Base Load Power Hub (BLPH)

I/O LIST

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Revision / Change Log

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DC UPS - TAG: UP-200F1

DIGITAL I/O LIST

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DIGITAL I/O

Cabinet	Designation	Type	Terminals	Component
CHARGER A/B	Mains fault	DO	X5 | 1-2-3	A5
CHARGER A/B	Rectifier fault	DO	X5 | 4-5-6	A5
CHARGER A/B	Output DC overvoltage	DO	X5 | 7-8-9	A5
CHARGER A/B	Output DC undervoltage	DO	X5 | 10-11-12	A5
CHARGER A/B	Battery low voltage	DO	X5 | 13-14-15	A5
CHARGER A/B	Earth fault positive polarity	DO	X5 | 16-17-18	A5
CHARGER A/B	Earth fault negative polarity	DO	X5 | 19-20-21	A5
CHARGER A/B	General cumulative fault	DO	X5 | 22-23-24	A5
CHARGER A/B	Distribution earth fault +/-	DO	X8 | 5-6-7	A21
CHARGER A/B	Common distribution fault	DO	X8 | 10-11	K4
CHARGER A/B	Battery simmetry fault	DO	X8 | 12-13	A10

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DC UPS - TAG: UP-200F1

MODBUS REGISTER LIST

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Register locations

- ***Modbus mapping (version 4)***

  Note about numbering and addressing registers:

  The Modbus numbering scheme for holding registers starts from 40,001. In addition to Modbus holding register number (nMbHR), two other schemes of interest should be defined the Jbus register number (nJbR) and the actual register address that is encoded in Modbus message over the network (aRN). Here are the equations related these three schemes:

  nMbHR = 40,001 + aRN,

  nJbR = aRN.

  Also, the JBUS usage imposes nJbR > 0.

- ***Register tables***

Alarm and event table:

Modbus Register (nMbHR)	Jbus Register (nJbR)	aRN (hex)	Variable	Range
40,002	1	0x1	High Mains Voltage	0 = No alarm, 1 = Alarm
40,003	2	0x2	Low Mains Voltage	
40,004	3	0x3	Charger Failure	
40,005	4	0x4	High Battery Voltage	
40,006	5	0x5	Low Battery Voltage	
40,007	6	0x6	High DC Voltage	
40,008	7	0x7	Low DC Voltage	
40,009	8	0x8	Ground Fault +	
40,010	9	0x9	Ground Fault -	
40,011	10	0xa	Spare 1	
40,012	11	0xb	Spare 2	
40,013	12	0xc	Spare 3	
40,014	13	0xd	Spare 4	
40,015	14	0xe	Spare 5	
40,016	15	0xf	Spare 6	
40,017	16	0x10	Spare 7	
40,018	17	0x11	Spare 8	
40,019	18	0x12	Charger Current Limit Indicator	
40,020	19	0x13	Battery Current Limit Indicator	
40,021	20	0x14	High Charger Current	
40,022	21	0x15	High Battery Current	
40,023	22	0x16	High Temperature	
40,024	23	0x17	Temperature Sensor Error	
40,025	24	0x18	Internal Communication Error	
40,026	25	0x19	Battery Test Fail	
40,027	26	0x1a	Battery Test Aborted	
40,028	27	0x1b	High Battery Temperature	
40,029	28	0x1c	High Float Current	
40,030	29	0x1d	Long Charge Time	
40,031	30	0x1e	No Power Supply Voltage	
40,032	31	0x1f	Battery in Operation	
40,033	32	0x20	Battery Symmetry Fault	
40,034	33	0x21	Equation 1	
40,035	34	0x22	Equation 2	
40,036	35	0x23	Equation 3	
40,037	36	0x24	Equation 4	
40,038	37	0x25	Equation 5	
40,039	38	0x26	Equation 6	
40,040	39	0x27	Equation 7	
40,041	40	0x28	Equation 8	
40,042	41	0x29	Equation 9	
40,043	42	0x2a	Equation 10	
40,044	43	0x2b	Equation 11	
40,045	44	0x2c	Equation 12	
40,046	45	0x2d	Equation 13	
40,047	46	0x2e	Equation 14	
40,048	47	0x2f	Equation 15	
40,049	48	0x30	Equation 16	

All holding registers in this table have a read-only access.

