RTU TELEM MODULES TELEM-DO8, TELEM-DI24 and TELEM-AI12 (REMOTE TERMINAL UNIT)

USER'S MANUAL
Technical documentation, programming, installation and setup instructions, drawings

2001

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MARTEM AS
Akadeemia tee 21G
12618 Tallinn, ESTONIA

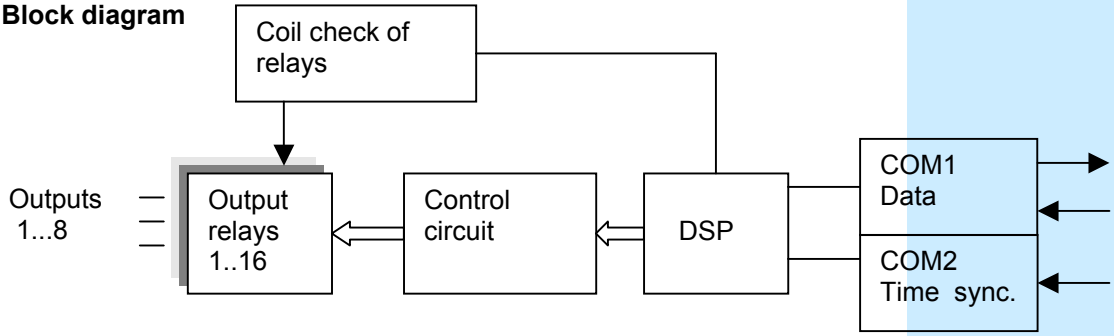
ISO 9001 EVS-EN No. K-010/K73; K74.2
Tel. +372 639 7979
Fax +372 639 7980

martem@online.ee
www.martem.ee
Reg. No. 10405229

TELEM-DO8 digital output RTU module

The TELEM family RTU module TELEM-DO8 has relay outputs for controlling 8 objects. It has 8 output relays for “On” and 8 output relays for “Off” operation. Module bases on 16-bit DSP. Module can be an independent RTU or can be interfaced to SCS system. It interfaces to other equipment via RS-232, RS-422 or RS-485 hardware interfaces. TELEM-DO8 communicates with IEC60870-5-101 protocol, which is international telecommunication standard for SCADA systems.

1. Block diagram



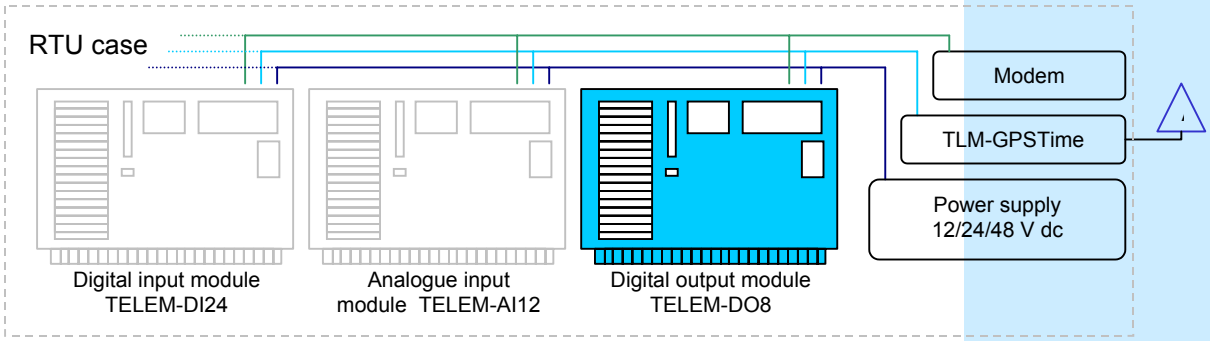
New features

* Offline mode operation, data GSM communication request by RTS

* Configuration / parameterization with IEC protocol at the same line with data communication

* Pulse length 20ms …1min. with 1 ms. accuracy, pulse series 1…256 pulses

1.1 RTU module connections



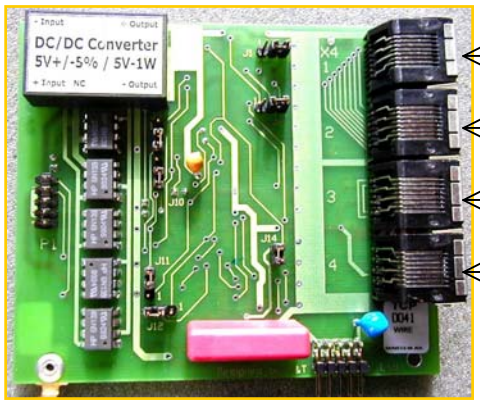
2. Technical data

1. 8 independently configurable control outputs (2 relays for 1 output, Trip/close control)
2. Coil impedance control before control operation (select / execute)
3. Every relay has 1 NO and 1 NC contact pairs
4. Relay execute has 1NO contact to screw terminal (X2; 49,50)
5. Relay parameters:
   - 5 A, 220 V, AC, 1100 VA or 0.2 A, 220 V DC, 48 W
   - isolation between contacts 2000V AC, between coil and contacts: 2000V AC
6. Every output has 2 LED-s for state indication
7. Every output has it's own detachable terminal
8. Built in clock with backup battery.

3. Configuration parameters

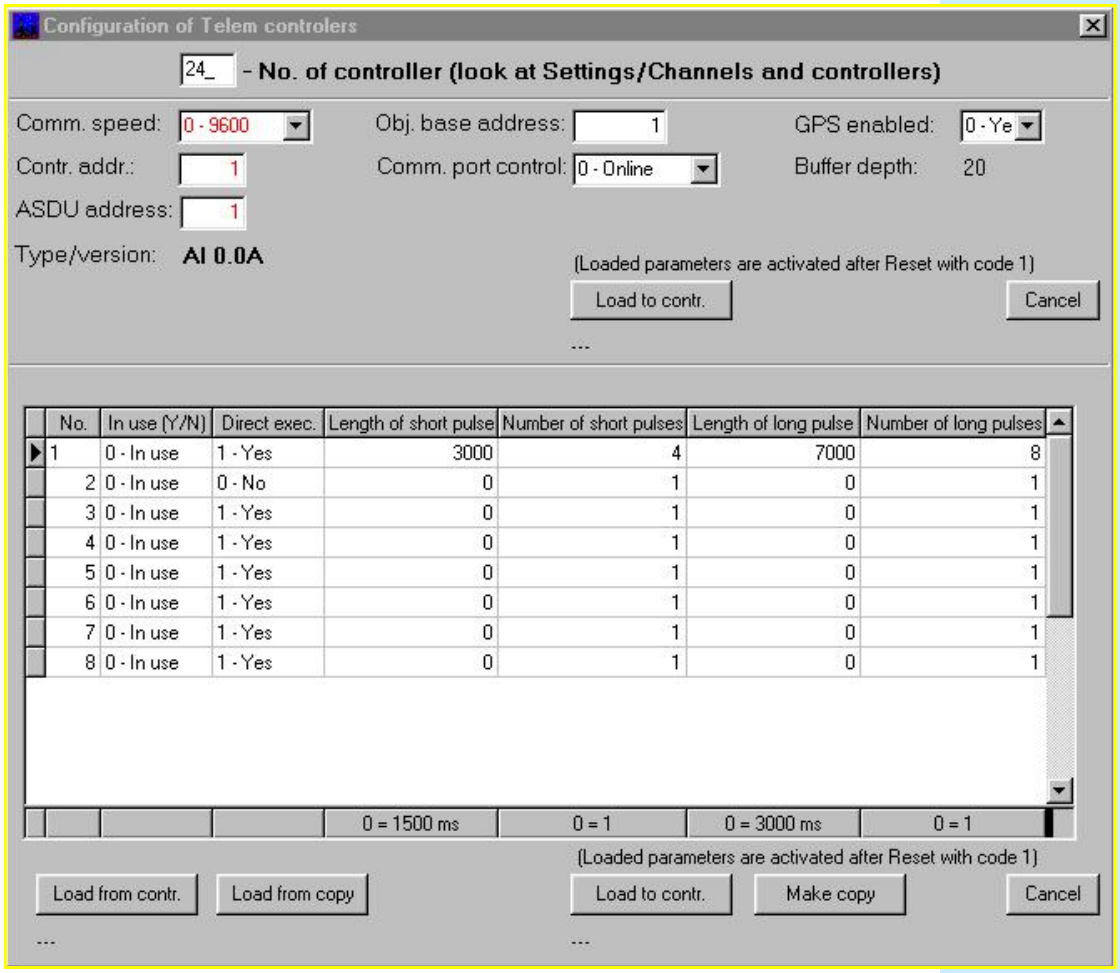
3.1 Configuration parameters for module

Parameter	Between	Default value
1. Communication speed	200 – 38400 bps	9600
2. Link address	1-255	1
3. ASDU address	1-255	1
4. Objects base address	0-65534	0
5. Communication mode	Online Online with RTS/CTS Offline with RTS/DCD	Online
6. GPS enabled	Yes/No	Yes
7. Buffer depth for each (in/out) command		20
8. Type/version: Loaded module program version (ex. DO0.1)		



Communication board TLM-WIRE

3.2 Configuration parameters for digital outputs



Parameter	Value	Default value (in cell)
1. In use	Yes/No	Yes
2. Control mode (Direct execute)	Select and execute / Execute	Select and execute (0-No)
3. Short pulse duration	20- 65535 ms.	1500 ms (0)
4. Number of short pulses	1- 256 n	1 (1)
5. Long pulse duration	20- 65535 ms.	2000 ms (0)
6. Number of long pulses	1- 256 n	1 (1)

RTU Module is configurable by Telem-2000 software or other configuration software, which has IEC60870-5-101 protocol. Configuration parameters are altered using IEC60870-5-101 protocol parameter setting commands. Parameter setting commands specification for this module is available on request. Telem-2000 RTU configuration software runs under the Windows -95, -98, -2000 and NT4.0 operating systems on any standard PC, communicates via it's COM interface and performs the following principal functions:

- Configuration / parameterization of telecontrol substations
- Back up of RTU configuration data
- Diagnostics and real-time supervision simultaneously with data acquisition.

