DSP20-5G

DIGITAL SIGNAL PROCESSOR

▸ 24 Digits LCD display

▸ 5 Inputs

▸ Auto-Tuning function

▸ SAW filters against Lte 4G and 5G interferences

▸ A.C.G. in each filter

▸ 32 high selectivity digital filters

▸ DC powering from plug or coaxial output

▸ Zamak chassis for high screening protection

Programmable compact multi-input multiband amplifier to digitally filter, convert and equalize DVB-T / T2 channels. Ideal for fibre installation.

WARRANTY 5 YEARS

LEM GUI

SAW FILTER PROTECTED

AUTO TUNING

Firmware rel. 1.5
Hardware rel. 5.5

MODEL		DSP20-5G
NUMBER OF INPUTS	5	1 FM; 1 BIII/DAB; 3 UHF
INPUTS FREQUENCY RANGE	MHz	FM (40... 108) BIII (170... 230) / DAB (170... 240) UHF (470... 694)
LTE PROTECTION		LTE700
SINGLE CHANNEL FILTERS		32
NUMBER OF CHANNEL PER FILTERS		1... 2
INPUT LEVEL RANGE	dBμV	FM 35... 90 - BIII/DAB 40... 110 - UHF... 45... 90
BI/FM INPUT ATTENUATOR	dB	0/-12/-24
BIII/DAB INPUT AMPLIFIER	dB	0/+20 (OFF/ON)
UHF INPUT AMPLIFIER		0/+10 (OFF/ON)
BIII/DAB - UHF INPUTS A.C.G. RANGE	dB	40 dB
DIGITAL FILTERS SELECTIVITY	dB	35 @1MHz
SELECTABLE FILTERS AMPLITUDE	MHz	6/7/8/9/10
VHF GAIN	dB	30
UHF GAIN	dB	40
OUTPUT LEVEL RANGE	dBμV	70... 90
BIII/DAB ADJUSTABLE SLOPE	dB	0... -10
UHF ADJUSTABLE SLOPE	dB	0... -5
MAX VHF-UHF OUTPUT LEVEL	dBμV	100 (IM3 DIN 45004B - 60 dBc)
MAX OUTPUT LEVEL WITH 6 MUX	dBμV	90
RETURN LOSS IN/OUT	dB	>12
USB CONNECTOR		USB 1.0 / 2.0 Type B
REMOTE POWER SUPPLY VHF-UHF		12V / 24V 100 mA
MAXIMUM CONSUMPTION		15Vcc 0,46A - 7W
OPERATING TEMPERATURE	°C	-5... 50
DIMENSIONS	mm	193 x 148 x 36

ICONS DESCRIPTION

High rejection SAW filters for optimal protection against Lte 4G and 5G interferences

In addition to the easy to use built-in LCD display, programming applications are available for PC Windows and Android devices

Self programming Auto-tuning function to scan and detect DVB-T/T2 signals from the VHF/UHF inputs and allocate a single digital filter for each transponder

DESCRIPTION OF SYMBOLS AND ELECTRICAL SAFETY

The equipment complies with the CE requirements

The equipment is designed for indoor use only

Equipment grounding terminal

This symbol indicates that the equipment complies with the safety requirements for class II equipment

To avoid the risk of electric shock, do not open the equipment.