Measurements and status:

Modbus Register (nMbHR)	Modbus register (nJbR)	aRN (hex)	Variable	Range
40,100	99	0x63	Mains Voltage	VAC / 10
40,101	100	0x64	Battery Voltage	VDC / 10
40,102	101	0x65	Load Voltage	VDC / 10
40,103	102	0x66	Charger Current	Positive Amps / 10
40,104	103	0x67	Battery Current	Signed Amps / 10
40,105	104	0x68	Ambient Temperature	Signed Celsius
40,106	105	0x69	Battery Temperature	Signed Celsius
40,107	106	0x6a	Battery Symmetry Voltage	VDC/10
40,108	107	0x6b	Common Alarm Relay	0: negated, 1: asserted
40,109	108	0x6c	Earth Fault Impedance	Signed earth fault in k-Ohm/10
40,110	109	0x6d	Charge Status	0: Float 1: Highrate 2: Commissioning 3: Battery test 4: Charger Off
40,111	110	0x6e	Remaining Charge Time	Minutes
40,112	111	0x6f	AhMeter	%
40,113	112	0x70	Equation 1	16-bit signed integer value of equation result this result is multiplied by a factor defined by EQ configuration parameter 'ModbusMultiplier ' , rounded to nearest integer value and clamped to [-32,768, 32,767]
40,114	113	0x71	Equation 2	
40,115	114	0x72	Equation 3	
40,116	115	0x73	Equation 4	
40,117	116	0x74	Equation 5	
40,118	117	0x75	Equation 6	
40,119	118	0x76	Equation 7	
40,120	119	0x77	Equation 8	
40,121	120	0x78	Equation 9	
40,122	121	0x79	Equation 10	
40,123	122	0x7a	Equation 11	
40,124	123	0x7b	Equation 12	
40,125	124	0x7c	Equation 13	
40,126	125	0x7d	Equation 14	
40,127	126	0x7e	Equation 15	
40,128	127	0x7f	Equation 16	

All holding registers in this table have a read-only access.

History access:

Modbus Register (nMbHR)	Jbus register (nJbR)	aRN (hex)	Variable	Range
40,150	149	0x95	Request/confirm history entry	1: most recent
40,151	150	0x96	Number of items in history list	Number of events
40,152	151	0x97	Year - Month	MSB: Actual Year-2000 LSB: Month (1-12)
40,153	152	0x98	Day - Hour	MSB: Day (1-31) LSB: Hours (0-23)
40,154	153	0x99	Minute - Second	MSB: Minutes (0-59) LSB: Seconds (0-59)
40,155	154	0x9A	Code of alarm/event	
40,156	155	0x9B	Setpoint or data value	

All holding registers except first one in this table have a read-only access.
First register in this table must be preset for the other to be updated.

Commands:

Modbus Register (nMbHR)	Jbus register (nJbR)	aRN (hex)	Variable	Value definition
40,200	199	0xC7	Charge highrate/float	2 = highrate, 1 = float 0 = ineffective
40,201	200	0xC8	Alarm acknowledgment	1 = proceed 0; 2 = ineffective
40,202	201	0xC9	Rectifier shut down/start up	1 = shut down 2 = start up 0 = ineffective
40,203	202	0xCA	Clear history list	1 = proceed 0; 2 = ineffective
40,204	203	0xCB	Start/Stop battery test	1 = Stop 2 = Start 0 = ineffective
40,205	204	0xCC	Set Ah meter to 100%	1 = Set to 100% 0; 2 = ineffective
40,206	205	0xCD	Commissioning/Float	1 = float 2 = Commissioning 0 = ineffective

All holding registers in this table are write only.
Writing to more than one holding register in this table is not allowed and will result in an explicit error.
For commands to be executed, a protection mechanism exists based on a special configuration parameter. CmdCookie (defined in configuration object COMMUN2).
The command will be taken into account if the value in the Modbus frame less the Modbus CmdCookie equals one of possible definition values for the command at stake. For example, if we want to initiate a highrate charge (value 1 for this) and if Modbus CmdCookie equals 1234, then we must set the proper holding register to 1235.

