

***i-com* SERIES EXTERNAL UPS – MODBUS (RS485) COMMUNICATION ADAPTER**

(MDX2)



INSTALLATION AND USER MANUAL

Thank you for selecting our product to protect your electrical equipment.

The Modbus adaptor has been designed with the utmost care. We recommend that you take the time to read this manual to take full advantage of the many features of your new equipment.

Environment

Our staff pays great attention to the environmental impact of its products during the design and manufacture stages, through to the end of its life cycle.

- This product complies with the most strict regulations.
- It does not contain CFCs or HCFCs

Recycling of packing materials

Packing materials were selected to facilitate recycling. Please make sure they are correctly recycled in compliance with all applicable regulations.

Special precautions

- If the adaptor must be stored prior to installation, storage must be in a dry place
- The admissible storage temperature range is -10 C to +70 C.

MODBUS Adaptor Models

- **MDX2-EX**External UPS-MODBUS Adaptor
- **MDX2-INT**Internal UPS-MODBUS Adaptor

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1. Introduction

1.1 Unpacking and Checking Contents

EXTERNAL MODBUS ADAPTOR
5 volts DC power supply
RS232 UPS-ADAPTOR cable (CC05)
Utility CD
Installation and user manual

1.2 Overview



1.3 Functions

MODBUS adaptor provides data communication between a UPS and a far terminal like a computer system. The system provides a communication channel between RS485(PC side) and RS232(UPS side) interface

Note:

- The MODBUS adaptor can be used with UPS models supporting TX301, TX300, and TX100 protocols.
- 2 wires RS485 link is available

1.4 Technical Specifications

Function	Parameters	Default values
Modbus	Baud rate	9600 bauds
Modbus	Parity	No parity
Modbus	Device number	1-255
Modbus	connection	2 wires
RS232	Baud rate	2400 bauds
RS232	Parity	No parity
RS232	Stop bit	1 stop bit
RS232	Connection to UPS	RX,TX,Gnd

2. Installation

2.1 Configuration Of The Modbus Communication Parameters



The device takes the device number during power on please select device number from 1 to 255 by setting device number dip switches



$$\text{Device No} = D_7 \times 2^7 + D_6 \times 2^6 + D_5 \times 2^5 + D_4 \times 2^4 + D_3 \times 2^3 + D_2 \times 2^2 + D_1 \times 2^1 + D_0 \times 2^0$$

Where D_n is the n^{th} dip switch. For example, if we need to set the device's address to 183 then we need to set 7th, 5th, 4th, 2nd, 1st, and 0th dip switch pins. The address is calculated using above equation as follows:

$$\text{Device No} = 1 \times 2^7 + 0 \times 2^6 + 1 \times 2^5 + 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$$

2.2 RS232 Connection to UPS

Connect CC05 RS232 cable from serial port connector of the MODBUS adapter to the serial port of the UPS.

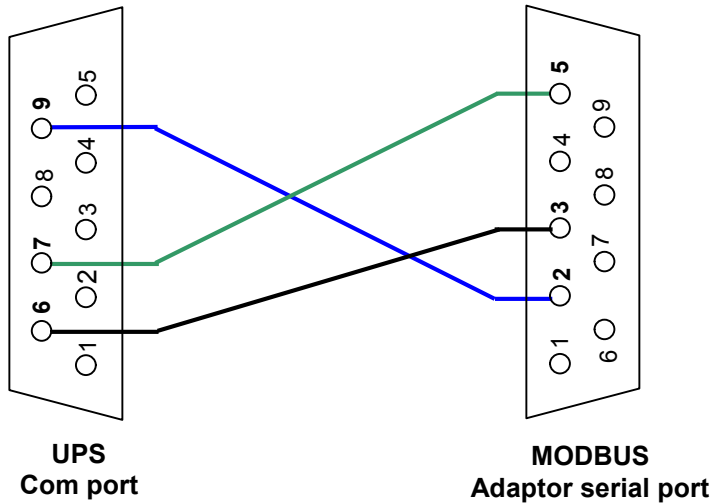
CC05 RS232 Data Cable

Max. Length = 25 meters.

parts	pcs
9 pins D type connector (male)	1
9 pins D type connector (female)	1
3 wired shielded cable	Max 25 meters

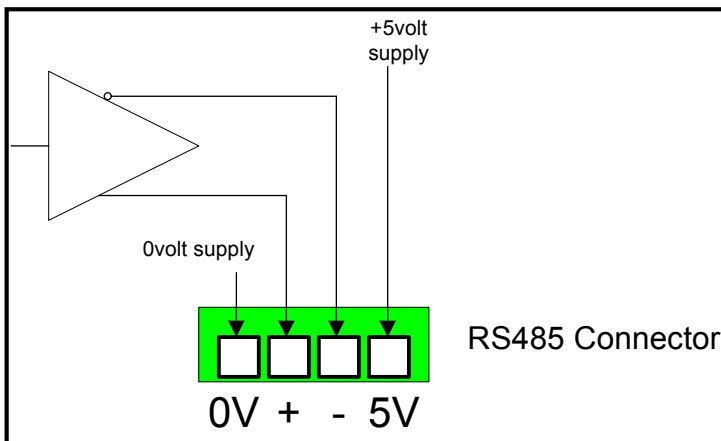
9 pins D type male

9 pins D type female



UPS connector Pin Nr	PC port Pin Nr
6	3
7	5
9	2

2.3 RS485 Connection



Connect RS485 terminals of the MODBUS adaptor to RS485 link

The internal MODBUS RS485 port connection of the adaptor

0volt and +5 volt outputs are dedicated for polarity resistors do not use this supply for other purposes.

