MARTEM
KAUGJUHTIMISSÜSTEEMID
TELECONTROL SYSTEMS

Data Concentrator TELEM-GW6

User Manual

Martem AS
2015

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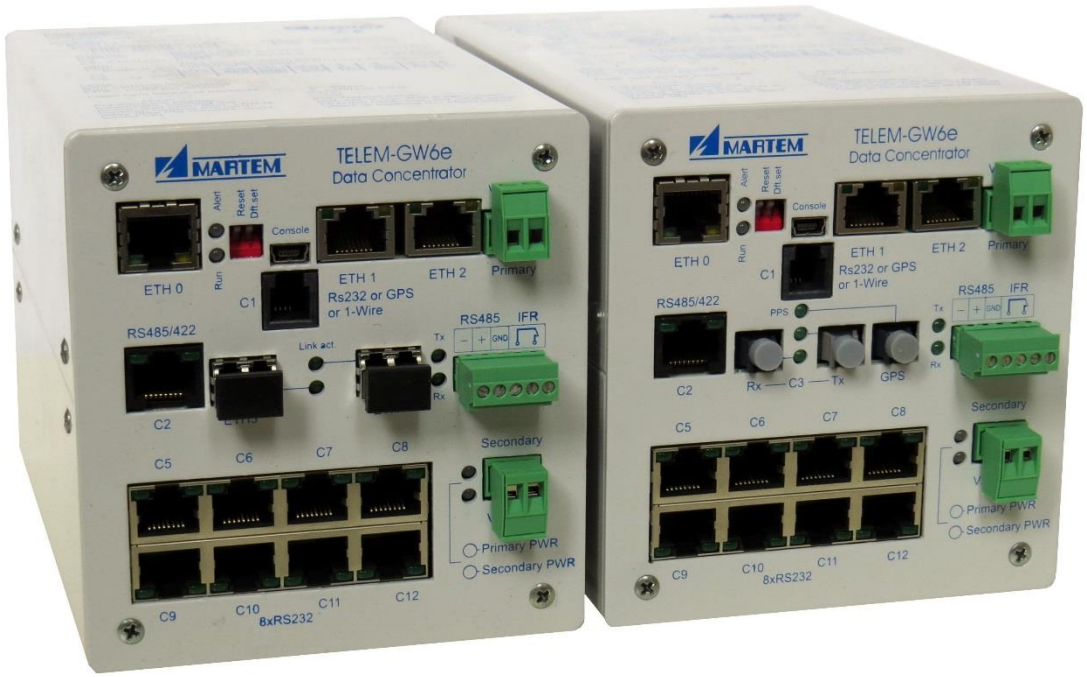
1. Introduction



TELEM-GW6e

Data Concentrator TELEM-GW6 (GW6-e) is designed for use in electrical networks as an communication concentrator.

Main applications of GW6 are:

- Data acquisition and control of regional and national electricity utilities in SCADA systems for remote control and substation automation.
- Cross-referencing of data exchange protocols
- Creating transparent TCP/IP to serial channels for remote connections to various equipment (for remote handling of various equipment)
- Comprehensive integration of different devices
- Full scale data exchange between substation devices and substation control system including setting values, measurement values, registered fault parameter values, changes of state with associated time markings etc.

2. Main features

- Transparent TCP/IP connections via Ethernet and serial ports
- Various data exchange protocols via Ethernet and serial ports
- Cross-referencing of data exchange protocols
- Automatic protocol conversion from IEC 60870-5-101 to IEC 60870-5-104 without description of data objects.
- Firewall functionality
- OpenVPN, IPsec, L2TP and SSH connections
- SNMP (Simple Network Management Protocol)
- SDN (Software Defined Networking), DPI (Deep Packet Inspection)
- Syslog
- Graphic Web Server
- A user-friendly configuration tool similar to Microsoft® Windows™
- Configurable remotely over communication line
- Configuration export to ASCII, CSV format files
- TELEM RTU devices can be remotely configured via TELEM-GW6
- Logical operations between digital and analog signals can be described
- PLC logic support, configuration tool with integrated PLC editor in compliance with IEC-61131-3 standard
- Data sending with time and quality stamp
- Console port
- Several time synchronization options (possible to synchronize from multiple control centers. GW6 is used to synchronize substation devices by protocol):
    - GPS input
    - NTP client and server
    - IEC 60870-5-101
    - IEC 60870-5-104
    - IEC 60870-5-103
- All ports are galvanically isolated from case and power circuit (except C1 and console port from power circuit)
- 1-wire sensor port (up to 10 sensors) e.g. for temperature
- Real-time clock with back-up capacitor
- Internal fault relay contact (missing in card L version)

