PENKO Engineering B.V.

Your Partner for Fully Engineered Factory Solutions

How to…
Use the scope function in Pi Mach II

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Start up

Connect the device to the PC and start the program Pi Mach II. Make sure the communication settings are correct.

Click on "Scope".

The scope function is now opened and ready to use.

Scope configuration

Channels

You can set up 10 channels at the same time to scope registers, ext registers, indicators, inputs, outputs and markers. The first column is used to select what you want to scope and the second column is used to set which number you want to scope.

In the example below, channel 1 is set up to scope indicator 1.

Sample

With sample you can set the interval time in between the samples. The sample speed can be inserted in the box INTERVAL. The value is in milliseconds. 100 mean 100 milliseconds or 0.1 second. 10 samples per second are made at this speed. To attain the highest possible sampling speed, enter the value 0. Now the controller will use full speed to take samples. The speed varies per controller, from 1000 to 16000 samples per second. In case the run is not stopped manually the scope stops automatically after reaching a sample size of 100.000 samples. This for example means the following runtimes:

- 1 sample/second = (1/1)*100.000 = 27 minutes en 46 seconds

1600 samples/second = (1/1600)*100.000 = 62.5 seconds

Trigger

Select if a trigger is used. In the example below, when channel 1 is below 0 or above 50 the scoping will start.

Sequence: Set up the trigger, press start, the top right corner of the graph will say "Trigger armed". When the weight of channel 1 is lower than 0 or higher than 50 the scoping will start.

Trigger:

☑ Trigger enabled	
Trigger on Chn.	1
Lower then value	0
Higher then value	50

Info

The info box provides information of the process. It gives an overview of the size of samples, the first used sample, available samples, buffer size, sample count and sample rate.

Info:

```
Status        : 0
First         : 0
Avail         : 0
Sample Size   : 4
Buffer Size   : 2048
Sample Count  : 512
Samp/sec      : 1600
```

Basic functions

Start/Stop: Start or stop scoping.

Scroll lock/Scroll unlock: When scroll is unlocked during scoping, you can see the live data. And when the scroll is lock during scoping, you can pause the data.

Y-Scale low and high: Set the length of the Y-axle.

X-Scale low and high: Set the length of the X-axle.

Background: Set the background color for the graph.

Display grid: Select if a display grid is shown in the graph.

Start	Scroll UnLock	Y-Scale Low	0	X-Scale Low	1000	Background	Black
		Y-Scale High	2000	X-Scale High	1010	☐ Display grid	

