DOP 4

QUICK START MANUAL

Table of contents

1 Introduction 3

1.1 Purpose 3

1.2 Overview 4

2 Device Selection 5

2.1 Selecting and assigning an H&B device 6

3 Data Recording 8

3.1 Recording of sensor data (Short time) 9

3.2 Analyzing the recorded sensor data 10

3.3 Recording of sensor data (Long time) 12

3.4 Scope Functions 13

4 Accessing Dialogs 14

4.1 Dialogs from the Command Selector 14

4.2 Dialogs from the Commands View 15

4.3 Dialogs from the Main Menu 16

5 Device Calibration Walkthrough 18

1 Introduction

1.1 Purpose

The purpose of this document is to describe how to get started using the "Device Operating Program" DOP 4 Windows PC software as a tool for calibrating the H&B load cell digital amplifier devices and making detailed recordings of load cell data streamed from these H&B devices.

The "Device Operating Program" DOP 4 Windows PC software will hereafter be referred to as the DOP 4.

The detailed functionality of the different device command parameters used in the DOP 4 will not be explained in this document. The commands are described in details in other documents covering the functionalities of the different H&B devices.

By having an active internet connection to the PC running the DOP 4, it is possible to access the web pages describing the different command parameters in details.
In different areas of the DOP 4, buttons are placed to gain easy access to the command documentation web pages.

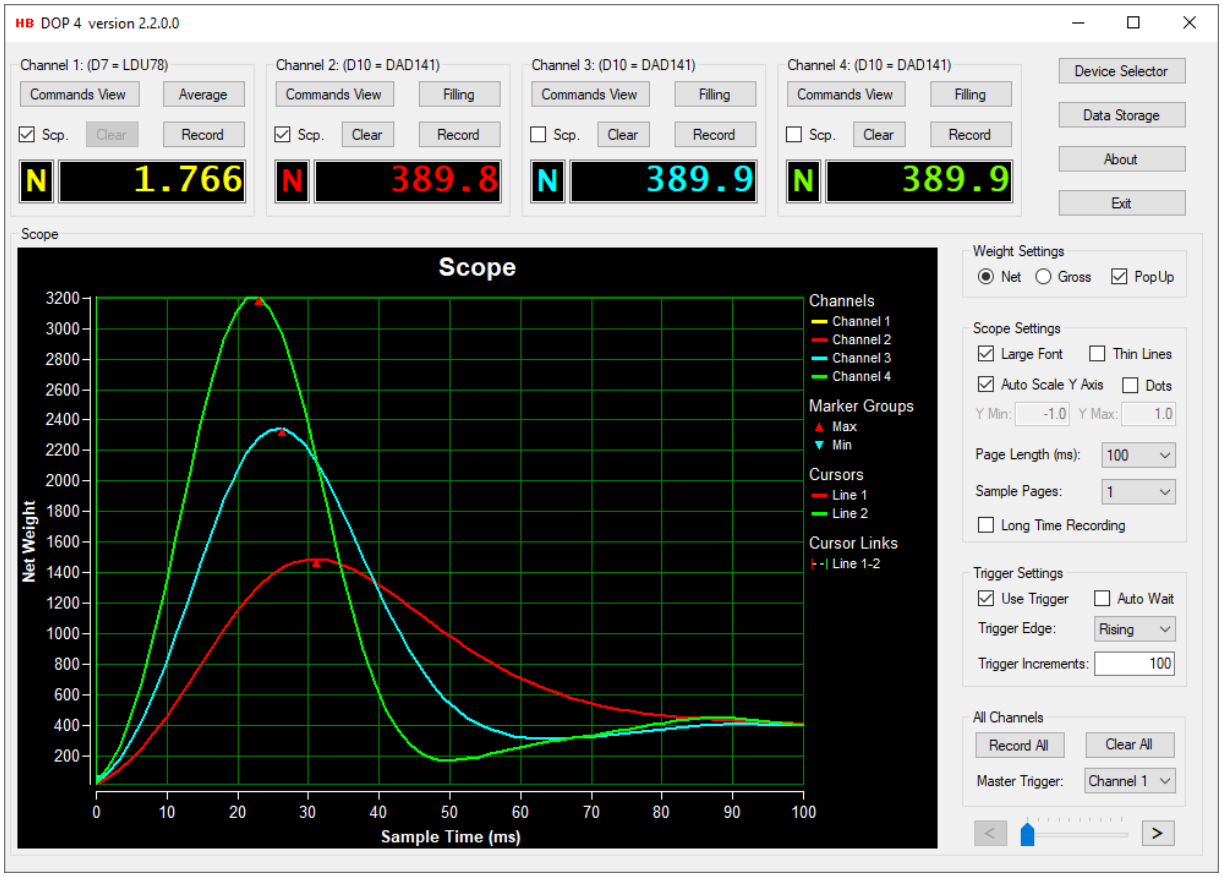
This manual is to be used as guidance for getting started using the DOP 4 and will not cover all the details on how to use the many functionalities of the DOP 4. For a detailed description of using the many dialogs of the DOP 4 it is recommended to read the "DOP 4 Users Manual" in details or simply use it as reference manual.

The DOP 4 can be used for calibration of various H&B devices and setting the values of the many command parameters covered by the different devices.

The DOP 4 can be used for recording and analyzing data of strain gauge sensors, e.g. load cells, force sensors, torque sensors or scales (using load cells). In this document we just use **sensor** as the generic term.

1.2 Overview

The DOP 4 application is a Windows PC tool for calibrating, analyzing and fine tuning measurement parameters for a number of the Hauch & Bach digital amplifier devices for weighing and force measurements, such as the DAS72.1, DAD141.1, LDM64.1, LDM88.1 and the LDU series LDU68.x, LDU69.1, LDU78.1, LDU179.1.



The main page consists of four channel groups from which recording, measurement and H&B device calibration can be controlled after one or more H&B devices are connected to the channels from the "Device Selector" dialog.

Special dialogs are available for detailed average and filling measurements.

Analyzing sensor data recordings can be done by examination of the scope object containing the graphical representation of the data recorded.

Recorded sensor data can be stored in separate files via the "Data Storage" dialog. The stored data can later on be reloaded into the scope display.