3. Technical Data

Data communication protocols

To higher level systems:

- IEC 60870-5-104
- IEC 60870-5-101 unbalanced and balanced,

To lower level devices:

- IEC 61850,
- IEC 60870-5-104,
- IEC 60870-5-103,
- IEC 60870-5-101 Unbalanced,
- Modbus-RTU, Modbus-TCP,
- IEC 62056-21 (IEC 1107),
- SPA-Bus

Communication ports

Communication ports may be freely configured for upper or lower level communication

Base board

- 3 x Ethernet connection with RJ45 port
- 1 x RS-232 serial connection with 4P4C port
- 1 x Console mini USB port

Expansion card 1

Card R

- 1 x RS-422, RS-485 (2-wire) or RS-485 (4-wire) serial connection, galvanically isolated + time sync pulse out
- 1 x Fiber-optic connection with ST or Versatile link connectors
- 1 x GPS Fiber-optical connection with ST or Versatile link connectors
- 1 x RS-485 (2-wire) serial connection, galvanically isolated
- 1 x Internal fault relay contact

Card L

- 1 x RS-422, RS-485 (2-wire) or RS-485 (4-wire) serial connection, galvanically isolated + time sync pulse out
- 1 x GPS Fiber-optical connection with ST or Versatile link connectors, data and pulse
- 2 x Optical LAN

Expansion card 2

- 8 x RS-232 serial connections with RJ45 connectors with surge protection
- Secondary power supply

Data communication parameters:

- 1 start bit
- Odd, even or no parity
- Communication rates from 300 to 115200 bit/sec

Electrical characteristics of isolated input

- Dielectric withstand IEC 60255-5
- Withstand to static discharge IEC 61000-4-2, 15kV
- Withstand to surges, bursts IEC 61000-4-4, 61000-4-5, 2,5kV AC, 4kV DC

Mechanical parameters

- Degree of protection IP 31
- Dimensions (W x H x D) 108 x 114 x 166 (190 with protruding parts) mm
- Ambient temperature in operation –30°C…+70°C
- Weight 1100 g
- Mounting DIN rail