4. Communication

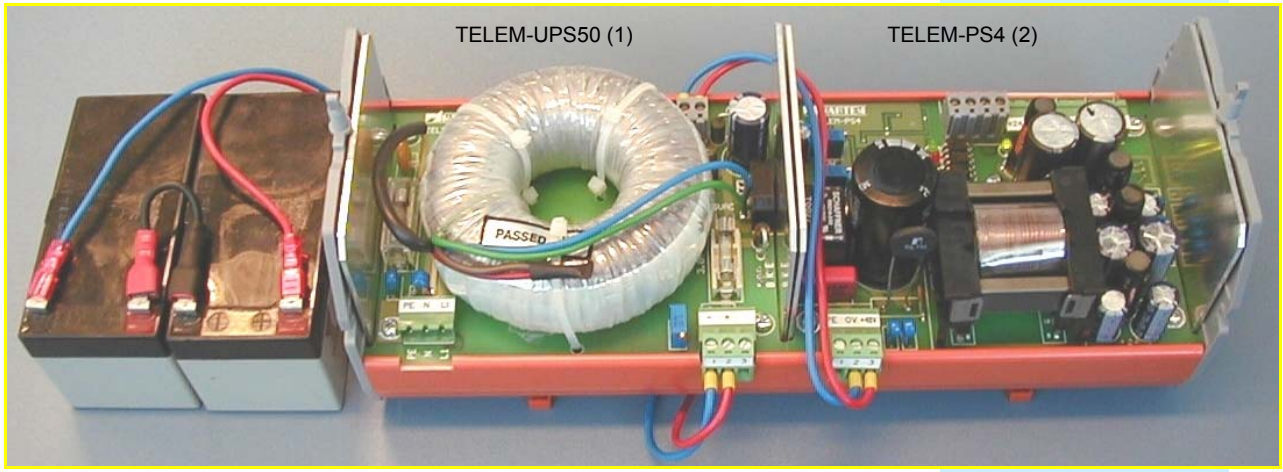
1. Asynchronous 200…38400 bps, data bits 8, parity N, stop bits 1
2. Communication protocol: IEC60870-5-101 unbalanced mode, slave
3. Address lengths: Link- 1 byte, ASDU- 2 byte, object- 2 byte
4. GPS input 9600 bps (RS422/485 RX), protocol: ASCII (Motorola), device TLM-GPSTime
5. Selectable communication interface: RS-232, RS-422 or RS-485
6. Communication interface is optically isolated to 2,5kV RMS

5. Power requirements

1. 7-24V DC, 4 VA
2. 24V DC –2/+10%,2 VA
3. Fuse protection 7-24V (not replaceable) 0,5A , time-lag
4. Fuse protection 24V (replaceable) 100mA quick

We offer the power supplies:

1. TELEM-UPS50 input 220V AC 70VA output 48V DC, with 7Ah (2x12V Pb) accumulator and recharging system
2. TELEM-PS4 input 24-110V DC 60VA isolated outputs 12V, 24V, isolated 48V and isolated 12V, 2 output optic signal (work accumulator) and shutdown after 40 sec. (accumulator critically low)



Power supplies have 4 kV isolation. One power supply TELEM-PS4 can feed 10 TELEM-DO8 modules

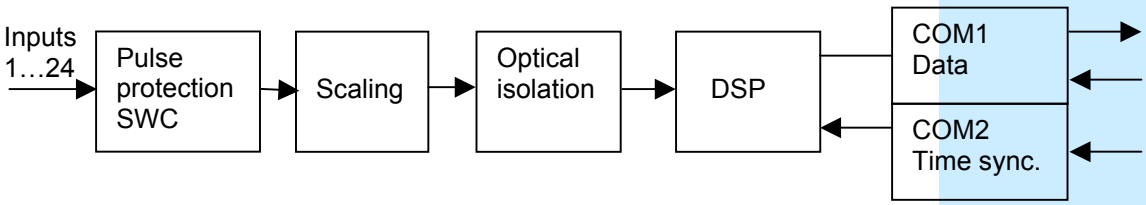
6. Installation, terminals and environment

1. Enclosure BOPLA RCP2000, IP54 210x180x80mm
2. Weight 2,6 kg.
3. Mountable to DIN 35 or with screws
4. For outputs detachable PHOENIX terminals GMVSTB4 for 2,5/4 mm² wires
5. For powering detachable PHOENIX terminal GMVSTB6 for 2,5/4 mm² wires
6. For communication four RJ45 shielded connectors
7. Over voltage protection:
   - IEC-255-4, 5 kV pulse protection
   - IEC-255-5, 2 kV DC
8. Ambient temperature range in operation: –20…+50°C

TELEM-DI24 digital input RTU module

The TELEM family RTU module TELEM-DI24 has 24 inputs, which can be configured to digital inputs or counter inputs. Module bases on 16-bit DSP. Module can be an independent RTU or can be interfaced to SCS system. It interfaces to other equipment via RS-232, RS-422 or RS-485 hardware interfaces. TELEM-DI24 communicates with IEC60870-5-101 protocol, which is international telecommunication standard for SCADA systems. Module has time synchronization input for GPS receiver.

1. Block diagram



New features

* GPS time synchronization with ms accuracy

* 2 level input filters

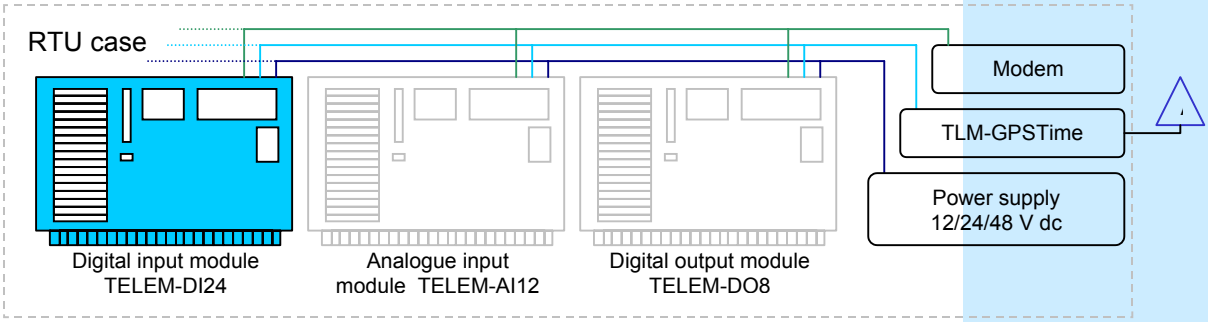
* Buffer depth for each time tagged input >=45

* Logical operations with inputs

* Offline mode operation, data GSM communication request by RTS

* Configuration / parameterization with IEC protocol at the same line with data communication

1.1 RTU module connections



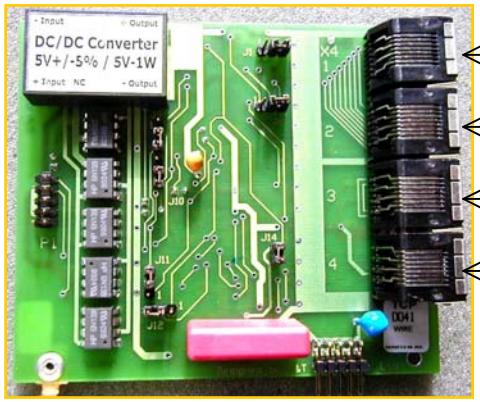
2. Technical data

1. 24 isolated independently configurable inputs
2. Inputs are configurable to single DI, double DI or counter input
3. Digital inputs have configurable 2 level filters
4. Logical operations with inputs
5. Internal power 48V DC, External power for inputs: 12V, 24V, 110V AC or DC
6. Signal current on closed contacts: 8…12mA
7. Every input has LED for state indication
8. Input isolation voltage: 2,5kV 1 min. (IEC255-5)
9. Pulse and static protection between input and FGND: 430V RMS
10. Inputs scanning time: 1ms
11. Built in clock with backup battery for time tagging. Clock is synchronized by GPS receiver or with IEC protocol command. On synchronizing by GPS the clock guarantees time tagging with 1 ms accuracy.
12. In offline mode requests communication with RTS signal

