VA3 12 = VA4				
766	Counter start condition 1 >= PAnn4 2 <= PAnn4	1	1	2	
767	Counter value condition If PAnn5 true, then counter is running	-10000000	0	10000000	
768	Hysteresis If condition PAnn6 is true, then this value is used at PAnn5 as hysteresis + or –	-10000000	0	10000000	
769	SMTP Activation value 1 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	708	1000	[EV]
770	Relational Operator value 1 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
771	SMTP Value value 1	-1000000	0	1000000	
772	SMTP Activation value 2 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	711	1000	[EV]
773	Relational Operator value 2 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
774	SMTP Value value 2	-1000000	0	1000000	
775	SMTP Activation value 3 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	714	1000	[EV]
776	Relational Operator value 3 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	

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777	SMTP Value value 3	-1000000	0	1000000	
778	SMTP Activation value 4 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	717	1000	[EV]
779	Relational Operator value 4 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
780	SMTP Value value 4	-1000000	0	1000000	
No.	VA12 (Free value, start- or hour counter) (Parameter adjustments require FC99)	Min	Std	Max	Scaling
781	Activate function 0 = Switched Off 1 = Activated, adjustments require FC99 2 = Activated, adjustments do not require FC99	0	0	2	
782	Counter type 0 = no counter 1 = hour counter 2 = start counter	0	0	2	
783	Name scaled to VA How should the Y-axis be named (ex. Machine A, Machine B, etc.)	NULL	VA9	String[256]	
784	Unit scaled to DP register What is the unit of the Y-axis (ex. h, starts-stop, etc.)	NULL	h	String[256]	
785	Connection to ... 1 = DI1 2 = DI2 3 = DI3 4 = DI4 5 = DO1 6 = DO2 7 = DO3 8 = DO4 9 = VA1 10 = VA2 11 = VA3 12 = VA4	0	1	12	
786	Counter start condition 1 >= PAnn4 2 <= PAnn4	1	1	2	
787	Counter value condition If PAnn5 true, then counter is running	-10000000	0	10000000	
788	Hysteresis If condition PAnn6 is true, then this value is used at PAnn5 as hysteresis + or –	-10000000	0	10000000	
789	SMTP Activation value 1 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	708	1000	[EV]
780	Relational Operator value 1 1 → == (equal) 2 → <> (unequal) 3 → > (larger)	1	4	6	

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	4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.				
791	SMTP Value value 1	-1000000	0	1000000	
792	SMTP Activation value 2 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	711	1000	[EV]
793	Relational Operator value 2 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
794	SMTP Value value 2	-1000000	0	1000000	
795	SMTP Activation value 3 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	714	1000	[EV]
796	Relational Operator value 3 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
797	SMTP Value value 3	-1000000	0	1000000	
798	SMTP Activation value 4 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	717	1000	[EV]
799	Relational Operator value 4 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
800	SMTP Value value 4	-1000000	0	1000000	
No.	VA13 (Free value, start- or hour counter) (Parameter adjustments require FC99)	Min	Std	Max	Scaling
801	Activate function 0 = Switched Off 1 = Activated, adjustments require FC99 2 = Activated, adjustments do not require FC99	0	0	2	
802	Counter type 0 = no counter 1 = hour counter 2 = start counter	0	0	2	
803	Name scaled to VA	NULL	VA9	String[256]	

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	How should the Y-axis be named (ex. Machine A, Machine B, etc.)				
804	Unit scaled to DP register What is the unit of the Y-axis (ex. h, starts-stop, etc.)	NULL	h	String[256]	
805	Connection to ... 1 = DI1 2 = DI2 3 = DI3 4 = DI4 5 = DO1 6 = DO2 7 = DO3 8 = DO4 9 = VA1 10 = VA2 11 = VA3 12 = VA4	0	1	12	
806	Counter start condition 1 >= PAnn4 2 <= PAnn4	1	1	2	
807	Counter value condition If PAnn5 true, then counter is running	-10000000	0	10000000	
808	Hysteresis If condition PAnn6 is true, then this value is used at PAnn5 as hysteresis + or –	-10000000	0	10000000	
809	SMTP Activation value 1 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	708	1000	[EV]
810	Relational Operator value 1 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
811	SMTP Value value 1	-1000000	0	1000000	
812	SMTP Activation value 2 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	711	1000	[EV]
813	Relational Operator value 2 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
814	SMTP Value value 2	-1000000	0	1000000	
815	SMTP Activation value 3 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	NULL	h	String[256]	
816	Relational Operator value 3 1 → == (equal) 2 → <> (unequal)	0	714	1000	[EV]