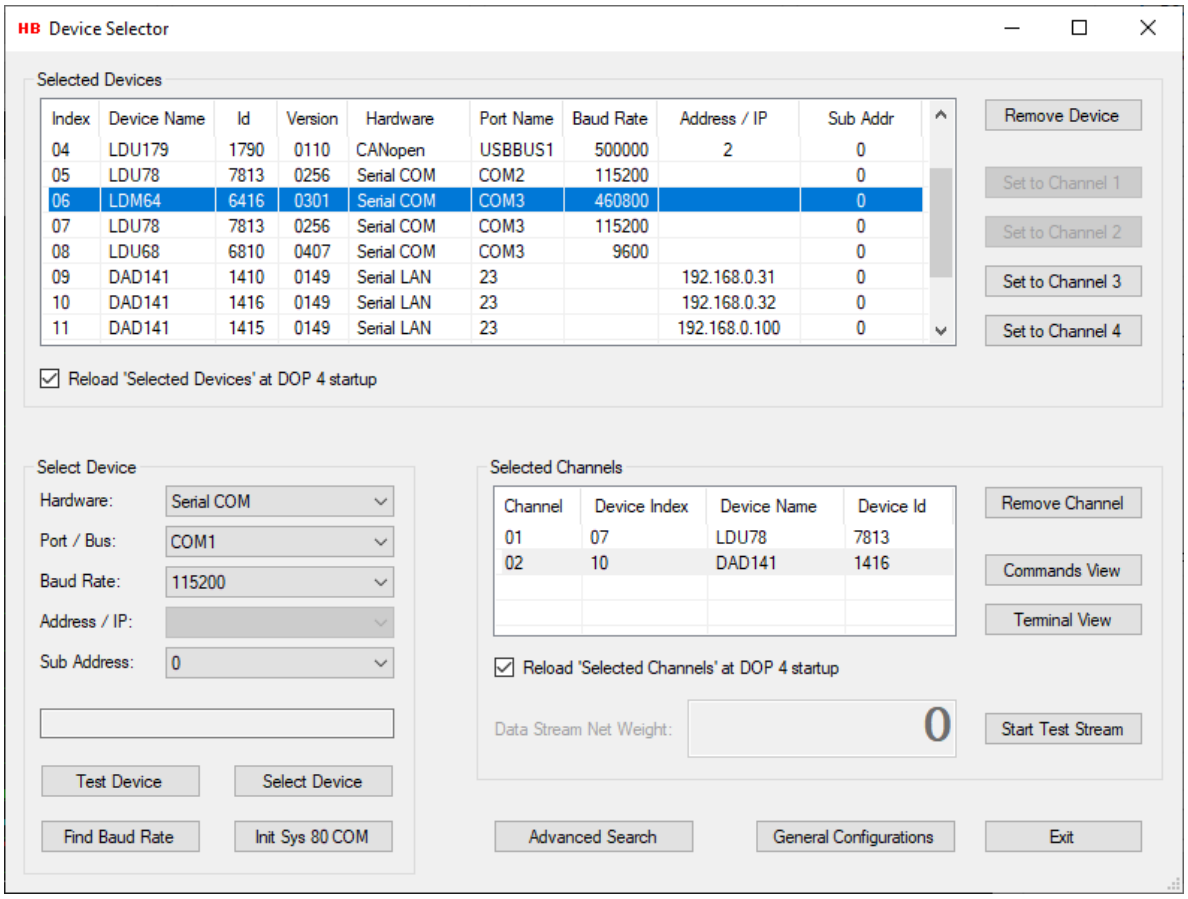
Calibration and tarring of H&B devices can be done from special "Calibration" and "Filter / Tare" dialogs.

For detail information on measuring, calibration and filtering and the description of specific dialog areas of the DOP 4 application, refer to the specific sections in the "DOP 4 Users Manual" covering these issues.

Start by selecting and assigning an H&B device to a scope display channel.

2 Device Selection

From the "Device Selector" dialog, H&B devices to be used in a DOP 4 session are selected.



Select one or more H&B devices and assign them to one or more channels to be used in the main window, calibration and measurement dialogs.

One H&B device can be assigned to one or more channels.

Up to 4 channels are available for assignment from up to four different H&B devices.

Functionality for testing H&B connections, such as:

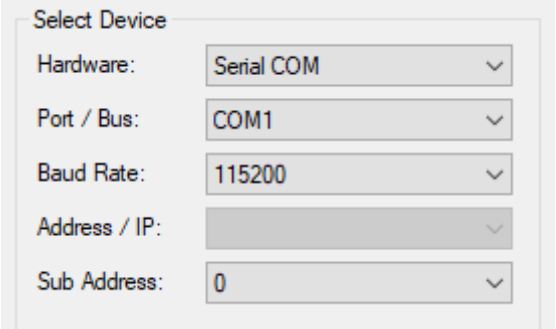
- Button "Test Device": to use in case the COM port setup / speed is known.
- Button "Find Baud Rate": to use in case the baud rate of COM port is unknown.

An Advanced Search dialog to search for connected devices by setting up different search criteria for different device interfaces is available.

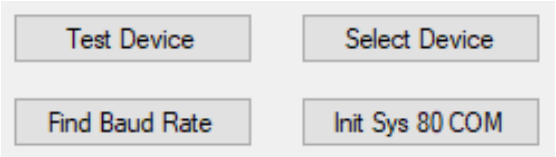
A General Configurations dialog is available for setting up Tool Tips functionality and behaviors for the application in general.

2.1 Selecting and assigning an H&B device

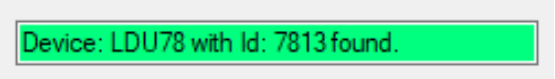
From the "Select Device" group box, select the communication parameters for communicating with an H&B device.



Select the H&B device by selecting the "Select Device" Button.



If an H&B device is found, the name and Id will be displayed in the device status text field.

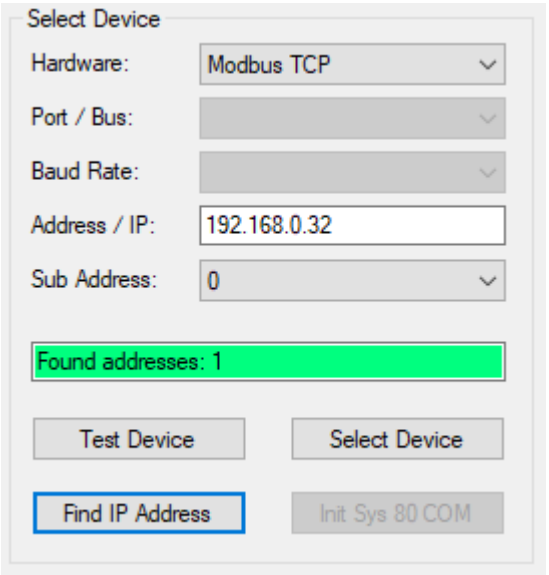


By selecting "Modbus TCP" as hardware, the button "Find IP Address" appears and replaces the "Find Baud Rate" button.

By selecting the button "Find IP Address" a search will start for IP addresses belonging to DAD141 or LDM88 devices connected to the PC via an Ethernet switch.

Found addresses will be shown in the "Address / IP" field.

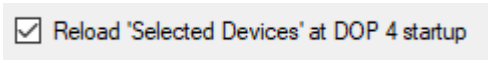
When an IP address is found, the device can be selected using "Modbus TCP" as hardware, but it's recommended that switch the hardware selection to "Serial LAN" if connected to a DAD141 device and use the serial ascii connection this selection gives.



In general, if possible, select "Serial LAN" instead of "Modbus TCP" as the serial interface has a better resolution and gives access to more special dialogs which cannot be reached with the "Modbus TCP" interface.

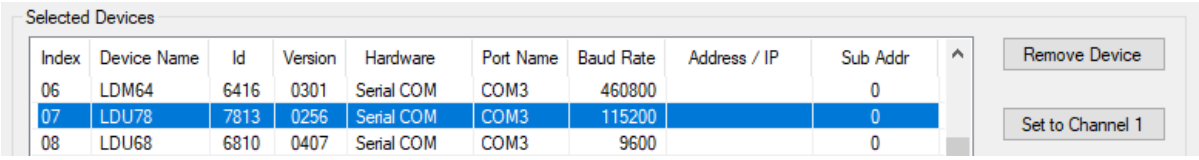
WARNING! LDM88 devices will restart doing this procedure.

When checking the "Reload 'Selected Devices' at DOP 4 startup" check box, the selected H&B device will be remembered for the next DOP 4 application startup.

