Delta Energy Systems (Germany) GmbH

Public Solar Inverter Communication Protocol (Version 1.2)

Contents

1 Change log

Version	Date	Changes
1.0	14th Oct 2014	
1.1	22nd May 2015	Add H3 as variant 222 (native serial and part number)
1.2	19th Sept. 2015	Add DELTA 15 TL, - 20 TL, - 24 TL and - 28 TL (NA models)

2 Haftungsausschluss

Delta Energy Systems (Germany) GmbH, im weiteren Delta genannt, veröffentlicht mit diesem Dokument die Definitionen des RS485 Protokolls, der Identifier, der Framestrukturen und der Statusbytes die zur Kommunikation mit Delta Wechselrichtern benötigt werden. Diese Veröffentlichung kann jeder Zeit und ohne Angaben von Gründen ganz oder teilweise zurückgezogen werden. Weiterhin ist Delta nicht verpflichtet dieses Dokument für zukünftige Wechselrichter anzupassen, geschweige denn die verwendeten Protokolle, Identifier, Framestrukturen und Statusbytes zukünftiger Wechselrichter auch zu veröffentlichen. Delta behält sich außerdem das Recht vor dieses Dokument jeder Zeit, ohne Angabe von Gründen und ohne Benachrichtigung anzupassen, zu erweitern oder einzuschränken.

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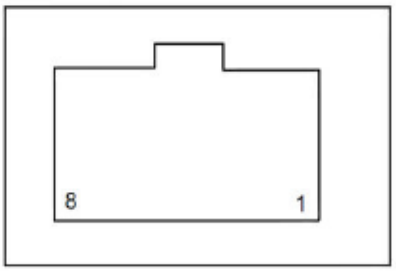
Delta ist der einzige Besitzer dieses Dokuments und daher alleinig zur Weitergabe berechtigt. Delta veröffentlicht dieses Dokument im Download-Bereich seines Kundenportals.

3 RS485 Wiring

The physical pin out of the different inverter families are different and described in the section.

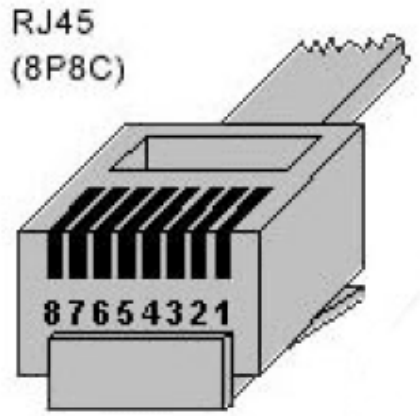
3.1 SOLIVIA CS/CM and SOLIVIA G3

Connector pin assignment RS485 (EIA485)



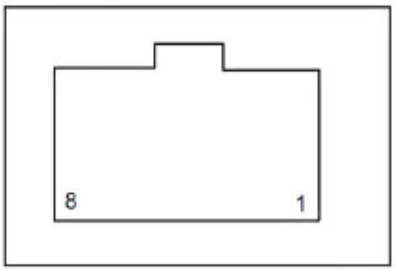
Top View

Pin	
1	Reserved
2	Reserved
3	Reserved
4	GND (RS485)
5	Reserved
6	RX_B (RS485)
7	TX_A (RS485)
8	Reserved



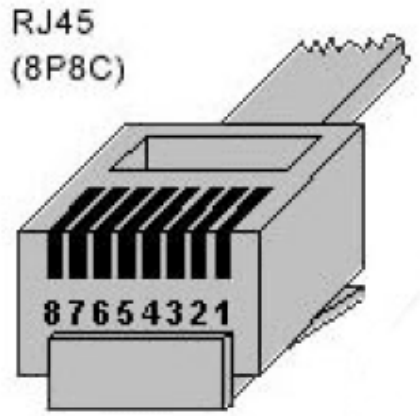
3.2 SOLIVIA G4

Connector pin assignment RS485 (EIA485)

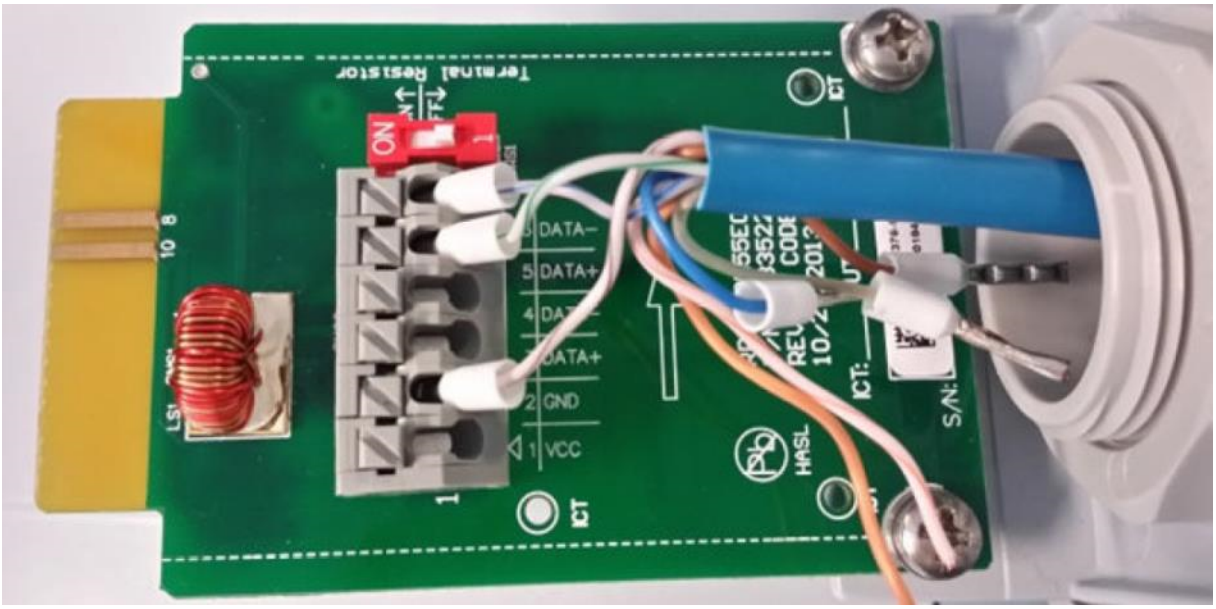


Top View

Pin	
1	Reserved
2	Reserved
3	Reserved
4	GND (RS485)
5	Reserved
6	Reserved
7	TX_A (RS485)
8	RX_B (RS485)



3.3 RPI



4 Communication Protocol

The protocol is based on an addressing system, in which the system controller is the master and the solar inverters (maximum number of 32 inverters in a RS485 network) are slaves. The master initiates all communications and the slaves respond only to the command which contains their specific address.

4.1 Physical layer:

The physical layer uses a UART device in asynchronous communication mode. The outside hardware is RS485 compatible.

Possible Baud rates:	2400 baud 4800 baud 9600 baud 19200 baud (default value) 38400 baud
Number of data bits (fixed value):	8
Parity (fixed value):	none parity
Number of stop bits (fixed value):	1

4.2 Protocol Characters

The characters in table are used in the communication protocol.

Character	ASCII (hex) Code	Description
'ENQ'	05	Link request (Master only)
'ACK'	06	Slave accepting link (Slave only)
'NAK'	15	Slave not accepting link (Slave only)
'STX'	02	Message start
'ETX'	03	Message end

4.3 Device Addresses

For the communication the device addresses 1 to 254 can be selected. The address 255 is used for global calls (broadcast commands) to all slave devices. The device address is in 8-bit integer format.

4.4 Protocol

The next tables show the three possible communication protocols.

Packet 1 shows a communication from the master to one or all slave devices.

Packet 2 shows the response from a slave device with acknowledge for correct interpretation of the received request frame.

Packet 3 shows the response from a slave device with a not acknowledge for the received request frame. The invalid request frame can include an invalid command, an invalid subcommand.

Packet 1: Master to slave

Byte #	Data byte	Description
1	'STX'	Start of protocol
2	'ENQ'	Master sending request
3	address	Address of receiving device
4	# of data bytes	Number of data included commands
5	command	Command send to slave

6	sub command	Sub command send to slave
N	data	N bytes of data
N + 1	CRC low byte	Low byte of checksum
N + 2	CRC high byte	High byte of checksum
N + 3	'ETX'	End of protocol

Packet 2: Slave response with acknowledge to master

Byte #	Data byte	Description
1	'STX'	Start of protocol
2	'ACK'	Slave acknowledging
3	address	Address of slave responding
4	# of data bytes	Number of data included commands
5	command	Repeat command being responded to
6	sub command	Repeat sub command being responded to
N	data	N bytes of data
N + 1	CRC low byte	Low byte of checksum
N + 2	CRC high byte	High byte of checksum
N + 3	'ETX'	End of protocol

Packet 3: Slave response with no acknowledge to master

Byte #	Data byte	Description
1	'STX'	Start of protocol
2	'NAK'	Slave not acknowledging
3	address	Address of slave responding
4	# of data bytes	Number of data included commands
5	command	Repeat command being responded to
6	sub command	Repeat sub command being responded to
7	crc low byte	Low byte of checksum
8	crc high byte	High byte of checksum
9	'ETX'	End of protocol

Hint: The checksum is the result from a CRC16 algorithm not including the framing ('STX' and 'ETX') characters. The CRC16 is calculated by the following polynomial: $X^{16} + X^{15} + X^2 + 1$.

Hint: The slave answer with NAK only if the command or subcommand is invalid.

Hint: The slave answer to a valid writing command with the ACK frame and the data value is the internal slave data. If the slave receives a value out of the internal limits it will ignore the received data and set the internal value according to the allowed limits.

4.5 CRC-16 calculation

The following 'C' code listing correctly implements the CRC-16 calculation intended for use in the solar control network. This CRC-16 implementation is consistent with the most commonly used CRC-16 'standard'

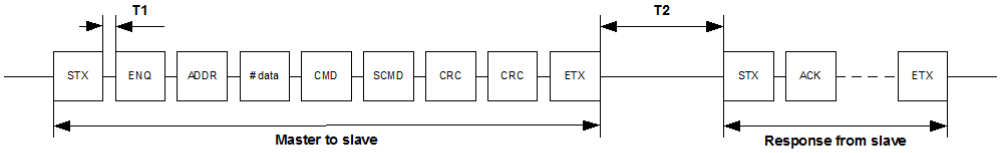
```
unsigned int calc_crc(unsigned char *sop,unsigned char *eop){
    unsigned int crc;
    unsigned char bit_count;
    unsigned char *char_ptr;

    char_ptr = sop;

    crc = 0x0000;                           //initialize to zero, not all 1's
    do{
          crc^=((*char_ptr)&0x00ff);        //make sure only 8-bits get modified
          bit_count = 0;
          do{
                if(crc&0x0001){             //test before shifting
                      crc>>=1;
                      crc^=0xA001;          //reflected version of poly:0x8005
                }else{
                      crc>>=1;
                }
          }while(bit_count++ < 7);          //for every bit
    }while(char_ptr++ < eop);               //for every byte
    return crc;                             //return 16 bits of crc
}
```

Hint: Once the CRC-16 is implemented, testing the algorithm for consistency is easy:

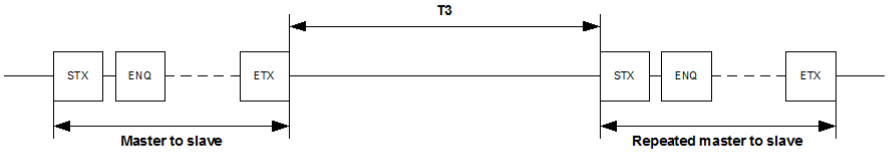
- Input the ASCII string of “123456789” through the calculation. It should return a value of 0xBB3D
- Send the ASCII string back through the calculation, with the two bytes of the CRC appended to the end in *reversed* order: “123456789”, 0x3D, 0xBB. The returned value should now be 0x0000

4.6 Timing

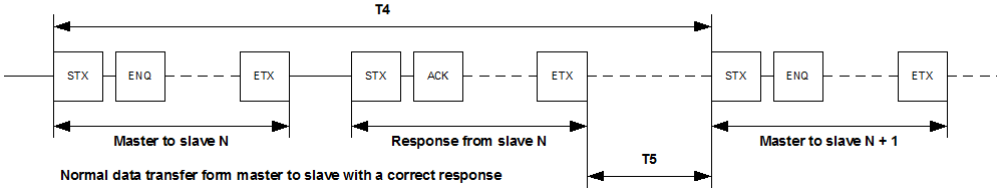
The diagrams show the timing of the communication. The time T1 to T5 differs depending on the baud rate setting. See table for different values.



