

WIRELESS FAMILY DEVICES
ZB-CONNECTION
Handy Analyzer
(product code: Z-HANDZER-M)

Document version Number	Date	Firmware Revision	Author
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1) DEVICE GENERAL CHARACTERISTICS

Remote Network Analyzer (Z-HANDZER-M), hereinafter referred to as simply HandZer, is a device which provides aid in the installation, testing and maintenance of ZB-Connection networks.

Its use is not necessary during normal operation of the network.

In the limited time of operation within a network HandZer works like a Router without the normal radio traffic maintenance functions.

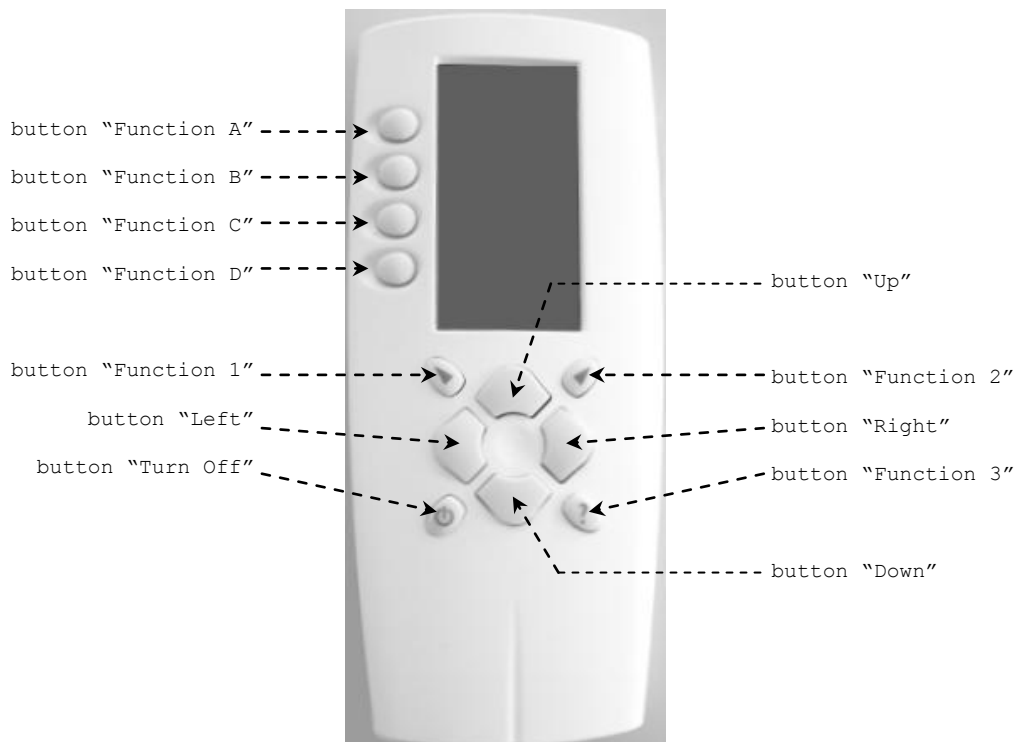
Its role is essentially identify, from the physical location where it works, which and how many Routers are reachable and what is radio signal level to each Router.

Therefore it allows to identify whether the location chosen for installation of a new device is sufficiently covered by the infrastructure of the Routers already operating in the network.

2) DEVICE ELECTRICAL CHARACTERISTICS

ALIMENTAZIONE:	3 AAA Battery 1,5V
WIRELESS CHARACTERISTICS:	2405 MHz ÷ 2480 MHz DSSS Modulation Nominal transmission Power 0 dBm IEEE 802.15.4 compliant Stack EmberZNet3.5.x Stack version 0 Proprietary profile ID Proprietary encryption key
DEGREE OF PROTECTION:	IP40

3) DEVICE LAYOUT - BUTTONS NAME DEFINITIONS



4) FUNCTIONING MODE

HandZer has two main functioning mode:

❖ NOT JOINED HANDZER

HandZer is not joined to any radio network;

In this mode it can try annexation to a network or it can execute energy scan.

Functions available in this mode:

- Energy Scan (menu "Ener.Scan")
- Network Scan (menu "Netw.Scan")
- Joining Scan (menu "Join Netw")

❖ JOINED HANDZER

HandZer is joined to a compatible network (ZB-Connection network);

Only in this mode it can activate the testing task (Ping Test).

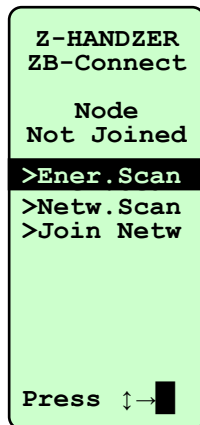
Functions available in this mode:

- Ping Test
- Network Commands (menu "Commands")
- Leave Network (menu "Leave Net")

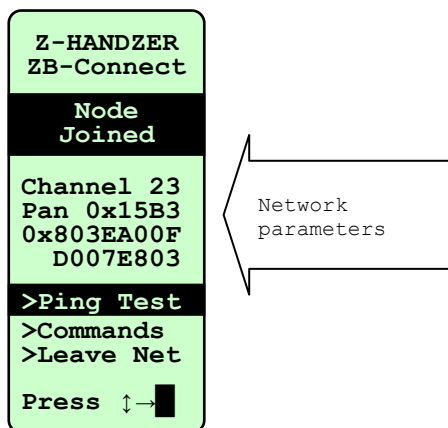
5) MAIN MENU

The main menu structure depends by the functioning mode.

