

# Getting Started with front panel control



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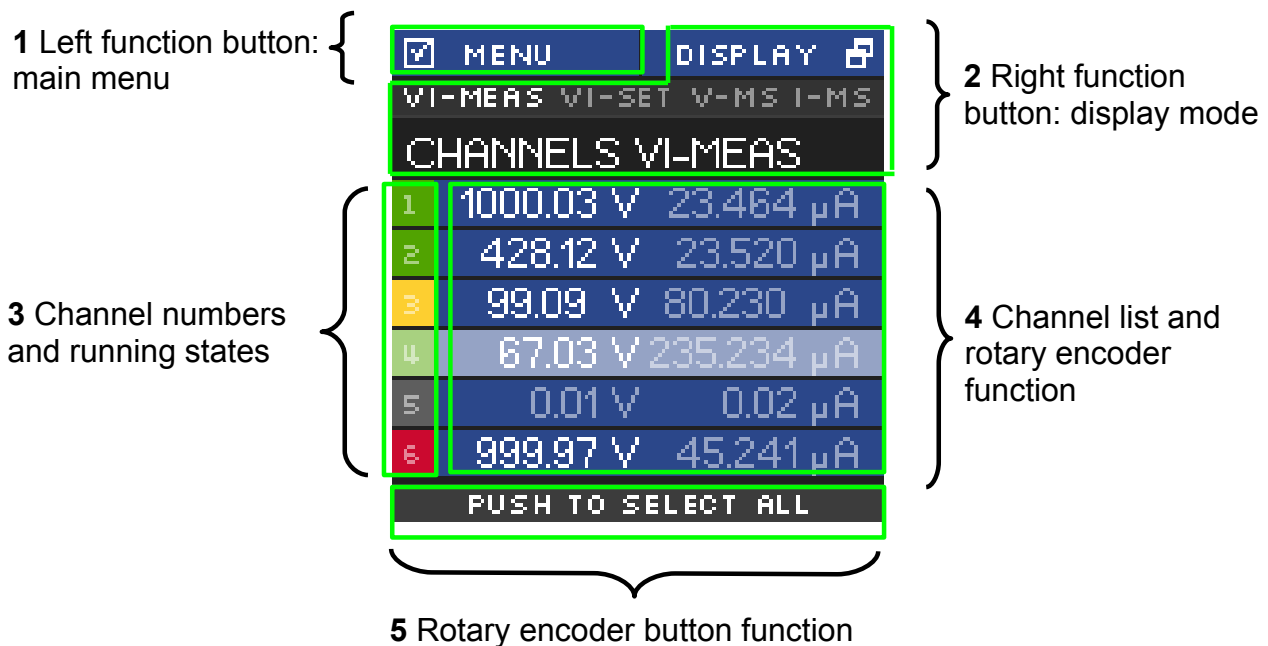
## 1 Front Panel Overview



## 2 Local Operation

### 2.1 Main Screen (Channel List)

After start up of the NHS the display will show a Main screen similar to the following image which consists of 5 elements:



#### 1. Left function button: main menu

Shows the function of the left button. If the user pushes the left button in Main screen, the display will show the Menu screen.

#### 2. Right function button: display mode

If the user pushes the right button in Main screen, the Main screen will switch to the next display mode, which is shown directly above the channel list.

Following display modes are available:

1. VI-MEAS → voltage and current – measured values
2. VI-SET → voltage and current – set values
3. V-MS → voltage – measured and set values
4. I-MS → current – measured and set values

### 3. Channel numbers and running states

This is part of the channel list (4) and shows the corresponding channel number. The background colour signals the running state of each channel. The background colours means the following:

- Black* – the channel is switched off
- Green* – the channel is switched on
- Yellow* – the channel is switched on but no regulation (CV, CC) is active
- Orange* – the channel is switched on but has unmasked error event(s)
- Red* – the channel has at least one masked error event

### 4. Rotary encoder button function

If the user presses the button of the rotary encoder, the menu will switch to the channel menu of the marked channel.

### 5. Channel list and rotary encoder function

The channel list shows - dependent on the display mode - measure and/or set values of voltage and current for each channel.

