

CCC MultiCom Interface with Modbus/JBus Protocol

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1. General

The MultiCom interface assembly can be used as a Modbus/JBus interface. With this interface, it is possible to integrate UPS units as slaves in a SCADA system with the Modbus or JBus protocol.

JBUS is a Modbus derivative in which register addressing is offset by 1. For safety reasons, only the “read register” command is used in this application, i.e. it only loads information from the UPS unit.

With the Modbus/JBus interface it is possible to monitor one UPS unit directly via an RS232 connection or several units via an RS485 bus. The interface (X5) can be switched from RS232 to RS485 for this purpose.

The RS232 interface (X2) is used for configuration.

Package content:

- 1 x Operating Instructions with licence key
- 1 x CCC data line for configuration
- 1 x bus interface connector
- 1 x Terminating resistor 120R
- 1 x Screen terminal block

Prerequisites.

for the personnel:

The “Structure” and “Configuration” chapters assume technical qualifications as an electrician. These qualifications may take the form of a completed professional training course in an electrical profession or an additional qualification as an “Elektrofachkraft für festgelegte Tätigkeiten” (“Skilled person for defined electrical work”) offered by a Chamber of Industry and Commerce (CIC).

for the UPS system:

- 1 x UPS system in the Protect series with a MultiCom interface
- 1 x RS485 data line for integration in a SCADA system

Technical data:

Modbus/JBus:

Protocol:	JBUS (Modbus derivative)
Transmission mode:	Half-duplex
Transmission code:	RTU
Synchronisation:	Start/stop
Data transmission:	9600 baud, 8 data bits, no parity, 1 stop bit (adjustable)
Function code:	03 (read register)
Error check:	CRC
Response time:	> 10 ms (adjustable)

RS422/485:

- Max. line length: 1200 m
- Max. 32 bus stations
- Data line: Screened 1:1 (2 x 0.22; twisted pair), e.g. Lapp “UNITRONIC-BUS LD”

2. Design

2.1 Structure of the Assembly

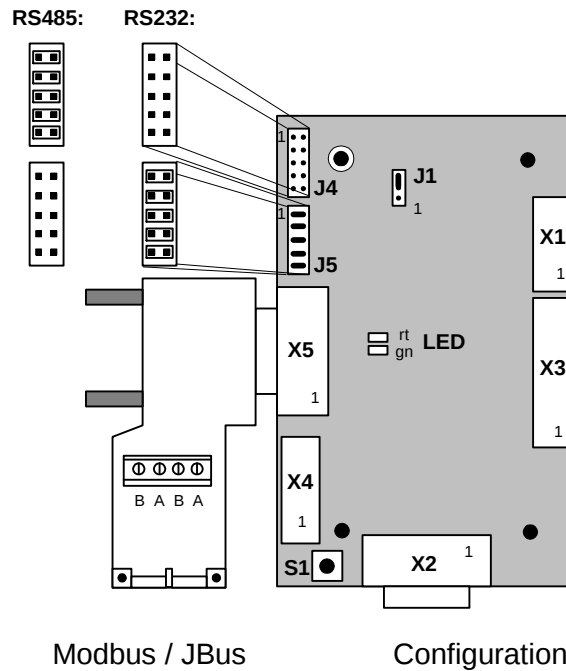


Figure 1 MultiCom interface as a Modbus/JBus interface (top view)

Configuration jumpers:

J4: All closed: RS485 (Modbus/JBus standard)

J5: All closed: RS232 (factory setting)

The transmission topology of the Modbus/JBus interface (connector X5) is set with the two configuration jumper blocks (J4/J5). The factory setting is RS232. In order to be able to use the Modbus/JBus interface in the bus system via RS485 or as a point-to-point connection via RS422, you must remove all jumpers from block J5 and insert them into block J4.

Button:

S1: Button for starting the configuration

2.2 Structure of the Wiring

RS232 data bus at X5:

If you want to operate Modbus/JBus via RS232, please use the enclosed data line.

RS485 bus line at X5:

Connect the two RS485 wires of the data line to the bus interface connector. You must terminate the end of the bus by fitting the enclosed 120R resistor between connections A and B.

The data bus is configured as follows:

D-SUB 9-pin socket (SCADA system)	D-SUB 9-pin male (MultiCom)	Terminal block (signal)
3	3	B
8	8	A

Screen connection of the RS485 bus line:

Shielding is a means of weakening (attenuating) magnetic, electrical or electromagnetic interference fields.

Interference currents on line shields are dissipated to earth by means of the shield busbar that has a conductive connection to the housing. A low-impedance connection to the PE conductor is especially important to prevent these interference currents from themselves becoming a source of interference.

If possible, only use lines with a braided shield. The shield coverage should be at least 80%. Avoid using lines with a foil shield because tensile and compressive stresses applied when fastening the line can easily damage the foil, resulting in a reduction in the shielding effect.

Please bear the following points in mind when handling the screen:

- Use cable clips or shield terminal blocks made of metal to secure the braided shield. The clips must surround the shield and make good contact with it over a large area.
- Route the shield on a shield busbar directly from where the line enters the cubicle. Route the shield right up to the assembly; however, ensure that it does not make contact there!

You can achieve **effective interference suppression** in the high-frequency range **by connecting the shield at both ends**. **Therefore**, please **always** connect the shield **at both ends**. If there is a potential difference between the earthing points, however, an equalising current can flow along a shield that is connected at both ends. In this case, you should route an additional potential equalising line.

By connecting the shield at one end, you can **only attenuate the low frequencies**. You should **therefore** only connect the shield at one end **in exceptional circumstances, namely if**:

- potential differences exist and you cannot route a potential equalising line,
- foil shields (static shields) are used.

On the UPS side, you must connect the line screen to the housing potential of the UPS unit via the enclosed screen terminal block. Openings are provided in the plate of the UPS for installation in the connection room area. Remove approximately 20 mm of the sheath at this point and fasten the line with the shield terminal block. Ensure good contact between the terminal, the line screen and the UPS housing!



ATTENTION:

You must **route the shield up to the assembly**. It must not be connected to the bus interface connector.

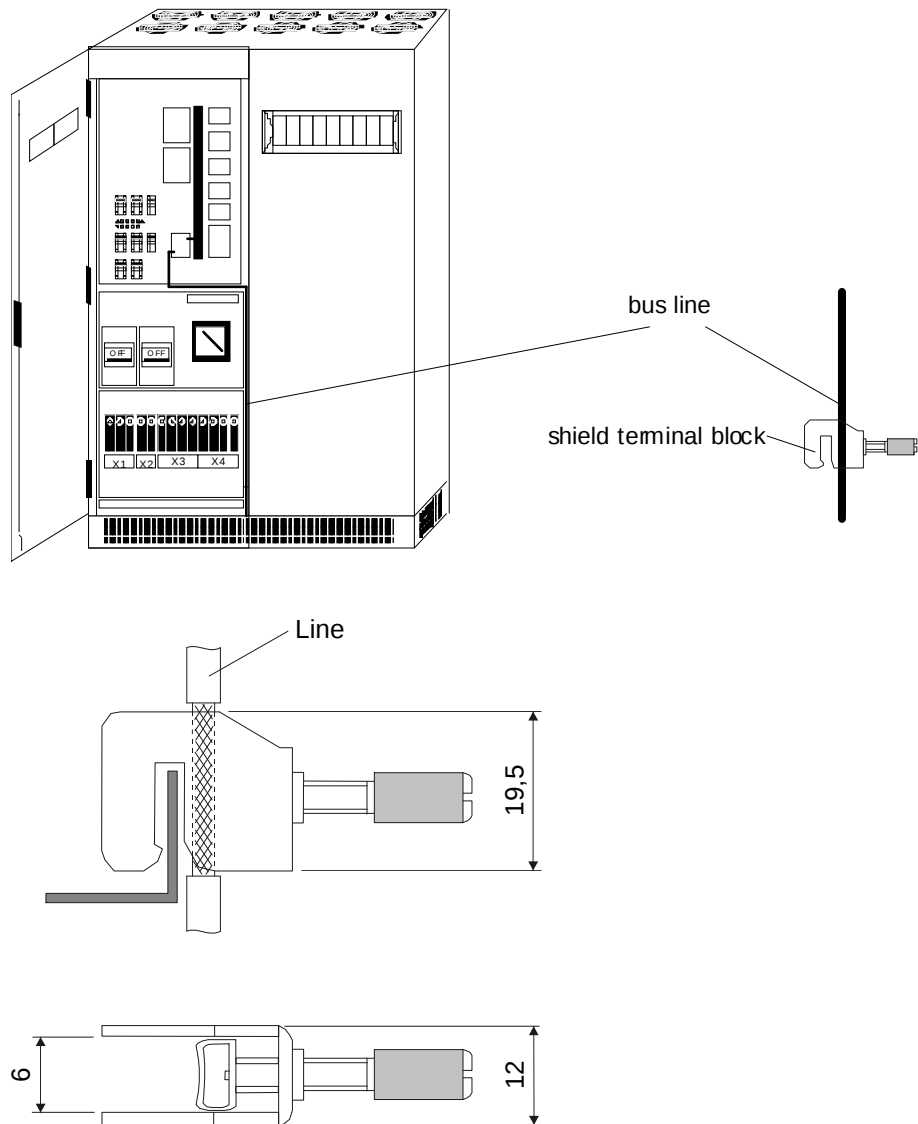


Figure 2 Shield connection

Configuration line for X2:

The enclosed data line is required to configure the PC via the RS232 interface X2.

