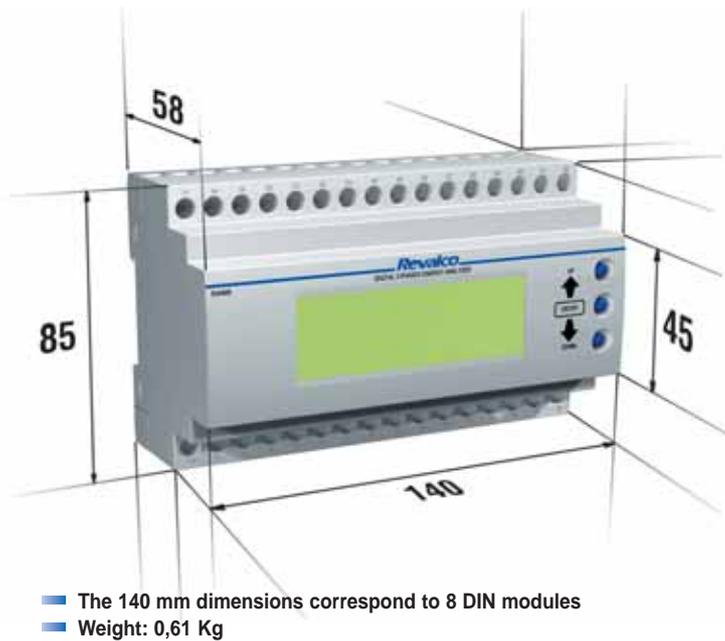


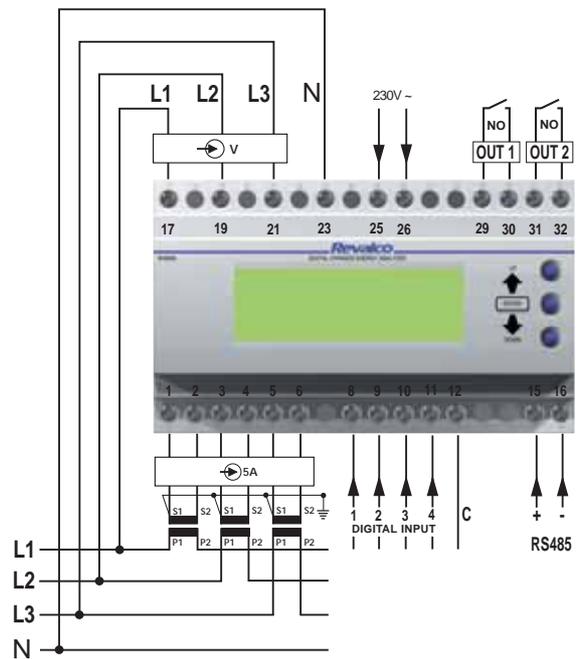
NETWORK ANALYSER 1RANM8



DIMENSIONS in mm

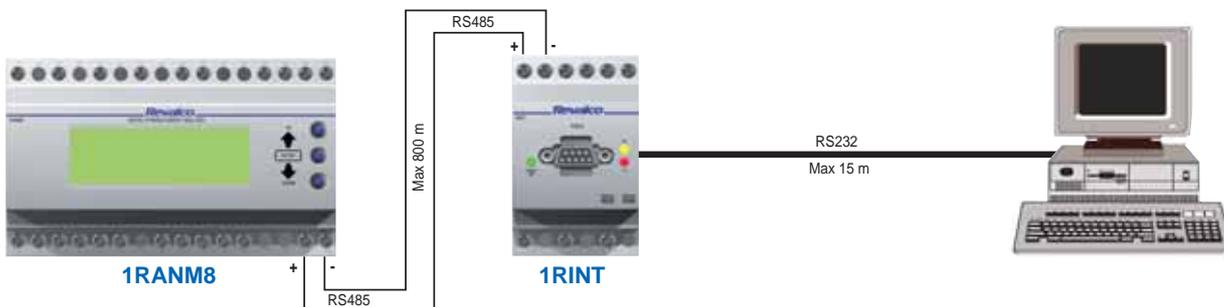


CONNECTION DIAGRAM

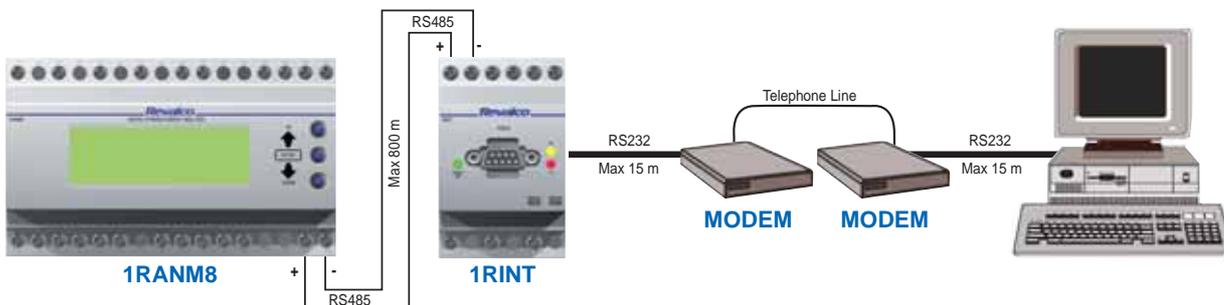


SERIAL COMMUNICATION

Scheme n. 1: Connection between instruments and PC for distances up to 800m



Scheme n. 2: Connection via Modem



GENERAL DESCRIPTION

1RANM8 is an electronic instrument expressly developed to measure and control several electrical parameters in a threephase system of : Voltages, Currents, Power, Integrated Power, Frequency, Power factor, Crest factor and distortion of the harmonic waves of voltage and current.

The selection of these parameters and the Network settings are made easy by the use of only three shift keys..

The instrument is convenient to use especially for :

- Monitoring the energy consumption and the condition of the installed devices
- Use in automation systems and process control
- Management of the energy costs, related to the real consumption
- Control of the over power and/or optimising the use of the devices combined with PLC or PC

All the measured values are visible on the analyser's display or furnished to the above remote displays by a serial interface RS 485 (except the harmonic waves).

Electrical parameters	Measured values	Computed values
- Voltage (RMS) phase-neutral	V1-V2-V3 (V)	
- Voltage (RMS) phase-phase	V1-V2-V3 (VV)	
- Current (RMS)	I1 - I2 - I3 (A)	
- Active Power	P1-P2-P3 (W)	
- Reactive Power	Q1-Q2-Q3 (VAR)	
- Frequency	F (Hz)	
- Apparent Power		S1-S2-S3 (VA)
- Power Factor		Pf1-Pf2-Pf3 (cos φ)
- Total Active Power		Pt (W)
- Total Reactive Power		Qt (VAR)
- Total Apparent Power		St (VA)
- Total Power Factor		Pft (cos φ)
