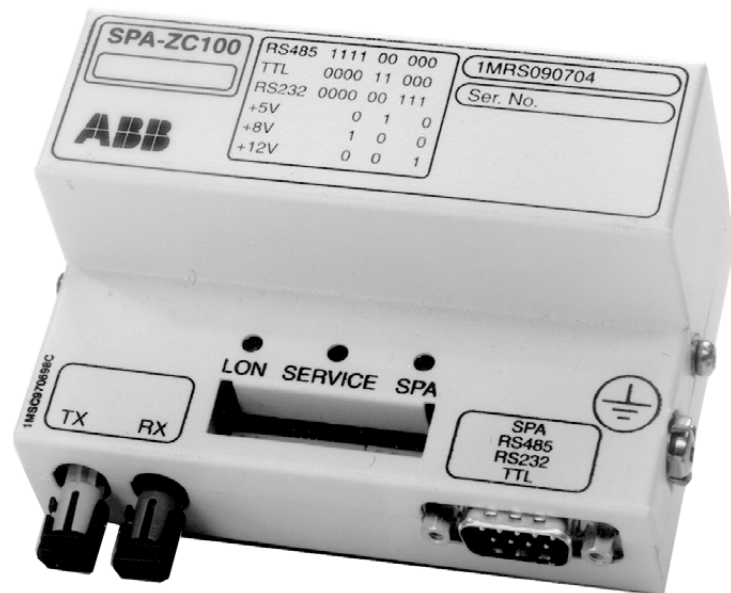# Communicate^{IT}, Lon®/SPA Gateway
SPA-ZC 100

Installation Manual

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Contents:

1.   Features

- LonWorks^® connection module for devices including SPA-bus interface.
- Polling of measurements, indications and events from SPA-bus slave modules to the local database.
- Spontaneous sending of updated measurements, indications and events to LonWorks devices.
- Transparent transfer of settings and other parameter data messages in SPA-bus format.
- Configuration/programming via LonWorks interface.
- SPA-bus interface using a 9-pin D-connector with RS-485, RS-232 or TTL-level signalling, max. communication rate of 19200 bits/s.
- LonWorks interface using glass or plastic fibre cables, with a maximum communication rate of 1.25 Mbits/s.

2. Introduction

This manual describes the mechanical and electrical installation of the SPA-ZC 100 gateway module to a device containing the SPA-bus interface. Programming of SPA-ZC 100 is described in the SPA-ZC 100/102 Programming manual (1MRS750743-MUM) and is out of scope of this document.

The SPA-bus device to which this module is connected can be any protective relay, control module or alarm annunciator which has an interface for the SPA-bus (RS-485, RS-232 or logic/TTL interface). The SPA interface type is selected with DIP-switches located between the D9-connector and fibre optics connectors. The operating current for the SPA-ZC 100 module is received from the device it is connected to.

The first section of this document describes the mechanical installation illustrated by some examples. The second section describes the electrical configuration of the SPA-ZC 100 module for different SPA-bus types and supply voltages. Additional information such as the technical data, data for fault diagnosis and ordering information are given in the subsequent sections.

2.1. Contents of delivery

SPA-ZC 100

Connection cable (SPA25A05 or 1MRS120516)

Installation plate

Fastening screws (in the bottom of SPA-ZC 100)

Installation manual

3. Instructions

3.1. Mechanical installation

Normally, the SPA-ZC 100 module replaces the other SPA-bus connection modules of the device. The SPA-ZC 100 is installed on the back of the device using the installation plate and screws enclosed in delivery.

CAUTION 1 To attach the installation plate to SPA-ZC 100 module use the screws fastened to the bottom of the module. Longer screws can damage the electric circuit board inside.

CAUTION 2 Before connecting the cable between the SPA device and the SPA-ZC 100, ensure that the DIP switch configuration of the module is correct. See section 2.2 Electrical installation.