3. Configuration

You can configure **Modbus/JBus data transmission** and the **data protocol**. The **Modbus/JBus address** and the **response time** can be **set** in the data protocol.

For this configuration, you must connect the **PC** to the **MultiCom interface (X2)** via the enclosed **data cable** and **start a terminal program**, e.g. Hyperterminal, on the PC.

Setting the terminal program:

Data transmission:	COMx, 9600 baud / 8 data bits / 1 stop bit
	No parity / no protocol
Terminal emulation:	VT100

You can then **start the configuration by pressing the “S1” button** on the MultiCom interface. Ensure that no communication has taken place via interface X2/X5 for at least 10 seconds previously. Initiation of the configuration is displayed by the two **LEDs flashing** on the MultiCom interface and the following display on the terminal:

“PRESS <CR> FOR CONFIGURATION WHILE LED IS FLASHING”

The **configuration starts** provided you **press the <ENTER> key (<CR>) within 30 seconds**. The configuration main menu is opened:

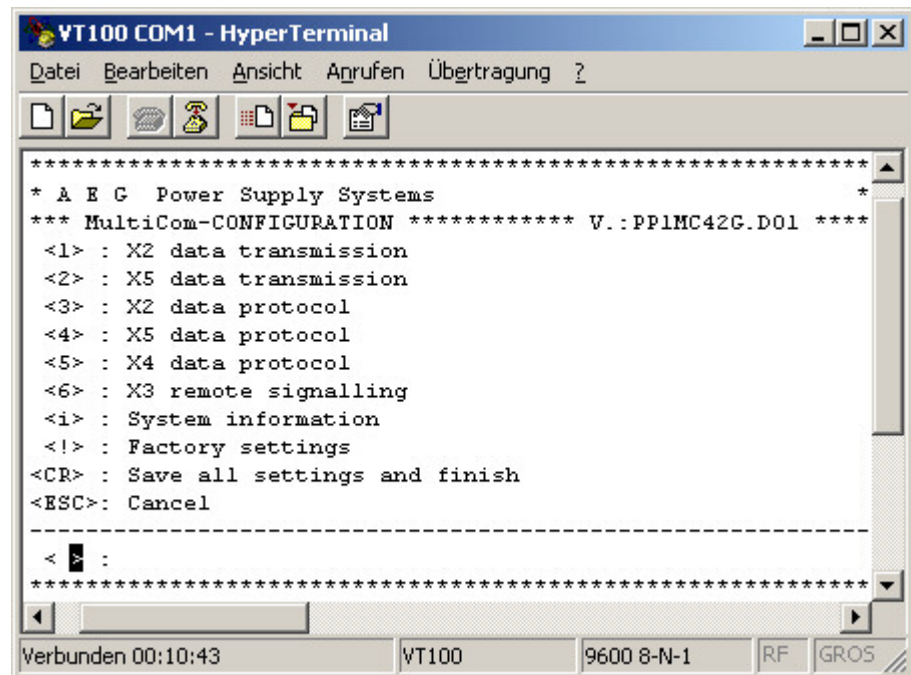


Figure 3 Main menu

If the configuration does not start, you must wait for 10 seconds and repeat the procedure. Make sure that no data is received via the X2/X5 interfaces during this time.

Press the following key in the **main menu**:

- **<CR>** to **save** the set **values**, exit the configuration **and activate** the **MultiCom interface**.
- **<ESC>** to **cancel** the configuration.
- **<2>** to access the **X5 data transmission configuration**.
- **<4>** to access the **X5 data protocol configuration**.

The possible keyboard actions are shown in the menu in “< >”.

The following **special keys** can be used in all menus:

- <CR>**: Carriage Return- (↵) or ENTER key
- <ESC>**: Escape key
- <TAB>**: Tabulator (→) key
- <BS>**: Backspace (←) or Rubout key
- < >**: Space bar

Modbus/JBus protocol enabling and configuration

To access the **X5 data protocol configuration**, you must press **<4>** in the **main menu**:

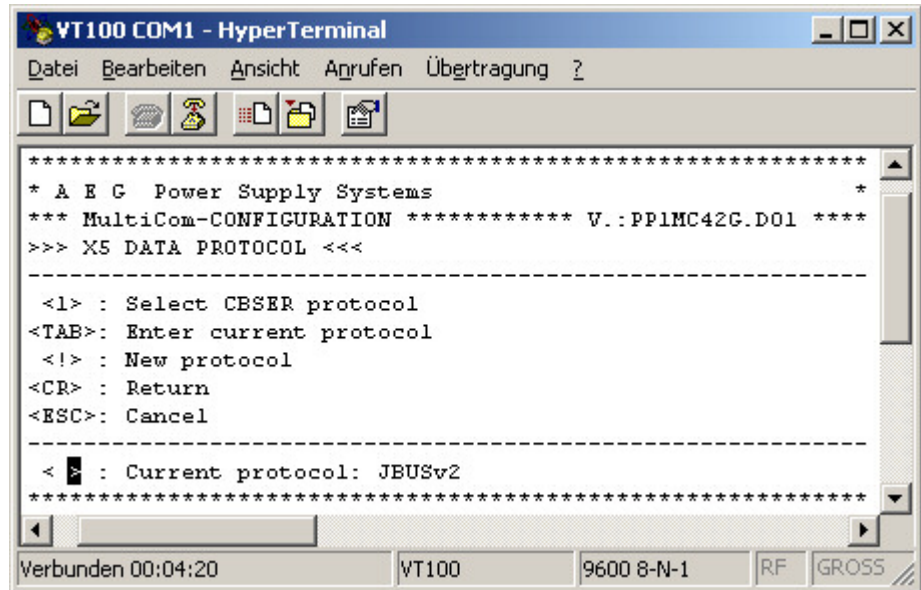


Figure 4 Data protocol configuration menu

Press one of the following keys in the “**X5 Data Protocol**” menu:

- **<!>** to allow the **Modbus/JBus protocol** to be **enabled at initial start-up**. You must then enter the license key (stated on the cover sheet of these operating instructions) and confirm it by pressing **<CR>**. The protocol configuration is opened if the license key is entered correctly.
- **<TAB>** to **configure** the **protocol** if it was previously enabled and “**JBUSv2**” is displayed at the bottom of the screen.
- **<CR>** to **accept** the set **values**. The configuration is finished and the main menu is opened again.
- **<ESC>** to **cancel** the configuration. This opens the main menu.