❖ MAIN MENU - NOT JOINED HANDZER



❖ MAIN MENU - JOINED HANDZER



In both cases the pressure of the buttons "Up" and "Down" change line of the selected menu, pressing the button "Right" activate the selected function.

Changing LCD contrast

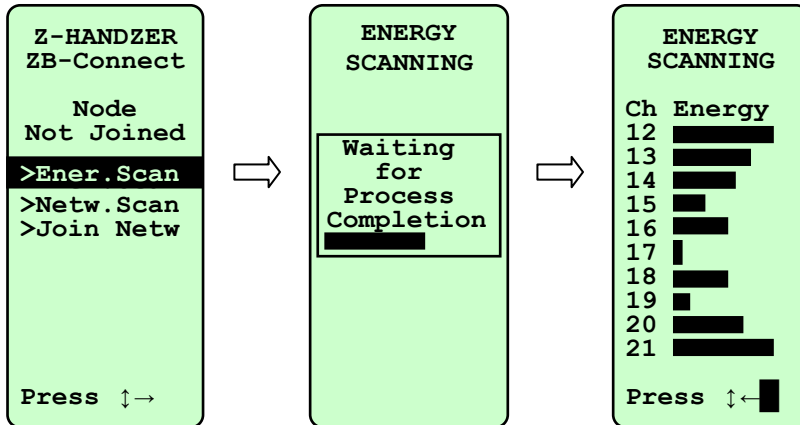
When main menu is active (in any of the two modes) pressing the button "function 1" causes the decrease of the LCD contrast; in the opposite, pressing button "function 2" causes the increase.

6) ENERGY SCAN

Energy Scan process measures the maximum value of RSSI (Received Signal Strength Indication) found for each of the 16 radio channels.

This value gives an indication of electromagnetic pollution level presents in each channel.

The duration of the whole process is approximately one minute.



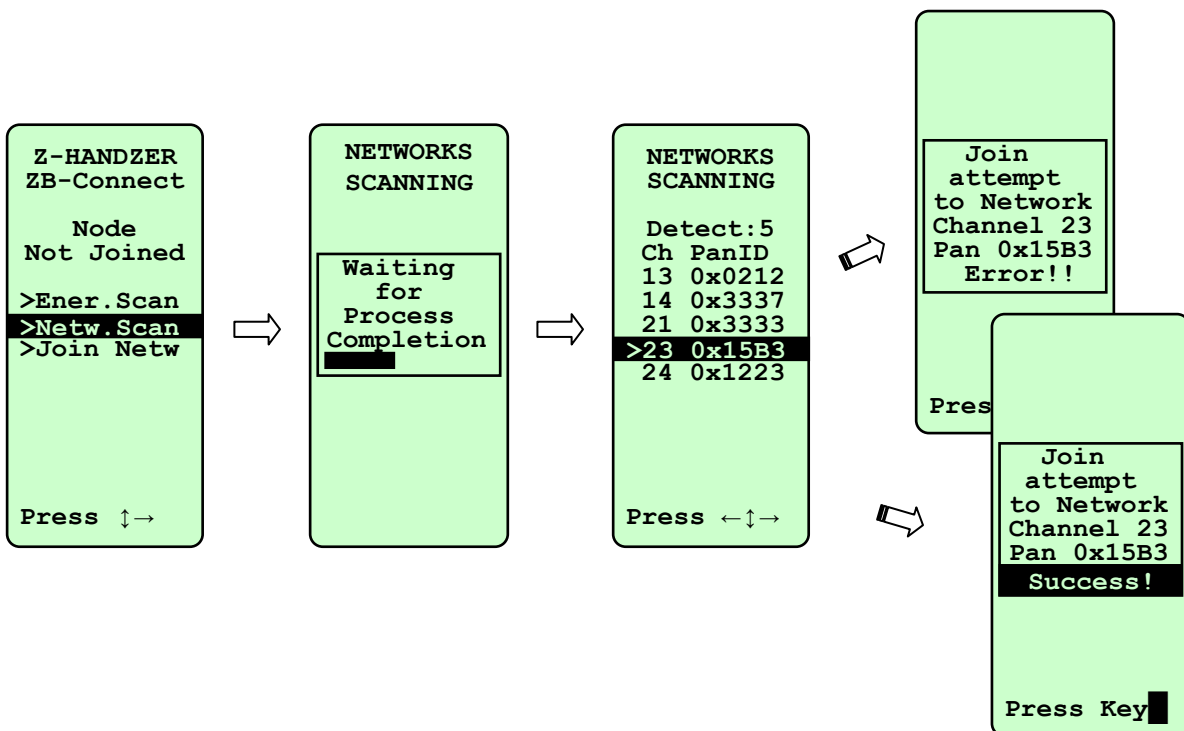
Pressing button "up" and "down" makes display scroll for displaying all values. Pressing button "left" returns to the main menu.

7) NETWORK SCAN

Network Scan process analyzes all 16 radio channels seeking ZigBee networks.

The duration of the whole process is approximately 20 seconds.

After the end of the process HandZer shows the list of the detected networks.



Pressing button "Up" and "Down" permits to chose the desired network.

