



vpn4log Functions

vpn4log Software Functions

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1 Description

The vpn4log device is a gateway 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 gateway is based on 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...

- 1 x Ethernet 1000BASE-T interface RJ45 port, optional with PoE+
- 2 x USB 2 Typ A ports
- 2 x USB 3 Typ A ports
- 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 vpn4log device.

2.3 Functions

The vpn4log data logger device offers the following functions:

- Gateway
- 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

3 Functions

3.1 Cycle Time

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

- a cycle time of 1 s for FC99

... 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. The writing of EV's into the database is event based, so this is not depending on the cycle time.

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3.2 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.

3.2.1 Protocol

The following protocols are on the respective interfaces

Protocol:	Ethernet 0
c4l:	X
SMTP:	X
NTP:	X

3.2.2 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 vpn4log 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 vpn4log device.

3.3 USB Typ A Port

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

3.4 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.

3.5 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.

3.6 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:

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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)

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/msmtpc, 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>.

3.7 Update via Git Client

A clone of the control log repository is present on the device, which is used to update the vpn4log applications.

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3.8 Configuration via USB Interfaces

So that no additional display is necessary, as soon as a USB mass storage device 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

3.8.1 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.

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

3.8.2 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.

3.8.3 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.

3.8.4 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.

3.8.5 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.

3.8.6 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.

3.8.7 Notifications

Each USB interface can generate the following events:

- Download from device

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3.9.2 Commands

On each Ethernet interface on which the vpn4log protocol is activated, simple commands such as "set system time", "configuration mode on", "configuration mode off", "query parameters", etc. can be sent with a defined command set.

3.9.3 Service Mode

The following operations can only be performed in service mode:

- SC: Write time
- PA: Write Parameter (also applies to reading the configuration via the USB file "confup.csv")
- TP: Write Parameter Texts (also applies to importing texts via USB file "textup.csv")
- FC30: Initialize event list
- FC32: Initialize parameters
- FC33: Initialize ETH settings, system restart required
- FC34: Initialize NTP settings, system restart required
- FC99: System Restart

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

3.9.4 Reading Parameters

A parameter is read with an ASCII string @PA<No.><CR><>LF>. If the command is valid, the vpn4log sends back the ASCII string @PA<No.>.<Data><CR><>LF> as an answer.

3.9.5 Setting Parameters

A parameter is written with an ASCII string @PA<No.>.<Data><<CR><>LF>. The vpn4log only sends back the ASCII string @PA<No.>.<Data><CR><>LF> if the command is valid and the service mode is activated.

3.9.6 Reading Texts

A text parameter is read with an ASCII string @TP<Nr.><CR><>LF>. If the command is valid, the vpn4log sends back the ASCII string @TP<Nr.>.<Daten><CR><>LF> as an answer.

3.9.7 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 vpn4log sends back the ASCII string @TP<Nr.>.<Daten><CR><>LF> as an answer.

3.9.8 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 vpn4log sends back the ASCII string @EV<Nr.>.<Daten><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
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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	Command	VAn.w : Value
	Explanation	Read the values generated or created by the application <i>DTE Request:</i> @VAn<CR><LF> <i>DCE Answer:</i> @VAn.w<CR><LF>
	Number	n Number of the Variable w Value of the Variable
	Data	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
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 (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

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		(Caution: only possible if service mode FC01 is on, system start with FC99 required) DTE Request: @FC34<CR><LF> DCE Answer: @FC34<CR><LF> FC99 System Restart (Caution: only possible if service mode FC01 is on) DTE Request: @FC34<CR><LF> DCE Answer: @FC34<CR><LF>								
SC	Set Clock Command code for reading and writing the system time. <table><tr><td>Command</td><td>SC :Set Clock</td></tr><tr><td>Explanation</td><td>Output and writing the system time DTE Request: @SC<CR><LF> DCE Answer: @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 DTE Request: @SC<CR><LF> DCE Answer: @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 DTE Request: @SC<CR><LF> DCE Answer: @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

4.4 PA Parameters

4.4.1 System (0 to 50)

No.	Function	Min	Std	Max	Scaling
	Basic Functions <i>(Parameter adjustments need FC99, except PAs marked with (**) which can be adjusted without FC01)</i>				

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	Version	Commit	Remarks				
	1.06	1d26578a	Launch				
	1.07	2d4e08ac	Neuer PA10				
1	Project Number			NULL	vpn4log	String[256]	
(2)	Reserve Parameter						
3	Device Time 0 → Operating System 1 → NTP-Server			0	0	1	
(4)	Reserve Parameter			0	0	0	
5	Language 1 → Language 1 (TP 1001 to 2000) 2 → Language 2 (TP 2001 to 3000)			1	1	2	
(6)	Reserve Parameter			0	0	0	
7(**)	Winter / Summer Time 0 → CET 1 → CEST (+1h)			0	0	1	
(8)	Reserve Parameter			0	0	0	
9	Serial No.			NULL	C4L0-YYMM-nnnn-nnnn	String[256]	
10	Station ID			NULL	NULL	String[256]	
(11-50)	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	vpn4log	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	1	1	7	

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	2 → 10Mbps/Full duplex 3 → 10Mbps/Half duplex 4 → 100Mbps/Full duplex 5 → 100Mbps/Half duplex 6 → 1Gbps/Full duplex 7 → 1Gbps/Half duplex				
(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]

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133	SMTP f <mail from Address>	NULL	NULL	String[256]	
134	SMTP t <mail to Address> Info: It is also possible to string several email addresses together as follows! Example: one@domain.com, two@domain.com	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> Info: - 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 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.	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	

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157(*)	Activation of the DO-Lists download B ³ b ² b ¹ b ⁰ DO4 DO3 DO2 DO1 0 → off >0 → on	0	0	4	
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	
(161-1000)	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
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 Info: Wenn smtp.office365.com verwendet wird, muss am Ende im Text TP1140 und TP2140 das Steuerzeichen <\n> (Line Feed) angehängt	Subject SMTP Info: If smtp.office365.com is used, there must be the control sign <\n> (Line Feed) at the end of text

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	<i>werden, weil sonst der Email Body nicht erkannt wird</i>	<i>TP1140 and TP2140 because otherwise the Email body will not be shown.</i>
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4.6 VA (Current Value)

Process variables scaled.

No.	Description
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

The values <Free operating value> are available but are not used by this application. Depending on the requirements, this value can be written to the DB at a later point in time using separate software, so that it can also be called up via the interface.

4.7 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: PA571.571

- the Event 571 is written as in the "EV Entry" column
- an SMTP is sent with the <subject> according to TP140 and the <body> TP571

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
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

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