Software GSV8term

Configuration software for GSV-8

Operating manual

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Software GSV-8term

The program GSV8term allows the configuration of the measuring amplifier GSV-8.

Start of the program

Start the GSV8term.exe with a double click.
Enter the COM-Port number.

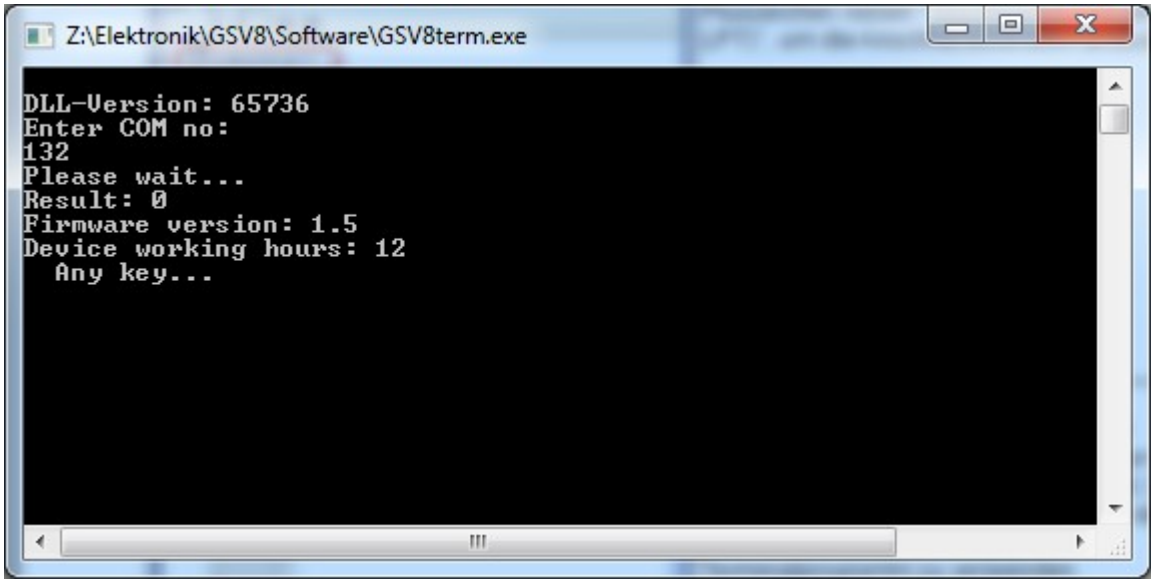

Figure 1: Program start GSV8term.exe

The Figure 1 shows the message after program start.
The Software shows status "Result" of the actions and function calls.

- Result: 0: no error, action was successfully completed.
- Result: -1: an error is occurred.
- Result: 1: no errors, action was successfully completed (with a return signal).

After pressing a button the measuring values of 8 channels are shown. (Figure 2):