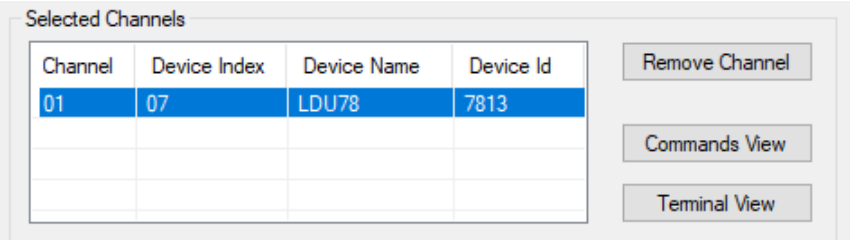


At next startup, just select a channel for the device if not already done and the "Device Selector" dialog can be exited.

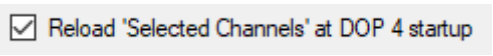
From the "Selected Devices" group box, Select one or more of the four "Set to Channel x" buttons.

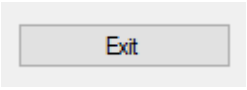


The selected H&B device and the associated channel can now be seen in the "Selected Channels" group box.



When checking the "Reload 'Selected Channels' at DOP 4 startup" check box, the selected H&B devices currently listed in the "Selected Channels" list view will be reloaded into the list view and opened, next time the DOP 4 application is started. The devices must be powered and connected to the PC.



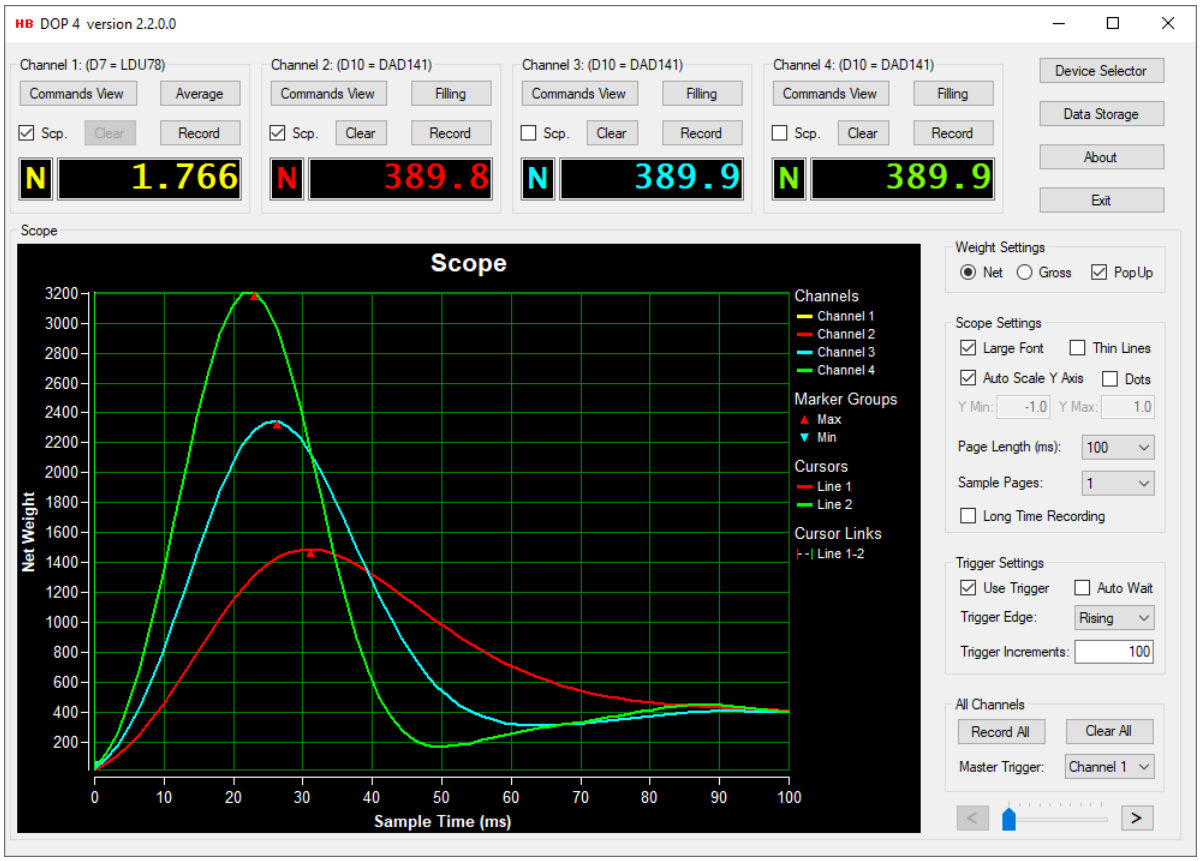


Select the "Exit" button to leave the "Device Selector dialog and enter the main menu.

The DOP 4 application is now ready for data recording and configuration for the selected device.

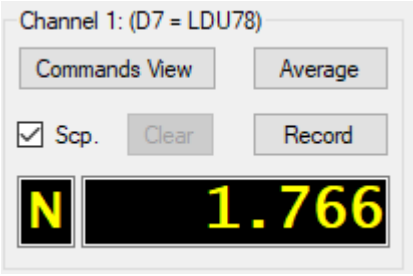
3 Data Recording

Having selected one or more H&B devices from the "Device Selector" dialog, the DOP 4 application is now ready for load cell data recording from the main menu.

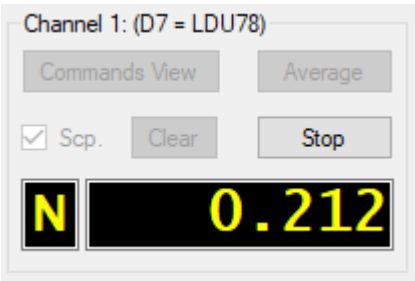


In this section some examples of recording load cell data from an H&B device will be demonstrated.

By simply selecting the "Record" button in the "Channel" group box without enabling trigger condition, the load cell data recording will start immediately and will last for the record time defined in the "Scope Settings" group box.



When the recording is started, the text of the "Record" button changes to "Stop".
Select the "Stop" button for stopping the current load cell data recording.



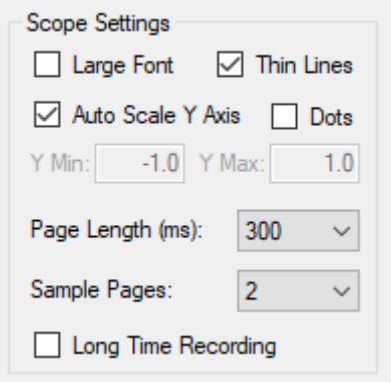
3.1 Recording of sensor data (Short time)

In this section an example of short time recording of sensor data from an H&B device will be demonstrated.
In the example we make a triggered multi page short time sensor data recording. Adjust the parameters specified in the example to your environment.

In the "Scope Settings" group box, set the value of the "Page Length" to 300 milliseconds.
Set the "Sample Pages" to 2 pages.

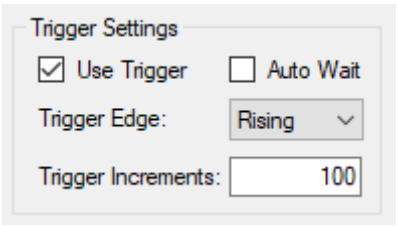
This will give a total record time of 600 milliseconds.

For "Page Lengths" larger than 10000 ms, it can be recommended to check the "Thin Lines" check box for faster scope display update when scrolling through the scope sample pages using the scope sample page arrows.