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Read scope data
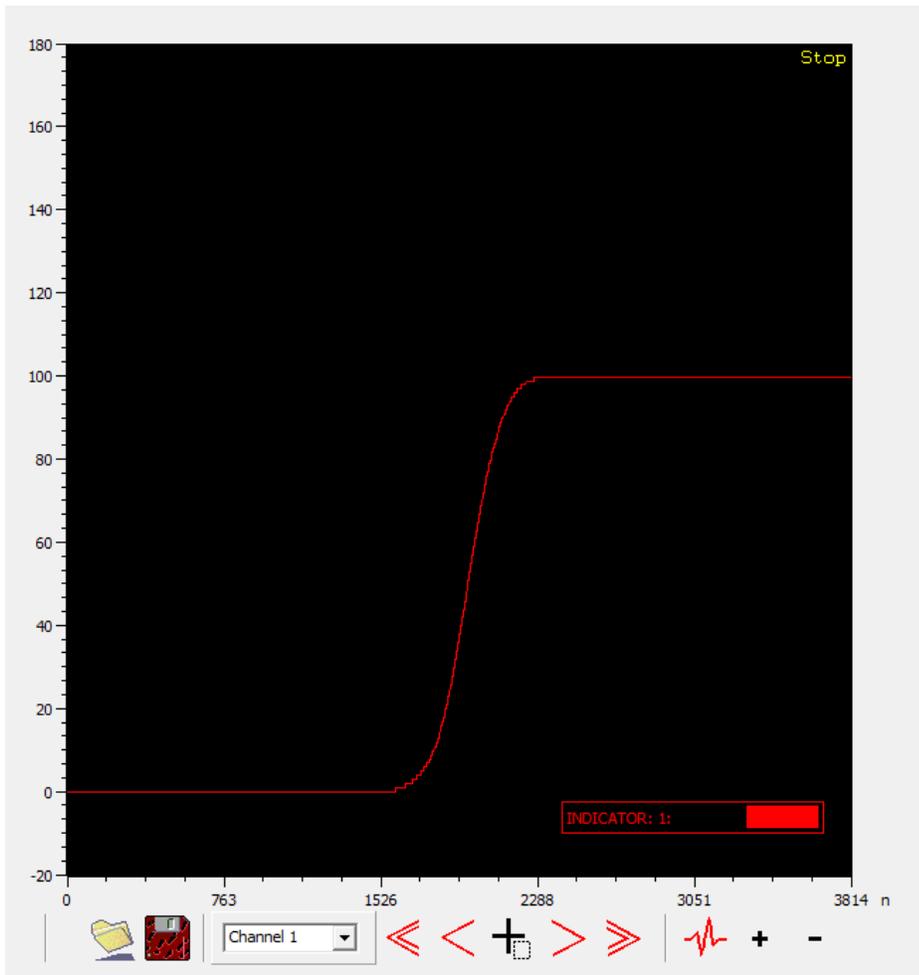
When the scoping is done, a graph is show, the following buttons can be used to interpret the data:

	Open previously saved graph, the data is stored in a CSV format.
	Save graph data in a CSV format.
Channel 1 ▾	Select channel
≪	Move cursor rapidly by 10 samples to the left
<	Move cursor by 1 sample to the left
✛	Toggle cursor
>	Move cursor by 1 sample to the right
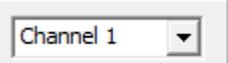
>>	Move cursor rapidly by 10 samples to the right
⌁	Scope data best fit
+	Zoom in, right mouse click has the same function
–	Zoom out, left mouse click has the same function

When the cursor is toggled on, you can view the data at any point in the graph. Use the arrows to move left or right in the graph.
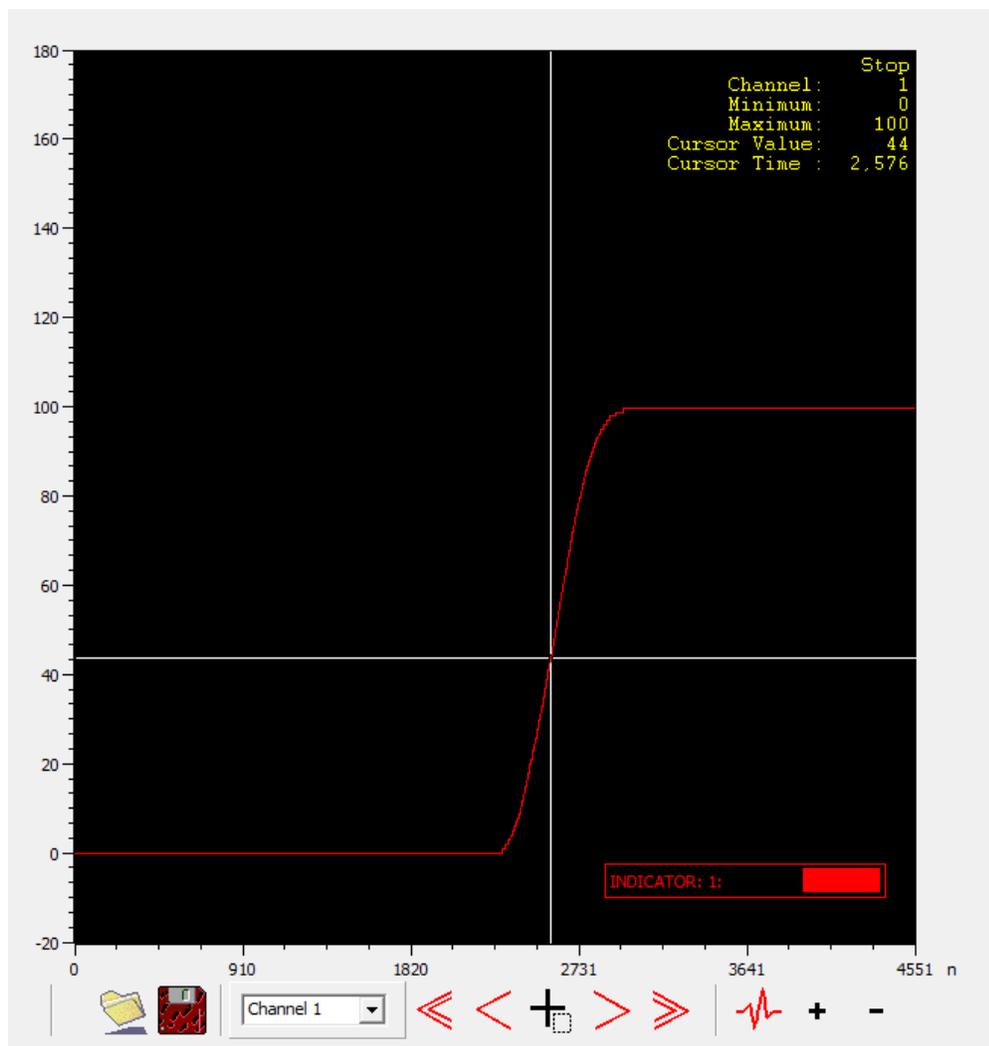
Scope filters