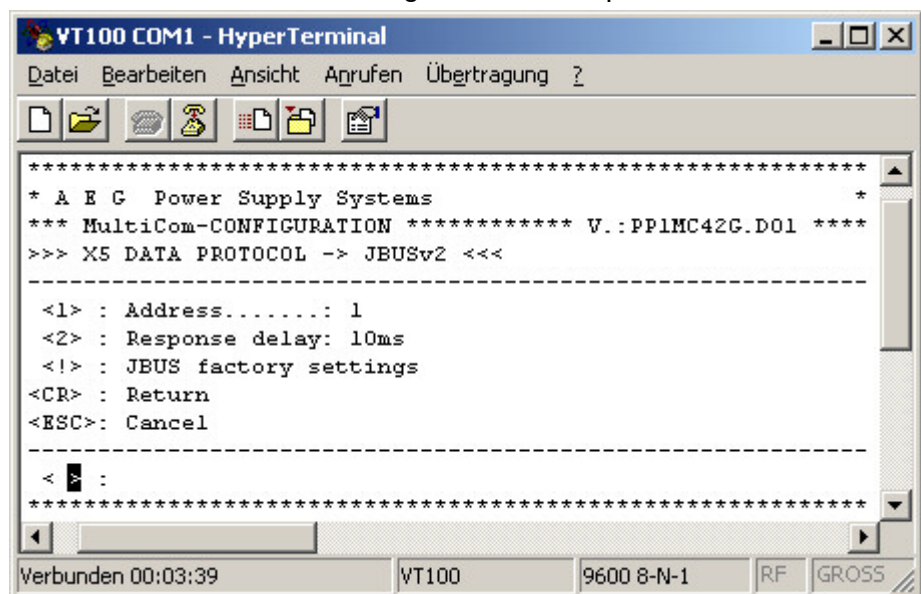


Figure 5 Modbus/JBus protocol configuration menu

Press one of the following keys in the “X5 Data Protocol – JBusV2” menu:

- **<!>** to **load** the **factory setting**.
- **<1>** to **configure** the **Modbus/JBus slave address**.
- **<2>** to **configure** the **delay time between a request** from the master and the **response** from the slave.
- **<CR>** to **accept** the set **values**. The configuration is finished and the main menu is opened again.
- **<ESC>** to **cancel** the configuration. This opens the main menu.

Modbus/JBus data transmission configuration

To access the **X5 data transmission configuration**, you must press **<2>** in the **main menu**:

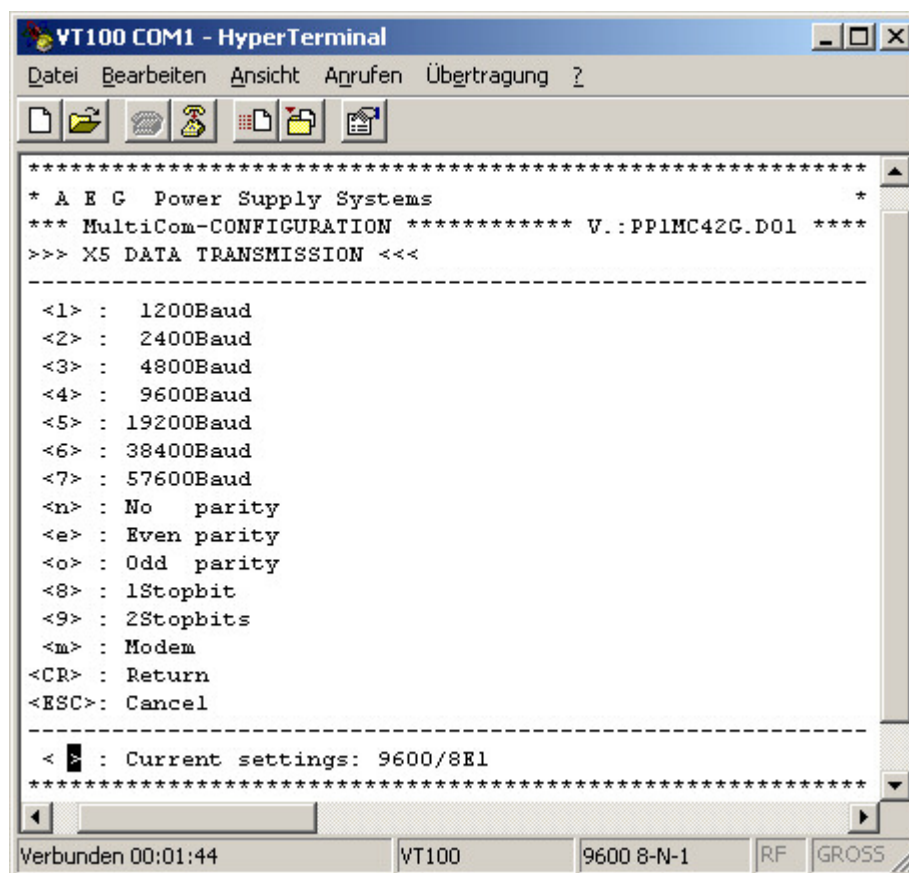


Figure 6 Modbus/JBus data transmission configuration menu

Press one of the following keys in the “X5 Data Transmission” menu:

- **<1-7>** to set the **baud rate**.
- **<n,e,o>** to set the **parity**.
- **<8,9>** to set the **number of stop bits**.
- **<CR>** to **accept** the set **values**. The configuration is finished and the main menu is opened again.
- **<ESC>** to **cancel** the configuration. This opens the main menu.

The **Modbus/JBus factory setting** is **9600 8 N 1**.

4. Modbus/JBus Protocol

The RTU (Remote Terminal Unit) transmission mode is used for the Modbus/JBus message.

“0x” is used in the following to represent data in the hexadecimal number system.

General message structure:

Start	Address	Function	Data bytes	CRC	End
Time interval >3.5 bytes	1 byte	1 byte	n bytes	2 bytes	Time interval 3.5 bytes

Master request:

<Address> <Function> <Start addr.> <No. of reg.> <CRC>

<Address> Modbus/JBbus node address (1-99)
 <Function> 0x03 = Read register
 <Start addr.> (High/Low) Register start address (0-65535)
 <No. of reg.> (High/Low) Number of registers (1-128)
 <CRC> (High/Low) CRC check

Response of a slave:

<Address> <Function> <No. of bytes> <Data> <CRC>

<Address> Modbus/JBbus node address (1-99)
 <Function> 0x03 = Read register
 0x83 = Error
 <No. of bytes> Number of registers (1-128)
 <Data> (High/Low) Register content
 <CRC> (High/Low) CRC check

Possible error messages

The function code 0x03 is implemented in the Modbus/JBus interface. In the event of an error the interface responds with 0x83 instead of 0x03. The number of bytes 0x01 is followed in the data field by an error code with the following meaning:

Code 0x01: Illegal function

A function code other than 0x03 was sent to the Modbus/JBus interface.

Code 0x02: Illegal data

Data was requested from an illegal register range.

Code 0x04: Error with connected device

This message signals that the CCC is not communicating with any UPS control unit or that the checksum (CRC) is incorrect.

Examples of a Modbus/JBus interface as a slave with the address 1:

Example for JBus:

The **master requests** the UPS status at register address 1 from a slave with the address 1; refer to the unit profile of a three-phase UPS.

Slave address	Function	Start address (high/low)	No. of registers (high/low)	CRC check (high/low)
0x01	0x03	0x00 0x01	0x00 0x01	xx xx

The **slave responds** with the UPS status = Inverter Operation.

Address	Function	No. of data bytes	Data (high/low)	CRC check (high/low)
0x01	0x03	0x02	0x00 0x01	xx xx

Example for Modbus:

The **master requests** the UPS status at register address 1 from a slave with the address 2; refer to the unit profile of a three-phase UPS.

Slave address	Function	Start address (high/low)	No. of registers (high/low)	CRC check (high/low)
0x01	0x03	0x00 0x02	0x00 0x01	xx xx

The **slave responds** with the UPS status = Inverter Operation.

Address	Function	No. of data bytes	Data (high/low)	CRC check (high/low)
0x01	0x03	0x02	0x00 0x01	xx xx

5. UPS Unit Profile

5.1 General

In the UPS profile, the following **data types** are used:

WORD

“Word” is a 16-bit integer between 0 and 65.535 (0xFFFF). The value to be displayed is a number between 0 and 65.535. The value is sent in the sequence High byte/Low byte.

WORD10

“Word10” is a 16-bit integer between 0 and 65535. The value to be displayed is a number between 0,0 and 6553,5. The number transmitted must be divided by 10 to obtain this value. The value is sent in the sequence HIGH byte / LOW byte.

INT10 is a 16-bit unsigned integer in the value range from -32.768 to +32.767 (0x8000-0x7FFF). The value to be displayed is a number between -3.276,8 and +3.276,7. The number transmitted must be divided by 10 to obtain this value. The value is sent in the sequence HIGH byte / LOW byte.

