KONGSBERG

RMC-ST

Hardware Module Description

Kongsberg Maritime Part no. 321520

325472/B

Document history

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Rev. A	September 2008	First version.
Rev. B	December 2010	Corrected according to new document review

Note

Warning

The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. The user must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.
Kongsberg Maritime disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.

Comments

To assist us in making improvements to the product and to this manual, we welcome comments and constructive criticism.
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Glossary

ESD	Electrostatic Discharge
Ex	Explosive atmosphere
FS	Field Station
GND	Module 0 V reference
IE	Instrumentation Earth
I/O	Input/Output
KM	Kongsberg Maritime
K-Thrust	Kongsberg Truster System
MTBF	Mean Time Between Failure
PE	Protective Earth
RBUS	Serial Process Bus
RCU	Remote Controller Unit
RIO	Remote I/O
RMC-ST	Remote Media Converter for ST fibre optic connector
RMP420	Remote MultiPurpose module series 420
RPC	RIO Panel Controller
SPBUS	Serial Process Bus

Overview

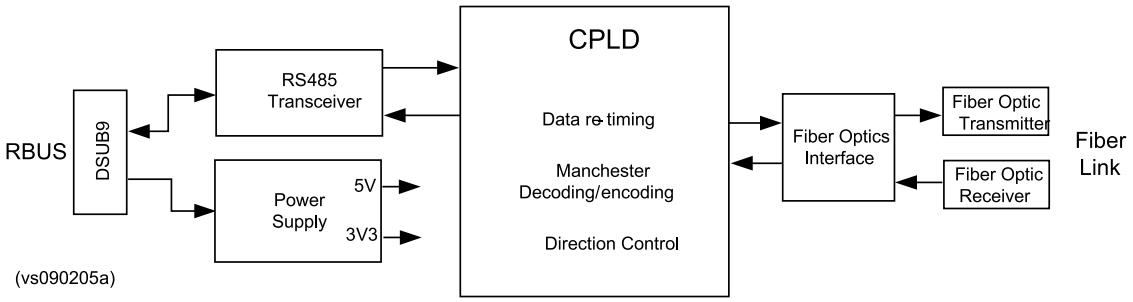
RMC-ST is a media converter module that extend and galvanic isolate the Kongsberg RBUS or SPBUS (remote I/O buses) using fibre optics. The RBUS and SPBUS are RS485 based communication buses that interconnect the RCU (remote controller module) and related RIO (remote I/O) modules (e.g. RMP420).

Using this media converter and fibre optics cables, distances in range of kilometres can be achieved without any degradation of signal quality even when several pairs of media converters are used along the RBUS. The limitation lays in the total time delay along the line which limits the update speed of data in the system.

- Fibre link length up to 1 km
- Up to 3 fibre links can be inserted in series in one RBUS or SPBUS
- Easy snap-on mounting to DIN rail
- Ex Zone 2 approved

Function

Figure 1 Block diagram of RMC-ST



Module functions

The main functions of RMC-ST are:

- Direction Control
- Manchester decode/encode
- RBUS/SPBUS interface
- Optic fibre interface

The RMC-ST regenerates the shape and timing of signals. Thus several fibre links can be used on one RBUS/SPBUS line without any degeneration.

LED indicators

There are three LED indicators on the front of the module (see Figure 4)

Table 1 LED indicators

Signal name	Colour	Function
Power ON	Lit green	The module is powered via DSUB connector from RBUS' 24 VDC
Rx	Flashing yellow	RMC-ST is receiving data from the DSUB connector link.
Tx	Flashing green	RMC-ST is transmitting data to the DSUB connector link.

RBUS/SPBUS termination

The RMC-ST has no embedded line termination resistor built in for the RBUS/SPBUS.

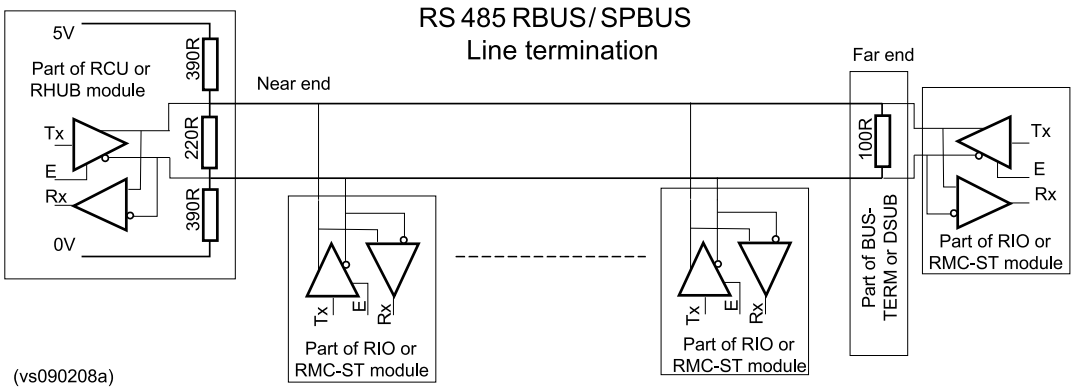
Near end fail safe biasing is typical executed inside RCU or HUB units.
Far end bus impedance termination is typical executed by a dedicated bus termination design.

