ELTEK VALERE
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MODBUS Implementation

UPC4

OPERATING INSTRUCTIONS

Notes to this manual

ATTENTION! Read this manual carefully before installing and commissioning the specified module.
Familiarity with the contents of this manual is required for installing and operating the specified module.
The rules for prevention of accidents for the specific country and the general safety rules in accordance with IEC 364 must be observed.

The function description in this manual corresponds to the date of publishing.
Technical changes and changes in form and content can be made at any time by the manufacturer without notice. There are no obligations to update the manual continually.

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Changes and errors excepted.

The current revision status of this manual is the following:

Revision: 1.1

Date: 2010-11-04

System: UPC4-MODBUS

Revision	Description	Author	Date
0.0	Working draft	MSC	2010-09-02
1.0	Finalized	RTH	2010-09-13
1.1	"Contents" reworked	RTH	2010-11-04

Contents

1 MODBUS RTU Hardware and Configuration

1.1 Technical description

The Universal Power Control unit UPC4 supports MODBUS RTU functionality without the need of external hardware. It is just necessary to setup the configuration with the result that MODBUS is active then.

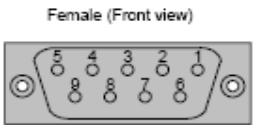
The MODBUS interface consists of a half duplex RS-485 driver, its output signals are available on a 4-pin MSTB connector and a 9-pin Sub-D connector.

1.1.1 Electrical connection

- 4-pin MODBUS connector

4-pin connector	Description
⏚	Cable shield (not connected with GND)
A	D0 (RS485+)
B	D1 (RS485-)
GND	Signal Common

- D-shell 9-pin MODBUS connector



9-pin D-shell Pin outs:

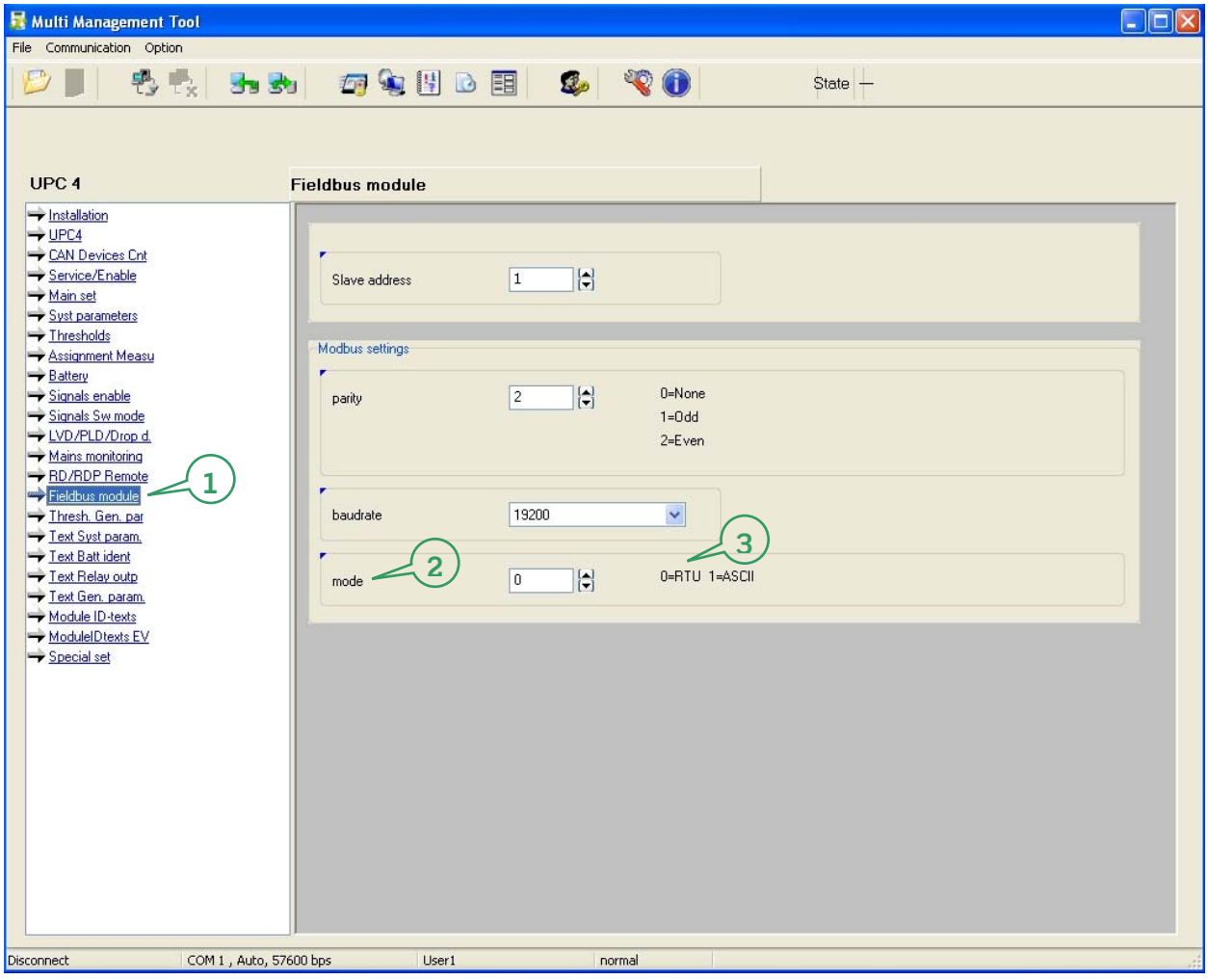
Pin on **D9-shell**	IDv circuit
5	A (D0)
9	B (D1)
1	Signal Common