The Modbus/JBus interface supports the following **unit types**:

- **Three-phase UPS**
UPS unit with a three-phase input and a three-phase output
- **Single-phase UPS**
UPS unit with a three-phase input and a single-phase output
- **Three-phase inverter**
Inverter with a three-phase output
- **Single-phase inverter**
Inverter with a single-phase output
- **Three-phase converter**
Converter with a three-phase output
- **Single-phase converter**
Converter with a single-phase output

The following **abbreviations** are used:

- “O”:** Optional
- A:** Alarm, fault or error that causes the assembly to be deactivated
- W:** Warning, self-acknowledging fault
- I:** Information
- 1:** active

5.2 Unit Profile of a Three-Phase UPS

Status:

JBus	Modbus	Bit no.:	Type	Name	Description
1	2	3-0	WORD	UPSStatus	UPS status: 1=Normal Operation 2=Bypass Operation 3=Battery operation 4=Ecomode 6=Deactivation is imminent 7=Off "O"

Alarms:

JBus	Modbus	Bit no.:	Type	Name	Description (1=active)
2	3	0	WORD	NonCriticalFault	W: Collective warning
3	4	0	WORD	CriticalFault	A: Collective alarm
4	5	0	WORD	Input1Active	W: Freely progr. input at A13/14 "O"
5	6	0	WORD	Input2Active	W: Freely progr. input at A13/14 "O"
6	7	0	WORD	Input3Active	W: Freely progr. input at A13/14 "O"
7	8	0	WORD	EmergencySwitchOff	A: UPS output off "O"
8	9	0	WORD	DouCanFault	W: DOU CAN fault
9	10	0	WORD	MainsFault	W: Rectifier/bypass mains fault
10	11	0	WORD	RectifierWarning	W: Rectifier warning
11	12	0	WORD	RectifierFault	A: Rectifier fault
12	13	0	WORD	BatteryAlarm	A: Battery fault
13	14	0	WORD	InverterWarning	W: Inverter warning
14	15	0	WORD	InverterFault	W: Inverter fault
15	16	0	WORD	SBSWarning	W: Bypass warning
16	17	0	WORD	SBSFault	A: Bypass fault
17	18	0	WORD	EqualisingCharge	I: Charger status – equalising charging
18	19	0	WORD	Charge	I: Charger status – charging
19	20	0	WORD	TrickleCharge	I: Charger status – trickle charging
20	21	0	WORD	GenSetOperation	I: Charger status: Em. power supply "O"
21	22	0	WORD	BattTemp.SensFault	W: Battery temp. sensor "O"
22	23	0	WORD	BatteryTemp.TooHigh	W: Battery temp. too high "O"
23	24	0	WORD	CircuitBreaker	W: Circuit-breaker tripped "O"
24	25	0	WORD	BatteryWarning	W: Battery warning
25	26	0	WORD	BatteryLow	W: Battery undervoltage
26	27	0	WORD	Overload	W: Inverter overload
27	28	0	WORD	FanFault	W: Fan fault
28	29	0	WORD	Overload	A: Inverter overload
29	30	0	WORD	ShortCircuit	A: Inverter short-circuit
30	31	0	WORD	DcUnderVoltage	A: Inverter DC undervoltage
31	32	0	WORD	DcOverVoltage	A: Inverter DC overvoltage
32	33	0	WORD	PowerStackOverTemp	A: Inverter stack fault
33	34	0	WORD	SBSReady	I: Bypass ready
34	35	0	WORD	SBSMainsFault	W: Bypass mains fault
35	36	0	WORD	SBSBlocked	W: Bypass blocked
36	37	0	WORD	RectifierOn	I: Rectifier on
37	38	0	WORD	InverterOn	I: Inverter on
38	39	0	WORD	SBSOn	I: Bypass on

Unit profile of a three-phase UPS

Measured values

Rectifier mains:

JBus	Modbus	Bit no.:	Type	Name	Value range
39	40	15-0	WORD10	RectMainsFreq.	0.0 - 99.0 Hz
40	41	15-0	WORD	RectMainsVoltL1	0 – 999 V
41	42	15-0	WORD	RectMainsVoltL2	0 – 999 V
42	43	15-0	WORD	RectMainsVoltL3	0 – 999 V

Bypass mains:

JBus	Modbus	Bit no.:	Type	Name	Value range
43	44	15-0	WORD10	SBSMainsFreq.	0.0 – 99.9 Hz
44	45	15-0	WORD	SBSMainsVoltL1	0 – 999 V
45	46	15-0	WORD	SBSMainsVoltL2	0 – 999 V
46	47	15-0	WORD	SBSMainsVoltL3	0 – 999 V

Battery values:

JBus	Modbus	Bit no.:	Type	Name	Value range
47	48	15-0	WORD	BatteryVoltage	0 – 999 V
48	49	15-0	INT10	BatteryCurrent	+ - 0.0 – 3000.0 A
49	50	15-0	WORD10	AutonomyTime	0.0 – 999.0 min
50	51	15-0	WORD	BatteryCapacity	0 - 100%
51	52	15-0	INT10	BatteryTemperature	+ - 0.0 - 99.9 °C "O"

UPS output:

JBus	Modbus	Bit no.:	Type	Name	Value range
52	53	15-0	WORD10	OutputFreq.	0.0 – 99.0 Hz
53	54	15-0	WORD	OutputVoltageL1	0 – 999 V
54	55	15-0	WORD	OutputLoadL1	0 – 100%
55	56	15-0	WORD	OutputCurrentL1	0 – 9999 A
56	57	15-0	WORD10	OutputPowerL1	0.0 – 1000.0 kW
57	58	15-0	WORD	OutputVoltageL2	0 – 999 V
58	59	15-0	WORD	OutputLoadL2	0 – 100%
59	60	15-0	WORD	OutputCurrentL2	0 – 9999 A
60	61	15-0	WORD10	OutputPowerL2	0.0 – 1000.0 kW
61	62	15-0	WORD	OutputVoltageL3	0 – 999 V
62	63	15-0	WORD	OutputLoadL3	0 – 100%
63	64	15-0	WORD	OutputCurrentL3	0 – 9999 A
64	65	15-0	WORD10	OutputPowerL3	0.0 – 1000.0 kW

LifeCheck:

JBus	Modbus	Bit no.:	Type	Name	Value range
65	66	0	WORD	LifeCheck	Bit 0-1 toggled 1x per minute

Auxiliary signals (for units with customisable signals):

JBus	Modbus	Bit no.:	Type	Name	Description
66	67	0	WORD	AUX1 - Rectifier	User-defined signal 1 from rectifier "O"
67	68	0	WORD	AUX2 - Rectifier	User-defined signal 2 from rectifier "O"
68	69	0	WORD	AUX3 - Rectifier	User-defined signal 3 from rectifier "O"
69	70	0	WORD	AUX4 - Rectifier	User-defined signal 4 from rectifier "O"
70	71	0	WORD	AUX5 - Rectifier	User-defined signal 5 from rectifier "O"
71	72	0	WORD	AUX6 - Rectifier	User-defined signal 6 from rectifier "O"
72	73	0	WORD	AUX7 - Rectifier	User-defined signal 7 from rectifier "O"
73	74	0	WORD	AUX1 - Inverter	User-defined signal 1 from inverter "O"
74	75	0	WORD	AUX2 - Inverter	User-defined signal 2 from inverter "O"
75	76	0	WORD	AUX3 - Inverter	User-defined signal 3 from inverter "O"
76	77	0	WORD	AUX4 - Inverter	User-defined signal 4 from inverter "O"
77	78	0	WORD	AUX5 - Inverter	User-defined signal 5 from inverter "O"
78	79	0	WORD	AUX6 - Inverter	User-defined signal 6 from inverter "O"
79	80	0	WORD	AUX7 - Inverter	User-defined signal 7 from inverter "O"
80	81	0	WORD	AUX1 - SBS	User-defined signal 1 from bypass "O"
81	82	0	WORD	AUX2 - SBS	User-defined signal 2 from bypass "O"
82	83	0	WORD	AUX3 - SBS	User-defined signal 3 from bypass "O"
83	84	0	WORD	AUX4 - SBS	User-defined signal 4 from bypass "O"
84	85	0	WORD	AUX5 - SBS	User-defined signal 5 from bypass "O"
85	86	0	WORD	AUX6 - SBS	User-defined signal 6 from bypass "O"
86	87	0	WORD	AUX7 - SBS	User-defined signal 7 from bypass "O"