- In a typical bus topology the preferred impedance termination will be done in the RMC-Term unit (KM item no. 346007) as illustrated in figure 3.
- For K-Thrust specific system deliveries when Panel Controller Units (RPC4xx) are interfaced, other solutions may be used. For detail, see KM dwg. 350378.

Note

It is important that only one end of the RBUS is terminated with the three-resistor network and the other end then terminated with a single resistor only, as illustrated in figure 2.

Figure 2 Illustrated line termination for RBUS/SPBUS



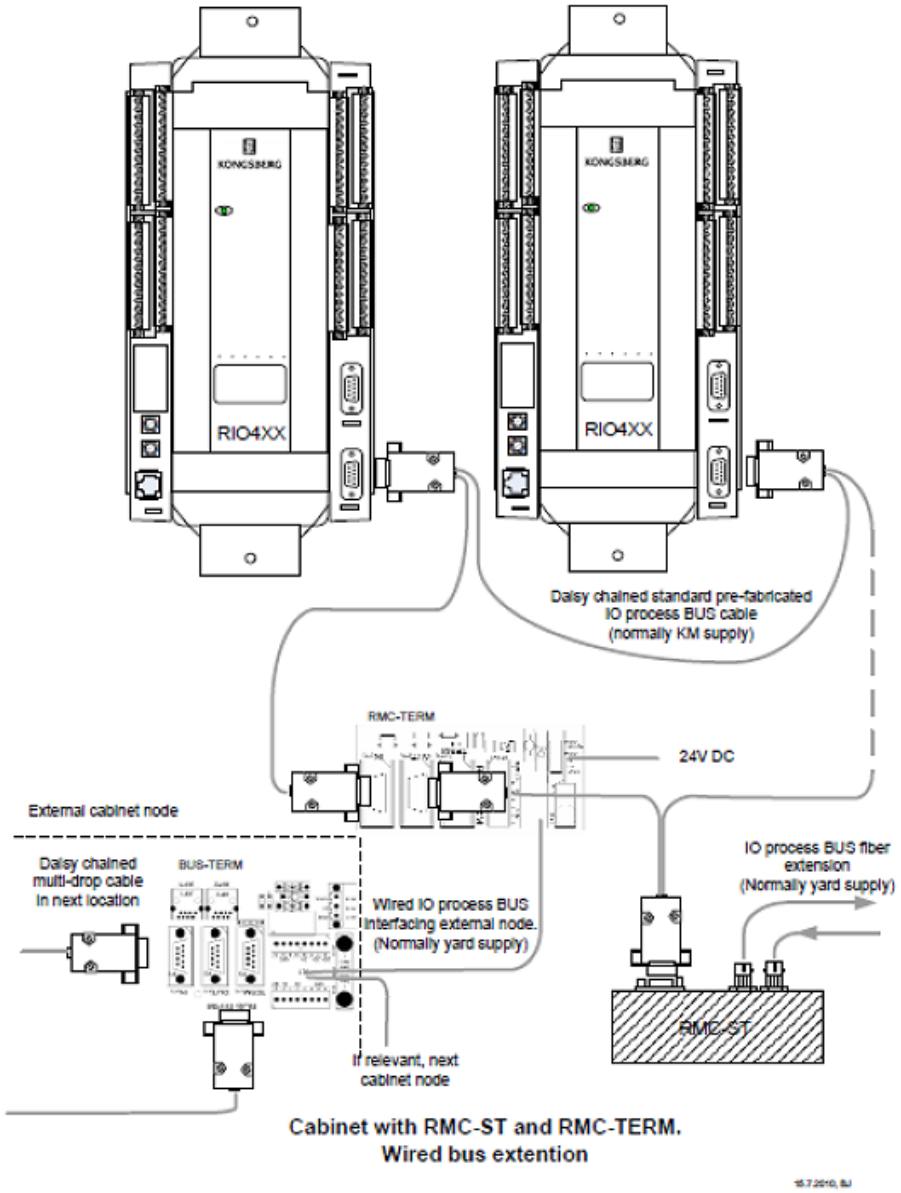
RMC-ST power connection

The power supply to the RMC-ST is provided from the RBUS/SPBUS cable via the DSUB connector.

