

# SRS485 Option Card for Lon<sup>®</sup> Star Coupler RER 111

Technical Reference Manual



ABB Automation





Issued: 09.12.1997  
 Version: B2/22.2.2000  
 Checked: M.K.  
 Approved: T.S.

Technical Reference Manual

We reserve the right to change data without prior notice.

## Contents:

<b>1. Introduction</b>	<b>4</b>
<b>2. Functions</b>	<b>5</b>
<b>3. Mechanical and electrical design 6</b>	
3.1. Block diagram	6
3.2. Mechanical structure	6
<b>4. Interfaces</b>	<b>8</b>
4.1. General	8
4.2. RS485 interface	8
4.3. Fibre-optic interface	9
<b>5. Installation</b>	<b>10</b>
<b>6. Technical data</b>	<b>11</b>
<b>7. Maintenance and service</b>	<b>13</b>
7.1. Self-diagnostics	13
7.1.1. Fibre-optic receiver LED	13
7.1.2. RS485 LED	13
7.2. Service and spare parts	13
<b>8. Ordering information</b>	<b>14</b>

## Revision history

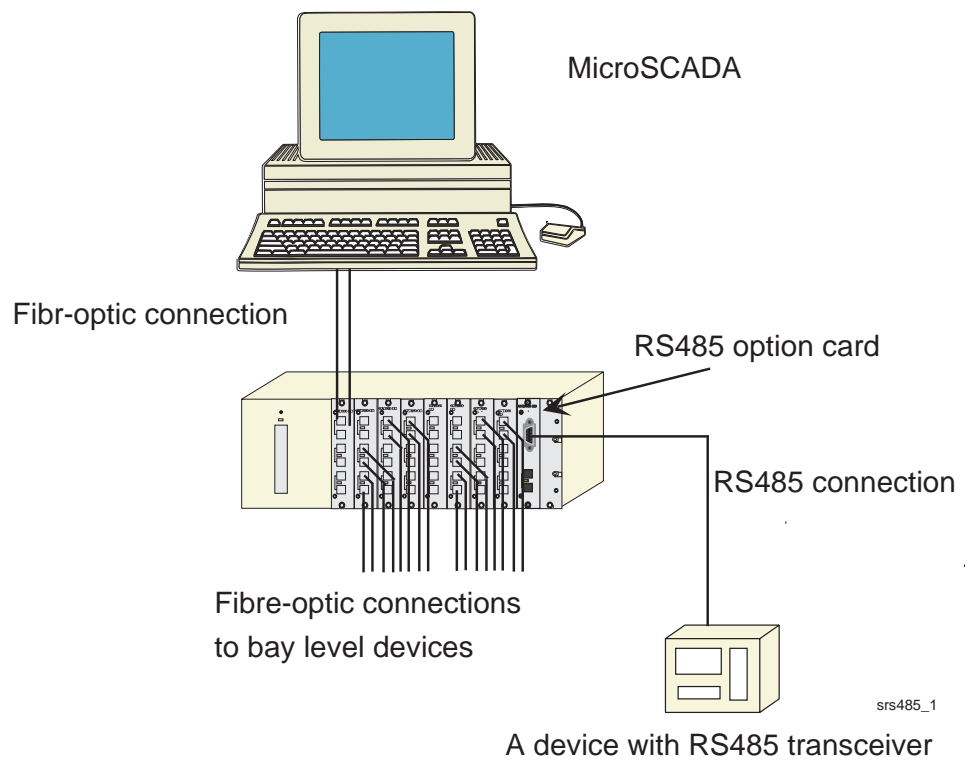
Date	Revision	Author	Description
09.12.1997	A	T. Peltoniemi	Original version
29.12.1999	B1	M. Kiikkala	Update version (Q4/99)
22.02.2000	B2	M. Kiikkala	References to SMA-transceiver option removed

Echelon, LON, LonBuilder, LonManager, LonTalk, LonWorks, Neuron and 3150 are U.S. registered trademarks of Echelon Corporation. LonLink, LonMark, LonSupport, LonUsers, LonMaker and 3120 are trademarks of Echelon Corporation

## 1. Introduction

The RS485 option card is designed for use within the RER 111 unit. This device is not a "stand-alone" device.