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	3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.				
817	SMTP Value value 3	1	3	6	
818	SMTP Activation value 4 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	-1000000	0	1000000	
819	Relational Operator value 4 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	0	717	1000	[EV]
820	SMTP Value value 4	1	3	6	
No.	VA14 (Free value, start- or hour counter) (Parameter adjustments require FC99)	Min	Std	Max	Scaling
821	Activate function 0 = Switched Off 1 = Activated, adjustments require FC99 2 = Activated, adjustments do not require FC99	0	0	2	
822	Counter type 0 = no counter 1 = hour counter 2 = start counter	0	0	2	
823	Name scaled to VA How should the Y-axis be named (ex. Machine A, Machine B, etc.)	NULL	VA9	String[256]	
824	Unit scaled to DP register What is the unit of the Y-axis (ex. h, starts-stop, etc.)	NULL	h	String[256]	
825	Connection to ... 1 = DI1 2 = DI2 3 = DI3 4 = DI4 5 = DO1 6 = DO2 7 = DO3 8 = DO4 9 = VA1 10 = VA2 11 = VA3 12 = VA4	0	1	12	
826	Counter start condition 1 >= PAnn4 2 <= PAnn4	1	1	2	
827	Counter value condition If PAnn5 true, then counter is running	-10000000	0	10000000	
828	Hysteresis If condition PAnn6 is true, then this value is used at PAnn5 as hysteresis + or –	-10000000	0	10000000	
829	SMTP Activation value 1 0 → off	0	708	1000	[EV]

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	>0 → on, Number corresponds to the text from TP + offset Language setting PA5				
830	Relational Operator value 1 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
831	SMTP Value value 1	-1000000	0	1000000	
832	SMTP Activation value 2 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	711	1000	[EV]
833	Relational Operator value 2 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
834	SMTP Value value 2	-1000000	0	1000000	
835	SMTP Activation value 3 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	714	1000	[EV]
836	Relational Operator value 3 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
837	SMTP Value value 3	-1000000	0	1000000	
838	SMTP Activation value 4 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	717	1000	[EV]
839	Relational Operator value 4 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
840	SMTP Value value 4	-1000000	0	1000000	
No.	VA15 (Free value, start- or hour counter) (Parameter adjustments require FC99)	Min	Std	Max	Scaling
841	Activate function 0 = Switched Off 1 = Activated, adjustments require FC99	0	0	2	

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	2 = Activated, adjustments do not require FC99				
842	Counter type 0 = no counter 1 = hour counter 2 = start counter	0	0	2	
843	Name scaled to VA How should the Y-axis be named (ex. Machine A, Machine B, etc.)	NULL	VA9	String[256]	
844	Unit scaled to DP register What is the unit of the Y-axis (ex. h, starts-stop, etc.)	NULL	h	String[256]	
845	Connection to ... 1 = DI1 2 = DI2 3 = DI3 4 = DI4 5 = DO1 6 = DO2 7 = DO3 8 = DO4 9 = VA1 10 = VA2 11 = VA3 12 = VA4	0	1	12	
846	Counter start condition 1 >= PAnn4 2 <= PAnn4	1	1	2	
847	Counter value condition If PAnn5 true, then counter is running	-10000000	0	10000000	
848	Hysteresis If condition PAnn6 is true, then this value is used at PAnn5 as hysteresis + or –	-10000000	0	10000000	
849	SMTP Activation value 1 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	708	1000	[EV]
850	Relational Operator value 1 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
851	SMTP Value value 1	-1000000	0	1000000	
852	SMTP Activation value 2 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	711	1000	[EV]
853	Relational Operator value 2 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	4	6	
854	SMTP Value value 2	-1000000	0	1000000	
855	SMTP Activation value 3	0	714	1000	[EV]