Modbus is often a middleware to other industrial protocols such as Profibus-DP, etc…
In this case, outputs are virtualized values that are constantly updated in refresh cycles.
Then we must ensure commands, constantly written to in these circumstances, do not constantly trigger actions.

Some precautions have been implemented to allow pass commands through such automations:

- There always exists an "ineffective" value for each command that enables the client to constantly assert they don't want to start any command,
- As network and process latencies always exist it is difficult to make sure that no two successive commands with an active value (for example: start battery test) will trigger two equivalent actions (and then fill the history list with worthless events, etc…). In order to avoid this, a time filter (Configuration parameter COMMUN2.ModbusCmdTimeFilter), ensures that a given command appearing with the same value within this time frame will be accepted and will have no effect on the system. It is then reasonable to set COMMUN2.ModbusCmdTimeFilter beyond the known refresh delay.

Note: setting COMMUN2.ModbusCmdTimeFilter to zero completely disables this time filter.

Software versions:

Modbus Register (nMbHR)	Jbus register (nJbR)	aRN (hex)	Variable	Value definition
40,250-40,256	249-255	0xf9-0xff	Software version of the control processor	16 characters, zero terminated
40,257	256	0x100	Software version of the regulation co-coprocessor	MSB: major version LSB: minor version
40,248	257	0x101	Modbus table version	

All holding registers in this table have a read-only access.

Setup time and date:

Modbus Register (nMbHR)	Jbus register (nJbR)	aRN (hex)	Variable	Value definition
40,259	258	0x102	Preload command	In order to set time and date, this register must be set to value of COMMUN2.ModbusCmdCookie When read it always returns zero
40,260-40,261	259-260	0x103-0x104	Date and time in local time given in seconds since 2000/1/1 at 00:00:00	This 32- bit value is coded as Most Significant Word at first address and Less Significant Value at second address

Input variables for equations:

Modbus Register (nMbHR)	Jbus register (nJbR)	aRN (hex)	Variable	Value definition
40, 262	261	0x105	First input register for equations	0 to 65,535
40, 263	262	0x106	Second input register for equations	0 to 65,535

- These registers can be read by equations as MB1, MB2 variables.
- They are not stored in flash by the GCAU: after a reset, equations will read them as zero prior to being written through Modbus.
- All holding registers in this table have read-write access.

Reserved registers:

The following registers are reserved. They are accessible but still unused. The reason for them is to implement Modbus gateways (such as Profibus) that map these registers in addition to the registers above. This allows those gateways to be compatible with future mappings.

Modbus Register (nMbHR)	Jbus register (nJbR)	aRN (hex)	Variable	Value definition
40,050-40,065	49-64	0x31-0x40	Reserved	Read only – returns 0xffff
40,129-40,149	128-148	0x80-0x94		
40,157-40,158	156-157	0x9c-0x9d		
40,207-40,209	206-208	0xce-0xd0		Read/write Accepts all Returns 0xffff
40,264-40,275	263-274	0x107-0x112		
40,300-40,331	299-330	0x12b - 0x14a		Read only – returns 0xffff

Note: Modbus registers 40,207-40,209 can only be written to, one by one.

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AC UPS PAS - TAG: UP-200F3

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Cabinet	Designation	Type	Terminals	Component
BY-PASS	Cabinet fan fault	DO	X12 | 7-8-9	A90
BY-PASS	Common fault distribution breakers	DO	X12 | 10-11-12	QF31 ... QF49
BY-PASS	Manual by-pass switch position	DO	X12 | 1-2-3	Q29
BY-PASS	Surge arrester status	DO	X12 | 4-5-6	F25
UPS A/B	Inverter operation	DO	X3 | 1-2-3	A12
UPS A/B	Static switch operation	DO	X3 | 4-5-6	A12
UPS A/B	Rectifier fault or mains fault	DO	X3 | 7-8-9	A12
UPS A/B	Minimum battery voltage	DO	X3 | 10-11-12	A12
UPS A/B	General cumulative UPS fault	DO	X4 | 1-2-3	A12
UPS A/B	Static switch blocked	DO	X3 | 1-2-3	A13
UPS A/B	Fan fault	DO	X3 | 4-5-6	A13
UPS A/B	Battery room fan on	DO	X3 | 7-8-9	A13
UPS A/B	Inverter remote off command	DI	X5 | 1-2	A12
UPS A/B	Battery room fan fault - charge inhibit	DI	X4 | 1-2	A13
UPS A/B	Spare	DI	X4 | 3-4	A13