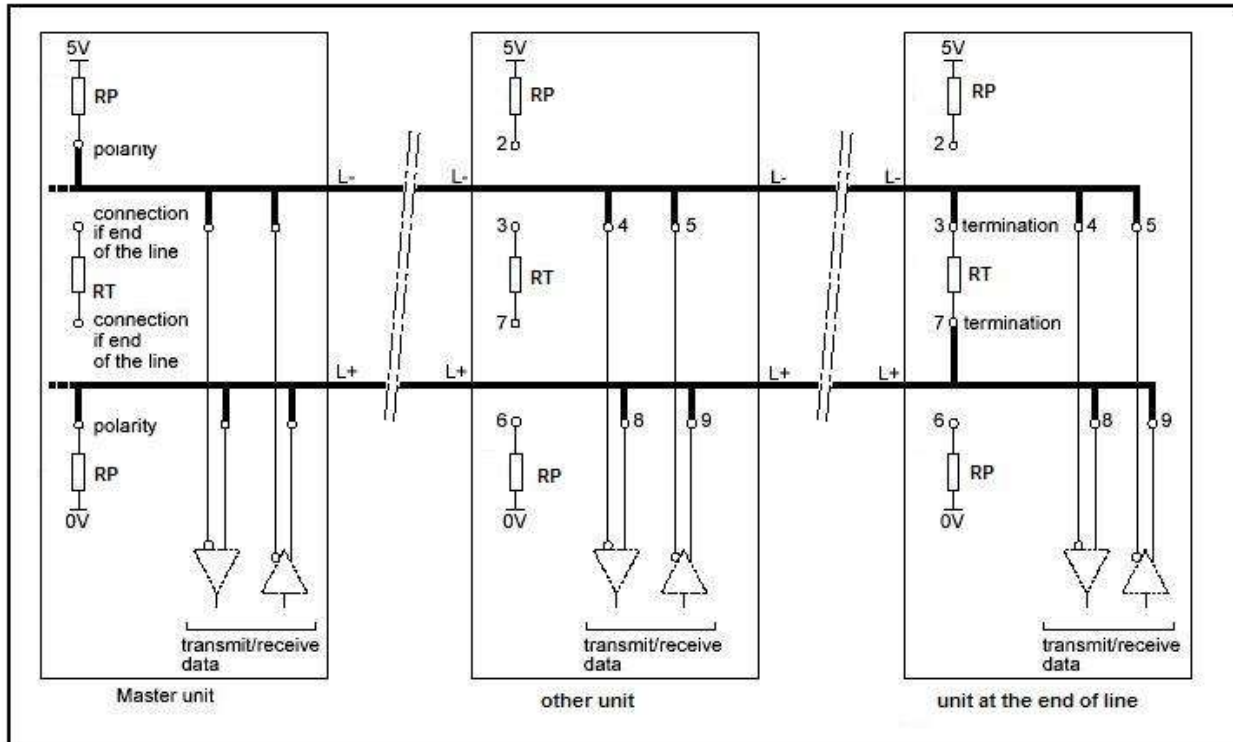
About Polarity

Normally the master of the network sets the polarity of the line (RP resistor 330 ohm ½ watt)

About termination

The two ends of the line must be terminated (RT resistor 150 ohm ½ watt)

Diagram of a two wire RS485 connection



2.4 Installation

Check RS232-UPS, and RS485 connections. If connections are OKAY, connect the power cord of the MODBUS adaptor to mains power (The power of the adaptor must be supplied from UPS output otherwise during line failure the power of the MODBUS adaptor shutdown)

3. Operation

Turn on the UPS

During power up the MODBUS adaptor will check the UPS communication version if it supports the version it will run.

The MDX2 MODBUS adaptor supports TX100, TX300 and TX301 UPS communication protocols.

For Test Purpose download MODBUS tester program from the link <http://www.modbus.pl/modbus.htm>

4. Indicator Lamp



The indicator lamps on the MODBUS adaptor shows the status of communication.

Indicator lamp functions	
Lamp status	Description
RS232 led (green) Always on	Adaptor power on and UPS RS232 connection is lost False status
RS232 led Regular Blink	Adaptor is communicating with UPS
RS232 led Irregular blinking	Adaptor do not support some UPS commands
MODBUS led (yellow) Always on	Adaptor power on and MODBUS connection is lost False status
MODBUS led Regular Blink	Adaptor is communicating with MODBUS Network
ALARM led	Always off

• **TX300 PROTOCOL HOLDING REGISTER map (for 3 phase UPS)**
MEASUREMENT GROUP (TX300 PROTOCOL)