Normal data transfer form master to slave with a correct response



Data transfer form master to slave with no response from slave



Normal data transfer form master to slave with a correct response

Baud rate	T1	T2	T3	T4	T5
2400	< 12 ms	≤ 5 ms	> 48 ms	> 1920 ms	> 48 ms
4800	< 6 ms	≤ 5 ms	> 24 ms	> 960 ms	> 24 ms
9600	< 3 ms	≤ 5 ms	> 12 ms	> 480 ms	> 12 ms
19200	< 1,5 ms	≤ 5 ms	> 6 ms	> 240 ms	> 6 ms
38400	< 0,75 ms	≤ 5 ms	> 3 ms	> 120 ms	> 3 ms

5 Solar Inverter Identification

To identify Delta solar inverters, the request 0+0 (command = 0 AND subcommand = 0) has to be sent to the specific inverters. The solar inverter responses a special identification frame that includes the “variant parameter” as first byte of the payload.

#	1	2	3	4	5	6	7	8	9	10	11	12	13
Data	6	1	S	I		2	5	0	0		D	E	,
Hex	06	01	53	49	20	32	35	30	30	20	44	45	2C

Use the variant (byte #2) to identify the Inverter name, data frame and setup frame structure as well as the status byte definition.

VARIANT	Name
1	SI 2500
3	SI 3300
4	SI 5000
9	SOLIVIA 2.0 EU G3
11	SI 11kW (3 phases module of CM/CS)
14	SOLIVIA 5.0 EU G3
15	SOLIVIA 2.5 EU G3
18	SOLIVIA 3.0 EU G3
19	SOLIVIA 3.3 EU G3
20	SOLIVIA 3.6 EU G3
27	SOLIVIA 15 EU TL
28	SOLIVIA 20 EU TL
31	SOLIVIA 2.5 NA G4
34	SOLIVIA 3.0 NA G4
35	SOLIVIA 3.3 NA G4
36	SOLIVIA 3.6 NA G4
38	SOLIVIA 4.4 NA G4
39	SOLIVIA 5.0 NA G4
43	SOLIVIA 15 EU TL G4
44	SOLIVIA 20 EU TL G4
55	SOLIVIA 2.5 AP G3
58	SOLIVIA 3.0 AP G3
59	SOLIVIA 3.3 AP G3
60	SOLIVIA 3.6 AP G3
63	SOLIVIA 5.0 AP G3
85	SOLIVIA 3.0 EU T4 TL
88	SOLIVIA 5.0 EU T4 TL
89	SOLIVIA 6.0 EU T4 TL
90	SOLIVIA 8.0 EU T4 TL
91	SOLIVIA 10 EUT4 TL
93	SOLIVIA 12 EU T4 TL
95	SOLIVIA 30 EU T4 TL
99	SOLIVIA CS
100	SOLIVIA CM
102	SOLIVIA 2.0 EU G4 TR
103	SOLIVIA 2.5 EU G4 TR
105	SOLIVIA 3.0 EU G4 TR
106	SOLIVIA 3.3 EU G4 TR

107	SOLIVIA 3.6 EU G4 TR
109	SOLIVIA 4.4 EU G4 TR
110	SOLIVIA 5.0 EU G4 TR
111	SOLIVIA 10 EU G4 TR (EVR)
113	SOLIVIA 11 EU G4 TR
114	SOLIVIA11 EU G4 TR (EVR)
120	SOLIVIA3.0 NAG4TL
121	SOLIVIA3.8 NAG4TL
122	SOLIVIA5.0 NAG4TL
123	SOLIVIA7.6 NAG4TL
124	SOLIVIA5.2 NAG4TL
125	SOLIVIA6.6 NAG4TL
158	DELTA 20 TL
159	DELTA 15 TL
160	DELTA 28 TL
161	DELTA 24 TL
200	RPI M6
201	RPI M8
202	RPI M10
203	RPI M12
204	RPI M15A
205	RPI M20A
206	RPI M30
207	RPI H3
208	RPI H5
209	RPI H3A
210	RPI H4A
211	RPI H5A
212	RPI H3A
213	RPI H4A
214	RPI H5A
215	RPI M6A
216	RPI M8A
217	RPI M10A
218	PRI M50A
219	RPI M30A
220	RPI M15A
221	RPI M20A
222	RPI H3

For the complete identification the communication master uses the CMD[0] + SUB-CMD[64] to obtain the software version of the communication controller. How this information is codified is inverter-specific, depends in general on the variant and type previously described. At the moment we have the following situation:

- For the SI 3300 (variant=3), the inverter responds with a frame containing 2 bytes of data: the first one is the software version minor and the second one the software version major. Example: 0x01 0x05 => sw version 5.1
- For the Solivia CM/CS (variant=100 or 99), the inverter responds to the SW version request with 3 bytes: the first one is the major, the second one is the minor and the third one is the

bug-fix.
Example: 0x01 0x05 0x01=> sw version 1.5.1

- For all other inverter variants and corresponding types, the inverter sends back as data always 2 bytes where the first one is the software version major and the second one the software version minor.
  Example: 0x01 0x05 => sw version 1.5

For future variant/types the number of bytes of data and how they are codified can change.

6 Broadcast Commands

CMD	SUB-CMD	TYPE	DESCRIPTION	HINT
0	32+158	4 uc bytes	actual date	Byte 1 ->day of the week 1 .. 7 (Sunday = 1) Byte 2 -> day 1 .. 31 Byte 3 -> month 1 .. 12 Byte 4 -> year 2 .. 99
0	33+128	3 uc bytes	actual time	Byte 1 -> hours 0 .. 23 Byte 2 -> minutes 0 .. 59 Byte 3 -> seconds 0 .. 59
13	8+128	UINT8	external power control limit	1 = 1% (copy of main command 5 sub command 26)
5	31+128	INT16	Reactive power control	1 = 0.01 (negative values = capacitive operation)
15	31+128	INT16	Reactive power control	1 = 0.01 (negative values = capacitive operation)

To send a command as broadcast to all connected inverters, the destination address needs to be 0xFF (255).

The commands can also be used for single inverters. For this, send the command to the specific inverter (RS485 address) and not to the broadcast address 255.

The commands will be processed if the inverter is technically able to do.

7 SOLIVIA CM/CS Production Data (Variant 99 and 100)

Only for the SOLIVIA CM/CS we get the production data of the components of the rack with the CMD [96] and SUB-CMD[0]. Here the data received from the Solivia CM/CS:

Description	*Unit*	*# of Bytes*
Rack SAP serial number		*18 Byte*
System Controller Serial Number		*8 Bytes*
Software revision System Controller	*MA,MI,BF*	*3 Byte*
Hw revision System Controller		*1 Byte*
Back Plane Controller SAP serial number		*18 Byte*
Software revision Backplane Controller	*MA,MI,BF*	*3 Byte*
Hardware revision Backplane Controller		*1 Byte*
Module1 SAP serial number		*18 Byte*
Module1 AC Controller sw version	*MA,MI,BF*	*3 Byte*
Module1 Hardware revision		*1 Byte*
The “Module 1” fields are repeated 8 times more (in total 9 modules)		***198***
	Total # of Bytes:	***250***

8 Measurement and statistic data

To get the measurement and statistic data from the connected inverter type the MS use the CMD [96] + SUB-CMD [1].

8.1 VARIANT 1 and TYPE not 2

Description	Unit	# of Bytes	Scaling
SAP part number		11 Byte	
SAP serial number		18 Byte	
SAP date code		4 Byte	
SAP revision		2 Byte	
Software revision ac control	MA,MI	2 Byte	
Software revision dc control	MA,MI	2 Byte	
Software revision display	MA,MI	2 Byte	
Software revision ens control	MA,MI	2 Byte	
Solar current at input 1	A	2 (MSB, LSB)	Value / 10
Solar voltage at input 1	V	2 (MSB, LSB)	
Solar isolation resistance at input 1	KOhm	2 (MSB, LSB)	
AC current	A	2 (MSB, LSB)	Value / 10
AC voltage	V	2 (MSB, LSB)	
AC power	W	2 (MSB, LSB)	
AC frequency	Hz	2 (MSB, LSB)	Value / 100
Supplied ac energy	Wh	2 (MSB, LSB)	
Inverter runtime	Minutes	2 (MSB, LSB)	
Calculated temperature at ntc (DC side)	°C	2 (MSB, LSB)	***Signed*** *int16*
Solar input MOV resistance	KOhm	2 (MSB, LSB)	
Calculated temperature at ntc (AC side)	°C	2 (MSB, LSB)	***Signed*** *int16*
AC voltage (AC control)	V	2 (MSB, LSB)	Value / 10
AC frequency (AC control)	Hz	2 (MSB, LSB)	Value / 100
DC injection current (AC control)	A	2 (MSB, LSB)	Value / 1000
AC voltage (ENS control)	V	2 (MSB, LSB)	Value / 10
AC frequency (ENS control)	Hz	2 (MSB, LSB)	Value / 100
DC injection current (ENS control)	A	2 (MSB, LSB)	Value / 1000
Maximum solar 1 input current	A	2 (MSB, LSB)	Value / 10
Maximum solar 1 input voltage	V	2 (MSB, LSB)	
Maximum solar 1 input power	W	2 (MSB, LSB)	
Minimum isolation resistance solar 1	KOhm	2 (MSB, LSB)	
Maximum isolation resistance solar 1	KOhm	2 (MSB, LSB)	
Maximum ac current of today	A	2 (MSB, LSB)	Value / 10
Minimum ac voltage of today	V	2 (MSB, LSB)	
Maximum ac voltage of today	V	2 (MSB, LSB)	
Maximum ac power of today	W	2 (MSB, LSB)	
Minimum ac frequency of today	Hz	2 (MSB, LSB)	Value / 100
Maximum ac frequency of today	Hz	2 (MSB, LSB)	Value / 100
Supplied ac energy	KWh	4 (MSB, LSB)	Value / 10
Inverter runtime	Hours	4 (MSB, LSB)	
Global alarm status		1 Byte	
Status DC input		1 Byte	
Limits DC input		1 Byte	
Status AC output		1 Byte	
Limits AC output		1 Byte	
Isolation warning status		1 Byte	
DC hardware failure		1 Byte	
AC hardware failure		1 Byte	
ENS hardware failure		1 Byte	
Internal Bulk failure		1 Byte	
Internal communications failure		1 Byte	
AC hardware disturbance		1 Byte	
History status messages		20 Byte	
	Total # of Bytes:	**141**	

8.2 VARIANT 3 and FW version equal or greater than 8.0

Description	Unit	# of Bytes	Scaling
SAP part number		11 Byte	
SAP serial number		18 Byte	
SAP date code		4 Byte	
SAP revision		2 Byte	
Software revision ac control	MA,MI	2 Byte	
Software revision dc control	MA,MI	2 Byte	
Software revision display	MA,MI	2 Byte	
Software revision ens control master	MA,MI	2 Byte	
Software revision ens control slave	MA,MI	2 Byte	
Solar voltage at input 1	V	2 (MSB, LSB)	
Solar current at input 1	A	2 (MSB, LSB)	Value / 10
Solar isolation resistance at input 1	kOhm	2 (MSB, LSB)	
Calculated temperature at ntc (DC side)	°C	2 (MSB, LSB)	***Signed*** *int16*
Solar input MOV resistance	kOhm	2 (MSB, LSB)	
SI3300 Ac current	A	2 (MSB, LSB)	Value / 10
SI3300 AC voltage	V	2 (MSB, LSB)	
SI3300 AC power	W	2 (MSB, LSB)	
SI3300 AC frequency	Hz	2 (MSB, LSB)	Value / 100
SI3300 Calculated temperature at ntc (AC side)	°C	2 (MSB, LSB)	***Signed*** *int16*
AC ctrl voltage	V	2 (MSB, LSB)	Value / 10
AC ctrl frequency	Hz	2 (MSB, LSB)	Value / 100
ENS master Grid voltage	V	2 (MSB, LSB)	Value / 100
ENS master Grid ens frequency	Hz	2 (MSB, LSB)	Value / 100
ENS master Grid DC injection current	A	2 (MSB, LSB)	Value / 100
ENS slave Grid voltage	V	2 (MSB, LSB)	Value / 100
ENS slave Grid frequency	Hz	2 (MSB, LSB)	Value / 100
ENS slave Grid DC injection current	A	2 (MSB, LSB)	Value / 100
Supplied ac energy	Wh	2 (MSB, LSB)	
Inverter runtime	Minutes	2 (MSB, LSB)	
Maximum ac current of today	A	2 (MSB, LSB)	Value / 10
Minimum ac voltage of today	V	2 (MSB, LSB)	
Maximum ac voltage of today	V	2 (MSB, LSB)	
Maximum ac power of today	W	2 (MSB, LSB)	
Minimum ac frequency of today	Hz	2 (MSB, LSB)	Value / 100
Maximum ac frequency of today	Hz	2 (MSB, LSB)	Value / 100
Supplied ac energy	kWh	4 (MSB, LSB)	Value / 10
Inverter runtime	Hours	4 (MSB, LSB)	
Maximum solar 1 input current	A	2 (MSB, LSB)	Value / 10
Maximum solar 1 input voltage	V	2 (MSB, LSB)	
Maximum solar 1 input power	W	2 (MSB, LSB)	
Minimum isolation resistance solar 1	kOhm	2 (MSB, LSB)	
Maximum isolation resistance solar 1	kOhm	2 (MSB, LSB)	
Alarms status		1 Byte	
Status DC input		1 Byte	
Limits DC input		1 Byte	
Status AC output		1 Byte	
Limits AC output		1 Byte	
Warnings status		1 Byte	
DC hardware failure		1 Byte	
AC hardware failure		1 Byte	
ENS hardware failure		1 Byte	
Internal Bulk failure		1 Byte	
Internal communication failure		1 Byte	
AC hardware disturbance		1 Byte	
History status messages		20 Byte	

