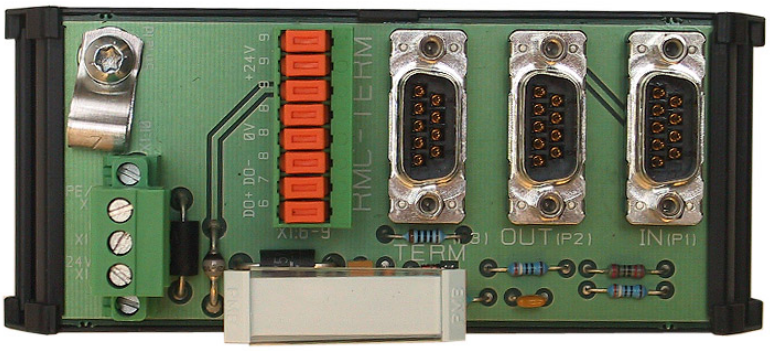
KONGSBERG

RMC-Term

Hardware Module Description

Kongsberg Maritime Part no. 346007



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Document history

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Rev. A	December 2010	First version.

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

RMC-TERM	Remote Media Converter Termination
CE	Communauté Européenne
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
Ex	Explosion Approval
FS	Field Station
GND	Module 0 V reference
IDC	Insulated Displacement Connector
IE	Instrumentation Earth
I/O	Input/Output
IP	Ingress Protection/Enclosure Rating
KM	Kongsberg Maritime
LAN	Local Area Network
MTBF	Mean Time Between Failure
PE	Protective Earth
RBUS	Remote Process I/O Bus
RCU	Remote Controller Unit
RDIOR420	Remote I/O Relay module series 420
RIO	Remote I/O
RMP420	Remote MultiPurpose module series 420
SPBUS-Term	Serial Process I/O BUS Termination
STP	Shielded Twisted Pair

Overview

KM utilizes an I/O process bus in order to interface the field I/O modules to the host computer(s). Two different versions of the I/O process bus are currently being delivered. Serial Process bus (SPBUS) and Remote bus (RBUS).

This RMC-TERM unit may be utilized both in SPBUS and RBUS topologies when the fibre extension IO process bus module is part of the topology. Thus the RMC-TERM module is designed to terminate the IO process bus on the remote side of the RMC-ST module.

When using a RMC-ST module, a corresponding RMC-TERM module has to be fitted in the bus topology. Redundant RBUS channel topology require a corresponding number of RMC-Term modules.