Addr	Parameter	Unit	PROTOCOL	Min-max
0	RECTIFIER INPUT VOLTAGE 1 phase-neutral (*)	V	P1	0-511
1	RECTIFIER INPUT VOLTAGE 2 phase-neutral (*)	V	P1	0-511
2	RECTIFIER INPUT VOLTAGE 3 phase-neutral (*)	V	P1	0-511
3	Not used			
4	Not used			
5	Not used			
6	BYPASS INPUT VOLTAGE 1 phase-phase	Not used		
7	BYPASS INPUT VOLTAGE 2 phase-phase	Not used		
8	BYPASS INPUT VOLTAGE 3 phase-phase	Not used		
9	BYPASS INPUT VOLTAGE 1 phase-neutral	V	P2	0-511
10	BYPASS INPUT VOLTAGE 2 phase-neutral	V	P2	0-511
11	BYPASS INPUT VOLTAGE 3 phase-neutral	V	P2	0-511
12	INVERTER OUTPUT VOLTAGE 1 phase-phase	Not used		
13	INVERTER OUTPUT VOLTAGE 2 phase-phase	Not used		
14	INVERTER OUTPUT VOLTAGE 3 phase-phase	Not used		
15	INVERTER OUTPUT VOLTAGE 1 phase-neutral	Not used		
16	INVERTER OUTPUT VOLTAGE 2 phase-neutral	Not used		
17	INVERTER OUTPUT VOLTAGE 3 phase-neutral	Not used		
18	OUTPUT VOLTAGE 1 phase-phase	Not used		
19	OUTPUT VOLTAGE 2 phase-phase	Not used		
20	OUTPUT VOLTAGE 3 phase-phase	Not used		
21	OUTPUT VOLTAGE 1 phase-neutral (Bypass)	V	P2	0-255
22	OUTPUT VOLTAGE 2 phase-neutral (Bypass)	V	P2	0-255
23	OUTPUT VOLTAGE 3 phase-neutral (Bypass)	V	P2	0-255
24	RECTIFIER INPUT FREQUENCY	Not used		
25	BYPASS FREQUENCY	Hz * 10	P1	0-999
26	INVERTER FREQUENCY	Not used		
27	OUTPUT FREQUENCY (Bypass Freq. if Bypass)	Hz * 10	P1	0-999
28	INPUT CURRENT PHASE 1 (if option board is used)	A	P2	0-511
29	INPUT CURRENT PHASE 2 (if option board is used)	A	P2	0-511
30	INPUT CURRENT PHASE 3 (if option board is used)	A	P2	0-511
31	OUTPUT CURRENT 1	Not used		
32	OUTPUT CURRENT 2	Not used		
33	OUTPUT CURRENT 3	Not used		
34	OUTPUT LOAD% 1 percentage	% LOAD	P2	0-255
35	OUTPUT LOAD% 2 percentage	% LOAD	P2	0-255
36	OUTPUT LOAD% 3 percentage	% LOAD	P2	0-255
37	TOTAL BATTERY VOLTAGE	V	P1	0-511
38	BATTERY CHARGE CURRENT	Not used		
39	BATTERY DISCHARGE CURRENT	Not used		
40	UPS INSIDE TEMPERATURE	Deg*10	P1 (if sensor used)	0-255
41	DEVICE NOMINAL ACTIVE POWER	W/100	F2	0-65535
42	DEVICE INPUT PHASES		F2	1-3
43	DEVICE OUTPUT PHASES		F2	1-3
44	DEVICE NOMINAL INPUT VOLTAGE	V	F2	
45	DEVICE NOMINAL INPUT FREQUENCY	Hz	F2	
46	NOMINAL BYPASS VOLTS	V	F2	
47	NOMINAL BYPASS FREQUENCY	Hz	F2	
48	NOMINAL OUTPUT VOLTAGE	V	F2	
49	NOMINAL OUTPUT FREQUENCY	Hz	F2	
(*) : If split by-pass used, Rectifier Input Voltage indicates phase – phase.				
50	NUMBER OF 12 VOLT BATTERIES		F2	0-255
51	FAULT OR STATUS CODE		P1	0-255
52	DEVICE CONFIGURATION		F2	0-1
53	DEVICE TYPE		F2	0-1
54	BYPASS CONFIGURATION		F2	0-1
55	BATTERY CONFIGURATION		F2	0-1
56	UPS PROTOCOL	0:TX100, 1:TX300, 2:MC114 (I/VVV)		0-255
57	MODBUS adaptor revision number			0-255

ALARM AND STATUS GROUP BIT MEANING (TX300 PROTOCOL)

Addr	Alarms	BIT	Description
100	inverter heatsink overtemp (>85°C)	7(128)	1=ALARM 0=NORMAL
100	inverter output voltage high (>242V)	6(64)	1=ALARM 0=NORMAL
100	inverter output voltage low (<170V)	5(32)	1=ALARM 0=NORMAL
100	output overload (>%150)	4(16)	1=ALARM 0=NORMAL
100	battery voltage high	3(8)	1=ALARM 0=NORMAL
100	IGBT overcurrent	2(4)	1=ALARM 0=NORMAL
100	Phase synchron bad	1(2)	0=SYNCHRON 1=FREE RUNNING
100	Bypass voltage bad (198V - 242V)	0(1)	1=ALARM 0=NORMAL
101	General UPS alarm	7(128)	1=ALARM 0=NORMAL
101	Output off	6(64)	1=ALARM 0=NORMAL
101	fuse failure	5(32)	1=ALARM 0=NORMAL
101	battery cicuit breaker open (S5)	4(16)	1=ALARM 0=NORMAL
101	replace batteries	3(8)	1=ALARM 0=NORMAL
101	performing boost charge (+432Vdc)	2(4)	1=ALARM 0=NORMAL
101	rotate rectifier input phases	1(2)	1=ALARM 0=NORMAL
101	Emergency stop (Output OFF)	0(1)	1=ALARM 0=NORMAL
102	Maintenance bypass	7(128)	1=ALARM 0=NORMAL
102	Manual static bypass	6(64)	1=ALARM 0=NORMAL
102	Rectifier fault	5(32)	1=ALARM 0=NORMAL
102	mains failure on rectifier input	4(16)	1=ALARM 0=NORMAL
102	battery voltage low	3(8)	1=ALARM 0=NORMAL
102	load on bypass	2(4)	1=ON BYPASS 0=ON INVERTER
102	UPS fault	1(2)	1=ALARM 0=NORMAL
102	performing battery test	0(1)	1=PERFORMING TEST 0=NORMAL
103	waiting shutdown or UPS shutdown	7(128)	1=ALARM 0=NORMAL
103	beeper off/on	6(64)	1=OFF 0=ON
103	Fan failure	5(32)	Not used
103	End off backup time (Battery out end)	4(16)	1=ALARM 0=NORMAL
103		3(8)	NU
103		2(4)	NU
103		1(2)	NU
103		0(1)	NU