The scope filters will show the same graph as the original but what would have happened when 1 or more filters are used or set differently.

Sample speed

Set the sample speed of the indicator to 1000 or 1600 sample per second.

Digital Filter

Select if you want a Dynamic or static filter.

Dynamic filter: choose Dynamic filter when the weighing signal is changing fast.

Static filter: choose Static filter when the weighing signal is slowly changing.

Set the Cutoff Frequency, any frequency (that can interfere with the weighing signal) above the selected value will be filtered out.
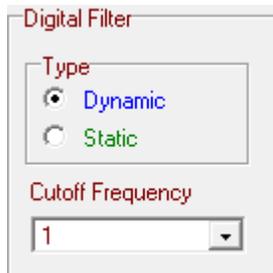
Overall filter

Select the strength of the overall damping, or switch it off completely. Set the overall filter to effect all indicator signals used in the device. Off means no effect and 7 is the strongest damping.

Frequency moving average

Set the amount of samples that will be used for the moving average.

If you have frequencies from outside the weighing unit that interfere with the weighing signal, you can filter these frequencies out by using the Moving Average filter. You can see these frequencies by using the scope function in Pi.

For example, if there are three frequencies that need to be filtered out, and those frequencies are 70Hz, 35Hz and 10Hz. Select the highest frequency that can be divided 70Hz, 35Hz and 10Hz, which is 5Hz.

5Hz is 200msec, if the Sample rate is selected to 1600 sample per sec. It means that during the 200msec it will measure 320 samples. From these 320 samples the Indicator will calculate the average and this will be the average weighing signal.

The higher the Moving Average is, the faster the Indicator is weighing.

Miscellaneous

Set a color for the new filtered graph.

Select if the previous graph will be erased.

Show new filtered graph.

Spectrum analyzer

Use spectrum analyzer to view the frequencies that may interfere with the weight signal.