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MODBUS REGISTER LIST

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LEGENDA	
W	Warning
A	Alarm
I	Information

Device profile of a three-phase UPS

Status:

Read: Fct.-Code 3 (Read Holding Register) or Fct.-Code 4 (Read Input Register)

Reg.	Bit no.	Type	Name	Description
1	3-0	WORD	UPSStatus	UPS status: 1=Normal mode 2=Bypass mode 3=Battery mode 4=Eco mode **"O"** 6=Deactivation is imminent 7=Off

Alarms:

Read: Fct.-Code 3 (Read Holding Register) or Fct.-Code 4 (Read Input Register)

Reg.	Bit no.	Type	Name	Description (1=active)
2	0	WORD	NonCriticalFault	W: Collective warning
3	0	WORD	CriticalFault	A: Collective alarm
4	0	WORD	Userdef_DigIn1Active	W: **"O"**
5	0	WORD	Userdef_DigIn2Active	W: **"O"**
6	0	WORD	Userdef_DigIn3Active	W: **"O"**
7	0	WORD	EmergencySwitchOff	A: UPS output off **"O"**
8	0	WORD	DouCanFault	W: DOU CAN fault
9	0	WORD	MainsFault	W: Rectifier/bypass mains fault
10	0	WORD	RectifierWarning	W: Rectifier warning
11	0	WORD	RectifierFault	A: Rectifier fault
12	0	WORD	BatteryAlarm	A: Battery fault
13	0	WORD	InverterWarning	W: Inverter warning
14	0	WORD	InverterFault	A: Inverter fault
15	0	WORD	SBSWarning	W: Bypass warning
16	0	WORD	SBSFault	A: Bypass fault
17	0	WORD	EqualisingCharge	I: Charger status – equalising charging
18	0	WORD	Charge	I: Charger status – charging
19	0	WORD	TrickleCharge	I: Charger status – trickle charging
20	0	WORD	GenSetOperation	I: Charger status: Em. power supply **"O"**
21	0	WORD	BattTemp.SensFault	W: Battery temp. sensor **"O"**
22	0	WORD	BatteryTemp.ToHigh	W: Battery temp. too high **"O"**
23	0	WORD	CircuitBreaker	W: Circuit-breaker tripped **"O"**
24	0	WORD	BatteryWarning	W: Battery warning
25	0	WORD	BatteryLow	W: Battery undervoltage
26	0	WORD	Overload	W: Inverter overload
27	0	WORD	FanFault	W: Fan fault
28	0	WORD	Overload	A: Inverter overload
29	0	WORD	ShortCircuit	A: Inverter short-circuit
30	0	WORD	DcUnderVoltage	A: Inverter DC undervoltage
31	0	WORD	DcOverVoltage	A: Inverter DC overvoltage
32	0	WORD	PowerStackOverTemp	A: Inverter stack fault
33	0	WORD	SBSReady	I: Bypass ready
34	0	WORD	SBSMainsFault	W: Bypass mains fault
35	0	WORD	SBSBlocked	W: Bypass blocked
36	0	WORD	RectifierOn	I: Rectifier on
37	0	WORD	InverterOn	I: Inverter on
38	0	WORD	SBSOn	I: Bypass on

Device profile of a three-phase UPS

Measured values:

Read: Fct.-Code 3 (Read Holding Register) or Fct.-Code 4 (Read Input Register)

Rectifier mains:

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

Bypass mains:

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

Battery values:

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

UPS output:

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

LifeCheck:

Register	Bit no.	Type	Name	Value range
65	0	WORD	LifeCheck	Bit 0-1 toggled 1x per minute

Device profile of a three-phase UPS

Auxiliary signals (for units with user-definable signals):

