Frequency Synthesizer
F-SCAN COMPACT DUO

Firmware Version FSC V2.1x with100 memory banks

INSTRUCTION MANUAL

This symbol identifies the equipment as Type B

ATTENTION: Consult accompanying documents

Preface

One of our prime objectives as a Swiss company is the development and manufacturing of precise and reliable products for physical therapy based on years of experience. Some of our products are well known and utilized internationally. As a small company we can afford to keep in touch with our customers who often contribute to new developments.

May your work with the F-SCAN COMPACT DUO be beneficial.

Introduction

The FREQUENCY SYNTHESIZER **F-SCAN COMPACT DUO** has been developed to fulfil the need of two independent frequency generators in one device.

The F-SCAN COMPACT DUO offers the same set of more than 340 pre-programmed applications if enabled by the user. An application can be selected and ready to start within one minute. 100 memory banks for up to

50 frequency values each or 25 sets of two when used in DUO mode, can be filled by the user with individually selected applications. Each of the 100 banks can be erased or reused.

The mode of operation is new. It resembles the operating mode of modern electronic devices and it does not take long to get used to the procedure. The F-SCAN COMPACT DUO is small and mobile. The integrated rechargeable Lithium-Ion battery powers the device for 3 hours or more of continued use. The device, its application cable and suitable electrodes are all that's needed to run an F-SCAN frequency application almost anywhere.

If an application is selected and started, it will run safe and automatically with factory set defaults. The user can interfere and adjust the settings of the signal form, the runtime for each frequency or the level of the signal amplitude. These user settings remain active either until the user changes them again, or resets them to the default settings with a touch on a button.

"Soft ramping" is used to switch from one frequency value to the next to avoid unwanted discharge impacts for the user. The signal amplitude is reduced to zero for the frequency exited and raised from zero to the operating level for the new value.

Power ON and OFF, as well as switches between frequency values and the end of an application, are signaled acoustically. The device switches OFF automatically after 2 minutes of inactivity.

The Lithium-Ion battery recharges if the device is connected to a PC or Notebook with the USB-cable. The latter, and a power supply to plug into mains – connected with the same USB-cable –, are shipped with the F-SCAN COMPACT DUO.

Two generators – DUO MODE

The most important benefit compared to other frequency devices is that the F-SCAN COMPACT DUO is equipped with a second generator which can be used to provide a different frequency on another wire of the application cable. This means: two devices in one. Frequency Specific Microcurrents FSM applications can easily be generated. When using the device in standard mode, the second generator creates the same signal as the master generator. When using in DUO MODE, the second generator outputs the frequency from the even number of a running program as described in the chapter **DUO MODE**.

Standard – shipping list for the F-SCAN COMPACT DUO

- F-SCAN COMPACT DUO
- Power supply (with USB-connector)
- Mini-USB-cable
- Application cable FTB033 plus 3 alligator clips to attach
- Sticky pads
- Instruction manual (not shown)

Default settings

Display language: **English**
(2nd choice German)

Runtime per Frequency: **3:00 minutes**
(range 0:30 to 60:00 minutes)

Amplitude of signals: **40%** of maximum of 12Vpp
(adjustable in steps of +/- 1%)

Wave form: **AUTO**
(SINE positive DC-OFFSET below 65000 Hz, SQUARE above 65000 Hz)

Program number 1 of table   ABC TABLE   and   123 FREQ

Memory positions of INDIVIDUAL APPLICATIONS are clear

Elements for operation

SOFT keys
F1, F2, F3.
Tasks for each key are defined in the bottom line of the display during operation.

Mini-USB-Connector. Connect to PC, Notebook or power supply to charge Lithium-Ion battery via USB-cable

Graphical monochrome LCD-display.

COMPACT
F-SCAN
102 ONS=32 DUO
TB-ELECTRONICS V2.18

KEY-UP

KEY- RIGHT

KEY-LEFT

KEY-DOWN

KEY-CENTER

3.5mm jack connector for application cable

Yellow/green LED as proof of output signal during operation

NOTE: The display lights up for a few seconds only to support input activities. The device switches OFF if inactivity exceeds 2 minutes. Both measures reduce the power drain on the battery.