> Spectrum analyzer

Below you can see an example of frequencies that may interfere with the weight signal. These frequencies can be filtered out with the Cutoff frequenties.
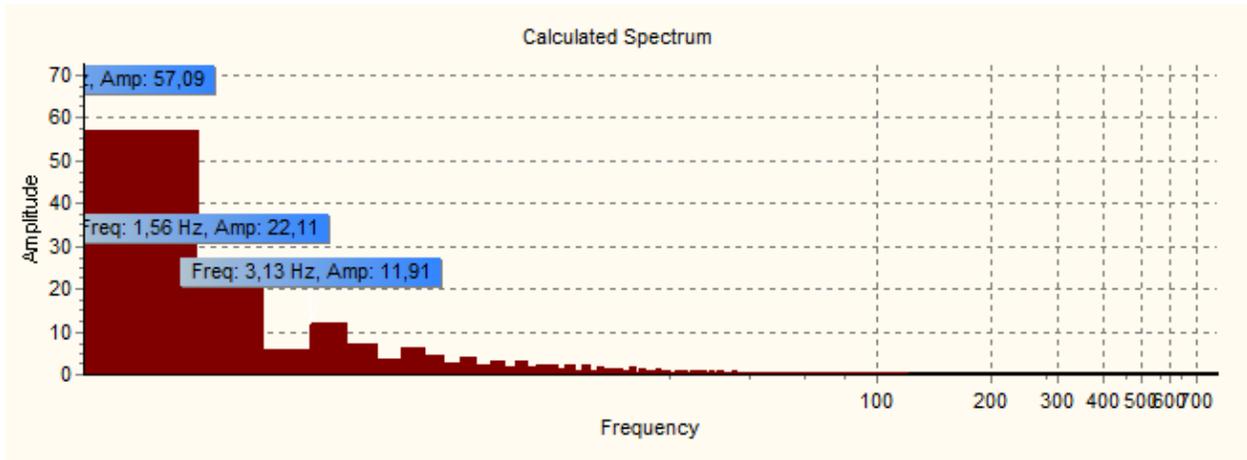
Improve the weight signal with the scope

The following figure shows how the filtering process is carried out in the controller. The unfiltered signal passes through a general filter with damping factors 1-10 and then goes through a digital filter. The end result is suitable to control the weighing process.
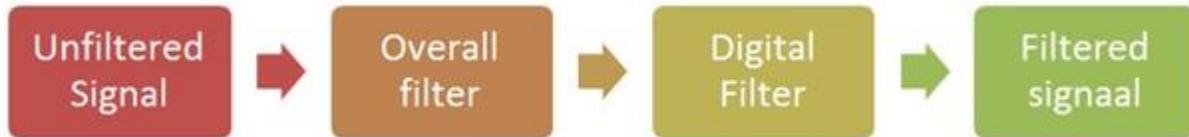
The general filter and the digital filter can be simulated by setting the parameters equal to those of the actual parameters in the controller.

In the example below we see an example what happens when the weight of 10 kg is placed on the scale without any filters:
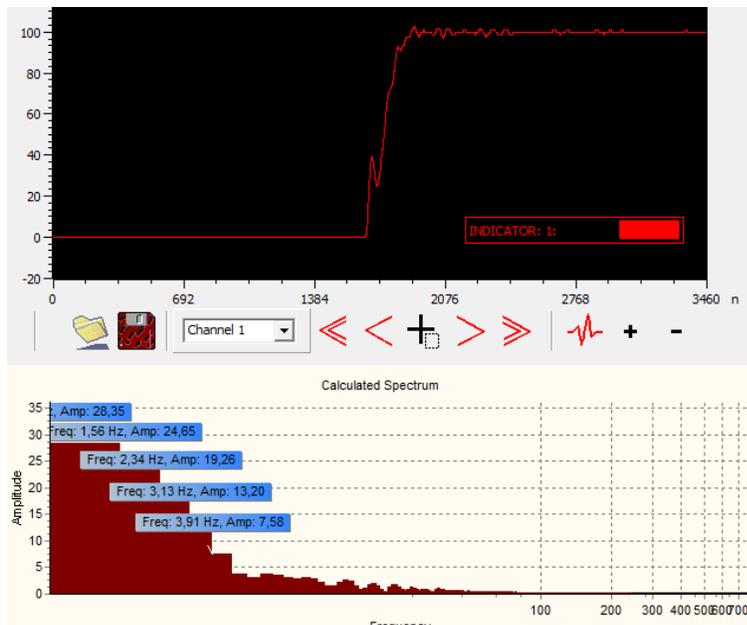

As you can see the graph does not look good, in the spectrum analyzer we can see that a lot of frequencies interfere with the weight signal. We can filter these frequencies out with the cutoff filter.