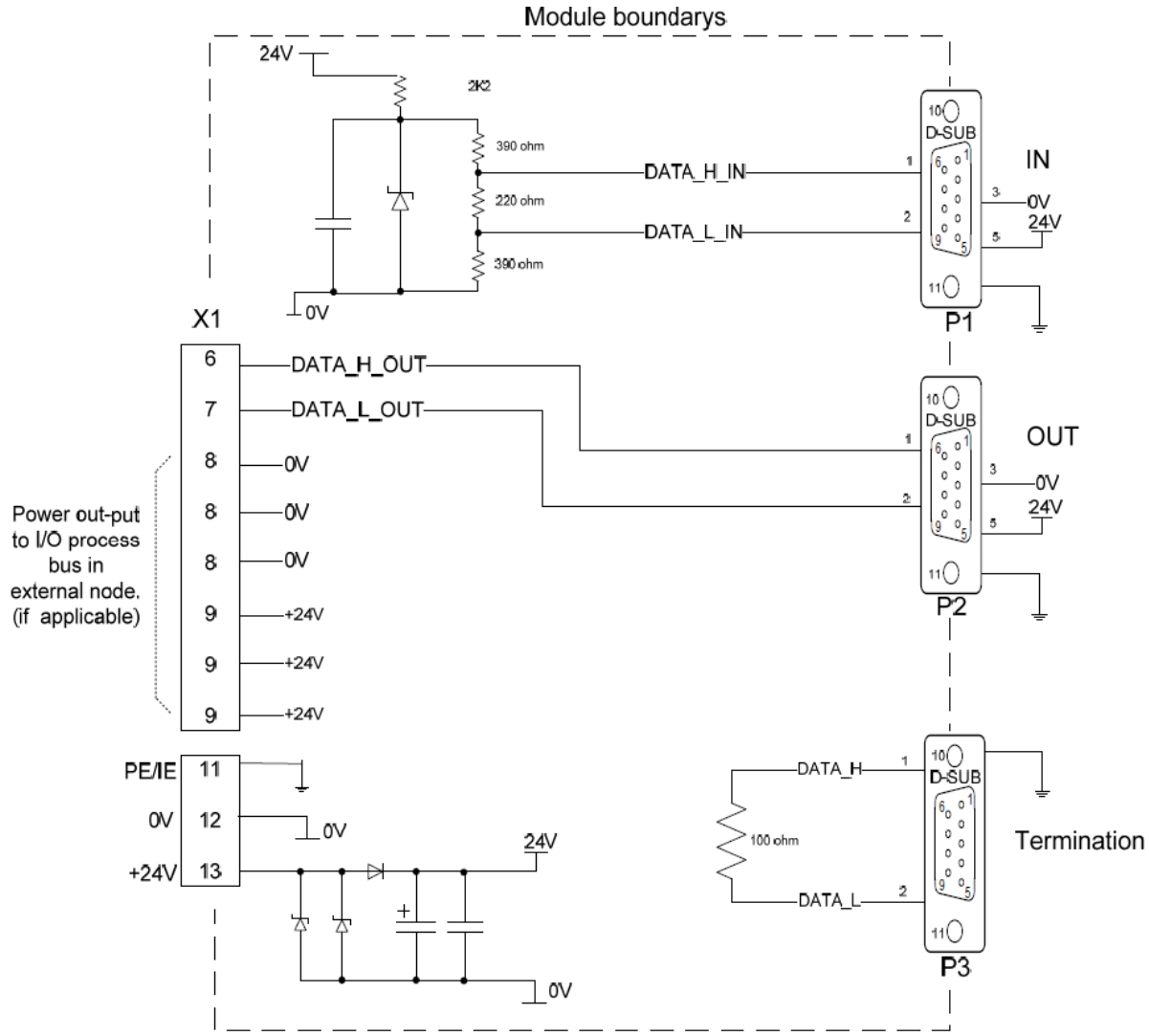
24V DC communication bus supply power is to be connected to separate screw terminals on X1.

Recommended BUS 24 VDC power supply is identical to host computer (RCU) power supply. One power supply feed per RBUS channel.

IDC part of termination board X1 is for interfacing of external cabling (normally yard supply). BUS data out is mainly designed for shielded twisted pair (STP) LAN cable. Termination is carried out with the time saving fast termination, punch down connection design: Insulation Displacement Connection. (IDC).

Function

Figure 1 Block diagram for RMC-TERM



The prefabricated internal RBUS cables (normally KM supply) have approx. 100 ohm impedance, therefore the RMC-Term impedance termination resistor R_T has the identical value.

BUS wiring

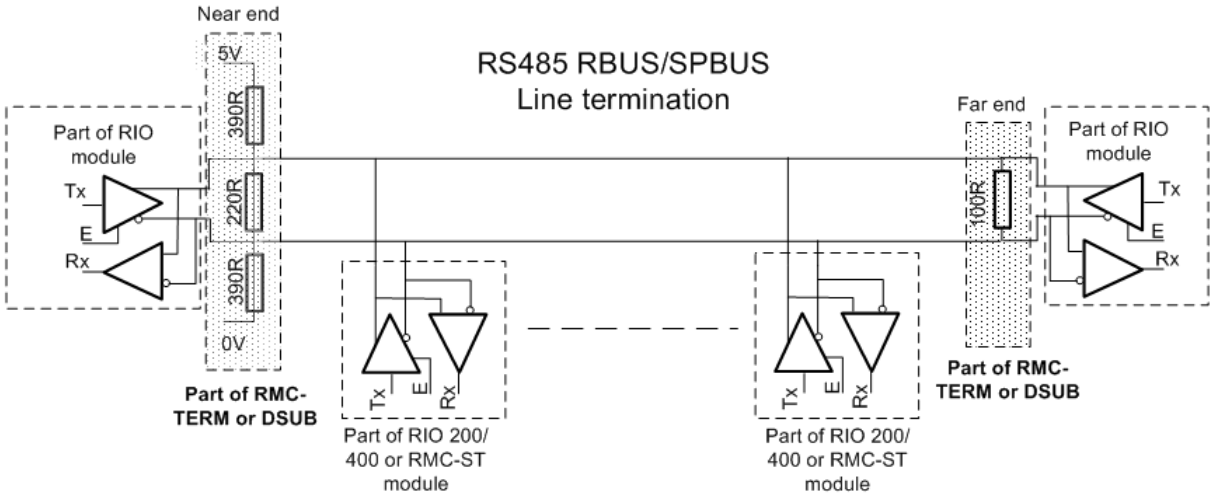
The RMC-TERM board mainly consist of five connectors: P1, P2 and P3 are prepared to daisy-chain interface the RIO modules to the media converter with standard pre-fabricated bus cables (normally KM supply). P3 is for impedance termination if this cabinet is the last one on the serial bus.