• TX301 PROTOCOL HOLDING REGISTER map (for 3 phase UPS)
MEASUREMENT GROUP (TX301 PROTOCOL)

Addr	Parameter	Unit	PROTOCOL	Min-max
6	Rectifier module status codes		D1	0-999
7	Inverter module status codes		D1	0-999
8	Not used			
9	Not used			
10	Not used			
11	Not used			
12	Not used			
13	Not used			
14	INPUT VOLTAGE 1 phase-neutral	V	D2	0-511
15	INPUT VOLTAGE 2 phase-neutral	V	D2	0-512
16	INPUT VOLTAGE 3 phase-neutral	V	D2	0-512
17	INPUT VOLTAGE L1-L3 phase-phase	V	D2	0-511
18	INPUT VOLTAGE L2-L1 phase-phase	V	D2	0-511
19	INPUT VOLTAGE L3-L2 phase-phase	V	D2	0-511
20	INPUT CURRENT PHASE 1 (if option board is used)	A	D2	0-511
21	INPUT CURRENT PHASE 2 (if option board is used)	A	D2	0-511
22	INPUT CURRENT PHASE 3 (if option board is used)	A	D2	0-511
23	BYPASS VOLTAGE 1 phase-neutral	V	D2	0-511
24	BYPASS VOLTAGE 2 phase-neutral	V	D2	0-512
25	BYPASS VOLTAGE 3 phase-neutral	V	D2	0-512
26	BYPASS VOLTAGE L1-L3 phase-phase	V	D2	0-511
27	BYPASS VOLTAGE L2-L1 phase-phase	V	D2	0-511
28	BYPASS VOLTAGE L3-L2 phase-phase	V	D2	0-511
29	INPUT FREQUENCY	Hz * 10	D2	0-999
30	BYPASS FREQUENCY	Hz * 10	D2	0-999
31	Not used			
32	Not used			
33	Not used			
34	Not used			
35	Not used			
36	Not used			
37	TOTAL BATTERY VOLTAGE	V	D3	0-999
38	POSITIVE BATTERY VOLTAGE	V	D3	0-512
39	NEGATIVE BATTERY VOLTAGE	V	D3	0-512
40	POSITIVE BATTERY CURRENT	A * 10	D3	0-512
41	NEGATIVE BATTERY CURRENT	A * 10	D3	0-512
42	BATTERY TEMPERATURE	C * 10	D3	
43	BATTERY BACKUP TIME	M	D3	
44	POSITIVE DC BUS VOLTAGE	V	D3	
45	NEGATIVE DC BUS VOLTAGE	V	D3	
46	BATTERY GROUPS NUMBER		D3	
47	BATTERY RATING	A/H	D3	
48	Not used			
49	Not used			
50	Not used			
51	Not used			
52	Not used			
53	Not used			
54	INVERTER VOLTAGE 1 phase-neutral	V	D4	0-511
55	INVERTER VOLTAGE 2 phase-neutral	V	D4	0-512
56	INVERTER VOLTAGE 3 phase-neutral	V	D4	0-512
57	OUTPUT VOLTAGE 1 phase-neutral	V	D4	0-511
58	OUTPUT VOLTAGE 2 phase-neutral	V	D4	0-512
59	OUTPUT VOLTAGE 3 phase-neutral	V	D4	0-512
60	OUTPUT VOLTAGE L1-L3 phase-phase	V	D4	0-511
61	OUTPUT VOLTAGE L2-L1 phase-phase	V	D4	0-511
62	OUTPUT VOLTAGE L3-L2 phase-phase	V	D4	0-511
63	OUTPUT FREQUENCY	Hz * 10	D4	

