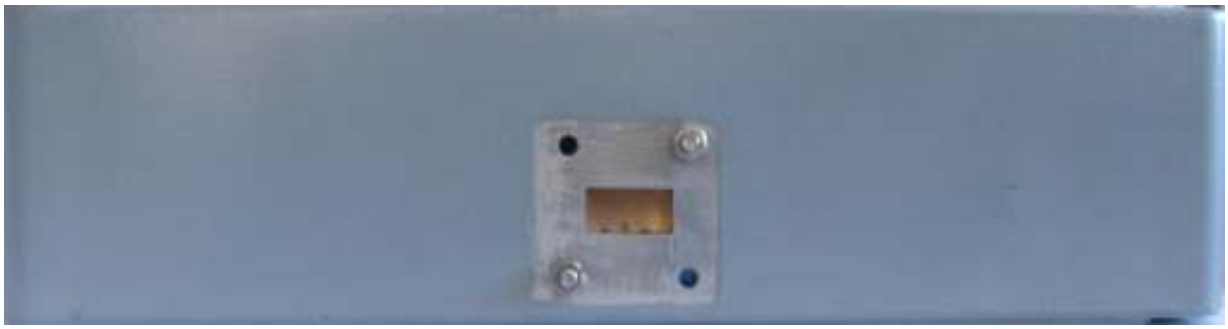
RFSW-02



Users Manual

0. Summary.

1. General Description

For redundant configurations ELBER has developed an advanced RF Hot Standby switch that operates with both analogue and digital signals.

The logic of operation is very simple: a power detector continuously monitors the RF power of the two same frequency transmitter outputs. If the RF power of one of the two signals falls below threshold, the other signal is presented to the RF switcher output. The threshold value is selectable through the user interface, with 1 dB hysteresis.

The RF Hot Standby has two different functional modes: forced mode and automatic mode.

In the former case one of the two inputs signals, chosen by the user, is directly routed to the output.

In automatic mode, the RF power of both transmitters is supervised. In addition, two relay inputs, one for each input, is available. If Input A's power is above threshold and no alarm is received through the relay contact, then transmitter A is directed to the output. If one of these two conditions is not satisfied, the same control is performed on Input B and signal B will be directed to the output; if both conditions are true, otherwise Input A will be directed to the output as it has a higher priority. The 1dB hysteresis ensures that there is no continuous switching between the two transmitters.

The RF Hot Standby switch is available in both indoor (RFSW-02) and split type version for outdoor configurations (RFSW-02/P + RFRL/W).

In the first case the equipment, housed in a 1U rack, receives directly the RF input signals, coming from the transmitters, through two coaxial cables.

In outdoor configuration the switcher is split in two components: an indoor control unit (RFSW-02/P) and an outdoor weatherproof RF housing (RFRL/W) that receives the RF input signals, coming from the external RF transmitting heads, through two waveguides/coaxial cables. The RF switcher control unit receives from the two transmitting indoor control units, through separate connections, the voltages representing the current RF output Power Level of the respective external RF Head.

The switcher control unit monitors these voltages and based on the level of these values, through an RG216 cable, drives the external weatherproof RF housing to switch out the correct external transmitting head.

2. Technical Specifications

2.1 Indoor system.

Input connectors	2 SMA female
RF Input Power	+20 dBm ÷ +38 dBm
Output connectors	SMA female
Remote control interface	RS-485, SNMP (optional)
Power Consumption	20 W
Power Supply	AC 115V ± 10 % - 230V 10 % DC 22V - 65 V galvanically isolated
Width	482 mm (Standard 19”)
Height	44 mm (1U)
Depth	480 mm
Weight	4 Kg

2.2 Outdoor system.

2.2.1 Indoor unit

Input connectors	2 DB9 Male
Output connector	LEMO
Remote control interface	RS-485, SNMP (optional)
Power Consumption	20 W
Power Supply	AC 115V ± 10 % - 230V 10 % DC 22V - 65 V galvanically isolated
Width	482 mm (Standard 19")
Height	44 mm (1U)
Depth	480 mm
Weight	4 kg