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	0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5				
856	Relational Operator value 3 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
857	SMTP Value value 3	-1000000	0	1000000	
858	SMTP Activation value 4 0 → off >0 → on, Number corresponds to the text from TP + offset Language setting PA5	0	717	1000	[EV]
859	Relational Operator value 4 1 → == (equal) 2 → <> (unequal) 3 → > (larger) 4 → < (smaller) 5 → >= (greater or equal) 6 → <= (smaller or equal) Info: has no influence on the type of evaluation, but rather, only influences the text in the SMTP body.	1	3	6	
860	SMTP Value value 4	-1000000	0	1000000	
(861-1000)	Reserve Parameter				

4.5 TP

The following control characters must be used in the text parameters:

- HAT (\t): Horizontal Tab
- VT (\v): Vertical Tab
- LF (\n): Line Feed
- CR (\r): Carrier Return

The following ISO character sets must be able to be processed:

- UTF-8
- ISO/IEC 8859-1
- ISO/IEC 8859-5

All text parameter numbers not mentioned here must also be retrievable, even if they are not listed here.
 The content of the unlisted text parameters is always NULL.

No.	Language 1: Offset 1000 (1001 to 2000)	Language 2: Offset 2000 (2001 to 3000)
	General	
1	NULL	NULL
...	NULL	NULL
3	NULL	NULL
4	Umstellen Gerätezeit	Change device time
6	Umstellen Sprache	Change language
8	Umstellen Winter- /Sommerzeit	Change winter - /summer time
53	Parameter upload über USB	Parameter upload through USB

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54	Parameter download über USB	Parameter download through USB
55	Text Parameter upload über USB	Text parameter upload through USB
56	Text Parameter download über USB	Text parameter download through USB
Ethernet		
104	Link Ethernet 0	Link Ethernet 0
132	Senden SMTP auf ETH0 fehlgeschlagen	Submit SMTP at ETH1 failed
140	Betreff SMTP <i>Info: Wenn smtp.office365.com verwendet wird, muss am Ende im Text TP1140 und TP2140 das Steuerzeichen <ln> (Line Feed) angehängt werden, weil sonst der Email Body nicht erkannt wird</i>	Subject SMTP <i>Info: If smtp.office365.com is used, there must be the control sign <ln> (Line Feed) at the end of text TP1140 and TP2140 because otherwise the Email body will not be shown.</i>
204	Link Ethernet 1	Link Ethernet 1
251	Link Ethernet 2	Link Ethernet 2
Digital Inputs		
308	Digitaler Eingang 1 wechselt von false auf true	Digital input 1 changes signal from false to true
309	Digitaler Eingang 1 wechselt von true auf false	Digital input 1 changes signal from true to false
318	Digitaler Eingang 2 wechselt von false auf true	Digital input 2 changes signal from false to true
319	Digitaler Eingang 2 wechselt von true auf false	Digital input 2 changes signal from true to false
328	Digitaler Eingang 3 wechselt von false auf true	Digital input 3 changes signal from false to true
329	Digitaler Eingang 3 wechselt von true auf false	Digital input 3 changes signal from true to false
338	Digitaler Eingang 4 wechselt von false auf true	Digital input 4 changes signal from false to true
339	Digitaler Eingang 4 wechselt von true auf false	Digital input 4 changes signal from true to false
Digital Outputs		
407	Digitaler Ausgang 1 wechselt von false auf true	Digital output 1 changes signal from false to true
408	Digitaler Ausgang 1 wechselt von true auf false	Digital output 1 changes signal from true to false
417	Digitaler Ausgang 2 wechselt von false auf true	Digital output 2 changes signal from false to true
418	Digitaler Ausgang 2 wechselt von true auf false	Digital output 2 changes signal from true to false
427	Digitaler Ausgang 3 wechselt von false auf true	Digital output 3 changes signal from false to true
428	Digitaler Ausgang 3 wechselt von true auf false	Digital output 3 changes signal from true to false
437	Digitaler Ausgang 4 wechselt von false auf true	Digital output 4 changes signal from false to true
438	Digitaler Ausgang 4 wechselt von true auf false	Digital output 4 changes signal from true to false
Analog Inputs		
512	Analoger Eingang 1 zu tief: <PA513> <PA514> <PA508>	Analog input 1 too low: <PA513> <PA514> <PA508>
515	Analoger Eingang 1 tief: <PA516> <PA517> <PA508>	Analog input 1 low: <PA516> <PA517> <PA508>
518	Analoger Eingang 1 hoch: <PA519> <PA520> <PA508>	Analog input 1 high: <PA519> <PA520> <PA508>
521	Analoger Eingang 1 zu hoch: <PA521> <PA522> <PA508>	Analog input 1 too high: <PA521> <PA522> <PA508>
562	Analoger Eingang 2 zu tief: <PA563> <PA564> <PA558>	Analog input 2 too low: <PA563> <PA564> <PA558>
565	Analoger Eingang 2 tief: <PA566> <PA567> <PA558>	Analog input 2 low: <PA566> <PA567> <PA558>
568	Analoger Eingang 2 hoch: <PA569> <PA570> <PA558>	Analog input 2 high: <PA569> <PA570> <PA558>
571	Analoger Eingang 2 zu hoch: <PA571> <PA722> <PA558>	Analog input 2 too high: <PA571> <PA722> <PA558>
Analog Outputs		
613	Analoger Ausgang 1 zu tief: <PA614> <PA615> <PA608>	Analog output 1 too low: <PA614> <PA615> <PA608>
616	Analoger Ausgang 1 tief: <PA617> <PA618> <PA608>	Analog output 1 low: <PA617> <PA618> <PA608>
619	Analoger Ausgang 1 hoch: <PA620> <PA621> <PA608>	Analog output 1 high: <PA620> <PA621> <PA608>
622	Analoger Ausgang 1 zu hoch: <PA623> <PA624> <PA608>	Analog output 1 too high: <PA623> <PA624> <PA608>
663	Analoger Ausgang 2 zu tief: <PA664> <PA665> <PA658>	Analog output 2 too low: <PA664> <PA665> <PA658>
666	Analoger Ausgang 2 tief: <PA667> <PA668> <PA658>	Analog output 2 low: <PA667> <PA668> <PA658>
669	Analoger Ausgang 2 hoch: <PA670> <PA671> <PA658>	Analog output 2 high: <PA670> <PA671> <PA658>
672	Analoger Ausgang 2 zu hoch: <PA673> <PA674> <PA658>	Analog output 2 too high: <PA673> <PA674> <PA658>
VA8		
709	Variable 8 zu tief: <PA710> <PA711> <PA705>	Variable 8 too low: <PA710> <PA711> <PA705>
712	Variable 8 tief: <PA713> <PA714> <PA705>	Variable 8 low: <PA713> <PA714> <PA705>
715	Variable 8 hoch: <PA716> <PA717> <PA705>	Variable 8 high: <PA716> <PA719> <PA705>
718	Variable 8 zu hoch: <PA719> <PA720> <PA705>	Variable 8 too high: <PA719> <PA720> <PA705>
VA9		

