MARTEM
KAUGJUHTIMISSÜSTEEMID
TELECONTROL SYSTEMS

Data Concentrator TELEM-GWM

User Manual

Martem AS
2016

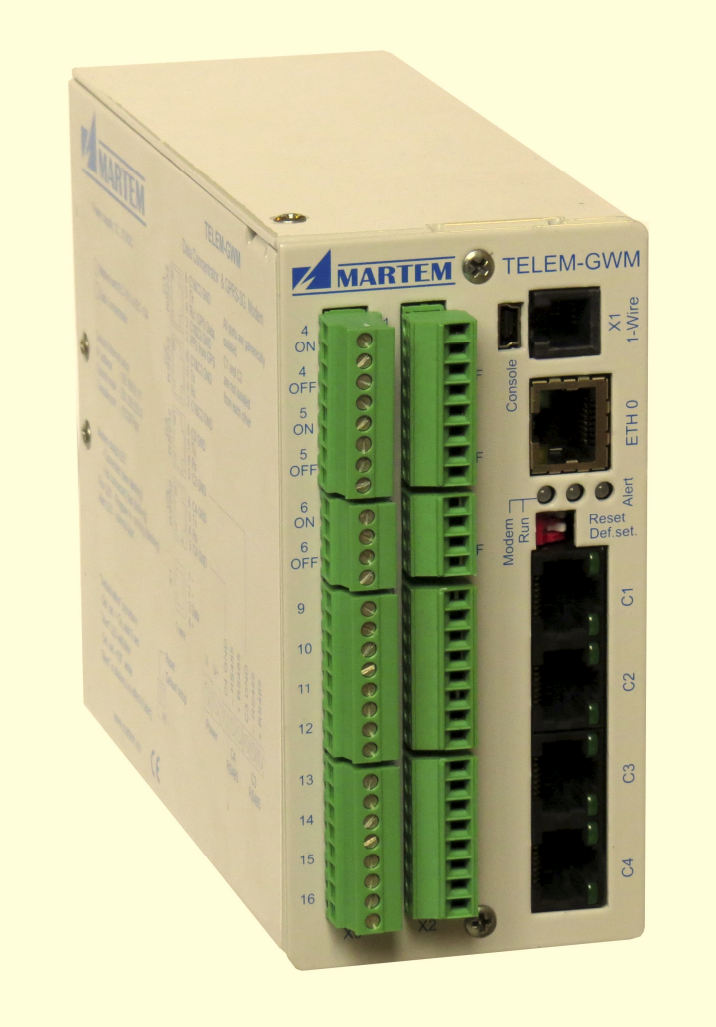
Contents

1. Introduction

TELEM-GWM is designed for use in electrical networks as an communication concentrator and as a 3G modem.

Main applications of GWM are:

- To operate as 3G modem with or without Data Concentrator software with possibility for direct protocol translation from IEC 60870-5-101 to IEC 60870-5-104 and vice versa
- 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 free configuration tool
- Configurable remotely over communication line
- Configuration export to ASCII, CSV format files
- TELEM RTU devices can be remotely configured via TELEM-GWM
- Logical operations between digital and analog signals
- Data sending with time and quality stamp
- Console port
- Several time synchronization options (possible to synchronize from multiple control centers. GWM is used to synchronize substation devices by protocol):
- GPS input
- NTP client and server
- All ports are galvanically isolated from case and power circuit
- 1-wire sensor port (up to 10 sensors) e.g. for temperature
- Real-time clock with back-up capacitor

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 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

- 1 x Ethernet connection with RJ45 port. 1,5kV isolation
- 2 x RS-232 with RJ45 connector, galvanically isolated. 15 kV surge protection
- 2 x RS-485/232. RJ45 connector for RS-232 and screw terminals for RS-485, galvanically isolated. 15 kV surge protection
- 1 x Console mini USB port

Expansion cards

- Card D
  - 8 optically isolated dry contact digital inputs (connected to dry contacts)
  - 3 double digital outputs (relay contacts max. 0.3A 110VDC, 2A 30VDC, 0.5A 125VAC)

- Card E
  - 16 optically isolated dry contact digital inputs (connected to dry contacts)
  - 6 double digital outputs (relay contacts max. 0.3A 110VDC, 2A 30VDC, 0.5A 125VAC)
- Card L
  - 3 x RJ45 LAN
- Card O
  - 1 x RJ45 LAN + 2 x Optical LAN

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
• Withstand to surges, bursts	IEC 61000-4-4, 61000-4-5