IDC connector X1:6–9 is prepared for external bus signal interface. Screw terminal X1:11–13 is prepared for biasing of the I/O bus, and to power the RMC-ST unit.

BUS termination

KM IO process bus physical layer is a standard RS485 daisy-chained multidrop bus-line. Figure 2 shows a standard fail-safe biased bus line, this is the standard method used in KM systems. Fail-safe biasing should be used in noisy environments in order to prevent false message detection. Without fail-safe biasing, the line can easily switch from 0 to 1 (or vice versa) and thereby generate a false start pulse. If this false pulse comes directly in front of a legal message – the message will then be corrupted and lost.

Figure 2 BUS Termination



Grounding

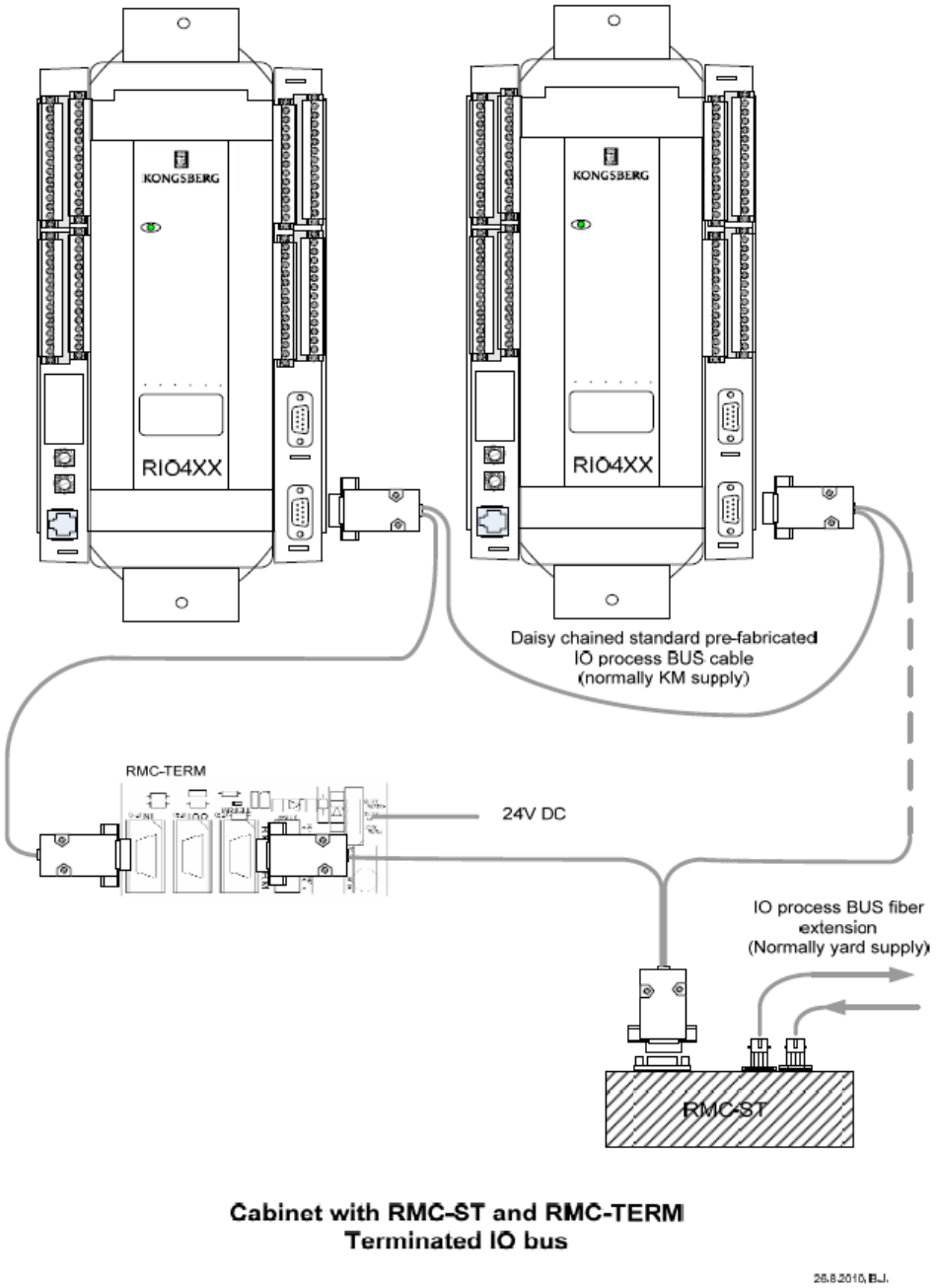
When terminating / connecting the STP cable to the IDC part at X1 connector, cable shield shall be clamped by the metal based strain reliefs. Illustrated as X1:10 in Figure 6. Further, make sure that X1:11 is terminated to PE.