- Harmonic distortion (numerical and graphic)		3xV - 3xI (h1...h15%)
- Total harmonic distortion		3xVthd - 3xIthd (%)
- Voltage crest factor		3xVcrs
- Current crest factor		3xIcrs
- Active Energy in 4 tariffs (positive and negative)		(kWhr)
- Reactive Energy in 4 tariffs (positive and negative)		(kVARhr)

The above unit measurements change automatically in relation to the voltage and current ratio's in use

■ **The software is available, free of charge, on our internet address www.revalco.it**

TECHNICAL CHARACTERISTICS

■ DISPLAY	LCD back illuminated, high performance, 4 lines x 20 columns with Alfa numerical characters, FFT semigraphic Working display time 100,000 h
■ TEST VOLTAGE	2 kV at 50Hz for 1 minute (1 kV for the measuring circuit)
■ POWER SUPPLY	230V +/- 10% 50/60Hz (others on request)
■ WORKING TEMPERATURE	0°C...+ 50°C
■ STORAGE TEMPERATURE	- 20°C...+ 80°C
■ FRONT PROTECTION DEGREE	IP 40
■ TERMINALS PROTECTION DEGREE	IP 20
■ CONSUMPTION	5 VA
■ STANDARDS	EN 50082-2/1994
■ PROTOCOL	MODBUS SLAVE RTU
■ MEMORY	EEPROM 2 kbyte
■ CLASS	0,5% for voltages phase-neutral and currents - 1,5% for voltages phase-phase - 0,3% for frequency - 1% other parameters ±2 digit
■ MEASUREMENT METHOD	128 scanings/period, scanning time 20 msec elaboration included (FFT 3 sec)
■ SERIAL COMMUNICATION	RS 485 (2 wires opto insulated) present on the analyser with the possibility of 255 address monitoring
■ VOLTAGE INPUT	three inputs between 0..150V - 0..300V - 0..500V end scale (for inputs 100V by means voltage transformer, select 150V)
■ CURRENT INPUT	5A RMS with possibility to choose the current transformer up to 10.000/5A
■ INPUTS	4, optoinsulated used for to count external impulses. Voltage from 10 to 30 VDC
■ OUTPUTS	2, by N.O. reed relays 0,5A/100V
■ DIMENSIONS	8 rail DIN modules