3. Configuration parameters

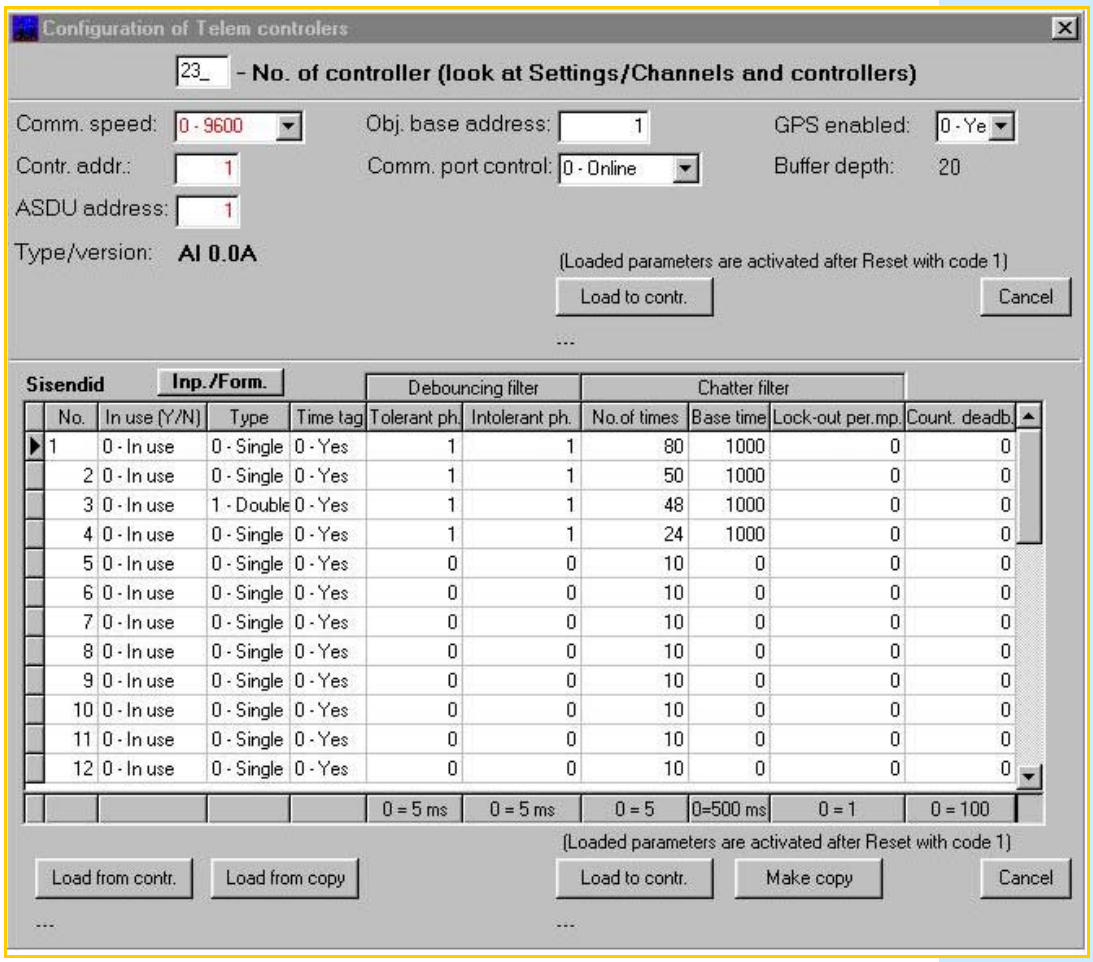
3.1 Configuration parameters for module

Parameter	Between	Default value
1. Communication speed	200 – 38400 bps	9600
2. Link Address	1-255	1
3. ASDU address	1-255	1
4. Objects base address	0-65534	0
5. Communication mode	Online Online with RTS/CTS Offline with RTS/DCD	Online
6. GPS enabled	Yes/No	Yes
7. Buffer depth for each time tagged input (Increases if some inputs are not in use, on 24 I/O depth = 45)		45
8. Type/version: Loaded module program version (ex. DI0.1)		



Communication board TLM-WIRE

3.2 Configuration parameters for digital inputs



Parameter	Value	Default value (in cell)
Common		
1. In use	Yes/No	Yes
2. Single- or double signal or counter input In case of double signal the next input is used for second signal	Single/ Doubel/ Counter	Single
3. Time tagged	Yes/No	Yes
Debouncing filter		
4. Tolerant phase (A period of time during which changes of state are permitted and ignored on a digital input signal)	1-255 ms.	5 ms (0)
5. Intolerant phase (A period of time during which the state of a digital input must remain constant)	1-255 ms.	5 ms (0)

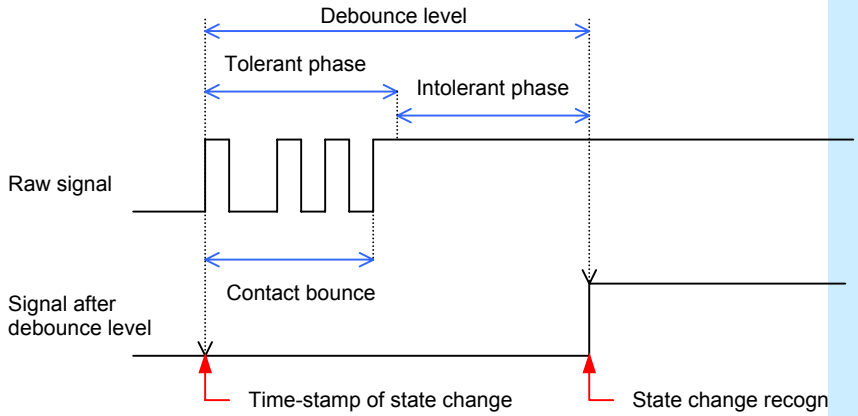
Parameter	Value	Default value (in cell)
Chatter filter A facility that is used to disable a digital input point if the number of state changes of that point during a defined time interval is excessively high		
6. Chatter times (changes)	1-255 times	5 (0)
7. Filter base (defined time interval)	0-32000 ms.	500 ms (0)
8. Lock-out period multiplier (number of filter base periods when the chatter filter will be on)	1-255 periods	1 (0)
Counter		
9. Number of pulses for creating an event Counter event is always without time tag	1-255 pulses	100 (0)

3.3 Digital input processing

3.3.1 Debouncing filter

Tolerant phase: A period of time during which contact bounce is “acceptable”. Having a tolerant period allows you to monitor and time-stamp the initial state of change, while ignoring any subsequent contact bounce.

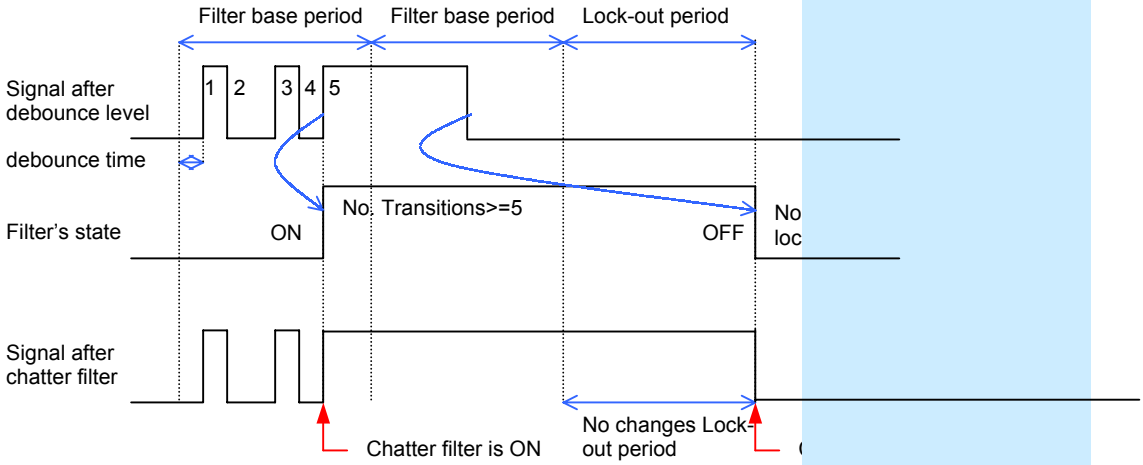
Intolerant phase: A period of time following the tolerant phase during which contact bounce is not “acceptable”. It ensures that contact bounce is not mistaken for a valid change of state.



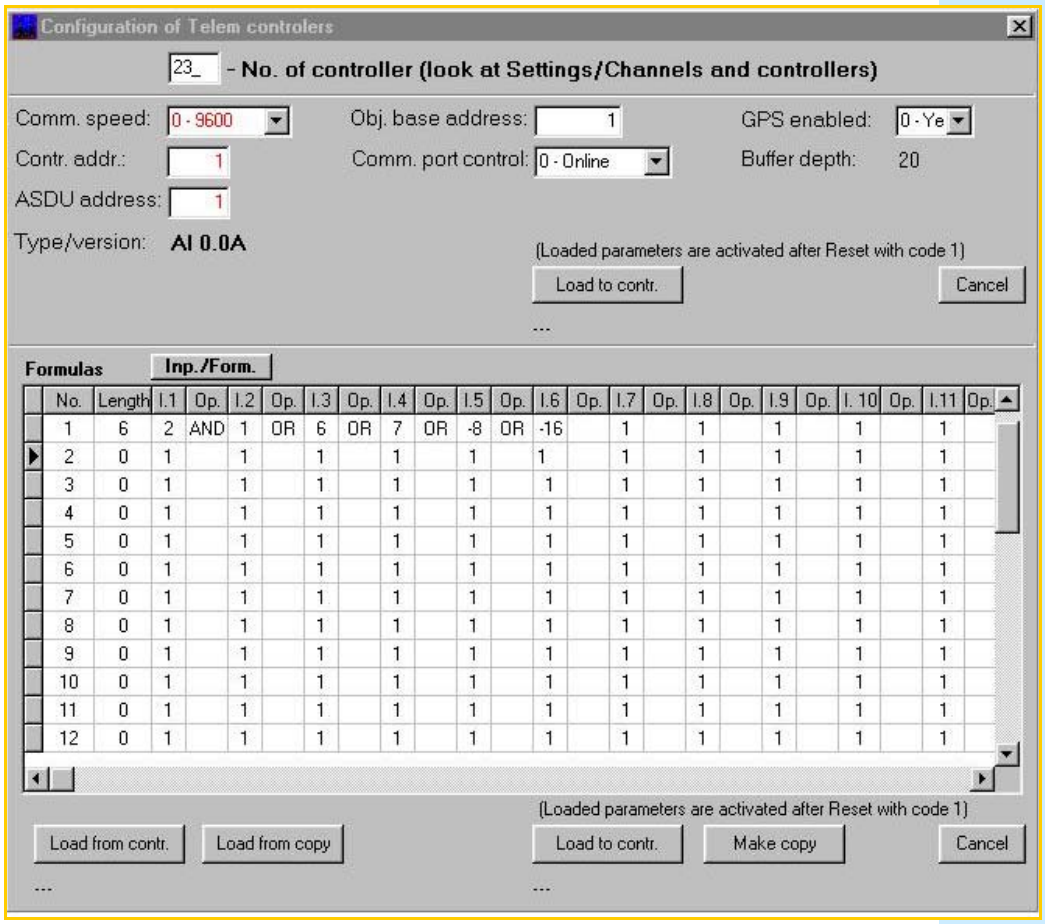
3.3.2 Chatter filter

Chatter times (changes): The maximum allowable number of state transitions that can occur within a filter base period. If the number of state transitions during a filter period equals or exceeds the maximum allowable number of state transitions, chatter filter will turn ON, and any further transitions will be ignored for the duration of the “lock-out” period.
Lock-out period: The minimum number of filter base periods during which the chatter filter will remain ON. The chatter filter can proceed from ON to OFF only if no state transitions are detected for an entire lock-out period.