5.3 Unit Profile of a Single-Phase UPS

Status:

JBus	Modbus	Bit no.:	Type	Name	Description
1	2	3-0	WORD	UPSStatus	UPS status: 1=Normal Operation 2=Bypass Operation 3=Battery operation 4=Ecomode 6=Deactivation is imminent 7=Off "O"

Alarms:

JBus	Modbus	Bit no.:	Type	Name	Description (1=active)
2	3	0	WORD	NonCriticalFault	W: Collective warning
3	4	0	WORD	CriticalFault	A: Collective alarm
4	5	0	WORD	Input1Active	W: Freely progr. input at A13/14 "O"
5	6	0	WORD	Input2Active	W: Freely progr. input at A13/14 "O"
6	7	0	WORD	Input3Active	W: Freely progr. input at A13/14 "O"
7	8	0	WORD	EmergencySwitchOff	A: UPS output off "O"
8	9	0	WORD	DouCanFault	W: DOU CAN fault
9	10	0	WORD	MainsFault	W: Rectifier/bypass mains fault
10	11	0	WORD	RectifierWarning	W: Rectifier warning
11	12	0	WORD	RectifierFault	A: Rectifier fault
12	13	0	WORD	BatteryAlarm	A: Battery fault
13	14	0	WORD	InverterWarning	W: Inverter warning
14	15	0	WORD	InverterFault	W: Inverter fault
15	16	0	WORD	SBSWarning	W: Bypass warning
16	17	0	WORD	SBSFault	A: Bypass fault
17	18	0	WORD	EqualisingCharge	I: Charger status – equalising charging
18	19	0	WORD	Charge	I: Charger status – charging
19	20	0	WORD	TrickleCharge	I: Charger status – trickle charging
20	21	0	WORD	GenSetOperation	I: Charger status: Em. power supply "O"
21	22	0	WORD	BattTemp.SensFault	W: Battery temp. sensor "O"
22	23	0	WORD	BatteryTemp.TooHigh	W: Battery temp. too high "O"
23	24	0	WORD	CircuitBreaker	W: Circuit-breaker tripped "O"
24	25	0	WORD	BatteryWarning	W: Battery warning
25	26	0	WORD	BatteryLow	W: Battery undervoltage
26	27	0	WORD	Overload	W: Inverter overload
27	28	0	WORD	FanFault	W: Fan fault
28	29	0	WORD	Overload	A: Inverter overload
29	30	0	WORD	ShortCircuit	A: Inverter short-circuit
30	31	0	WORD	DcUnderVoltage	A: Inverter DC undervoltage
31	32	0	WORD	DcOverVoltage	A: Inverter DC overvoltage
32	33	0	WORD	PowerStackOverTemp	A: Inverter stack fault
33	34	0	WORD	SBSReady	I: Bypass ready
34	35	0	WORD	SBSMainsFault	W: Bypass mains fault
35	36	0	WORD	SBSBlocked	W: Bypass blocked
36	37	0	WORD	RectifierOn	I: Rectifier on
37	38	0	WORD	InverterOn	I: Inverter on
38	39	0	WORD	SBSOn	I: Bypass on

Unit profile of a single-phase UPS

Measured values

Rectifier mains:

JBus	Modbus	Bit no.:	Type	Name	Value range
39	40	15-0	WORD10	RectMainsFreq.	0.0 - 99.0 Hz
40	41	15-0	WORD	RectMainsVoltL1	0 – 999 V
41	42	15-0	WORD	RectMainsVoltL2	0 – 999 V
42	43	15-0	WORD	RectMainsVoltL3	0 – 999 V

Bypass mains:

JBus	Modbus	Bit no.:	Type	Name	Value range
43	44	15-0	WORD10	SBSMainsFreq.	0.0 – 99.9 Hz
44	45	15-0	WORD	SBSMainsVoltL1	0 – 999 V

Battery values:

JBus	Modbus	Bit no.:	Type	Name	Value range
45	46	15-0	WORD	BatteryVoltage	0 – 999 V
46	47	15-0	INT10	BatteryCurrent	+ - 0.0 – 3000.0 A
47	48	15-0	WORD10	AutonomyTime	0.0 – 999.0 min
48	49	15-0	WORD	BatteryCapacity	0 – 100%
49	50	15-0	INT10	BatteryTemperature	+ - 0.0 - 99.9 °C "O"

UPS output:

JBus	Modbus	Bit no.:	Type	Name	Value range
50	51	15-0	WORD10	OutputFreq.	0.0 – 99.0 Hz
51	52	15-0	WORD	OutputVoltageL1	0 – 999 V
52	53	15-0	WORD	OutputLoadL1	0 – 100%
53	54	15-0	WORD	OutputCurrentL1	0 – 9999 A
54	55	15-0	WORD10	OutputPowerL1	0.0 – 1000.0 kW

LifeCheck:

JBus	Modbus	Bit no.:	Type	Name	Value range
55	56	0	WORD	LifeCheck	Bit 0-1 toggled 1x per minute

Auxiliary signals (for units with customisable signals):

JBus	Modbus	Bit no.:	Type	Name	Description
56	57	0	WORD	AUX1 - Rectifier	User-defined signal 1 from rectifier "O"
57	58	0	WORD	AUX2 - Rectifier	User-defined signal 2 from rectifier "O"
58	59	0	WORD	AUX3 - Rectifier	User-defined signal 3 from rectifier "O"
59	60	0	WORD	AUX4 - Rectifier	User-defined signal 4 from rectifier "O"
60	61	0	WORD	AUX5 - Rectifier	User-defined signal 5 from rectifier "O"
61	62	0	WORD	AUX6 - Rectifier	User-defined signal 6 from rectifier "O"
62	63	0	WORD	AUX7 - Rectifier	User-defined signal 7 from rectifier "O"
63	64	0	WORD	AUX1 - Inverter	User-defined signal 1 from inverter "O"
64	65	0	WORD	AUX2 - Inverter	User-defined signal 2 from inverter "O"
65	66	0	WORD	AUX3 - Inverter	User-defined signal 3 from inverter "O"
66	67	0	WORD	AUX4 - Inverter	User-defined signal 4 from inverter "O"
67	68	0	WORD	AUX5 - Inverter	User-defined signal 5 from inverter "O"
68	69	0	WORD	AUX6 - Inverter	User-defined signal 6 from inverter "O"
69	70	0	WORD	AUX7 - Inverter	User-defined signal 7 from inverter "O"
70	71	0	WORD	AUX1 - SBS	User-defined signal 1 from bypass "O"
71	72	0	WORD	AUX2 - SBS	User-defined signal 2 from bypass "O"
72	73	0	WORD	AUX3 - SBS	User-defined signal 3 from bypass "O"
73	74	0	WORD	AUX4 - SBS	User-defined signal 4 from bypass "O"
74	75	0	WORD	AUX5 - SBS	User-defined signal 5 from bypass "O"
75	76	0	WORD	AUX6 - SBS	User-defined signal 6 from bypass "O"
76	77	0	WORD	AUX7 - SBS	User-defined signal 7 from bypass "O"

5.4 Unit Profile of a Three-Phase Inverter

Status:

JBus	Modbus	Bit no.:	Type	Name	Description
1	2	3-0	WORD	InverterStatus	Inverter status: 1=Normal Operation 2=Bypass Operation 4=Ecomode 7=Off "O"

Alarms:

JBus	Modbus	Bit no.:	Type	Name	Description (1=active)
2	3	0	WORD	NonCriticalFault	W: Collective warning
3	4	0	WORD	CriticalFault	A: Collective alarm
4	5	0	WORD	Input1Active	W: Freely progr. input at A13/14 "O"
5	6	0	WORD	Input2Active	W: Freely progr. input at A13/14 "O"
6	7	0	WORD	Input3Active	W: Freely progr. input at A13/14 "O"
7	8	0	WORD	EmergencySwitchOff	A: UPS output off "O"
8	9	0	WORD	DouCanFault	W: DOU CAN fault
9	10	0	WORD	InverterWarning	W: Inverter warning
10	11	0	WORD	InverterFault	W: Inverter fault
11	12	0	WORD	SBSWarning	W: Bypass warning
12	13	0	WORD	SBSFault	A: Bypass fault
13	14	0	WORD	DcVoltageLow	W: DC undervoltage
14	15	0	WORD	Overload	W: Inverter overload
15	16	0	WORD	FanFault	W: Fan fault
16	17	0	WORD	Overload	A: Inverter overload
17	18	0	WORD	ShortCircuit	A: Inverter short-circuit
18	19	0	WORD	DcUnderVoltage	A: Inverter DC undervoltage
19	20	0	WORD	DcOverVoltage	A: Inverter DC overvoltage
20	21	0	WORD	PowerStackOverTemp	A: Inverter stack fault
21	22	0	WORD	SBSReady	I: Bypass ready
22	23	0	WORD	SBSMainsFault	W: Bypass mains fault
23	24	0	WORD	SBSBlocked	W: Bypass blocked
24	25	0	WORD	InverterOn	I: Inverter on
25	26	0	WORD	SBSOn	I: Bypass on