2.2.2 Outdoor unit

Supply connector	LEMO
Output connector	Depending on the RF Head connected: ▪ MT/07 Female N-type ▪ MT/10 IEC PBR 120 ▪ MT/14 IEC PBR 140 ▪ MT/18 IEC UBR 220
Power Consumption	10 W
Width	280 mm
Height	100 mm
Depth	180 mm
Weight	2 kg

3. Installation.

1. Open the package box. Using a cutting tool be careful not to damage the content of the package content.
2. The box should contain:
    a. Indoor version:
        i. The RFSW-02 switch
        ii. One AC power cord
        iii. One DC power cord with connector at one end
        iv. The User Manual
    b. Outdoor version:
        i. The RFSW-02/P switch control unit
        ii. The RFRL/W waterproof switch
        iii. Two waveguide section for the connection with the transmitting heads
        iv. The RG-216 cable
        v. One AC power cord
        vi. One DC power cord with connector at one end
        vii. The User Manual
3. Install the indoor unit in a cabinet rack. The space required is 1 rack unit. Verify that:
    a. There is sufficient clearance on both sides of the equipment in order not to restrict air flow.
    b. The air flowing trough the apparatus must be dry and dust free.
    c. No heat sources should be placed too close to the equipment: the proper functioning is warranted for ambient temperature between -5°C to +60°C.
4. Install the power cord and connect to the primary power source.
5. Make the ground connection to the screw located on the rear of the apparatus, to meet the EMC directives.

6. Be sure of right voltage reading carefully the data in the manual or on the sticker placed on every apparatus (containing the serial number)
7. Connections:
    a. Indoor version:
        i. Connect the output of the two T_SL or TMC Elber's transmitters output to the two SMA input
        ii. Connect to the branching system the flange or N-type connector output of the switch
    b. Outdoor version:
        i. Connect the waveguide sections to the outputs of the MT or TMC/P Elber's transmitters
        ii. Connect two DB9 cable to the TCU (transmitter control unit) RS-485 connector or to the AL/P Rem Meter connector
        iii. Connect through RG-216 Cable the indoor and the outdoor unit
8. Switch on the indoor equipment through the switch in the back panel.
9. The status and the configuration of the device can be controlled locally (through keypad and display) following the instructions relative to the user interface.

4. Theory of operations

4.1 User interface (keypad + display).

The setup, control, and monitoring is provided through the navigation in the embedded software menu presented on a 24x2 alphanumeric display and operated by a six way keypad.

The six way keypad enables navigation through the various menus of the embedded system. The function of the keypad depends on the menu position. A short description follows:

Keypad	**Configuration Menu**		**Status Menus**
	Position 1	*Other Position*	
UP	Previous Menu		Previous Menu
DOWN	Next Menu		Next Menu
RIGHT	Cursor scrolls one position to the right	Cursor scrolls one position to the right	No use
LEFT	No use	Cursor scrolls one position to the left	No use
ENTER	Next Menu	Saves and applies changes	Next Menu
ESC	Displays Main Menu	Discard any changes	Displays Main Menu