The SPA-ZC 100 is connected with a short cable to the SPA-bus female D-connector at the back of the device. To ensure the correct operation the connection cable between the SPA-ZC 100 and the SPA-bus device has to be chosen properly (see tables below and ordering information section). The connection cable for the SACO 16D1 or similar types is attached by fastening the cable pins under screw connections. The order of pins is shown in the following picture.
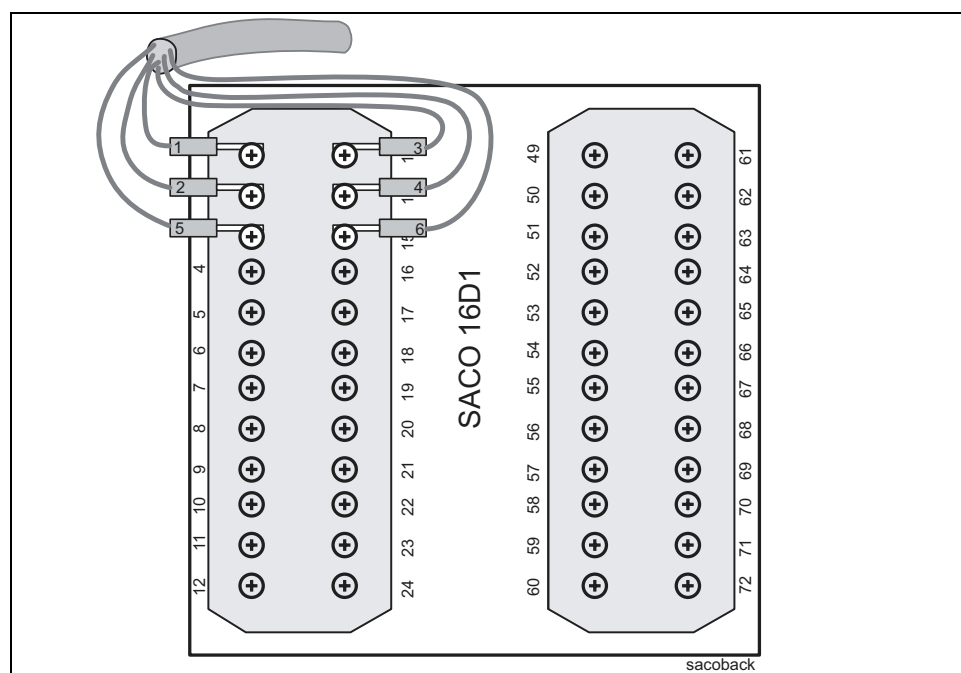
Fig. 3.1.-1   Connection of 1MRS120516 cable to SACO 16D1.

The fibre-optic cable connectors will be attached to the optic transceiver and receiver of the SPA-ZC 100. The other end of the cable is attached to a RER 111 (LON Star Coupler) or similar device, so that the fibre connected to the transceiver of the SPA-ZC 100 is connected to the receiver of the RER 111 and vice versa. Do not bend the fibre-optic cable more than permitted, minimum bending radius (~ 50mm). For additional information, see manual "Plastic-core fibre-optic cables. Features and instructions for mounting".

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The pictures below show how the module is used with feeder terminals, analog or digital alarm annunciator units, distance relays or disturbance recorders, etc. The pictures show the typical connection of the SPA-ZC 100 module to a SPAC 538 C protection relay, to a SACO 16D1 annunciator unit and to a SPAU 341 C voltage regulator.
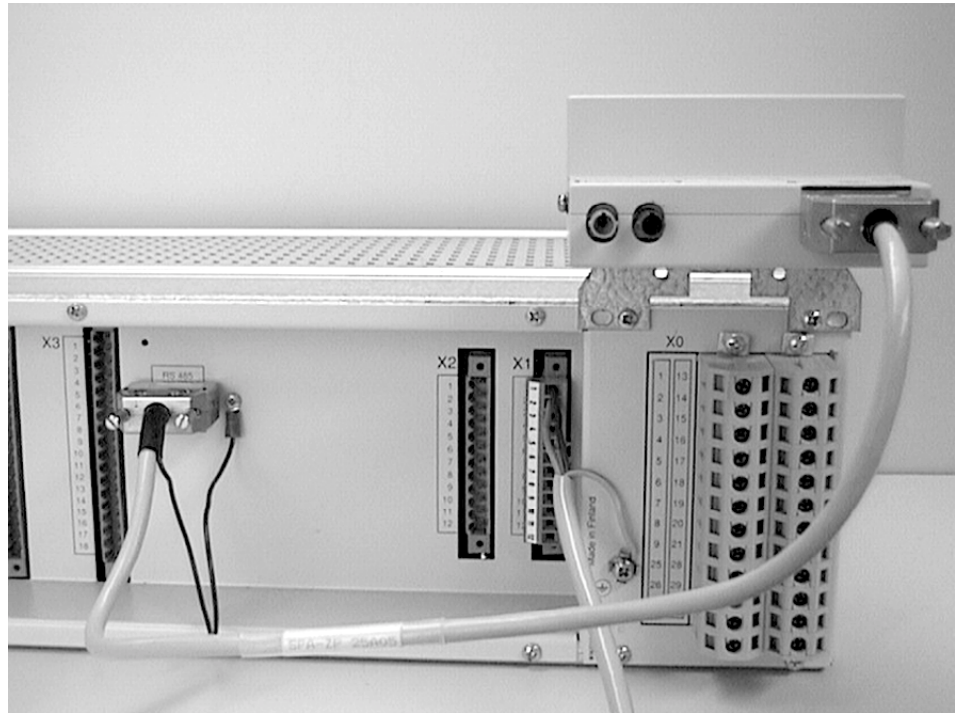