The option card provides point-to-point connection to LONWORKS™ devices requiring an RS485 interface and communication to the substation protection and control system.



*Fig. 1.-1 Connection to a device with an RS485 interface.*

The RS485 option card includes a fibre-optic transceiver pair of one of the two types below:

- ST-type glass fibre-optic transceivers
- snap-in-type plastic fibre-optic transceivers.

The transceiver type has to be stated in the order. For ordering information, see chapter 8.

## 2. Functions

The RS485 option card consists of a fibre-optic interface and a 9-pin D-type connector for the RS485 interface.

The option card itself has no local intelligence. It operates purely as a repeater unit between multiple connections. Messages received from one interface are transmitted to the other interface and to the open collector bus of the mother board. The open collector bus on the mother board can also activate the transmitters of the RS485 interface and the fibre-optic interface.

The RS485 D-type connector can also supply a +8 V dc power supply, if required. For pin allocations, please see chapter 4.

A LED indicator flashes whenever a message is received by the RS485 interface of the option card.

As the RS485 interface cannot receive and transmit data simultaneously, this card has no collision detection support for the RS485 interface.

The RS485 option card is equipped with a single fibre-optic transceiver pair. This fibre-optic pair is available with two different types of fibre-optic interfaces. The transceivers are not interchangeable and have to be defined by the user in the order. For ordering information, see chapter 8.

The fibre-optic interface in the RS485 option card has a built-in support for collision detection.

The RS485 option card also contains a LED for the fibre-optic receiver. This LED flashes when a message is being received.

The RS485 option card has a self supervision feature for continuous light reception. If the fibre-optic channel receives continuous light, the reception on the channel is cut off. The error is notified to the I/O module of the RER 111 LON Star Coupler via the error line. Error reset is also notified. For information regarding the error line of the RER 111 Star Coupler, refer to the RER 111 manual 1MRS750104-MUM, chapter 4.1.

The indication LED of the fibre-optic channel is continuously lit if continuous light is received.