Reg.	Bit no.	Type	Name	Description
66	0	WORD	Userdef_AUX1 – Rect.	"**O**"
67	0	WORD	Userdef_AUX2 – Rect.	"**O**"
68	0	WORD	Userdef_AUX3 – Rect.	"**O**"
69	0	WORD	Userdef_AUX4 – Rect.	"**O**"
70	0	WORD	Userdef_AUX5 – Rect.	"**O**"
71	0	WORD	Userdef_AUX6 – Rect.	"**O**"
72	0	WORD	Userdef_AUX7– Rect.	"**O**"
73	0	WORD	Userdef_AUX1 – Inv.	"**O**"
74	0	WORD	Userdef_AUX2 – Inv.	"**O**"
75	0	WORD	Userdef_AUX3 – Inv.	"**O**"
76	0	WORD	Userdef_AUX4 – Inv.	"**O**"
77	0	WORD	Userdef_AUX5 – Inv.	"**O**"
78	0	WORD	Userdef_AUX6 – Inv.	"**O**"
79	0	WORD	Userdef_AUX7 – Inv.	"**O**"
80	0	WORD	Userdef_AUX1 – SBS	"**O**"
81	0	WORD	Userdef_AUX2 – SBS	"**O**"
82	0	WORD	Userdef_AUX3 – SBS	"**O**"
83	0	WORD	Userdef_AUX4 – SBS	"**O**"
84	0	WORD	Userdef_AUX5 – SBS	"**O**"
85	0	WORD	Userdef_AUX6 – SBS	"**O**"
86	0	WORD	Userdef_AUX7 – SBS	"**O**"

Date/time:

Read: Fct.-Code 3 (Read Holding Register) or Fct.-Code 4 (Read Input Register)

Write: Fct.-Code 6 (Write single Holding Register) or Fct.-Code 16 (Write multiple Holding Register)

Reg.	Bit no.	Type	Name	Description
150	15-0	WORD	Real time (decimal)	Year (20xx)
151	15-0	WORD		Day (0-31)
152	15-0	WORD		Month (1-12)
153	15-0	WORD		Hour (0-23)
154	15-0	WORD		Minute (0-59)
155	15-0	WORD		Second (0-59)
156	15-0	WORD		Millisecond (0-999)
157	15-0	WORD		Weekday 1 = Monday, 2 = Tuesday, …

Device profile of a three-phase UPS

Unit control:

Read: Fct.-Code 3 (Read Holding Register) or Fct.-Code 4 (Read Input Register)

Write: Fct.-Code 6 (Write single Holding Register)

Reg.	Bit no.	Type	Name	Description
1000	15-0	WORD	Rectifier Control	0 = - 1 = ON 2 = OFF 9 = acknowledge fault 10 = equalising charging 11 = charge 12 = trickle charging
1001	15-0	WORD	Inverter Control	0 = - 1 = ON 2 = OFF 3 = Eco mode "**O**" 9 = acknowledge fault
1002	15-0	WORD	SBS Control	0 = - 9 = acknowledge fault
1003	15-0	WORD	**Battery Quick Test** – Control (LB) | Status (HB)	Control (LB) : 0x__00 = - 0x__01 = Start test 0x__02 = Cancel test Status (HB) : 0x00__ = Test not implemented 0x01__ = Test impl., waiting for approval 0x02__ = Test approved 0x03__ = Test running 0x04__ = Test successful 0x05__ = Test cancelled 0x06__ = Test warning 0x07__ = Test error
1004	15-0	WORD	**Battery Capacity Test** (with current load or constant current) – Control (LB) | Status (HB)	Control (LB) : 0x__00 = - 0x__01 = Start test 0x__02 = Cancel test Status (HB) : 0x00__ = Test not implemented 0x01__ = Test impl., waiting for approval 0x02__ = Test approved 0x03__ = Test running 0x04__ = Test successful 0x05__ = Test cancelled 0x06__ = Test warning 0x07__ = Test error
1005	15-0	WORD10	**Battery Capacity Test - RemainingTime**	0.0-6553.0 min

Control: The last accepted control command is read out; if the command failed, the read-out is 0.