Signals sent to the output port

SINE

SQUARE DC-OFFSET positive,
(0Vpp to 12Vpp)
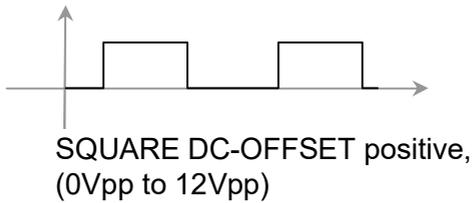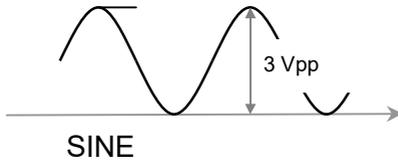
To improve efficacy, a small portion of a 10 MHz wave is modulated on the output signals.

First steps

The charge level of the Lithium-Ion battery of the F-SCAN COMPACT DUO must be checked first after the device and its accessories have been unpacked.

CHARGE YOUR F-SCAN COMPACT DUO BEFORE FIRST USE FOR AT LEAST 4 HOURS. CONNECT THE DEVICE AND THE POWER SUPPLY WITH THE USB CABLE AND PLUG THE POWER SUPPLY INTO AN AC-OUTLET. IF THE DEVICE IS POWERED ON DURING THE CHARGING PROCEDURE, LESS ENERGY FOR ENERGIZING THE BATTERY PACK IS AVAILABLE AND THE CHARGING PROCEDURE TAKES LONGER.
THE LCD MAY SHOW APPEARING AND DISAPPEARING STRIPES DURING THE CHARGING AND THE DEVICE MAY WARM UP SLIGHTLY. THESE EFFECTS ARE NORMAL.

IF YOUR DEVICE IS EQUIPPED WITH WIRELESS CHARGING OPTION: Place the F-SCAN COMPACT DUO on the charging pod in the center so that you can see the indicator light on the pod changing from red to blue.

Press KEY-CENTER . An acoustic signal accompanies the start-up sequence.   The display shows   briefly the units name, the company identification and the release level of the firmware, followed by the start screen:

    followed by
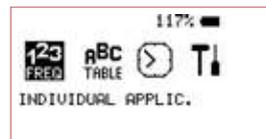
If the battery is fully charged its icon in the upper right corner of the display will show a load of more than 100%**.** The battery icon flashes if the device is

connected with the USB-cable to either the power supply or a booted PC or Notebook or wireless charging pod until the battery is fully charged.

The battery discharges slowly when the device is operated stand-alone. The battery should be recharged if its capacity reaches 30%. A protection circuit shuts the device off if it is operated below that level.

It may occur that the device cannot be powered on during an active charging process. In such case disconnect the device, start it up, then reconnect to the charger.

Fully charged the battery supports minimum of 3 hours of continuous stand-alone operation.

The Lithium-Ion battery does not age prematurely if the device remains connected to a power source whenever it is not used stand-alone.

After power on in stand-by menu, it is possible to select different backlight settings:

- o Press F1 to select 100% backlight with backlight off after 20 seconds and use KEY_UP or KEY_DOWN to adjust backlight.

- o With F2, you select 70% and can use KEY_UP and KEY_DOWN for modification of backlight WITHOUT backlight off after 20 seconds.

- o With F3, you select 50% and can use KEY_UP and KEY_DOWN for modification of backlight WITHOUT backlight off after 20 seconds.

- o Use KEY-UP and KEY-DOWN to adjust individual brightness of backlight.