The equipment is compliant with RoHS 2011/65EU

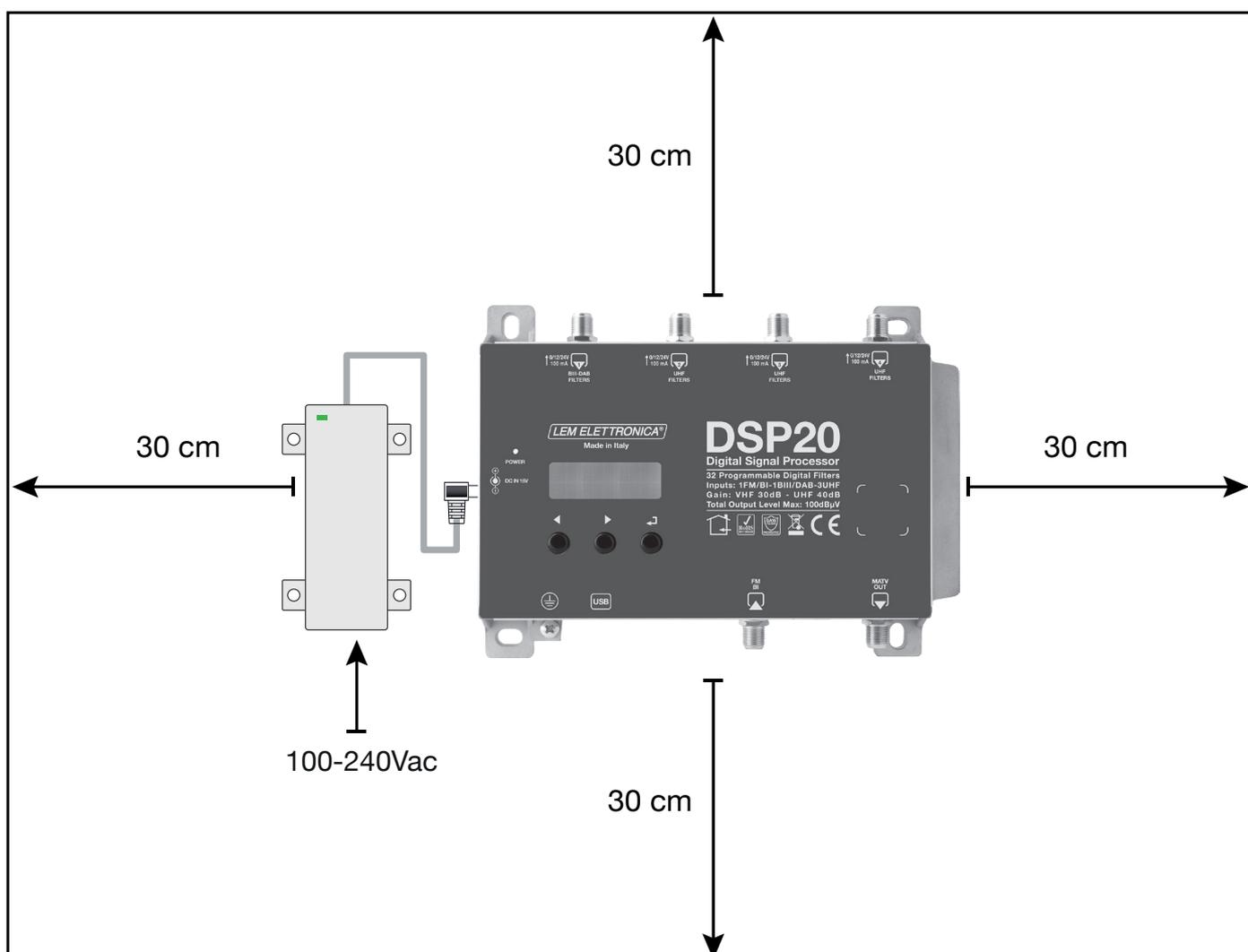Dispose according