Unit profile of a three-phase inverter

Measured values

Bypass mains:

JBus	Modbus	Bit no.:	Type	Name	Value range
26	27	15-0	WORD10	SBSMainsFreq.	0.0 - 99.9 Hz
27	28	15-0	WORD	SBSMainsVoltL1	0 – 999 V
28	29	15-0	WORD	SBSMainsVoltL2	0 – 999 V
29	30	15-0	WORD	SBSMainsVoltL3	0 – 999 V

DC voltage:

JBus	Modbus	Bit no.:	Type	Name	Value range
30	31	15-0	WORD	DcVoltage	0 – 999 V

Inverter output:

JBus	Modbus	Bit no.:	Type	Name	Value range
31	32	15-0	WORD10	OutputFreq.	0.0 - 99.0 Hz
32	33	15-0	WORD	OutputVoltageL1	0 – 999 V
33	34	15-0	WORD	OutputLoadL1	0 – 100%
34	35	15-0	WORD	OutputCurrentL1	0 – 9999 A
35	36	15-0	WORD10	OutputPowerL1	0.0 – 1000.0 kW
36	37	15-0	WORD	OutputVoltageL2	0 – 999 V
37	38	15-0	WORD	OutputLoadL2	0 – 100%
38	39	15-0	WORD	OutputCurrentL2	0 – 9999 A
39	40	15-0	WORD10	OutputPowerL2	0.0 – 1000.0 kW
40	41	15-0	WORD	OutputVoltageL3	0 – 999 V
41	42	15-0	WORD	OutputLoadL3	0 – 100%
42	43	15-0	WORD	OutputCurrentL3	0 – 9999 A
43	44	15-0	WORD10	OutputPowerL3	0.0 – 1000.0 kW

LifeCheck:

JBus	Modbus	Bit no.:	Type	Name	Value range
44	45	0	WORD	LifeCheck	Bit 0-1 toggled 1x per minute

Auxiliary signals (for units with customisable signals):

JBus	Modbus	Bit no.:	Type	Name	Description
45	46	0	WORD	AUX1 - Inverter	User-defined signal 1 from inverter "O"
46	47	0	WORD	AUX2 - Inverter	User-defined signal 2 from inverter "O"
47	48	0	WORD	AUX3 - Inverter	User-defined signal 3 from inverter "O"
48	49	0	WORD	AUX4 - Inverter	User-defined signal 4 from inverter "O"
49	50	0	WORD	AUX5 - Inverter	User-defined signal 5 from inverter "O"
50	51	0	WORD	AUX6 - Inverter	User-defined signal 6 from inverter "O"
51	52	0	WORD	AUX7 - Inverter	User-defined signal 7 from inverter "O"
52	53	0	WORD	AUX1 - SBS	User-defined signal 1 from bypass "O"
53	54	0	WORD	AUX2 - SBS	User-defined signal 2 from bypass "O"
54	55	0	WORD	AUX3 - SBS	User-defined signal 3 from bypass "O"
55	56	0	WORD	AUX4 - SBS	User-defined signal 4 from bypass "O"
56	57	0	WORD	AUX5 - SBS	User-defined signal 5 from bypass "O"
57	58	0	WORD	AUX6 - SBS	User-defined signal 6 from bypass "O"
58	59	0	WORD	AUX7 - SBS	User-defined signal 7 from bypass "O"

5.5 Unit Profile of a Single-Phase Inverter

Status:

JBus	Modbus	Bit no.:	Type	Name	Description
1	2	3-0	WORD	InverterStatus	Inverter status: 1=Normal Operation 2=Bypass Operation 4=Ecomode 7=Off "0"

Alarms:

JBus	Modbus	Bit no.:	Type	Name	Description (1=active)
2	3	0	WORD	NonCriticalFault	W: Collective warning
3	4	0	WORD	CriticalFault	A: Collective alarm
4	5	0	WORD	Input1Active	W: Freely progr. input at A13/14 "0"
5	6	0	WORD	Input2Active	W: Freely progr. input at A13/14 "0"
6	7	0	WORD	Input3Active	W: Freely progr. input at A13/14 "0"
7	8	0	WORD	EmergencySwitchOff	A: UPS output off "0"
8	9	0	WORD	DouCanFault	W: DOU CAN fault
9	10	0	WORD	InverterWarning	W: Inverter warning
10	11	0	WORD	InverterFault	W: Inverter fault
11	12	0	WORD	SBSWarning	W: Bypass warning
12	13	0	WORD	SBSFault	A: Bypass fault
13	14	0	WORD	DcVoltageLow	W: DC undervoltage
14	15	0	WORD	Overload	W: Inverter overload
15	16	0	WORD	FanFault	W: Fan fault
16	17	0	WORD	Overload	A: Inverter overload
17	18	0	WORD	ShortCircuit	A: Inverter short-circuit
18	19	0	WORD	DcUnderVoltage	A: Inverter DC undervoltage
19	20	0	WORD	DcOverVoltage	A: Inverter DC overvoltage
20	21	0	WORD	PowerStackOverTemp	A: Inverter stack fault
21	22	0	WORD	SBSReady	I: Bypass ready
22	23	0	WORD	SBSMainsFault	W: Bypass mains fault
23	24	0	WORD	SBSBlocked	W: Bypass blocked
24	25	0	WORD	InverterOn	I: Inverter on
25	26	0	WORD	SBSOn	I: Bypass on

Unit profile of a single-phase inverter

Measured values

Bypass mains:

JBus	Modbus	Bit no.:	Type	Name	Value range
26	27	15-0	WORD10	SBSMainsFreq.	0.0 - 99.9 Hz
27	28	15-0	WORD	SBSMainsVoltL1	0 – 999 V

DC voltage:

JBus	Modbus	Bit no.:	Type	Name	Value range
28	29	15-0	WORD	DcVoltage	0 – 999 V

Inverter output:

JBus	Modbus	Bit no.:	Type	Name	Value range
29	30	15-0	WORD10	OutputFreq.	0.0 - 99.0 Hz
30	31	15-0	WORD	OutputVoltageL1	0 – 999 V
31	32	15-0	WORD	OutputLoadL1	0 - 100%
32	33	15-0	WORD	OutputCurrentL1	0 – 9999 A
33	34	15-0	WORD10	OutputPowerL1	0.0 – 1000.0 kW

LifeCheck:

JBus	Modbus	Bit no.:	Type	Name	Value range
34	35	0	WORD	LifeCheck	Bit 0-1 toggled 1x per minute

Auxiliary signals (for units with customisable signals):

JBus	Modbus	Bit no.:	Type	Name	Description
35	36	0	WORD	AUX1 - Inverter	User-defined signal 1 from inverter "O"
36	37	0	WORD	AUX2 - Inverter	User-defined signal 2 from inverter "O"
37	38	0	WORD	AUX3 - Inverter	User-defined signal 3 from inverter "O"
38	39	0	WORD	AUX4 - Inverter	User-defined signal 4 from inverter "O"
39	40	0	WORD	AUX5 - Inverter	User-defined signal 5 from inverter "O"
40	41	0	WORD	AUX6 - Inverter	User-defined signal 6 from inverter "O"
41	42	0	WORD	AUX7 - Inverter	User-defined signal 7 from inverter "O"
42	43	0	WORD	AUX1 - SBS	User-defined signal 1 from bypass "O"
43	44	0	WORD	AUX2 - SBS	User-defined signal 2 from bypass "O"
44	45	0	WORD	AUX3 - SBS	User-defined signal 3 from bypass "O"
45	46	0	WORD	AUX4 - SBS	User-defined signal 4 from bypass "O"
46	47	0	WORD	AUX5 - SBS	User-defined signal 5 from bypass "O"
47	48	0	WORD	AUX6 - SBS	User-defined signal 6 from bypass "O"
48	49	0	WORD	AUX7 - SBS	User-defined signal 7 from bypass "O"

