

RTU ANALOG INPUT MODULE TELEM-AI12-T

User manual

Preface

This document, User Manual edition 1.0 for RTU Analog Input Module TELEM-AI12-T version 1.0, provides a general technical description of the module, its configuration and use. Although we have carefully checked the contents of this publication for conformity with the hardware and software described, we cannot guarantee complete conformity since errors cannot be excluded. The information provided in this manual is checked at regular intervals and any corrections that might become necessary are included in the next releases. Any suggestions for improvement are welcome.

The RTU Digital Input Module TELEM-AI12-T has been designed and manufactured according to the quality principles of ISO 9001.

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Contents

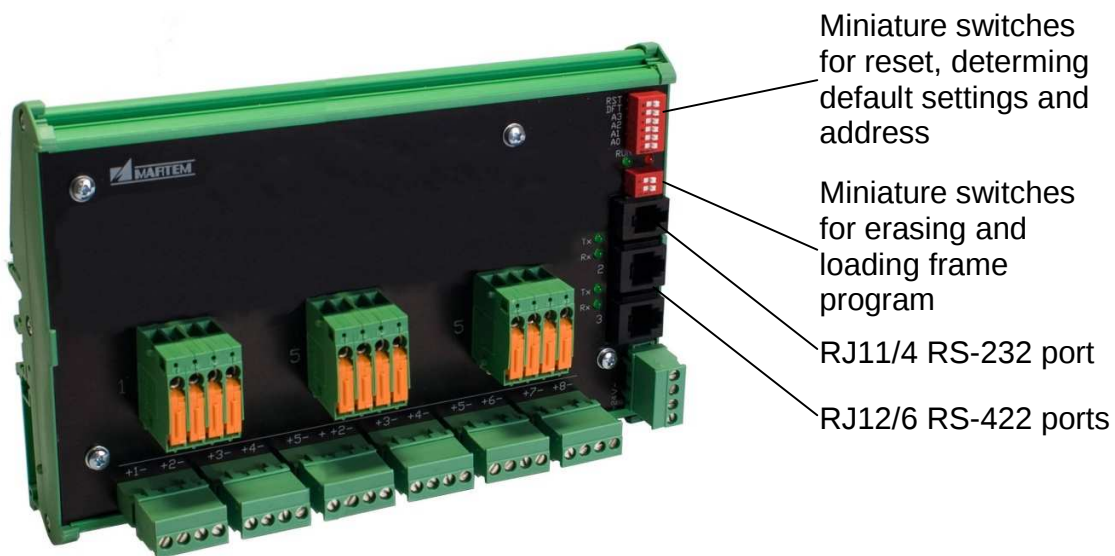
1. Application	3
2. Construction	3
3. Features	3
4. Technical Data.....	4
5. Mode switches and device address.....	5
5.1 Mode switches.....	5
5.2 Setting an address.....	5
6. Communication	6
7. Configuration Parameters.....	6
7.1 Configuration Parameters for a Module.....	7
7.2 Configuration parameters for analog inputs.....	8
12 . Connection Cables.....	10

1. Application

TELEM-AI12-T analog input module is used for analog info acquisition and data exchange with higher level devices or systems. Its functionality allows it to be flexibly used for distributed process automation in systems to measure analog values using different transducers, data processing and acquisition where excellent noise immunity with respect to environmental and electromagnetic influences is important. It may be used as a standalone device or in a daisy chain connection with other modules.

2. Construction

The mechanical design is based on a plastic box that can be readily mounted on 35-mm rails. The module is based on 32 ARM CPU. Interfaces to other equipment are RS-232 or RS-422. Data exchange protocol IEC 60870-5-1-101.



3. Features

- Two level input filters
- Binary signals are recorded with a time resolution of 1 ms
- Measurements are periodically saved
- Online leased line or offline dial-up mode operation, data GSM communication request by an event in substation or by the remote control center
- Configuration / parameterization with IEC protocol at the same line with data communication

- Daisy chain master – slave connection for up to 15 modules using RS 422 interface
- Self diagnostics and supervision simultaneously with data acquisition
- Quick value changes can be registered with time tags (min and max value)
- Periodical time-tagged measurements

4. Technical Data

Input

Number of differential independently configurable analog inputs	12
Input ranges	0...5; 0...10; 0...20 +/-5 mA +/-5; +/-10; +/-20; 4...20 mA 0...10 V
Measurement accuracy	0.1% (automatically scaled)
Resolution	16 bit
Scanning period	1 ms
Form of transfer measured values	normalized
Buffer size for each input	126 values

Power requirements

Supply voltage	9-30 V DC, 4 VA
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Installation, terminals and environment

Enclosure (wxhxd)	250 x 120 x 60
Weight	500 g
Mountable	DIN 35
Cross section of wires for signal	Max. 2,5 mm ²
Cross section of wires for power	Max. 2,5 mm ²
Plug connector for communication	RJ11/4; RJ12/6
Over voltage protection	IEC-60255-4, 5 kV pulse protection IEC-60255-5, 2 kV DC
Ambient temperature in operation	-20...+50°C

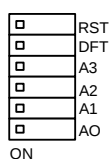
Disturbance

Emission	EN-55022A
Static discharge	EN-61000-4-2
Fast transients	EN-61000-4-4
Surge	EN-61000-4-5
Conducted HF field	EN-61000-4-6
Emitted HF field	EN-61000-4-3

5. Mode switches and device address

5.1 Mode switches

Mode of operation, address of the module and the default settings are determined using switches on the board.