Table 1

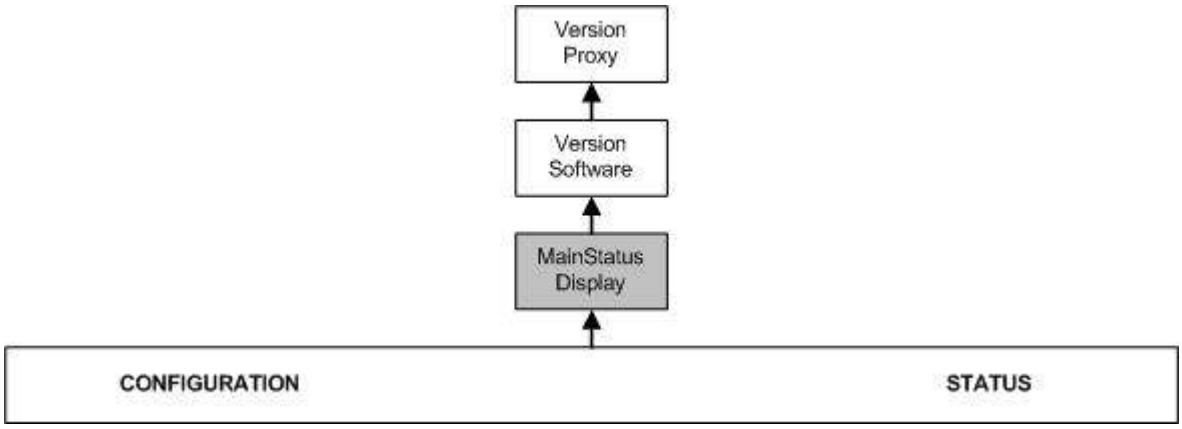


Figure 1: Menu structure

Table 2

Option	Description
Main Status Display	It visualizes the equipment status and "ALARM: PLEASE CHECK" if there are any alarms else "LOCKED".
Version Software	This menu is automatically displayed for 3 seconds and provides the version of the microcontroller firmware.
Version Proxy	This menu is displayed for a fixed time of three seconds, after which the display returns to the main menu. The firmware version of Proxy board is visualized.
Configuration	The Configuration Menu option allows to access to the System configuration parameters. *Refer to Paragraph 4.1.1*
Status	The Configuration Menu option allows to access to the System status parameters. *Refer to Paragraph 4.1.2*

4.1.1 Configuration menu

The Configuration Menu allows the user to modify the parameters of the device. Figure 2 shows the Configuration Menu tree structure.