Topology illustrations

The fibre converter RMC-ST and corresponding RMC-Term module may be connected in a various topologies depending on the specific site installation. Examples in figure 3–5 are only guidelines.

Single Node Supply

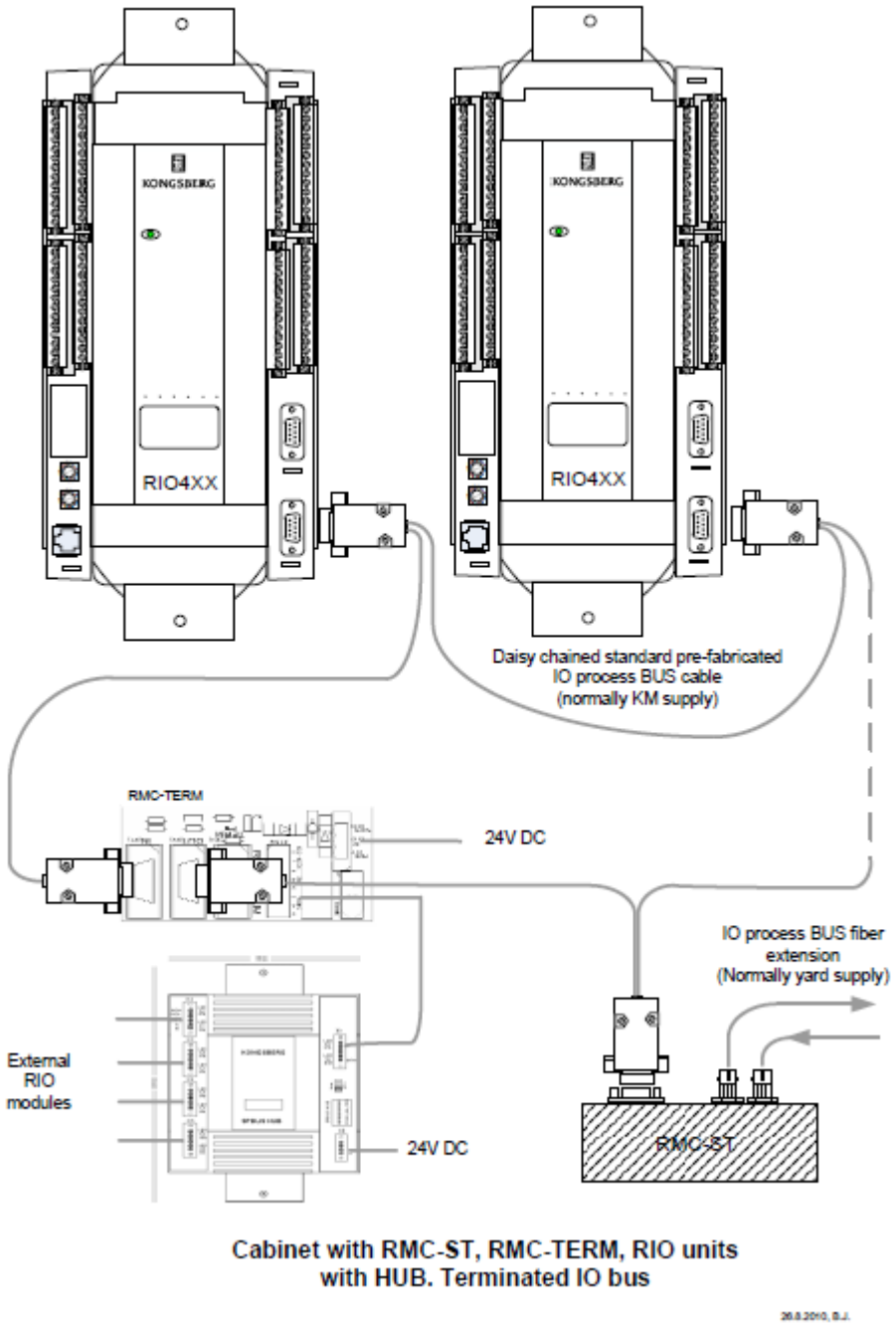
Figure 3 Termination of single node IO process bus