RST – ON - reset the device
DFT - ON- restores the default setup after a reset
*DFT-ON; RST-ON/OFF; DFT-OFF
A0 - A3 - determines the address of the module



ERASE - ON erases the frame program **(be careful)**
PROG - ON loads a new frame program

5.2 Setting an address

A0	A1	A2	A3	Address
on	off	off	off	1
off	on	off	off	2
on	on	off	off	3
off	off	on	off	4
on	off	on	off	5
off	on	on	off	6
on	on	on	off	7
off	off	off	on	8
on	off	off	on	9
off	on	off	on	10
on	on	off	on	11
off	off	on	on	12
on	off	on	on	13
off	on	on	on	14
on	on	on	on	15
off	off	off	off	16

6. Communication

- Transmission rate 200...38400 bit/s
- Communication mode asynchronous, data bits 8, parity N, stop bits 1
- Communication protocol IEC60870-5-101 slave/master, unbalanced
- Link address length 1 byte
- ASDU address length 2 byte
- Object address length 2 byte
- Time synchronization protocol ASCII (Motorola), device TLM-
- Communication interface selectable RS-232, RS-422
- Communication interface isolation optically to 2,5kV RMS

7. Configuration Parameters

The RTU Module is configurable by configuration software that supports the IEC60870-5-101 protocol. Configuration parameters are altered using the parameter setting commands of the IEC60870-5-101 protocol. Specification of parameter setting commands for this module is available on request. RTU configuration software runs under Windows 95, 98, 2000, XP and NT4.0 operating systems on any standard PC, communicates via COM port interface and performs the following principal functions:

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

7.1 Configuration Parameters for a Module

Configuration of Telem controllers

1 - No. of controller (look at Settings/Channels and controllers)

Common parameters

Link. addr.: Obj. base address: ☐ Disable time sync. by protocol

ASDU address: Comm. port control: GPS e:

Comm. speed: ☐ Only GPS min. and sec.

Parity: **Loaded parameters are activated after Reset**

Type/version: **AI 3.04** ...

Analog inp.

No.	In use (Y/N)	Range	Filtr. time	Zero zone	Deadb.1	Min.interv.	Deadb.2	Deadb.2 time
1	0 - In use	0 - +- 5 mA	0	0	0	0	0	0
2	0 - In use	0 - +- 5 mA	0	0	0	0	0	0
3	0 - In use	0 - +- 5 mA	0	0	0	0	0	0
4	0 - In use	0 - +- 5 mA	0	0	0	0	0	0
5	0 - In use	0 - +- 5 mA	0	0	0	0	0	0
6	0 - In use	0 - +- 5 mA	0	0	0	0	0	0
7	0 - In use	0 - +- 5 mA	0	0	0	0	0	0
8	0 - In use	0 - +- 5 mA	0	0	0	0	0	0
9	0 - In use	0 - +- 5 mA	0	0	0	0	0	0
10	0 - In use	0 - +- 5 mA	0	0	0	0	0	0
11	0 - In use	0 - +- 5 mA	0	0	0	0	0	0