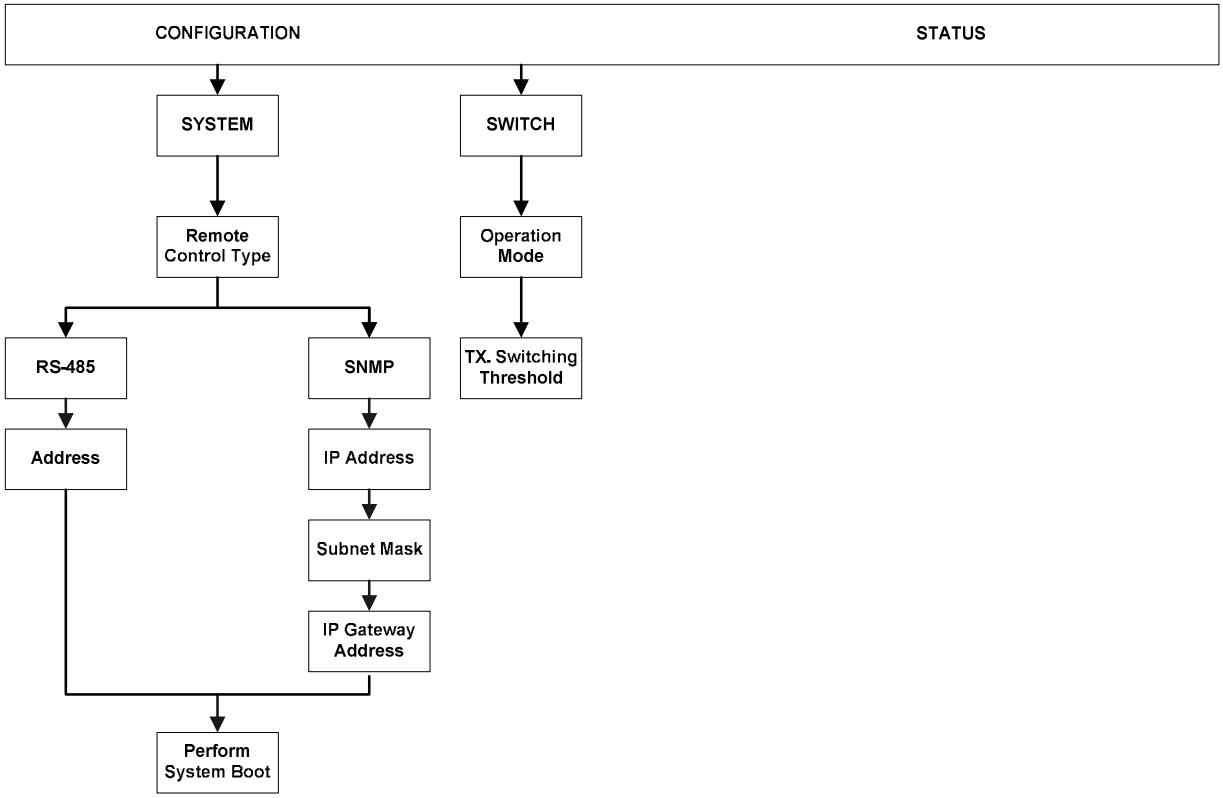


Figure 2: RFSW-02 configuration menu

Table 3

Option	Description
Operation Mode	The function-mode of the switcher can be select; the mode available are: AUTO, FORCED ON TRANSMITTER 1, FORCED ON TRANSMITTER 2.
Tx Switching threshold	This value can be set in the range 0-40 dBm. When the transmitter is below the selected threshold, the output is switched on the other transmitter. If the first transmitter returns above threshold (1 dB hysteresis), it is again selected at the output.
Remote Control Type	• RS-485 • Ethernet/SNMP (optional)
Perform System Boot	System reset

4.1.2 Status menu

4.1.2.1 System

The remote control parameters selected in the configuration menu can be verified. Figure 3 shows the menu tree structure.