Example: Chatter times (changes) 5, Lock-out period 1



3.4 Logical operations with digital inputs



It is possible to configure the formulas where inputs are combined with NOT, AND, OR and XOR operations.
In case of using formulas every formula occupies one IEC protocol object address of inputs (substitutes the input).

By default the IEC objects and inputs are bound with following formulas:

Y1 = X1
Y2 = X2
…Y24 = X24 Where X is input and Y is the calculated value.

RTU Module is configurable by Telem-2000 software or other configuration software, which has IEC60870-5-101 protocol. Configuration parameters are altered using IEC60870-5-101 protocol parameter setting commands. Parameter setting commands specification for this module is available on request. Telem-2000 RTU configuration software runs under the Windows -95, -98, -2000 and NT4.0 operating systems on any standard PC, communicates via it's COM interface and performs the following principal functions:

- Configuration / parameterization of telecontrol substations
- Back up of RTU configuration data
- Diagnostics and real/time supervision simultaneously with data acquisition.

4. Communication

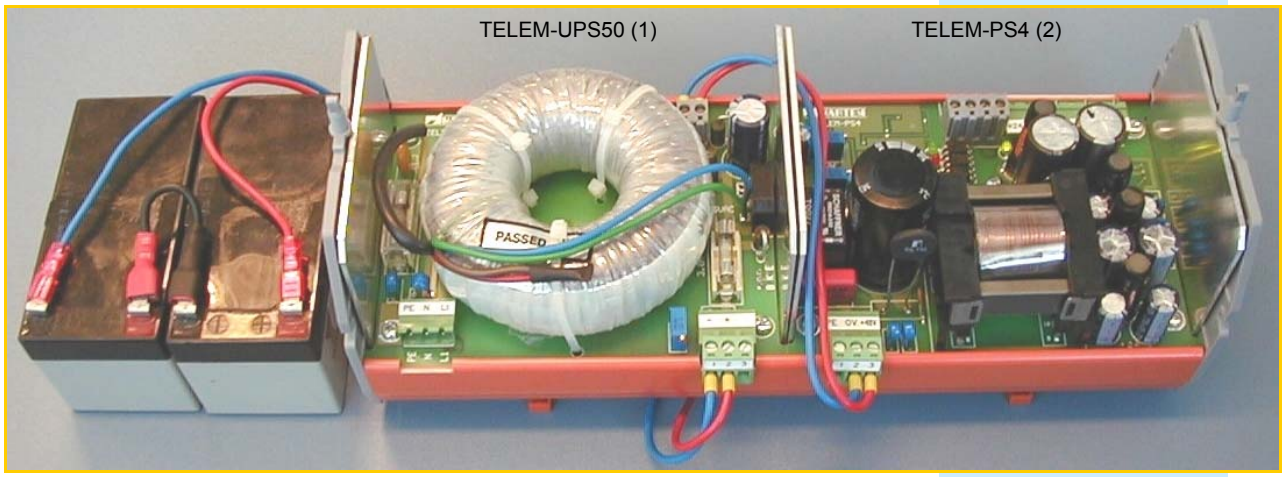
1. Asynchronous 200…38400 bps, data bits 8, parity N, stop bits 1
2. Communication protocol: IEC60870-5-101 unbalanced mode, slave
3. Address lengths: Link- 1 byte, ASDU- 2 byte, object- 2 byte, time object address 64511 dec
4. GPS input 9600 bps (RS422/485 RX), protocol: ASCII (Motorola), device TLM-GPSTime
5. PCB Selectable communication interface: RS-232, RS-422 or RS-485
5. Communication interface is optically isolated to 2,5kV RMS

5. Power requirements

1. 7-24V DC, 4 VA for CPU board
2. Isolated 48V –10/+25%, DC, 10VA for digital inputs
3. Fuse protection 7-24V (not replaceable) 0,5A, time-lag
4. Fuse protection 48V (not replaceable) 0,5A, time-lag

We offer the power supplies:

1. TELEM-UPS50 input 220V AC 70VA output 48V DC, with 7Ah (2x12V Pb) accumulator and recharging system
2. TELEM-PS4 input 24-110V DC 60VA isolated outputs 12V, 24V, isolated 48V and isolated 12V, 2 output optic signal (work accumulator) and shutdown after 40 sec. (accumulator critically low)



Power supplies have 4 kV isolation. One power supply TELEM-PS4 can feed 3 TELEM- DI24 modules.

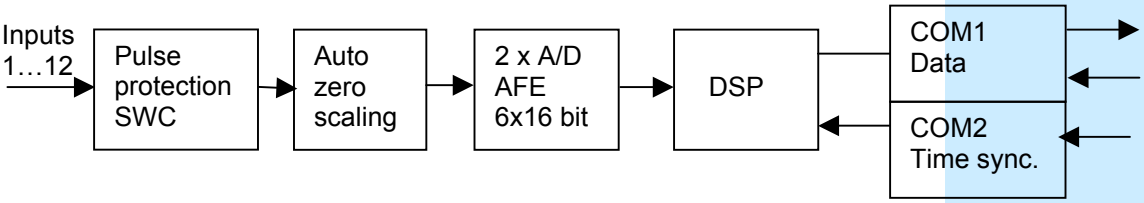
6. Installation, terminals and environment

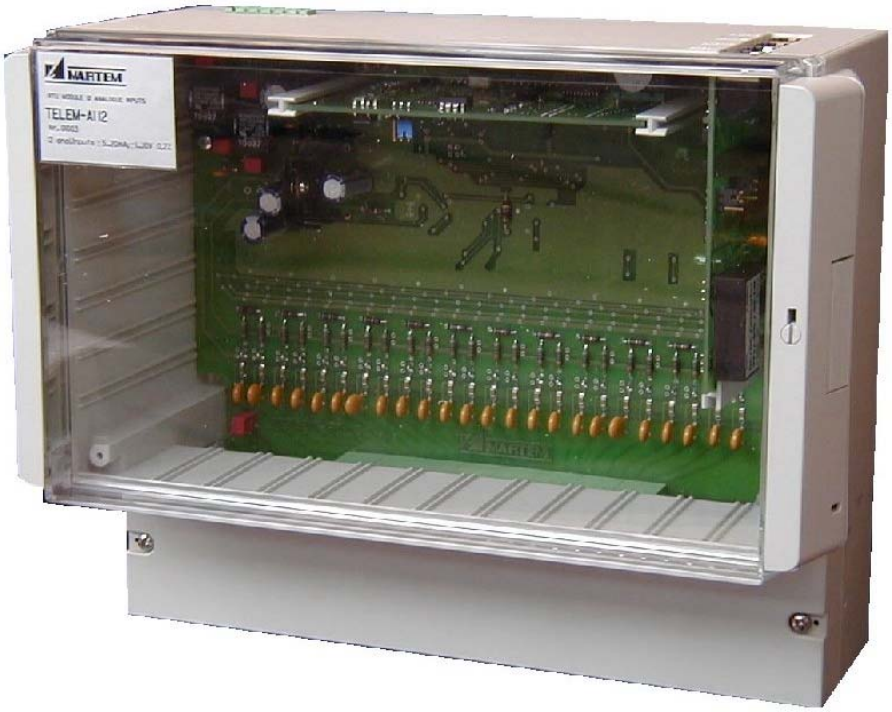
1. Enclosure BOPLA RCP2000, IP54 210x180x80mm
2. Weight 2,2 kg.
3. Mountable to DIN 35 or with screws
4. For signal cabling PHOENIX terminals MKDS3/8 for 2,5/4 mm² wires
5. For powering detachable PHOENIX terminal GMVSTB for 2,5/4 mm² wires
6. For communication four RJ45 shielded connectors
7. Over voltage protection:
   - IEC-255-4, 5 kV pulse protection
   - IEC-255-5, 2 kV DC
8. Ambient temperature range in operation: –20…+50°C

TELEM-AI12 analog input RTU module

The TELEM family RTU module TELEM-AI12 has 12 differential analogue inputs. Module bases on 16-bit DSP. Module can be an independent RTU or can be interfaced to SCS system. It interfaces to other equipment via RS-232, RS-422 or RS-485 hardware interfaces. TELEM-AI12 communicates with IEC60870-5-101protocol, which is international telecommunication standard for SCADA systems. Module has time synchronization input for GPS receiver.

1. Block diagram





New features

* GPS time tagged measurements for quick changes

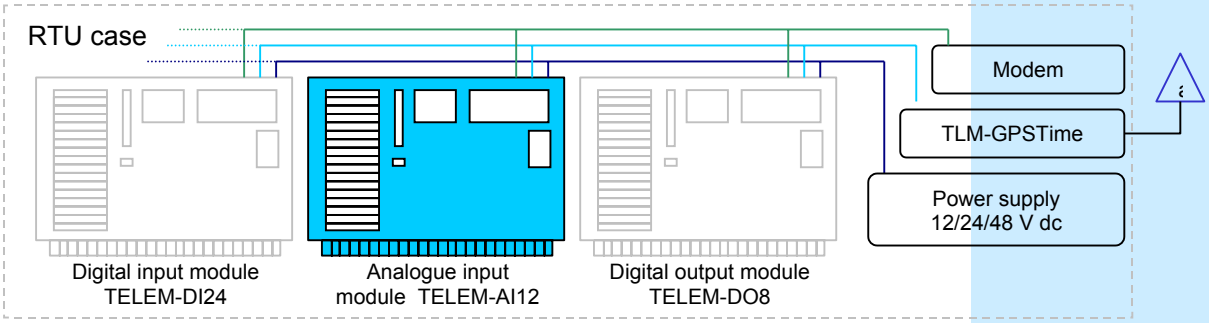
* Offline mode operation, data GSM communica-tion request by RTS

* Periodically saved measurements, buffer size for each input is up to 126 measurements

* Configuration / parame-terization with IEC protocol at the same line with data communication

* User configurable input ranges for every input +/-5mA…+/-20mA, 4…20mA, A/D res. 16 bits

