BASEL PRECISION INSTRUMENTS GmbH
c/o University of Basel, Physics Department
Klingelbergstr. 82, 4056 Basel, Switzerland
www.baspi.ch; info@baspi.ch

LNHS I to V Converter
Remote Control Interface (SP 983a)

User's Manual | Revision 1.3 | May 2016

Features

- Fits to the *LNHS I to V Converter (SP 983)*
- Helpful if the I/V converter is difficult to access
- Remote control of gain and LP cut-off frequency
- Reads and displays the *Overload* LED
- Intuitive operation with a color backlighted touchscreen
- No deterioration of noise performance of the I/V converter
- Also controllable by simple ASCII-commands via serial port
- Restores the last settings at power up
- Small size (130 x 70 x 40 mm), low weight (190 g)
- 4 meters 10 pin interconnection flat cable included
- 3 meters 9 pin D-SUB RS-232 cable (1:1) included
- Wide input (100…240 VAC) wall-plug power supply included
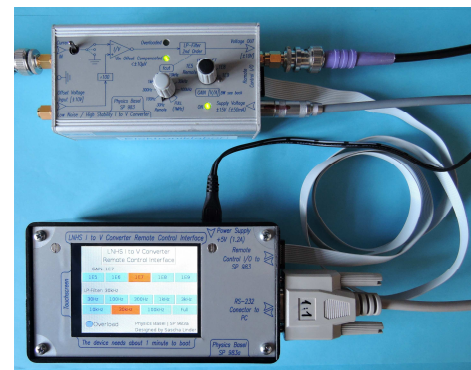
Description

To reach the best noise performance of the Low Noise High Stability (*LNHS) I to V Converter (SP 983)* it is recommended to install it as close as possible to the sample. That's why the device is often mounted directly on the break-out box on top of the cryostat. So it may be difficult to access the knobs on the front panel where the gain and the low-pass filter cut-off frequency are selected. Further the important red *Overload* LED may not be visible.
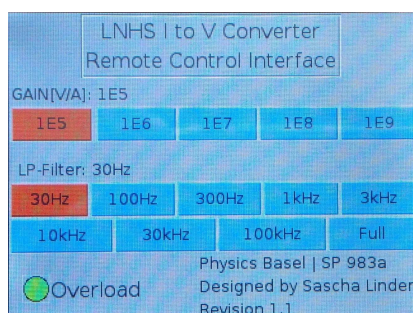

For such installations this *Remote Control Interface (SP 983a)* is a helpful device. It allows controlling the gain and the low-pass filter cut-off frequency remotely and it also displays the status of the *Overload* LED.

By pressing the corresponding field on the touchscreen (see photo on the left) the *GAIN [V/A]* and *LP-Filter* settings are remotely changed. Since the fields are on the touch screen are pretty small, the operation with the fingernail is proposed. The *Overload* indicator changes its color from green (OFF) to red (ON) if the I/V converter gets overloaded. The actual settings are periodically stored and after power up the last settings are automatically recovered. The booting of the device takes around one minute; during the booting phase the gain is set to 1E5 V/A and the cut-off frequency may varying.

In parallel to the manual touch-control of the *GAIN [V/A]* and *LP-Filter* settings the device can also communicate via a standard RS-232 serial port with a computer. By sending simple text commands (ASCII) the *GAIN* and *LP-Filter* settings can be altered and the actual settings (*GAIN, LP-Filter* and *Overload*) can be readout.

Settings and Connections
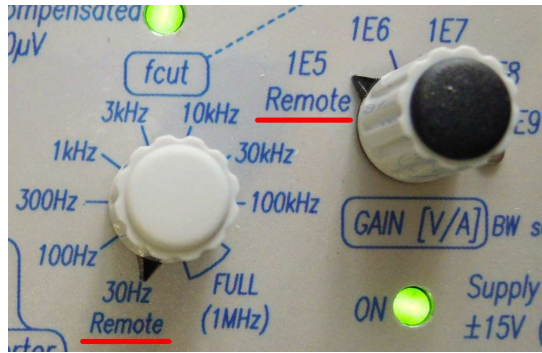
While using the remote control interface it is important that the two rotary switches on the *LNHS I to V Converter (SP 983)* are set to the position "Remote" (see photo on the left). The *GAIN [V/A]* has to be in the position "*1E5, Remote*" and the *fcut* must be set to the position "*30Hz, Remote*"; both knobs are then in its most counter-clockwise position.

If local settings (by the two rotary switches) are preferred the cable at the *Remote Control I/O connector* has to be disconnected or the remote control interface has to be turned off.

The *Remote Control I/O* connectors (10 pin) of the remote control interface and the I/V converter have to be interconnected by a 1:1 cable (see below). A 4 meter long flat interconnection cable is included and it is equipped on both sides with the suitable connectors (*Minitek 2x5P, 89947-710LF*). Note that the plugs are coded with a recess on the upper side and the connector has a central key which must be orientated to the upper side of the devices so that the flat cables leave the connectors on the top.
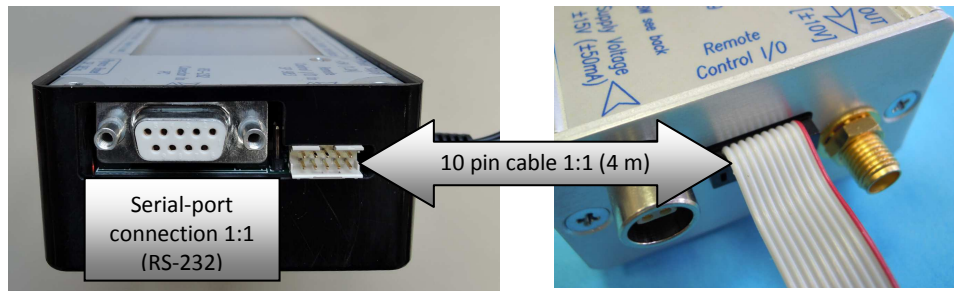
The remote control signals are galvanically isolated by optocouplers inside the *LNHS I/V Converter*. Therefore no ground-loops or interference can occur when using the remote control interface. Nevertheless, make sure that no high-frequency noise is coupled into the remote control I/O interconnection cable. Otherwise the high-frequency noise may capacitive coupling into the sensitive electronics of the I/V converter. In low-interference laboratory environment an unshielded flat cable up to a length of around 5 meters should be fine. When the remote control cable has to travel over a large distance or in a noisy environment, a shielded interconnection cable between the remote control interface and the I/V converter may be necessary.