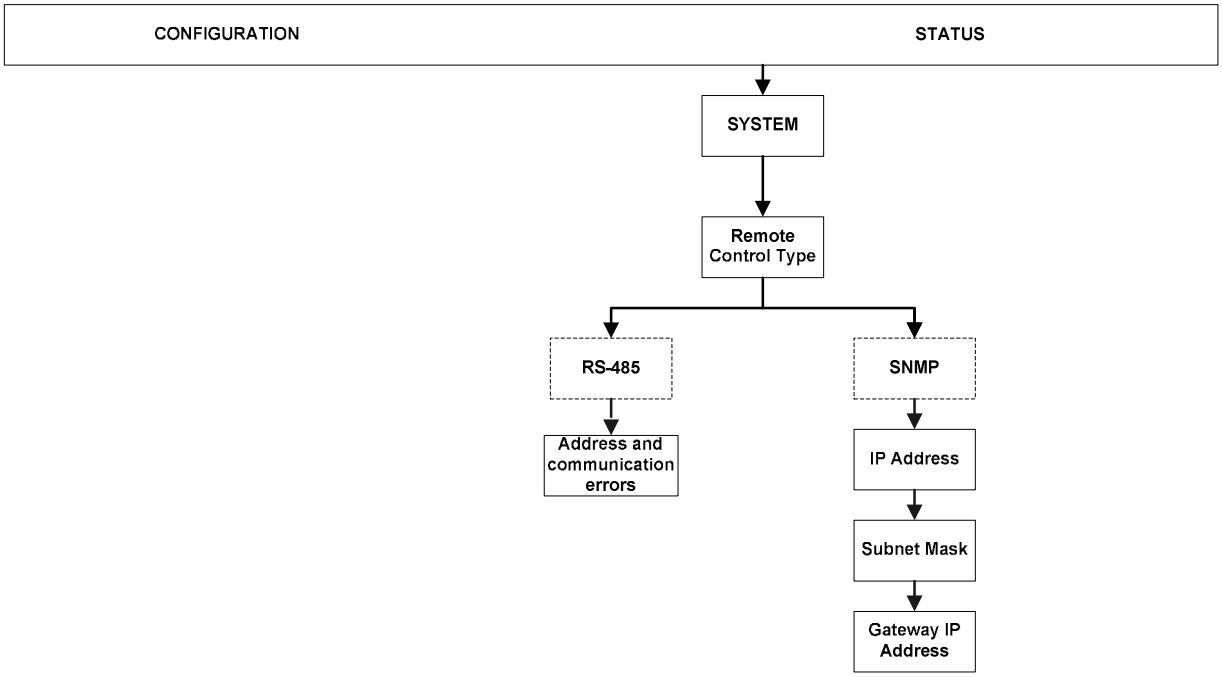


Figure 3: System status menu

Table 4

Option	Description
Status Remote Type Control	Visualizes the remote control type
Communication Errors and addresses	Visualization of the RS-485 selected address Visualization of the error parity number and protocol violation
IP Address	Visualization of the SNMP board IP address
Subnet Mask	Visualization of the subnet mask
Gateway IP address	Visualization of the IP address of the network Gateway

4.1.2.2 Switcher

The Status switcher menu allows the user to verify the functioning parameters selected in the configuration menu and to read the output status.

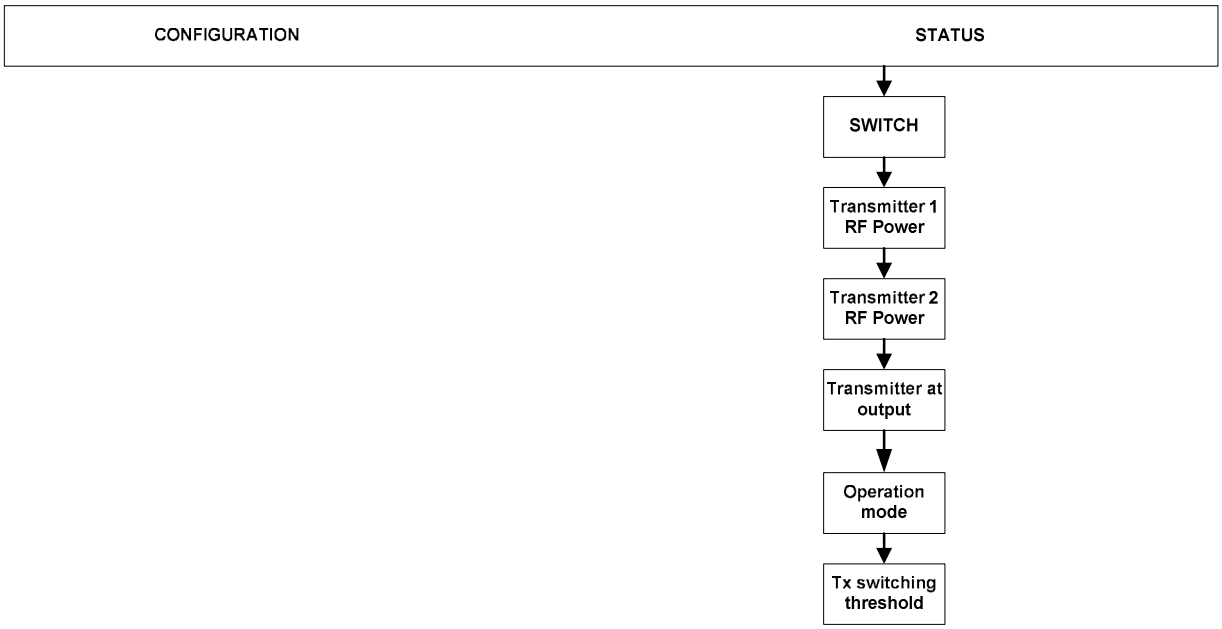


Figure 4: Switcher status menu

Table 5

Option	Description
Transmitter 1 RF Power	Visualizes the transmitter 1 RF Power
Transmitter 2 RF Power	Visualizes the transmitter 2 RF Power
Transmitter at output	It shows the current transmitter selected
Operation Mode	Visualization of the function-mode (AUTO or FORCED on one of the inputs)
Tx switching threshold	Visualization of the current selected threshold