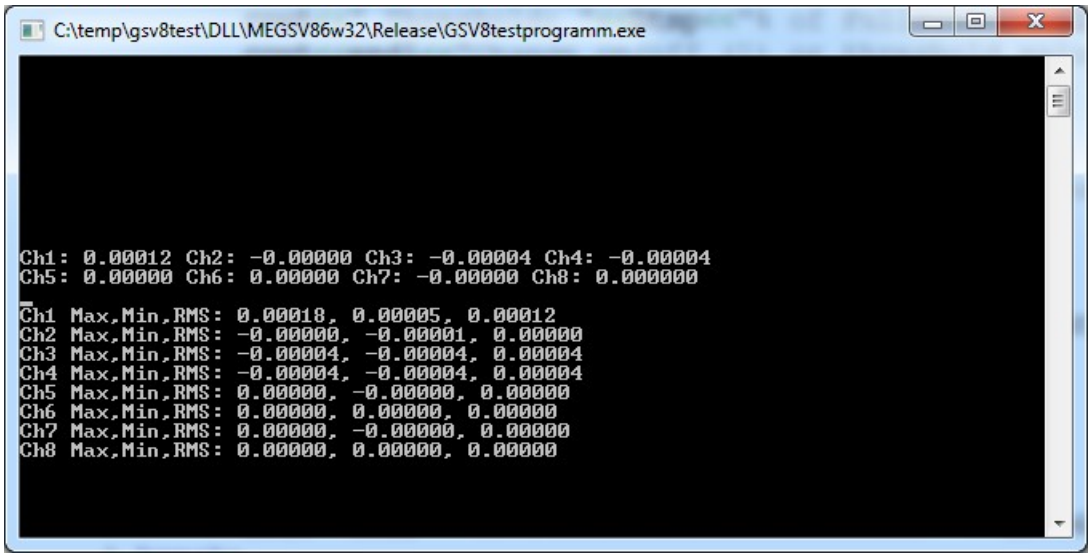

Figure 2: GSV8term: measuring values display

The first line shows the actual measuring values of the input channels 1 to 4.

The second line – of the channels 5 to 8.

The next 8 lines show for each channel maximum and minimum values as well as the root mean square (RMS). These values are determined either by 100 values (for measuring data rates < 100/s) or by a second.

Functions

Various settings can be displayed and changed by pressing following buttons:

Button	Function menu page 1
F1	operation (show this button list)
F2	Change menu page (page 1 <-> 2)
a	Settings of the analogue outputs
b	Block / unblock all write functions
c	Noise suppression in the range of the zero point
d	Settings for the digital filter
e	Error memory and user operating hour counter
f	Measuring data rate and analogue input filter
i	Type of analogue inputs

Button	Function menu page 1
j	Emulated measured value (‘calibration jump’) / measure the sensor basic detuning
k	Load the calibration matrix for the 6-axis sensor
l	Load user and manufacturer settings
m	Maximum value function for the device
n	Scaling factor for the measured value indicator
o	Digital inputs and outputs
p	Change user password / PIN
q	Exit the programm
s	Save user settings
t	Change the date format in the measured data frame
u	Unit (only saved in the device)
x	Start permanent measured data transmission (assuming it is off)
y	Stop measured data transmission
z	Zero setting

Button	Function menu page 2
F1	Operation (show this buttons list)
F2	Change menu page (page 1 <-> 2)
c	CANopen settings
i	Interface settings
q	Exit the programm

Setting the digital filter

There are two adjustable digital filters, each can be individually set for each of the 8 input channels. In the measured data signal processing chain, the FIR filter is listed first, followed by the IIR filter.

Finite impulse response filter

The FIR filter is a low pass filter with which the filter order N and the cutoff frequency fg can be set. The cutoff frequency is the frequency at which the signal is already attenuated by -3 dB. This corresponds to a factor of approx. 0.7. Frequencies lying above this will continue to be attenuated.

The filter order determines the maximum and minimum adjustable cutoff frequency fg in terms of the data rate Fa, and the steepness of the attenuation range. Higher orders have a steeper slope, i.e. an increase in the signal frequency causes the attenuation to increase faster. The so-called step response is slower at higher orders however, i.e. it always takes N+1 measured values until the filter's output value corresponds to the input value.

Order	fg/Fa min	fg/Fa max
14	0,05	0,190
12	0,06	0,225
10	0,07	0,270
8	0,09	0,340
6	0,12	0,350
4	0,18	0,410

To set the FIR-low pass filter do the following enters in the terminal program:

- enter the *d*
- enter the *channel number*,
- enter the *2*:

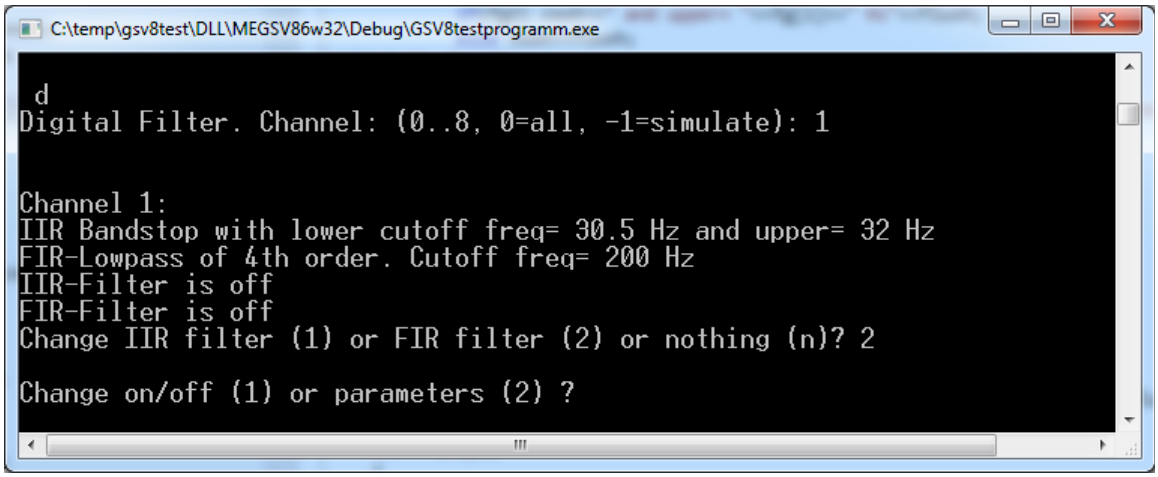

Figure 3: configure filter

By entering *1* you can switch on or off the filter. By entering *2* the limit frequency and the order can be changed.

Infinite Impulse Response Filter

The digital filter is a so-called infinite impulse response filter (IIR) of fourth order.

Four different filter types can be set:

1. Low pass filter: Sensor signals at low frequency (including DC size with f=0) pass through the filter, signals at a higher frequency are attenuated.
2. High pass filter: Sensor signals at low frequency (including DC size with f=0) are attenuated, signals at a higher frequency pass through the filter. Note: Frequencies above half of the measured data rate cannot be processed. The measuring amplifier includes an analogue-to-digital sampling system, which in itself acts as a low pass.
3. Band pass filter: Signals are allowed to pass through within a frequency range, signals which are above or below this range are attenuated.
4. Band stop filter ('Notch filter'): Signals are attenuated within a frequency range, signals which are above or below this range are allowed to pass through.

The cutoff frequency can be configured for low and high pass filters. The cutoff frequency is the frequency at which the signal is already attenuated by -3 dB. This corresponds to a factor of approx. 0.7. Frequencies lying above for low pass and lying below for high pass will continue to be attenuated.

Two cutoff frequencies can be configured for band pass and band stop filters; the upper and the lower. Attenuation by -3 dB also occurs here. The two cutoff frequencies may not be the same. Signal frequencies lying between these are allowed to pass through for the band pass filter, and are attenuated for the band stop filter.

The maximum (and also the minimum if need be) of each cutoff frequency is dependent on the measured data rate. Cutoff frequencies can be set to (0.49 * measured data rate), i.e. almost to half.

The filters can be individually configured for each channel and also switched on and off. The configuration also remains the same for filters that have been switched off.

Pressing the button d switches the device on or off and enables the device to be configured. Then enter the desired channel (1 to 8), <Enter>.