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729	Variable 9 zu tief: <PA730> <PA731> <PA725>	Variable 9 too low: <PA730> <PA731> <PA725>
732	Variable 9 tief: <PA733> <PA734> <PA725>	Variable 9 low: <PA733> <PA734> <PA725>
735	Variable 9 hoch: <PA736> <PA737> <PA725>	Variable 9 high: <PA736> <PA737> <PA725>
738	Variable 9 zu hoch: <PA739> <PA740> <PA725>	Variable 9 too high: <PA739> <PA740> <PA725>
VA10		
749	Variable 10 zu tief: <PA750> <PA751> <PA745>	Variable 10 too low: <PA750> <PA751> <PA745>
752	Variable 10 tief: <PA753> <PA754> <PA745>	Variable 10 low: <PA753> <PA754> <PA745>
755	Variable 10 hoch: <PA756> <PA767> <PA745>	Variable 10 high: <PA756> <PA767> <PA745>
758	Variable 10 zu hoch: <PA759> <PA760> <PA745>	Variable 10 too high: <PA759> <PA760> <PA745>
VA11		
769	Variable 11 zu tief: <PA770> <PA771> <PA765>	Variable 11 too low: <PA770> <PA771> <PA765>
772	Variable 11 tief: <PA773> <PA774> <PA765>	Variable 11 low: <PA773> <PA774> <PA765>
775	Variable 11 hoch: <PA776> <PA777> <PA765>	Variable 11 high: <PA776> <PA777> <PA765>
778	Variable 11 zu hoch: <PA779> <PA780> <PA765>	Variable 11 too high: <PA779> <PA780> <PA765>
VA12		
789	Variable 12 zu tief: <PA790> <PA791> <PA785>	Variable 12 too low: <PA790> <PA791> <PA785>
792	Variable 12 tief: <PA793> <PA794> <PA785>	Variable 12 low: <PA793> <PA794> <PA785>
795	Variable 12 hoch: <PA796> <PA797> <PA785>	Variable 12 high: <PA796> <PA797> <PA785>
798	Variable 12 zu hoch: <PA799> <PA800> <PA785>	Variable 12 too high: <PA799> <PA800> <PA785>
VA13		
809	Variable 13 zu tief: <PA810> <PA811> <PA805>	Variable 13 too low: <PA810> <PA811> <PA805>
812	Variable 13 tief: <PA813> <PA814> <PA805>	Variable 13 low: <PA813> <PA814> <PA805>
815	Variable 13 hoch: <PA816> <PA817> <PA805>	Variable 13 high: <PA816> <PA817> <PA805>
818	Variable 13 zu hoch: <PA819> <PA820> <PA805>	Variable 13 too high: <PA819> <PA820> <PA805>
VA14		
829	Variable 14 zu tief: <PA830> <PA831> <PA825>	Variable 14 too low: <PA830> <PA831> <PA825>
932	Variable 14 tief: <PA833> <PA834> <PA825>	Variable 14 low: <PA833> <PA834> <PA825>
935	Variable 14 hoch: <PA836> <PA837> <PA825>	Variable 14 high: <PA836> <PA837> <PA825>
938	Variable 14 zu hoch: <PA839> <PA840> <PA825>	Variable 14 too high: <PA839> <PA840> <PA825>
VA15		
849	Variable 15 zu tief: <PA850> <PA851> <PA845>	Variable 15 too low: <PA850> <PA851> <PA845>
952	Variable 15 tief: <PA853> <PA854> <PA845>	Variable 15 low: <PA853> <PA854> <PA845>
955	Variable 15 hoch: <PA856> <PA857> <PA845>	Variable 15 high: <PA856> <PA857> <PA845>
958	Variable 15 zu hoch: <PA859> <PA860> <PA845>	Variable 15 too high: <PA859> <PA860> <PA845>
959	Reserve	Spare
960	Reserve	Spare
...	...	...
...	...	...
...	...	...
999	Reserve	Spare
1000	Reserve	Spare