1.1.2 Configuration

The MODBUS/RTU specific configuration parameters are read from the UPC4 configuration values. The parameters can be changed according to the following:

1. Connect the UPC4 via null modem cable to your PC or Laptop and start the configuration software. Go to the 'FIELDBUS module' configuration area (see **(1)** at the picture below).
   Set "mode" **(2)** to "RTU" **(3)**, ASCII mode is ignored because only RTU mode is available now.

REMARK: For general use of the UPC4 configuration software (MMT) please read the UPC4 operation manual and the manual of the MMT respectively.



1.1.3 Termination

There are several termination possibilities using the 3-pole dip switch.
Termination between Line A and Line B
Termination between Line B and Ground
Termination between Line A and +5V

2 MODBUS protocol support and register mapping

2.1 MODBUS protocol support

The UPC4 MODBUS/RTU card supports the following standard MODBUS commands. All other commands will be answered with an exception code.

CMD	(hex)	**Function**	**Data Access**
03	(0x03)	Read Holding Register	16 bits access
04	(0x04)	Read Input Register	16 bits access
06	(0x06)	Write Single Register	16 bits access
08	(0x08)	Diagnostic	Sub code: 0x00, 0x0A..0x012
11	(0x0B)	Get Com event counter	
17	(0x11)	Report Slave ID	
43	(0x2B)	Read Device Identification	Sub code: 14

2.2 Register mapping

Register	IR[1] Adr	HR[2] Adr.
Not available! (Reserved for future use)	0 99	
UPC4 measurement values: - Battery, System, Mains, General	**100** **199**	
Digital Inputs Alert (Alert through enable) bits LED & Relays output	**200** **299**	
Date & Time Set bits	**300** **329**	**300** **329**
CAN Rectifier values: - Voltage, current, temperature, ...	**330** **629**	
CAN DC-DC values: - Voltage, current, temperature, ...	**640** **759**	
CAN Inverter values: - Voltage, current, temperature, ...	**760** **879**	
CAN Static Bypass Switch values: - Mains/Battery voltage - Output current - Mains frequency - Temperature	**880** **899**	
General CAN values - FAN, MMB, DEB, RYB, ...	**900** **979**	

[1] IR = Input Register (read only, 16 bit access)
[2] HR = Holding Register (read/write, 16 bit access)