How to SELECT and RUN an APPLICATION

Program number 27 shall be used

Connect the 3.5mm plug of the application cable to the socket located on the front side of the device below the label

Connect the application cable to the self adhesive pads or the alligator clips wit wet towels. For NON DUO applications, the black connection is not necessary.
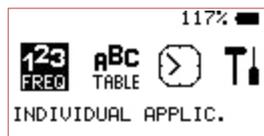
1.	Switch on	
2.	List	
3.	Select with	
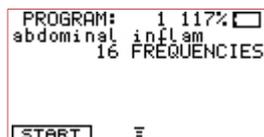
4. Select entry.
    Press and hold
    until the desired program number
    appears in the center
    of the top line of the display.
    Take the hand holds or position
    the self adhesive pads.

```
PROGRAM:   27 117%■
asthmatic bronchitis
         08 FREQUENCIES


 START      ☰
```

5. Start with
    or

```
PROGRAM:   27 117%■
asthmatic bronchitis
01 of  08 FREQUENCIES
AUTO F=522
         CV=   0 AMP: 63

T=   1:57 TT= 22:57
 STOP   WAVE  PAUSE
```

F1

Program 27 holds 8 frequency values and completes the application within 24 minutes .

The device switches OFF automatically two minutes after completing the application, unless it is switched OFF manually before by pressing CENTER until the device signals.

Display readings of an active application:

name of application

number of total frequencies of application

program number

battery charge indicator

number of active frequency

wave form of outputs

signal amplitude in %

2nd generator frequency when in DUO mode

runtime remaining for the whole application

runtime remaining for the active frequency

F1 stops the application

F2 changes wave form

F3 stops the application for a pause

```
PROGRAM:   1 100%▪
Asthma
01 of   08 FREQUENCIES
AUTO F1=970
                AMP: 70
    F2=64
T=  1:34 TT= 22:34
[ STOP ]  [ WAVE ]  [ PAUSE ]
```

Soft keys F1, F2, F3

Their function changes in different program windows. The actual task is defined in the bottom line of the display during operation.

Whenever a frequency runs, **F2** acts like a serial switch to change the wave form. A touch switches from AUTO to SINE. A second touch to SQUARE DC-OFFSET. and another switches back to AUTO. A user selection remains active until it is either changed again, or until a reset to the default settings.

A brief touch stops the active frequency and starts the next one in line.

F3 stops the application for a pause. PAUSE flashes and the signal amplitude AMP shows "0":

```
PROGRAM: 350 117%▪
ZAPPER C
01 of   09 FREQUENCIES
AUTO F=40000
            ▪AMP▪ 0
T=  6:55 TT= 62:55
[ START ]    [ PAUSE ]
```

To restart from the point of interruption, press **F1** or **F3** .

Memory banks for user defined applications

The F-SCAN COMPACT DUO offers 100 memory banks of 50 positions each or 25 positions in DUO MODE.

User can enter frequency sequences from the Internet or from other sources. Entries will be saved until erased by the user. The procedure to follow to either erase all user entries together, or one sequence only, will be described later in this document.

Example: how to enter frequency values of 100 Hz, 200 Hz and 1234 Hz in memory location number #1:

1. Switch on with CENTER
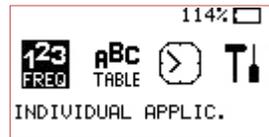
2. Select with CENTER.
   ,00 FREQUENCIES' in the display indicates that no frequencies are stored in bank #1.
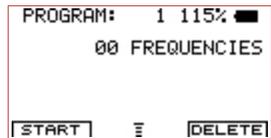
   Memory banks can be selected with KEY-UP and KEY-DOWN

3. Input of a frequency
   F=0 indicates that the actual value is 0 Hz.

4. Enter 100 Hz   F=1

   times 10   F=10

   times 10   F=100

   Confirm with CENTER
   Now the first value F=100 Hz is memorized in bank #1

5. Input of a frequency

6. Enter 200 Hz   F=1

    Plus 1   F=2

    times 10   F=20

    times 10   F=200

    Confirm with CENTER
    Now the second value F=200 Hz
    is memorized in bank #1.