to local authorities recycling processes
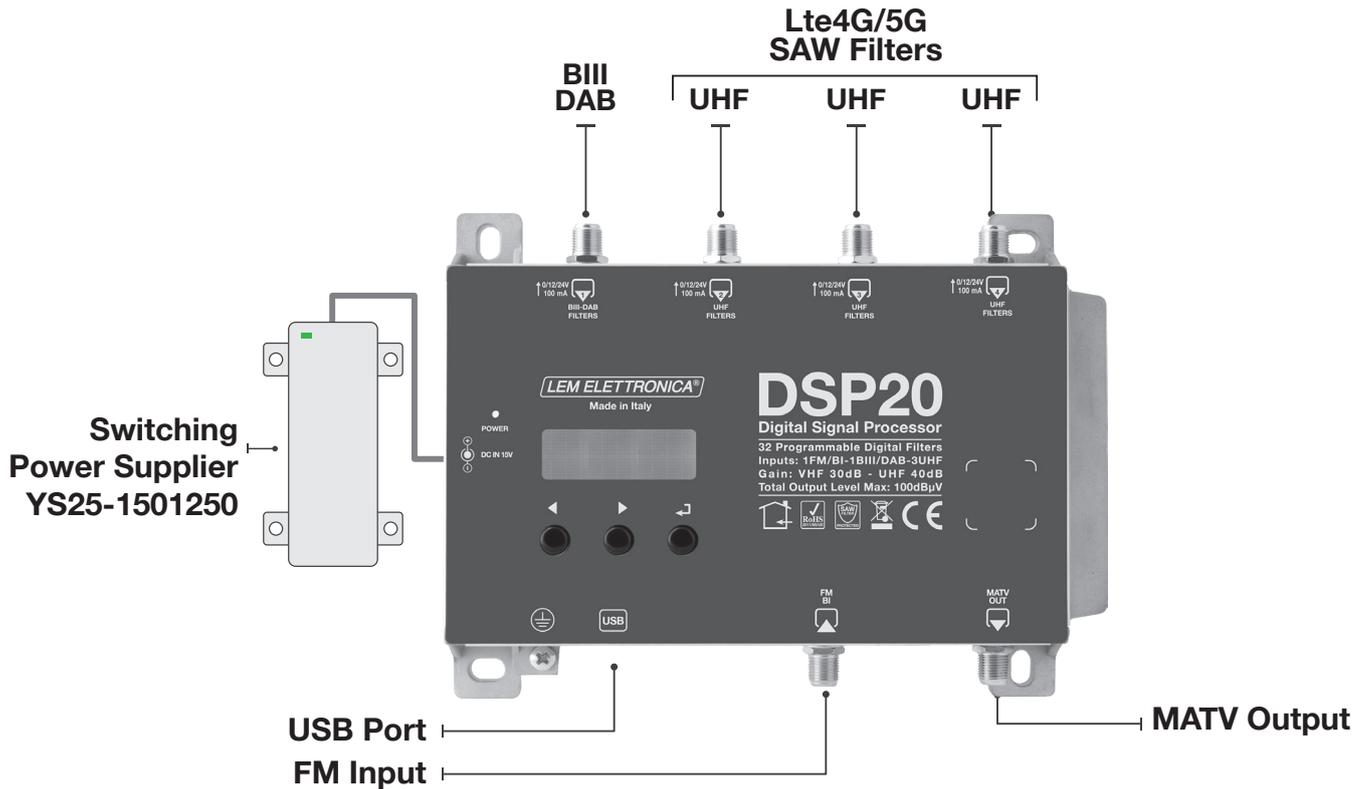
⚠ Safety instructions