Total # of Bytes:	**147**

8.3 VARIANT 4, 14, 63

Description	Unit	# of Bytes	Scaling
SAP part number		11 Byte	
SAP serial number		18 Byte	
SAP date code		4 Byte	
SAP revision		2 Byte	
Software revision ac control	MA,MI	2 Byte	
Software revision dc control	MA,MI	2 Byte	
Software revision display	MA,MI	2 Byte	
Software revision ens control	MA,MI	2 Byte	
Solar current at input 1	A	2 (MSB, LSB)	Value / 10
Solar voltage at input 1	V	2 (MSB, LSB)	
Solar isolation resistance at input 1	kOhm	2 (MSB, LSB)	
Solar current at input 2	A	2 (MSB, LSB)	Value / 10
Solar voltage at input 2	V	2 (MSB, LSB)	
Solar isolation resistance at input 2	kOhm	2 (MSB, LSB)	
AC current	A	2 (MSB, LSB)	Value / 10
AC voltage	V	2 (MSB, LSB)	
AC power	W	2 (MSB, LSB)	
AC frequency	Hz	2 (MSB, LSB)	Value / 100
Supplied ac energy	Wh	2 (MSB, LSB)	
Inverter runtime	Minutes	2 (MSB, LSB)	
Calculated temperature at ntc (DC side)	°C	2 (MSB, LSB)	***Signed*** *int16*
Solar input 1 MOV resistance	kOhm	2 (MSB, LSB)	
Solar input 2 MOV resistance	kOhm	2 (MSB, LSB)	
Calculated temperature at ntc (AC side)	°C	2 (MSB, LSB)	***Signed*** *int16*
AC voltage (AC control)	V	2 (MSB, LSB)	Value / 10
AC frequency (AC control)	Hz	2 (MSB, LSB)	Value / 100
DC injection current (AC control)	A	2 (MSB, LSB)	Value / 1000
AC voltage (ENS control)	V	2 (MSB, LSB)	Value / 10
AC frequency (ENS control)	Hz	2 (MSB, LSB)	Value / 100
DC injection current (ENS control)	A	2 (MSB, LSB)	Value / 1000
Maximum solar 1 input current	A	2 (MSB, LSB)	Value / 10
Maximum solar 1 input voltage	V	2 (MSB, LSB)	
Maximum solar 1 input power	W	2 (MSB, LSB)	
Minimum isolation resistance solar 1	kOhm	2 (MSB, LSB)	
Maximum isolation resistance solar 1	kOhm	2 (MSB, LSB)	
Maximum solar 2 input current	A	2 (MSB, LSB)	Value / 10
Maximum solar 2 input voltage	V	2 (MSB, LSB)	
Maximum solar 2 input power	W	2 (MSB, LSB)	
Minimum isolation resistance solar 2	kOhm	2 (MSB, LSB)	
Maximum isolation resistance solar 2	kOhm	2 (MSB, LSB)	
Maximum ac current of today	A	2 (MSB, LSB)	Value / 10
Minimum ac voltage of today	V	2 (MSB, LSB)	
Maximum ac voltage of today	V	2 (MSB, LSB)	
Maximum ac power of today	W	2 (MSB, LSB)	
Minimum ac frequency of today	Hz	2 (MSB, LSB)	Value / 100
Maximum ac frequency of today	Hz	2 (MSB, LSB)	Value / 100
Supplied ac energy	kWh	4 (MSB, LSB)	Value / 10
Inverter runtime	Hours	4 (MSB, LSB)	
Global alarm status		1 Byte	
Status DC input		1 Byte	
Limits DC input		1 Byte	
Status AC output		1 Byte	
Limits AC output		1 Byte	
Isolation warning status		1 Byte	
DC hardware failure		1 Byte	
AC hardware failure		1 Byte	
ENS hardware failure		1 Byte	
Internal Bulk failure		1 Byte	
Internal communications failure		1 Byte	
AC hardware disturbance		1 Byte	
History status messages		20 Byte	

Total # of Bytes:	**159**

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8.4 VARIANT 27, 28, 43, 44, 89, 90, 91, 93, 95, 200 - 206

Description	Unit	# of Bytes	Scaling
SAP part number		11 Byte	
SAP serial number		18 Byte	
SAP date code		4 Byte	
SAP revision		2 Byte	
DSP FW Rev[0.13]	MA,MI	2(MSB,LSB)	
DSP FW Date	MA,MI	2(MSB,LSB)	ex : 0x0A0B => V10.11
Redundant MCU FW Rev.	MA,MI	2(MSB,LSB)	
Redundant MCU FW Date	MA,MI	2(MSB,LSB)	
Display MCU FW Rev.	MA,MI	2(MSB,LSB)	
Display MCU FW Date	MA,MI	2(MSB,LSB)	
AC Voltage(Phase1)	V	2(MSB,LSB)	Value/10
AC Current(Phase1)	A	2(MSB,LSB)	Value/100
AC Power(Phase1)	W	2(MSB,LSB)	
AC Frequency(Phase1)	Hz	2(MSB,LSB)	Value/100
AC Voltage(Phase1) (read from Redundant)	V	2(MSB,LSB)	Value/10
AC Frequency(Phase1) (read from Redundant)	Hz	2(MSB,LSB)	Value/100
AC Voltage(Phase2)	V	2(MSB,LSB)	Value/10
AC Current(Phase2)	A	2(MSB,LSB)	Value/100
AC Power(Phase2)	W	2(MSB,LSB)	
AC Frequency(Phase2)	Hz	2(MSB,LSB)	Value/100
AC Voltage(Phase2) (Read from Redundant)	V	2(MSB,LSB)	Value/10
AC Frequency(Phase2) (Read from Redundant)	Hz	2(MSB,LSB)	Value/100
AC Voltage(Phase3)	V	2(MSB,LSB)	Value/10
AC Current(Phase3)	A	2(MSB,LSB)	Value/100
AC Power(Phase3)	W	2(MSB,LSB)	
AC Frequency(Phase3)	Hz	2(MSB,LSB)	Value/100
AC Voltage(Phase3) (Read from Redundant)	V	2(MSB,LSB)	Value/10
AC Frequency(Phase3) (Read from Redundant)	Hz	2(MSB,LSB)	Value/100
Solar Voltage at Input 1	V	2(MSB,LSB)	Value/10
Solar Current at Input 1	A	2(MSB,LSB)	Value/100
Solar Power at Input 1	W	2(MSB,LSB)	
Solar Voltage at Input 2	V	2(MSB,LSB)	Value/10
Solar Current at Input 2	A	2(MSB,LSB)	Value/100
Solar Power at Input 2	W	2(MSB,LSB)	
ACPower[0.14]	W	2 (MSB, LSB)	
(+) Bus Voltage	V	2(MSB,LSB)	Value/10
(-) Bus Voltage	V	2(MSB,LSB)	Value/10
Supplied ac energy today[0,15]	Wh	4(MSB,LSB)	
Inverter runtime today	second	4(MSB,LSB)	
Supplied ac energy (total) [0.13][0,15]	kWh	4(MSB,LSB)	
Inverter runtime(total)	second	4(MSB,LSB)	
Calculated temperature inside rack	°C	2(MSB,LSB)	***Signed*** *int16*
Status AC Output 1		1 Byte	
Status AC Output 2		1 Byte	
Status AC Output 3		1 Byte	
Status AC Output 4		1 Byte	
Status DC Input 1		1 Byte	
Status DC Input 2		1 Byte	
Error Status		1 Byte	
Error Status AC 1		1 Byte	
Global Error 1[0.13]		1 Byte	

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CPU Error	1 Byte
Global Error 2	1 Byte
Limits AC output 1	1 Byte
Limits AC output 2	1 Byte
Global Error 3	1 Byte
Limits DC 1	1 Byte
Limits DC 2	1 Byte
History status messages	20 Byte
Total # of Bytes:	***155***

8.5 VARIANT 99, 100

Description	Unit	# of Bytes	Scaling
Solar current at input 1	A	4(MSB, LSB)	Value / 100
Solar voltage at input 1	V	2 (MSB, LSB)	
Solar isolation resistance at input 1	MOhm	2 (MSB, LSB)	Value / 100
Solar current at input 2	A	4 (MSB, LSB)	Value / 100
Solar voltage at input 2	V	2 (MSB, LSB)	
Solar isolation resistance at input 2	MOhm	2 (MSB, LSB)	Value / 100
AC current (Phase1)	A	4 (MSB, LSB)	Value / 100
AC voltage (Phase1)	V	2 (MSB, LSB)	
AC frequency (Phase1)	Hz	2 (MSB, LSB)	Value / 100
AC power (Phase1)	W	4 (MSB, LSB)	
AC current (Phase2)	A	4(MSB, LSB)	Value / 100
AC voltage (Phase2)	V	2 (MSB, LSB)	
AC frequency (Phase2)	Hz	2 (MSB, LSB)	Value / 100
AC power (Phase2)	W	4 (MSB, LSB)	
AC current (Phase3)	A	4 (MSB, LSB)	Value / 10
AC voltage (Phase3)	V	2 (MSB, LSB)	
AC frequency (Phase3)	Hz	2 (MSB, LSB)	Value / 100
AC power (Phase3)	W	4 (MSB, LSB)	
AC power (total)	W	4 (MSB, LSB)	
Supplied ac energy today	Wh	4 (MSB, LSB)	
Inverter runtime today	Minutes	2 (MSB, LSB)	
Calculated temperature inside rack	°C	2 (MSB, LSB)	**Signed** int16
DC injection current (AC control)	mA	2 (MSB, LSB)	
Maximum solar 1 input current	A	4 (MSB, LSB)	Value / 100
Maximum solar 1 input voltage	V	2 (MSB, LSB)	
Maximum solar 1 input power	W	4 (MSB, LSB)	
Minimum isolation resistance solar 1	kOhm	2 (MSB, LSB)	
Maximum isolation resistance solar 1	kOhm	2 (MSB, LSB)	
Maximum solar 2 input current	A	4 (MSB, LSB)	Value / 100
Maximum solar 2 input voltage	V	2 (MSB, LSB)	
Maximum solar 2 input power	W	4 (MSB, LSB)	
Minimum isolation resistance solar 2	kOhm	2 (MSB, LSB)	
Maximum isolation resistance solar 2	kOhm	2 (MSB, LSB)	
Maximum ac current of today (Phase1)	A	4(MSB, LSB)	Value / 100
Minimum ac voltage of today (Phase1)	V	2 (MSB, LSB)	
Maximum ac voltage of today (Phase1)	V	2 (MSB, LSB)	
Maximum ac power of today (Phase1)	W	4 (MSB, LSB)	
Minimum ac frequency of today (Phase1)	Hz	2 (MSB, LSB)	Value / 100
Maximum ac frequency of today (Phase1)	Hz	2 (MSB, LSB)	Value / 100
Maximum ac current of today (Phase2)	A	4 (MSB, LSB)	Value / 100
Minimum ac voltage of today (Phase2)	V	2 (MSB, LSB)	
Maximum ac voltage of today (Phase2)	V	2 (MSB, LSB)	
Maximum ac power of today (Phase2)	W	4 (MSB, LSB)	
Minimum ac frequency of today (Phase2)	Hz	2 (MSB, LSB)	Value / 100
Maximum ac frequency of today (Phase2)	Hz	2 (MSB, LSB)	Value / 100
Maximum ac current of today (Phase3)	A	4 (MSB, LSB)	Value / 100
Minimum ac voltage of today (Phase3)	V	2 (MSB, LSB)	
Maximum ac voltage of today (Phase3)	V	2 (MSB, LSB)	
Maximum ac power of today (Phase3)	W	4(MSB, LSB)	
Minimum ac frequency of today (Phase3)	Hz	2 (MSB, LSB)	Value / 100
Maximum ac frequency of today (Phase3)	Hz	2 (MSB, LSB)	Value / 100
Supplied ac energy (total)	kWh	4 (MSB, LSB)	Value / 100
Inverter runtime (total)	Hours	4 (MSB, LSB)	
Status Solivia CM/CS (1)		1 Byte	
Status Solivia CM/CS (2)		1 Byte	
Status Solivia CM/CS (3)		1 Byte	
Mod 1 AC Hardware Error		1 Byte	
Mod 1 AC Comm. Error		1 Byte	
Mod 1 AC Grid Error		1 Byte	
Mod 1 Calibration Error		1 Byte	
Mod 1 DC Hardware Error		1 Byte	