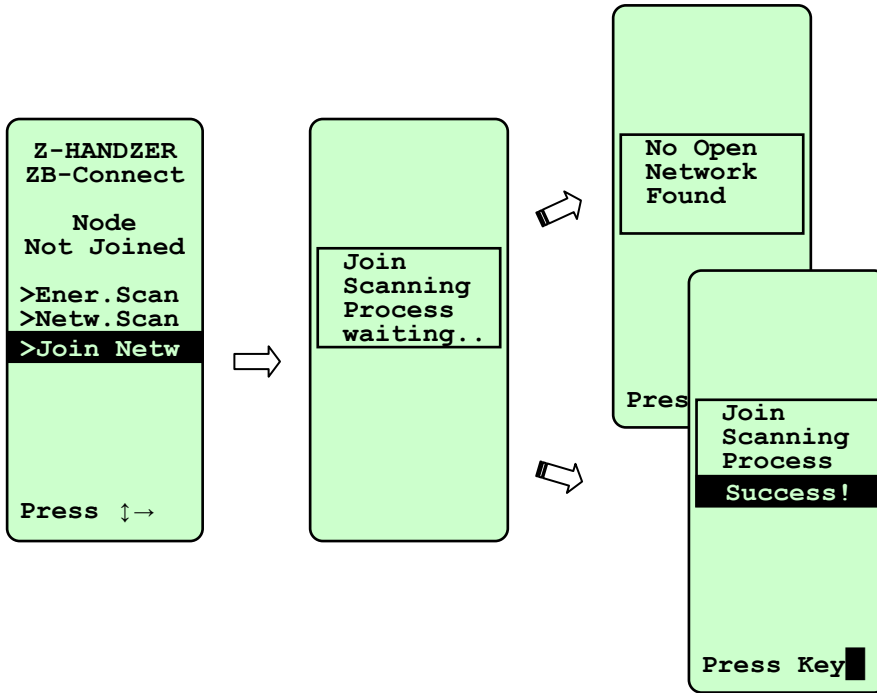
Pressing button "Left" returns to the main menu.

Pressing button "Right" executes the join attempt to the desired network.

8) Join Netw

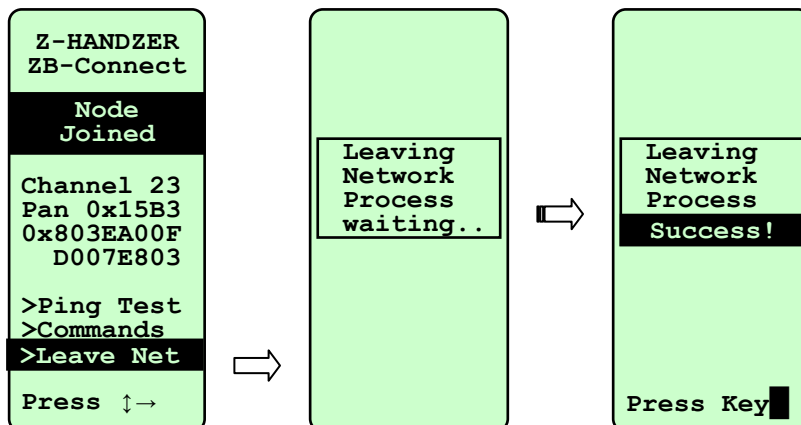
Join Netw process analyzes all 16 radio channels seeking a network compatible and opened.

If it is found a network with correct characteristic HandZer attempts to join with it. The duration of the whole process is maximum 25 seconds.



9) DISASSOCIATION

Disassociation process causes HandZer to disconnect to the network which was previously attached.

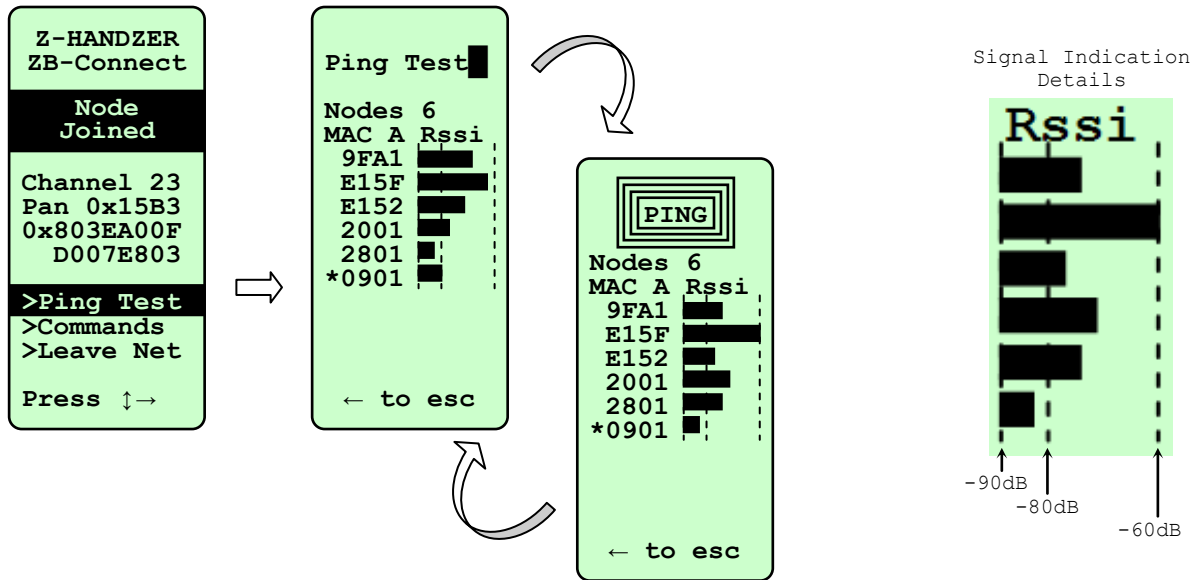


10) PING TEST

Ping Test is the main task of HandZer.