1. Do not expose the amplifier to extreme temperatures.
2. Place the amplifier in a dry and well-aired location.
3. Install the unit on a vertical wall, or in a waterproof cabinet with a minimum IP55 rating, and fix it safely using the provided fixing plugs.
4. Connect the power adapter cord to a detachable power supply socket.

IMPORTANT!

Use only the power supplier YS25-1501250 provided with the amplifier. The use of non-original power suppliers determines the non-compliance of the product and can cause malfunctions and void the warranty.
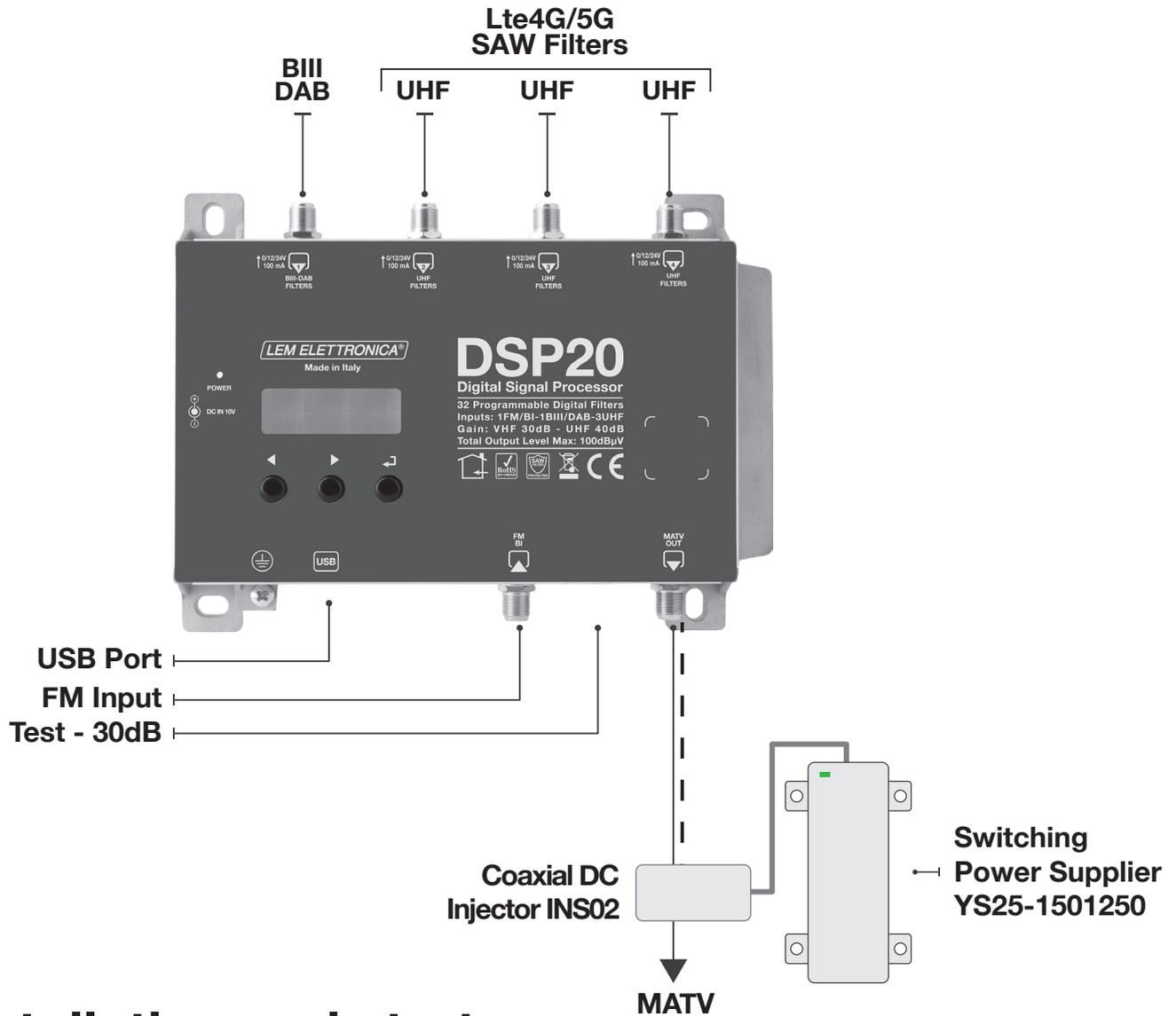
Standard Connections Schematic

Lte4G/5G
SAW Filters

BIII
DAB

UHF   UHF   UHF

↑0/12/24V   ↑0/12/24V   ↑0/12/24V   ↑0/12/24V
100 mA   100 mA   100 mA   100 mA
BIII-DAB   UHF   UHF   UHF
FILTERS   FILTERS   FILTERS   FILTERS

LEM ELETTRONICA®
Made in Italy

DSP20
Digital Signal Processor
32 Programmable Digital Filters
Inputs: 1FM/BI-1BIII/DAB-3UHF
Gain: VHF 30dB - UHF 40dB
Total Output Level Max: 100dBμV