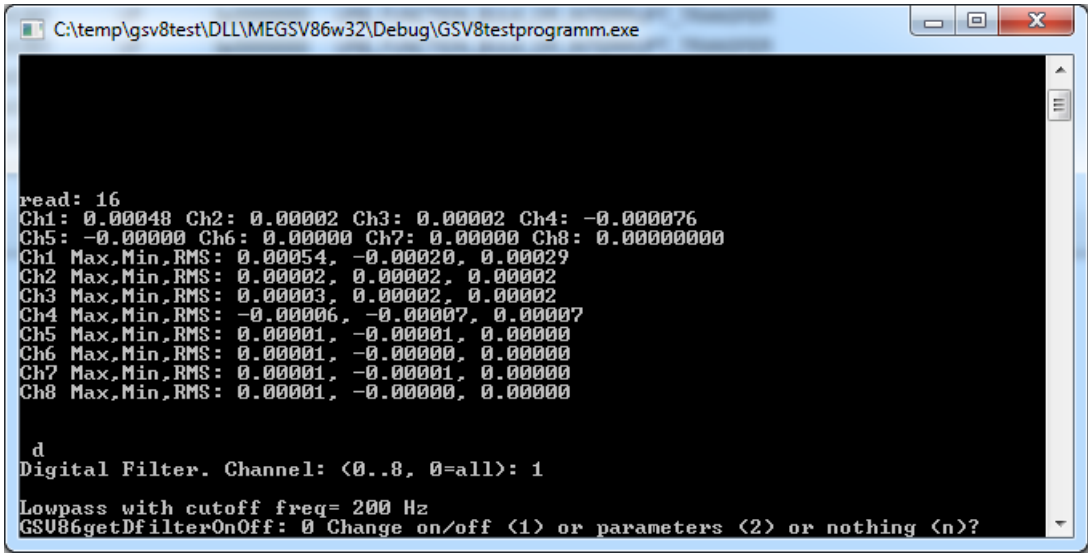

Figure 4: Switch on and off the digital filter

The filter configuration is displayed. If the filter is on, a 1 is written behind *GSV86getDfilterOnOff*, otherwise a 0 is used.

Enter button 2 to change the filter type and the limit frequency or frequencies. (Figure 5). Initially enter the filter type according to the above mentioned position number, for band stop enter 4, for example.

Only then should you enter the cutoff frequency below and then above. These lie symmetrical around the frequency to be attenuated in the band stop. If you want the network frequency to be attenuated, for example, then enter 48 and 52 Hz:

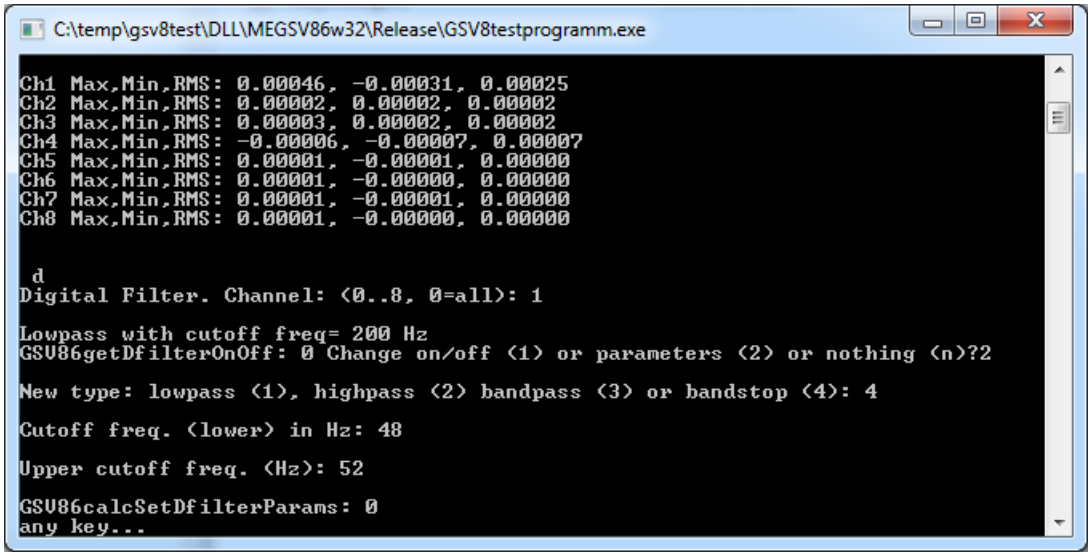

Figure 5: Filter configuration

A value of -1 shows an error.

Possible errors are:

- limit frequency fg lies outside the permissible range. This always depends on the measured data rate Fa and is (0.05 x Fa) to (0.49 x Fa) for the low pass filter, for example:

Filter type	fg/Fa min.	fg/Fa max.	technically sensible range
Low pass	0,05	0,49	0,05 bis ca. 0,3
High pass	0,0001	0,49	ca.0,005 bis 0,2
Band pass	0,0001	0,49	lower: ca.0,005 bis 0,1 upper: 0,05 bis ca. 0,3

Filter type	fg/Fa min.	fg/Fa max.	technically sensible range
Band stop	0,0001	0,49	ca.0,02 bis 0,3

- For band pass or band stop: The upper limit frequency is smaller than the lower limit frequency.