With it is possible to know which are the Routers present into the HandZer radio range area.

For each Router it shows the two last significant of the unique device address (MAC Address) and the associated signal level (RSSI).



During Ping Test, HandZer sends at regular interval (3 seconds) radio messages to all Routers in its range (broadcast request with unitary radius).

When this message is transmitted, a "PING" message appears in the high area of the display.

Routers that receive this message respond with a message addressed to HandZer, this answer contains the Router address. Messages received by HandZer are used to update values displayed.

The Ping Test has a duration of four minutes, after which HandZer goes to the main menu.

Alternatively, Ping Test may be terminated by pressing the "Left" button.

Any other button during Ping Test forces transmission of the broadcast request.

The three vertical lines where is draw the RSSI level represent from left to right the values of -90dB, -80dB, -60dB.

The intermediate line of -80dB represents the value below which the signal is considered poor and above which is considered good.

Note:

An asterisk in the left of MAC Address indicates that the node in question is the coordinator.

Note:

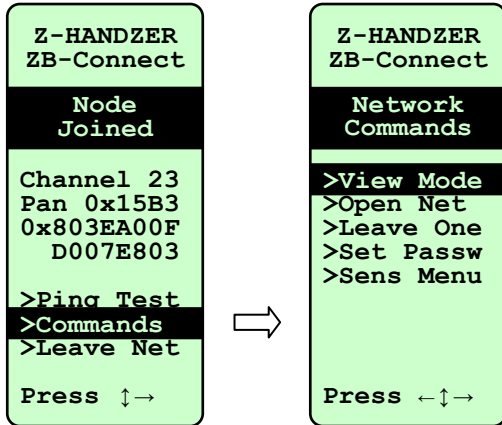
From version 8.0 and later, you can see, in alternative to MAC Address, the Modbus Address. To activate this modality refer to menu "View Mode" in the "Commands" menu.

11) NETWORK COMMANDS

The "Commands" menu allows you to run some commands and settings within the network to which HandZer is connected.

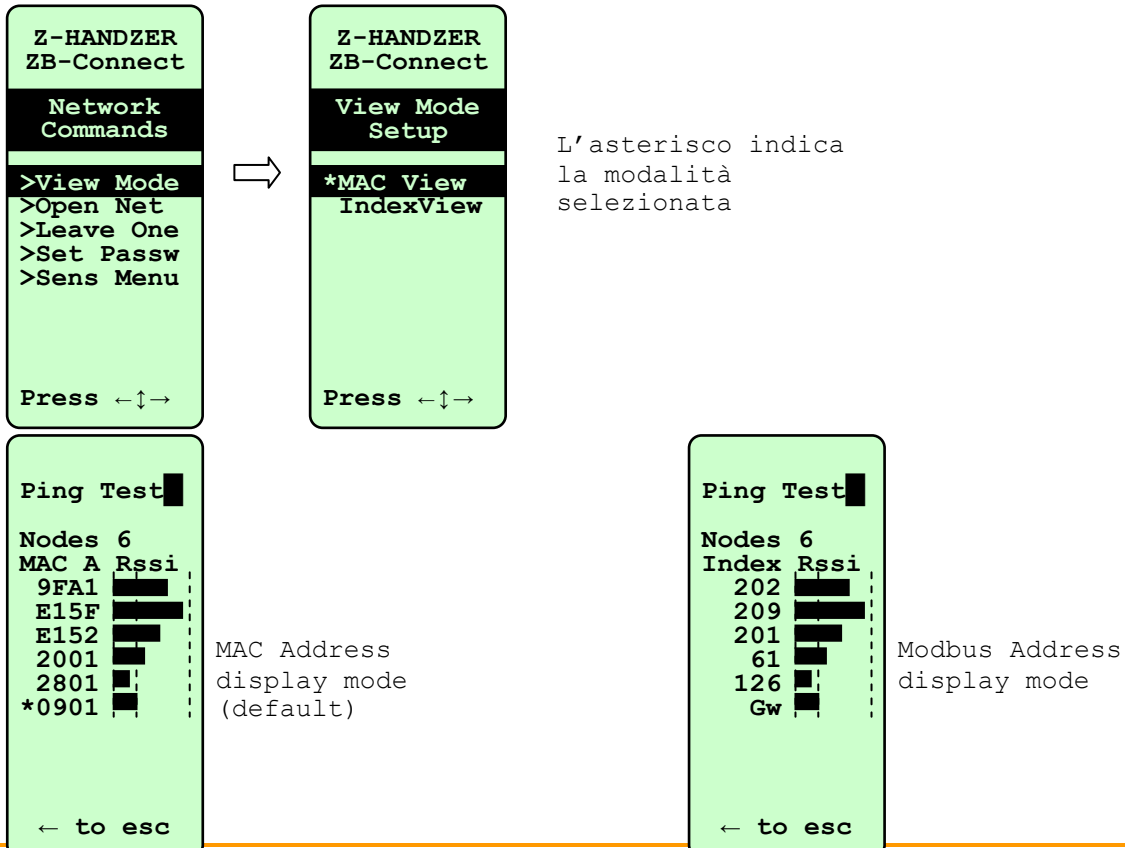
Commands available are:

- 1) Address display setting (MAC Address / Modbus Address)
- 2) Opening/Closing network (to connect new devices)
- 3) Router Leaving
- 4) Setting Gateway Password
- 5) Sensor Menù



11.1) "VIEW MODE" MENU

This menu allows you to change the routers address display mode. The display modes are: MAC Address (default value) and Modbus Address.