Inside the cabinet, P1, P2, and P3 D-sub connectors are prepared to daisy-chain interface the RIO modules to the communication bus with standard prefabricated cables (normally KM supply). P3 is for impedance termination if the cabinet is the last one on the communication bus as illustrated in Figure 3, 4 and 5.

Single Node Topology with HUB segregation

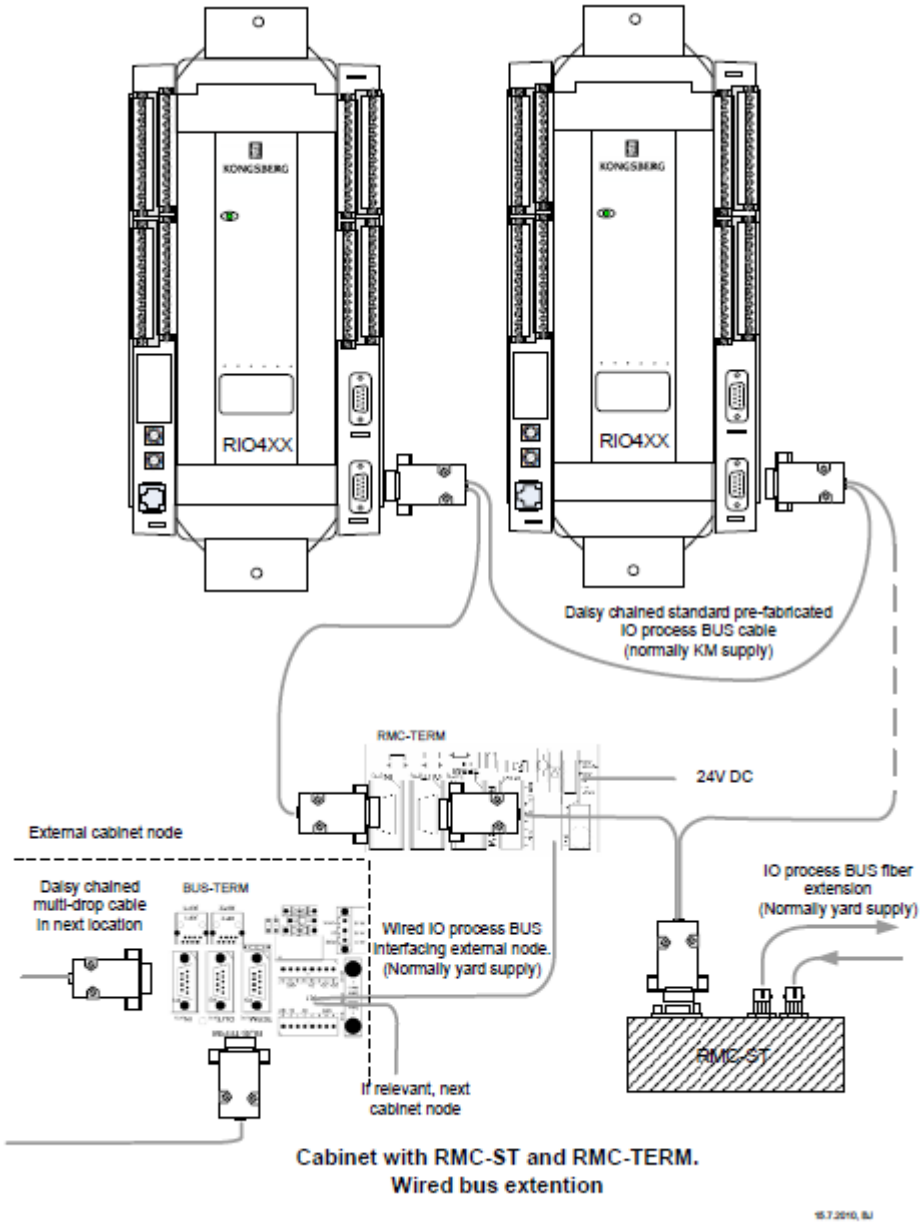
Figure 4 Termination of single node IO process bus and HUB extension