5.6 Unit Profile of a Three-Phase Converter

Status:

JBus	Modbus	Bit no.:	Type	Name	Description
1	2	3-0	WORD	InvStatus	Inverter status: 1=Normal Operation 3=Battery operation 6=Deactivation is imminent 7=Off

Alarms:

JBus	Modbus	Bit no.:	Type	Name	Description (1=active)
2	3	0	WORD	NonCriticalFault	W: Collective warning
3	4	0	WORD	CriticalFault	A: Collective alarm
4	5	0	WORD	Input1Active	W: Freely progr. input at A13/14 "O"
5	6	0	WORD	Input2Active	W: Freely progr. input at A13/14 "O"
6	7	0	WORD	Input3Active	W: Freely progr. input at A13/14 "O"
7	8	0	WORD	EmergencySwitchOff	A: Inv output off "O"
8	9	0	WORD	DouCanFault	W: DOU CAN fault
9	10	0	WORD	MainsFault	W: Rectifier mains fault
10	11	0	WORD	RectifierWarning	W: Rectifier warning
11	12	0	WORD	RectifierFault	A: Rectifier fault
12	13	0	WORD	BatteryAlarm	A: Battery fault
13	14	0	WORD	InverterWarning	W: Inverter warning
14	15	0	WORD	InverterFault	W: Inverter fault
15	16	0	WORD	EqualisingCharge	I: Charger status – equalising charging
16	17	0	WORD	Charge	I: Charger status – charging
17	18	0	WORD	TrickleCharge	I: Charger status – trickle charging
18	19	0	WORD	GenSetOperation	I: Charger status: Em. power supply "O"
19	20	0	WORD	BattTemp.SensFault	W: Battery temp. sensor "O"
20	21	0	WORD	BatteryTemp.TooHigh	W: Battery temp. too high "O"
21	22	0	WORD	CircuitBreaker	W: Circuit-breaker tripped "O"
22	23	0	WORD	BatteryWarning	W: Battery warning
23	24	0	WORD	BatteryLow	W: Battery undervoltage
24	25	0	WORD	Overload	W: Inverter overload
25	26	0	WORD	FanFault	W: Fan fault
26	27	0	WORD	Overload	A: Inverter overload
27	28	0	WORD	ShortCircuit	A: Inverter short-circuit
28	29	0	WORD	DcUnderVoltage	A: Inverter DC undervoltage
29	30	0	WORD	DcOverVoltage	A: Inverter DC overvoltage
30	31	0	WORD	PowerStackOverTemp	A: Inverter stack fault
31	32	0	WORD	RectifierOn	I: Rectifier on
32	33	0	WORD	InverterOn	I: Inverter on

Unit profile of a three-phase converter

Measured values

Rectifier mains:

JBus	Modbus	Bit no.:	Type	Name	Value range
33	34	15-0	WORD10	RectMainsFreq.	0.0 - 99.0 Hz
34	35	15-0	WORD	RectMainsVoltL1	0 – 999 V
35	36	15-0	WORD	RectMainsVoltL2	0 – 999 V
36	37	15-0	WORD	RectMainsVoltL3	0 – 999 V

Battery values:

JBus	Modbus	Bit no.:	Type	Name	Value range
37	38	15-0	WORD	BatteryVoltage	0 – 999 V
38	39	15-0	INT10	BatteryCurrent	+ - 0.0 – 3000.0 A
39	40	15-0	WORD10	AutonomyTime	0.0 – 999.0 min
40	41	15-0	WORD	BatteryCapacity	0 - 100%
41	42	15-0	INT10	BatteryTemperature	+ - 0.0 - 99.9 °C "O"

Inverter output:

JBus	Modbus	Bit no.:	Type	Name	Value range
42	43	15-0	WORD10	OutputFreq.	0.0 – 99.0 Hz
43	44	15-0	WORD	OutputVoltageL1	0 – 999 V
44	45	15-0	WORD	OutputLoadL1	0 – 100%
45	46	15-0	WORD	OutputCurrentL1	0 – 9999 A
46	47	15-0	WORD10	OutputPowerL1	0.0 – 1000.0 kW
47	48	15-0	WORD	OutputVoltageL2	0 – 999 V
48	49	15-0	WORD	OutputLoadL2	0 – 100%
49	50	15-0	WORD	OutputCurrentL2	0 – 9999 A
50	51	15-0	WORD10	OutputPowerL2	0.0 – 1000.0 kW
51	52	15-0	WORD	OutputVoltageL3	0 – 999 V
52	53	15-0	WORD	OutputLoadL3	0 – 100%
53	54	15-0	WORD	OutputCurrentL3	0 – 9999 A
54	55	15-0	WORD10	OutputPowerL3	0.0 – 1000.0 kW

LifeCheck:

JBus	Modbus	Bit no.:	Type	Name	Value range
55	56	0	WORD	LifeCheck	Bit 0-1 toggled 1x per minute

Auxiliary signals (for units with customisable signals):

JBus	Modbus	Bit no.:	Type	Name	Description
56	57	0	WORD	AUX1 - Rectifier	User-defined signal 1 from rectifier "O"
57	58	0	WORD	AUX2 - Rectifier	User-defined signal 2 from rectifier "O"
58	59	0	WORD	AUX3 - Rectifier	User-defined signal 3 from rectifier "O"
59	60	0	WORD	AUX4 - Rectifier	User-defined signal 4 from rectifier "O"
60	61	0	WORD	AUX5 - Rectifier	User-defined signal 5 from rectifier "O"
61	62	0	WORD	AUX6 - Rectifier	User-defined signal 6 from rectifier "O"
62	63	0	WORD	AUX7 - Rectifier	User-defined signal 7 from rectifier "O"
63	64	0	WORD	AUX1 - Inverter	User-defined signal 1 from inverter "O"
64	65	0	WORD	AUX2 - Inverter	User-defined signal 2 from inverter "O"
65	66	0	WORD	AUX3 - Inverter	User-defined signal 3 from inverter "O"
66	67	0	WORD	AUX4 - Inverter	User-defined signal 4 from inverter "O"
67	68	0	WORD	AUX5 - Inverter	User-defined signal 5 from inverter "O"
68	69	0	WORD	AUX6 - Inverter	User-defined signal 6 from inverter "O"
69	70	0	WORD	AUX7 - Inverter	User-defined signal 7 from inverter "O"

5.7 Unit Profile of a Single-Phase Converter

Status:

JBus	Modbus	Bit no.:	Type	Name	Description
1	2	3-0	WORD	InvStatus	Inverter status: 1=Normal Operation 3=Battery operation 6=Deactivation is imminent 7=Off

Alarms:

JBus	Modbus	Bit no.:	Type	Name	Description (1=active)
2	3	0	WORD	NonCriticalFault	W: Collective warning
3	4	0	WORD	CriticalFault	A: Collective alarm
4	5	0	WORD	Input1Active	W: Freely progr. input at A13/14 "O"
5	6	0	WORD	Input2Active	W: Freely progr. input at A13/14 "O"
6	7	0	WORD	Input3Active	W: Freely progr. input at A13/14 "O"
7	8	0	WORD	EmergencySwitchOff	A: Inv output off "O"
8	9	0	WORD	DouCanFault	W: DOU CAN fault
9	10	0	WORD	MainsFault	W: Rectifier mains fault
10	11	0	WORD	RectifierWarning	W: Rectifier warning
11	12	0	WORD	RectifierFault	A: Rectifier fault
12	13	0	WORD	BatteryAlarm	A: Battery fault
13	14	0	WORD	InverterWarning	W: Inverter warning
14	15	0	WORD	InverterFault	W: Inverter fault
15	16	0	WORD	EqualisingCharge	I: Charger status – equalising charging
16	17	0	WORD	Charge	I: Charger status – charging
17	18	0	WORD	TrickleCharge	I: Charger status – trickle charging
18	19	0	WORD	GenSetOperation	I: Charger status: Em. power supply "O"
19	20	0	WORD	BattTemp.SensFault	W: Battery temp. sensor "O"
20	21	0	WORD	BatteryTemp.TooHigh	W: Battery temp. too high "O"
21	22	0	WORD	CircuitBreaker	W: Circuit-breaker tripped "O"
22	23	0	WORD	BatteryWarning	W: Battery warning
23	24	0	WORD	BatteryLow	W: Battery undervoltage
24	25	0	WORD	Overload	W: Inverter overload
25	26	0	WORD	FanFault	W: Fan fault
26	27	0	WORD	Overload	A: Inverter overload
27	28	0	WORD	ShortCircuit	A: Inverter short-circuit
28	29	0	WORD	DcUnderVoltage	A: Inverter DC undervoltage
29	30	0	WORD	DcOverVoltage	A: Inverter DC overvoltage
30	31	0	WORD	PowerStackOverTemp	A: Inverter stack fault
31	32	0	WORD	RectifierOn	I: Rectifier on
32	33	0	WORD	InverterOn	I: Inverter on