Mod 1 DC Voltage Error		*1 Byte*
Mod 1 I/O TWI Comm. Status		*1 Byte*
Mod 1 External Error		*1 Byte*
+ Red highlighted for each Module x 8		*64 Byte*
Mod 1 Status		*1 Byte*
+ Red highlighted for each Module x 8		*8 Byte*
History status messages		*11 Byte*
	Total # of Bytes:	***245***

8.6 VARIANT 15, 18, 19, 20, 31, 34, 35, 36, 38, 39, 55, 58, 59, 60

Description	Unit	# of Bytes	Scaling
SAP part number		11 Byte	
SAP serial number		18 Byte	
SAP date code		4 Byte	
SAP revision		2 Byte	
Software revision ac control	Major, Minor, Bug fixing	3 Byte	
Software revision dc control	Major, Minor, Bug fixing	3 Byte	
Software revision display	Major, Minor, Bug fixing	3 Byte	
Software revision sc control	Major, Minor, Bug fixing	3 Byte	
Solar voltage at input 1	V	2 (MSB, LSB)	
Solar current at input 1	A	2 (MSB, LSB)	Value / 10
Solar isolation resistance at input 1	kOhm	2 (MSB, LSB)	
Calculated temperature at ntc (DC side)	°C	2 (MSB, LSB)	***Signed*** *int16*
Solar input MOV resistance	kOhm	2 (MSB, LSB)	
Ac current	A	2 (MSB, LSB)	Value / 10
AC voltage	V	2 (MSB, LSB)	
AC power	W	2 (MSB, LSB)	
AC frequency	Hz	2 (MSB, LSB)	Value / 100
Calculated temperature at ntc (AC side)	°C	2 (MSB, LSB)	***Signed*** *int16*
SC Grid voltage	V	2 (MSB, LSB)	Value / 100
SC Grid ens frequency	Hz	2 (MSB, LSB)	Value / 100
SC Grid DC injection current	A	2 (MSB, LSB)	Value / 100
AC Grid voltage	V	2 (MSB, LSB)	Value / 100
AC Grid frequency	Hz	2 (MSB, LSB)	Value / 100
AC Grid DC injection current	A	2 (MSB, LSB)	Value / 100
Day Supplied ac energy	Wh	2 (MSB, LSB)	(Value x 10)
Inverter runtime	Minutes	2 (MSB, LSB)	
Maximum ac current of today	A	2 (MSB, LSB)	Value / 10
Minimum ac voltage of today	V	2 (MSB, LSB)	
Maximum ac voltage of today	V	2 (MSB, LSB)	
Maximum ac power of today	W	2 (MSB, LSB)	
Minimum ac frequency of today	Hz	2 (MSB, LSB)	Value / 100
Maximum ac frequency of today	Hz	2 (MSB, LSB)	Value / 100
Supplied ac energy	kWh	4 (MSB, LSB)	Value / 10
Inverter runtime	Hours	4 (MSB, LSB)	
Maximum solar 1 input current	A	2 (MSB, LSB)	Value / 10
Maximum solar 1 input voltage	V	2 (MSB, LSB)	
Maximum solar 1 input power	W	2 (MSB, LSB)	
Minimum isolation resistance solar 1	kOhm	2 (MSB, LSB)	
Maximum isolation resistance solar 1	kOhm	2 (MSB, LSB)	
Alarms status		1 Byte	
Status DC input		1 Byte	
Limits DC input		1 Byte	
Status AC output		1 Byte	
Limits AC output		1 Byte	
Warnings status		1 Byte	
DC hardware failure		1 Byte	
AC hardware failure		1 Byte	

SC hardware failure		1 Byte
Internal Bulk failure		1 Byte
Internal communication failure		1 Byte
AC hardware disturbance		1 Byte
DC HW stage error		1 Byte
Calibration Status		1 Byte
Neutral Error		1 Byte
History status messages		20 Byte
	Total # of Bytes:	**148**

8.7 VARIANT 53, 73, 102, 103, 105, 106, 107, 109, 110 111, 113, 114, 120, 121, 122, 123, 124, 125, 158, 159, 160, 161

Description	Unit	# of Bytes	Scaling
SAP part number		11 Byte	
SAP serial number		18 Byte	
SAP date code		4 Byte	
SAP revision		2 Byte	
Software Revision System controller	Major, Minor, Bug fixing	3 Byte	
Software Revision Power Controller	Major, Minor, Bug fixing	3 Byte	
Software Revision ENS controller	Major, Minor, Bug fixing	3 Byte	
Software Revision Watch dog controller	Major, Minor, Bug fixing	3 Byte	
Software Revision DC controller	Major, Minor, Bug fixing	3 Byte	
Software Revision DC 1	Major, Minor, Bug fixing	3 Byte	
Software Revision DC 2	Major, Minor, Bug fixing	3 Byte	
Software Revision DC 3	Major, Minor, Bug fixing	3 Byte	
Software Revision AC	Major, Minor, Bug fixing	3 Byte	
Software Revision AC1	Major, Minor, Bug fixing	3 Byte	
Software Revision AC2	Major, Minor, Bug fixing	3 Byte	
Software Revision AC3	Major, Minor, Bug fixing	3 Byte	
Software Revision reserved	Major, Minor, Bug fixing	3 Byte	
Solar power at input 1	W	2 [UINT16]	1 = 1W
Solar voltage at input 1	V	2 [UINT16]	1 = 1V
Solar current at input 1	A	2 [UINT16]	1 = 0,1A
Solar power at input 2	W	2 [UINT16]	1 = 1W
Solar voltage at input 2	V	2 [UINT16]	1 = 1V
Solar current at input 2	A	2 [UINT16]	1 = 0,1A
Solar power at input 3	W	2 [UINT16]	1 = 1W
Solar voltage at input 3	V	2 [UINT16]	1 = 1V
Solar current at input 3	A	2 [UINT16]	1 = 0,1A
AC current - L1	A	2 [UINT16]	1 = 0,1A

AC voltage - L1	V	2 [UINT16]	1= 1V
AC frequency - L1	Hz	2 [UINT16]	1= 0,01Hz
AC active power - L1	W	2 [UINT16]	1 = 1W
AC reactive power - L1	VAR	2 [INT16]	1 = 1VAR
AC current – L2	A	2 [UINT16]	1 = 0,1A
AC voltage – L2	V	2 [UINT16]	1= 1V
AC frequency – L2	Hz	2 [UINT16]	1= 0,01Hz
AC active power – L2	W	2 [UINT16]	1 = 1W
AC reactive power – L2	VAR	2 [INT16]	1 = 1VAR
AC current – L3	A	2 [UINT16]	1 = 0,1A
AC voltage – L3	V	2 [UINT16]	1= 1V
AC frequency – L3	Hz	2 [UINT16]	1= 0,01Hz
AC active power – L3	W	2 [UINT16]	1 = 1W
AC reactive power – L3	VAR	2 [INT16]	1 = 1VAR
solar isolation plus	kOhm	2 [UINT16]	1 = 1kOhm
solar isolation minus	kOhm	2 [UINT16]	1 = 1kOhm
Temperature amb	°C	2 [INT16]	1 = 1°C
Temperature heatsink	°C	2 [INT16]	1 = 1°C
Supplied ac energy total	Wh	8 [UINT64]	1 = 1Wh
Inverter runtime total	Minutes	4 [UINT32]	1 = 1 minute
Status 1		4 [UINT32]	bit description
Status 2		4 [UINT32]	bit description
Status 3		4 [UINT32]	bit description
Status 4		4 [UINT32]	bit description
Internal status 1		4 [UINT32]	reserved bit description
Internal status 2		4 [UINT32]	reserved bit description
Internal status 3		4 [UINT32]	reserved bit description
Internal status 4		4 [UINT32]	reserved bit description
Supplied ac energy day	Wh	8 [UINT64]	1 = 1Wh
Inverter runtime day	Minutes	4 [UINT32]	1 = 1 minute
reserved		67	
	Total # of Bytes:	253	

If the inverter is a single phase device, the values for phase 2 and phase 3 will be 0.

If the inverter has not 3 MPPTs, the values for the missing MPPTs will be 0.

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8.8 VARIANT 85, 88, 207 - 211

Description	Unit	# of Bytes	Scaling
SAP part number		11 Byte	
SAP serial number		18 Byte	
SAP date code		4 Byte	
SAP revision		2 Byte	
DSP FW Rev	MA,MI	2(MSB,LSB)	
DSP FW Date	MA,MI	2(MSB,LSB)	ex : 0x0A0B => V10.11
Redundant MCU FW Rev.	MA,MI	2(MSB,LSB)	
Redundant MCU FW Date	MA,MI	2(MSB,LSB)	
Display MCU FW Rev.	MA,MI	2(MSB,LSB)	
Display MCU FW Date	MA,MI	2(MSB,LSB)	
Display WebPage Ctrl FW Rev.	MA,MI	2(MSB,LSB)	
Display WebPage Ctrl FW Date	MA,MI	2(MSB,LSB)	
Display WiFi Ctrl FW Rev.	MA,MI	2(MSB,LSB)	
Display WiFi Ctrl FW Date	MA,MI	2(MSB,LSB)	
AC Voltage(Phase1)	V	2(MSB,LSB)	Value/10
AC Current(Phase1)	A	2(MSB,LSB)	Value/100
AC Power(Phase1)	W	2(MSB,LSB)	
AC Frequency(Phase1)	Hz	2(MSB,LSB)	Value/100
AC Voltage(Phase1) (read from Redundant)	V	2(MSB,LSB)	Value/10
AC Frequency(Phase1) (read from Redundant)	Hz	2(MSB,LSB)	Value/100
AC Voltage(Phase2)	V	2(MSB,LSB)	Value/10
AC Current(Phase2)	A	2(MSB,LSB)	Value/100
AC Power(Phase2)	W	2(MSB,LSB)	
AC Frequency(Phase2)	Hz	2(MSB,LSB)	Value/100
AC Voltage(Phase2) (Read from Redundant)	V	2(MSB,LSB)	Value/10
AC Frequency(Phase2) (Read from Redundant)	Hz	2(MSB,LSB)	Value/100
AC Voltage(Phase3)	V	2(MSB,LSB)	Value/10
AC Current(Phase3)	A	2(MSB,LSB)	Value/100
AC Power(Phase3)	W	2(MSB,LSB)	
AC Frequency(Phase3)	Hz	2(MSB,LSB)	Value/100
AC Voltage(Phase3) (Read from Redundant)	V	2(MSB,LSB)	Value/10
AC Frequency(Phase3) (Read from Redundant)	Hz	2(MSB,LSB)	Value/100
Solar Voltage at Input 1	V	2(MSB,LSB)	Value/10
Solar Current at Input 1	A	2(MSB,LSB)	Value/100
Solar Power at Input 1	W	2(MSB,LSB)	
Solar Voltage at Input 2	V	2(MSB,LSB)	Value/10
Solar Current at Input 2	A	2(MSB,LSB)	Value/100
Solar Power at Input 2	W	2(MSB,LSB)	
ACPower	W	2 (MSB, LSB)	
(+) Bus Voltage	V	2(MSB,LSB)	Value/10
(-) Bus Voltage	V	2(MSB,LSB)	Value/10
Supplied ac energy today	Wh	4(MSB,LSB)	
Inverter runtime today	second	4(MSB,LSB)	
Supplied ac energy (total)	kWh	4(MSB,LSB)	
Inverter runtime(total)	second	4(MSB,LSB)	
Calculated temperature inside rack	캘	2(MSB,LSB)	**Signed** int16
Status AC Output 1		1 Byte	
Status AC Output 2		1 Byte	
Status AC Output 3		1 Byte	
Status AC Output 4		1 Byte	
Status DC Input 1		1 Byte	
Status DC Input 2		1 Byte	

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Error Status	1 Byte
Error Status AC 1	1 Byte
Global Error 1	1 Byte
CPU Error	1 Byte
Global Error 2	1 Byte
Limits AC output 1	1 Byte
Limits AC output 2	1 Byte
Global Error 3	1 Byte
Limits DC 1	1 Byte
Limits DC 2	1 Byte
History status messages	20 Byte
Total # of Bytes:	***163***

If the inverter is a single phase device, the values for phase 2 and phase 3 will be 0.

If the inverter is a single MPPT device, the values for MPPT 2 will be 0.