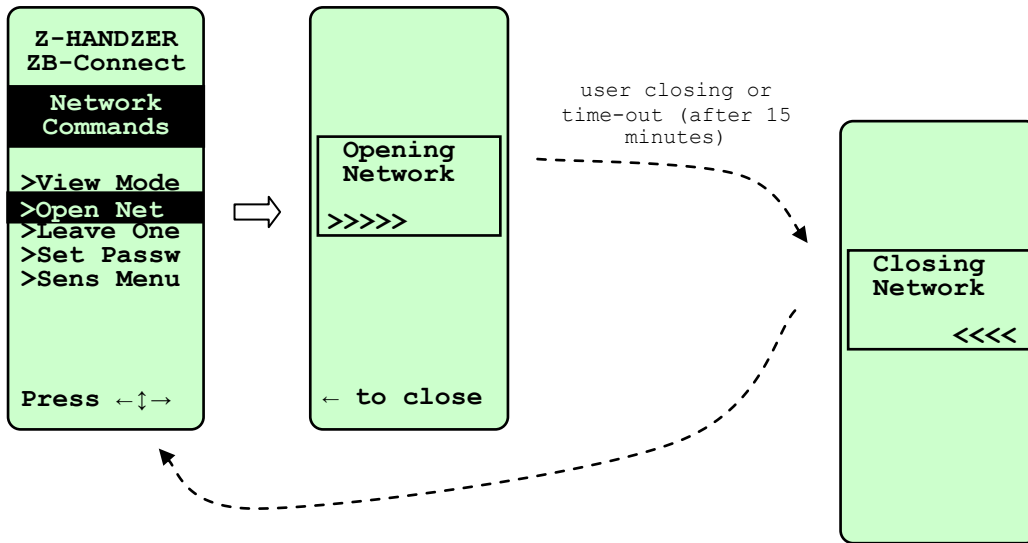
11.2) "OPEN NETWORK" MENU

This menu allows you to send cyclically to all routers (including the Gateway/Coordinator) a message to open the network.

During the state of openness, you can connect new devices to the network.

This state remains until to the manual closing (pressing button "Left"), or automatically after 15 minutes.

The activation of the menu is subject to the introduction of a value equal to the password of the gateway (if it is different from zero).

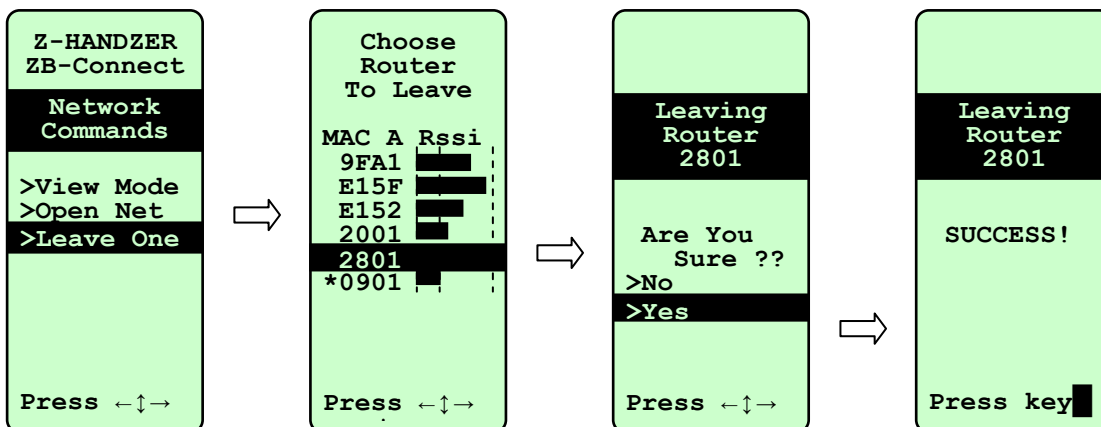


11.3) "LEAVE ONE" MENU

This menu allows you to force the disassociation of a single router (including the Gateway/Coordinator).

After started the menu, HandZer displays the list of devices routers near HandZer itself.

Selecting the desired router HandZer prompts, and then it sends the disassociation command.