Notes:

- The limit frequency or frequencies of the filter are saved in relation to the measured data rate. If this is changed, the digital filter's absolute limit frequency changes as well.
- The above mentioned filter range can also be adjusted by changing the measured data rate. If, for example, a low pass filter with fg = 10 Hz is desired, the measured data rate can be set to <= 200/s.

Simulation of the filter

If you enter -1 instead of the channel number, it will not be possible to set the selected filter settings in the device. Instead, the program records the frequency response and/or the step response as (a) text file(s) into a file path you have chosen. The simulation is performed in the time domain in which the original GSV-8 computing algorithm is used. The result files can be displayed graphically, e.g. using a spreadsheet program.

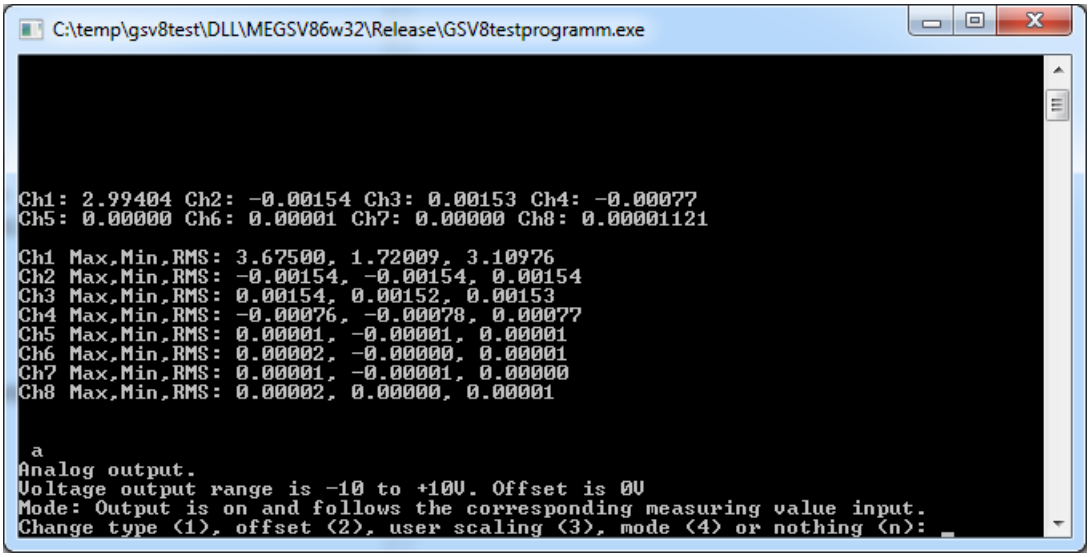

Figure 6: Configuration of the analogue output

Please enter a to configure the analogue outputs.

Now you can change the type, offset value or the scaling.

Type: The following output types can be set:

Button	Output type	Output nominal range	Display range (+5%)	Offset value (default)
1	voltage, unipolar	0 to 10V	-0,5 to 10,5V	0V
2	voltage, bipolar	-10 to +10V	-10,5 to 10,5V	0V
3	voltage, unipolar	0 to 5V	-0,25 to 5,25V	0V
4	voltage, bipolar	-5 to +5V	-5,25 to 5,25V	0V
5	current, unipolar	4 to 20 mA	3,2 to 20,8mA	4mA
6	current, unipolar	0 to 20 mA	0 to 21mA	0mA

- 0 to 10V,
- 10 to +10V,
- 0 to 5V,
- -5 to +5V,
- 4 to 20 mA.

The range increases by 5% overhead for the sensor's saturation value (this can occur when the sensor input is open, for example).

The output offset specifies the value that is outputted for a sensor signal = 0. It can be modified in a range of up to 60%. The scaling is adjusted automatically in the process so that the above mentioned nominal range is observed.