RPI M20A Var 221

8.9 VARIANT 212 - 222

Description	Unit	# of Bytes	Scaling
SAP part number		11 Byte	ASCII
SAP serial number		13 Byte	ASCII
SAP date code		4 Byte	
SAP revision		2 Byte	
DSP FW Rev	MA,MI	2(MSB,LSB)	
DSP FW Date	MA,MI	2(MSB,LSB)	ex : 0x0A0B => V10.11
Redundant MCU FW Rev.	MA,MI	2(MSB,LSB)	
Redundant MCU FW Date	MA,MI	2(MSB,LSB)	
Display MCU FW Rev.	MA,MI	2(MSB,LSB)	
Display MCU FW Date	MA,MI	2(MSB,LSB)	
Display WebPage Ctrl FW Rev	MA,MI	2(MSB,LSB)	
Display WebPage Ctrl FW Date	MA,MI	2(MSB,LSB)	
Display WiFi Ctrl FW Rev	MA,MI	2(MSB,LSB)	
Display WiFi Ctrl FW Date	MA,MI	2(MSB,LSB)	
AC Voltage(Phase1)	V	2(MSB,LSB)	Value/10
AC Current(Phase1)	A	2(MSB,LSB)	Value/100
AC Power(Phase1)	W	2(MSB,LSB)	
AC Frequency(Phase1)	Hz	2(MSB,LSB)	Value/100
AC Voltage(Phase1) (read from Redundant)	V	2(MSB,LSB)	Value/10
AC Frequency(Phase1) (read from Redundant)	Hz	2(MSB,LSB)	Value/100
AC Voltage(Phase2)	V	2(MSB,LSB)	Value/10
AC Current(Phase2)	A	2(MSB,LSB)	Value/100
AC Power(Phase2)	W	2(MSB,LSB)	
AC Frequency(Phase2)	Hz	2(MSB,LSB)	Value/100
AC Voltage(Phase2) (Read from Redundant)	V	2(MSB,LSB)	Value/10
AC Frequency(Phase2) (Read from Redundant)	Hz	2(MSB,LSB)	Value/100
AC Voltage(Phase3)	V	2(MSB,LSB)	Value/10
AC Current(Phase3)	A	2(MSB,LSB)	Value/100
AC Power(Phase3)	W	2(MSB,LSB)	
AC Frequency(Phase3)	Hz	2(MSB,LSB)	Value/100
AC Voltage(Phase3) (Read from Redundant)	V	2(MSB,LSB)	Value/10
AC Frequency(Phase3) (Read from Redundant)	Hz	2(MSB,LSB)	Value/100
Solar Voltage at Input 1	V	2(MSB,LSB)	Value/10
Solar Current at Input 1	A	2(MSB,LSB)	Value/100
Solar Power at Input 1	W	2(MSB,LSB)	
Solar Voltage at Input 2	V	2(MSB,LSB)	Value/10
Solar Current at Input 2	A	2(MSB,LSB)	Value/100
Solar Power at Input 2	W	2(MSB,LSB)	
ACPower	W	2 (MSB, LSB)	
(+) Bus Voltage	V	2(MSB,LSB)	Value/10
(-) Bus Voltage	V	2(MSB,LSB)	Value/10
Supplied ac energy today	Wh	4(MSB,LSB)	
Inverter runtime today	second	4(MSB,LSB)	
Supplied ac energy (total)	kWh	4(MSB,LSB)	
Inverter runtime(total)	second	4(MSB,LSB)	
Calculated temperature inside rack	°C	2(MSB,LSB)	***Signed*** *int16*
Status AC Output 1		1 Byte	
Status AC Output 2		1 Byte	
Status AC Output 3		1 Byte	
Status AC Output 4		1 Byte	
Status DC Input 1		1 Byte	
Status DC Input 2		1 Byte	
Error Status		1 Byte	

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Error Status AC 1	1 Byte
Global Error 1	1 Byte
CPU Error	1 Byte
Global Error 2	1 Byte
Limits AC output 1	1 Byte
Limits AC output 2	1 Byte
Global Error 3	1 Byte
Limits DC 1	1 Byte
Limits DC 2	1 Byte
History status messages	20 Byte
Total # of Bytes:	***158***

If the inverter is a single phase device, the values for phase 2 and phase 3 will be 0.

If the inverter is a single MPPT device, the values for MPPT 2 will be 0.

9 Setup data

To get the setup data from the connected inverter type the WL use the CMD [96] + SUB-CMD [2]. To overwrite the setup data with changed parameters the WL use the CMD [96] + SUB-CMD [130]. The write option should be protected with extended access privileges.

9.1 VARIANT 1 and INVERTER_TYPE not 2

Description	Unit	# of Bytes	Scaling
Grid overvoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid critical overvoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid undervoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid critical undervoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid high frequency setpoint	Hz	2 (MSB, LSB)	Value / 100
Grid low frequency setpoint	Hz	2 (MSB, LSB)	Value / 100
Grid synchronization time	s	2 (MSB, LSB)	Value / 100
Grid restart time	s	2 (MSB, LSB)	Value / 100
Grid dc current injection setpoint	A	2 (MSB, LSB)	Value / 1000
DC injection monitor		1 Byte	0 -> OFF 1 -> DC injection mode without restart 2 -> DC injection mode with re-start
Isolation error setpoint	kOhm	2 (MSB, LSB)	
Varistor fuse monitor setpoint	kOhm	2 (MSB, LSB)	
Isolation error setpoint at startup	kOhm	2 (MSB, LSB)	
Isolation and GND monitor configuration		1 Byte	0xA5 -> Isolation warning 0x63 -> Isolation error 0x00 -> ISO/GND OFF 0x10 -> PV+ grounded 0x08 -> PV- grounded
MOV error enable	boolean	1 Byte	0 -> Function disabled (FALSE) 1..255 -> Function enabled (TRUE)
Store setup to EEPROM		1 Byte	1 -> Store all eeprom data
	Total # of Bytes:	**28**	

9.2 VARIANT 3 and FW version equal or greater than 8.0

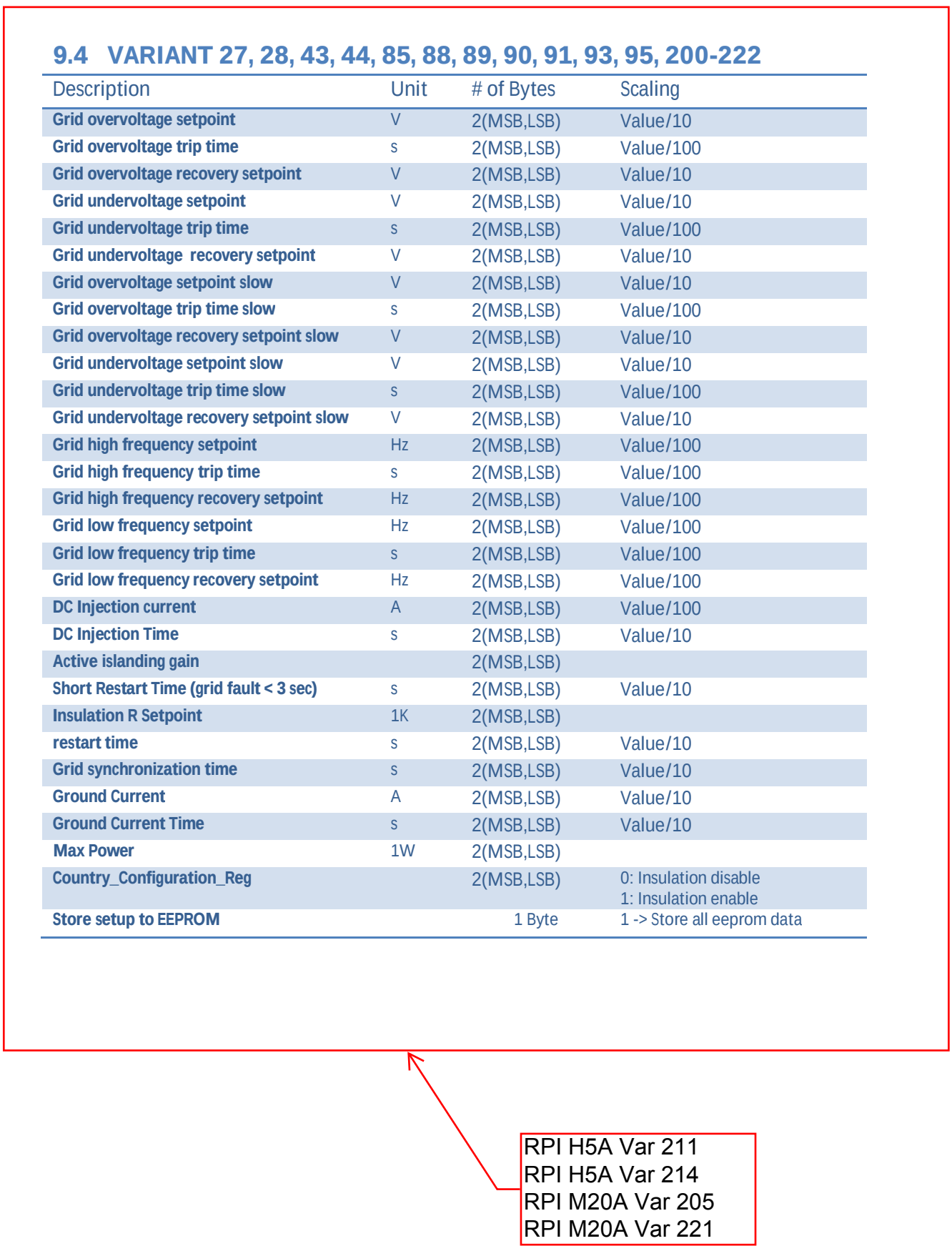
Description	Unit	# of Bytes	Scaling
Grid overvoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid critical overvoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid undervoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid critical undervoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid high frequency setpoint	Hz	2 (MSB, LSB)	Value / 100
Grid low frequency setpoint	Hz	2 (MSB, LSB)	Value / 100
Grid synchronization time	s	2 (MSB, LSB)	Value / 100
Grid restart time	s	2 (MSB, LSB)	Value / 100
Grid dc current injection setpoint	A	2 (MSB, LSB)	Value / 100
Isolation error setpoint in running condition	kOhm	2 (MSB, LSB)	
Varistor monitor setpoint	kOhm	2 (MSB, LSB)	
Isolation error setpoint at startup	kOhm	2 (MSB, LSB)	
Isolation and GND monitor configuration		1 Byte	0xA5 > Isolation warning 0x63 -> Isolation error 0x00 -> ISO/GND OFF 0x10 -> PV+ grounded 0x08 -> PV- grounded
Varistor warning enable	boolean	1 Byte	0 -> Function disabled (FALSE) 1..255 -> Function enabled (TRUE)
Store setup to EEPROM		1 Byte	1 -> Store all eeprom data
Total # of Bytes:		**27**	

9.3 VARIANT 4, 14, 63

Description	Unit	# of Bytes	Scaling
Grid overvoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid critical overvoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid undervoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid critical undervoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid high frequency setpoint	Hz	2 (MSB, LSB)	Value / 100
Grid low frequency setpoint	Hz	2 (MSB, LSB)	Value / 100
Grid synchronization time	s	2 (MSB, LSB)	Value / 100
Grid restart time	s	2 (MSB, LSB)	Value / 100
Grid dc current injection setpoint	A	2 (MSB, LSB)	Value /1000
DC injection monitor		1 Byte	0 -> OFF 1 -> DC injection mode without restart 2 -> DC injection mode with re-start
Isolation error setpoint	kOhm	2 (MSB, LSB)	
Isolation error setpoint at startup	kOhm	2 (MSB, LSB)	
Isolation and GND monitor configuration		1 Byte	0xA5 > Isolation warning 0x63 -> Isolation error 0x00 -> ISO/GND OFF 0x10 -> PV+ grounded 0x08 -> PV- grounded
Store setup to EEPROM		1 Byte	1 -> Store all eeprom data
Total # of Bytes:		**25**	