In the "Trigger Settings" group box, check the "Use Trigger" check box and set the value of the "Trigger Increments" to 100 increments or just a reachable increment value higher than the currently weight of the unloaded scale.

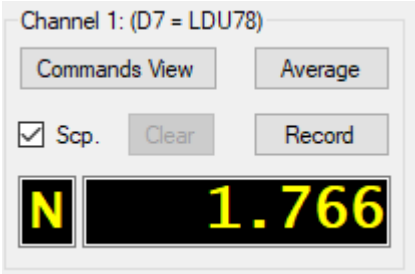
The increment value is the trigger weight on the scale without the decimal point.



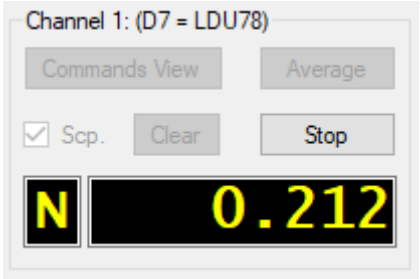
Selecting the "Record" button in the associated "Channel" group box, will start the recording session by waiting for the weight on the scale to reach the specified increments value.

Load the scale with a weight higher than the specified increments value and the displaying of recorded load cell data on the scope display will start.

The recording will in this case last for 600 milliseconds divided over two scope display pages.

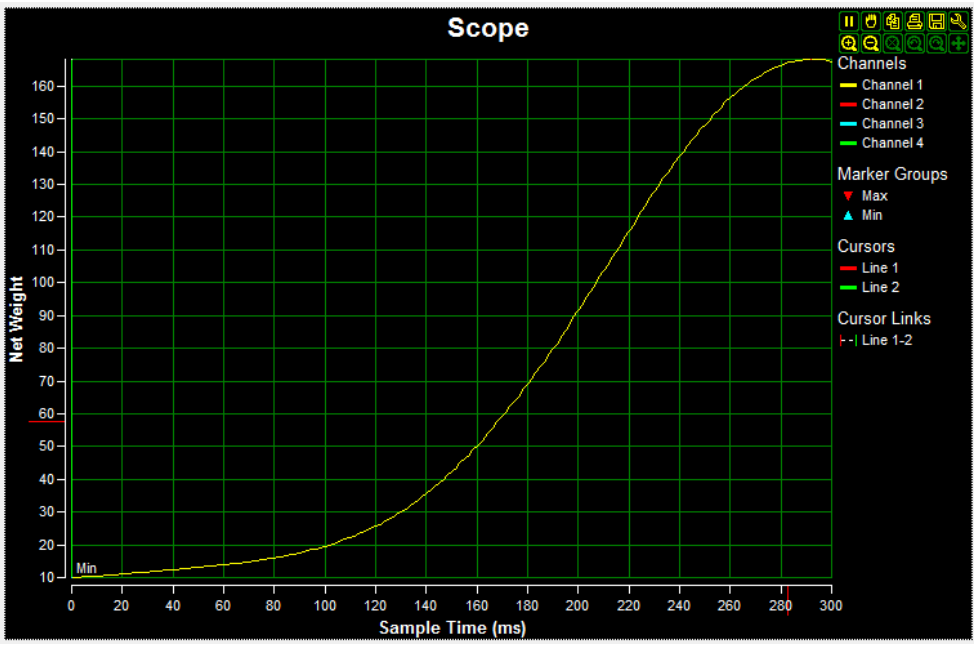


When the recording is started waiting for the trigger condition to be fulfilled, the text of the "Record" button changes to "Stop".
Select the "Stop" button for stopping the current load cell data recording before the recording stops automatic.

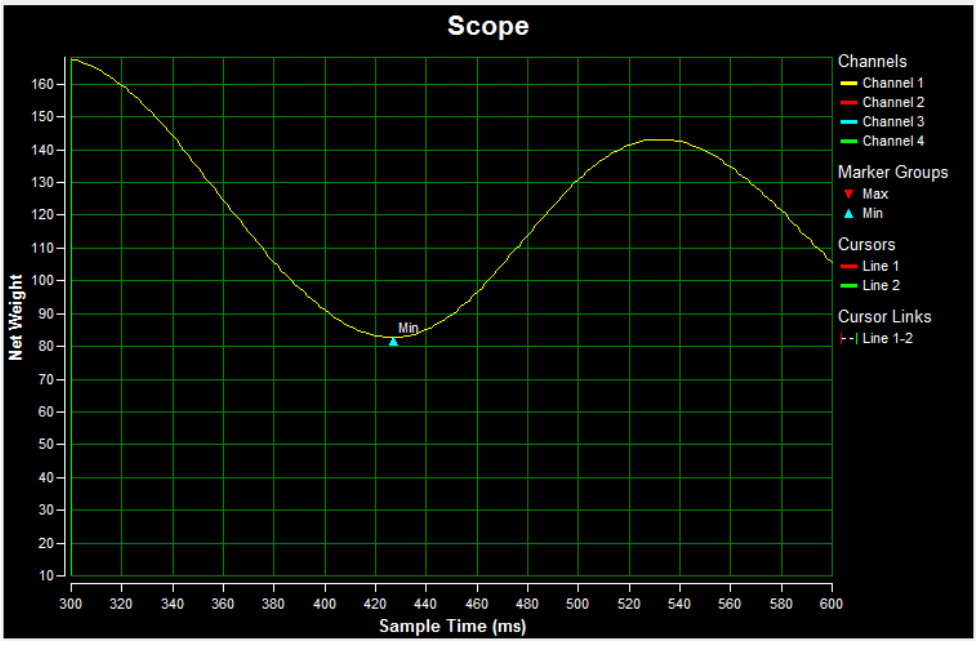


3.2 Analyzing the recorded sensor data

When the recording is done, the two scope display pages can be analyzed using the scope sample page arrows.