7. Input of a frequency

8. enter 1234 Hz   F=1

    times 10   F=10

    Plus 1   F=11

    Plus 1   F=12

    times 10   F=120

    Plus 1   F=121

    Plus 1   F=122

    Plus 1   F=123

    times 10   F=1230

    Plus 1   F=1231

    Plus 1   F=1232

    Plus 1   F=1233

    Plus 1   F=1234

Confirm with CENTER
Now the third value F=1234 Hz
is memorized in bank #1.

```
PROGRAM:   1 115%
        03 FREQUENCIES


 START    ☰    DELETE
```
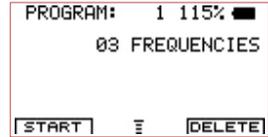
Hint for entering of frequencies:

-        Before confirming with CENTER, a wrong entry can be erased to
         F = 0 with KEY-LEFT

-        With KEY-UP   values are incremented.

-        With KEY-DOWN   values are decremented.

Start program with

Start a user defined application

The F-SCAN COMPACT DUO offers 100 memory banks of 50 positions each.

If the program is started with "F1", both generators output the same frequency in sequences one by one.

DUO MODE

When a user defined application is started with CENTER, the program follows the DUO MODE principle. This means, that the first frequency "F1" of a program outputs the signal on the red wire of the cable FTB033. The second frequency indicated as "F2" is output at the black wire of the application cable. The blue wire is the reference of both generators.

It is possible to use the red and black wire only to receive a mixed signal of F1 and F2. But the reference on the blue wire is necessary to measure the conductivity.

In DUO MODE, the maximum of 50 frequencies per memory bank (… per program) is divided by 2 because always two frequencies run simultaneously. The conductivity is measured for both output signals. Although the conductivity is measured in microamperes, the indication is in CV (conductivity value). The reason is that at low frequencies, the measurement of microamperes can be inaccurate.

The image shows how the screen looks like when a program has been started in DUO mode. Gernerator number F1 outputs 970 Hertz, while generator F2 outputs 64 Hertz and the bar shows that a microcurrent is flowing.

```
PROGRAM:    1 100%━
Asthma
01 of  08 FREQUENCIES
AUTO F1=970
                 AMP: 70
     F2=64
T=   1:34 TT= 22:34
 STOP    WAVE    PAUSE
```

Input of decimals

Some applications mentioned in the literature call for use of frequencies with up to 2 decimals (i.e. 8.82 Hz). The F-SCAN COMPACT DUO offers this feature.

1. Input a frequency with decimals, i.e. 8.82 Hz. *F=0.00 shows,that the Actual value of the Frequency is 0 Hz.*

    F2

2. Enter 8 Hz, press 8 times

    ```
              F=8.00

    WOB=OFF
    PFEILTASTEN VERWENDEN
     WOBBLE   DECI    NAME
    ```

3. Press softkey "DECI"

    F2

    ```
              F=8.00

    WOB=OFF
    PFEILTASTEN VERWENDEN
                DECI
    ```

4. Press KEY-UP and hold until decimal shows 82. Confirm with CENTER.

    ```
              F=8.82

    WOB=OFF
    PFEILTASTEN VERWENDEN
                DECI
    ```

Name an application

Press KEY F3 to enter the NAME submenu.

Use KEY LEFT, KEY RIGHT, KEY UP and KEY DOWN to operate the NAME submenu:

KEY LEFT:	clears an entry	
KEY UP:	increases the character value	
KEY DOWN:	decreases the character value	
KEY RIGHT:	selects the next character	

```
INPUT NAME
_
    F=0.00
WOB=OFF
USE ARROW KEYS
WOBBLE   DECI    NAME
```
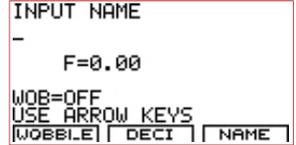
With KEY CENTER the entry will be confirmed and memorized.

TIMER

Change the runtime per frequency

The factory default for each frequency value issued by the F-SCAN COMPACT DUO is 3:00 minutes. The user can adjust it in steps of 15 seconds between 0:30 and 60:00 minutes.