In display mode *VI-MEAS* the following can be seen:

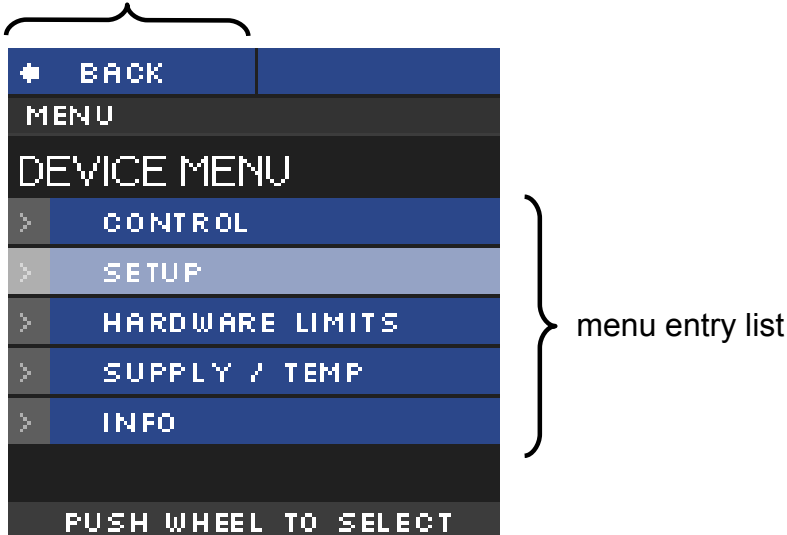
- If a channel is switched off, the values of  $V_{\text{meas}}$  and  $I_{\text{meas}}$  are grey.
- If a channel is in constant voltage regulation,  $V_{\text{meas}}$  value is white and  $I_{\text{meas}}$  value is grey
- If a channel is in constant current regulation,  $V_{\text{meas}}$  value is grey and  $I_{\text{meas}}$  value is white

The channel row which is slightly brighter (in image channel 4) is the marked channel by the rotary encoder. Turning the rotary encoder counter-clockwise will mark the channel above the current channel and turning clockwise will mark the channel below the current channel.

## 2.2 Menu Screen

By pressing the left button in Main screen, the display will switch to the Menu screen, that looks similar to the image below:

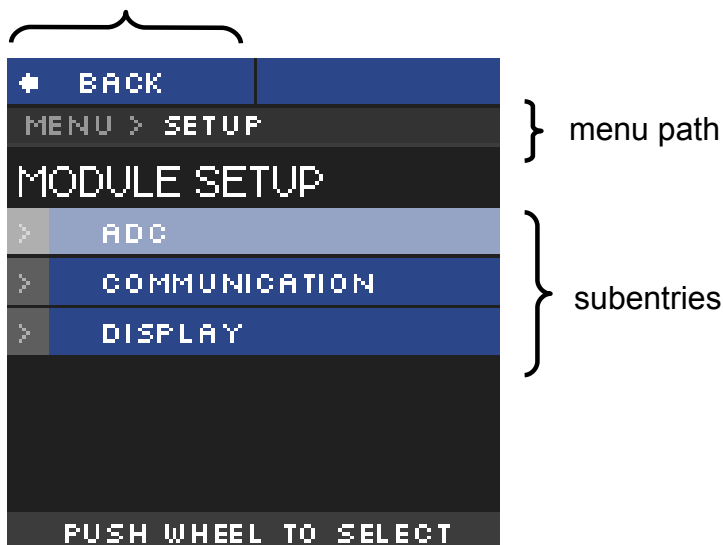
back to Main screen by pressing left button



The Menu screen shows menu entries to set up behaviour and check information of the device hardware.

To enter a menu entry, the user has to mark an entry by turning rotary encoder and then pressing the rotary encoder button. The selected entry is then shown in the menu path.

back to Menu screen



## 2.3 Menu Structure

Available Menu entries are:

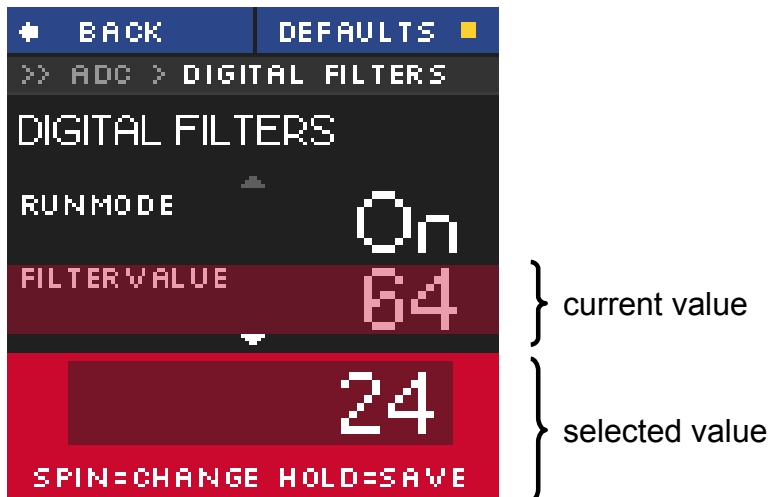
Entry	Subentry	Subentry	Content
CONTROL	VOLTAGE RAMP	-	Set voltage ramp speed
	CURRENT RAMP	-	Set current ramp speed
	CLEAR ALL EVENTS	-	Clear all events
	SET KILL ENABLE	-	Set mode Kill Enable/Disable
SETUP	MEASUREMENT	ADC SAMPLERATE	Set ADC sample rate
		DIGITAL FILTER	Set digital filter steps
	COMMUNICATION	CAN BUS BITRATE	Set CAN bus bitrate
		CAN BUS ADDRESS	Set CAN bus ID
	DISPLAY	POWER SAVE	Set display power safe mode
	RESET SET VALUES	-	Reset all set values
	FACTORY RESET	-	Reset all settings to factory default
HARDWARE LIMITS	-	-	Shows hardware limits $V_{max}$ and $I_{max}$ . This screen is automatically shown, if the hardware limits were changed.
SUPPLY / TEMP	-	-	Shows supply voltages and temperature
INFO	-	-	Shows serial number, firmware name and release, nominal voltage and current

## 2.4 Editing Menu Entries

A Menu entry that has a fixed amount of possible values can be easily edited by turning the rotary encoder, the selected value will be shown at the bottom of display screen.

A submit and save of the selected value is done by pressing the rotary encoder button.

A reset to its default value is done by pressing the right button.



A Menu entry with a none-fixed amount of values e.g. voltage ramp speed is edited a little bit different.

The selected value is also shown at the bottom of the display but with a digit hi-lighted by a cursor. A **short press** on the rotary encoder button and the cursor will jump to the next lower digit. Turning the rotary encoder changes the selected value in the resolution of the corresponding digit.

A submit and save of the selected value is done by **pressing and holding** the rotary encoder button for more than one second.



## 2.5 Channel Details

To change the set values of a channel or to monitor one single channel with larger digits, the Channel screen needs to be entered. This can be done in Main screen by turning the rotary encoder until the wished channel is marked and then pressing the rotary encoder button to select it. A screen similar to the following will be shown.

back to Main screen  
with left button

switch screen between set and  
measured values with right button



} selected screen: set or measurements

} selected channel with its running and regulation state (constant voltage / constant current)

} set (orange) or measured (white) values of voltage and current of the selected channel

## 2.6 Editing Channel Set Values

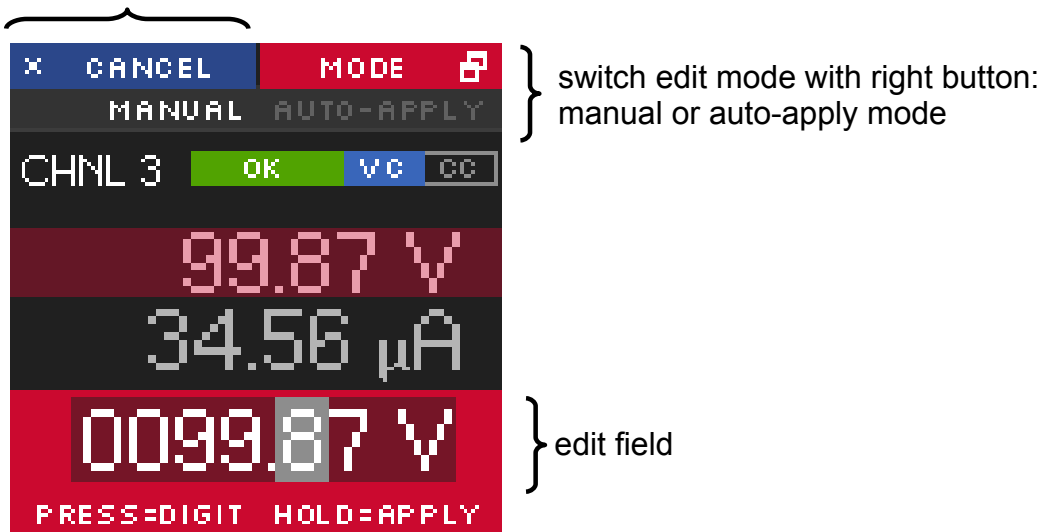
In the channel screen it is possible to edit set values of the selected channel. This is done by marking current or voltage value by turning rotary encoder and applying this by pressing the rotary encoder button. An edit field beneath the shown values will be displayed.