Cabinet with RMC-ST, RMC-TERM, RIO units with HUB. Terminated IO bus

Multi Node Topology

Figure 5 Termination of multi node IO process bus



Note

When interfacing several cabinets or I/O nodes as illustrated in Figure 5, a shielded twisted pair (STP) LAN cable (normally yard supply) is to be connected to the Insulated Displacement Connector (IDC) part at terminal block X1.

RMC-Term power connection

The power supply interface on the RMC-Term module is provided with a blocking diode. Redundant power supplies will keep the serial line powered if a cabinet node is turned off.

When the process I/O BUS is interfaced in a multi node topology, this may involve several BUS-Term unis. Thus, the design allows power to be supplied on different BUS-Term units along the BUS, as illustrated in figure 5.

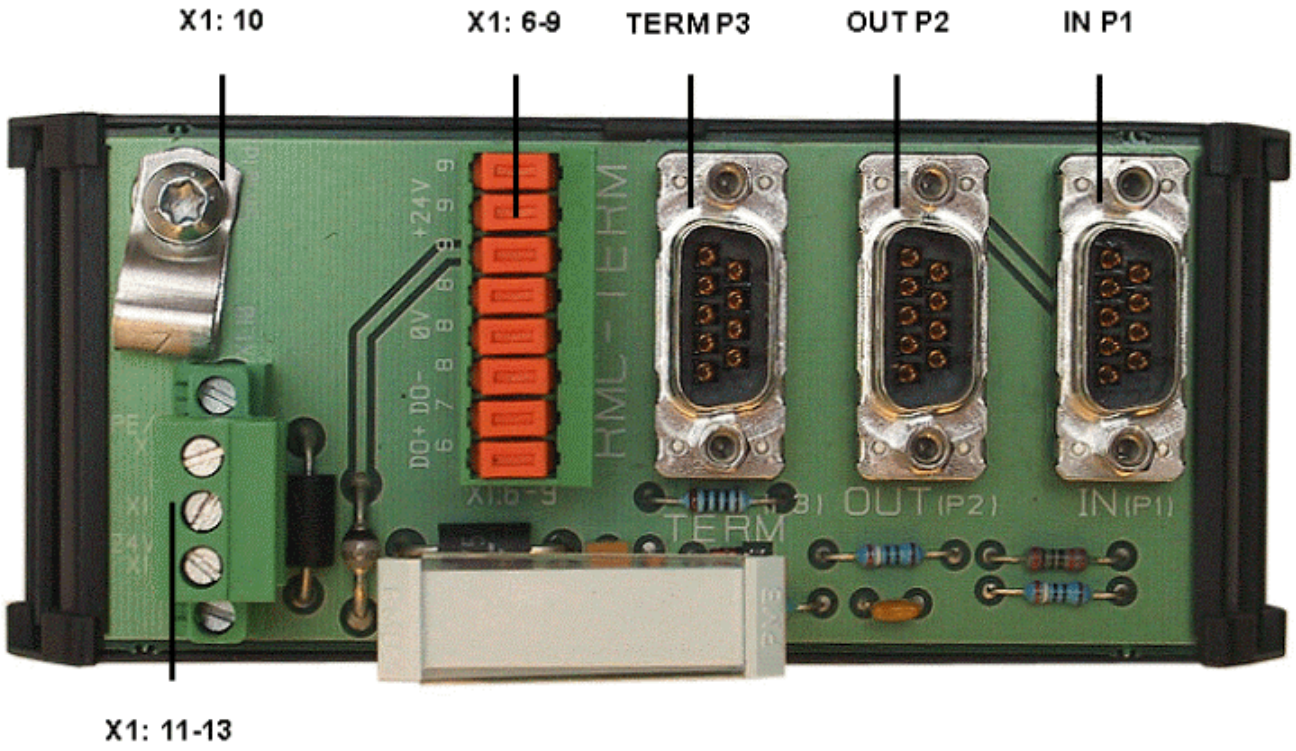
Technical Specifications

Table 1 Technical specification

Power supply requirements and specifications	
Supply voltage	+24 VDC +30% - 25%
Mechanical specifications	
Module size (W x H x D)	122 x 64 x 52 mm (included Phoenix Contact cassette)
Weight	0.12 kg
Mounting	Snap on to DIN-rail T35–15/7.5
Communication bus cable connection	IDC type
Cable cross section	Minimum 0.22 mm^2 (AWG 22/7) Maximum 0.34 mm^2 (AWG 26/7)
Power cable connection	Screw terminal slotted type
Cable cross section	2.5 mm^2
Environmental requirements	
IP class	IP 20