### 3. Mechanical and electrical design

#### 3.1. Block diagram

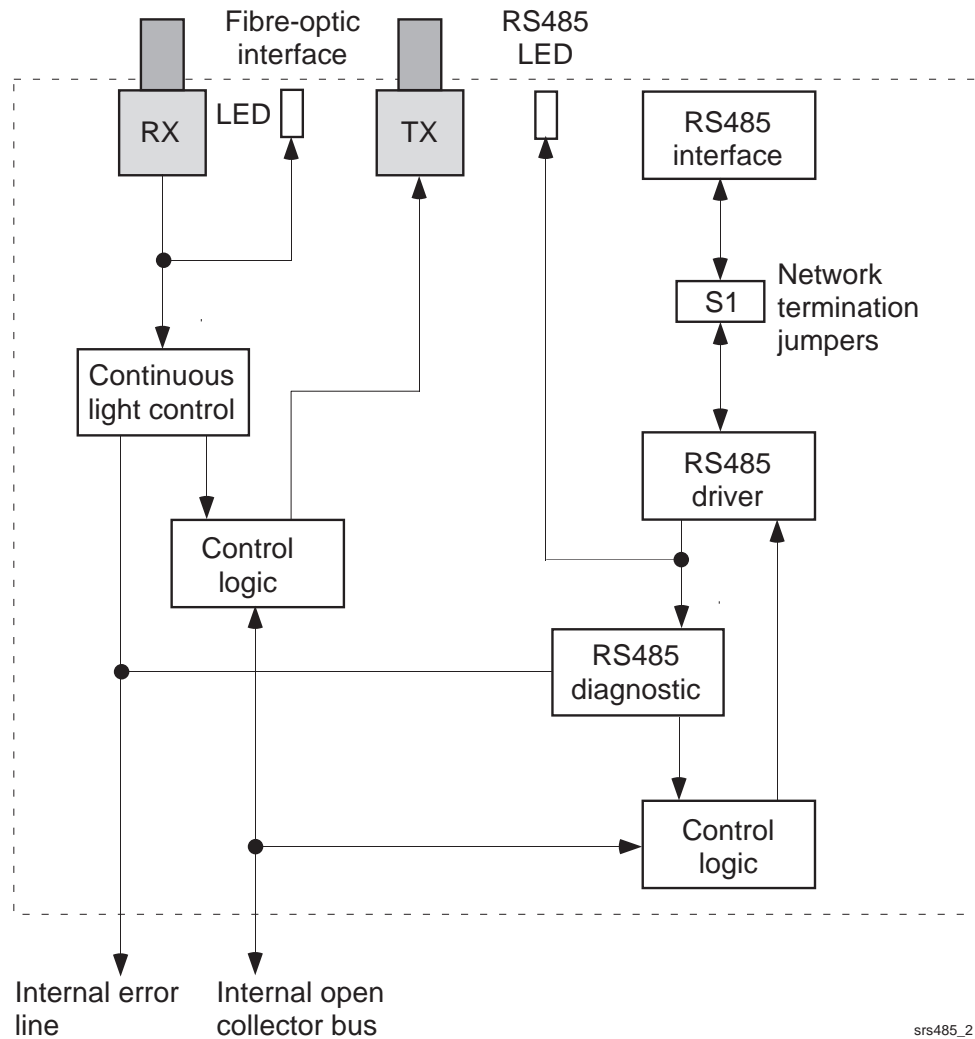


Fig. 3.1.-1 Block diagram of RS485 option card.

#### 3.2. Mechanical structure

The RS485 option card is built onto a printed circuit board (PCB) of size 100 mm x 160 mm. The size of the front plate is 116.4 mm x 19.8 mm.

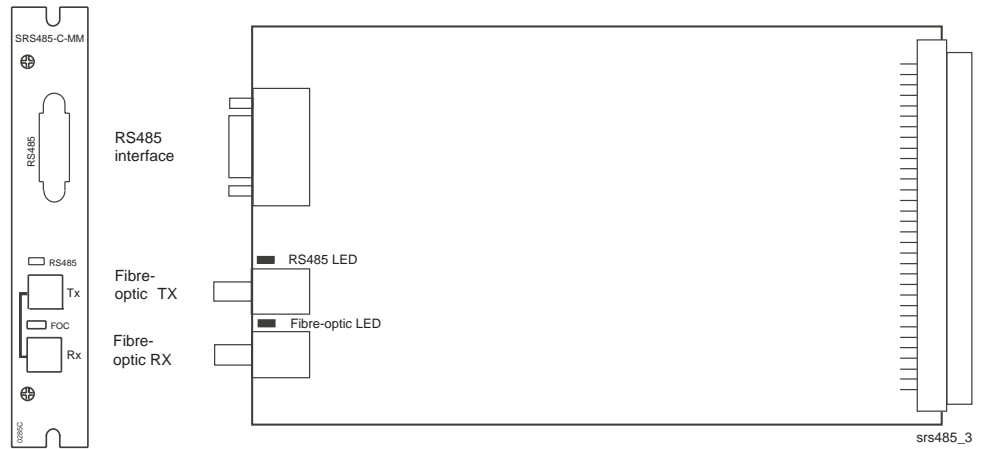


Fig. 3.2.-1 Mechanical structure of RS485 option card.

## 4. Interfaces

### 4.1. General

The RS485 option card has 3 separate interfaces:

- a 64-pin E1 card connector for the connection to the mother board of the RER 111 unit
- a 9-pin D-type female connector for the RS485 interface
- a fibre-optic transceiver pair for the fibre-optic interface.

### 4.2. RS485 interface

Electrically, the RS485 interface is according to the EIA specification for RS485. Physically, the interface is a 9-pin D-type female connector.

**Table 4.2.-1 Specification for RS485 interface**

Specification	RS485 interface
Transmission speed	1.25 Mb/s
Max. cable length	15 m
Type of network	Point-to-point
Terminal resistance	Necessary at both ends of the bus

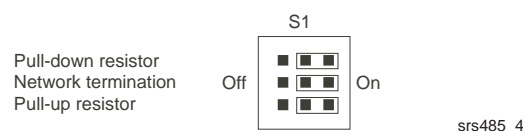
The pin designation of the RS485 interface is shown in table 4.2.-2 below. As RS485 transceivers are polarity-sensitive the connection of the data lines is critical for the network communication.