OPERATION

Powering the instrument, the words Revalco the actual version and a description of the analyser appears on the display ; after few seconds the instrument changes to the main page. Display selection and programming of the various parameters are achieved by operation of 3 shift keys UP (next) - DOWN (previous) - ENTER (variations of the parameters)

Press ENTER to illuminate the display.

When RAN M8 is illuminated you can see the first page that shows phase-neutral Voltage, Current, Active Power, phase-phase Voltage on the three phases	<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th></th> <th>L1</th> <th>L2</th> <th>L3</th> </tr> </thead> <tbody> <tr> <td>U</td> <td>225.2</td> <td>224.0</td> <td>224.0</td> </tr> <tr> <td>A</td> <td>150.0</td> <td>152.0</td> <td>150.0</td> </tr> <tr> <td>KW</td> <td>46.76</td> <td>46.24</td> <td>46.28</td> </tr> <tr> <td>U_v</td> <td>380.2</td> <td>400.0</td> <td>390.0</td> </tr> </tbody> </table>		L1	L2	L3	U	225.2	224.0	224.0	A	150.0	152.0	150.0	KW	46.76	46.24	46.28	U _v	380.2	400.0	390.0
	L1	L2	L3																		
U	225.2	224.0	224.0																		
A	150.0	152.0	150.0																		
KW	46.76	46.24	46.28																		
U _v	380.2	400.0	390.0																		

By pressing UP you can see the second page that shows the Apparent Reactive and Active Power, Power Factor	<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th></th> <th>L1</th> <th>L2</th> <th>L3</th> </tr> </thead> <tbody> <tr> <td>K%h</td> <td>1450</td> <td>1450</td> <td>1450</td> </tr> <tr> <td>K%h_r</td> <td>725</td> <td>728</td> <td>728</td> </tr> <tr> <td>KW</td> <td>46.76</td> <td>46.24</td> <td>46.28</td> </tr> <tr> <td>Pf</td> <td>0.601</td> <td>0.601</td> <td>0.601</td> </tr> </tbody> </table>		L1	L2	L3	K%h	1450	1450	1450	K%h _r	725	728	728	KW	46.76	46.24	46.28	Pf	0.601	0.601	0.601
	L1	L2	L3																		
K%h	1450	1450	1450																		
K%h _r	725	728	728																		
KW	46.76	46.24	46.28																		
Pf	0.601	0.601	0.601																		

By pressing UP again you can see the third page that shows the total values of the Power and real Factor Power, and Frequency. "tx" shows the actual tariff of energy (t1, t2...) and the remaining time in the integration period. The peak values IPM and IPL are showed on fifth subpage	<table border="1" style="margin: auto; border-collapse: collapse;"> <tbody> <tr> <td colspan="2">totals:</td> <td>(t1 03m)</td> </tr> <tr> <td>K%h</td> <td>0.00</td> <td></td> </tr> <tr> <td>K%h_r</td> <td>0.00</td> <td>SYNC Hz</td> </tr> <tr> <td>KW</td> <td>0.00</td> <td>Pt ---</td> </tr> </tbody> </table>	totals:		(t1 03m)	K%h	0.00		K%h _r	0.00	SYNC Hz	KW	0.00	Pt ---
totals:		(t1 03m)											
K%h	0.00												
K%h _r	0.00	SYNC Hz											
KW	0.00	Pt ---											