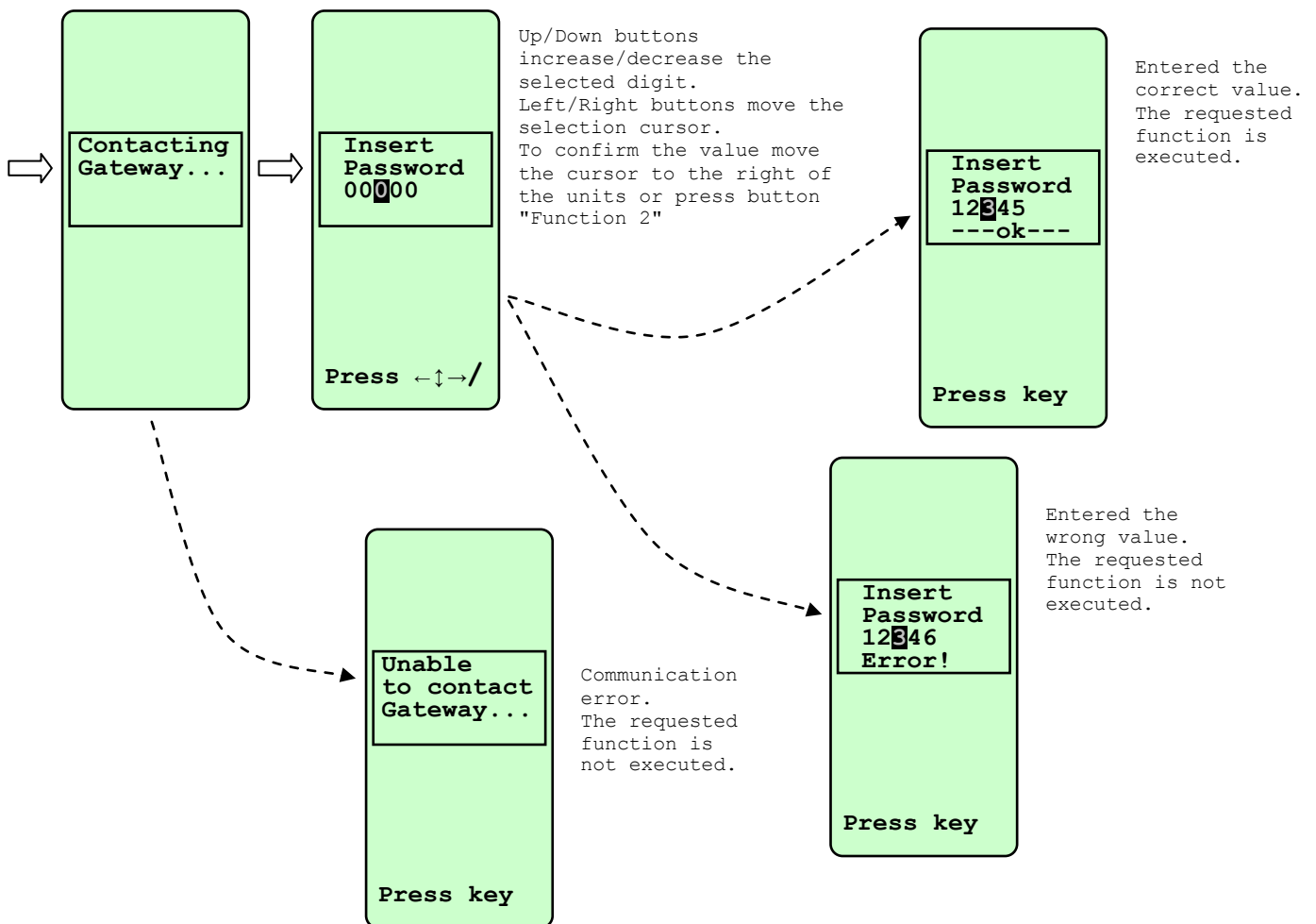
11.4) PASSWORD INTRODUCTION

Activation of "Open Network" menu and "Leave One" menu are subject to the introduction of a numerical value.

This code number must be equal to the password of the gateway.

The value of this password resides in the Gateway (HoldingRegister[13]).

Before requesting for the code introduction, HandZer performs a communication with the Gateway to know the value of the password. For this reason it is necessary that Gateway is powered on and its firmware version is compatible (firmware version 8.1 and higher).



If the Gateway's password is zero (default value) HandZer does not require the code and the selected function is immediately executed.

If the password value is equal to 65535 (0xFFFF) HandZer does not require the code and the selected function is always blocked. In this case appears the message "Function Disable".

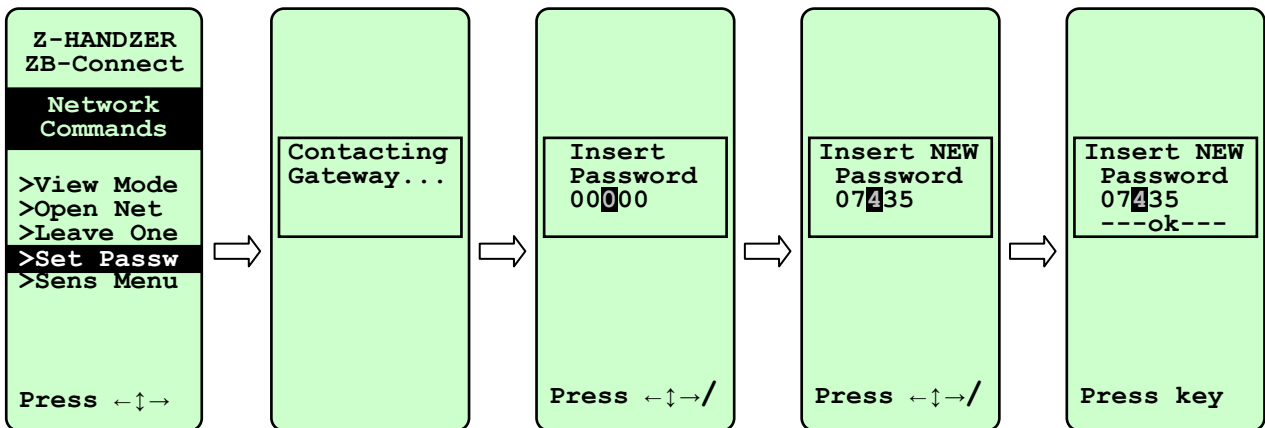
HandZer requires the password code only at the first access to one of the Network Commands menu. Any subsequent accesses to these menus do not require the introduction of the password until the exit from Network Commands Menu.

11.5) SET PASSWORD MENU

This menu allows to program Gateway's password.