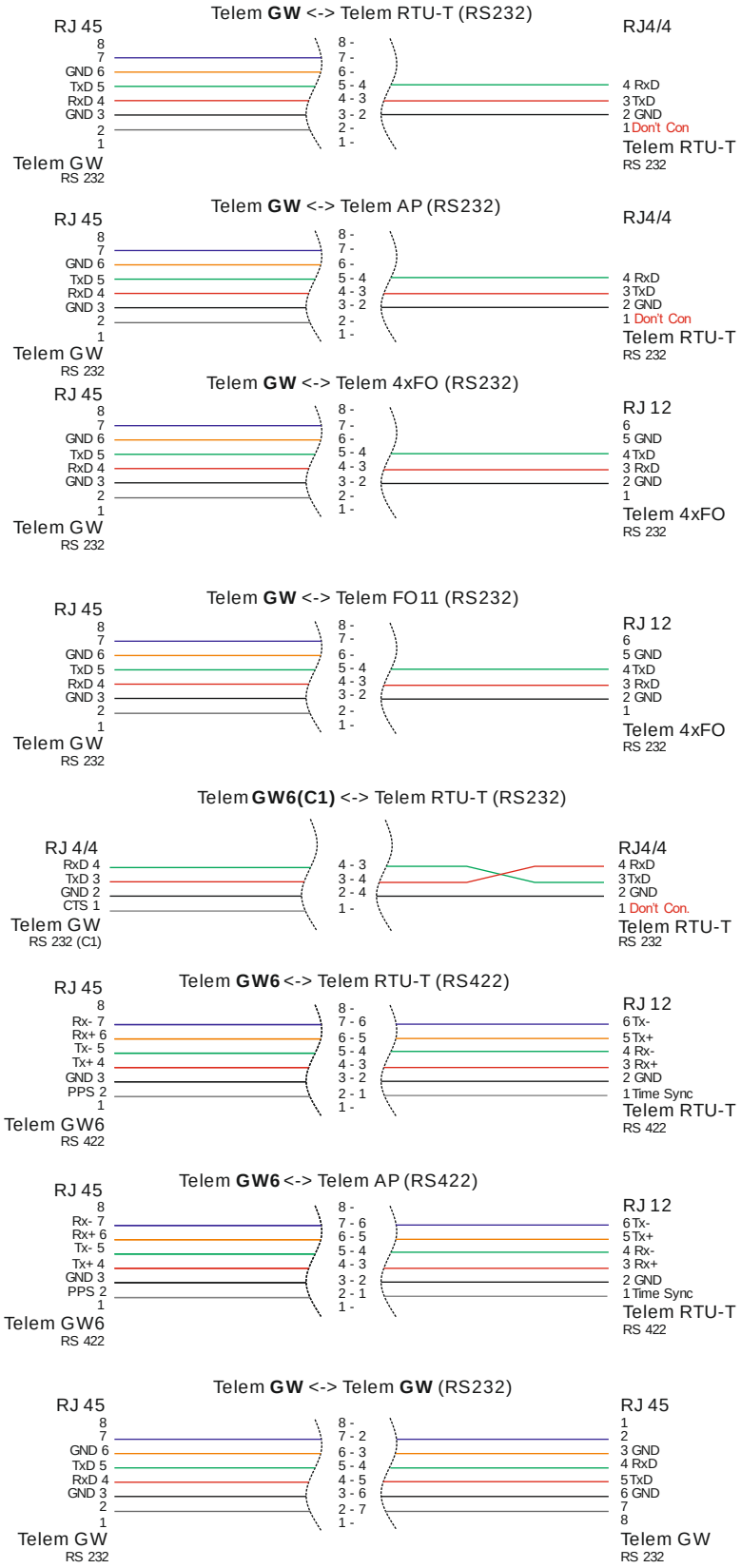
Radio frequency compatibility

- RF emission IEC 55022 Class A
- Immunity to RF fields IEC 61000-4-3, 61000-4-6

Power supply

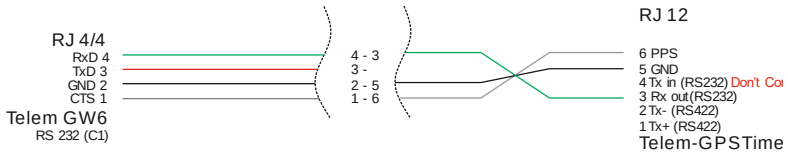
- Supply voltage range 12 to 72 V DC
- Power consumption < 8 VA, < 25 VA with card L

4. Communication cables

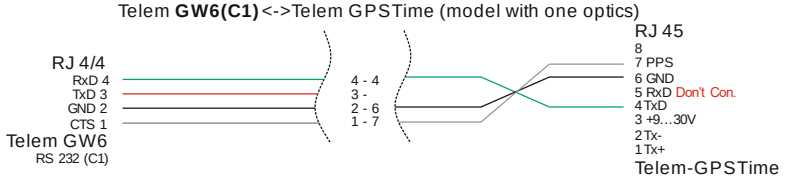


Communication cables

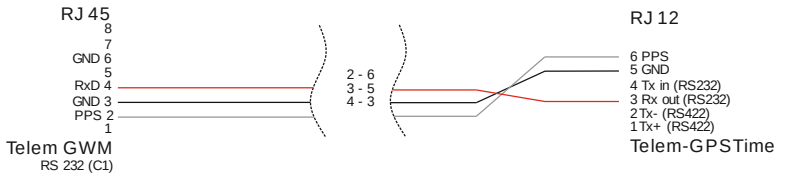
Telem **GW6(C1)** <->Telem GPSTime (model with two optics)



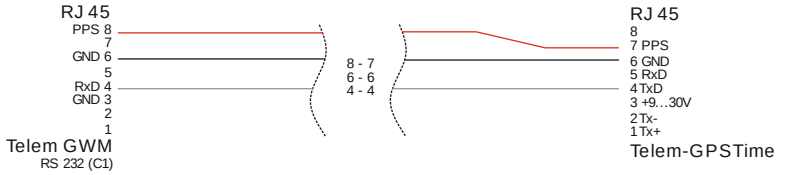
Telem **GW6(C1)** <->Telem GPSTime (model with one optics)