**Table 4.2.-2 Pin designations of the RS485 interface**

Pin	Signal	Description
1	Data A	Signal line
2	Data B	Signal line
7	Gnd	Ground
9	+8 V dc	Power supply output

The function of the RS485 option card sets requirements for the voltage levels in idle RS485 connection. When the RER 111 unit is not transmitting data and the RS485 bus is idle, the RS485 transceiver is in the receive mode. In the receive mode, the data signal A should be greater than data signal B (> 200 mV). Otherwise the unit is malfunctioning. To obtain this voltage level the RS485 option card includes pull-up and pull-down resistors, which are connected to the data lines through jumpers. By default, both resistors are connected, Figure 4.2.-1

The RS485 bus requires network termination at both ends of the bus. In the RS485 option card, network termination is a built-in feature (120 Ω resistor), which can be selected with the jumper. By default, network termination is enabled. The default setting of the jumper is shown in Figure 4.2.-1



*Fig. 4.2.-1 RS485 option card jumper settings.*



Ground is common to signals and power supply.

Power supply output to an external device available via the RS485 interface. The power supply feature can be used only in one RS485 option card per RER 111 unit and the maximum current is 500 mA.

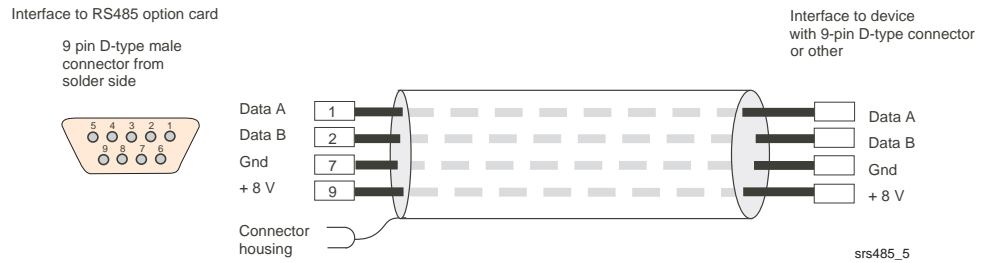


Fig. 4.2.-2 Cable between RS485 option card and other device with RS485 interface.

The RS485 communication cable must be a shielded cable. It is recommended to connect the shield to earth in one end of the cable. However, depending on the specific case and the surroundings, the cable may need more than one earth connection. In that case the other earth connections should be made through a capacitor.

To connect the protective shield, note the following instruction. The protective shield is designed to be connected to the casing of the D-type connector. The connector of the option card is earthed to the case of the RER 111 unit. The figure below illustrates the connection of the protective shield to the cable connector.

The cable connector should be made of conductive material.

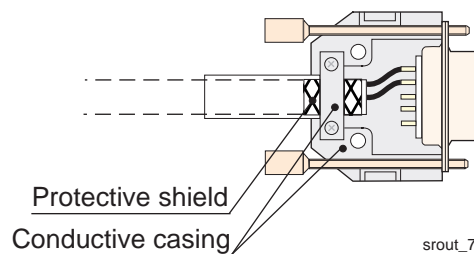


Fig. 4.2.-3 Cable protective shield connection.

### 4.3. Fibre-optic interface

For more information regarding fibre-optic cables and the fibre-optic connection of option cards, refer to the RER 111 manual 1MRS750104-MUM, chapter 6.2.

## 5. Installation

As the RS485 option card is not intended for "stand-alone" use, it has to be installed in the RER 111 unit. It can be placed in any of the 9 slots available.

The number of RS485 option cards in one RER 111 unit is limited to 3.