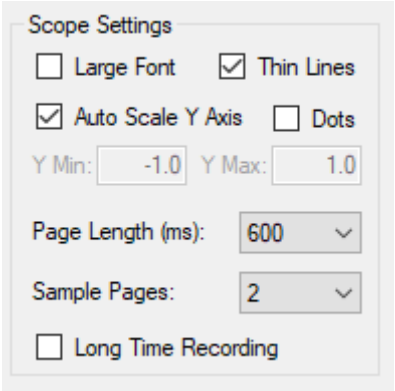


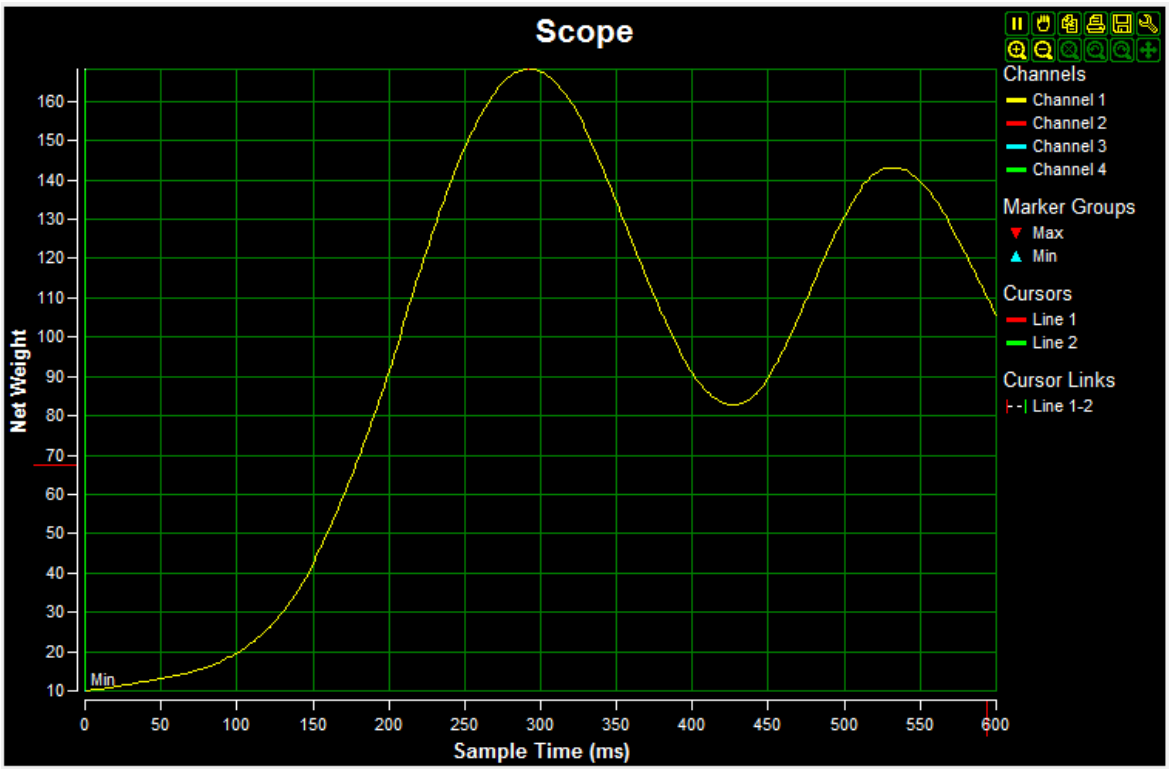
Page 1 (0...300ms)



Page 2 (300...600ms)

By changing the scope sample page length from 300 milliseconds to 600 milliseconds, the total data recording can be seen in one scope display page.

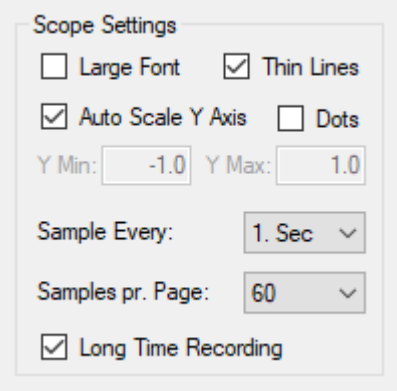




3.3 Recording of sensor data (Long time)

In this section an example of long time recording of load cell data from several H&B devices will be demonstrated by doing a multi channel recording having a recording time of 60 seconds pr scope sample page. A long time recording can only be stopped manually by selecting the "Stop" button.

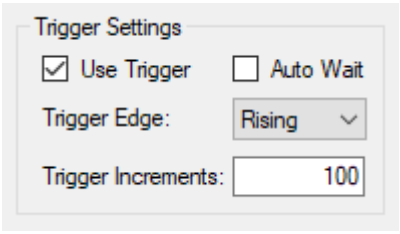
For long time recording of load cell data to the scope display, check the "Long Time Recording" check box in the "Scope Settings" group box.



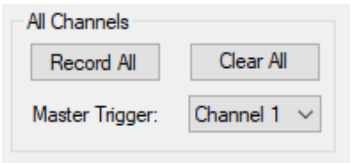
Define the sample interval for a given record session by selecting one of the preset sample interval values from the "Sample Every:" drop down box. The load cell data from the H&B device for recording will be polled by the defined time interval when the recording starts. In this case it's once every second.

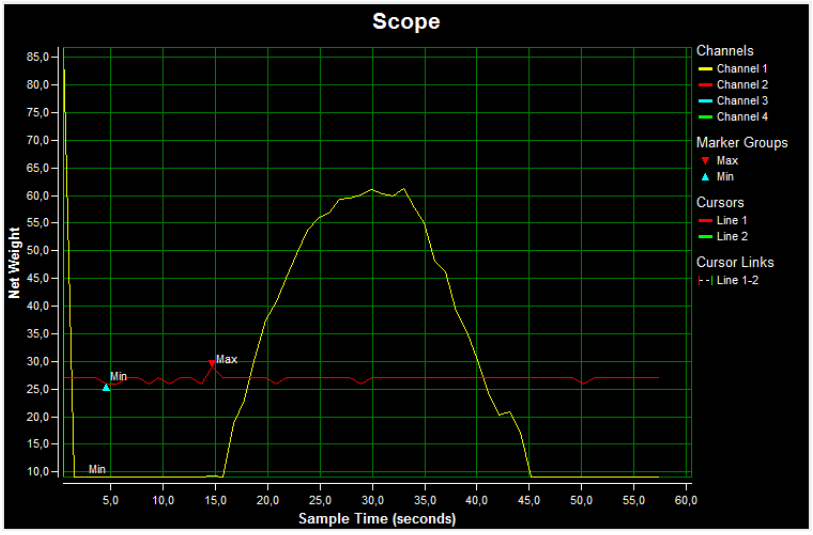
Define the number of samples per scope display page by selecting one of the preset samples per page values from the "Sample Pages" drop down box. In this case it's 60 samples per scope display page.

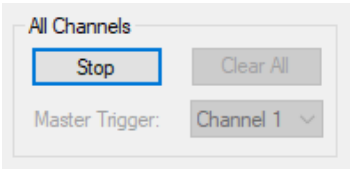
The trigger settings are as described in the short time recording example.



Start the multi device longtime recording by selecting the "Record All" button. The text of the "Record All" button will change to "Stop". By selecting the "Stop" button the current long time recording will stop.
The load cell data recording from the two participating H&B devices to the scope display will start when the trigger condition for the device assigned to channel 1 is fulfilled.





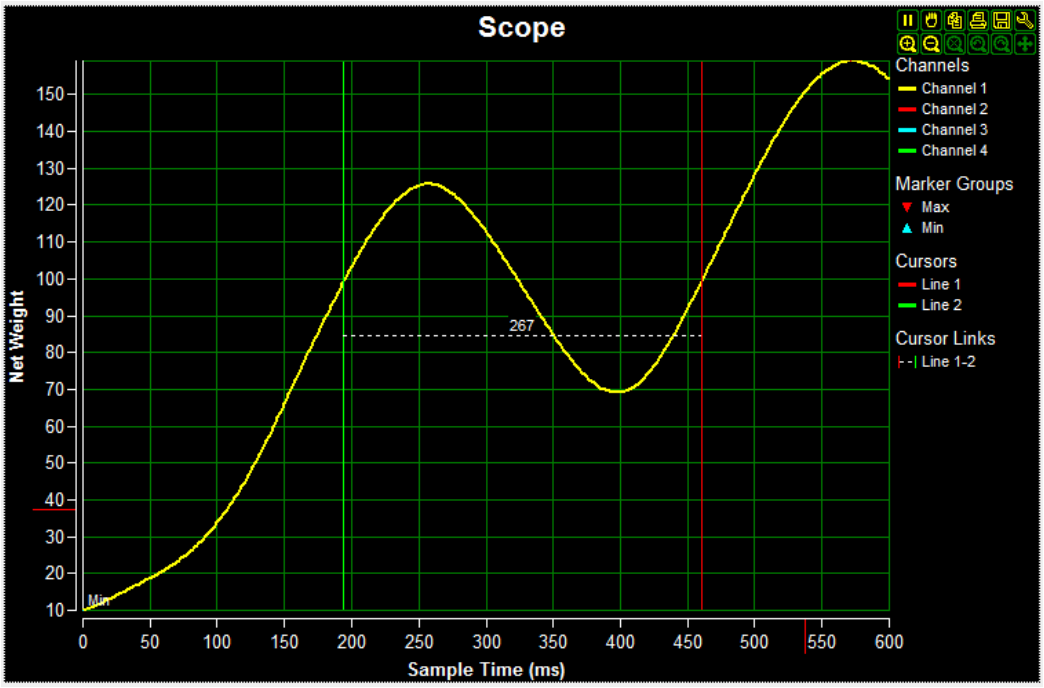


In the same way multiple recordings can be done for short time recording.