By pressing UP again you can see the fourth page that shows the total values, import or export, of the Active and Reactive energy. The arrows indicate the actual function of the analyser.	<table border="1" style="margin: auto; border-collapse: collapse;"> <tbody> <tr> <td>+kWh (T)</td> <td>00000000.00</td> </tr> <tr> <td>+k%h-h(T)</td> <td>00000000.00</td> </tr> <tr> <td>-kWh (T)</td> <td>00000000.00</td> </tr> <tr> <td>-k%h-h(T)</td> <td>00000000.00</td> </tr> </tbody> </table>	+kWh (T)	00000000.00	+k%h-h(T)	00000000.00	-kWh (T)	00000000.00	-k%h-h(T)	00000000.00
+kWh (T)	00000000.00								
+k%h-h(T)	00000000.00								
-kWh (T)	00000000.00								
-k%h-h(T)	00000000.00								

By pressing ENTER you can see the first subpage that shows the values of the Active/Reactive Energy of the 1st tariff's meter	<table border="1" style="margin: auto; border-collapse: collapse;"> <tbody> <tr> <td>+kWh (1)</td> <td>00000000.00</td> </tr> <tr> <td>+k%h-h(1)</td> <td>00000000.00</td> </tr> <tr> <td>-kWh (1)</td> <td>00000000.00</td> </tr> <tr> <td>-k%h-h(1)</td> <td>00000000.00</td> </tr> </tbody> </table>	+kWh (1)	00000000.00	+k%h-h(1)	00000000.00	-kWh (1)	00000000.00	-k%h-h(1)	00000000.00
+kWh (1)	00000000.00								
+k%h-h(1)	00000000.00								
-kWh (1)	00000000.00								
-k%h-h(1)	00000000.00								

By pressing ENTER again you can see the second subpage that shows the values of the Active/Reactive Energy of the 2nd tariff's meter	<table border="1" style="margin: auto; border-collapse: collapse;"> <tbody> <tr> <td>+kWh (2)</td> <td>00000000.00</td> </tr> <tr> <td>+k%h-h(2)</td> <td>00000000.00</td> </tr> <tr> <td>-kWh (2)</td> <td>00000000.00</td> </tr> <tr> <td>-k%h-h(2)</td> <td>00000000.00</td> </tr> </tbody> </table>	+kWh (2)	00000000.00	+k%h-h(2)	00000000.00	-kWh (2)	00000000.00	-k%h-h(2)	00000000.00
+kWh (2)	00000000.00								
+k%h-h(2)	00000000.00								
-kWh (2)	00000000.00								
-k%h-h(2)	00000000.00								

By pressing ENTER again you can see the third subpage that shows the values of the Active/Reactive Energy of the 3rd tariff's meter	<table border="1" style="margin: auto; border-collapse: collapse;"> <tbody> <tr> <td>+kWh (3)</td> <td>00000000.00</td> </tr> <tr> <td>+k%h-h(3)</td> <td>00000000.00</td> </tr> <tr> <td>-kWh (3)</td> <td>00000000.00</td> </tr> <tr> <td>-k%h-h(3)</td> <td>00000000.00</td> </tr> </tbody> </table>	+kWh (3)	00000000.00	+k%h-h(3)	00000000.00	-kWh (3)	00000000.00	-k%h-h(3)	00000000.00
+kWh (3)	00000000.00								
+k%h-h(3)	00000000.00								
-kWh (3)	00000000.00								
-k%h-h(3)	00000000.00								

By pressing ENTER again you can see the fourth subpage that shows the values of the Active/Reactive energy of the 4th tariff's meter	<table border="1" style="margin: auto; border-collapse: collapse;"> <tbody> <tr> <td>+kWh (4)</td> <td>00000000.00</td> </tr> <tr> <td>+k%h-h(4)</td> <td>00000000.00</td> </tr> <tr> <td>-kWh (4)</td> <td>00000000.00</td> </tr> <tr> <td>-k%h-h(4)</td> <td>00000000.00</td> </tr> </tbody> </table>	+kWh (4)	00000000.00	+k%h-h(4)	00000000.00	-kWh (4)	00000000.00	-k%h-h(4)	00000000.00
+kWh (4)	00000000.00								
+k%h-h(4)	00000000.00								
-kWh (4)	00000000.00								
-k%h-h(4)	00000000.00								