POWER

DC IN 15V

Switching
Power Supplier
YS25-1501250

◄   ►   ↵

USB

FM
BI

MATV
OUT

USB Port
FM Input

MATV Output

Installation and start-up

1 Connect an earth wire to grounding clamp

2 Connect the TV aerial(s) to the amplifier's inputs

3 Connect the MATV output and terminate the unused inputs with 75Ω
   loads

4 Connect the power supplier unit to the **DSP20-5G** and then connect the
   power supplier to mains plug

Connections Schematic with Remote PSU

Lte4G/5G SAW Filters

BIII DAB

UHF UHF UHF

↑0/12/24V 100 mA — BIII-DAB FILTERS
↑0/12/24V 100 mA — UHF FILTERS
↑0/12/24V 100 mA — UHF FILTERS
↑0/12/24V 100 mA — UHF FILTERS

LEM ELETTRONICA® Made in Italy

POWER
DC IN 15V

◄ ► ↵

USB

FM BI

MATV OUT

DSP20
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Total Output Level Max: 100dBμV

RoHS SAW CE

USB Port
FM Input
Test - 30dB

Coaxial DC Injector INS02

Switching Power Supplier YS25-1501250

MATV

Installation and start-up

1 Connect an earth wire to grounding clamp

2 Connect the TV aerial(s) to the amplifier's inputs

3 Connect the MATV output and terminate the unused inputs with 75Ω loads

4 Connect the power supplier unit to the coaxial DC injector INS02* and then connect the power supplier to mains plug

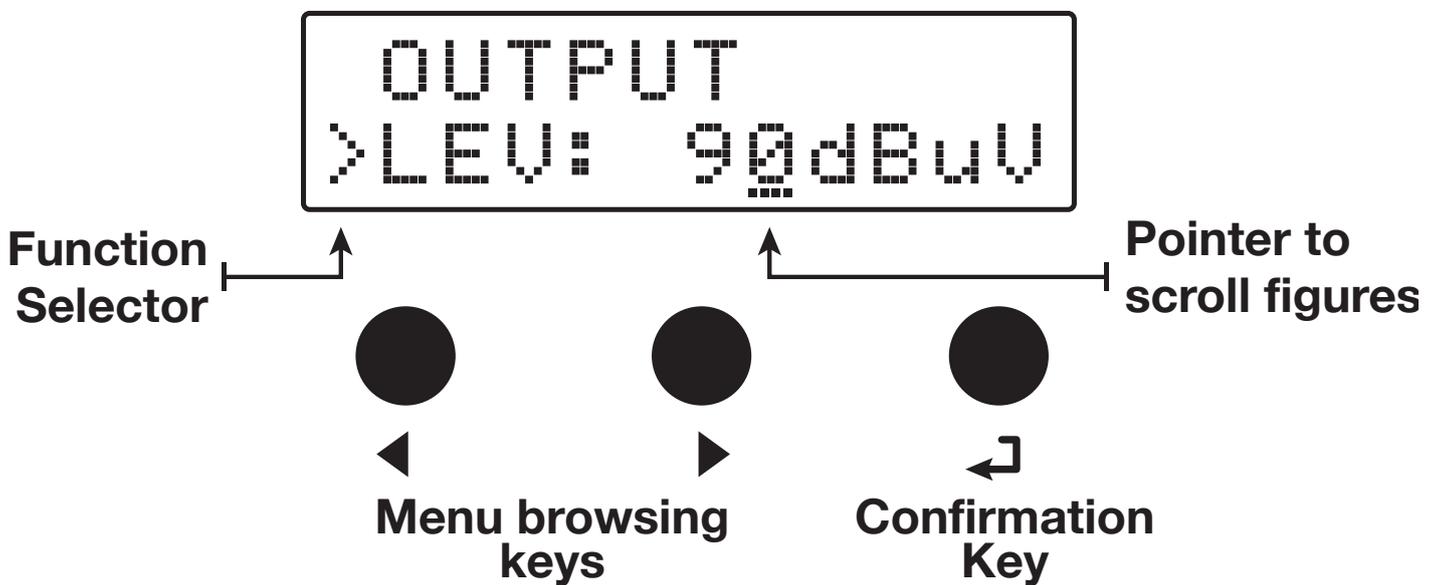*DC Coaxial Injector not included

Programming via display

1. Press ↵ to activate the display
2. Press ↵ for three seconds to enter the programming menu

```
5G
```

Note: the display will go out after 3 minutes if inactive, but the menu will remain open on the last selected function. Press any key to continue.