Example: how to change the timer from 3:00 minutes to 2:00 minutes:

1.   Switch on

```
                              114%▢
123  aBC  ⟩  T▮
FREQ  TABLE
INDIVIDUAL APPLIC.
```

2.   Select ADJUST TIMER
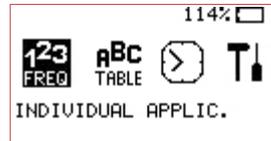
```
                              114%▢
123  aBC  ▶  T▮
FREQ  TABLE
              ADJUST TIMER
```

3.   Confirm with CENTER

```
🕘
T=  3:00
USE ⬍ KEYS
```

4.   Set TIMER to   4 times
      2:00 Minutes

```
🕘
T=  2:00
USE ⬍ KEYS
```

5.   Terminate ADJUST TIMER

```
                              114%▢
123  aBC  ▶  T▮
FREQ  TABLE
              ADJUST TIMER
```
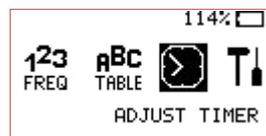
Change the amplitude of signals

The factory default for the amplitude of signals generated by the F-SCAN COMPACT DUO is 40% of the maximum of for SQUARE WAVE DC-OFFSET signals and SINE WAVE. The user can adjust it in steps of +/- 1%.

Example: how to change the amplitude from 80% to 75%:

1.   Switch on

2.   Select DEVICE SETTINGS

3.   Confirm with CENTER

4.   Confirm with CENTER
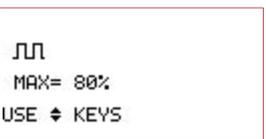
5.   Set amplitude to 75%,
     press KEY-DOWN   5 times.

6.   Terminate SET AMPLITUDE

NOTE: All user adjustments to the default settings remain active until either the user changes them again, or resets them as described on the following page. For setting all wave forms to AUTO, press F1. All to SINE, press F2. All to SQUARE, press F3.

Reset to default settings

If the switch DEFAULT SETTINGS in the window DEVICE SETTINGS is activated, the following parameter will be reset:

Display language: **English** (2nd choice German)
Runtime per Frequency: **3:00 minutes**
                                  (range 0:30 to 60:00 minutes)
Amplitude of signals: **40%** of maximum of 12Vpp
                                  (adjustable in steps of +/- 1%)
Wave form: **AUTO**
                                  (square DC-Offset)

Program-number 1 of table **ABC TABLE** and **123 FREQ**

Example: how to reset to DEFAULT SETTINGS:

1.   Switch on
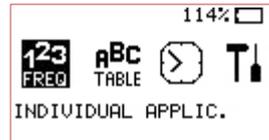
2.   Select DEVICE SETTINGS
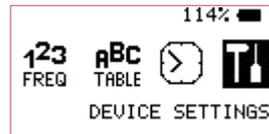
3.   Confirm with CENTER

4.   Select DEFAULT SETTINGS
       press KEY-DOWN   2 times.

5.   Confirm with CENTER
       Display shows activity and returns
   to main menu.
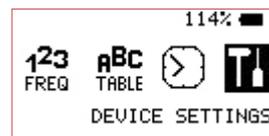
Clear ALL user memory banks

If the switch CLEAR USER MEMORY in the window DEVICE SETTINGS is activated, all 10 memory banks will be cleared. They will be ready for new input.

Example: how to clear all user memory banks:

1. Switch on

2. Select DEVICE SETTINGS

3. Confirm with CENTER

4. Select CLEAR USER MEMORY
   press KEY-DOWN 3 times.

5. Now press F3 Display shows
   activity and returns to main menu.
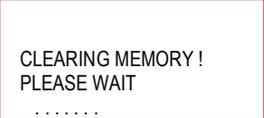
   After finishing the procedure …

6. Terminate DEVICE SETTINGS

Clear ONE user memory bank

Example: how to clear ONE user memory bank:

1. Switch on

```
                              114%
    123    aBC  ( > )  T
    FREQ   TABLE
    INDIVIDUAL APPLIC.
```
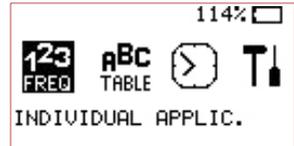
2. Select INDIVIDUAL APPLIC.
    Confirm with CENTER
    Memory bank #10 has 3 entries.

```
    PROGRAM:  10  115%
             03 FREQUENCIES


    [START]      ≡     [DELETE]
```
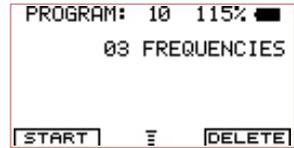
3. Press SOFT-KEY F3 until a beep.
    The last Frequency of
    Memory bank no. #10 will
    be cleared and the message
    ”02 FREQUENCIES“ is displayed.

    F3

```
    PROGRAM:  10  115%
             02 FREQUENCIES


    [START]      ≡     [DELETE]
```
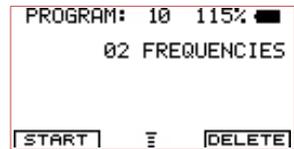
    Keep SOFT-KEY F3 pressed for another 2 seconds
    if all Frequencies of Memory bank #10
    should be cleared.

4. Terminate INDIVIDUAL APPLIC.

```
                              114%
    123    aBC  ( > )  T
    FREQ   TABLE
    INDIVIDUAL APPLIC.
```
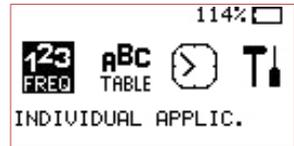
OPTION ChipCard FTB313

The special ChipCard has been developed to support an easy direct transfer of INDIVIDUAL APPLICATIONS between two F-SCAN COMPACT DUO devices. It can also be used to transfer one application from an F-SCAN COMPACT DUO to an F-SCAN MinDevice.

Data exchange between F-SCAN3, F-SCAN4 and F-SCAN MOBILE NT is also possible with the ChipCard FTB313.

The ChipCard must be inserted as pictured into the slot of the F-SCAN device.

Data transfer with ChipCard

If a valid ChipCard is inserted, and the function "DEVICE SETTINGS" activated, a "CHIPCARD MENU" can be accessed on the bottom line of the display.

## The "CHIP CARD MENU" offers 4 actions:

READ FROM ChipCard

If selected and confirmed with CENTER, all applications (including their names) stored on the ChipCard replace the previous content of the function "INDIVIDUAL APPLICATIONS". The procedure takes approx. 1 minute and cannot be interrupted. After completion, the F-SCAN COMPACT DUO must be switched "OFF".
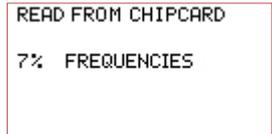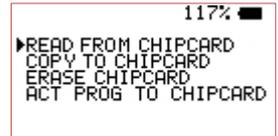
COPY TO ChipCard

If selected and confirmed with CENTER, all applications (including their names) stored in the function "INDIVIDUAL APPLICATIONS" replace the content of the ChipCard. The procedure takes approx. 4 minutes and cannot be interrupted. The application which had been used last with the F-SCAN COMPACT DUO will be marked. If the content of the ChipCard is transferred to an F-SCAN COMPACT DUO this application will be readily available after power "ON". This application will also transfer to an F-SCAN MinDevice if the ChipCard is used there.
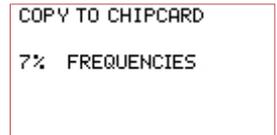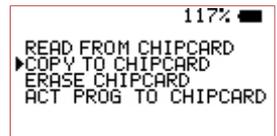
ERASE ChipCard

If selected and confirmed with CENTER, the content of the ChipCard will be erased. The procedure takes approx. 4 minutes and cannot be interrupted.
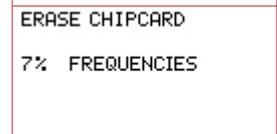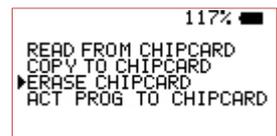
ACT PROG TO ChipCard