In order to guarantee high availability of the load supply, some control commands are only executed if the system meets certain requirements:

Rectifier off => inverter must be off
Inverter off => switching to bypass must be guaranteed
Battery test => the entire system must be in a normal state

Device profile of a three-phase UPS

Battery tests:

In low byte, the battery test registers contain the control commands and in high byte, the associated statuses of the battery tests. Depending on the unit configuration, different battery tests can be initiated:

The **Battery Quick Test** consists of briefly testing the battery charging circuit. This test is also performed cyclically by the unit.

The **Battery Capacity Test** consists of testing the battery capacity. For this purpose, the battery is discharged with the connected load or by a constant current and the battery status is evaluated.
The remaining time of the capacity test can be read in the **Remaining Time** register.

Control battery test (LB):
0x00: The test has never been started via Modbus.
0x01/2: The test has been started/cancelled (the control command remains in place until the next command).
Battery test status (HB):
0x00: The test is not implemented in the unit.
0x01: The test is implemented, but is presently not approved, or the start conditions to execute the test are lacking.
0x02: The test is approved and can be started.
0x03-7: The test result remains in place for a short time until another test is approved.

Example of battery cap. test 1004/1005:
0x0000 0000 Test not implemented, no cap. test approved
0x0100 1000 Test is implemented, not approved, waiting for approval, max. runtime 100.0min
0x0200 1000 Test is approved, max. runtime 100.0min
0x0301 805 Test running; max. remaining runtime 80.5min
0x0401 0000 Test successful, new test not possible
0x0201 1000 Test is re-approved (after approx. 30s)

For further information on the battery tests, see the unit operating instructions.

Base Load Power Hub (BLPH)

AC UPS F&G - TAG: UP-200F4

I/O LIST

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DIGITAL I/O

Cabinet	Designation	Type	Terminals	Component
BY-PASS	Common fault distribution breakers	DO	X12 | 10-11-12	QF31 ... QF47
BY-PASS	Manual by-pass switch position	DO	X12 | 1-2-3	Q29
BY-PASS	Surge arrester status	DO	X12 | 4-5-6	F25
UPS A/B	Inverter operation	DO	X3 | 1-2-3	A12
UPS A/B	Static switch operation	DO	X3 | 4-5-6	A12
UPS A/B	Rectifier fault or mains fault	DO	X3 | 7-8-9	A12
UPS A/B	Minimum battery voltage	DO	X3 | 10-11-12	A12
UPS A/B	General cumulative UPS fault	DO	X4 | 1-2-3	A12
UPS A/B	Static switch blocked	DO	X3 | 1-2-3	A13
UPS A/B	Fan fault	DO	X3 | 4-5-6	A13
UPS A/B	Battery room fan on	DO	X3 | 7-8-9	A13
UPS A/B	Inverter remote off command	DI	X5 | 1-2	A12
UPS A/B	Battery room fan fault - charge inhibit	DI	X4 | 1-2	A13
UPS A/B	Spare	DI	X4 | 3-4	A13

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Base Load Power Hub (BLPH)

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MODBUS REGISTER LIST

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LEGENDA	
W	Warning
A	Alarm
I	Information

Device profile of a three-phase UPS

Status:

Read: Fct.-Code 3 (Read Holding Register) or Fct.-Code 4 (Read Input Register)

Reg.	Bit no.	Type	Name	Description
1	3-0	WORD	UPSStatus	UPS status: 1=Normal mode 2=Bypass mode 3=Battery mode 4=Eco mode **"O"** 6=Deactivation is imminent 7=Off

Alarms:

Read: Fct.-Code 3 (Read Holding Register) or Fct.-Code 4 (Read Input Register)