Display LDC 2 x 12

```
OUTPUT
>LEV:  90dBuV
```

Function Selector

Pointer to scroll figures

◄ ►
Menu browsing keys

↵
Confirmation Key

Automatic channel scan and memorization

To begin the **AUTO-TUNING** procedure connect the antenna(s) to the **DSP20-5G** inputs, then follow the operations described below.

```
TUNING
AUTO      MAN
```

To begin the automatic programming, **AUTO-TUNING,** place the pointer --- below **AUTO**. Press ↵ to proceed.

```
>DC:       12V
 DC V1:    OFF
```

Before the MUX scanning, the **DSP20-5G** requires the selection of the inputs voltage 12V or 24V and the activation, if required, of the remote powering for each input. The remote powering is required in case of active antennas or external pre-amplifiers.

```
 DC V2:    OFF
>DC V3:    ON
```

```
>THR:  55dBuV
 START
```

If necessary set up the **THR** (minimum thresold) level or leave the default 55dBµV.

```
 THR:  55dBuV
>START
```

Press again ↵ to confirm the scanning and tuning.

```
TUNING
>     >       >
```

The amplifier **DSP20-5G** will start scanning from the input [1] for BIII band and the UHF inputs [2], [3] and [4] in sequence. The scanning/tuning procedure require around two minutes.

💡 **To stop the AUTO-TUNING procedure press ↵ for 5 seconds.**

```
 OUTPUT
>LEV:  87dBuV
```

When the **AUTO-TUNING** procedure is completed the display will show the maximum output level optimized for the number of MUX automatically found and saved. Press ↵ to confirm and complete the procedure. To change the output level press the keys ◀ ▶ then press ↵ to confirm.

⚠️ **Setting higher output levels than the one obtained through the AUTO-TUNING could reduce the quality of the received signals.**

💡 **If the number of the memorized MUX is lower than expected try reducing the THR level and restart the AUTO-TUNING procedure.**

Manual programming

```
TUNING
AUTO        MAN
```

Position the pointer --- on **MAN** to start the manual programming though the ▶ key and press ↵ to continue.

💡 **Press the keys ◀ ▶ at the same time to go back to the main menu from anywhere in the INPUT menu.**

FM/BI INPUT

```
 INPUT FM/BI
```

Press ↵ to enter the menu to set the **FM** input parameters.

FM/BI ATTENUATOR

```
 INPUT FM/BI
>ATTN:    12dB
```

Adjustable 0/12/24dB

Position the function selector > on **ATTN** and press ↵ to activate the pointer ---, select the desired output level through the keys ◀ ▶ and press ↵ to confirm.

INPUT [1] VHF

```
 INPUT VHF  1
```

INPUT 1 VHF
Processable channels
Input: E5... E13 - DAB
Output: E5... 69

To set the **INPUT VHF 1** parameters press ↵ to enter the menu.

REMOTE POWER SUPPLY

```
 INPUT VHF  1
>DC :   OFF
```

Position the function selector > on **DC** and press ↵ select **ON** to enable the remote power supply from INPUT 1 VHF. Press ↵ to confirm.

The remote power supply is set on 12Volt. It can be changed to 24Volt in the ADVANCED menu.

INPUT PREAMPLIFIER

```
 DC :   OFF
>PREAMP: OFF
```

OFF= 0dB
ON= 20dB

Position the function selector > on **PREAMP** and press ↵ to activate the pointer ---, scroll the keys ◀ ▶ end select **ON** to enable the preamplifier or **OFF** to disable it and press ↵ to confirm.