64	INPUT CURRENT PHASE 1 (if option board is used)	A	D4	0-511
65	INPUT CURRENT PHASE 2 (if option board is used)	A	D4	0-511
66	INPUT CURRENT PHASE 3 (if option board is used)	A	D4	0-511
67	Not used			
68	Not used			
69	Not used			
70	Not used			
71	Not used			
72	Not used			
73	OUTPUT LOAD% 1 percentage	% LOAD	D5	0-255
74	OUTPUT LOAD% 2 percentage	% LOAD	D5	0-255
75	OUTPUT LOAD% 3 percentage	% LOAD	D5	0-255
76	OUTPUT POWER L1	KVA * 10	D5	
77	OUTPUT POWER L2	KVA * 10	D5	
78	OUTPUT POWER L3	KVA * 10	D5	
79	POWER FACTOR L1	PF * 10	D5	
80	POWER FACTOR L2	PF * 10	D5	
81	POWER FACTOR L3	PF * 10	D5	
82	CREST FACTOR L1	CF * 10	D5	
83	CREST FACTOR L2	CF * 10	D5	
84	CREST FACTOR L3	CF * 10	D5	
85	Not used			
86	Not used			
87	Not used			
88	Not used			
89	Not used			
90	Not used			
91	TH1 TEMPERATURE SENSOR	C * 10	D6	
92	TH2 TEMPERATURE SENSOR	C * 10	D6	
93	TH3 TEMPERATURE SENSOR	C * 10	D6	
94	FAN MAINTENANCE COUNTER		D6	
95	BATTERY MAINTENANCE COUNTER		D6	
96	GENERAL MAINTENANCE COUNTER		D6	
97	OPTIONAL MAINTENANCE COUNTER		D6	
98	UPS RTC DATE		D6	
99	UPS RTC TIME		D6	
100	RELATIVE HUMIDITY		D6	
101	Not used			
102	Not used			
103	Not used			
104	Not used			
105	Not used			
106	Not used			
107	NOMINAL INPUT VOLTAGE	V	F2	
108	NOMINAL INPUT FREQUENCY	Hz * 10	F2	
109	NOMINAL BYPASS VOLTAGE	V	F2	
110	NOMINAL BYPASS FREQUENCY	Hz * 10	F2	
111	NOMINAL OUTPUT VOLTAGE	V	F2	
112	NOMINAL OUTPUT FREQUENCY	Hz * 10	F2	
113	DEVICE INPUT PHASES		F2	
114	DEVICE OUTPUT PHASES		F2	
115	BATTERY NUMBER IN ONE GROUP		F2	
116	DEVICE TYPE		F2	
117	DEVICE OPERATION MODE		F2	
118	BYPASS CONFIGURATION		F2	
119	BATTERY CONFIGURATION		F2	
120	N+1 MINIMUM UPS		F2	
121	UPS NUMBER		F2	
122	CHASSIS NUMBER LO WORD		F2	
123	CHASSIS NUMBER HI WORD		F2	
124	SYSTEM POWER LO WORD		F2	
125	SYSTEM POWER HI WORD		F2	

ALARM AND STATUS GROUP BIT MEANING (TX301 PROTOCOL)

Addr	Alarms	BIT	Description
0	Inverter IGBT ALARM	0 (1)	1=ALARM 0=NORMAL
0	Overtemperature	1 (2)	1=ALARM 0=NORMAL
0	Battery volt high	2 (4)	1=ALARM 0=NORMAL
0	Inverter AC LOW	3 (8)	1=ALARM 0=NORMAL
0	Inverter AC HIGH	4 (16)	1=ALARM 0=NORMAL
0	Overload shutdown	5 (32)	1=ALARM 0=NORMAL
0	O/P short circuit	6 (64)	1=ALARM 0=NORMAL
0	Maintenance by-pass	7 (128)	1=ALARM 0=NORMAL
0	Manual by-pass	8 (256)	1=ALARM 0=NORMAL
0	Battery low shutdown	9 (512)	1=ALARM 0=NORMAL
0	REPO STOP	10 (1024)	1=ALARM 0=NORMAL
0	DC balance alarm	11 (2048)	1=ALARM 0=NORMAL
0	Peak overcurrent	12 (4096)	1=ALARM 0=NORMAL
0	Can not start	13 (8192)	1=ALARM 0=NORMAL
0	Power on but fault prevents startup	14 (16384)	1=ALARM 0=NORMAL
0	Inverter system fault	15 (32768)	1=ALARM 0=NORMAL
1	By-pass input failure	0 (1)	1=ALARM 0=NORMAL
1	By-pass volt out of tolerance	1 (2)	1=ALARM 0=NORMAL
1	By-pass frequency out of tolerance	2 (4)	1=ALARM 0=NORMAL
1	Overload warning	3 (8)	1=ALARM 0=NORMAL
1	Inverter Overtemperature	4 (16)	1=ALARM 0=NORMAL
1	Output off warning	5 (32)	1=ALARM 0=NORMAL
1	Load on by-pass	6 (64)	1=ALARM 0=NORMAL
1	Reverse inverter output current	7 (128)	1=ALARM 0=NORMAL
1	Inverter module reset	8 (256)	1=ALARM 0=NORMAL
1	Battery low warning	9 (512)	1=ALARM 0=NORMAL
1	Generator operation	10 (1024)	1=ALARM 0=NORMAL
1	Output phase loss	11 (2048)	1=ALARM 0=NORMAL
1	Senkron BAD	12 (4096)	1=ALARM 0=NORMAL
1	Short circuit warning	13 (8192)	1=ALARM 0=NORMAL
1	Output switch off	14 (16384)	1=ALARM 0=NORMAL
1	Service login	15 (32768)	1=ALARM 0=NORMAL
2	Test mode	0 (1)	1=ALARM 0=NORMAL
2	Rotate by-pass phases	1 (2)	1=ALARM 0=NORMAL
2	Inverter stop	2 (4)	1=ALARM 0=NORMAL
2	Inverter DC DOWN	3 (8)	1=ALARM 0=NORMAL
2	Output current limited	4 (16)	1=ALARM 0=NORMAL
2	Fuse failure	5 (32)	1=ALARM 0=NORMAL
2	PSP failure	6 (64)	1=ALARM 0=NORMAL
2		7 (128)	1=ALARM 0=NORMAL
2		8 (256)	1=ALARM 0=NORMAL
2		9 (512)	1=ALARM 0=NORMAL
2	User login	10 (1024)	1=ALARM 0=NORMAL
2		11 (2048)	1=ALARM 0=NORMAL
2	Password required for startup	12 (4096)	1=ALARM 0=NORMAL
2		13 (8192)	1=ALARM 0=NORMAL
2		14 (16384)	1=ALARM 0=NORMAL
2		15 (32768)	1=ALARM 0=NORMAL
3	AC input volt HIGH	0 (1)	1=ALARM 0=NORMAL
3	Line Failure	1 (2)	1=ALARM 0=NORMAL