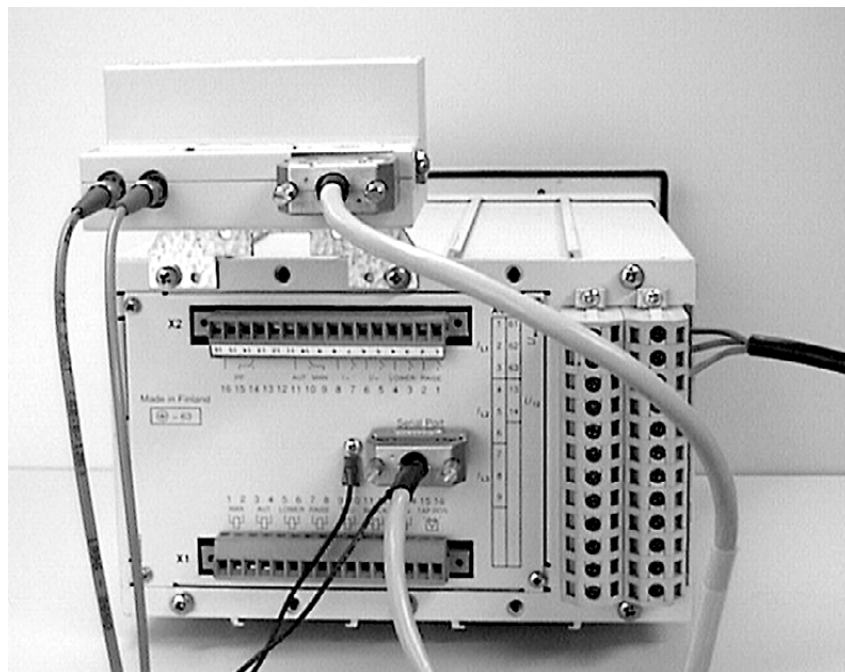*Fig. 3.1.-2   A SPA-ZC 100 module fitted to the SPAC 538 C protection relay.*

Fig. 3.1.-3   A SPA-ZC 100 module fitted to the SPAU 341 C voltage regulator.
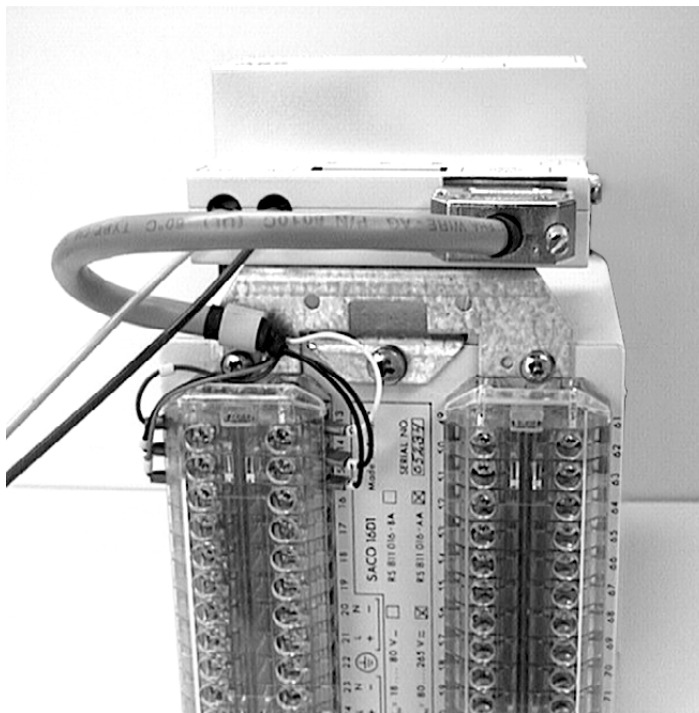
Fig. 3.1.-4   A SPA-ZC 100 module fitted to the SACO 16D1 annunciator unit.