Unit profile of a single-phase converter

Measured values

Rectifier mains:

JBus	Modbus	Bit no.:	Type	Name	Value range
33	34	15-0	WORD10	RectMainsFreq.	0.0 - 99.0 Hz
34	35	15-0	WORD	RectMainsVoltL1	0 – 999 V
35	36	15-0	WORD	RectMainsVoltL2	0 – 999 V
36	37	15-0	WORD	RectMainsVoltL3	0 – 999 V

Battery values:

JBus	Modbus	Bit no.:	Type	Name	Value range
37	38	15-0	WORD	BatteryVoltage	0 – 999 V
38	39	15-0	INT10	BatteryCurrent	+ - 0.0 – 3000.0 A
39	40	15-0	WORD10	AutonomyTime	0.0 – 999.0 min
40	41	15-0	WORD	BatteryCapacity	0 - 100%
41	42	15-0	INT10	BatteryTemperature	+ - 0.0 - 99.9 °C "O"

Inverter output:

JBus	Modbus	Bit no.:	Type	Name	Value range
42	43	15-0	WORD10	OutputFreq.	0.0 – 99.0 Hz
43	44	15-0	WORD	OutputVoltageL1	0 – 999 V
44	45	15-0	WORD	OutputLoadL1	0 – 100%
45	46	15-0	WORD	OutputCurrentL1	0 – 9999 A
46	47	15-0	WORD10	OutputPowerL1	0.0 – 1000.0 kW

LifeCheck:

JBus	Modbus	Bit no.:	Type	Name	Value range
47	48	0	WORD	LifeCheck	Bit 0-1 toggled 1x per minute

Auxiliary signals (for units with customisable signals):

JBus	Modbus	Bit no.:	Type	Name	Description
48	49	0	WORD	AUX1 - Rectifier	User-defined signal 1 from rectifier "O"
49	50	0	WORD	AUX2 - Rectifier	User-defined signal 2 from rectifier "O"
50	51	0	WORD	AUX3 - Rectifier	User-defined signal 3 from rectifier "O"
51	52	0	WORD	AUX4 - Rectifier	User-defined signal 4 from rectifier "O"
52	53	0	WORD	AUX5 - Rectifier	User-defined signal 5 from rectifier "O"
53	54	0	WORD	AUX6 - Rectifier	User-defined signal 6 from rectifier "O"
54	55	0	WORD	AUX7 - Rectifier	User-defined signal 7 from rectifier "O"
55	56	0	WORD	AUX1 - Inverter	User-defined signal 1 from inverter "O"
56	57	0	WORD	AUX2 - Inverter	User-defined signal 2 from inverter "O"
57	58	0	WORD	AUX3 - Inverter	User-defined signal 3 from inverter "O"
58	59	0	WORD	AUX4 - Inverter	User-defined signal 4 from inverter "O"
59	60	0	WORD	AUX5 - Inverter	User-defined signal 5 from inverter "O"
60	61	0	WORD	AUX6 - Inverter	User-defined signal 6 from inverter "O"
61	62	0	WORD	AUX7 - Inverter	User-defined signal 7 from inverter "O"

6. Annex

Unit profiles for Version 1 (can be activated with the licence key: aeg05b2jbu)

Addr	AddrHex	Regs	Type	Name	Contents	U3	U1	I3	I1
0	0x000	1	WORD	CCCCommStatus	0=Ok; 1=Fault	x	x	x	x
1	0x001	1	WORD	DeviceType	0=UPS; 1=Inverter	x	x	x	x
2	0x002	33	STRINGZ	UPSType		x	x	x	x
35	0x023	9	STRINGZ	IdentNumber		x	x	x	x
44	0x02C	7	STRINGZ	FirmwareVersion		x	x	x	x
51	0x033	28	STRINGZ	Location		x	x	x	x
79	0x04F	49	---	Not defined					
128	0x080	1	WORD	UPSSStatus	0=Off; 1=Inverter operation; 2=Bypass operation; 3=Battery operation	x x x x	x x x x	x x x x	x x x x
129	0x081	15	---	Not defined					
144	0x090	1	WORD	RectOn	0=Off; 1=On	x	x		
145	0x091	1	WORD	RectStatus	0=Ok; 1=Fault	x	x		
146	0x092	1	WORD	RectMainsStatus	0=Ok; 1=Fault	x	x		
147	0x093	1	WORD10	RectMainsVoltL1	0.0 – 999.0 V	x	x		
148	0x094	1	WORD10	RectMainsVoltL2	0.0 – 999.0 V	x	x		
149	0x095	1	WORD10	RectMainsVoltL3	0.0 – 999.0 V	x	x		
150	0x096	10	---	Not defined					
160	0x0A0	1	WORD	BattLastTest	0=Ok; 1=Fault	x	x		
161	0x0A1	1	WORD10	BattStandbyTime	0.0 – 999.0 min	x	x		
162	0x0A2	1	WORD10	BattCapacity	0.0 - 100.0%	x	x		
163	0x0A3	1	WORD	BattTempSensor-Installed	0=Not installed; 1=Installed	x	x		
164	0x0A4	1	WORD	BattTempSensorFault	0=Ok; 1=Fault	x	x		
165	0x0A5	1	WORD10	BattTemperature	0.0 – 99.9°C	x	x		
166	0x0A6	10	---	Not defined					
176	0x0B0	1	WORD	DCStatus	0=Ok; 1=Fault			x	x
177	0x0B1	1	WORD10	DCVoltage	0.0 – 999.0 V			x	x
178	0x0B2	14	---	Not defined					
192	0x0C0	1	WORD	InvOn	0=Off; 1=On	x	x	x	x
193	0x0C1	1	WORD	InvStatus	0=Ok; Bit 0 set=Fault; Bit 1 set=Overload; Bit 2 set=Fan fault; Bit 3 set=Battery low; Bit 4 set=CAN fault	x	x	x	x
194	0x0C2	1	WORD10	InvLoadL1	0.0 - 999.0%	x	x	x	x
195	0x0C3	1	WORD10	InvLoadL2	0.0 - 999.0%	x		x	
196	0x0C4	1	WORD10	InvLoadL3	0.0 - 999.0%	x		x	
197	0x0C5	1	WORD10	InvCurrentL1	0.0 – 999.0 A	x	x	x	x
198	0x0C6	1	WORD10	InvCurrentL2	0.0 – 999.0 A	x		x	
199	0x0C7	1	WORD10	InvCurrentL3	0.0 – 999.0 A	x		x	
200	0x0C8	8	---	Not defined					
208	0x0D0	1	WORD	BypassStatus	0=Ok; Bit 0 set=Fault; Bit 1 set=Blocked	x	x	x	x
209	0x0D1	15	---	Not defined					
224	0x0E0	1	WORD	CANCommStatus	0=Ok; 1=Fault	x	x	x	x
225	0x0E1	1	WORD	NEA Input	0=Off, 1=On	x	x	x	x
226	0x0E2	1	WORD	Input 1	0=Off, 1=On	x	x	x	x
227	0x0E3	1	WORD	Input 2	0=Off, 1=On	x	x	x	x
228	0x0E4	1	WORD	Input 3	0=Off, 1=On	x	x	x	x
229	0x0E5	283	---	Not defined					
512	0x200	65024	---	Reserved					

The registers marked “x” indicate the supported UPS and inverter systems. **U3**: Three-phase UPS; **U1**: Single-phase UPS; **I3**: Three-phase inverter; **I1**: Single-phase inverter