3	DC BUS voltage HIGH	2 (4)	1=ALARM 0=NORMAL
3	DC BUS voltage LOW	3 (8)	1=ALARM 0=NORMAL
3	Rectifier input frequency BAD	4 (16)	1=ALARM 0=NORMAL
3	Overtemperature warning	5 (32)	1=ALARM 0=NORMAL
3	Blackout	6 (64)	1=ALARM 0=NORMAL
3	Rectifier IGBT alarm	7 (128)	1=ALARM 0=NORMAL
3	Rotate rectifier input phases	8 (256)	1=ALARM 0=NORMAL
3	Not used	9 (512)	Not used
3	Not used	10 (1024)	Not used
3	Not used	11 (2048)	Not used
3	Not used	12 (4096)	Not used
3	Rectifier interrupted	13 (8192)	1=ALARM 0=NORMAL
3	DC BUS DOWN	14 (16384)	1=ALARM 0=NORMAL
3	Rectifier system fault	15 (32768)	1=ALARM 0=NORMAL
4	Performing battery test	0 (1)	1=ALARM 0=NORMAL
4	Boost charge mode	1 (2)	1=ALARM 0=NORMAL
4	AC input voltage peak HIGH	2 (4)	1=ALARM 0=NORMAL
4	Input CB open	3 (8)	1=ALARM 0=NORMAL
4	Rectifier STOP	4 (16)	1=ALARM 0=NORMAL
4	(+)BATT charge limit	5 (32)	1=ALARM 0=NORMAL
4	(-)BATT charge limit	6 (64)	1=ALARM 0=NORMAL
4	Waiting DC BUS	7 (128)	1=ALARM 0=NORMAL
4	Battery failure	8 (256)	1=ALARM 0=NORMAL
4	Batt.TEMP sensor failure	9 (512)	1=ALARM 0=NORMAL
4	Battery temperature high	10 (1024)	1=ALARM 0=NORMAL
4	Rectifier input phase loss	11 (2048)	1=ALARM 0=NORMAL
4	PFC RESET	12 (4096)	1=ALARM 0=NORMAL
4	Waiting startup delay	13 (8192)	1=ALARM 0=NORMAL
4	Not used	14 (16384)	Not used
4	Not used	15 (32768)	Not used
5	TH1 temp HIGH	0 (1)	1=ALARM 0=NORMAL
5	TH1 temp HIGH	1 (2)	1=ALARM 0=NORMAL
5	TH2 temp LOW	2 (4)	1=ALARM 0=NORMAL
5	TH2 temp LOW	3 (8)	1=ALARM 0=NORMAL
5	FAN maintenance	4 (16)	1=ALARM 0=NORMAL
5	Battery maintenance	5 (32)	1=ALARM 0=NORMAL
5	Optional maintenance	6 (64)	1=ALARM 0=NORMAL
5	TH1 SENSOR FAIL	7 (128)	1=ALARM 0=NORMAL
5	TH2 SENSOR FAIL	8 (256)	1=ALARM 0=NORMAL
5	RESET Fault	9 (512)	1=ALARM 0=NORMAL
5	Battery CB open	10 (1024)	1=ALARM 0=NORMAL
5	General maintenance	11 (2048)	1=ALARM 0=NORMAL
5	PFC CAN COMM ERR	12 (4096)	1=ALARM 0=NORMAL
5	INV CAN COMM ERR	13 (8192)	1=ALARM 0=NORMAL
5	Not used	14 (16384)	Not used
5	Not used	15 (32768)	Not used

• **TX100 PROTOCOL HOLDING REGISTER map (for 1 phase UPS)**
MEASUREMENT GROUP (TX100 PROTOCOL)