Mechanical parameters

• Degree of protection IP 31	
• Dimensions W x H x D (without connectors)	65 x 132 x 173 mm
• Ambient temperature in operation	–40℃…+70℃
• Weight	900 g
• Mounting	DIN rail
• Relative humidity	90% non-condensing

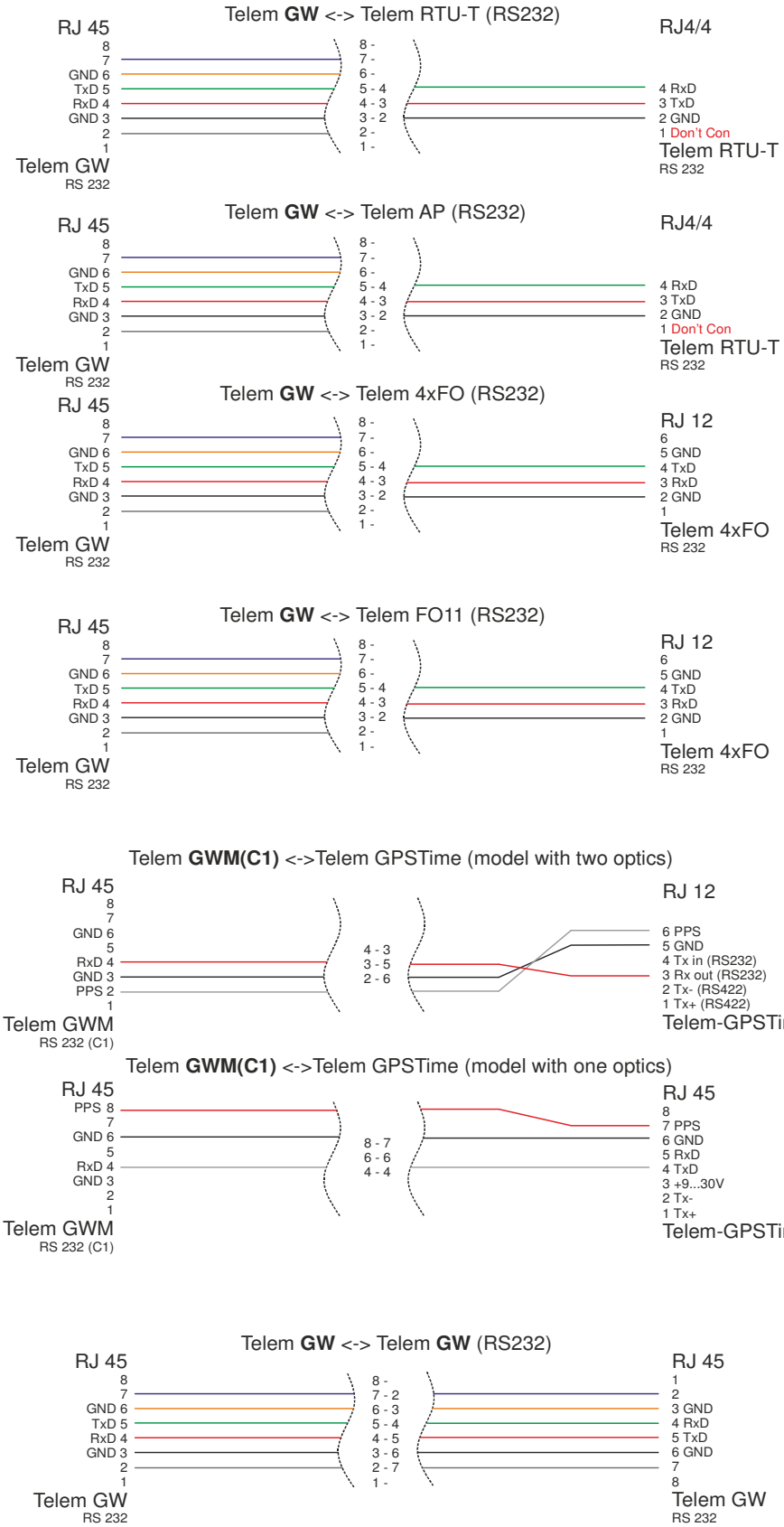
Radio frequency compatibility

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

Power supply

• Supply voltage range	20 ... 72 V DC Optional 10 ... 36 V DC
• Power consumption	< 18 W

4. Communication cables



5. Firmware update

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

- Copy the compressed (*.7z) firmware update file (provided by Martem AS) to your computer
- Set up SSH connection with GW6 (see chapter 11.2) 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.

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

MODEM – green LED – fast blinking (couple times per second) indicates that modem is not connected, slow blinking (once per second) indicates that modem is connected, no blinking indicates that modem is not connected/fault.