1.1 RTU module connections



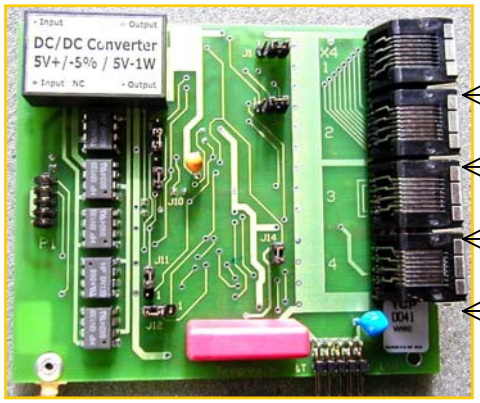
2. Technical data

1. 12 differential independently configurable inputs
2. Input ranges: - 0-5 mA , 0-10 mA, 0-20 mA, 4-20 mA, +/-5 mA, +/-10 mA, +/-20 mA
   - on request : 0-1 V, 0-10 V, +/-1 V, +/-10 V
3. Measurement accuracy: 0.2% (automatically scaled)
4. Resolution: 12 bits (16 bit AD-C resolution)
5. Inputs scanning time: 1ms
6. Auxiliary 24 V power for 4-20mA and 0-20mA inputs is commutable on RTU board
7. Pulse and static protection between input and FGND: 100V RMS
8. Built in clock with backup battery for time tagging. Clock is synchronized by GPS receiver or with IEC protocol command. On synchronizing by GPS the clock maintains 1 ms accuracy.
9. Measured values are transferred in normalized form.
10. Quick value changes can be registered with time tag (min and max value).
11. Periodical time tagged measurements
12. In offline mode requests communication with RTS signal

3. Configuration parameters

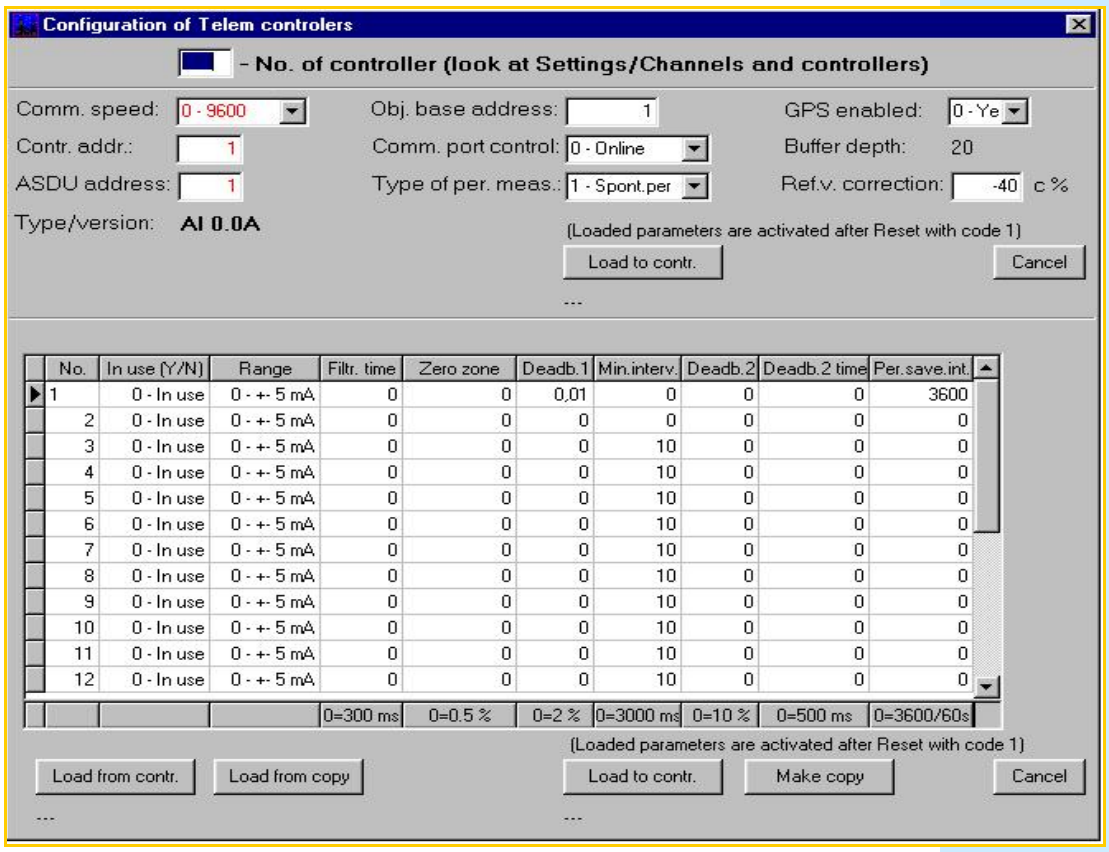
3.1 Configuration parameters for module

Parameter	Between	Default value
1. Communication speed	200 – 38400 bps	9600
2. Link Address	1-255	1
3. ASDU address	1-255	1
4. Objects base address	0-65534	0
5. Communication mode	Online Online with RTS/CTS Offline with RTS/DCD	Online
6. Type of periodical analog measurements On Spont. per. sends time tagged values after specified interval (3.2.8). On Request per. collects time tagged measurements and sends only on request	Spont. per./ Request per.	Spont.per.
7. GPS enabled	Yes/No	Yes
8. Buffer depth for each time tagged input (Increases if some inputs are not in use , 12 I/O- depth is 20)		20
9. Referents voltage correction (factory setting ex. –40 ‰)		0
10. Type/version: Loaded module program version (ex. AI0.1)		



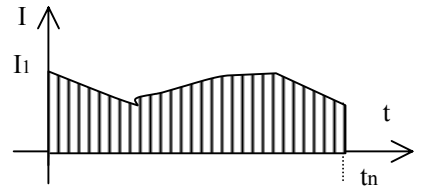
Communication board TLM-WIRE

3.2 Configuration parameters for analog inputs



Parameter	Value	Default value (in cell)
1. In use	Yes/No	Yes
2. Input signal range	0…5; 0…10; 0…20 +/-5; +/-10; +/-20; 4…20mA	+/-5 mA
3. Filtration coefficient Determines, how many samples are averaged (1 ms time resolution). Drawing 1.	1- 65535 ms.	300 ms (0)
3. Zero zone If value is in this range around zero, then it is transferred as zero. Drawing 2.	0,01- 25,5%	0,5 % (0)
4. Dead Band 1 for events without time tag. Drawing 3.	0,01- 25,5%	2 % (0)
5. Min. interval for events. Drawing 4.	1- 65535 ms	3000 ms (0)
6. DeadBand2 for time tagged event. If this value change takes place within p.7 specified time period, then two events are created with min. and max. values of this time period. Drawing 5.	0,01- 65%	10 % (0)
7. Time interval for Dead band 2. Drawing 5.	1- 65535 ms	600 ms (0)
8. Time interval for periodical time tagged event and tagged values (p. 3.1.6). Drawing 6	1- 65535 sec.	3600 sec.(0)

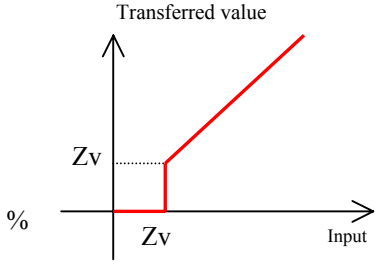
3.3 Analogue inputs configuration descriptions



Draw 1.

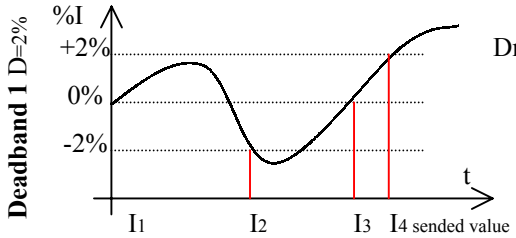
$I_1 = I_{SUM}(t_0 \ldots t_n)/tn$ **Filter time** D t_n=300mS

r

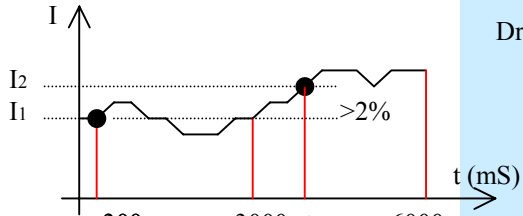


Draw 2.

Zero zone D = +/-0,5%

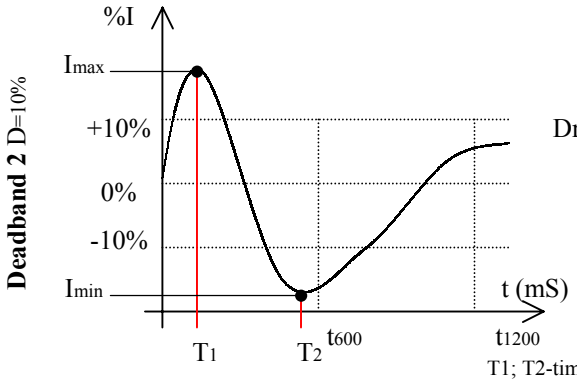


Draw 3.



Draw 4.

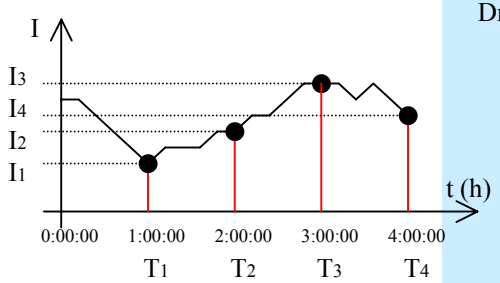
Min. send interval D=3000mS



Draw 5.

T1; T2-time tagged value

Deadband 2 time D=600mS t_{600} send Imin,T2 and Imax,T1



Draw 6.

Period save intervals D=60 min

RTU Module is configurable by Telem-2000 software or other configuration software, which has IEC60870-5-101 protocol. Configuration parameters are altered using IEC60870-5-101 protocol parameter setting commands. Parameter setting commands specification for this module is available on request. Telem-2000 RTU configuration software runs under the Windows -95, -98, -2000 and NT4.0 operating systems on any standard PC, communicates via it's COM interface and performs the following principal functions:

- Configuration / parameterization of telecontrol substations
- Back up of RTU configuration data
- Diagnostics and supervision real/time simultaneously with data acquisition.