Example of RMC-ST use

Figure 3 illustrates how the RBUS can be wired within field stations (FS) and using the RMC-ST module for interfacing at external RIO modules.

Figure 3 RMC-ST in multi node IO process bus



Technical Specifications

Table 2 Technical specification

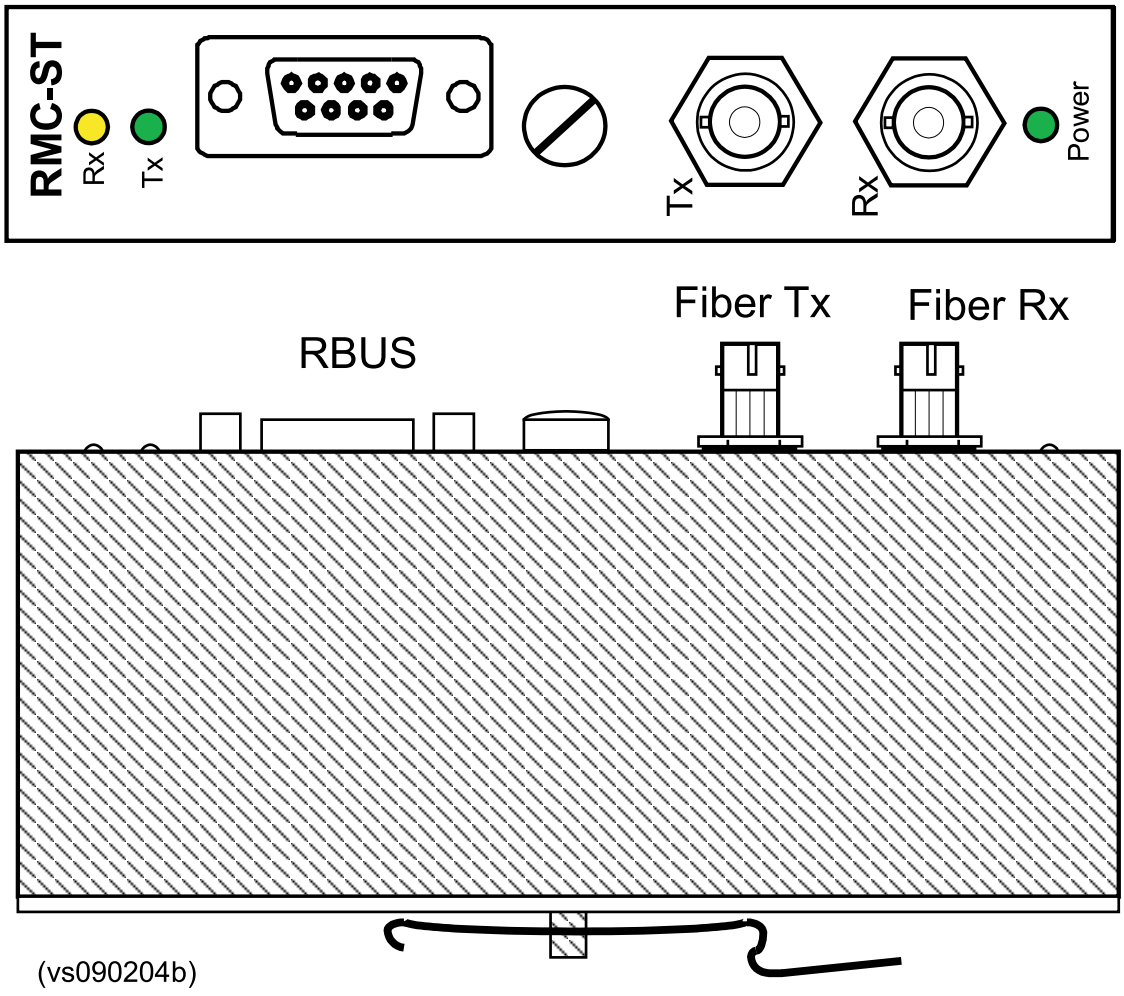
Power supply requirements and specifications	
Supply voltage	10 to 32 VDC supplied via RBUS cable
Inrush current	Maximum 3 A, 1 mJ/25 µs
Stand by power	Typical 75 mA, maximum 80 mA, both at 24 VDC
Isolation	Isolated by fibre cable
SPBUS/RBUS Interface	
Power Supply	24 VDC ±20% (Max 50 mA)
Connector	9 Pin DSUB
Insulation	500V (Optocoupler)
Physical Layer	RS-485
Bit-rate	2Mbit/sec
Signal Code	Manchester encoded (Self-clocked)
Cable Attenuation	< 6.5 db / 100m @ 10 MHz (CAT 5)
Max cable length	200m between repeaters, Max. 3 reapeters
Fibre optic RBUS/SPBUS	
Connector	ST connectors
Cable	62.5/125 µm multi-mode fibre
Cable length	Recommended maximum 1 km, cable loss 3 dB/km plus termination loss 1 dB at each end due to patch cables If no extra termination is used, 3 dB/km gives 1.5 km cable length
Power budget	Maximum 5 dBm damping of optical signal in fibre cable allowed
Mechanical specifications	
Module size (W x H x D)	27 x 115 x 50 mm
Weight	0.12 kg
Mounting	Snap on to DIN rail

Table 2 Technical specification (cont'd.)