By pressing ENTER again you can see the fifth subpage that shows the actual peak values(IPM) and previous (IPL), integrated in the fixed time 15 min, of the Active/Reactive Energy.	<table border="1" style="margin: auto; border-collapse: collapse;"> <tbody> <tr> <td>+kWh IPm</td> <td>000000.00</td> </tr> <tr> <td>+k%h-h IPm</td> <td>000000.00</td> </tr> <tr> <td>+kWh IP1</td> <td>000000.00</td> </tr> <tr> <td>+k%h-h IP1</td> <td>000000.00</td> </tr> </tbody> </table>	+kWh IPm	000000.00	+k%h-h IPm	000000.00	+kWh IP1	000000.00	+k%h-h IP1	000000.00
+kWh IPm	000000.00								
+k%h-h IPm	000000.00								
+kWh IP1	000000.00								
+k%h-h IP1	000000.00								

By pressing ENTER again you can see the sixth subpage that shows the registered values on two digital inputs (when connected), number of counting and "weight" of impulses	<table border="1" style="margin: auto; border-collapse: collapse;"> <tbody> <tr> <td>cnt.1:</td> <td>00000000.00</td> </tr> <tr> <td></td> <td>0.01 /imp</td> </tr> <tr> <td>cnt.2:</td> <td>00000000.00</td> </tr> <tr> <td></td> <td>0.01 /imp</td> </tr> </tbody> </table>	cnt.1:	00000000.00		0.01 /imp	cnt.2:	00000000.00		0.01 /imp
cnt.1:	00000000.00								
	0.01 /imp								
cnt.2:	00000000.00								
	0.01 /imp								

By pressing ENTER again you return to the fourth page,

By pressing UP you can see the fifth page that shows the total harmonic distortions and the crest values of Voltage and Current, of the three phases	<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th></th> <th>L1</th> <th>L2</th> <th>L3</th> </tr> </thead> <tbody> <tr> <td>Uth%</td> <td>000</td> <td>000</td> <td>000</td> </tr> <tr> <td>Ucrs</td> <td>000</td> <td>000</td> <td>000</td> </tr> <tr> <td>Ith%</td> <td>000</td> <td>000</td> <td>000</td> </tr> <tr> <td>Icrs</td> <td>000</td> <td>000</td> <td>000</td> </tr> </tbody> </table>		L1	L2	L3	Uth%	000	000	000	Ucrs	000	000	000	Ith%	000	000	000	Icrs	000	000	000
	L1	L2	L3																		
Uth%	000	000	000																		
Ucrs	000	000	000																		
Ith%	000	000	000																		
Icrs	000	000	000																		

By pressing UP again you can see the sixth and last page that shows in a numeric and graphic way, the distortion until the fifteenth harmonic wave	<table border="1" style="margin: auto; border-collapse: collapse;"> <tbody> <tr> <td>■</td> <td>U2</td> <td></td> </tr> <tr> <td>■</td> <td>---</td> <td>%</td> </tr> <tr> <td>■</td> <td>h12</td> <td></td> </tr> <tr> <td>■</td> <td>---</td> <td>%</td> </tr> </tbody> </table>	■	U2		■	---	%	■	h12		■	---	%
■	U2												
■	---	%											
■	h12												
■	---	%											

By pressing ENTER the waves to control change (h1, h2, h3...h15), while pressing ENTER for 2 seconds, changes the parameter to which you wish to control the distortion of the harmonic waves (V1..I1..V2..I2..V3..I3).

CONFIGURATION SELECTION MENU

By pressing UP and DOWN at the same time (more than 5 sec) you can have the following **configuration selection menu**:

```
CONFIG: (v450)
meter      system
inputs     outputs
>password  exit
```

by pressing ENTER you change the position of the arrow on the display, to choose the screen on which the display is shown

Choosing **Meter** and pressing UP, the following screen appears :

```
Volt.range: 300 U
Volt.in.mult: 1 x
Current TF : 5/5A
>exit
```

- > volt range: by pressing UP or DOWN you select the input voltage between 150V, 300V or 600V (these are the ranges ; if you have 100V input choose 150V)
- > volt in mult: by pressing UP or DOWN you select the multiplication factor from 1x to 240x for input 150V, from 1x to 120x for input 300V, from 1x to 70x for input 500V
- > current range: by pressing UP or DOWN you select the primary current of the transformer, from 5A to 10.000A (the variation occurs 5A by 5A)
- > exit : by pressing UP or DOWN you return to the CONFIG menu