4. Communication

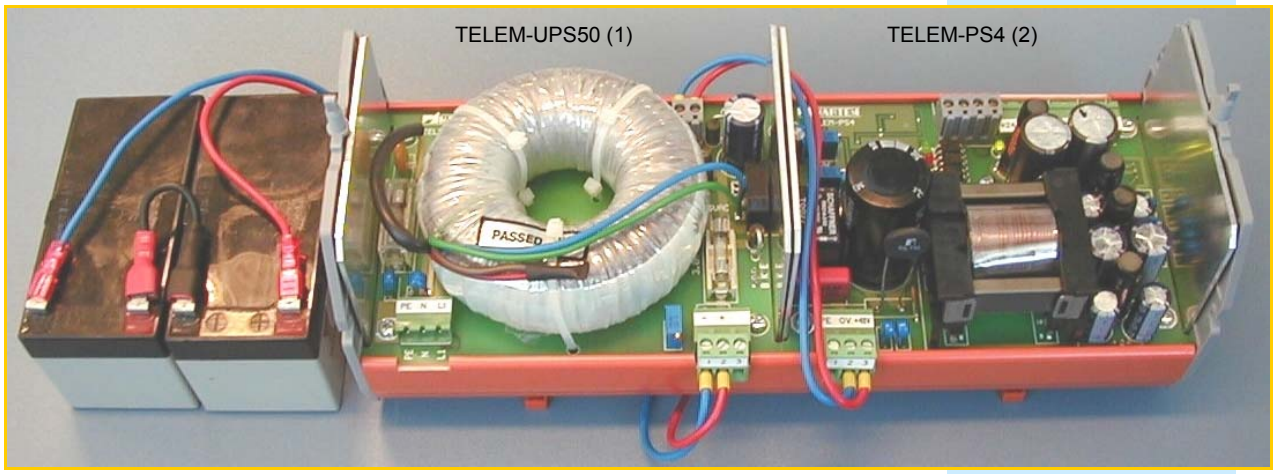
1. Asynchronous 200…38400 bps, data bits 8, parity N, stop bits 1
2. Communication protocol: IEC60870-5-101 unbalanced mode, slave
3. Address lengths: Link- 1 byte, ASDU- 2 byte, object- 2 byte, time object address 64511 dec
4. GPS input 9600 bps (RS422/485 RX), protocol: ASCII (Motorola), device TLM-GPSTime
5. PCB Selectable communication interface: RS-232, RS-422 or RS-485
6. Communication interface is optically isolated to 2,5kV RMS

5. Power requirements

1. 7-24V DC, 4 VA for CPU board
2. 24V DC –2/+10%, 8 VA for transducers with auxiliary supply
3. Fuse protection 7-24V (not replaceable) 0,5A, time-lag
4. Fuse protection 24V (not replaceable) 0,5A, time-lag

We offer the power supplies:

1. TELEM-UPS50 input 220V AC 70VA output 48V DC, with 7Ah (2x12V Pb) accumulator and recharging system
2. TELEM-PS4 input 24-110V DC 60VA isolated outputs 12V, 24V, isolated 48V and isolated 12V, 2 output optic signal (work accumulator) and shutdown after 40 sec. (accumulator critically low)



Power supplies have 4 kV isolation. One power supply TELEM-PS4 can feed 5 TELEM- AI12 modules.

6. Installation, terminals and environment

1. Enclosure BOPLA RCP2000, IP54 210x180x80mm
2. Weight 2,2 kg.
3. Mountable to DIN 35 or with screws
4. For signal cabling PHOENIX terminals MKDS3/8 for 2,5/4 mm² wires
5. For powering detachable PHOENIX terminal GMVSTB for 2,5/4 mm² wires
6. For communication four RJ45 shielded connectors
7. Over voltage protection:
   - IEC-255-4, 5 kV pulse protection
   - IEC-255-5, 2 kV DC
8. Ambient temperature range in operation: –20…+50°C

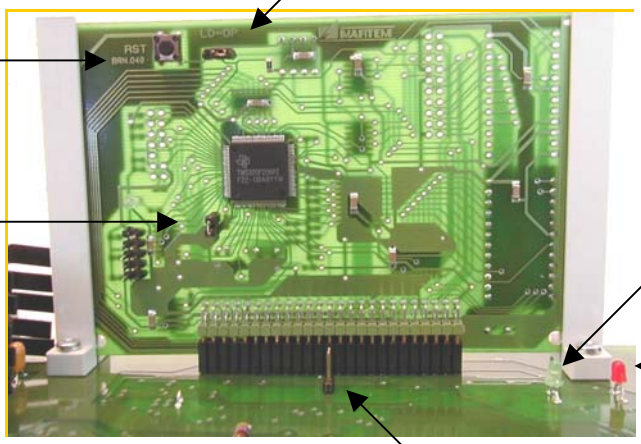
DSP processor board

Board bases on 16-bit DSP. Board´s hardware is same for all RTU- s TELEM-RTU22, TELEM-AI12, TELEM-DI24, TELEM-DO8. Difference is in loaded program (CMB/AI/DI/DO). Software type and version is identified by marker attached to timekeeper chip.

1. Jumper and LED descriptions

LD/OP: Load program/ Run program. **Normally in OP position.** For loading DSP program (CMB, DO, DI, AI) jumper is in LD position .

RST: Reset button.



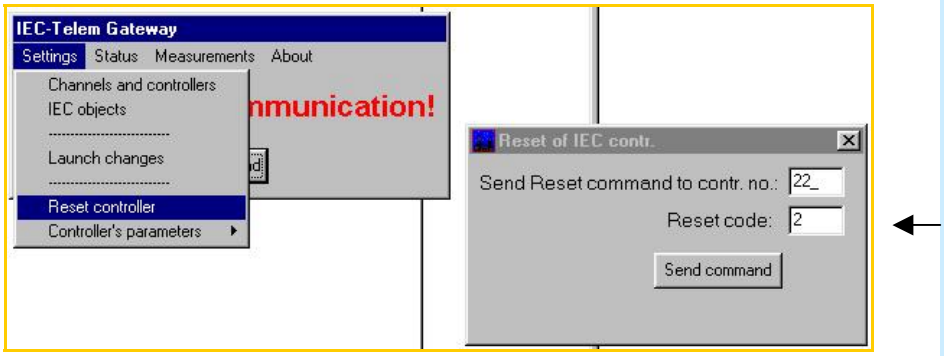
Normally with jumper. For loading DSP program (CMB, DO, DI, AI) without jumper.

OPER: **Normally On.** If the green LED is Off then processor board does not work. If flashes (slowly) then GPS time correction works properly.

FAIL: **Normally Off.** If the red LED is blinking then processor board makes continuously reset. One flash means reset by local RST button or remote data reset command. TELEM-DI24 flashes when chatter filter turns on

Normally without jumper. If with jumper and RST button is pressed then DSP loads factory settings (9600 Bod, addr. 1,ASDU addr. 1, obj. addr. 0, online, GPS Yes and all I/O conf. parameters get default value).

2. Remote reset to controller by TELEM-2000 software



Reset codes:

1- Reset (setup parameters are activated)
2- Reset with clearing data buffers
3- Reset with restoring factory settings (**attention!**)
4- Reset with clearing counters for TELEM-DI24 (counter values to “0”)

1. TLM-WIRE Communication board

1.1 LED and pin descriptions, connections

LINE

X4-1,2 (RS422/485) **DATA IN/OUT slave**

RS485 2-wire 7,8

8 -TX
7 +TX
6 -RX
5 +RX
4 -RTS
3 +RTS
2 -CTS
1 +CTS

X4-3 (RS422) **GPS IN**

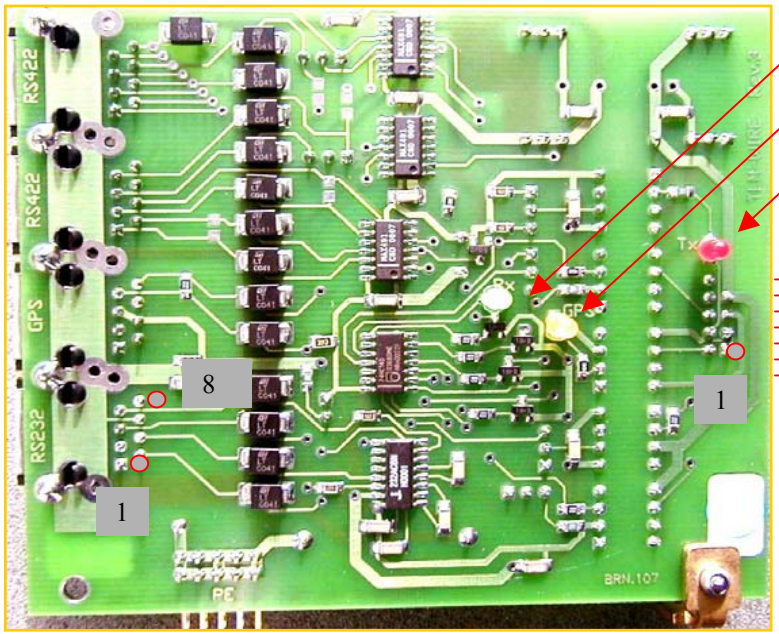
4,5 GND
2,7 -RX
1,8 +RX

X4-4 (RS232) **DATA IN/OUT master**

7 RTS
6 FGND
5 TX
4 RX
3 GND
2 CTS

X4-1

Draw 1.