If selected and confirmed with CENTER, the last
program chosen from the function   INDIVIDUAL
APPLICATIONS will be copied to the ChipCard. The
procedure takes a few seconds.

```
                            117% ▰
READ FROM CHIPCARD
COPY TO CHIPCARD
ERASE CHIPCARD
▸ACT PROG TO CHIPCARD
```
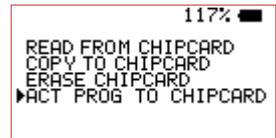
Function of the CHIPCARD with an F-SCAN MinDevice

If an INDIVIDUAL APPLICATION stored in an F-SCAN COMPACT DUO
should be transferred to an F-SCAN MinDevice, the following procedure
applies:

Transfer the application from the COMPACT to a ChipCard using the routine
explained before. Remove the ChipCard and insert it into the slot of the
MinDevice with the chip pointing up. The MinDevice must be "OFF".

Switch the MinDevice "ON".

The content of the transferred application is now read automatically and
stored in the device – the green LED in the middle blinks until the transfer is
completed.

Switch the MinDevice "OFF" and remove the ChipCard.

ChipCard immediate use

When no ChipCard FTB313 is inserted, the main menu indicates
"INDIVIDUAL APPLIC." in the main menu when "123" is pre-selected. When
a ChipCard is inserted, the text changes to "ChipCard APPLIC." to indicate,
that all operations are related to the ChipCard. Also when selecting "123"
with the center button while the ChipCard is inserted, the program indicator
changes to "ChipCard".

So the internal memory is not touched when a ChipCard is inserted and all
operations like running a program or creating programs affect the ChipCard.
This feature offers a huge and unlimited easy-to-handle storage capacity just
by using ChipCards.

Miscellaneous and simple test of outputs

LITHIUM-ION BATTERY

If the battery is charged while the device is OFF, it may refuse to switch ON. Disconnect the USB-cable, start the F-SCAN COMPACT DUO, then reconnect the cable.

WAVE FORM

If the wave form is changed from the factory default AUTO, the selection is maintained until changed back. If SQUARE FULL WAVE is selected the signals from low frequencies may be felt to be irritating. An adjustment of the signal amplitude below the default of 40% will solve the problem.

LANGUAGE SELECTION

Selection of German as the display language does not affect the names of the applications stored. The device must be reprogrammed at the factory to incorporate the German names.

CONDUCTIVITY VALUE (CV) and functional test of the APPLICATION CABLE

A CV-value appears on the display whenever a frequency is active. It is displayed as a horizontal bar. The CV can also be used as a functional control of the device, and the application cable with the set of electrodes, as follows: The F-SCAN COMPACT DUO must be readied for an application and a frequency started. The electrodes must not touch. The display must show no bargraph and LED must be bright. If the electrodes are made to touch, the bargraph must increase to maximum width – device, application cable and electrodes are OK. If the electrodes are placed apart again, the bargraph reduces slowly back to zero.

Technical data

Housing	Plastic
Dimensions	105 mm x 66 mm x 19mm
Monochrome display	45mm x 24mm; 128 x 64 pixel
Minimum frequency	1Hz
Frequency stability	30 ppm
Memory	100 user definable memory banks List of 349 complete applications if enabled by user
Power supply	Power supply: Input 100–240 VAC, 50–60 Hz, Output 5 VDC, 500mA
Multi signal port OUT	Sine signal, DC-Offset, Amplitude 3Vpp Square DC-Offset, Amplitude 0 … 12Vpp.
Output range	1Hz to 100 kHz.

Changes to improve or simplify the product will be made without prior notice

Declaration of Conformity

Herewith we declare:

TB-ELECTRONICS GmbH
Poststrasse 4
CH-9443 Widnau

that the following product with the marking

F-SCAN COMPAC DUOT Frequency Synthesizer

declare under our sole responsibility to which this declaration relates is in conformity with the following standard:

EMC: 89/336, 92/31, 93/68
Harmonized standards: EN 61326-1
Ratings, characteristics   5VDC, 300mA

Widnau, 03 - 04 - 2018

legally binding Signature