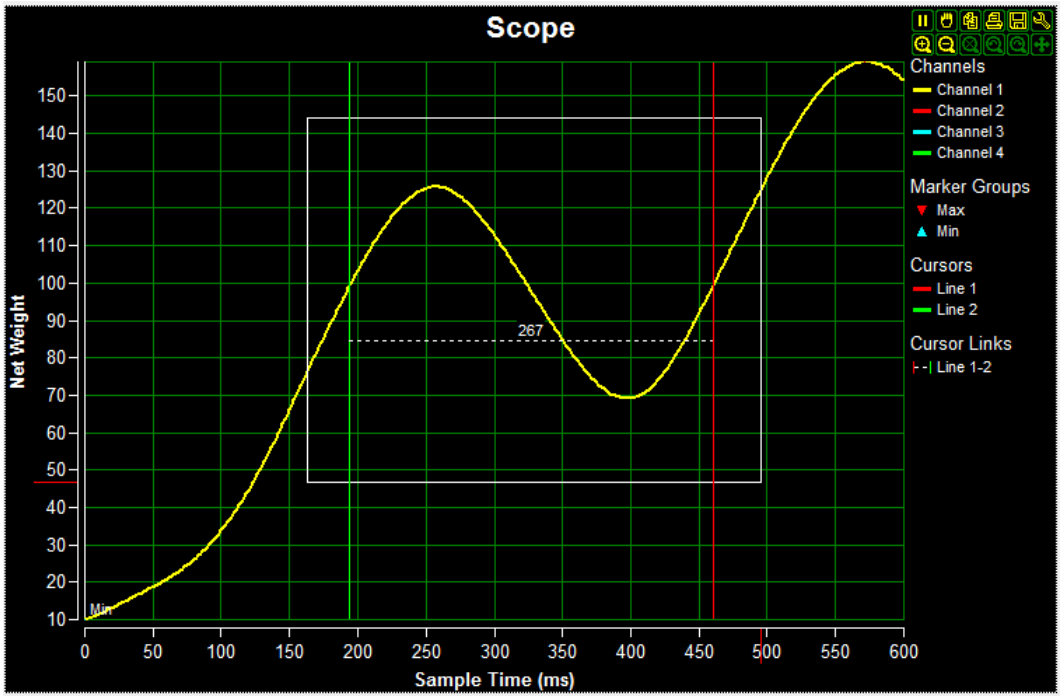
3.4 Scope Functions

In this section two interesting functions among many scope functions are mentioned.

Two cursor lines are available for measuring time distances. The two cursors are by default located on the far left side of the scope.
Use the mouse to drag the cursors from side to side on the scope display.



An area of the scope display can be zoomed by selecting the area to be zoomed using the mouse.



4 Accessing Dialogs

At different places in the DOP 4 application, there are buttons by which special dialogs can be accessed. For a detailed description of these dialogs, refer to the "DOP 4 Users Manual".

In the main menu there are several shortcut buttons by which other dialogs can be accessed.

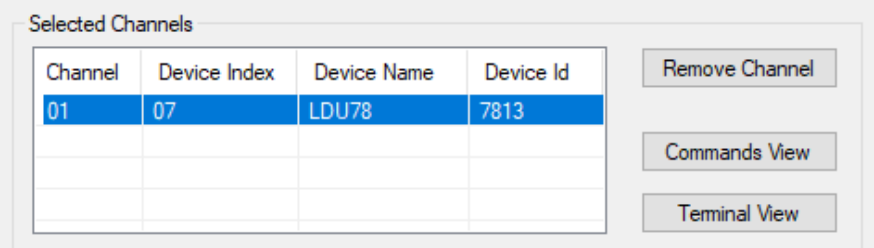
From the "Device Selector" menu, the user selects the H&B devices to be used in a DOP 4 session.

Recorded scope display data can be saved and reloaded from the "Data Storage" dialog. Stored scope data files can be loaded without any assignment of H&B devices.

4.1 Dialogs from the Command Selector

When an H&B device is assigned in the "Device Selector" dialog, there are several shortcut buttons by which other dialogs can be accessed.

In the "Commands View" dialog the commands valid for the currently selected H&B device can be examined. If a command is writeable, it is also possible to change the current value of the command.

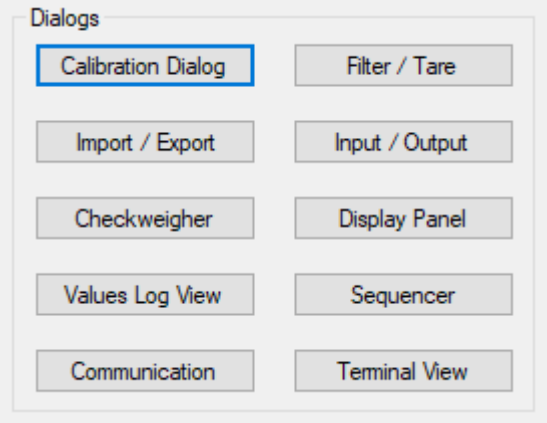


The "Terminal View" dialog is a dialog tool for sending raw parameter commands to the device and to examine the received command responses.

The "Terminal View" dialog comes in three versions, one version for devices using Serial COM and Serial LAN as communication interface, one version for devices using CANopen as communication interface and one version for devices using Modbus as communication interface.

Remark:
There is currently no "Terminal View" dialog available for the Profibus communication interface.

4.2 Dialogs from the Commands View



In the "Commands View" dialog there are several shortcut buttons by which other dialogs can be accessed.

If zero and span calibration is to be performed, or the value of the "Decimal Position", is to be changed, the special dialog "Calibration Dialog" is used.

For changing filter command values and setting tare, it's recommended that the special dialog "Filter / Tare" is used.

For exporting and importing selected command parameters to one or more H&B devices, the special dialog "Import / Export" can be used.

For changing setpoints and digital IO command parameter values and monitoring input / output values the special dialog "Input / Output" can be used.

For changing checkweigher, mass flow or filling command parameter values the special dialog "Checkweigher", "Mass Flow" or "Filling" dialog depending on the currently selected H&B device can be used.

For having a big weight display to be watched from distance, the "Display Panel" dialog can be used.

For viewing, saving or printing all of the command parameter values for the currently selected device, the "Values Log View" dialog can be used.

For defining a number of device commands to be executed in certain sequence with a defined delay between the different commands, the "Sequencer" dialog can be used.

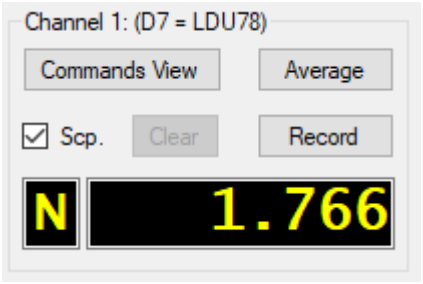
For setting up communication parameters for serial communication devices, the "Communication" dialog can be used. (Only for devices connected by Serial COM or Serial LAN interface).