4.2 External description

4.2.1 Front Panel.

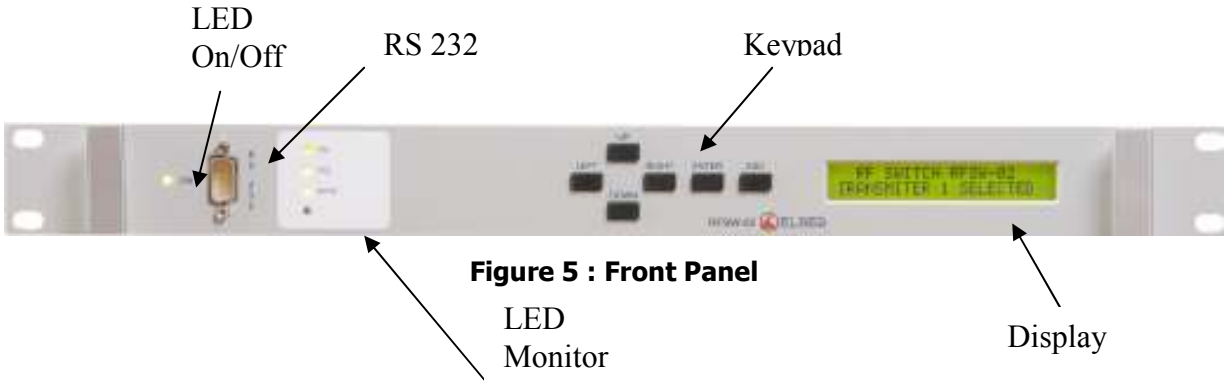


Figure 5 : Front Panel

4.2.1.1 Controls and indicators

Tag	Description
LED	Green: Equipment switched ON Off: Equipment switched OFF
LEDS monitor	
Six Way Keypad	Keypad used to navigate through embedded software menu
LCD	A 24x2 alphanumeric display

LED	GREEN	FLASHING	RED
TX 1	Transmitter 1 above threshold	Transmitter 1 enabled at the output	Transmitter 1 below threshold
TX 2	Transmitter 2 above threshold	Transmitter 2 enabled at the output	Transmitter 2 below threshold
AUTO	Automatic	-	Forced

4.2.1.2 Connectors description

Serial communication is performed through RS232 connector. The connector is a standard DB9 having the following connections:

Pin 2: Receive
Pin 3: Transmit
Pin 5: Earth
Other pins not connected

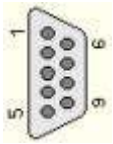


Figure 6 : DB9 male connector

4.2.2 Back panel

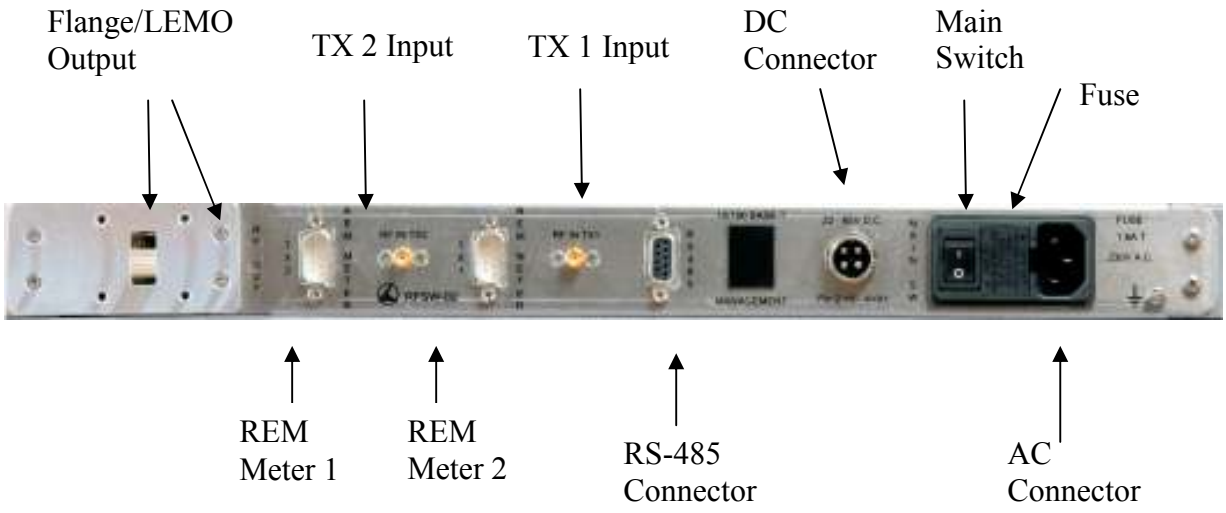


Figure 7: Back panel

4.2.2.1 Connectors description

<table>
<tr><th>Connector</th><th>Description</th></tr>
<tr><td>Input and output connectors</td><td>
<table>
<tr><th>Connector</th><th>Description</th></tr>
<tr><td>RF IN TX 1</td><td>RF TX 1 input connector, type SMA</td></tr>
<tr><td>RF IN TX 2</td><td>RF TX 2 input connector, type SMA</td></tr>
<tr><td>REM Meter tx 1</td><td>REM Meter tx 1 input connector, type DB9 male</td></tr>
<tr><td>REM Meter tx 2</td><td>REM Meter tx 2 input connector, type DB9 male</td></tr>
<tr><td>Flange/LEMO Output</td><td>Flange or N-type (indoor version) or LEMO (outdoor version)</td></tr>
</table>
</td></tr>
<tr><td>RS-485</td><td>DB9 connector for remote control:
Pin 1: A 485
Pin 2: B 485</td></tr>
</table>

	Pin 3: +5V Pin 5: RESET Pin 8: ALARM COM Pin 9: GND
Rem Meter	DB9 connector for switch control: Pin 1: 0-5 V depending on Power output Pin 5: GND
DC Connector	22-65 V DC Input
Main Switch	ON/OFF (apparatus)
Fuse	230V 1.6A
AC Connector	230V 50/60 Hz

5. System configuration

At any time (always using the keypad/display interface) the following parameters can be changed:

- Function-mode
  - AUTO
  - FORCED ON Transmitter 1
  - FORCED ON Transmitter 2
- Threshold of switching
- Remote control type
  - RS-485
  - Ethernet/SNMP (Optional)

6. Monitor

6.1 Alarm description

The presence of alarms is indicated by red LEDs on the front panel.
Descriptions as follow:

TX1 : Power output of transmitter one is below threshold

TX2 : Power output of transmitter two is below threshold

AUTO : The switcher is not enable; at the output is forcedly presented the input selected in the configuration menu (corresponding to the flashing led).

6.2 Monitor description

The monitoring of the main functional parameters can be made through the local interface (keypad and display on the front panel).
The acquired values concern:

1. Function-mode
2. Transmitter one and two power level
3. Remote control type selected
4. Configuration parameters of the remote control

7. Programming

Firmware upgrade concern the microcontroller.

It isn't necessary to open the equipment, removing the cover; an RS-232 cable modified in order to have GND on pin 9 should be used.

For further information please contact the manufacturer.

The manufacturer will supply the new firmware and the software to upload it in case the customer want to make the upgrade in his main office or on site; on the contrary the operation will be done at Elber's main office in a maximum time of one week plus transport time.

The firmware upgrade is free in the term of warranty agreed at purchase.