3.2.   Electrical installation

3.2.1.   Fibre-optic LONWORKS interface

For an interface to LONWORKS the device includes a fibre-optic transmitter and receiver for glass core or plastic core fibre-optic cables.

Specification of the fibre optic connections:

	Glass fibre	**Plastic fibre**
Cable connector	ST-connector	snap-in connector
Cable diameter	62.5/125 um	1 mm
Max. cable length	1000 m	20 m
Wavelength	820-900 nm	660 nm
Transmitted power	-13 dBm (HFBR-1414)	-13 dBm (HFBR-1521)
Receiver sensitivity	-24 dBm (HFBR-2412)	-20 dBm (HFBR-2521)

3.2.2.   SPA-bus interface

For a SPA-bus interface, the module includes a 9-pin male D-connector. The interface types used are RS-232, RS-485 or TTL. The voltage levels used are +5V, +8V and +12V. The DIP switches located on the connector board between the fibre-optic connectors and D-connector are used to select signal types and voltage levels.

The picture and the table below shows how to select the interface type and power supply on the SPA-bus interface:

Table 3.2.2-1   SPA-bus interface

Interface type	DIP Switch positions
RS-485 (+8V pin 9, GND pins 7,5)	1.1 - 1.5 ON 1.6 - 1.8 OFF 2.1 - 2.4 OFF
TTL (+8V pin 9, GND pins 7,5)	1.1 - 1.4 OFF 1.5 - 1.7 ON 1.8 OFF 2.1 - 2.4 OFF
TTL (+5V pin 8, GND pins 7,5)	1.1 - 1.5 OFF 1.6 - 1.8 ON 2.1 - 2.4 OFF
RS-232 (+12V pin 4, GND pins 5,7)	1.1 - 1.8 OFF 2.1 - 2.4 ON
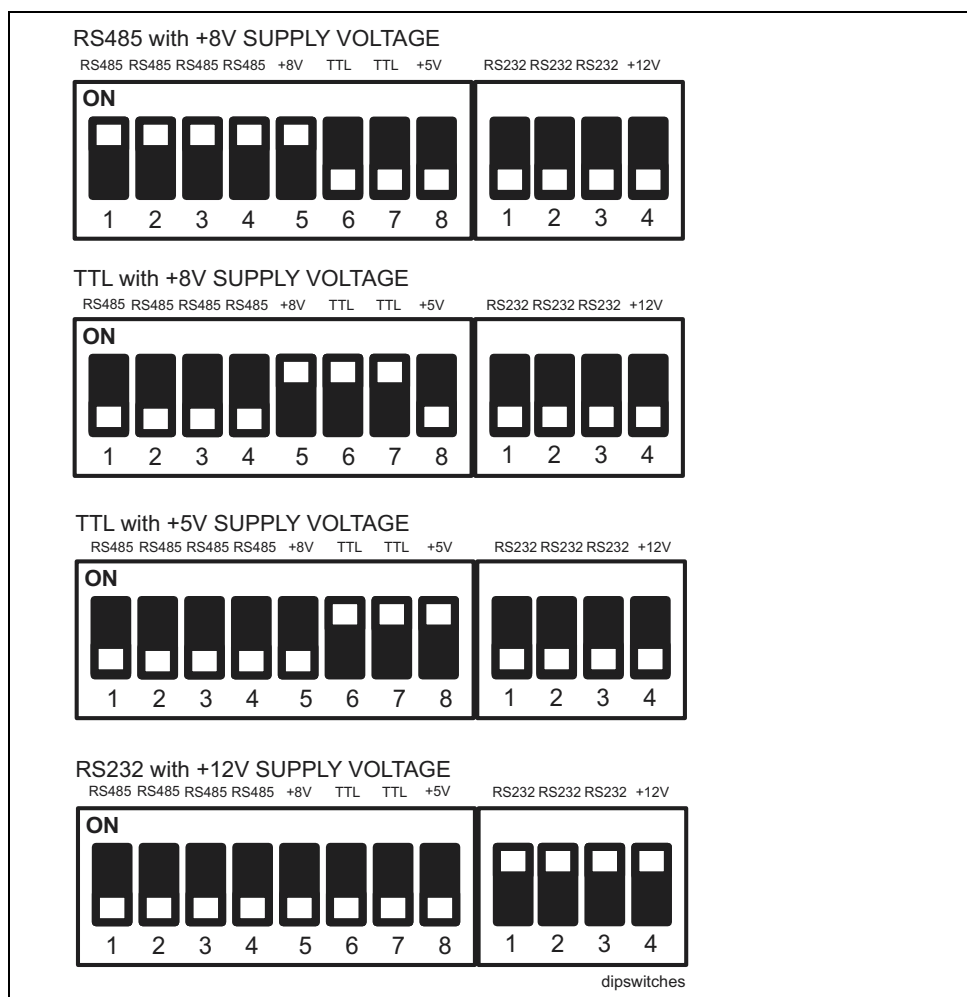
Fig. 3.2.2.-1 DIP switch configuration examples in the SPA-ZC 100.