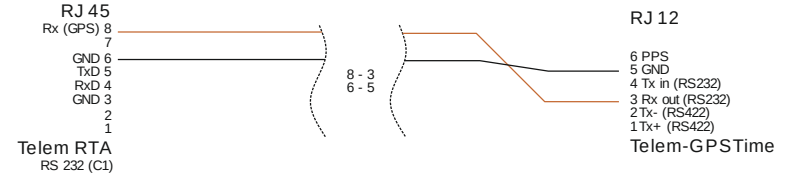
Telem **GWM(C1)** <->Telem GPSTime (model with two optics)



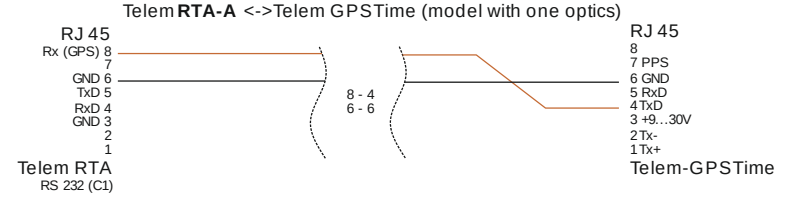
Telem **GWM(C1)** <->Telem GPSTime (model with one optics)



Telem **RTA-A** <->Telem GPSTime (model with two optics)



Telem **RTA-A** <->Telem GPSTime (model with one optics)



Communication cables

5. Firmware update

NB! Before updating to new firmware read the setup from your device, and make a backup.

Loading firmware via SSH

- Copy the compressed (*.7z) firmware update file (provided by Martem AS) to your computer
- Set up SSH connection with GW6 if you have not done this before in this session or changed users. Login as martem. If you have not changed the password then default password is provided by Martem AS
- Press the “Upd.” button next to SSH settings
- Press the pick button and select the copied update file (file will be automatically unpacked to temporary folder)
- Press the “Update” button, the update process starts
- Wait until the device resumes to its normal operation state (“Run” LED will start slow blinking again)
- Firmware update is complete. Check if firmware update was successful.

Checking results of the firmware update operation:

- Press “Get Result” button
- Check the state of installed files at the last part of the file. If the state of update files is OK - firmware update was successful.

Loading firmware through Secure Digital (SD) Memory Card slot:

- Connect Secure Digital (SD) Memory Card to your computer
- Extract the compressed firmware update file (provided by Martem AS) to your SD Memory Card
- Disconnect the card from your computer
- Insert the card to TELEM-GW6 SD Memory Card slot

:* SD Memory Card slot is located at the back of the device

- Perform reset operation to TELEM-GW6 device
- Wait until the device resumes to it’s normal operation state
- Firmware update is complete. Remove the SD Memory Card and check if firmware update was successful

Checking results of the firmware update operation:

- Connect the SD Memory Card to your computer
- Open the folder you extracted earlier
- Check if the file “res.txt” is present and open it
- Check the state of installed files at the last part of the file

*If the state of update files is OK - firmware update was successful

6. Default setup, indication

RESET: Switch RESET to ON state and then back to OFF state for Reset operation

DFT. SET: To apply default setup:

1. Switch DFT. SET to ON state
    - Alert indication LED starts blinking within 5 seconds
    - Alert indication LED will blink for 2 seconds
2. Switch DFT. SET back to OFF state when the alert indication LED is blinking to apply default setup

If DFT. SET is switched back to OFF state when the alert indication LED is not blinking, default setup will NOT be applied

For operation

Green LED – Blinking green indicates that the program is running

Red LED – Failure

For communication

Green LED at GPS port – blinking indicates the existence of GPS time synchronization.

7. Notes

If not stated otherwise on the individual pages of this document, AS Martem reserves the right to make modifications.

Although the contents of this publication have been checked 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.