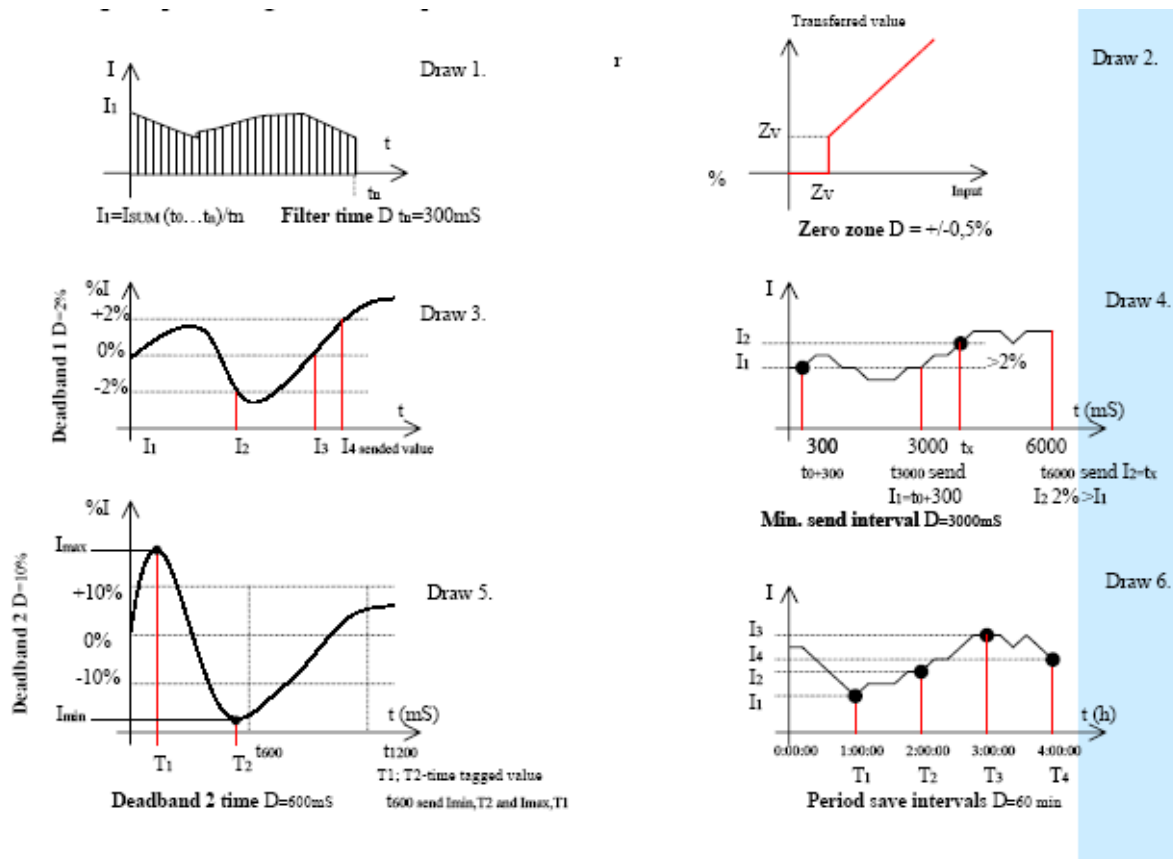
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Parameter	Value	Default value
1. Communication speed	200 – 38400 bps	9600
2. Link Address	1-15	1
3. ASDU address	1-15	1
4. Object's base address	0-65500	0
5. Communication mode	Online	Online
6. Type of periodical analog measurements [On Spont. per. sends time-tagged values after specified interval (7.2.9). On Request per. collects the time-tagged measurements and sends them only on request.]	Spont. per. Request per.	Spont.per.

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. A30.4)]		

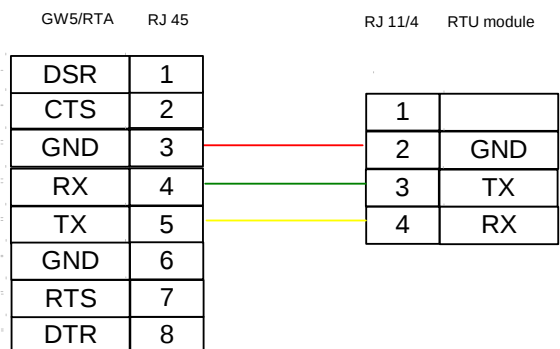
7.2 Configuration parameters for analog inputs

Parameter	Value	Default value
1. In use	Yes No	Yes
2. Input signal range	0...5	0...10; 0...20; +/-5 mA; +/-5; +/-10; +/-20; 4...20mA
3. Filtration coefficient [Determines, how many samples are averaged (1 ms time resolution). Drawing 1]	1- 65535 ms	300 ms (0)
4. Zero zone [If the value in this range is around zero then it is transferred as zero. Drawing 2.]	0,01- 100%	0,5 ‰ (0)
5. Dead Band 1 [for events without a time tag. Drawing 3]	0,01- 100%	2 ‰ (0)
6. Min. interval [Min. interval for events. Drawing 4]		
7. Dead Band 2 [for a time-tagged event. If this value change takes place within the time period specified on p. 7 then two events are created with min. and max. values of this time period. Drawing 5]	0,01- 100%	10 ‰ (0)
8. Time interval for Dead Band 2	1- 65535 ms	600 ms (0)
9. Time interval for a periodical time-tagged event and the tagged values (p. 7.1.6) [Drawing 6]	1- 65535 sec.	3600 sec.(0)

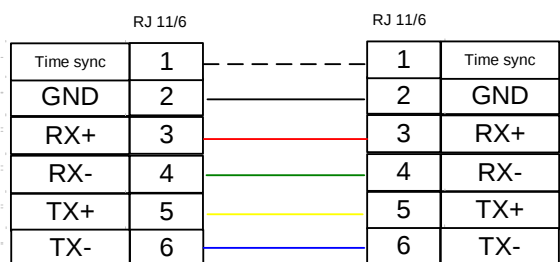


12 . Connection Cables

Data concentrator-RTU module connection



RTU module RS-422 Slave-Slave connection



RTU module RS-422 Master-Slave connection