The pin numbers of the SPA-bus/RS-485 connection are:

Pin	Usage
1	DATA A, data signal pair, signal A (+)
2	DATA B, data signal pair, signal B (-)
3	RTS A, request to send signal pair, signal A (+)
4	RTS B, request to send signal pair, signal B (-)
7	GND, signal ground for the power supply
8	+5V, optional power supply for the SPA-ZC 100
9	+8V, power supply for the SPA-ZC 100

The pin numbers of the SPA-bus/TTL connection are as follows:

Pin	Usage
2	RXD, data from the SPA-bus device
3	TXD, data to the SPA-bus device
7	GND, signal ground for the power supply
8	+5V, optional power supply for the SPA-ZC 100
9	+8V, power supply for the SPA-ZC 100
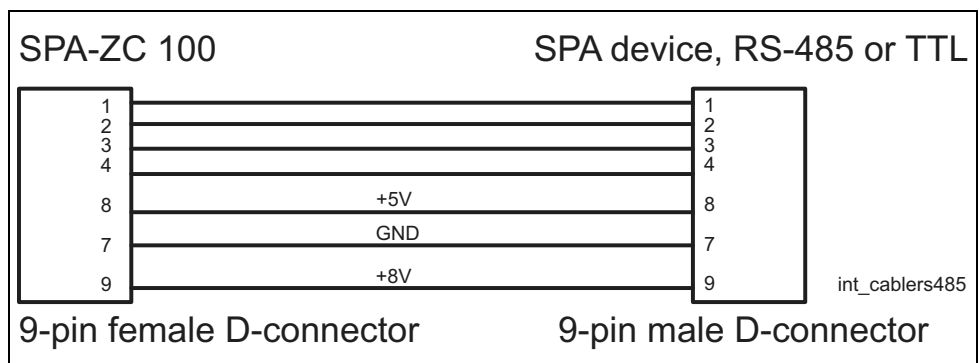
Fig. 3.2.2.-2   Interface cable: SPA-ZC 100 to SPA-bus device with RS-485 or TTL/Logic interface.

The pin numbers of the SPA-bus/RS-232 connection are as follows:

Pin	Usage
2	TXD, data to the SPA-bus device
3	RXD, data from the SPA-bus device
5	GND, signal ground for the power supply
4	+12V, power supply for the SPA-ZC 100
8	+5V, optional power supply for the SPA-ZC 100
9	-12V, not used by the SPA-ZC 100

SPA-ZC 100   SPA device, RS-232

9-pin female D-connector   9-pin male D-connector
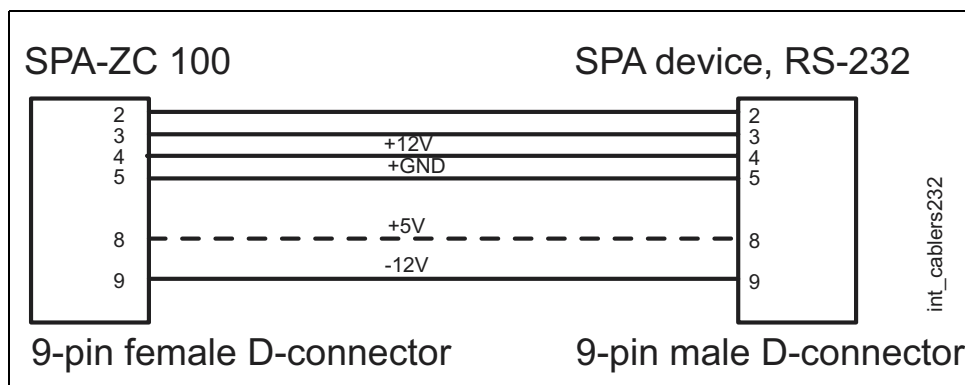
Fig. 3.2.2.-3   Interface cable: SPA-ZC 100 to SPA-bus device with RS-232.