9.4 VARIANT 27, 28, 43, 44, 85, 88, 89, 90, 91, 93, 95, 200-222

Description	Unit	# of Bytes	Scaling
Grid overvoltage setpoint	V	2(MSB,LSB)	Value/10
Grid overvoltage trip time	s	2(MSB,LSB)	Value/100
Grid overvoltage recovery setpoint	V	2(MSB,LSB)	Value/10
Grid undervoltage setpoint	V	2(MSB,LSB)	Value/10
Grid undervoltage trip time	s	2(MSB,LSB)	Value/100
Grid undervoltage recovery setpoint	V	2(MSB,LSB)	Value/10
Grid overvoltage setpoint slow	V	2(MSB,LSB)	Value/10
Grid overvoltage trip time slow	s	2(MSB,LSB)	Value/100
Grid overvoltage recovery setpoint slow	V	2(MSB,LSB)	Value/10
Grid undervoltage setpoint slow	V	2(MSB,LSB)	Value/10
Grid undervoltage trip time slow	s	2(MSB,LSB)	Value/100
Grid undervoltage recovery setpoint slow	V	2(MSB,LSB)	Value/10
Grid high frequency setpoint	Hz	2(MSB,LSB)	Value/100
Grid high frequency trip time	s	2(MSB,LSB)	Value/100
Grid high frequency recovery setpoint	Hz	2(MSB,LSB)	Value/100
Grid low frequency setpoint	Hz	2(MSB,LSB)	Value/100
Grid low frequency trip time	s	2(MSB,LSB)	Value/100
Grid low frequency recovery setpoint	Hz	2(MSB,LSB)	Value/100
DC Injection current	A	2(MSB,LSB)	Value/100
DC Injection Time	s	2(MSB,LSB)	Value/10
Active islanding gain		2(MSB,LSB)	
Short Restart Time (grid fault < 3 sec)	s	2(MSB,LSB)	Value/10
Insulation R Setpoint	1K	2(MSB,LSB)	
restart time	s	2(MSB,LSB)	Value/10
Grid synchronization time	s	2(MSB,LSB)	Value/10
Ground Current	A	2(MSB,LSB)	Value/10
Ground Current Time	s	2(MSB,LSB)	Value/10
Max Power	1W	2(MSB,LSB)	
Country_Configuration_Reg		2(MSB,LSB)	0: Insulation disable 1: Insulation enable
Store setup to EEPROM		1 Byte	1 -> Store all eeprom data



9.5 VARIANT 99, 100

Description	Unit	# of Bytes	Scaling
Grid overvoltage setpoint	V	2 (MSB, LSB)	Value
Grid critical overvoltage setpoint	V	2 (MSB, LSB)	Value
Grid undervoltage setpoint	V	2 (MSB, LSB)	Value
Grid critical undervoltage setpoint	V	2 (MSB, LSB)	Value
Grid high frequency setpoint	Hz	2 (MSB, LSB)	Value / 100
Grid low frequency setpoint	Hz	2 (MSB, LSB)	Value / 100
Grid synchronization time	s	2 (MSB, LSB)	Value / 100
Grid restart time	s	2 (MSB, LSB)	Value / 100
Grid dc current injection setpoint	mA	2 (MSB, LSB)	Value
Isolation error setpoint at startup String 1	MOhm	2 (MSB, LSB)	Value / 100
Isolation and GND monitor configuration String 1		1 Byte	0x00> Isolation warning 0x01 -> Isolation error 0x02 -> ISO/GND OFF 0x03 -> PV+ grounded 0x04 -> PV- grounded
Isolation error setpoint at startup String 2	MOhm	2 (MSB, LSB)	Value / 100
Isolation and GND monitor configuration String 2		1 Byte	0x00> Isolation warning 0x01 -> Isolation error 0x02 -> ISO/GND OFF 0x03 -> PV+ grounded 0x04 -> PV- grounded
Total # of Bytes:		**23**	

9.6 VARIANT 15, 18, 19, 20, 31, 34, 35, 36, 38, 39, 55, 58, 59, 60

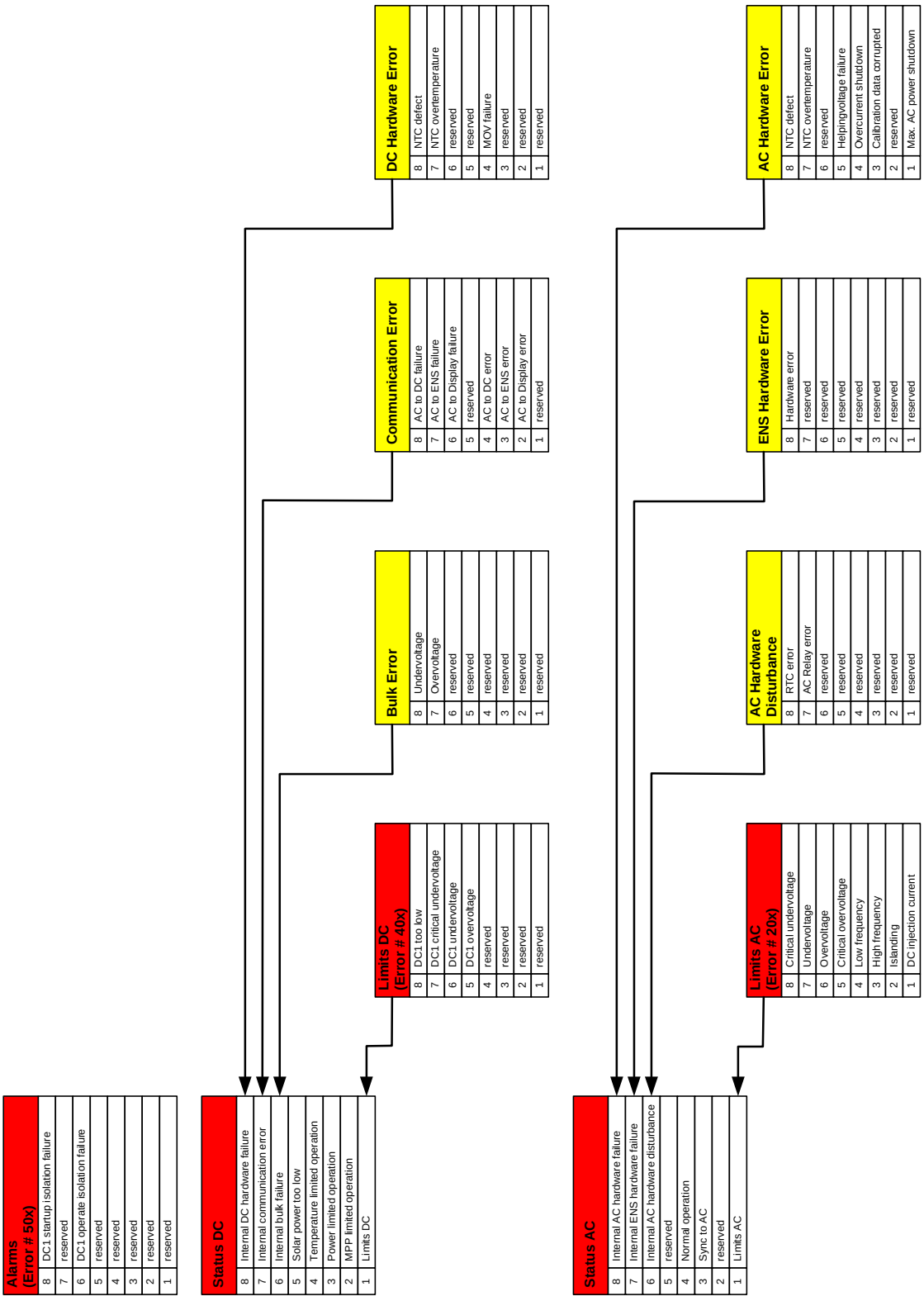
Description	Unit	# of Bytes	Scaling
Grid overvoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid critical overvoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid undervoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid critical undervoltage setpoint	V	2 (MSB, LSB)	Value / 10
Grid high frequency setpoint	Hz	2 (MSB, LSB)	Value / 100
Grid low frequency setpoint	Hz	2 (MSB, LSB)	Value / 100
Grid synchronization time	s	2 (MSB, LSB)	Value / 100
Grid dc current injection setpoint	A	2 (MSB, LSB)	Value / 100
Isolation error setpoint in running condition	kOhm	2 (MSB, LSB)	
Varistor monitor setpoint	kOhm	2 (MSB, LSB)	
Isolation error setpoint at startup	kOhm	2 (MSB, LSB)	
Earth fault monitor		1 Byte	For EU: Value = 1 : enable Iso error, disable varistor Value = 33 : enable Iso error, enable varistor Value= 2 : enable Iso warning, disable varistor Value= 34 : enable Iso warning, enable varistor Value = 4 : PV plus grounded. disable varistor Value = 36 : PV plus grounded. enable varistor Value = 8 : PV minus grounded, disable varistor Value = 40 : PV minus grounded, enable varistor Value = 16 : disable iso and gnd, disable varistor Value = 48 : disable iso and gnd, enable varistor For US: Value = 72 : enable GFDI and fuse to plus grounded, disable varistor Value = 104 : enable GFDI and fuse to plus grounded, enable varistor Value = 68 : enable GFDI and fuse to minus grounded, disable varistor Value = 100 : enable GFDI and fuse to minus grounded, enable varistor
Store setup to EEPROM		1 Byte	1 -> Store all eeprom data
	Total # of Bytes:	**24**	

9.7 VARIANT 53, 73, 102, 103, 105, 106, 107, 109, 110, 111, 113, 114, 120, 121, 122, 123, 124, 125, 158, 159, 160, 161

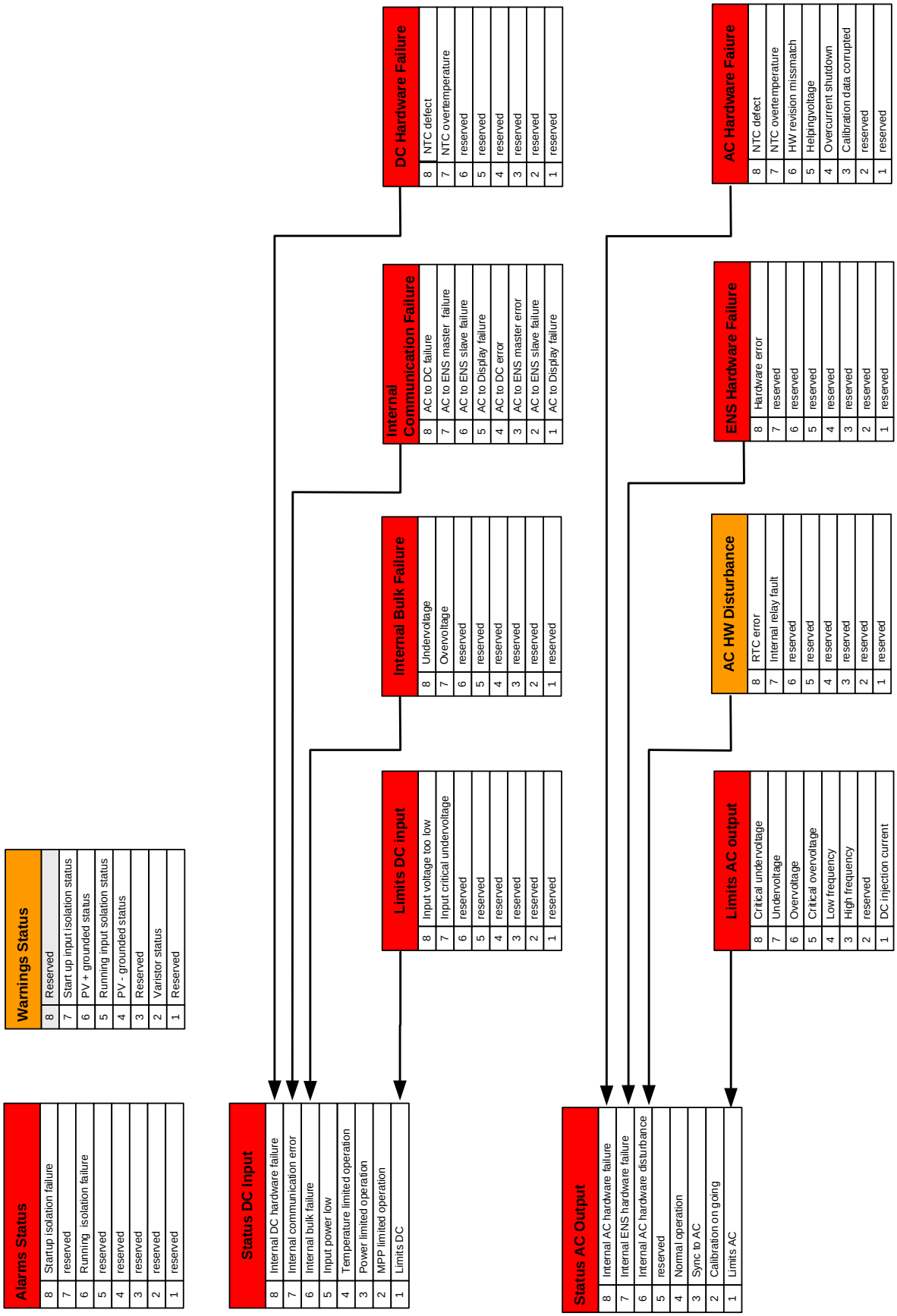
Description	Unit	# of Bytes	Scaling
Reactive power mode		1 [UINT8]	0 = Reactive power disabled 1 = Fix power factor 2 = Power factor characteristic Cosϕ(P) 3 = Fix reactive power 4 = Reactive power characteristic Q(U)
Adjustable maximal allow output power		1 [UINT8]	1 = 0.01Pn
Recover frequency level		2 [UINT16]	1 = 0.01Hz
Fix power factor		2 [INT16]	1 = 0.01
Power factor point 1 of power factor curve (PF1)		2 [INT16]	1 = 0.01
Power factor point 2 of power factor curve (PF2)		2 [INT16]	1 = 0.01
Power factor point 3 of power factor curve (PF3)		2 [INT16]	1 = 0.01
Power factor point 4 of power factor curve (PF4)		2 [INT16]	1 = 0.01
Active power point 2 of power factor curve (AP2)		1 [UINT8]	1 = 0.01Pn
Active power point 3 of power factor curve (AP3)		1 [UINT8]	1 = 0.01Pn
Fix reactive power		2 [INT16]	1 = 0.01Pn
Q(u) maximal reactive power (cap) (Q/Pn)		2 [INT16]	1 = 0.01Pn
Q(u) minimal reactive power (ind) (Q/Pn)		2 [INT16]	1 = 0.01Pn
Q(u) Voltage to maximal reactive power		2 [UINT16]	1 = 1V
Q(u) Voltage to minimal reactive power		2 [UINT16]	1 = 1V
The width of hysteresis band		2 [UINT16]	1 = 1V
Delay time		2 [UINT16]	1 = 10ms
K factor		1 [UINT8]	1 = 1
Power limit until power off where reactive power must be set to 0.		1 [UINT8]	1 = 0.01Pn
Upper voltage limit of the dead band		2 [UINT16]	1 = 1V
Under voltage limit of the dead band		2 [UINT16]	1 = 1
FRT active time after voltage comes back to dead band.		2 [UINT16]	1 = 10ms
FRT_IBLimitSymetricFail		1 [UINT8]	1 = 1%
FRT_IBLimitASymetricFail		1 [UINT8]	1 = 1%
Frequency level to start reduction active power		2 [UINT16]	1 = 0.01Hz
Frequency level to stop reduction active power		2 [UINT16]	1 = 0.01Hz
Power reduction gradient depend on frequency		1 [UINT8]	1 = 1%
reserved		208	ignore
Total # of Bytes:		**253**	