2.3 Input register

2.3.1 UPC4 measurement values

Adr	Access	Type	Unit	Description
100	read	signed	[1/10V]	V_{Batt1} Battery 1 voltage
101	read	signed	[1/10V]	V_{Batt2} Battery 2 voltage
102	read	signed	[1/10V]	V_{Batt3} Battery 3 voltage
103	read	signed	[1/10V]	V_{Batt4} Battery 4 voltage
104	read	signed	[1/10V]	V_{Batt5} Battery 5 voltage
105	read	signed	[1/10V]	V_{Batt6} Battery 6 voltage
106	read	signed	[1/10V]	V_{Batt7} Battery 7 voltage
107	read	signed	[1/10A]	I_{Batt1} Battery 1 current
108	read	signed	[1/10A]	I_{Batt2} Battery 2 current
109	read	signed	[1/10A]	I_{Batt3} Battery 3 current
110	read	signed	[1/10A]	I_{Batt4} Battery 4 current
111	read	signed	[1/10A]	I_{Batt5} Battery 5 current
112	read	signed	[1/10A]	I_{Batt6} Battery 6 current
113	read	signed	[1/10A]	I_{Batt7} Battery 7 current
114	read	signed	[1/10V]	$V_{Batt1/2}$ Battery 1 tap voltage (half voltage)
115	read	signed	[1/10V]	$V_{Batt2/2}$ Battery 2 tap voltage (half voltage)
116	read	signed	[1/10V]	$V_{Batt3/2}$ Battery 3 tap voltage (half voltage)
117	read	signed	[1/10V]	$V_{Batt4/2}$ Battery 4 tap voltage (half voltage)
118	read	signed	[1/10V]	$V_{Batt5/2}$ Battery 5 tap voltage (half voltage)
119	read	signed	[1/10V]	$V_{Batt6/2}$ Battery 6 tap voltage (half voltage)
120	read	signed	[1/10V]	$V_{Batt7/2}$ Battery 7 tap voltage (half voltage)
121	read	signed	[1/10°C]	T_{Batt1} Battery 1 temperature
122	read	signed	[1/10°C]	T_{Batt2} Battery 2 temperature
123	read	signed	[1/10°C]	T_{Batt3} Battery 3 temperature
124	read	signed	[1/10°C]	T_{Batt4} Battery 4 temperature
125	read	signed	[1/10°C]	T_{Batt5} Battery 5 temperature
126	read	signed	[1/10°C]	T_{Batt6} Battery 6 temperature
127	read	signed	[1/10°C]	T_{Batt7} Battery 7 temperature
128	read	signed	[1/10V]	V_{Load} System load voltage
129	read	signed	[1/10A]	I_{Load} System load current
130	read	signed	[1/10V]	Riso
131	read	signed	[1/10A]	I_{Sum_Ibatt} Battery sum current
132	read	signed	[1/10A]	$I_{Sum\_rectifer}$ Rectifier sum current (via CAN-Bus)
133	read	signed	[1/10A]	I_{Sum_DCDC} DCDC-converter sum current (via CAN-Bus)
134	read	signed	[1/10A]	$I_{Load\_calculatetd}$ Calculated load current ($I_{Sum\_rectifer}$ -I_{Sum_Ibatt})
135	read	signed	[1/10V]	$V_{General\_E1}$ General voltage E1
136	read	signed	[1/10V]	$V_{General\_E2}$ General voltage E2
137	read	signed	[1/10V]	$V_{General\_E3}$ General voltage E3
138	read	signed	[1/10V]	$V_{General\_E4}$ General voltage E4
139	read	signed	[1/10V]	$V_{General\_E3}$ General voltage E5
140	read	signed	[1/10V]	$V_{General\_E4}$ General voltage E6
141	read	signed	[1/10A]	$I_{General}$ General current I1
142	read	signed	[1/10A]	$I_{General}$ General current I2
143	read	signed	[1/10A]	$I_{General}$ General current I3
144	read	signed	[1/10A]	$I_{General}$ General current I4
145	read	signed	[1/10A]	$I_{General}$ General current I5
146	read	signed	[1/10A]	$I_{General}$ General current I6