Changing the password requires the prior introduction of its current value. Values allowed are numbers between 0 and 65534.

It is not possible to program the special value 65535 (0xFFFF). This value can be programmed in the gateway only via direct serial communication with it.

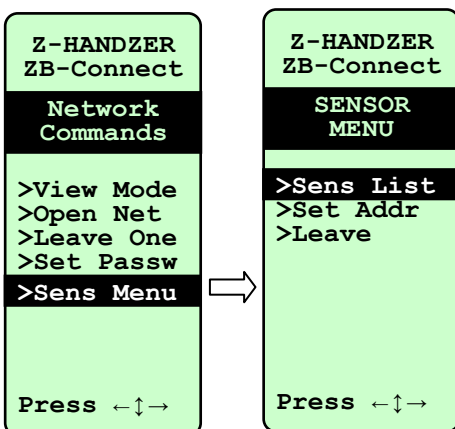


11.6) SENSOR MENU

This menu allows to perform some commands on sensors that make up a network. The possible commands are:

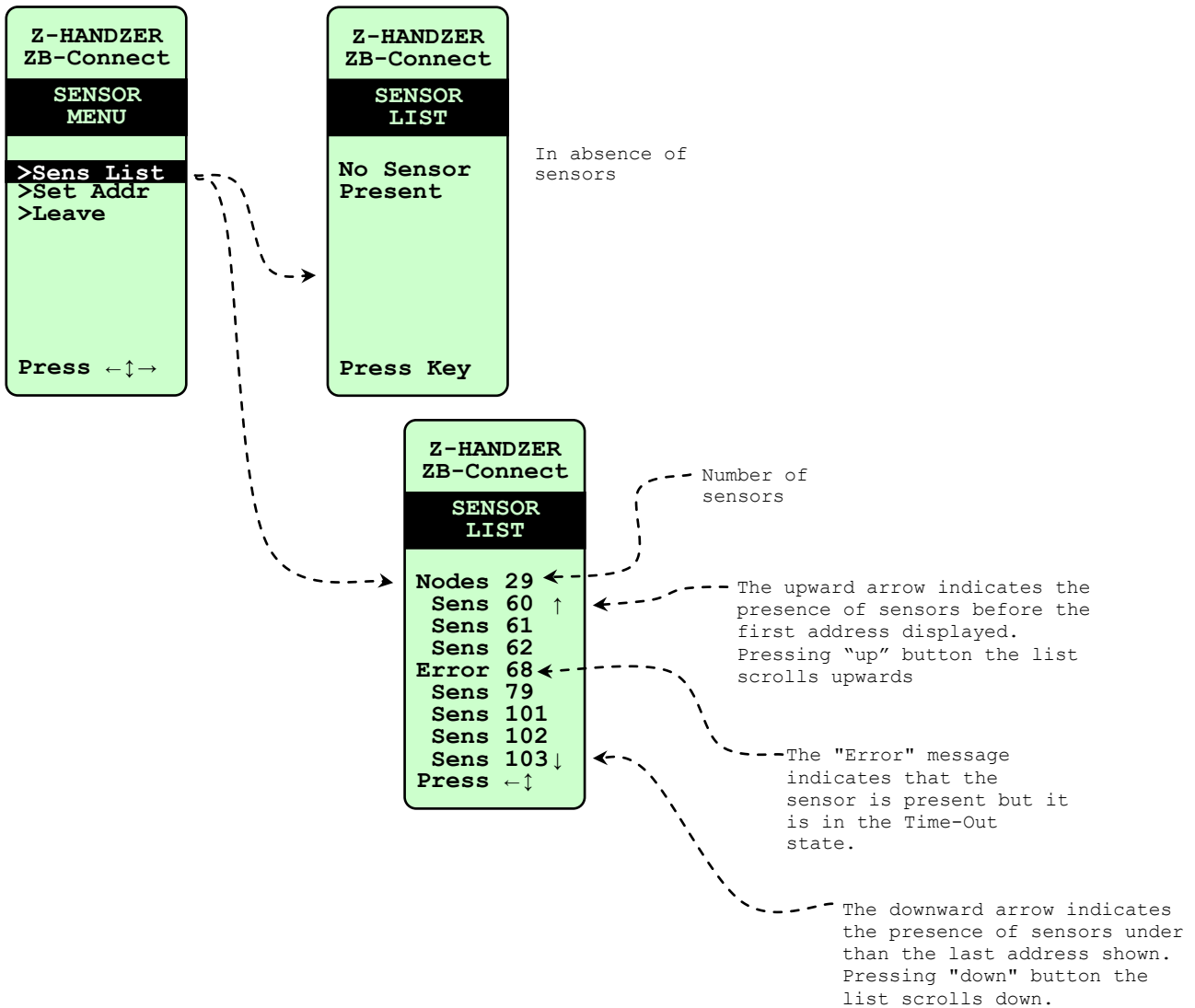
- List of all sensor that compose a network
- Setting address for special probes (probes without dip-switch).
- Sensor disassociation

Activation of this menu is subject to the Gateway's password insertion.