The edit value is shown with a digit hi-lighted by a cursor. A **short press** on the rotary encoder button and the cursor will jump to the next lower digit. Turning the rotary encoder changes the selected value in the resolution of the digit.

Submit and apply of the edit value is done by **pressing and holding** the rotary encoder button for more than one second.

There are two modes of editing available: **manual** and **auto-apply**. In manual mode, the edited value is not accepted until the user applied it with pressing and holding the rotary encoder button. In auto-apply mode the edit value is immediately accepted as turning the rotary encoder.

cancel edit with left button



## 3 Channel Switches and LEDs

For each channel of the NHS device there is one “On/Off” switch to turn the channel on and off and there are two LEDs (“OK” and “HV ON”) to signal status of the channel.

The green LED “OK” signals the general condition of the channel and the yellow LED “HV ON” signals measured output voltage at the corresponding channel or is flashing shortly every time the user presses the corresponding “On/Off” switch.

Following behaviours are possible:

LED “OK”	LED “HV ON”	Meaning
not illuminated	not illuminated	An error event occurred, the channel cannot be switched on.
not illuminated	illuminated	An error occurred but there is still a measured voltage at the channel.
illuminated	not illuminated	The channel is switched off and can be turned on.
illuminated	illuminated	The channel is turned on and there is output voltage at the channel.

## 4 Remote Control

The NHS devices offer two remote control interfaces: USB and CAN.

With the USB connector, one NHS can be controlled with the iseg SCPI instruction set. Available control applications are iseg Terminal and iseg SCPI Control. Please consider the NHS\_SCPI\_eng.pdf document for further details.

With the CAN interface connectors, up to 64 NHS devices can be controlled on one CAN line. Therefore every device has to have a unique CAN Bus address, which can be configured in the Device Menu (see chapter 2). Please consider EDCP\_MULTI\_CHANNEL\_CAN.pdf document for further details.

## 5 Safety Loop and External Inhibit

### 5.1 Safety Loop

A safety loop can be implemented via the safety loop socket (SL) on the front panel.

If the safety loop is active, then an output voltage in any channel is only present if the safety loop is closed and an external current in a range of 5 to 20 mA of any polarity is driven through the loop. The loop can be activated by removing the internal jumper. The jumper can be accessed via a ventilation slot on the bottom of the module.

If the safety loop is opened during the operation, the output voltages are shut off without ramp. Furthermore, the corresponding bits in the „ModuleStatus“ and „ModuleEventStatus“ registers are set (see EDCP\_MULTI\_CHANNEL\_CAN.pdf). After closing the loop again, the „ModuleEventStatus“ register must be reset to turn the channels on again.

## 5.2 Single channel Inhibit

Optionally it is possible to install an Inhibit for each channel via the Sub-D connector. The pin assignment is as follows:

Channel 0-5 / GND	0	1	2	3	4	5	GND		
SUB-D9 connector pin	1	2	3	6	7	8	4	5	9

Channel 0 to 5 corresponds to Pin 1 to 6 at the Sub-D connector, all other pins are connected to GND.

If an Inhibit contact pin is connected to GND for at least 100 milliseconds, an Inhibit signal is generated. The channel status bit `isExternalInhibit` and the channel event status bit `EExternalInhibit` are set. One of the following reactions to this signal can be programmed:

- No Action (default)
- Turn off the channel with ramp
- Shut down the channel without ramp
- Shut down all channels without ramp

These reactions can be programmed by the CAN interface, see chapter Delayed Trip in the `EDCP_MULTI_CHANNEL_CAN.pdf` document for reference.

When the INHIBIT is no longer active (TTL-HIGH potential or not connected), the Inhibit flag must be reset before the voltage can be switched on again (consider `EDCP_MULTI_CHANNEL_CAN.pdf` document).