Adr	Access	Type	Unit	Description
147	read	signed	[1/10°C]	$T_{General}$ General temperature T1
148	read	signed	[1/10°C]	$T_{General}$ General temperature T2
149	read	signed	[1/10°C]	$T_{General}$ General temperature T3
150	read	signed	[1/10°C]	$T_{General}$ General temperature T4
151	read	signed	[1/10°C]	$T_{General}$ General temperature T5
152	read	signed	[1/10°C]	$T_{General}$ General temperature T6
153	read	signed	[1/10R]	$R_{General}$ General resistor R1
154	read	signed	[1/10R]	$R_{General}$ General resistor R2
155	read	signed	[1/10R]	$R_{General}$ General resistor R3
156	read	signed	[1/10R]	$R_{General}$ General resistor R4
157	read	signed	[1/10R]	$R_{General}$ General resistor R5
158	read	signed	[1/10R]	$R_{General}$ General resistor R6
159	read	signed	[1/10V~]	V_{L1} Mains voltage phase 1 (optional with ext. MM-Board)
160	read	signed	[1/10V~]	V_{L2} Mains voltage phase 2 (optional with ext. MM-Board)
161	read	signed	[1/10V~]	V_{L3} Mains voltage phase 3 (optional with ext. MM-Board)
162	read	signed	[1/10A~]	I_{L1} Mains current phase 1 (optional with ext. MM-Board)
163	read	signed	[1/10A~]	I_{L2} Mains current phase 2 (optional with ext. MM-Board)
164	read	signed	[1/10A~]	I_{L3} Mains current phase 3 (optional with ext. MM-Board)
165	read	signed	[1/100Hz]	F_{L1} Frequency phase 1 (optional with ext. MM-Board)
166	read	signed	[1/100Hz]	F_{L2} Frequency phase 2 (optional with ext. MM-Board)
167	read	signed	[1/100Hz]	F_{L3} Frequency phase 3 (optional with ext. MM-Board)
168..199				n.u.

2.3.2 Digital inputs

Adr	Access	Type	Unit	Description
200	read	16 bit	bool	Alarm bits0..15 Global
201	read	16 bit	bool	Alarm bits16..31 Global
202	read	16 bit	bool	Alarm bits32..47 Global
203	read	16 bit	bool	Alarm bits48..63 Global
204	read	16 bit	bool	Alarm bits64..79 Global
205	read	16 bit	bool	Alarm bits80..95 Global
206				
207				
208				
209				
210	read	16 bit	bool	Alarm bits0..15 DC-System
211	read	16 bit	bool	Alarm bits16..31 DC-System
212	read	16 bit	bool	Alarm bits32..47 DC-System
213	read	16 bit	bool	Alarm bits48..63 DC-System
214	read	16 bit	bool	Alarm bits64..79 DC-System
215	read	16 bit	bool	Alarm bits80..95 DC-System
216	read	16 bit	bool	Alarm bits96..111 DC-System
217	read	16 bit	bool	Alarm bits112..127 DC-System
218	read	16 bit	bool	Alarm bits128..143 DC-System
219	read	16 bit	bool	Alarm bits144..159 DC-System
220	read	16 bit	bool	Alarm bits160..175 DC-System

221	read	16 bit	bool	Alarm bits176..191 DC-System
222	read	16 bit	bool	Alarm bits192..207 DC-System
223	read	16 bit	bool	Alarm bits208..223 DC-System
224				
225				
226				
227				
228				
229				
230	read	16 bit	bool	Alarm bits 0..8 Battery 1 lowbyte and Battery 2 highbyte
231	read	16 bit	bool	Alarm bits 0..8 Battery 3 lowbyte and Battery 4 highbyte
232	read	16 bit	bool	Alarm bits 0..8 Battery 5 lowbyte and Battery 6 highbyte
233	read	16 bit	bool	Alarm bits 0..8 Battery 7 lowbyte and Battery 8 highbyte
234				
235				
236				
237				
238				
239				
240	read	16 bit	bool	optional CAN Fuse Monitoring Board (FMB)
241	read	16 bit	bool	optional CAN Fuse Monitoring Board (FMB)
242	read	16 bit	bool	optional CAN Fuse Monitoring Board (FMB)
243	read	16 bit	bool	optional CAN Fuse Monitoring Board (FMB)
244	read	16 bit	bool	optional CAN Fuse Monitoring Board (FMB)
245	read	16 bit	bool	optional CAN Fuse Monitoring Board (FMB)
246	read	16 bit	bool	optional CAN Fuse Monitoring Board (FMB)
247	read	16 bit	bool	optional CAN Fuse Monitoring Board (FMB)
248	read	16 bit	bool	optional CAN Fuse Monitoring Board (FMB)
249	read	16 bit	bool	optional CAN Fuse Monitoring Board (FMB)
250	read	16 bit	bool	optional CAN Fuse Monitoring Board (FMB)
251	read	16 bit	bool	optional CAN Fuse Monitoring Board (FMB)