Addr	Parameter	Unit	PROTOCOL	Min-max
0	RECTIFIER INPUT VOLTAGE 1 phase-phase	V	P1	0-511
1	RECTIFIER INPUT VOLTAGE 2 phase-phase	V	P1	0-511
2	RECTIFIER INPUT VOLTAGE 3 phase-phase	V	P1	0-511
3	Not used			
4	Not used			
5	Not used			
6	BYPASS INPUT VOLTAGE 1 phase-phase	Not used		
7	BYPASS INPUT VOLTAGE 2 phase-phase	Not used		
8	BYPASS INPUT VOLTAGE 3 phase-phase	Not used		
9	BYPASS INPUT VOLTAGE 1 phase-neutral	V	P1	0-511
10	BYPASS INPUT VOLTAGE 2 phase-neutral	Not used		
11	BYPASS INPUT VOLTAGE 3 phase-neutral	Not used		
12	INVERTER OUTPUT VOLTAGE 1 phase-phase	Not used		
13	INVERTER OUTPUT VOLTAGE 2 phase-phase	Not used		
14	INVERTER OUTPUT VOLTAGE 3 phase-phase	Not used		
15	INVERTER OUTPUT VOLTAGE 1 phase-neutral	Not used		
16	INVERTER OUTPUT VOLTAGE 2 phase-neutral	Not used		
17	INVERTER OUTPUT VOLTAGE 3 phase-neutral	Not used		
18	OUTPUT VOLTAGE 1 phase-phase	Not used		
19	OUTPUT VOLTAGE 2 phase-phase	Not used		
20	OUTPUT VOLTAGE 3 phase-phase	Not used		
21	OUTPUT VOLTAGE 1 phase-neutral (Bypass)	V	P1	0-255
22	OUTPUT VOLTAGE 2 phase-neutral (Bypass)	Not used		
23	OUTPUT VOLTAGE 3 phase-neutral (Bypass)	Not used		
24	RECTIFIER INPUT FREQUENCY	Not used		
25	BYPASS FREQUENCY	Hz*10	P1	
26	INVERTER FREQUENCY	Not used		
27	OUTPUT FREQUENCY (Bypass Freq. if Bypass)	Hz*10	P1	0-999
28	INPUT CURRENT PHASE 1	Not used		
29	INPUT CURRENT PHASE 2	Not used		
30	INPUT CURRENT PHASE 3	Not used		
31	OUTPUT CURRENT 1	Not used		
32	OUTPUT CURRENT 2	Not used		
33	OUTPUT CURRENT 3	Not used		
34	OUTPUT LOAD% 1 percentage	% LOAD	P1	0-255
35	OUTPUT LOAD% 2 percentage	Not used		
36	OUTPUT LOAD% 3 percentage	Not used		
37	TOTAL BATTERY VOLTAGE	V	P1	0-511
38	BATTERY CHARGE CURRENT	Not used		
39	BATTERY DISCHARGE CURRENT	Not used		
40	UPS INSIDE TEMPERATURE	Deg*10	P1 (if sensor used)	0-255
41	DEVICE NOMINAL ACTIVE POWER	W / 100	F2	0-65535
42	DEVICE INPUT PHASES		F2	1-3
43	DEVICE OUTPUT PHASES		F2	1-3
44	DEVICE NOMINAL INPUT VOLTAGE	V	F2	
45	DEVICE NOMINAL INPUT FREQUENCY	Hz*10	F2	
46	NOMINAL BYPASS VOLTS	V	F2	
47	NOMINAL BYPASS FREQUENCY	Hz*10	F2	
48	NOMINAL OUTPUT VOLTAGE	V	F2	
49	NOMINAL OUTPUT FREQUENCY	Hz*10	F2	
50	NUMBER OF 12 VOLT BATTERIES		F2	0-255
51	FAULT OR STATUS CODE		P1	0-255
52	DEVICE CONFIGURATION		F2	0-1
53	DEVICE TYPE		F2	0-1
54	BYPASS CONFIGURATION		F2	0-1
55	BATTERY CONFIGURATION		F2	0-1
56	UPS PROTOCOL		0:TX100, 1:TX300, 2:MC114 (I/VVV)	0-255
57	MODBUS adaptor revision number			0-255

ALARM AND STATUS GROUP BIT MEANING (TX100 PROTOCOL)

Addr	Alarms	BIT	Description
100	inverter heatsink overtemp	7(128)	1=ALARM 0=NORMAL
100	inverter output voltage high	6(64)	1=ALARM 0=NORMAL
100	inverter output voltage low	5(32)	1=ALARM 0=NORMAL
100	output overload	4(16)	1=ALARM 0=NORMAL
100	battery voltage high	3(8)	1=ALARM 0=NORMAL
100	internal overcurrent	2(4)	1=ALARM 0=NORMAL
100	phase synchron bad	1(2)	0=SYNCHRON 1=FREE RUNNING
100	bypass voltage bad	0(1)	1=ALARM 0=NORMAL
101	General UPS alarm	7(128)	1=ALARM 0=NORMAL
101	Output off	6(64)	1=ALARM 0=NORMAL
101	fuse failure	5(32)	1=ALARM 0=NORMAL
101	battery CB open	4(16)	1=ALARM 0=NORMAL
101	replace batteries	3(8)	1=ALARM 0=NORMAL
101	performing boost charge	2(4)	1=ALARM 0=NORMAL
101	rotate rectifier input phases	1(2)	1=ALARM 0=NORMAL
101	Emergency stop	0(1)	1=ALARM 0=NORMAL
102	Maintenance bypass	7(128)	1=ALARM 0=NORMAL
102	Manual bypass	6(64)	1=ALARM 0=NORMAL
102	Rectifier fault	5(32)	1=ALARM 0=NORMAL
102	mains failure on rectifier input	4(16)	1=ALARM 0=NORMAL
102	battery voltage low	3(8)	1=ALARM 0=NORMAL
102	load on bypass	2(4)	1=ON BYPASS 0=ON INVERTER
102	UPS fault	1(2)	1=ALARM 0=NORMAL
102	performing battery test	0(1)	1=PERFORMING TEST 0=NORMAL
103	waiting shutdown or UPS shutdown	7(128)	1=ALARM 0=NORMAL
103	beeper off/on	6(64)	1=OFF 0=ON
103	Fan failure	5(32)	Not used
103	End off backup time	4(16)	1=ALARM 0=NORMAL
103		3(8)	NU
103		2(4)	NU
103		1(2)	NU
103		0(1)	NU

• STS PROTOCOL HOLDING REGISTER map (for STATIK TRANSFER SWITCH)
MEASUREMENT GROUP (STS PROTOCOL)