X4-4

CONTROLLER

LED` s

RX on-"0"

RX (GPS) on-"1"

TX on-"1"

P1 (TTL)

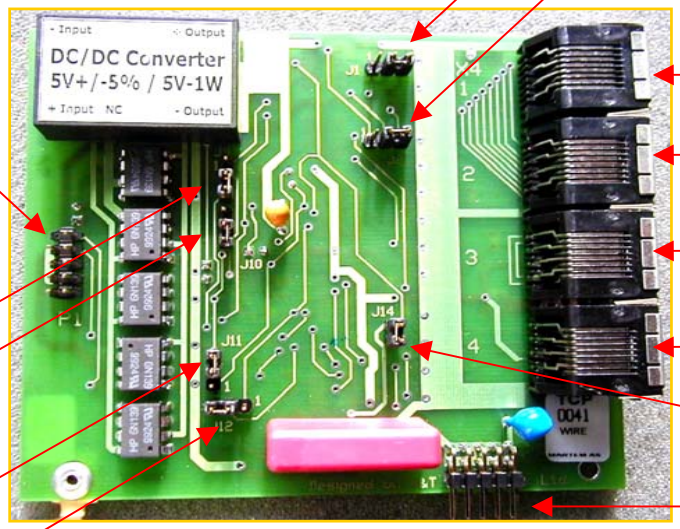
10 CTS
8 RTS
6 RX
5 +5V 0,1 A
4 TX
2 RX (GPS)
1,3,7 -5V (GND)

* X4 (1…4) Shielded RJ45 (8 pins)

* P1 2x5 pin flat cable con.

1.2 Jumper settings and plug connectors

Draw 2.



RS485 (**J1**-1): RS422 (**J1**-2)

RS485 (**J2**-1): RS422 (**J2**-2)

RS422/485 (**X4**;1) RX, TX, RTS, CTS

RS422/485 (**X4**;2) RX, TX, RTS, CTS

RS422 (**X4**;3) RX-GPS

RS232 (**X4**;4) RX, TX, RTS, CTS

Master (**J14**-on): Slave (**J14**-off)

FGND (**P2**)

TTL (**P1**) RX, TX, RTS, CTS, GPS, 5V DC

TX RS422/485 (**J9**-1): RS232 (**J9**-2)

RX RS422/485 (**J10**-1): RS232 (**J10**-2)

RTS RS422/485 (**J11**-1): RS232 (**J11**-2)

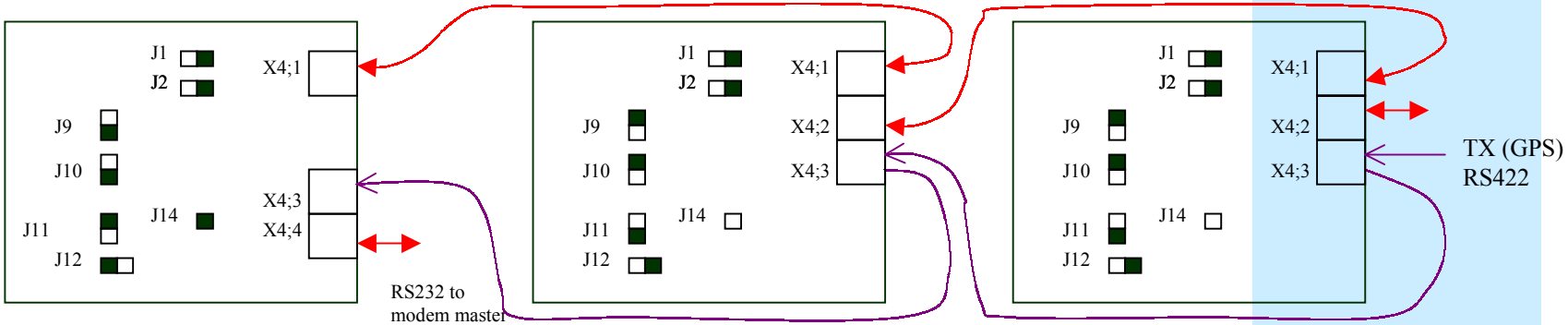
CTS RS422/485 (**J12**-1): RS232 (**J12**-2)

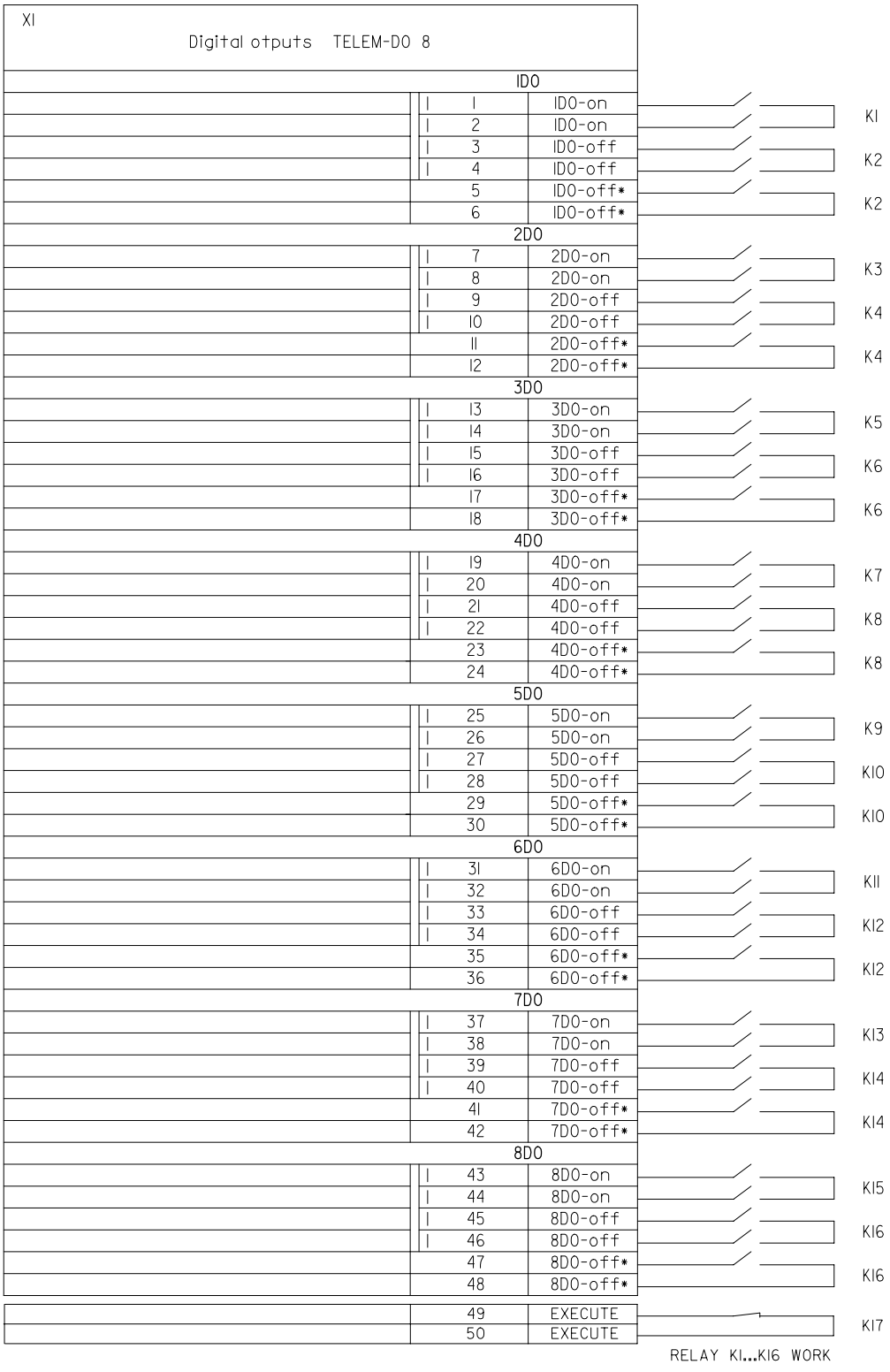
Draw 3.

Example of Master 232/422

Example of Slave I / Master 422 (pins 1/ mirror)

Draw 4. Example of Slave II.. 422 (pins 1/1 direct wire)





X2		
	1	GND
	2	GND

K1...K16 - TYPE MY3-02-US-SV
PCB.terminals - MVSTBW 2,5/4-ST
- MSTBVA 2,5/4-G
- MKDS 1,5/2-G
PCB.terminals - P2,5DI 22J/4-ST

TELEM-DO 8

REMOTE TERMINAL UNIT MODULE, 8 DIGITAL OUTPUT

B	off*	04/17/01	HRP	Date	31/10/00
				Created	A.Veskimeister
				Control	

DIGITAL OUTPUT CONN. PANEL X1,X2

Pages 1

MARTEM AS

RTU TELEM 2.1

Page 1

Modify	Info	Date	Name

ai.di.do.ruutjoo.dgn

X1

Digital inputs TELEM-DI24

1	1 DI +
2	1 DI COM
3	2 DI +
4	2 DI COM
5	3 DI +
6	3 DI COM
7	4 DI +
8	4 DI COM
9	5 DI +
10	5 DI COM
11	6 DI +
12	6 DI COM
13	7 DI +
14	7 DI COM
15	8 DI +
16	8 DI COM
17	9 DI +
18	9 DI COM
19	10 DI +
20	10 DI COM
21	11 DI +
22	11 DI COM
23	12 DI +
24	12 DI COM
25	13 DI +
26	13 DI COM
27	14 DI +
28	14 DI COM
29	15 DI +
30	15 DI COM
31	16 DI +
32	16 DI COM
33	17 DI +
34	17 DI COM
35	18 DI +
36	18 DI COM
37	19 DI +
38	19 DI COM
39	20 DI +
40	20 DI COM
41	21 DI +
42	21 DI COM
43	22 DI +
44	22 DI COM
45	23 DI +
46	23 DI COM
47	24 DI +
48	24 DI COM

-48V

PCB.terminals - MKKDSH 3/3
PCB.terminals - MKDSP 3/3

X2

1	GND
2	GND

PCB.terminals - P2,5DI22J/4-ST

TELEM-DI 24

REMOTE TERMINAL UNIT MODULE, 24 DIGITAL INPUTS

B		04/17/01	HRP	Date	31/10/00
				Created	A.Veskimeister
				Control	

DIGITAL INPUTS CONN. PANEL X1,X2

Pages 1

MARTEM AS

RTU TELEM 2.2

Page 1

Modify	Info	Date	Name

ai.di.do.ruutjoo.dgn

X1

Analog inputs TELEM-AI12

1	1 AI +
2	1 AI -
3	2 AI +
4	2 AI -
5	3 AI +
6	3 AI -
7	4 AI +
8	4 AI -
9	5 AI +
10	5 AI -
11	6 AI +
12	6 AI -
13	7 AI +
14	7 AI -
15	8 AI +
16	8 AI -
17	9 AI +
18	9 AI -
19	10 AI +
20	10 AI -
21	11 AI +
22	11 AI -
23	12 AI +
24	12 AI -