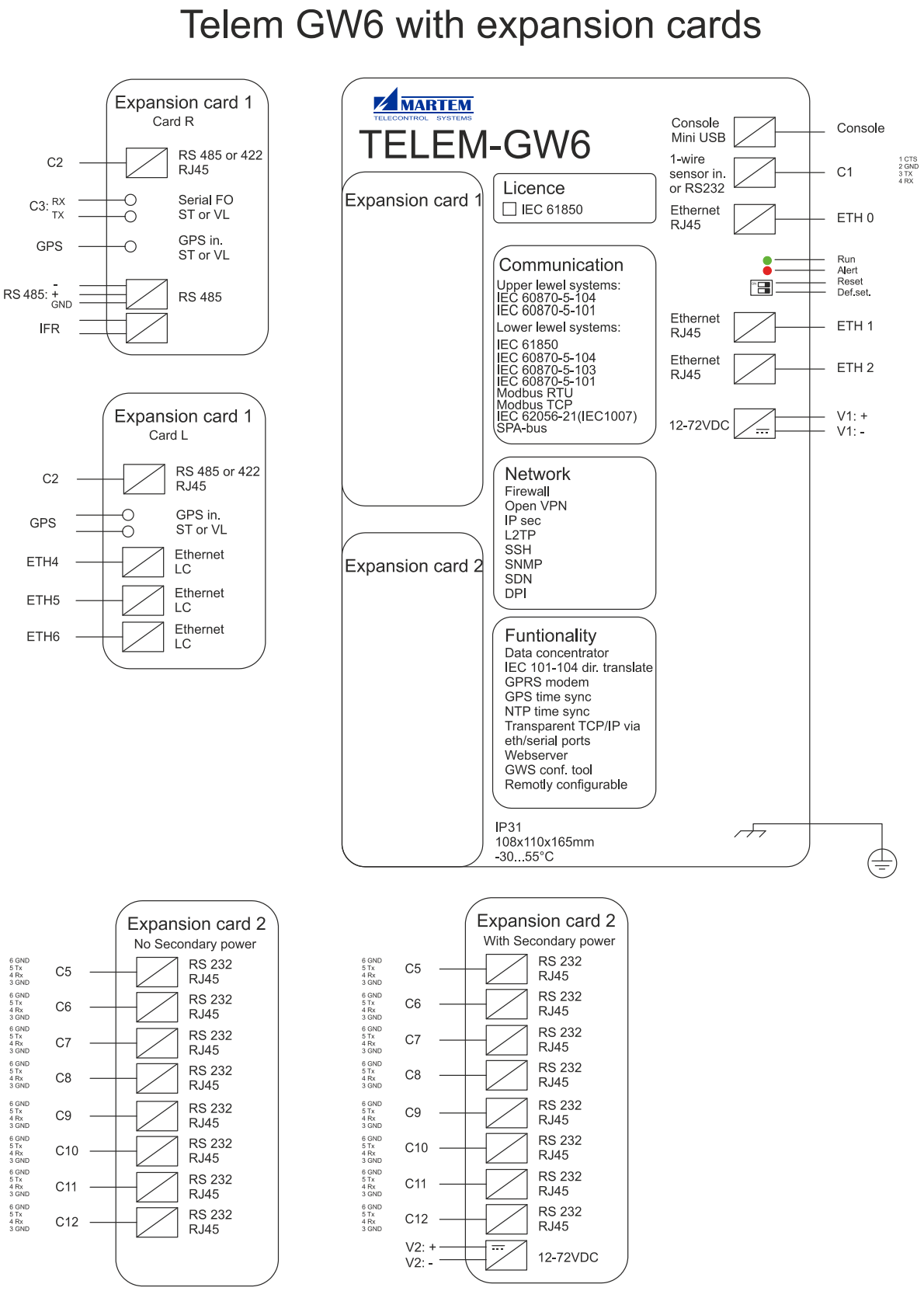
Any suggestions for improvement are welcome.

The contents of this manual are subject to change without prior notice.

Latest firmware, software and updates can be downloaded from:
phobos.martem.ee/shr

More information about Martem devices can be found at
phobos.martem.ee/wiki/Esileht

8. Block diagram



9. Order code

TELEM GW6 has many hardware versions, versions are described with an order code.
User friendly configurator can be found: phobos.martem.ee/order/

GW6-eXXXX-XXXX-CX (e.g. GW6-e1112-R211-C0)

Licence
- 0 – NO IEC61850
- 1 – IEC61850

Processor
- 1 – Base model
- 2 – Custom model

Port C1
- 1 – COM1 or GPS
- 2 – ONE-wire input

GPS sync
- 1 – From Port C1
- 2 – GPS optical input

Expansion card 1
- R – Card R
- L – Card L

Port C2 conf.
- 1 – 4-wire RS485
- 2 – 2-wire RS485
- 3 – RS422

GPS optics
- 1 – VL (plastic)
- 2 – ST (glass)
- X – None (with card L)

Port C3 optics
- 1 – VL (plastic)
- 2 – ST (glass)
- X – None (with card L)

Secondary power
- 0 – Not Supported
- 1 – Supported

10. Open-source software information

This device produced by AS Martem includes open-source components. The most up to date info of exact software used by Martem's build system and licensing info of used software can be found from http://phobos.martem.ee/shr/br-sources/