10 Status description

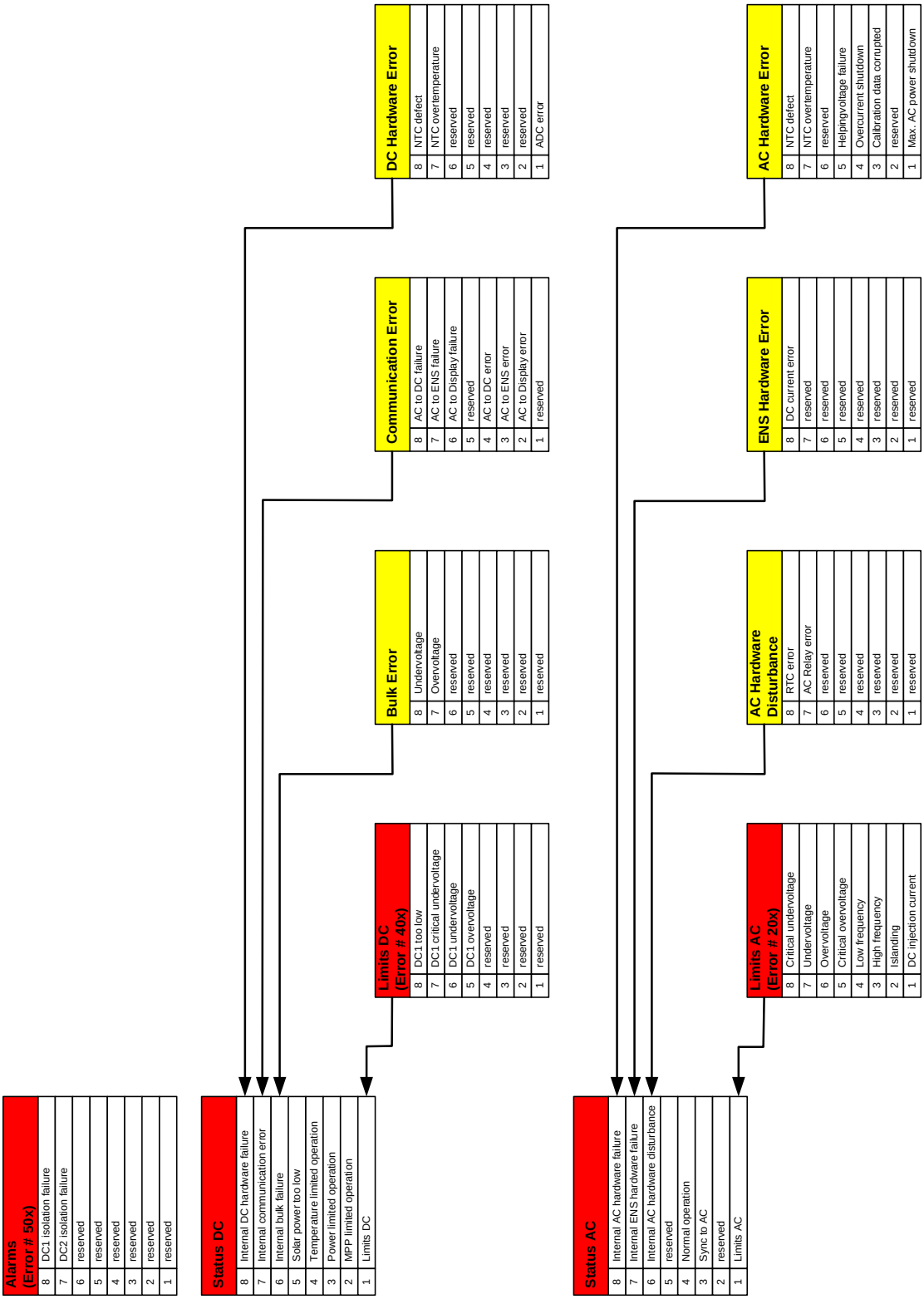
10.1 VARIANT 1 and TYPE not 2



10.2 VARIANT 3 and FW version equal or greater than 8.0



10.3 VARIANT 4, 14, 63



10.4 VARIANT 99, 100

For the SOLIVIA CM/CS we use 3 bytes for the Status of the complete System and for the 9 Modules we use 9 bytes for each. In Sum 81 bytes for Status information.

Status – System Controller

Status System (1)	
8	Isolation error String 2
7	Isolation error String 1
6	Reserved
5	Varistor DC demaged
4	Varistor AC demaged
3	Quint3 20A
2	Quint3 3.5A
1	BPC communication error

Status System (2)	
8	reserved
7	reserved
6	Cabinet OFF
5	Cabinet temperature error
4	Fan 3 blocked
3	Fan 2 blocked
2	Fan 1 blocked
1	PowerControl

Status System (3)	
8	reserved
7	reserved
6	reserved
5	reserved
4	reserved
3	reserved
2	Date automatically set at start-up
1	BPC not respondig at start-up

In Status System (2) bit 6 gets to 1 every time the cabinet is disconnected from the grid using the GUI of the System Controller. As soon as is re-connected the bit gets to 0. This happens from software version 0.3.0 of the SC. In Status System (3) bit 1 get to 1 if the BPC does not answer to the SC at start-up, and bit 2 if the SC finds data on the CF referring to a date in the future and the SC does not get any feedback from the user for 10 minutes. The bits are set at start-up and never reset. They are active from software version 0.3.3.

The 8 Error bytes for each Module:

Errors - Module

AC Hardware Errors	
7	NTC defect
6	NTC overtemperature
5	HW revision missmatch
4	Helpingvoltage
3	Overcurrent shutdown
2	Calibration data corrupted
1	Bulk under voltage
0	Bulk over voltage

DC Hardware Error	
7	NTC defect
6	NTC overtemperature
5	ENS_OK error
4	AC_OK error
3	reserved
2	Hardware error
1	Buck error
0	Bridge error

AC Comm. Errors	
7	Ext. Comm. timeout
6	IO fail
5	DC fail
4	ENS fail
3	IO broken
2	DC broken
1	ENS broken
0	reserved

DC Voltage error	
7	reserved
6	reserved
5	reserved
4	reserved
3	reserved
2	Input Over voltage
1	input voltage start up
0	Input Under voltage

AC GRID ERRORS	
7	Critical undervoltage
6	Undervoltage
5	Overvoltage
4	Critical overvoltage
3	Low frequency
2	High frequency
1	reserved
0	DC injection current

IO TWI comm status	
7	reserved
6	reserved
5	reserved
4	reserved
3	reserved
2	reserved
1	IO TWI bus error
0	IO Com error

Calibration errors	
7	reserved
6	reserved
5	DC HW revision error
4	AC HW revision error
3	Relay error
2	ENS compensation error
1	AC compensation error
0	LEM calibration error

External Error	
7	reserved
6	reserved
5	reserved
4	reserved
3	Power unsymmetric
2	I/O discrepancy
1	Phase not responding
0	Modul not responding

1 Status byte for each module

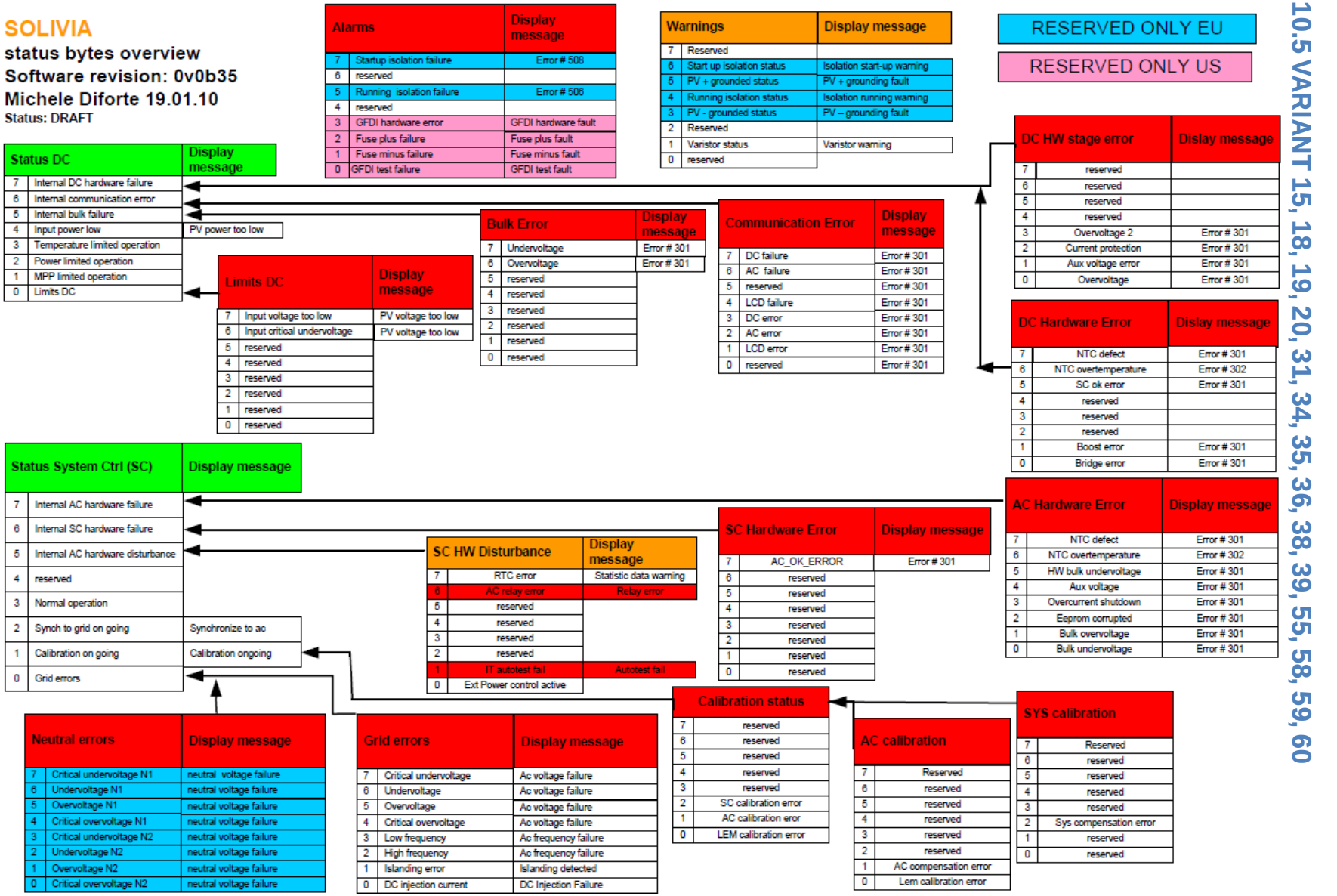
Status byte	
7	Master of Bus
6	Master of MPPT
5	reserved
4	Off
3	Error
2	Working
1	Ready
0	Present/not present

0 -> not present
1 -> present

SOLIVIA

status bytes overview
Software revision: 0v0b35
Michele Diforte 19.01.10
Status: DRAFT