Reg.	Bit no.	Type	Name	Description (1=active)
2	0	WORD	NonCriticalFault	W: Collective warning
3	0	WORD	CriticalFault	A: Collective alarm
4	0	WORD	Userdef_DigIn1Active	W: **"O"**
5	0	WORD	Userdef_DigIn2Active	W: **"O"**
6	0	WORD	Userdef_DigIn3Active	W: **"O"**
7	0	WORD	EmergencySwitchOff	A: UPS output off **"O"**
8	0	WORD	DouCanFault	W: DOU CAN fault
9	0	WORD	MainsFault	W: Rectifier/bypass mains fault
10	0	WORD	RectifierWarning	W: Rectifier warning
11	0	WORD	RectifierFault	A: Rectifier fault
12	0	WORD	BatteryAlarm	A: Battery fault
13	0	WORD	InverterWarning	W: Inverter warning
14	0	WORD	InverterFault	A: Inverter fault
15	0	WORD	SBSWarning	W: Bypass warning
16	0	WORD	SBSFault	A: Bypass fault
17	0	WORD	EqualisingCharge	I: Charger status – equalising charging
18	0	WORD	Charge	I: Charger status – charging
19	0	WORD	TrickleCharge	I: Charger status – trickle charging
20	0	WORD	GenSetOperation	I: Charger status: Em. power supply **"O"**
21	0	WORD	BattTemp.SensFault	W: Battery temp. sensor **"O"**
22	0	WORD	BatteryTemp.ToHigh	W: Battery temp. too high **"O"**
23	0	WORD	CircuitBreaker	W: Circuit-breaker tripped **"O"**
24	0	WORD	BatteryWarning	W: Battery warning
25	0	WORD	BatteryLow	W: Battery undervoltage
26	0	WORD	Overload	W: Inverter overload
27	0	WORD	FanFault	W: Fan fault
28	0	WORD	Overload	A: Inverter overload
29	0	WORD	ShortCircuit	A: Inverter short-circuit
30	0	WORD	DcUnderVoltage	A: Inverter DC undervoltage
31	0	WORD	DcOverVoltage	A: Inverter DC overvoltage
32	0	WORD	PowerStackOverTemp	A: Inverter stack fault
33	0	WORD	SBSReady	I: Bypass ready
34	0	WORD	SBSMainsFault	W: Bypass mains fault
35	0	WORD	SBSBlocked	W: Bypass blocked
36	0	WORD	RectifierOn	I: Rectifier on
37	0	WORD	InverterOn	I: Inverter on
38	0	WORD	SBSOn	I: Bypass on

Device profile of a three-phase UPS

Measured values:

Read: Fct.-Code 3 (Read Holding Register) or Fct.-Code 4 (Read Input Register)

Rectifier mains:

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

Bypass mains:

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

Battery values:

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

UPS output:

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

LifeCheck:

Register	Bit no.	Type	Name	Value range
65	0	WORD	LifeCheck	Bit 0-1 toggled 1x per minute

Device profile of a three-phase UPS

Auxiliary signals (for units with user-definable signals):

Reg.	Bit no.	Type	Name	Description
66	0	WORD	Userdef_AUX1 – Rect.	"**O**"
67	0	WORD	Userdef_AUX2 – Rect.	"**O**"
68	0	WORD	Userdef_AUX3 – Rect.	"**O**"
69	0	WORD	Userdef_AUX4 – Rect.	"**O**"
70	0	WORD	Userdef_AUX5 – Rect.	"**O**"
71	0	WORD	Userdef_AUX6 – Rect.	"**O**"
72	0	WORD	Userdef_AUX7– Rect.	"**O**"
73	0	WORD	Userdef_AUX1 – Inv.	"**O**"
74	0	WORD	Userdef_AUX2 – Inv.	"**O**"
75	0	WORD	Userdef_AUX3 – Inv.	"**O**"
76	0	WORD	Userdef_AUX4 – Inv.	"**O**"
77	0	WORD	Userdef_AUX5 – Inv.	"**O**"
78	0	WORD	Userdef_AUX6 – Inv.	"**O**"
79	0	WORD	Userdef_AUX7 – Inv.	"**O**"
80	0	WORD	Userdef_AUX1 – SBS	"**O**"
81	0	WORD	Userdef_AUX2 – SBS	"**O**"
82	0	WORD	Userdef_AUX3 – SBS	"**O**"
83	0	WORD	Userdef_AUX4 – SBS	"**O**"
84	0	WORD	Userdef_AUX5 – SBS	"**O**"
85	0	WORD	Userdef_AUX6 – SBS	"**O**"
86	0	WORD	Userdef_AUX7 – SBS	"**O**"