Example: If the output nominal range is 0 to 10 V, the offset point, i.e. the voltage at a sensor value of zero, should be 5 V. Button 2 and the desired offset voltage 5 are then entered:

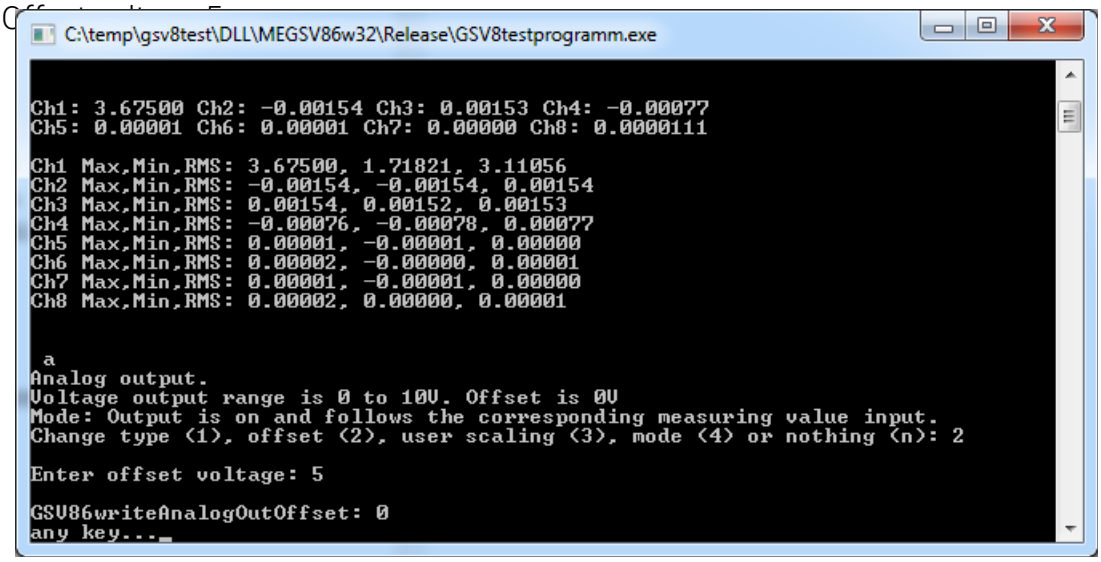

Figure 7: Offset for the analogue output

Figure 8 shows adjustment of the scaling with the button combination "*a*" and "*2*"

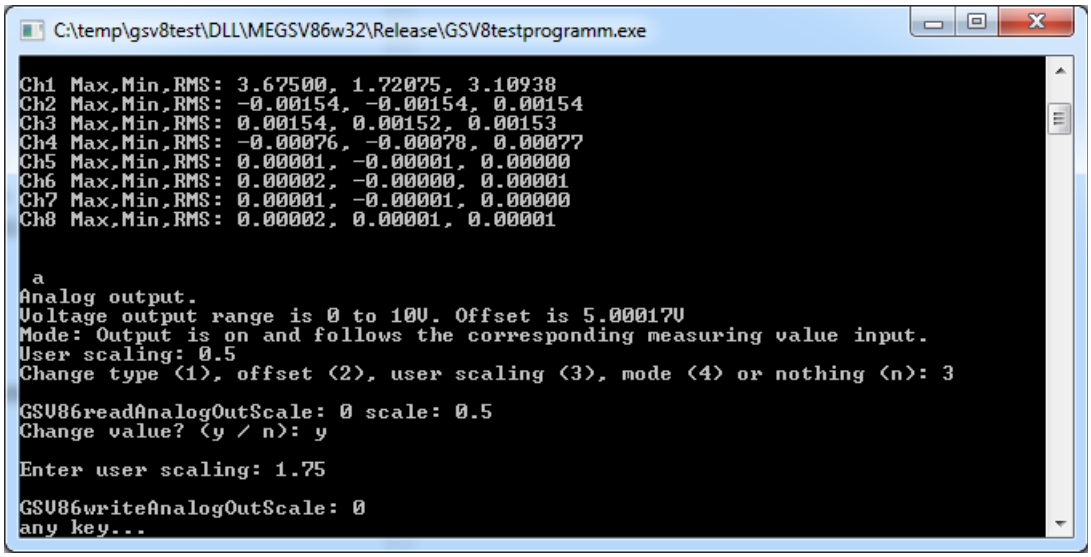

Figure 8: Scaling for the analogue output

In the example of the figure 8 an output scaling of 1.75 was chosen in order to change e.g. the real input sensitivity from 3.5 mV/V to 1 mV/V.