RUN – green LED – blinking green indicates that the program is running

ALERT – red LED – failure

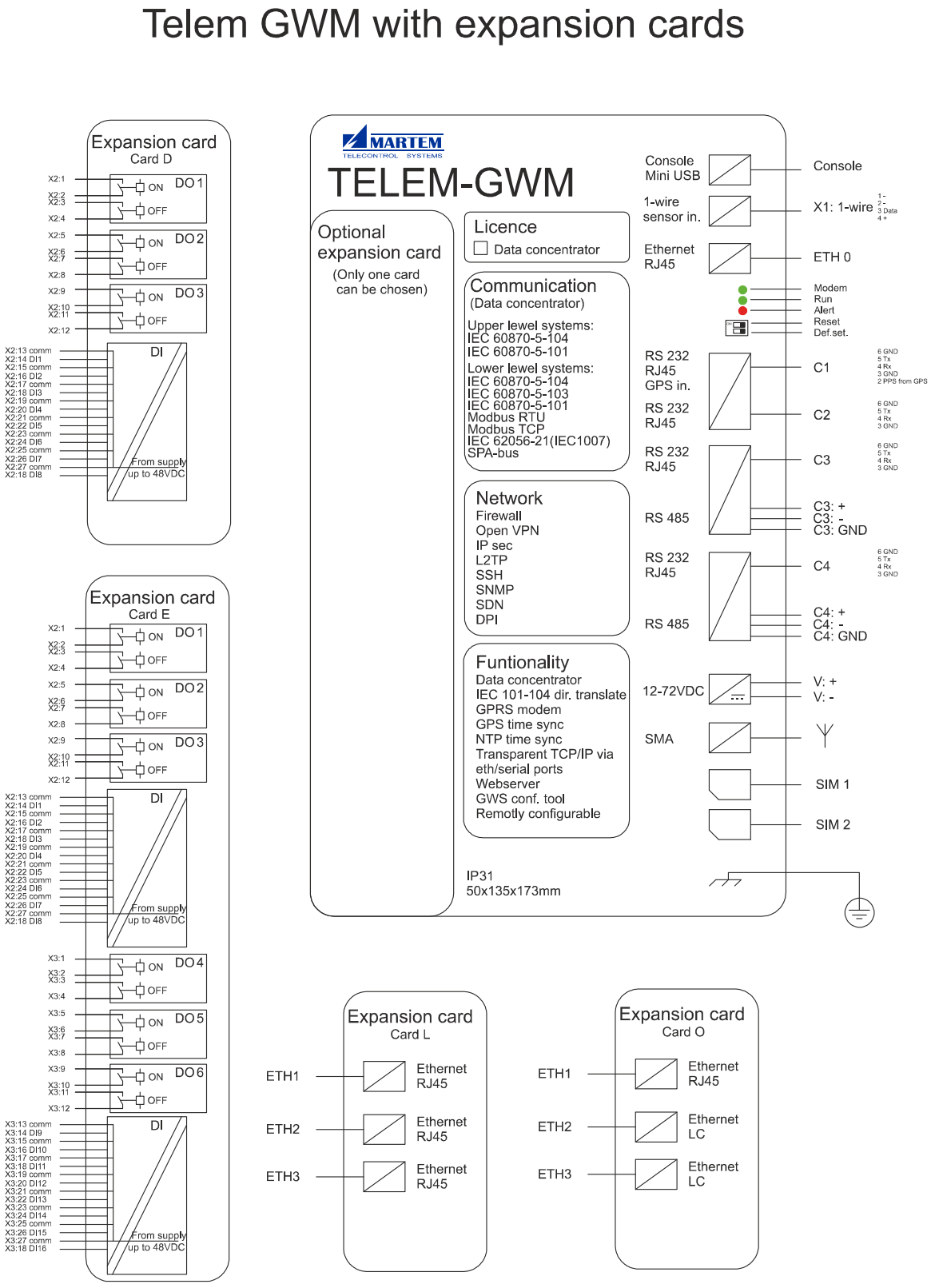
For communication (RS232 ports)

Green LED's – RX, TX

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

(e.g. GWM-C1-D-M2)

GWM-XX- X - MX

Licence

B - IEC101 to IEC104 dir. Translation

C - Data concentrator

Processor

1 – Base model

2 – Custom model

Expansion card

N – No card

D – 8 DI and 3 DO

E – 16 DI and 6 DO

L – 3 x RJ45 LAN

O – 1 x RJ45LAN + 2 x Optical LAN

Modem card

0 – No modem

1 – 3G modem

2 – 4G modem

10. Open-source software information

This device produced by Martem Ltd. 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/