Adr	Access	Type	Unit	Description
255	read	16 bit	bool	bit0..15 = internal digital input Dig_x.1 optional CAN Digital Input Board (DEB)
256	read	16 bit	bool	bit0..15 = external digital input Dig_x.2 optional CAN Digital Input Board (DEB)
257	read	16 bit	bool	LED State
258	read	16 bit	bool	LED Blink State
259				
260	read	16 bit	bool	Alarm Through Enable bits0..15 Global
261	read	16 bit	bool	Alarm Through Enable bits16..31 Global
262	read	16 bit	bool	Alarm Through Enable bits32..47 Global
263	read	16 bit	bool	Alarm Through Enable bits48..63 Global
264	read	16 bit	bool	Alarm Through Enable bits64..79 Global
265	read	16 bit	bool	Alarm Through Enable bits80..95 Global
266				
267				
268				
269				
270	read	16 bit	bool	Alarm Through Enable bits0..15 DC-System
271	read	16 bit	bool	Alarm Through Enable bits16..31 DC-System
272	read	16 bit	bool	Alarm Through Enable bits32..47 DC-System
273	read	16 bit	bool	Alarm Through Enable bits48..63 DC-System
274	read	16 bit	bool	Alarm Through Enable bits64..79 DC-System
275	read	16 bit	bool	Alarm Through Enable bits80..95 DC-System
276	read	16 bit	bool	Alarm Through Enable bits96..111 DC-System
277	read	16 bit	bool	Alarm Through Enable bits112..127 DC-System
278	read	16 bit	bool	Alarm Through Enable bits128..143 DC-System
279	read	16 bit	bool	Alarm Through Enable bits144..159 DC-System
280	read	16 bit	bool	Alarm Through Enable bits160..175 DC-System
281	read	16 bit	bool	Alarm Through Enable bits176..191 DC-System
282	read	16 bit	bool	Alarm Through Enable bits192..207 DC-System
283	read	16 bit	bool	Alarm Through Enable bits208..223 DC-System
284				
285				
286				
287				
288				
289				
290	read	16 bit	bool	Alarm Through Enable bits0..8 Battery 1 lowbyte bits0..8 Battery 2 highbyte
291	read	16 bit	bool	Alarm Through Enable bits0..8 Battery 3 lowbyte bits0..8 Battery 4 highbyte
292	read	16 bit	bool	Alarm Through Enable bits0..8 Battery 5 lowbyte bits0..8 Battery 6 highbyte
293	read	16 bit	bool	Alarm Through Enable bits0..8 Battery 7 lowbyte bits0..8 Battery 8 highbyte
294 .. 299				n.u.