Life cycle specifications	
MTBF calculated according to MIL-HDBK-217E (T=35°C, env=NS)	190,700 hours
Capability	
CE mark compliant.	Conform to EMC directive 2004/108/EC.

Configuration

Figure 6 Connector locations



Connectors

Daisy-chain connector – P1/P2 (D-SUB)

Two BUS interfaces are available on P1 and P2, which is a 9-pole male D-SUB connector. The pins 10 and 11 represent the screw locks of the D-SUB.

Figure 7 P1 pin layout

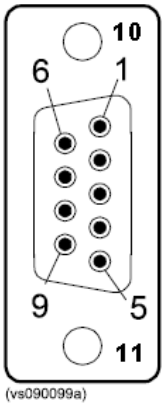


Table 2 P1 pin allocation

Pin	Name	Pin	Name
1	Data serial diff. BUS Positive	2	Data serial diff. BUS Negative
3	0 VDC	4	Not used
5	+ 24 VDC	6	
7	Not used	8	
9		10, 11	Shield

Termination connector – P3 (D-SUB)

The P3 connector is an end termination of the serial bus, with a fix 100 Ω resistor. It's a 9-pole male D-SUB connector. The pins 10 and 11 represent the screw locks of the D-SUB.

Table 3 P3 pin allocation

Pin	Name	Pin	Name
1	Data serial diff. BUS Positive	2	Data serial diff. BUS Negative
3	Not used	4	Not used
5		6	
7		8	
9		10, 11	Shield

Field Terminal X1

Consists of: Phoenix IDC 3.81 8-pin X1: 6–9 and MSTBV 2,5/ 3-GF-5,08 X1: 11–13.

Note

Note that the figures shows a 10-position version of the contact.

Cable cross section (stranded wire):

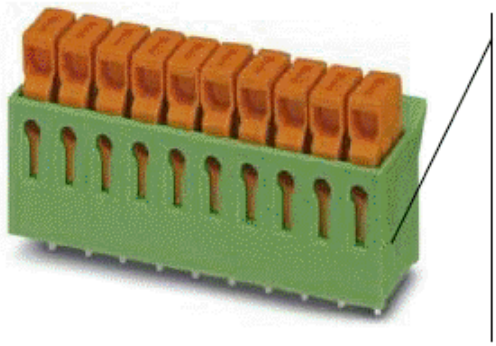
Minimum 0.22 mm² (AWG 22)

Maximum 0.34 mm² (AWG 26)

Note

Note that the figures shows a 10-position version of the contact.