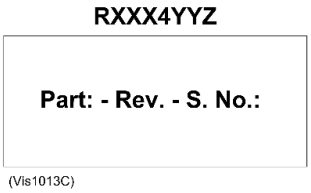
Compability	
CE mark compliant, EMC directive	2004/108/EC
Atex directive	94/9/EC
EN directive 60079 for electrical apparatus for explosive gas atmospheres	Ex nA II T4
Ex protection specification	II 3G EEx nA II T4 Ta: 55°C
Environmental requirements	
IP class	IP 20
Life cycle prediction	
Predicted failure rate @ GB 25°C (60% confident, based on chip suppliers data and MIL-HDBK-217F) Predicted failure rate @ NS 35°C (Environmental de-rating based on Rome Laboratory toolkit)	140 Years 37.8 Years

Configuration

Figure 4 Component location

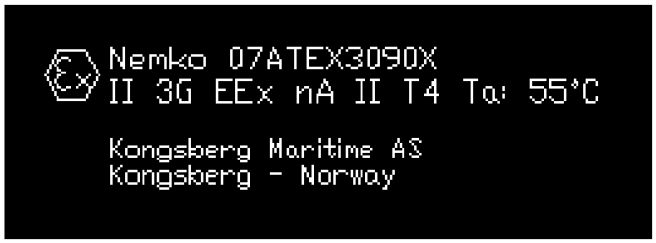


Module identification



There is a module identification label on each module. For any communication with Kongsberg Maritime regarding this module you should refer to the part number (Part#), revision (Rev.) and serial number. (Serial#). A bar code is also added to the label.

Ex label



The Ex label contains two lines of information:

- Nemko 07ATEX3090X is the type approval certificate number.
- II 3G EEx nA II T4 Ta: 55ºC are the Ex requirements satisfied by the module.

P1 pin allocation

P1 is a male 9-pin D-sub connector for the internal RBUS cable.

Figure 5 P1 pin layout

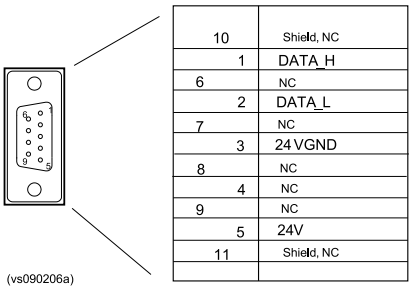


Table 3 P1 pin allocation

Pin	Name	Pin	Name
1	Data-H in	2	Data-L in
3	0 VDC	4	Not used
5	+ 24 VDC	6	
7	Not used	8	
9		Shield	Shield

Installation

Ex Zone 2 installation requirements

The choice of enclosure, placement of modules, components and free volume inside enclosure will affect the temperature.

When the module is used in Ex Zone 2, the following requirements must be met:

- The RIO module shall be mounted in an enclosure which complies with the requirement of clause 26.3 of EN 60079-15 and fulfil IP 54, or alternatively is mounted in an EEx e-enclosure.
- Maximum surface temperature shall not exceed temperature class T4 corrected for the maximum ambient temperature at service (Ta: 55°C) within the safety margin of 5°K.
- Maximum ambient temperature inside enclosure shall not exceed 75°C.

Installation procedure

Note

No static electricity precautions needs to be taken during installation of the RMC-ST module.

1. Label the module.
2. Snap the RMC-ST on to the DIN-rail.
3. Connect the fibre cable to Rx and Tx ST connectors as appropriate.
4. Connect the internal RBUS cable connector at P1 as appropriate.
5. If not already turned ON, turn ON the RBUS and RIO system power supplies at both ends of the fibre cable.
6. Verify the RIO system works properly.

Replacement

1. Disconnect the RBUS cable connector by releasing the two bolts of the DSUB connector cover and unplug.
2. Disconnect the Rx and Tx ST connectors of the fibre cable.
3. Remove the old module by snapping it off from the DIN rail by bending the lower part outwards.
4. Label the new module.
5. Snap the RMC-ST on to the DIN-rail.
6. Reconnect the fibre cable to Rx and Tx ST connectors as appropriate.
7. Reconnect the RBUS cable connector at the DSUB connector and fasten the two bolts.
8. Verify the RIO system works properly.