2.3.3 Date & time/set bits

Adr	Access	Type	Unit	Description
300..329				See chapter 2.3.9 Holding Register

2.3.4 CAN rectifier values

Adr	Access	Type	Unit	Description
330	read	unsigned	N	Number of configured rectifiers
331..378	read	unsigned	[1/10V]	$V_{REC1..48}$ Rectifier output voltage 1..48
381..428	read	unsigned	[1/10A]	$I_{REC1..48}$ Rectifier output current 1..48
431..478	read	signed	[°C]	$T_{REC1..48}$ Rectifier temperature 1..48
481..528	read	16 bit	BOOL	Rectifier state 1..48: bit0 = output voltage high bit1 = output voltage low bit2 = high temperature bit3..4 = n.u. bit5 = extern switched of bit6 = mains fault bit7 = alarm bit8..15 = n.u.
529	read	16 bit	BOOL	n.u.
530	read	16 bit	BOOL	Alarm bit0..15 : rectifier 1..16; 1=Alarm
531	read	16 bit	BOOL	Alarm bit16..31 : rectifier 17..32; 1=Alarm
532	read	16 bit	BOOL	Alarm bit32..47 : rectifier 33..48; 1=Alarm
533	read	16 bit	BOOL	n.u.
534	read	16 bit	BOOL	n.u.
535	read	16 bit	BOOL	CAN contact bit0..15 : rectifier 1..16; 1=Contact
536	read	16 bit	BOOL	CAN contact bit16..31 : rectifier 17..32; 1=Contact
537	read	16 bit	BOOL	CAN contact bit32..47 : rectifier 33..48; 1=Contact
538..629				n.u.

2.3.5 CAN DC/DC converter values

Adr	Access	Type	Unit	Description
640	read	unsigned	N	Number of configured DCDC-converter
641..656	read	unsigned	[1/10V]	$V_{DCDC1..16}$ DCDC output voltage 1..16
661..676	read	unsigned	[1/10A]	$I_{DCDC1..16}$ DCDC output current 1..16
681..696	read	signed	[°C]	$T_{DCDC1..16}$ DCDC temperature 1..16
701..716	read	16 bit	BOOL	DCDC state 1..16: bit0 = output voltage high bit1 = output voltage low bit2 = high temperature bit3..4 = n.u. bit5 = extern switched of bit6 = mains fault bit7 = alarm bit8..15 = n.u.
720	read	16 bit	BOOL	Alarm bit0..15 : DCDC 1..16; 1=Alarm
725	read	16 bit	BOOL	CAN contact bit0..15 : DCDC 1..16; 1=Contact
726..759				n.u.

2.3.6 CAN inverter values

Adr	Access	Type	Unit	Description
760	read	unsigned	N	Number of configured inverters
761..776	read	unsigned	[V]	$V_{INV1..16}$ inverter output voltage 1..16
781..796	read	unsigned	[1/10A]	$I_{INV1..16}$ inverter output current 1..16
801..816	read	unsigned	[Hz]	$F_{INV1..16}$ inverter frequency 1..16
821..836	read	signed	[°C]	$T_{INV1..16}$ inverter temperature 1..16
841..856	read	16 bit	BOOL	Inverter state 1..16: bit0 = n.u. bit1 = input voltage low bit2 = input voltage high bit3 = output voltage low bit4 = output voltage high bit5 = output current high bit6 = extern switched of bit7 = alarm bit8..15 = n.u.
860	read	16 bit	BOOL	Alarm bit0..15 : inverter 1..16; 1=Alarm
862	read	16 bit	BOOL	CAN contact bit0..15 : inverter 1..16; 1=Contact
863..879				n.u.

2.3.7 CAN static bypass switch values

Adr	Access	Type	Unit	Description
880	read	unsigned	[Vac]	Static Bypass Switch (SBS) mains voltage
881	read	unsigned	[Vac]	Static Bypass Switch (SBS) inverter voltage
882	read	unsigned	[1/10A]	Static Bypass Switch (SBS) output current
883	read	unsigned	[1/10Vdc]	Static Bypass Switch (SBS) battery voltage
884	read	unsigned	[1/10Hz]	Static Bypass Switch (SBS) mains frequency
885	read	unsigned	[1/10Hz]	Static Bypass Switch (SBS) inverter frequency
886	read	signed	[1/10°C]	Static Bypass Switch (SBS) temperature
887	read	16 bit	BOOL	SBS state: bit 0 SBS.State.ErrorSource1_precedence bit 1 SBS.State.ErrorSource2_spare bit 2 SBS.State.Synchronization bit 3 SBS.State.UNiVerter bit 4 SBS.State.Temperature_high_Heatsink bit 5 SBS.State.Output_current_high bit 6 SBS.State.UNV_Overload bit 7 SBS.State.DC_Voltage_low bit 8 SBS.State.DC_Voltage_high bit 9 SBS.State.DC_Voltage_low_Warning bit 10 SBS.State.DC_Voltage_high_Warning bit11 n.u. bit12 SBS.State.0iWR_Precedence_1iMains_Precedence bit13 SBS.State.Switch_state_Relay2_0in_active1iactive bit14 SBS.State.1iLoad_on_WR_0iLoad_on_Mains bit15 SBS.State.Collective_Alarm
888	read	16 bit	BOOL	SBS alarm state; bit0 = 1→Alarm
889	read	16 bit	BOOL	SBS CAN contact state; bit0 = 1 → Contact
890..899				n.u.