SINGLE MUX FILTERING

```
   PREAMP:    ON
>ADD 1 CH
```

```
   PREAMP:    ON
>  5-> 5 L  65
```

```
   PREAMP:    ON
>  5-> 5 L  65
```

Press ◀ ▶ to position the function selector > on **ADD 1 CH** and press ↵.

To activate the filtering function on a single MUX set the desired channel through the ◀ ▶ keys, then press ↵ twice to confirm.

The L figure shows the input level of the selected MUX in dBµV.

DAB FILTER

```
   PREAMP: ON
 > VHF-DAB
```

To activate the single 65MHz DAB filter press ▶ until the figure **VHF-DAB** is shawn, then press ↵ to confirm.

MUX CONVERSION

```
   PREAMP:    ON
>  5-> 5 L  65
```

```
   PREAMP:    ON
>  5-> 8 L  65
```

To activate the filtering and conversion function on a single MUX set the desired input channel through the ◀ ▶ keys and press ↵ to confirm. Select the output channel required for the conversion through the ◀ ▶ keys then press ↵ to confirm.

Output conversions up to the UHF channel 69 are permitted.

TWO MUX FILTERING

```
   ADD 1 CH
>ADD 2 CH
```

```
   PREAMP:    ON
>  9<>10 L  65
```

To add a filter for two channels with two adjacent MUX press ▶ and select **ADD 2 CH**. Press ↵ to confirm. Select the first channel with the ◀ ▶ keys. The second channel will automatically appear in second position. Press ↵ to confirm.

FILTERS OVERLAPPING

```
   8<>  8*L  65
>10<>  8*L  70
```

The selection of two or more output filters with the same frequency is allowed but marked with *

DELETE FILTER

```
  CH DELETED
```

Position the function selector ▶ on MUX filtering or MUX conversion using ◀ ▶ then keep pressed ↵ for five seconds.

INPUT [2] UHF

```
 INPUT  UHF  2
```

INPUT 2 UHF
Processable channels
Input: 21... 48
Output: E5... 69

To set the **INPUT 2 UHF** parameters, press ↵ to enter the menu.

The same procedures described for input 1 apply for all settings.

INPUT [3] UHF

```
 INPUT   U  3
```

INPUT 3 UHF
Processable channels
Input: 21... 48
Output: E5... 69

To set the **INPUT 3 UHF** parameters, press ↵ to enter the menu.

The same procedures described for input 1 apply for all settings.

INPUT [4] UHF

```
 INPUT   U  4
```

INPUT 4 UHF
Processable channels
Input: 21... 48
Output: E5... 69

To set the **INPUT 4 UHF** parameters, press ↵ to enter the menu.

The same procedures described for input 1 apply for all settings.

OUTPUT LEVEL SELECTION

```
 OUTPUT
```

Adjustable from 70 to 90dBµV

Press ▶ to select the menu **OUTPUT** and press ↵ to confirm and check the selected output level.

```
 OUTPUT
>LEV:  85dBuV
```

To adjust the output level, press ↵ and change the figure where the pointer is positioned to the required level. Press ↵ to confirm.

UHF SLOPE

```
 LEV:  85dBuV
>SLP:    5dB
```

Adjustable from 0 to 5dB

To adjust the UHF slope select **SLP** and press ↵, press ◀ ▶ to select the required value and press ↵ to confirm.

VHF SLOPE

```
 SLP:    5dB
>VHF:- 10dB
```

Adjustable from 0 to -10dB

To adjust the VHF gain select **VHF** and press ↵, press ◀ ▶ to select the required value and press ↵ to confirm.

ADVANCED SETTINGS

```
ADVANCED
```

REMOTE POWER SUPPLY

```
ADVANCED
>DC:     12V
```

```
ADVANCED
>DC:     24V
```

Select the **DC** voltage setting function and press ↵, press the ◀ ▶ keys to select the voltage 12V or 24V then press ↵ to confirm.