4.6 VA (Current Value)

Process variables scaled.

No.	Description
VA1	AI1 scaled (PA509 & PA510)
VA2	AI2 scaled (PA519 & PA520)
VA3	AO1 scaled (PA608 & PA609)
VA4	AO2 scaled (PA658 & PA659)
VA5	System time hh:mm:ss as a string
VA6	System time DD.HH.YYYY as a string
VA7	System time hh:mm:ss / DD.HH.YYYY as a string

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VA8	CPU-Temperature in °C
VA9	Free value, start- or hour counter [min]
VA10	Free value, start- or hour counter [min]
VA11	Free value, start- or hour counter [min]
VA12	Free value, start- or hour counter [min]
VA13	Free value, start- or hour counter [min]
VA14	Free value, start- or hour counter [min]
VA15	Free value, start- or hour counter [min]

4.7 DI (Current Value)

Digital Input Values.

No.	Description
DI1	Signal value of Digital Input 1
DI2	Signal value of Digital Input 2
DI3	Signal value of Digital Input 3
DI4	Signal value of Digital Input 4

4.8 DO (Current Value)

Digital Output Values.

No.	Description
DO1	Signal value of Digital Output 1
DO2	Signal value of Digital Output 2
DO2	Signal value of Digital Output 3
DO4	Signal value of Digital Output 4

4.9 AI (Current Value)

Analog Input values, unscaled

No.	Description
AI1	Value unscaled from Analog Input 1 (from PA503 & PA504)
AI2	Value unscaled from Analog Input 2 (from PA523 & PA524)

4.10 AO (Current Value)

Analog Output values, unscaled.