2.3.8 General CAN values

Adr	Access	Type	Unit	Description
900..915	read	16 bit	BOOL	Fan rack 1..16 state: - bit0=1→fan1 error; - bit2=1→fan2 error; - bit4=1→fan3 error; - bit6=1→fan4 error - bit8=1→fan5 error; - bit10=1→fan6 error
917	read	16 bit	BOOL	Alarm bit0..15 : fan rack 1..16; 1=Alarm
918	read	16 bit	BOOL	CAN contact bit0..15 : fan rack 1..16; 1=Contact
920	read	16 bit	BOOL	Mains Monitoring Board (MMB) state: - Not defined!
921	read	16 bit	BOOL	MMB Alarm; bit0=1→Alarm
922	read	16 bit	BOOL	MMB CAN contact bit0=1 →Contact
925	read	16 bit	BOOL	Relays Board (RYB) state: - Not defined!
926	read	16 bit	BOOL	RYB Alarm; bit0=1→Alarm
927	read	16 bit	BOOL	RYB CAN contact bit0=1 →Contact
930	read	16 bit	BOOL	Digital Input Board (DEB) state: - Not defined!
931	read	16 bit	BOOL	DEB Alarm; bit0=1→Alarm
932	read	16 bit	BOOL	DEB CAN contact bit0=1 →Contact
935..938	read	16 bit	BOOL	Battery Monitoring Board0..3 (BMB) state: - Not defined!
939	read	16 bit	BOOL	BMB Alarm; bit0..3=1→Alarm
940	read	16 bit	BOOL	BMB CAN contact bit0..3=1 →Contact
943..946	read	16 bit	BOOL	Fuse Monitoring Board0..3 (FMB) state: - Not defined!
947	read	16 bit	BOOL	FMB Alarm; bit0..3=1→Alarm
948	read	16 bit	BOOL	FMB CAN contact bit0..3=1 →Contact
960..975	read	16 bit	BOOL	UMD Device0..3 (UMD) state: - Not defined!
978	read	16 bit	BOOL	UMD Alarm; bit0..3=1→Alarm
979	read	16 bit	BOOL	UMD CAN contact bit0..3=1 →Contact

2.3.9 Holding registers

Adr	Access	Type	Unit	Description
300	read/write	unsigned	YYYY	RTC year, four digits (e.g. “2010”)
301	read/write	unsigned	MM	RTC month
302	read/write	unsigned	DD	RTC day
303	read/write	unsigned	hh	RTC hour
304	read/write	unsigned	mm	RTC minute
305	read/write	unsigned	ss	RTC second
306..309				n.u.
310	read/write	16 bit	bool	System Set Event Bits E1

311	read/write	16 bit	bool	System Set Event Bits E2
312	read/write	16 bit	bool	System Set Event Bits E3
313	read/write	16 bit	bool	System Set Event Bits E4
314	read/write	16 bit	bool	System Set Event Bits E5
315	read/write	16 bit	bool	System Set Event Bits E6
316	read/write	16 bit	bool	System Set Event Bits E7
317	read/write	16 bit	bool	System Set Event Bits E8
318	read/write	16 bit	bool	System Set Event Bits E9
319	read/write	16 bit	bool	System Set Event Bits E10
320	read/write	16 bit	bool	System Set Event Bits E11
321	read/write	16 bit	bool	System Set Event Bits E12
322	read/write	16 bit	bool	System Set Event Bits E13
323	read/write	16 bit	bool	System Set Event Bits E14
324	read/write	16 bit	bool	System Set Event Bits E15
325	read/write	16 bit	bool	System Set Event Bits E16
326..329				n.u.