Addr	Parameter	Unit	PROTOCOL	Min-max
0	SOURCE-1 INPUT VOLTAGE Phase-Neutral (L1)	V	SRV	0-511
1	SOURCE-1 INPUT VOLTAGE Phase-Neutral (L2)	V	SRV	0-511
2	SOURCE-1 INPUT VOLTAGE Phase-Neutral (L3)	V	SRV	0-511
3	SOURCE-2 INPUT VOLTAGE Phase-Neutral (L1)	V	SRV	0-511
4	SOURCE-2 INPUT VOLTAGE Phase-Neutral (L2)	V	SRV	0-511
5	SOURCE-2 INPUT VOLTAGE Phase-Neutral (L3)	V	SRV	0-511
6	Not used	Not used		
7	Not used	Not used		
8	Not used	Not used		
9	Not used	Not used		
10	SOURCE-1 INPUT FREQUENCY	Hz*10	SRV	0-999
11	SOURCE-2 INPUT FREQUENCY	Hz*10	SRV	0-999
12	Not used	Not used		
13	Not used	Not used		
14	Not used	Not used		
15	REFER TO ALARM TABLE.*****			
16	REFER TO ALARM TABLE.*****			
17	REFER TO ALARM TABLE.*****			
18	REFER TO ALARM TABLE.*****			
19	REFER TO ALARM TABLE.*****			
20	Not used	Not used		
21	Not used	Not used		
22	Not used	Not used		
23	Not used	Not used		
24	OUTPUT LOAD PERCENTAGE % (L1)	% LOAD	OPL	0-255
25	OUTPUT LOAD PERCENTAGE % (L2)	% LOAD	OPL	0-255
26	OUTPUT LOAD PERCENTAGE % (L3)	% LOAD	OPL	0-255
27	Not used	Not used		
28	Not used	Not used		
29	Not used	Not used		
30	OUTPUT LOAD CURRENT (L1)	A	OPL	0-511
31	OUTPUT LOAD CURRENT (L2)	A	OPL	0-511
32	OUTPUT LOAD CURRENT (L3)	A	OPL	0-511
33	Not used	Not used		
34	Not used	Not used		
35	Not used	Not used		
36	STS CABINET INSIDE TEMPERATURE	Deg*10	OPL	0-511
37	SYNCHRON ANGLE	Deg	OPL	0-511
38	Not used	Not used		
39	Not used	Not used		
40	Not used	Not used		
41	SOURCE-1 PHASE BALANCE		SST	0-65535
42	SOURCE-2 PHASE BALANCE		SST	0-65535
43	L3 ANALOG SYNCHRON DIFFERENCE		SST	0-511
44	Not used	Not used		
45	Not used	Not used		
46	Not used	Not used		
47	Not used	Not used		
48	POWER SUPPLY-1 DC OUTPUT VOLTAGE	V	SST	0-511
49	POWER SUPPLY-2 DC OUTPUT VOLTAGE	V	SST	0-511

ALARM AND STATUS GROUP BIT MEANING (STS PROTOCOL)

Addr	Alarms	BIT	Description
15	Source-1 Voltage out of tolerant	7(128)	1=ALARM 0=NORMAL
15	Source-1 phase synchron not OK	6(64)	1=ALARM 0=NORMAL
15	Not used	5(32)	0
15	Source-1 Black Out	4(16)	1=ALARM 0=NORMAL
15	Source-1 Balance bad	3(8)	1=ALARM 0=NORMAL
15	Source-1 Frequency bad	2(4)	1=ALARM 0=NORMAL
15	Source-1 Input SW off	1(2)	1=OFF 0=NORMAL
15	Source-1 SCR alternance loss	0(1)	1=ALARM 0=NORMAL
16	Source-2 Voltage out of tolerant	7(128)	1=ALARM 0=NORMAL
16	Source-2 phase synchron not OK	6(64)	1=ALARM 0=NORMAL
16	Not used	5(32)	0
16	Source-2 Black Out	4(16)	1=ALARM 0=NORMAL
16	Source-2 Balance bad	3(8)	1=ALARM 0=NORMAL
16	Source-2 Frequency bad	2(4)	1=ALARM 0=NORMAL
16	Source-2 Input SW off	1(2)	1=OFF 0=NORMAL
16	Source-2 SCR alternance loss	0(1)	1=ALARM 0=NORMAL
17	SOURCE-1 Bad	7(128)	1=ALARM 0=NORMAL
17	SOURCE-2 Bad	6(64)	1=ALARM 0=NORMAL
17	Synchron BAD	5(32)	1=ALARM 0=NORMAL
17	Overload	4(16)	1=ALARM 0=NORMAL
17	Non synchron inhibit	3(8)	1=INHIBIT 0=NORMAL
17	Transfer inhibit	2(4)	1=INHIBIT 0=NORMAL
17	Over temperature	1(2)	1=ALARM 0=NORMAL
17	Performing transfer test	0(1)	1=PERFORMING 0=NORMAL
18	POWER SUPPLY-1 Failure	7(128)	1=ALARM 0=NORMAL
18	POWER SUPPLY-2 Failure	6(64)	1=ALARM 0=NORMAL
18	Output SCR alternance loss	5(32)	1=ALARM 0=NORMAL
18	SOURCE-1 manuel transfer	4(16)	1=TRANSFER 0=NORMAL
18	SOURCE-2 manuel transfer	3(8)	1=TRANSFER 0=NORMAL
18	SOURCE-1 maintenance by-pass	2(4)	1=ALARM 0=NORMAL
18	SOURCE-2 maintenance by-pass	1(2)	1=ALARM 0=NORMAL
18	Output Switch OFF	0(1)	1=OFF 0=NORMAL
19	Preferred SOURCE	7(128)	1=SOURCE-2 0=SOURCE-1
19	Output SOURCE	6(64)	1=SOURCE-2 0=SOURCE-1
19	LOGIN	5(32)	1=NOT LOGGED 0=SERVICE LOGIN
19	Sound	4(16)	1=OFF 0=ON
19	LOGIN	3(8)	1=NOT LOGGED 0=USER LOGIN
19	SOURCE-1 Input MCCB Trip	2(4)	1=ALARM 0=NORMAL
19	SOURCE-2 Input MCCB Trip	1(2)	1=ALARM 0=NORMAL
19	Not used	0(1)	0