PROTECTION PASSCODE

```
DC  :     12V
>PSW:    000
```

```
DC  :     12V
>PSW:    000
```

Select **PSW** and press ↵, press the ◀ ▶ keys to select the first figure from the right. Press ↵ to confirm. Repeat for the other figures and press ↵ to confirm.

FILTERS AMPLITUDE

```
PSW:     000
>BW  :   8MHz
```

Select **BW** and press ↵, press the ◀ ▶ keys to select a non standard filter bandwidth. Press ↵ to confirm.

AUTO-TUNING INPUTS THRESHOLD

```
PSW:     000
>THR:  55dBuV
```

Adj. from 45 to 90dBμV

Select **THR**, the **AUTO-TUNING** and **MONITOR** miminum threshold function and press ↵. Use the ◀ ▶ keys to select the required value and press ↵ to confirm.

FAST A.C.G.

```
THR:  55dBuV
>FAST:  OFF
```

```
THR:  55dBuV
>FAST:  ON
```

For a faster Automatic Control Gain A.C.G. action select **ON** and press ↵ to confirm.

RESET DSP20-5G

```
 THR:  55dBuV
>RESET
```

```
 RESET?
YES        NO
```

```
 RESET OK
```

To restore the default settings select **RESET** and confirm **YES** pressing ↵. The display will show **RESET OK** for a few second to confirm the operation. If you wish to skip the **RESET** select **NO** and press ↵ to confirm.

⚠ **Please note with the RESET all the programmed settings will be lost.**

MONITOR

```
 RESET
>MONIT: OFF
```

The **MONITOR** function activates a real time monitoring procedure which check that the input level of each selected MUX is greater than the entered **THR** input threshold. If the measured level of a MUX is lower than the **THR** threshold, the corresponding filters are automatically deactivated. When the input level of the deactivated MUX return above the minimum threshold level **THR** the filter will be automatically reactivated.

⚠ **Please use the MONITOR function with maximum care.**

S/N DSP20-5G

```
 RESET
>SNBR:  00001
```

Select **SNBR**. The number displayed on the right is the univocal serial number of the product.

EXIT

```
 EXIT
```

```
 EXIT
YES        NO
```

To end the programming procedure select **EXIT** and press ↵. Select **YES** to exit programming mode and press ↵ to confirm.
To carry on with the programming, select **NO** and press ↵ to confirm.

Display Error Messages

```
DC NOT VALID
```
Power Led red

Wrong power input voltage. Please check the power supplier.

```
OVERCURRENT!
```
Power Led red

Input short circuit or over current. Please check the input(s) with the remote power supply activated and remove the issue.

PC Windows Programming GUI

1. Download the latest GUI release from our website http://www.lemelettronica.it

2. Install the GUI selecting the file **Setup.exe** and follow the guided procedure step by step until the installation is completed.

Software minimum requirements

Windows 7 or more recent operating system, Microsoft Framework.NET 3.5* or higher and langpack (free download from the Microsoft website).

* In recent versions of Windows, Framework.NET 3.5 is usually already installed, otherwise Framework.NET can be freely downloaded from the Microsoft website.

Hardware requirements
PC Windows compatible with USB port.
USB A-B cable.

SmartPhone/Tablet Android Programming GUI

1. Check if your Android device supports the **USB OTG** mode. Free application like USB OTG Checker can help.

2. To connect the Android Smartphone/Tablet you need a **USB OTG** cable or adapter.

3. Download the application LEMGUI from Google play and install.

4. Switch on the **DSP20-5G** and wait **until the BOOTING** procedure is completed.

5. Connect the **DSP20-5G** to your Android device with the USB-OTG cable

6. The LEM GUI will start automatically and you will be ready to set up the **DSP20-5G.**

Label with serial and tracking data

A A 1 0 0 0 0 1 5 0 1 9 - X 1 0 2 0 L

Model	Serial #	Manuf. Week	Manuf. Year	HW Rel.	FW Rel.