Event bits:

Index 1: Only for internal use!
Battery Test and boost charge Function:
Index 2: Start bits (set 1 = start e.g. battery test; set 0 = no effect)
Index 3: Stop bits (set 1 = break e.g. battery test; set 0 = no effect)
Index 4: Is Running bits (get 1 = Function is running e.g. battery test)
Index 5: Enabled bits (get 1 = Function is enabled; get 0 = Function is disabled)
For Index 2 to 5: bit0 = battery test comb1
bit1 = boost charge comb1
bit2 = BTstore comb1
Index 6: Only for internal use
Index 7: Only for internal use
Index 8: Only for internal use
LVD/PLD Function:
Index 9: LVD/PLD remote enabled
Index 10: manual_on (set 1 = PLD/LVD automatic is manual overdriven; set 0 = no effect)
Index 11: manual_off (set 1 = PLD/LVD automatic is on; set 0 = no effect)
Index 12: manual_stat (get 1 = manual on; get 0 = automatic on)
Index 13: opto_on (set 1 = in manual mode the optocoupler will be on; set 0 = no effect)
Index 14: opto_off (set 1 = in manual mode the optocoupler will be off; set 0 = no effect)
Index 15: opto_stat (get 1 = see index 13; 0 = see index 14)
Index 16: opto_pin (get 1 = optocoupler is on; get 0 = optocoupler is off)
For Index 9 to 16: bit 0: LVD
bit 1: PLD1
bit 2: PLD2

2.4 Diagnostics

2.4.1 Code 08 – Diagnostics

The following sub-functions are supported:

Sub-function code	Name	
Hex	Dec	
00	00	Return Query Data
0A	10	Clear all Counters and Diagnostic Registers
0B	11	Return Bus Message Count
0C	12	Return Bus Communication Error Count
0D	13	Return Slave Exception Error Count
0E	14	Return Slave Message Count
0F	15	Return Slave No Response Count
10	16	Return Slave NAK Count
11	17	Return Slave Busy Count
12	18	Return Bus Character Overrun Count

Example: Return query data

Request			**Response**	
Field Name	*(Hex)*		*Field Name*	*(Hex)*
Function code	**08**		Function code	**08**
Sub-function Hi	**00**		Sub-function Hi	**00**
Sub-function Lo	**00**		Sub-function Lo	**00**
Data Hi	**A5**		Data Hi	**A5**
Data Lo	**37**		Data Lo	**37**

2.4.2 Code 11 – Get comm event counter

Request			**Response**	
Field Name	*(Hex)*		*Field Name*	*(Hex)*
Function code	**0B**		Function code	**0B**
			Status Hi	**00**
			Status Lo	**00**
			Event Count Hi	**00**
			Event Count Lo	**53**

In this example the status word is 0x0000, indicating that no program function is in progress. The event counter shows that 83 (0x0053) events have been counted by the device.

2.4.3 Code 17 – Report slave ID

Request			Response	
Field Name	*(Hex)*		*Field Name*	*(Hex)*
Function code	**11**		Function code	**11**
			Byte Count	**16**
			Slave ID	**00**
			Run Indicator Status	**FF**
			Additional Data	**“UPC4_V210_B21”**

2.4.4 Code 43/14 – Read device identification

Request			Response	
Field Name	*(Hex)*		*Field Name*	*(Hex)*
Function code	**2B**		Function code	**2B**
MEI Type	**0E**		MEI Type	**0E**
Red Dev Id code	**01**		Red Dev Id code	**01**
Object Id	**00**		Conformity Level	**01**
			More Follows	**00**
			Next Object Id	**00**
			Number of Objects	**03**
			Object Id	**00**
			Object Length	**11**
			Object Value	**" Eltekvalere Industrial GmbH"**
			Object Id	**01**
			Object Length	**14**
			Object Value	**"UPC4 MODBUS/RTU "**
			Object Id	**02**
			Object Length	**14**
			Object Value	**“UPC4_V210_B21”**

3 Errata

3.1 UPC4_MODBUS_RTU _ Rev00 (08.11.2010)

No known bugs.

4 Appendix A

Supplier:

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