To install the RS485 option card in the RER 111 unit:

- 1 **Remove the strain screws on the blank plate or the front plate of the option card installed.**
- 2 **Lift off the blank plate or pull the required option card out of the casing.**
- 3 **Replace the old option card with a new one (the component side facing away from the power supply).**
- 4 **Push the option card into the unit until the front plate is flush with the rack.**
- 5 **Tighten the option card or the blank plate to the case with the strain screws.**

**Notice!** Do not touch the fibre-optic transceiver.  
Do not remove dust shields from transceivers not in use.

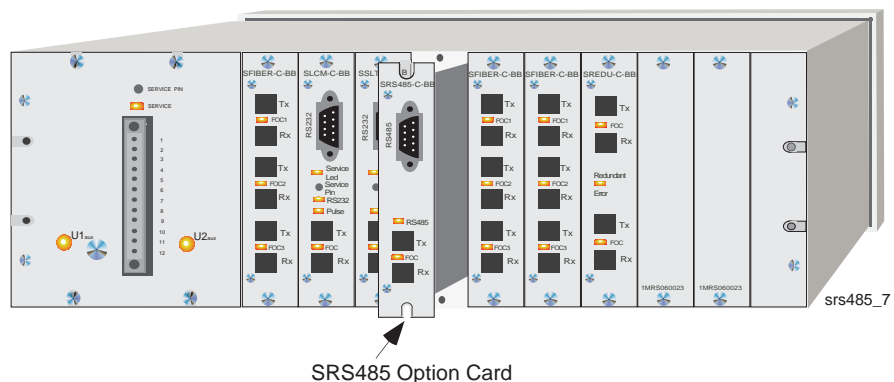


Fig. 5.-1 Installation of RS485 option card in the RER 111 unit.

## 6. Technical data

### Interfaces

RS485 interface	9-pin D-type female connector
Max. cable length	15 m
Max. number of RS485 option cards in one RER 111 unit	3
Fibre-optic interface	glass fibre with ST-type connectors plastic fibre with snap-in-type connectors
Communication speed	1.25 Mb/s
Option card to mother board	64-pin E1 connector

### Power source

From the mother board interconnection	+8 VDC
---------------------------------------	--------

### RS485 interface power supply output

Voltage	+8 VDC
Max. current	500 mA
Max. number of outputs in one RER 111 unit	1

### Power consumption

SROUT-C-MM option card	<1.4 W
SROUT-C-BB option card	<1.4 W

### Size

E1 card	100 mm x 160 mm
Front plate	116.4 mm x 19.8 mm

### Disturbance tests

High frequency interference test according to IEC 60255-22-1	
- common mode	2.5 kV, 1 Mhz
- differential mode	1.0 kV, 1 Mhz
Fast transient test according to IEC 61000-4-4 and IEC 60255-22-4, cl. 4	4 kV
Electrostatic discharge test according to IEC 61000-4-2 and IEC 60255-22-2, class III	
- contact discharge	6 kV
- air discharge	8 kV

### Environmental conditions

Specified ambient service temperature range	-10...+55°C
Transport and storage temperature range	-40...+70°C

**Climatic environmental tests**

Dry heat test according to IEC 60068-2-2	+55°C
Dry cold test according to IEC 60068-2-1	-10°C
Damp heat test according to IEC 60068-2-30	RH = 93%, 55°C, 6 cycles

## **7. Maintenance and service**

### **7.1. Self-diagnostics**

#### **7.1.1. Fibre-optic receiver LED**

The receiver LED flashes when a message is being received from the fibre-optic channel.

If the LED is continuously lit, the corresponding channel is heavily loaded or there is a malfunctioning device sending continuous light.

#### **7.1.2. RS485 LED**

The receiver LED flashes when a message is being received from the RS485 channel.

### **7.2. Service and spare parts**

If a fault occurs in the RS485 option card, the faulty option card should be replaced with a new one. For ordering information please see chapter 8.

## 8. Ordering information

When ordering please state the following:

1. Quantity
2. Type of fibre-optic transceivers

**Type designation:**

RS485 option card	Type Designation
RS485 option card with ST-type glass fibre-optic transceivers	SRS485-C-MM
RS485 option card with snap-in-type plastic fibre-optic transceivers	SRS485-C-BB

Example:

2pcs      SRS485-C-MM      *Two RS485 option cards with ST-type glass fibre-optic transceiver pair*

		Card identification
		Number of cards required





**ABB Substation Automation Oy**

P.O. Box 699  
FIN-65101 VAASA  
Finland

Tel. +358 10 224 000  
Fax. +358 10 224 1094  
[www.abb.fi](http://www.abb.fi)