For sending raw parameter commands to the device and to examine the received command responses the "Terminal View" dialog can be used.

For detailed information on how to use the different dialogs, refer to the "DOP 4 Users Manual" covering these issues.

4.3 Dialogs from the Main Menu

The main menu consists of a number of "Channel" group boxes. One or more of these "Channel" group boxes can be assigned with an H&B device.

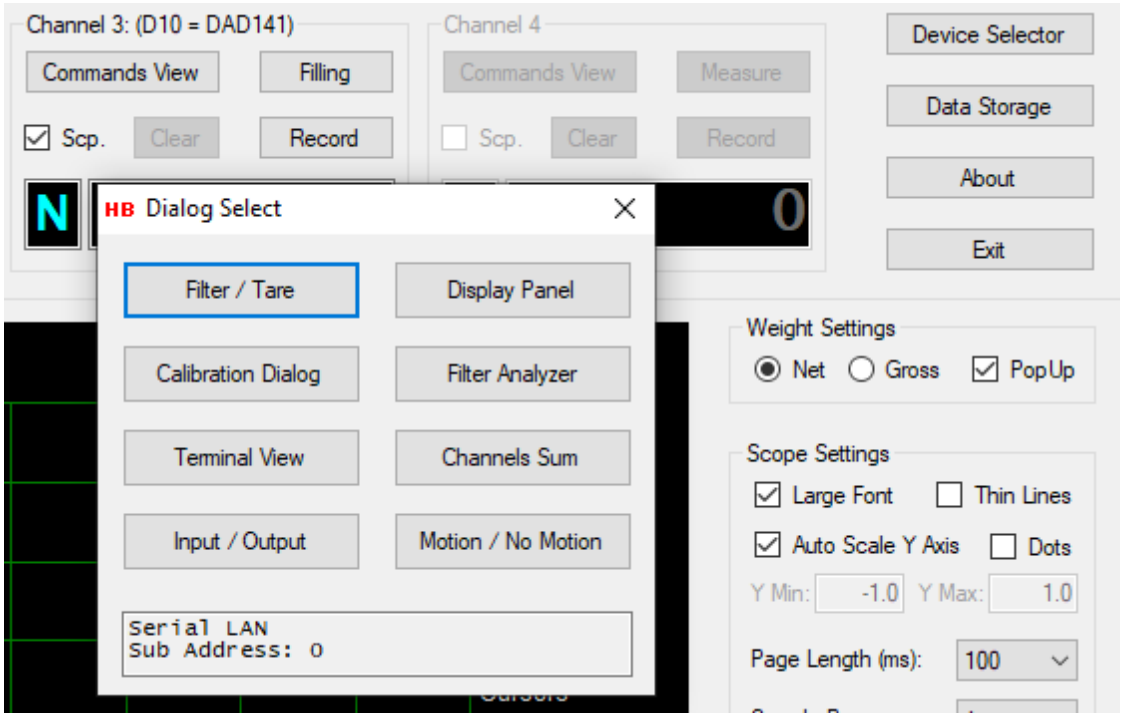


If the H&B device connected to a specific "Channel" group box supports either average dosed or mass flow measurement, the "Measure" button will be enabled and named with the current measurement type, through which the measurement dialogs can be accessed.

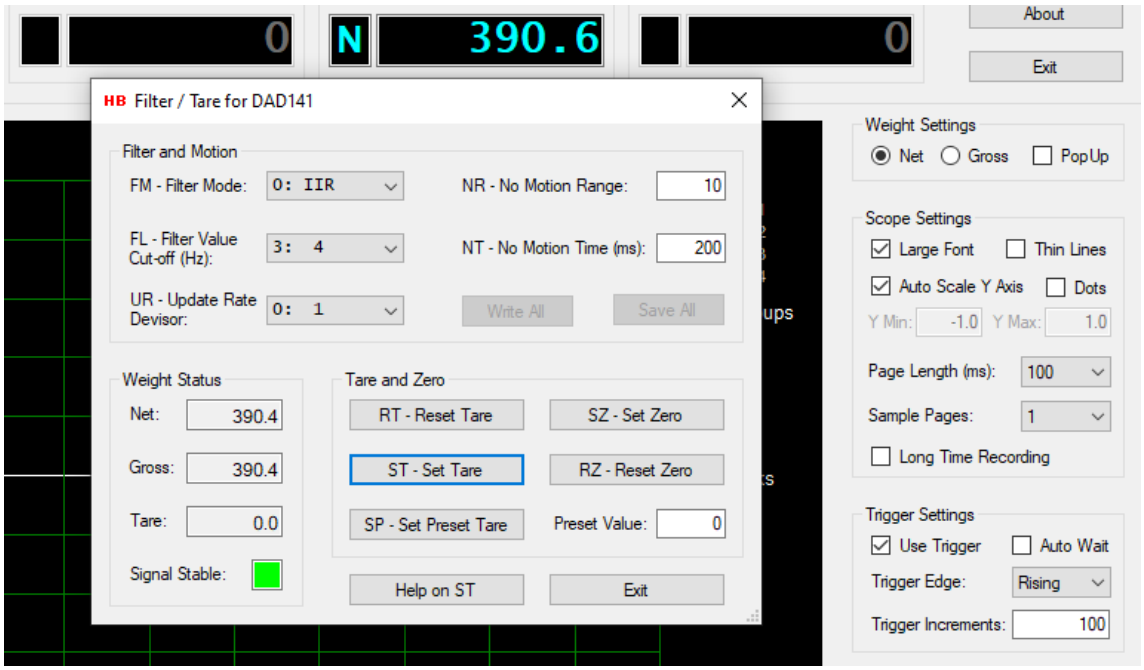
If the H&B device connected to the specific "Channel" group is loaded with "checkweigher" firmware, the "Average Measurement" dialog will be opened for the H&B device connected to the current "Channel" group box.
If the H&B device is loaded with "Filler" firmware, the "Dosed Measurement" dialog will be opened for the connected H&B device and ff the H&B device is loaded with "mass flow" firmware, the "Mass Flow Measurement" dialog will be opened for the connected H&B device.

By having the "PopUp" checkbox checked in the "Weight Settings" group box, a "Dialog Select" menu will appear when the mouse cursor is moved over an active channel weight display.

This menu will contain special dialogs which only can be accessed through the "Dialog Select"menu, so usually it's a good idea to leave the "Pop Up" checkbox checked.



By having the "PopUp" checkbox unchecked, the "Filter / Tare" dialog can be reached by left clicking the mouse, having its cursor placed over an active channel weight display.