No.	Description
AO1	Value unscaled from Analog Output 1 (from PA603 & PA604)
AO2	Value unscaled from Analog Output 2 (from PA653 & PA654)

4.11 DL (Historical Values with Timestamps)

Data lists with 1'000'000 entries each

No.	Description
DLDI1	Table with sample entries for Digital Input 1
DLDI2	Table with sample entries for Digital Input 2
DLDI3	Table with sample entries for Digital Input 3
DLDI4	Table with sample entries for Digital Input 4

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DLDO1	Table with sample entries for Digital Output 1
DLDO2	Table with sample entries for Digital Output 2
DLDO3	Table with sample entries for Digital Output 3
DLDO4	Table with sample entries for Digital Output 4
DLAI1	Table with sample entries for Analog Input 1
DLAI2	Table with sample entries for Analog Input 2
DLAO1	Table with sample entries for Analog Input 1
DLAO2	Table with sample entries for Analog Input 2
DLVA1	Table with sample entries for Variable 1
DLVA2	Table with sample entries for Variable 2
DLVA3	Table with sample entries for Variable 3
DLVA4	Table with sample entries for Variable 4

4.12 EV

The event table can contain a maximum of 500 entries.

The following ISO character sets must be able to be processed:

- UTF-8
- ISO/IEC 8859-1
- ISO/IEC 8859-5

Any PA in the parameter table with an [EV] in the "Scaling" column is always written to the event list even if the PA value is set to 0. With the value of PA, only the text in the SMTP <body> can be defined or, with 0, sending via SMTP can be deactivated.

Example 1: PA571.425

- the Event 571 is written as in the "EV Entry" column
- an SMTP is sent with the <subject> according to TP140 and the <body> TP425

Example 2: PA571.0

- the Event 571 is written as in the "EV Entry" column
- no SMTP is sent

There are 1000 events in total, but not all of them are used. All text parameter numbers not mentioned here must also be retrievable, even if they are not listed here. The content of the unlisted text parameters is always NULL.

EV w	EV Entry	Description Notification or Error
		General
1	-	Spare
...		
4	EVn.4.dt	Change device time
6	EVn.6.dt	Change device language
8	EVn.8.dt	Change winter/summer time
		CPU-Temperatur (future option issue 104)
25	EVn.25.dt	CPU-Temperatur too low: ≤ <PA26> <PA24>
27	EVn.27.dt	CPU-Temperatur low ≤ <PA28> <PA24>
29	EVn.29.dt	CPU-Temperatur high: ≥ <PA30> <PA24>