For further information about the remote control see the datasheet of the *LNHS I/V Converter* (SP 983), chapter "11. Remote Control".

The included wide input (100…240 VAC) wall-plug power supply (HNP10I-microUSB, 5 V, 2 A) has to be connected to the remote control interface on the top right side (see left).

Make sure that the orientation of the microUSB connector and the plug are correct before connecting.

The remote control interface can be turned off by disconnecting this connector or by switching off the mains of the wall-plug power supply.

Serial Communication

Besides the manual selecting of the *GAIN [V/A]* and the *LP-Filter* cut-off frequency, the remote control interface can also communicate with a computer. The communication between the remote control interface and the computer works via a serial connection using the RS-232 standard. A 9 pin D-SUB cable with a 1:1 wiring has to be used for the interconnection. Such a cable with a length of 3 meters is included. The settings of the serial port are the following:

Baudrate = 9'600
Databits = 8
Stopbits = 1
Parity = None
Flow control = None

A simple text communication (ASCII - which is not case sensitive), is used for data transmission. Therefore a terminal program (e.g. putty, running on a PC) can be used for testing the communication. If a command cannot be correctly interpreted, the remote control interface sends a help text-string.

SET Commands

The *GAIN [V/A]* and the *LP-Filter* cut-off frequency of the I/V converter can be programmed by sending the ASCII commands "SET". Each command must be terminated by a Carriage-Return <CR> (0x0D). When the command was correctly interpreted, the remote control interface responds with an "OK" followed by a Carriage-Return <CR> (0x0D) and a Line-Feed <LF> (0xA).

To set the *GAIN [V/A]*, the following command must be used:
"SET G" followed by a <SPACE> and then the desired *GAIN [V/A]* "1E5", "1E6", "1E7", "1E8" or "1E9" ended with a <CR>.
For example, to set the *GAIN [V/A]* to 1E7 the following ASCII command must be used:
SET G 1E7 <CR>
The device responds with:
OK <CR> <LF>

To set the *LP-Filter* cut-off frequency, the following command must be used:
"SET F" followed by a <SPACE> and then the desired *LP-Filter* cut-off frequency (30Hz...Full) and ended with a <CR>. The cut-off frequency can be typed with Hz or without and the "k" is interpreted correctly. For example setting the *LP-Filter* cut-off frequency of the I/V converter to 1 kHz can be done with one of the following commands:
SET F 1000 <CR>
SET F 1000Hz <CR>
SET F 1k <CR>
SET F 1kHz <CR>
In all cases above the device responds with:
OK <CR> <LF>

To set the *LP-Filter* cut-off frequency of the I/V converter to its maximum (full) the following command must be used:
SET F FULL <CR>
The device responds with:
OK <CR> <LF>

GET Commands

By using the "GET" ASCII commands the actual settings of the I/V converter can be read out. The command must be terminated by a Carriage-Return <CR> (0x0D). When sending "GET" without a parameter the remote control interface responds with the *GAIN [V/A]*, the *LP-Filter* cut-off frequency and the status of the *Overload* LED on three separated lines; each line is terminated with a Carriage-Return <CR> (0x0D) and a Line-Feed <LF> (0xA).

For example, when the I/V converter is actually set to a GAIN *[V/A]* of 1E7 and the *LP-Filter* cut-off frequency is set to 1 kHz and the *Overload* LED is turned OFF, the "GET" command reads the following:
GET <CR>
The device responds with:
Gain: 1E7 <CR> <LF>
Filter: 1kHz <CR> <LF>
Overload: OFF <CR> <LF>

To read-out only the actual *GAIN [V/A]*, the command "GET G" must be used:
GET G <CR>
The device responds with:
Gain: 1E7 <CR> <LF>

To read-out only the actual *LP-Filter* cut-off frequency, the command "GET F" must be used:
GET F <CR>
The device responds with:
Filter: 1kHz <CR> <LF>

To read-out only the actual *Overload* status, the command "GET O" must be used:
GET O <CR>
The device responds with:
Overload: OFF <CR> <LF>

Commands Send Automatically

When a changing *Overload* status is detected, a text message is automatically send via the serial port. This allows that an attached computer can react on the *Overload* state transition and automatically changes the GAIN [V/A], for example.

When the *Overload* status changes from OFF to ON, the following message is send automatically:
Overload: ON <CR> <LF>

When the *Overload* status changes from ON to OFF, the following message is send automatically:
Overload: OFF <CR> <LF>

Background

The remote control interface is based on a single-board computer "Raspberry Pi B+" running a Linux operation system. The 2.8" touchscreen has a resolution of 320 x 240 pixels and comes from the company "Adafruit". The application of remote control interface is written in the programming language "Phyton".