10.5 VARIANT 15, 18, 19, 20, 31, 34, 35, 36, 38, 39, 55, 58, 59, 60



Alarms		Display message
7	Startup isolation failure	Error # 508
6	reserved	
5	Running isolation failure	Error # 506
4	reserved	
3	GFDI hardware error	GFDI hardware fault
2	Fuse plus failure	Fuse plus fault
1	Fuse minus failure	Fuse minus fault
0	GFDI test failure	GFDI test fault

Warnings		Display message
7	Reserved	
6	Start up isolation status	Isolation start-up warning
5	PV + grounded status	PV + grounding fault
4	Running isolation status	Isolation running warning
3	PV - grounded status	PV – grounding fault
2	Reserved	
1	Varistor status	Varistor warning
0	reserved	

RESERVED ONLY EU

RESERVED ONLY US

Status DC		Display message
7	Internal DC hardware failure	
6	Internal communication error	
5	Internal bulk failure	
4	Input power low	PV power too low
3	Temperature limited operation	
2	Power limited operation	
1	MPP limited operation	
0	Limits DC	

Limits DC		Display message
7	Input voltage too low	PV voltage too low
6	Input critical undervoltage	PV voltage too low
5	reserved	
4	reserved	
3	reserved	
2	reserved	
1	reserved	
0	reserved	

Bulk Error		Display message
7	Undervoltage	Error # 301
6	Overvoltage	Error # 301
5	reserved	
4	reserved	
3	reserved	
2	reserved	
1	reserved	
0	reserved	

Communication Error		Display message
7	DC failure	Error # 301
6	AC failure	Error # 301
5	reserved	Error # 301
4	LCD failure	Error # 301
3	DC error	Error # 301
2	AC error	Error # 301
1	LCD error	Error # 301
0	reserved	Error # 301

DC HW stage error		Dislay message
7	reserved	
6	reserved	
5	reserved	
4	reserved	
3	Overvoltage 2	Error # 301
2	Current protection	Error # 301
1	Aux voltage error	Error # 301
0	Overvoltage	Error # 301

DC Hardware Error		Dislay message
7	NTC defect	Error # 301
6	NTC overtemperature	Error # 302
5	SC ok error	Error # 301
4	reserved	
3	reserved	
2	reserved	
1	Boost error	Error # 301
0	Bridge error	Error # 301

Status System Ctrl (SC)		Display message
7	Internal AC hardware failure	
6	Internal SC hardware failure	
5	Internal AC hardware disturbance	
4	reserved	
3	Normal operation	
2	Synch to grid on going	Synchronize to ac
1	Calibration on going	Calibration ongoing
0	Grid errors	

SC HW Disturbance		Display message
7	RTC error	Statistic data warning
6	AC relay error	Relay error
5	reserved	
4	reserved	
3	reserved	
2	reserved	
1	IT autotest fail	Autotest fail
0	Ext Power control active	

SC Hardware Error		Display message
7	AC_OK_ERROR	Error # 301
6	reserved	
5	reserved	
4	reserved	
3	reserved	
2	reserved	
1	reserved	
0	reserved	

AC Hardware Error		Display message
7	NTC defect	Error # 301
6	NTC overtemperature	Error # 302
5	HW bulk undervoltage	Error # 301
4	Aux voltage	Error # 301
3	Overcurrent shutdown	Error # 301
2	Eeprom corrupted	Error # 301
1	Bulk overvoltage	Error # 301
0	Bulk undervoltage	Error # 301

Neutral errors		Display message
7	Critical undervoltage N1	neutral voltage failure
6	Undervoltage N1	neutral voltage failure
5	Overvoltage N1	neutral voltage failure
4	Critical overvoltage N1	neutral voltage failure
3	Critical undervoltage N2	neutral voltage failure
2	Undervoltage N2	neutral voltage failure
1	Overvoltage N2	neutral voltage failure
0	Critical overvoltage N2	neutral voltage failure

Grid errors		Display message
7	Critical undervoltage	Ac voltage failure
6	Undervoltage	Ac voltage failure
5	Overvoltage	Ac voltage failure
4	Critical overvoltage	Ac voltage failure
3	Low frequency	Ac frequency failure
2	High frequency	Ac frequency failure
1	Islanding error	Islanding detected
0	DC injection current	DC Injection Failure

Calibration status	
7	reserved
6	reserved
5	reserved
4	reserved
3	reserved
2	SC calibration error
1	AC calibration eror
0	LEM calibration error

AC calibration	
7	Reserved
6	reserved
5	reserved
4	reserved
3	reserved
2	reserved
1	AC compensation error
0	Lem calibration error

SYS calibration	
7	Reserved
6	reserved
5	reserved
4	reserved
3	reserved
2	Sys compensation error
1	reserved
0	reserved

10.6 VARIANT: 27, 28, 43, 44, 85, 88, 89, 90, 91, 93, 95, 200-222

Status AC Output 1 Command: 64-1	
8	Grid Quality
7	Phase Jump
6	reserved
5	reserved
4	reserved
3	Under Frequency Range
2	Over Frequency Range
1	reserved

Status AC Output 2 Command: 64-2	
8	Under Voltage Range_S
7	reserved
6	Slow Over Voltage Range_R
5	Over Transient Voltage Range_R
4	Over Voltage Range_R
3	Under Voltage Range_R
2	No Grid
1	AC connected Fail

Status AC Output 3 Command: 64-3	
8	Slow Over Voltage Range_T
7	Over Transient Voltage Range_T
6	Over Voltage Range_T
5	Under Voltage Range_T
4	reserved
3	Slow Over Voltage Range_S
2	Over Transient Voltage Range_S
1	Over Voltage Range_S

Status AC Output 4 Command: 64-4	
8	reserved
7	reserved
6	reserved
5	reserved
4	reserved
3	reserved
2	3 Phases Unbalance
1	reserved

Status DC Input 1 Command: 64-5	
8	String2 PV input voltage too high
7	String1 PV input voltage too high
6	SPD broken
5	reserved
4	reserved
3	reserved
2	reserved
1	reserved

Status DC Input 2 Command: 64-6	
8	reserved
7	reserved
6	reserved
5	reserved
4	reserved
3	SOLAR_2_UVR
2	SOLAR_1_UVR
1	reserved

Error Status Command: 65-1	
8	reserved
7	reserved
6	reserved
5	reserved
4	FAN_FAIL
3	reserved
2	reserved
1	reserved

Error Status AC 1 Command: 65-2	
8	Heat Sink over temperature
7	Inside NTC Circuit Fail
6	Inside OTP
5	DC Injection_Total
4	DC Injection_T
3	DC Injection_S
2	DC Injection_R
1	reserved

Global Error 1 Command: 65-3	
8	DSP ADC Vgrid/Iout Bias Fail
7	Firmware Incompatibility
6	Relay Open
5	reserved
4	Inverter Choke over temperature
3	Heat Sink Ntc3 Circuit Fail
2	Heat Sink Ntc2 Circuit Fail
1	Heat Sink Ntc1 Circuit Fail

CPU Error Command: 65-4	
8	Internal Communication Fault (between Display)
7	Internal Communication Fault (between Redundant)
6	Fan Fail
5	Efficiency Abnormal
4	Red. ADC Iout_dc Bias Fail
3	Red. ADC Vgrid/Vinv Bias Fail
2	DSP ADC Iin/Iboost Bias Fail
1	DSP ADC Vin/Vbus Bias Fail

Global Error 2 Command: 65-5	
8	Bus_P over voltage rating
7	Bus unbalance
6	Relay Test Open
5	Relay Test Short
4	RCMU Circuit Fail
3	3P Current Unbalance
2	Insulation
1	Residual Current Over Rating

Limits AC output 1 Command: 66-1	
8	Output Current Over Rating_S
7	Output Current Transient Over Rating_S
6	Output Current Over Rating_R
5	Output Current Transient Over Rating_R
4	Bus voltage over rating
3	Bus_N under voltage rating
2	Bus_N over voltage rating
1	Bus_P under voltage rating

Limits AC output 2 Command: 66-2	
8	reserved
7	Inverter Failure
6	HW OOCP circuit
5	CT current sensor Fail_C
4	CT current sensor Fail_B
3	CT current sensor Fail_A
2	Output Current Over Rating_T
1	Output Current Transient Over Rating_T

Global Error 3 Command: 66-3	
8	reserved
7	reserved
6	reserved
5	reserved
4	reserved
3	Zero Cross Circuit Fail
2	reserved
1	reserved

Limits DC 1 Command: 66-4	
8	reserved
7	reserved
6	PV2 Current Over Rating
5	PV1 Current Over Rating
4	reserved
3	reserved
2	reserved
1	reserved

Limits DC 2 Command: 66-5	
8	PV2 Current Transient Over Rating
7	PV1 Current Transient Over Rating
6	reserved
5	reserved
4	reserved
3	reserved
2	reserved
1	power control active

10.7 VARIANT 53, 73, 102, 103, 105, 106, 107, 109, 110 111, 113, 114, 120, 121, 122, 123, 124, 125, 158, 159, 160, 161

Status 1

bit 0 = 1 -> Self test ongoing
bit 1 = 1 -> Firmware update
bit 2 = 1 -> Night mode
bit 3 = 1 -> L1 Voltage failure
bit 4 = 1 -> L2 Voltage failure
bit 5 = 1 -> L3 Voltage failure
bit 6 = 1 -> L1 Frequency failure
bit 7 = 1 -> L2 Frequency failure
bit 8 = 1 -> L3 Frequency failure
bit 9 = 1 -> L1 DC Inj. failure
bit 10 = 1 -> L2 DC Inj. Failure
bit 11 = 1 -> L3 DC Inj. failure
bit 12 = 1 -> L1 islanding
bit 13 = 1 -> L2 islanding
bit 14 = 1 -> L3 islanding
bit 15 = 1 -> L1 Grid error
bit 16 = 1 -> L2 Grid error
bit 17 = 1 -> L3 Grid error
bit 18 = 1 -> L1 Long grid out
bit 19 = 1 -> L2 Long grid out
bit 20 = 1 -> L3 Long grid out
bit 21 = 1 -> L1 Grid synchronization error
bit 22 = 1 -> L2 Grid synchronization error
bit 23 = 1 -> L3 Grid synchronization error
bit 24..31 RESERVED

Status 2

bit 0 = 1 -> PV1 Iso startup failure
bit 1 = 1 -> PV1 Iso running failure
bit 2 = 1 -> PV1+ grounding failure
bit 3 = 1 -> PV1- grounding failure
bit 4 = 1 -> PV2 Iso startup failure
bit 5 = 1 -> PV2 Iso running failure
bit 6 = 1 -> PV2+ grounding failure
bit 7 = 1 -> PV2- grounding failure
bit 8 = 1 -> PV3 Iso startup failure
bit 9 = 1 -> PV3 Iso running failure
bit 10 = 1 -> PV3+ grounding failure
bit 11 = 1 -> PV3- grounding failure
bit 12 = 1 -> PV1 voltage too low failure
bit 13 = 1 -> PV2 voltage too low failure
bit 14 = 1 -> PV3 voltage too low failure
bit 15 = 1 -> Internal failure
bit 16 = 1 -> Auto test failure
bit 17 = 1 -> PV power too low failure
bit 18..31 RESERVED

Status 3

bit 0 = 1 -> PV1 Iso startup warning
bit 1 = 1 -> PV1 Iso running warning

bit 2 = 1 -> PV1+ grounding warning
bit 3 = 1 -> PV1- grounding warning
bit 4 = 1 -> PV2 Iso startup warning
bit 5 = 1 -> PV2 Iso running warning
bit 6 = 1 -> PV2+ grounding warning
bit 7 = 1 -> PV2- grounding warning
bit 8 = 1 -> PV3 Iso startup warning
bit 9 = 1 -> PV3 Iso running warning
bit 10 = 1 -> PV3 + grounding warning
bit 11 = 1 -> PV3- grounding warning
bit 12 = 1 -> PV1 voltage too low warning
bit 13 = 1 -> PV2 voltage too low warning
bit 14 = 1 -> PV3 voltage too low warning
bit 15..31 RESERVED

Status 4

bit 0 = 1 -> Internal fan warning
bit 1 = 1 -> External fan warning
bit 2 = 1 -> Synchronization ongoing
bit 3..31 RESERVED

10.8 History Status Description

The history status is decoded in the format:

DC hardware failure	0x10bb	bb = DC Hardware Error Bits
Internal communication failure	0x20bb	bb = Communication Error Bits
DC limitations	0x30bb	bb = Dc Limits Bits
AC hardware failure	0x40bb	bb = AC Hardware Error Bits
ENS hardware failure	0x50bb	bb = ENS Hardware Error Bits
Grid failure	0x60bb	bb = Ac Limits Bits
Alarm status	0x70bb	bb = Alarm (Error #50x) Bits
Bulk error	0x80bb	bb = Bulk Error Bits

Details about the different bits positions are described in the chapter *status description*.