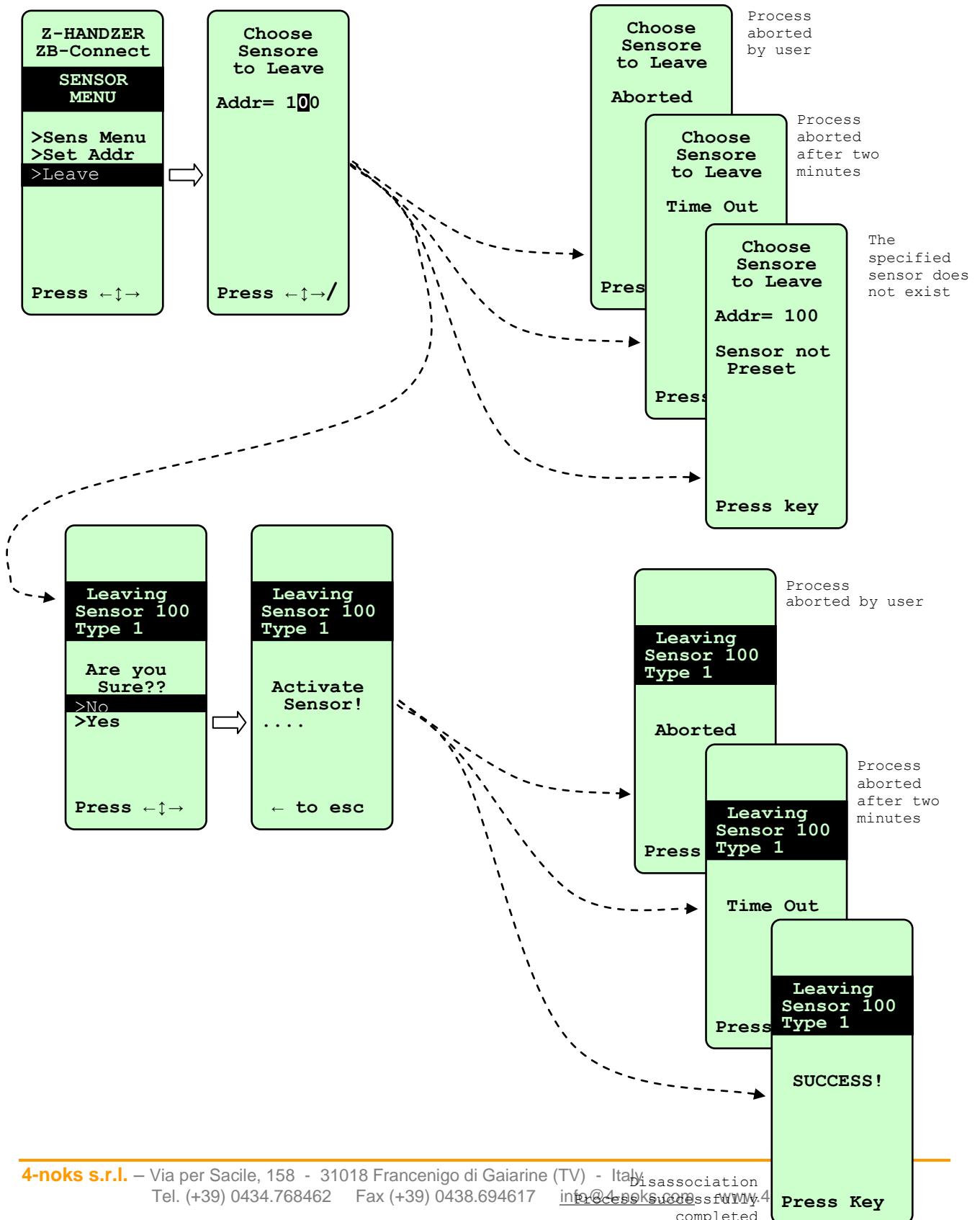
11.7) SENSOR LIST

This menu allows to view the whole list of the sensors present in a network.



11.9) SENSOR DISASSOCIATION

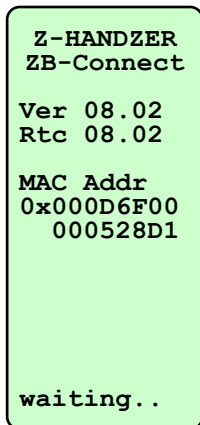
This menu allows to disassociate a specific sensor.



12) START-UP SCREEN

At the reset HandZer shows these screens in rapid succession:

- Whole screen black
- Bootloader screen
- Start-up animation
- Firmware version screen.



13) TURNING OFF HANDZER

HandZer after four minutes of inactivity automatically enters in a state of low consumption to preserve battery life.

Alternatively it is possible to enter before into the power-down state by pressing "Turn off" button.

From the power-down state a pressing of any button forces HandZer to come back to the state previous the turning off.

Note:

During the Ping Test pressing "Turn Off" button causes shutdown only for few seconds.

Note:

Even though the energy consumption during power-down is very low, it is preferable to remove the batteries in case of a prolonged non-use period.

14) BATTERIES LIFETIME

HandZer is expensive in terms of battery energy.

Battery lifetime is estimated in about 26 hours of continuous use of the device.

(consumption = 12J/minute, battery energy = 19000J, --> 19000/12 = 1580 min = 26,3h)

15) USING NOTES

HandZer is designed primarily for be used during installation of new ZB-Connection devices.

It allows to know the number of Routers which are accessible from the position where it runs Ping Test.

Of these nearby Routers Ping Test also shows information on the radio signal strength, thus highlighting the connections good than poor.

Installation rules recommend that each Router is in radio range of at least two other Routers.

The same for the End-Devices, it is recommended that each End-Device can connect effectively with at least two different Routers.

Where installation constraints prohibit a free location choice for Routers and End-Devices, HandZer allows to know the best position for additional Routers which must be added to cover positions that are not reached.