Figure 8 Pin layout on field terminal X1 LAN



X1 (6 through 9)

Pin# (X1)	Signal name	Description
6	DATA_H_OUT	Data serial diff. bus Positive
7	DATA_L_OUT	Data serial diff. bus Negative
8	+24V	Power
8	+24V	Power
8	+24V	Power
9	0V	Signal ref.
9	0V	Signal ref.
9	0V	Signal ref.

Shield is connected with Aluminum cable clamp (X1:10) and is also mechanical cable stress relief.

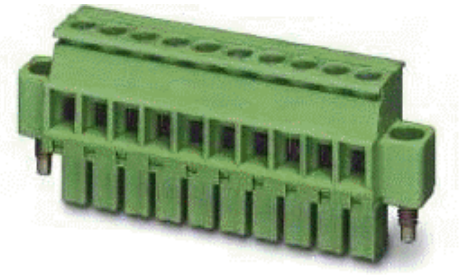
Field Terminal X1 Power Cable

Consists of: Phoenix MSTBV 2,5/ 3-GF-5,08. X1 (11 through 13)

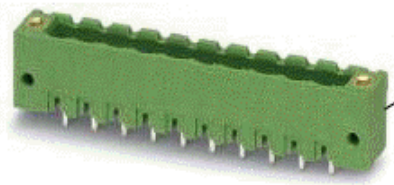
Cable cross section: 2.5mm² .

Plug X13: MCVW 1,5/3-STF-3,81. The figure shows a 10-position version of the product.

Figure 9 Pin layout on field terminal X1. Power



MCVW 1,5/3-STF-3,81



X1 (11 through 13)

Pin# (X1)	Signal name	Description
11	**PE/IE**	Ground
12	**0V**	Signal ref.
13	**+24VIN**	Power

Installation

Installation procedure

1 Label the board.

2 Clip the RMC-Term Phoenix cassette on to the DIN-rail.

3 Remove the insulation from the field cable to get proper connection to the strain relief metal area.

4 Fix the field cables to the module using the strain reliefs and bolts.

5 Terminate each wire to the IDC knife terminals X1: 6–9 by putting each end into the appropriate holes and then push down the locking key.

Note

It is not necessary to strip the wires before terminating them.

6 Connect the power wires as appropriate to the screw terminals on X1 terminals 11 to 13.

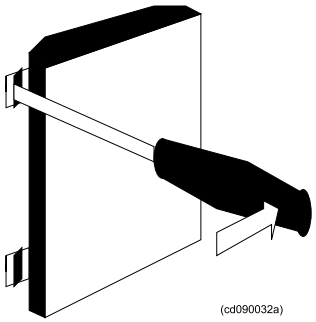
7 Connect the internal RBUS cables at P1 and P2 or P3, or at XP1 and XP2 as appropriate.

8 Turn ON the RBUS and RIO system power supply(s).

9 Verify the RIO system works properly.

Replacement

1. Turn OFF the RBUS and RIO system power supply(s).
2. Disconnect RBUS power wires by unscrewing the end-bolts and pull off the snap-on header of terminal block X1 terminal 11 to 13.
3. Disconnect the field-cable wires by opening the connector locks X1: 6–9 one by one, and finally pull out the wires.
4. Release the strain reliefs to remove the field cables. Keep the strain reliefs on the cables.
5. Disconnect the internal cable from P1 and P2 or P3.
6. Remove the board to be replaced by detaching the RMC-Term Phoenix cassette from the DIN-rail (see illustration).



7. Label the new board.
8. Remove the snap-on header from X1 terminal 11 to 13 on the new board and the two strain reliefs.
9. Clip the RMC-Term Phoenix cassette on the DIN-rail.
10. Fix the field cables to the module using the strain reliefs and bolts.
11. Terminate each wire to the knife terminals on X1: 6–9 by putting each end into the appropriate holes and then push down the locking key.
12. Connect the snap-on terminal header on X1 terminals 11 to 13 and fix the end-bolts.
13. Connect the internal RBUS cable to P1 and P2 or P3.
14. Turn ON the RBUS and RIO system power supply(s).
15. Verify the RIO system works properly.