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31	EVn.31.dt	CPU-Temperatur to high: ≥ <PA32> <PA24>
		USB-Stick
53	EVn.53.dt	Parameter upload via USB
54	EVn.54.dt	Parameter download via USB
55	EVn.55.dt	Text Parameter upload via USB
56	EVn.56.dt	Text Parameter download via USB
		Ethernet
141	EVn.132.dt	Failed to send SMTP on ETH0
147	EVn.142.dt	Connect NTP on ETH0 failed
		Digital Inputs
308	EVn.308.dt	Digital Input 1 changes signal from false to true
309	EVn.309.dt	Digital Input 1 changes signal from true to false
318	EVn.318.dt	Digital Input 2 changes signal from false to true
319	EVn.319.dt	Digital Input 2 changes signal from true to false
328	EVn.328.dt	Digital Input 3 changes signal from false to true
329	EVn.329.dt	Digital Input 3 changes signal from true to false
338	EVn.338.dt	Digital Input 4 changes signal from false to true
339	EVn.339.dt	Digital Input 4 changes signal from true to false
		Digital Outputs
407	EVn.407.dt	Digital Output 1 changes signal from false to true
408	EVn.408.dt	Digital Output 1 changes signal from true to false
417	EVn.417.dt	Digital Output 2 changes signal from false to true
418	EVn.418.dt	Digital Output 2 changes signal from true to false
427	EVn.427.dt	Digital Output 3 changes signal from false to true
428	EVn.428.dt	Digital Output 3 changes signal from true to false
437	EVn.437.dt	Digital Output 4 changes signal from false to true
438	EVn.438.dt	Digital Output 4 changes signal from true to false
		Analog Inputs
512	EVn.512.dt	Analog Input 1 too low: <PA513> <PA514> <PA508>
515	EVn.515.dt	Analog Input 1 low: <PA516> <PA517> <PA508>
518	EVn.518.dt	Analog Input 1 high: <PA519> <PA520> <PA508>
520	EVn.520.dt	Analog Input 1 too high: <PA521> <PA522> <PA508>
562	EVn.562.dt	Analog Input 2 too low: <PA563> <PA564> <PA558>
565	EVn.565.dt	Analog Input 2 low: <PA566> <PA567> <PA558>
568	EVn.568.dt	Analog Input 2 high: <PA569> <PA570> <PA558>
560	EVn.560.dt	Analog Input 2 too high: <PA571> <PA722> <PA558>
		Analog Outputs
613	EVn.613.dt	Analog Output 1 too low: <PA614> <PA615> <PA608>
616	EVn.616.dt	Analog Output 1 low: <PA617> <PA618> <PA608>
619	EVn.619.dt	Analog Output 1 high: <PA620> <PA621> <PA608>
622	EVn.622.dt	Analog Output 1 too high: <PA623> <PA624> <PA608>
663	EVn.663.dt	Analog Output 2 too low: <PA664> <PA665> <PA658>
666	EVn.666.dt	Analog Output 2 low: <PA667> <PA668> <PA658>
669	EVn.669.dt	Analog Output 2 high: <PA70> <PA671> <PA658>
672	EVn.672.dt	Analog Output 2 too high: <PA673> <PA674> <PA658>
		Free values, start- or hour counter
709	EVn.708.dt	Variable 9 value 1: <PA730> <PA731> <PA725>
712	EVn.711.dt	Variable 9 value 2: <PA733> <PA734> <PA725>
715	EVn.714.dt	Variable 9 value 3: <PA736> <PA737> <PA725>
718	EVn.717.dt	Variable 9 value 4: <PA739> <PA740> <PA725>
729	EVn.728.dt	Variable 10 value 1: <PA750> <PA751> <PA745>
732	EVn.731.dt	Variable 10 value 2: <PA753> <PA754> <PA745>
735	EVn.734.dt	Variable 10 value 3: <PA756> <PA767> <PA745>
738	EVn.737.dt	Variable 10 value 4: <PA759> <PA760> <PA745>
749	EVn.748.dt	Variable 11 value 1: <PA770> <PA771> <PA765>

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752	EVn.751.dt	Variable 11 value 2: <PA773> <PA774> <PA765>
755	EVn.754.dt	Variable 11 value 3: <PA776> <PA777> <PA765>
758	EVn.757.dt	Variable 11 value 4: <PA779> <PA780> <PA765>
769	EVn.768.dt	Variable 12 value 1: <PA790> <PA791> <PA785>
772	EVn.771.dt	Variable 12 value 2: <PA793> <PA794> <PA785>
775	EVn.774.dt	Variable 12 value 3: <PA796> <PA797> <PA785>
778	EVn.777.dt	Variable 12 value 4: <PA799> <PA800> <PA785>
789	EVn.788.dt	Variable 13 value 1: <PA810> <PA811> <PA805>
792	EVn.791.dt	Variable 13 value 2: <PA813> <PA814> <PA805>
795	EVn.794.dt	Variable 13 value 3: <PA816> <PA817> <PA805>
798	EVn.797.dt	Variable 13 value 4: <PA819> <PA820> <PA805>
809	EVn.808.dt	Variable 14 value 1: <PA830> <PA831> <PA825>
812	EVn.811.dt	Variable 14 value 2: <PA833> <PA834> <PA825>
815	EVn.814.dt	Variable 14 value 3: <PA836> <PA837> <PA825>
818	EVn.817.dt	Variable 14 value 4: <PA839> <PA840> <PA825>
829	EVn.828.dt	Variable 15 value 1: <PA850> <PA851> <PA845>
932	EVn.931.dt	Variable 15 value 2: <PA853> <PA854> <PA845>
935	EVn.934.dt	Variable 15 value 3: <PA856> <PA857> <PA845>
938	EVn.937.dt	Variable 15 value 4: <PA859> <PA860> <PA845>
849	EVn.848.dt	Variable 16 value 1: <PA850> <PA851> <PA845>
952	EVn.951.dt	Variable 16 value 2: <PA853> <PA854> <PA845>
955	EVn.954.dt	Variable 16 value 3: <PA856> <PA857> <PA845>
958	EVn.957.dt	Variable 16 value 4: <PA859> <PA860> <PA845>
...		
1000	-	Reserve

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