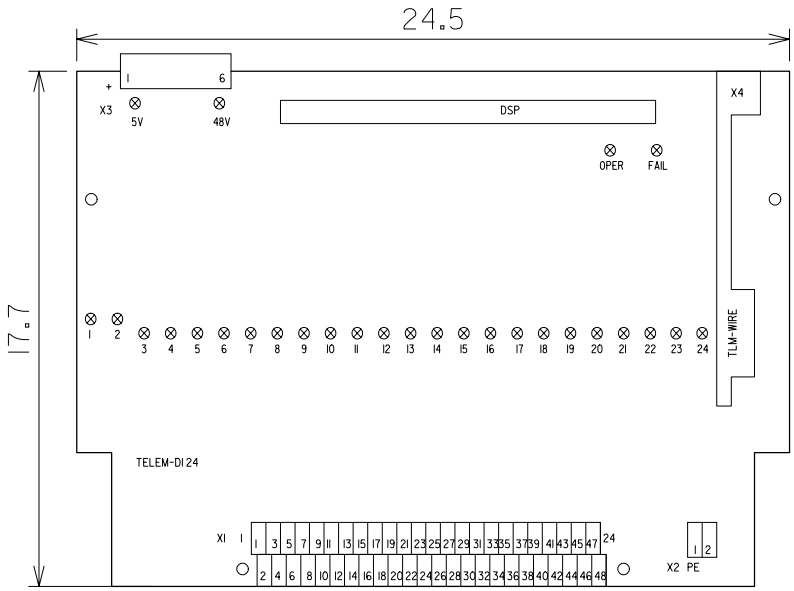
PCB.terminals - MKKDSH 3/3

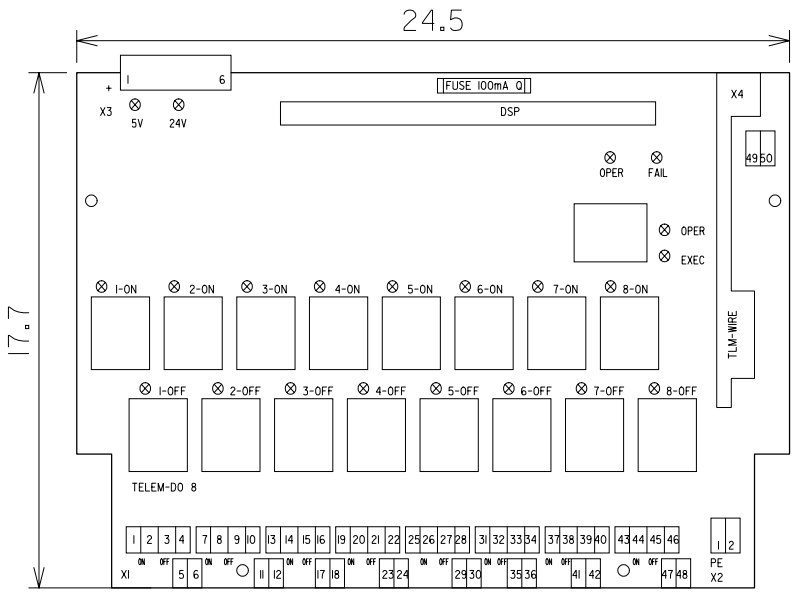
X2

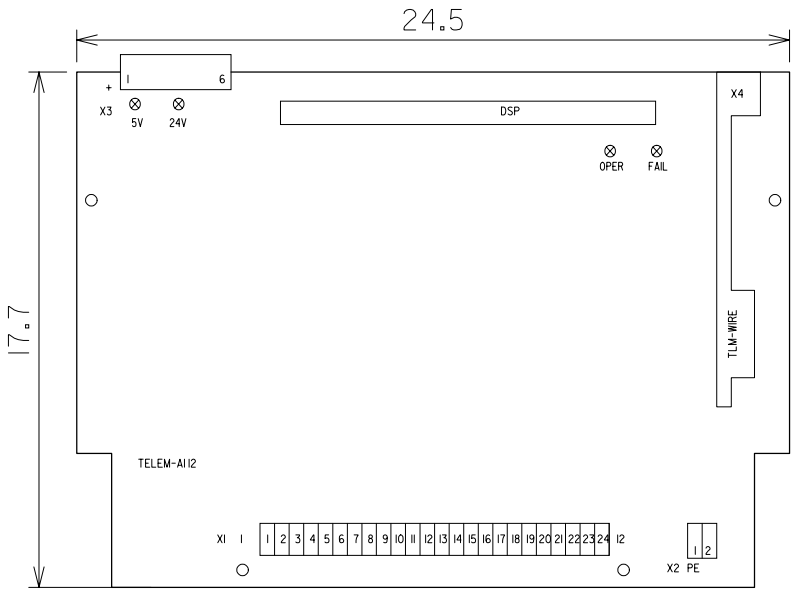
1	GND
2	GND

PCB.terminals - P2,5DI22J/4-ST

TELEM-AI 12				REMOTE TERMINAL UNIT MODULE, 12 ANALOGUE INPUTS	
B		04/17/01	HRP	Date	31/10/00
				Created	A.Veskimeister
				Control	
				ANALOG INPUTS CONN. PANEL X1,X2	Pages 1
				RTU TELEM 2.3	Page 1
				MARTEM AS	
Modify	Info	Date	Name	ai.di.do.ruutjoo.dgn	







TELEM RTU					REMOTE TERMINAL UNIT MODULE, TELEM-DI24, TELEM-DO8, TELEM-AI12
B		04/18/01	HRP	Date	31/10/00
				Created	A.Veskimelster
				Control	
					RTU MODULE TERMINALS, LEDS, BOX- PLACEMENT AND MARKERS
					Pages 1
					RTU TELEM 2.4
				MARTEM AS	Page 1
Modify	Info	Date	Name		al.dl.do.ruutjoo.dgn

X3

Supply connections

			Needed
	1	+II	DO8, DI24, AII2
	2	-II	DO8, DI24, AII2
	3	+24	DO8, AII2
	4	-24	DO8, AII2
	5	+48	DI24
	6	-48	DO8, DI24

PCB.terminals - MSTB 2,5/6-ST

Plug - MSTBA 2,5/6-G

X4

Wire connections

DATA RS422/485 X4-1RJ45			up line
	8	-TX	
	7	+TX	
	6	-RX	
	5	+RX	
	4	-RTS	
	3	+RTS	
	2	-CTS	
	1	+CTS	
DATA" RS422/485 X4-2 RJ45			
	8	-TX	
	7	+TX	
	6	-RX	
	5	+RX	
	4	-RTS	
	3	+RTS	
	2	-CTS	
	1	+CTS	
GPS RS422/485 X4-3 RJ45			
	8	+RX	
	7	-RX	
	6		
	5	GND	
	4	GND"	
	3		
	2	-RX"	
	1	+RX"	
DATA out RS232 X4-4 RJ45			
	8		
	7	RTS	
	6	FGND	
	5	TXD	
	4	RXD	
	3	GND	
	2	CTS	
	1		

PCB.terminals pluge shield - RJ45

SUPPLY, WIRE CONNECT.

REMOTE TERMINAL UNIT MODULE

B		04/17/01	HRP	Date	01/30/01
				Created	A.Veskimeister
				Control	

SUPPLY, WIRE COMM CON. PANEL X3,X4
TELEM-8DO, TELEM-24DI, TELEM-12AI

Pages 1

MARTEM AS

RTU TELEM 2.5

Page 1

Modify	Info	Date	Name

al.dl.do.ruutjoo.dgn

TELEM-PS4

TELEM-PS4 powers out

1	+24	max. 0.8; 24V +20/-5%
2		
3	+11	min. 0,2; max. 4A, 11V +/-1%
4	"0"/-11/-24	
5	+48	isolated max. 0,5A; 48V +20/-5%
6	-48	
7	+12	isolated max. 1A; 12V +/-5%
8	-12	

PCB terminals - MSTB2.5/8 (PS4)

TELEM-PS4 output signals

+OK	Signal OFF if PS4 work accumulator
-OK	
+SDW	Signal ON if accumulator critically low (shutdown after 40 sec.)
-SDW	

PCB.terminals - P2,5DI 22J/4-ST

TELEM-PS4 input supply

PE	All in/ out power lines are connected FGND 420V varistors
"0" -48V	isolated max. 2A; 24...110V DC
+48V	

PCB.terminals - GMVSTB 3/3 2,5/4

TELEM-UPS50

TELEM-UPS50 input AC supply

PE	FGND N/LI 420V; N/L 270V varistors
N	isolated max. 2A; 230V AC +/-20%
LI	

PCB.terminals - GMVSTB 3/3 2,5/4

TELEM-UPS50 accumulator connections

-24V	Accumulator 24V PB (2x 12V)
+24V	max. recharging 60mA (1...10 Ah)

PCB.terminals - GMVSTB 3/3 2,5/4

TELEM-PS4 output power

TELEM-PS4 input supply "0" -48V	-24/48V	isolated max. 3A; 24...36V...48 DC
TELEM-PS4 input supply +48V	+24/48V	

PCB.terminals - P2,5DI 22J/4-ST

TELEM-UPS50, TELEM-PS4				POWER SUPPLY MODULE, TELEM-UPS50; TELEM-PS4	
B		05/11/01	HRP	Date	31/10/00
				Created	A.Veskimeister
				Control	
				Connections powers input/output (accu, signals, supply)	Pages 1
				RTU TELEM 2.6	Page 1
				MARTEM AS	
Modify	Info	Date	Name	al.dl.do.ruutjoo.dgn	