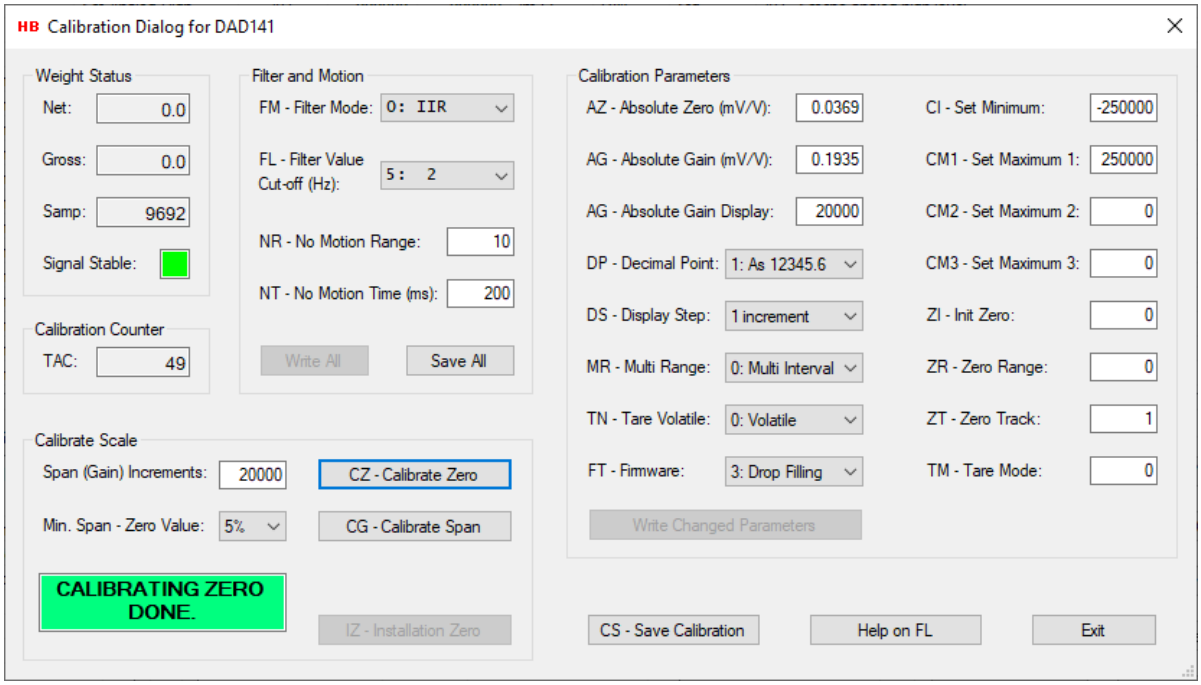
5 Device Calibration Walkthrough

This section will briefly describe the procedure for calibrating an H&B device using the "Calibration Dialog".

The "Calibration Dialog" is opened by selecting the "Calibration Dialog" button in the "Commands View" dialog or from the "Dialog Select" menu.

Please refer to the "DOP 4 Users Manual" for a more detailed explanation of the "Calibration Dialog" functionality.

IMPORTANT! When doing a calibration on devices having a "seal switch" such as the DAD141 and the LDM64 device, remember to remove the seal switch if one is present.



Before starting the calibration, be sure that the "Signal Stable" indicator is having a steady green indication when the load cell scale is in a steady state. If the "Signal Stable" indicator is red most of the time the scale is not steady enough to do a calibration.

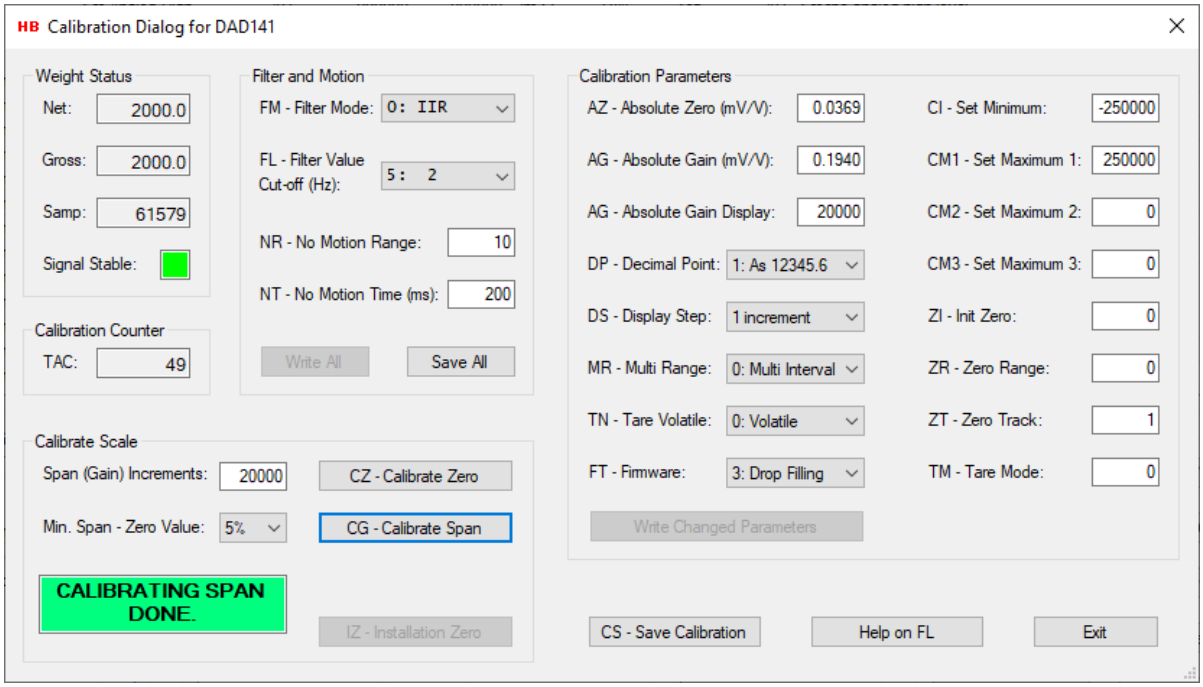
By setting the "NR – No Motion Range" to a higher value than the default value and the "NT – No Motion Time" to a lower value than the default value (ex. 10, 500) the device will be given a higher tolerance for accepting an unsteady scale as being stable.

To make the scale more stable you could also change the "FL- Filter Value" to a higher index with a lower frequency. The scale value will be steadier but it will also take longer time to get the display to a steady state when changing the weight load.

If you make the above mentioned changes in the "Filter and Motion" group box, be sure to select the "Write All" button if your changes should only be active for this power on or select the "Save All" button if the changed values should be remembered for the next power on of the device.

Now, be sure that there is no weight load on the scale and start the zero point calibration by selecting the "CZ – Calibrate Zero" button to set the zero point of the scale

A successfully zero point calibration will be indicated in the lower left of the "Calibration Dialog".



Now set the "Span (Gain) Increments" field to the same weight value as the weight by which the device is to be calibrated. The value should be entered without decimal point. The decimal point is set by selecting a value from the "DP – Decimal Point" dropdown box to be found in the "Calibration Parameters" group box.

At the same time be sure to set the "CI - Set Minimum" and "CM – Set Maximum" ("CM1 – Set Maximum 1") values to the correct range values to avoid over- and /or underflow indications. Not all devices are supporting the "CI" command.

Command parameters not supported by a given device will be disabled.

If changes are done to the parameter values in the "Calibration Parameters" group box, be sure to select the "Write Changed Parameters" button.

Now put some weight on the empty scale. The weight load must as explained earlier be the same as the value of the "Span (Gain) Increments" field without decimal point. So if you let's say put 50 Kg on the scale, the value of the "Span (Gain) Increments" field could be 50000 with the decimal point set to 3.

The weight load should be as close as possible to the actual weight load used in the daily weighing procedures and not less than 10% of typical daily ongoing weight load.

Now when the "Signal stable" indicator is green, select the "CG - Calibrate Span" button to initiate the calibration.

A successfully span calibration will be indicated in the lower left of the "Calibration Dialog".

IMPORTANT! When the calibration is done be sure to select the "CS - Save Calibration" button to save the calibration for the next power on. The internal TAC counter will be increased by this procedure.