Date/time:

Read: Fct.-Code 3 (Read Holding Register) or Fct.-Code 4 (Read Input Register)

Write: Fct.-Code 6 (Write single Holding Register) or Fct.-Code 16 (Write multiple Holding Register)

Reg.	Bit no.	Type	Name	Description
150	15-0	WORD	Real time (decimal)	Year (20xx)
151	15-0	WORD		Day (0-31)
152	15-0	WORD		Month (1-12)
153	15-0	WORD		Hour (0-23)
154	15-0	WORD		Minute (0-59)
155	15-0	WORD		Second (0-59)
156	15-0	WORD		Millisecond (0-999)
157	15-0	WORD		Weekday 1 = Monday, 2 = Tuesday, …

Device profile of a three-phase UPS

Unit control:

Read: Fct.-Code 3 (Read Holding Register) or Fct.-Code 4 (Read Input Register)

Write: Fct.-Code 6 (Write single Holding Register)

Reg.	Bit no.	Type	Name	Description
1000	15-0	WORD	Rectifier Control	0 = - 1 = ON 2 = OFF 9 = acknowledge fault 10 = equalising charging 11 = charge 12 = trickle charging
1001	15-0	WORD	Inverter Control	0 = - 1 = ON 2 = OFF 3 = Eco mode "**O**" 9 = acknowledge fault
1002	15-0	WORD	SBS Control	0 = - 9 = acknowledge fault
1003	15-0	WORD	**Battery Quick Test** – Control (LB) | Status (HB)	Control (LB) : 0x__00 = - 0x__01 = Start test 0x__02 = Cancel test Status (HB) : 0x00__ = Test not implemented 0x01__ = Test impl., waiting for approval 0x02__ = Test approved 0x03__ = Test running 0x04__ = Test successful 0x05__ = Test cancelled 0x06__ = Test warning 0x07__ = Test error
1004	15-0	WORD	**Battery Capacity Test** (with current load or constant current) – Control (LB) | Status (HB)	Control (LB) : 0x__00 = - 0x__01 = Start test 0x__02 = Cancel test Status (HB) : 0x00__ = Test not implemented 0x01__ = Test impl., waiting for approval 0x02__ = Test approved 0x03__ = Test running 0x04__ = Test successful 0x05__ = Test cancelled 0x06__ = Test warning 0x07__ = Test error
1005	15-0	WORD10	**Battery Capacity Test - RemainingTime**	0.0-6553.0 min

Control: The last accepted control command is read out; if the command failed, the read-out is 0.



In order to guarantee high availability of the load supply, some control commands are only executed if the system meets certain requirements:

Rectifier off => inverter must be off
Inverter off => switching to bypass must be guaranteed
Battery test => the entire system must be in a normal state

Device profile of a three-phase UPS

Battery tests:

In low byte, the battery test registers contain the control commands and in high byte, the associated statuses of the battery tests. Depending on the unit configuration, different battery tests can be initiated:

The **Battery Quick Test** consists of briefly testing the battery charging circuit. This test is also performed cyclically by the unit.

The **Battery Capacity Test** consists of testing the battery capacity. For this purpose, the battery is discharged with the connected load or by a constant current and the battery status is evaluated.
The remaining time of the capacity test can be read in the **Remaining Time** register.

Control battery test (LB):
0x00: The test has never been started via Modbus.
0x01/2: The test has been started/cancelled (the control command remains in place until the next command).
Battery test status (HB):
0x00: The test is not implemented in the unit.
0x01: The test is implemented, but is presently not approved, or the start conditions to execute the test are lacking.
0x02: The test is approved and can be started.
0x03-7: The test result remains in place for a short time until another test is approved.

Example of battery cap. test 1004/1005:
0x0000 0000 Test not implemented, no cap. test approved
0x0100 1000 Test is implemented, not approved, waiting for approval, max. runtime 100.0min
0x0200 1000 Test is approved, max. runtime 100.0min
0x0301 805 Test running; max. remaining runtime 80.5min
0x0401 0000 Test successful, new test not possible
0x0201 1000 Test is re-approved (after approx. 30s)

For further information on the battery tests, see the unit operating instructions.