To change the existing values and move the arrow, it is necessary to be in the CONFIG menu, move the arrow on >Password, press UP or DOWN to see > Password : _ _ _ _ on the display ; now press in sequence UP-UP-DOWN-UP until you see **>New Password**. By pressing ENTER it is now possible to move the arrow, while going in "Meter" and by pressing UP or DOWN it is now possible to change the values

Choosing **System** and by pressing UP, the following screen appears :

```
baud rate: 4800
net.addr.: 128
rst.energy
rst.counts >exit
```

- > baud rate : by pressing UP or DOWN you can change the transmission speed (bit/sec) between 1200, 2400, 4800 or 9600 baud
- > net addr : by pressing UP or DOWN you can choose the address n°, from 1 to 255
- > rst energy : by pressing UP or DOWN you can cancel the memorised energy values., while by pressing ENTER you see > rst IPmax and by pressing UP or DOWN you reset the actual peak value on the fifth subpage (IPM)
- > rst counts : by pressing UP or DOWN you reset the totals of the counters connected to the digital inputs
- > exit : by pressing UP or DOWN you return to the CONFIG menu

To change the existing values and move the arrow, it is necessary to select as explained before entering in "System" screen

Choosing **Inputs** and pressing UP the following screen appears :

```
inp1: 0.01 /imp
inp2: 0.01 /imp
ener.IP: 15 min.
tarifs: 2(4) >exit
```

- > inp.1 : by pressing UP or DOWN you change the "number" of the impulses on the digital input n° 1
- > inp.2 : by pressing UP or DOWN you change the "number" of the impulses on the digital input n° 2
- > ener IP : shows the integration time (fixed) of the totals, while by pressing UP you see the synchronisation's screen of the input n°1

```
inp1: ener.sync
inp2: 0.01 /imp
>ener.IP: inp1
tarifs: 2(4) exit
```

by pressing UP again you see the synchronisation's screen of the input n° 2

```
inp1: 0.01 /imp
inp2: ener.sync
>ener.IP: inp2
tarifs: 2(4) exit
```

by pressing UP again you can have the possible use of input n° 3 (only available when 2 tariffs are chosen. Infact with 4 tariffs, the inputs 3 and 4 are engaged)

```
inp1: 0.01 /imp
inp2: 0.01 /imp
>ener.IP: inp3
tarifs: 2 exit
```

- > tarifs : by pressing UP or DOWN you change the tariff's n° ; 2 or 4 (on the screen with "ener IP 15 min" only)
- > exit : by pressing UP or DOWN you return to the CONFIG menu

Choosing **Outputs** and by pressing UP

you see the following screen:

```
out1: out2:
OFF OFF
>exit
```

By pressing ENTER the following screen appears:

```
out1: out2:
>OFF OFF
exit
```

By pressing UP the following screen appears:

```
out1: out2:
al: al:
0000 0000
-t:00 -t:00>exit
```

- > out 1/out 2 : by pressing UP or DOWN you choose the alarm type (< min or > max)
- > al : by pressing UP or DOWN you choose the parameters for which you want the alarm option (always ON-always OFF-Pft-Hz-Vx-V3-V2-V1-lx-l3-l2-l1-Qt-Pt-pl kVARh-pl kWh)
- > 000 : by pressing UP or DOWN you change the numerical value of the alarm
- > -t : by pressing UP or DOWN you change the delay's alarm (0...15 sec)
- > exit : by pressing UP or DOWN you return to the CONFIG menu

To change the existing values and move the arrow, it is necessary to select as explained before, entering in "outputs" screen

Choosing **Password** you have already saw how to change the values into the various screens, and move the arrow pressing in sequence : UP-UP-DOWN-UP You can also enter a secret, personalised password that **must have absolutely a different sequence respect to those already mentioned above**

How to enter the personalised password :

In the CONFIG " menu", move the arrow to > Password

press UP or DOWN for to see > Password : _ _ _ _

press in sequence UP-UP-DOWN-UP until appears : > New password : _ _ _ _

enter now the new sequence, **(different from the previous)**

the word "repeat _ _ _ _" appears, now repeat the sequence selected and the new password is memorised.

To exit from the CONFIG menu, move the arrow to the > exit, then press UP