3.2.2.1.   **Programming of SPA-ZC 100 for LONWORKS**

The configuration of the SPA-ZC 100 is described in the SPA-ZC 100/102 Programming Manual (1MRS750743-MUM).

4.   Technical data

Interfaces	
- LONWORKS interface	type SPA-ZC 100 MM:
	Optical glass fibre glass transmitter and receiver with ST connectors
.	Optical fibre sizes to be used: 62.5/125 μm
	Emission Wavelength 820 nm
	type SPA-ZC 100 BB:
	Optical plastic fibre transmitter and receiver with snap-in connectors.
	max. communication rate 1.25 Mbits/s
- SPA-bus interface	RS-232, RS-485 or TTL
	9-pin, male D-connector
	max. cable length 0.5 m
	max. communication rate 19200 bits/s
Dimensions	
- BB	102 x 66 x 50
- MM	102 x 77 x 50
Weight	240 g
Power supply	
Source (via pins of the SPA-bus D-connector)	+8V DC from pin 9 (RS 485, TTL)
	or +12V DC from pin 4 (RS 232C)
	or +5V regulated DC from pin 8
Supply current consumption	
- quiescent state	210 mA
- theoretical max.	390 mA
Environmental conditions	
- service temperature	0...+55°C
- storage temperature	-40...+55°C
- max. relative humidity	95% (without condensation)

5.   Maintenance and service

5.1.   Self diagnostic

5.1.1.   SPA indicator LED

SPA indicator LED is lit whenever a SPA-ZC 100module is sending a message to the SPA-bus.

If the self supervision of the SPA-ZC 100 detects a fault in the SPA-bus communication, the SPA indicator LED remains lit.

5.1.2.   LON indicator LED

The LON indicator LED has two functions: It operates as a Service LED indicating the status of the Neuron chip. It also indicates when an application of SPA-ZC 100 is sending messages to LON network.

In the start-up situation, the LON indicator is normally lit once and then turns off.

Pressing of the service pin turns on the LON indicator.

The LON indicator LED is lit when a "Wink" message is received from LON network.

The LON indicator LED is lit whenever the SPA-ZC 100 application is sending a message to LON network. The LED is not lit when the network management messages are sent or received.

Normally, the LON indicator LED is lit only when the SPA-ZC 100 is sending data to LON network.

5.2.   Fault localization

The table below can be used to localize a fault and take corrective measures:

Problem	Fault type	Repair step
SPA and LON indicator LED not lit on start up. (Power supply trough the connection cable SPA indicator LED is off LON indicator LED is off	Supply failing	Check if the SPA-bus device has power. Check that the SPA-ZC 100 is properly connected to the device. Check the DIP-switch settings for SPA-bus interface type and supply voltage.
SPA-ZC 100 does not respond to LONWORKS messages	LONWORKS fault	Check the communication speed of devices sharing the same communication channel.
LON indicator LED is blinking	LONWORKS fault	Check that the SPA-ZC 100 is properly connected to the device. Check the fibre-optic connections. Check that the master address of the SPA-ZC 100 is correct.
SPA-ZC 100 does not work properly or that it gives different results to the same query	LONWORKS fault	Ensure that the LONWORKS address of the SPA-ZC 100 is unique in the communication network.

Problem	Fault type	Repair step
No responce from SPA-device. SPA indicator LED is continuously on, and occasionally blinking.	SPA-bus fault	Check that the SPA-ZC 100 is properly connected to the device. Check the operation of the SPA-bus device. Check the DIP-switch settings of the SPA-bus interface type. Check the configuration of the SPA-bus (SP-command): SPA-bus bit rate, parity, unit list definition. (See the SPA-ZC 100/102 Programming Manual for details).

5.3.   General about service

If the SPA-ZC 100 or part of it is found to be faulty, the normal service operation is to replace the whole SPA-ZC 100 with a new one. Please refer to ordering information.

6.   Ordering information

When ordering a SPA-ZC 100 module, please state the following information:

Ordering number 1MRS090704 xx; where xx stands for:

AA = plastic fibre optic connectors, no configuration

AB = SPAU 341C configuration #1

AC = SPAU 341C configuration #2

AD = SPAU 341C configuration #3

AE = SACO 16D3 connection cable 1MRS120516

DA = glass fibre optic connectors, no configuration

DB = SPAU 341C configuration #1

DC = SPAU 341C configuration #2

DD = SPAU 341C configuration #3

DE = SACO 16D3 connection cable 1MRS120516

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