So let's filter out all the frequencies above 1Hz. Set the cutoff frequency on 1 and press on the button "Filter". Now the scope will show the same graph but what would have happened when the cutoff frequency would be set on 1 Hz.
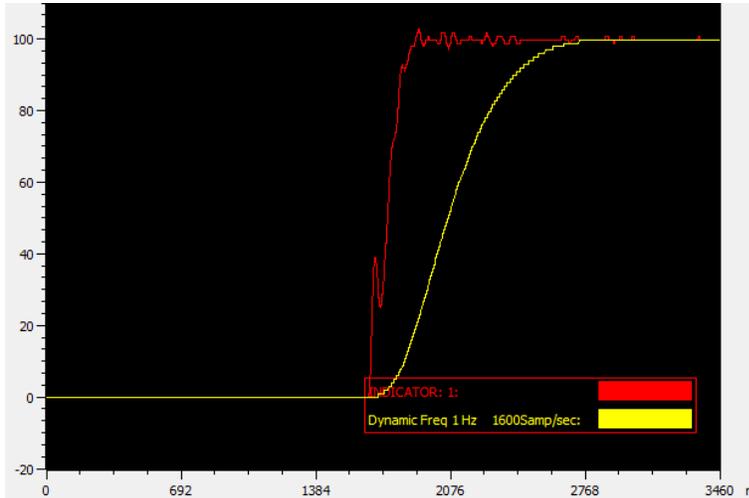
Now the weight signal is much better but the signal is very slow and it will take a while to reach the 10kg.

Now the cutoff frequency is set to 2,5Hz.
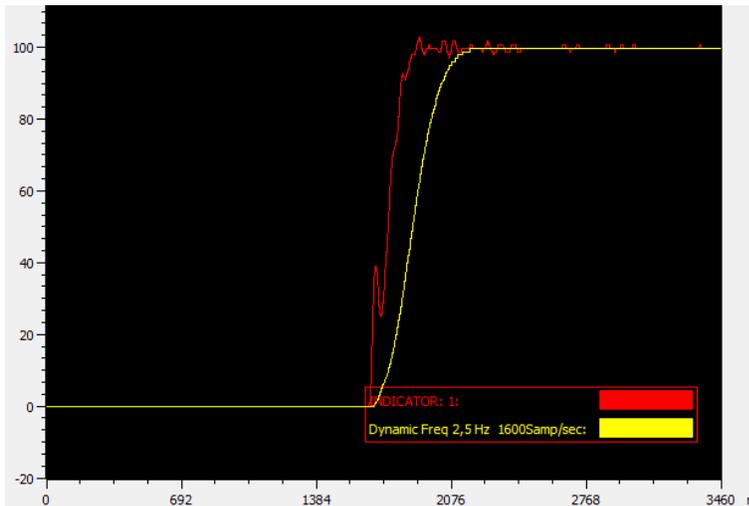
The weight signal is still good but the weigher is much faster compared to when the cutoff frequency was set on 1Hz.

Use the other filters to get your pervert signal, Finding the right filter for a specific signal is often a matter of trial and error. But when this signal is reached, you can use the settings in the scope to set up your device.

About PENKO

Our design expertise include systems for manufacturing plants, bulk weighing, check weighing, force measuring and process control. For over 35 years, PENKO Engineering B.V. has been at the forefront of development and production of high-accuracy, high-speed weighing systems and our solutions continue to help cut costs, increase ROI and drive profits for some of the largest global brands, such as Cargill, Sara Lee, Heinz, Kraft Foods and Unilever to name but a few.

Whether you are looking for a simple stand-alone weighing system or a high-speed weighing and dosing controller for a complex automated production line, PENKO has a comprehensive range of standard solutions you can rely on.

Certifications

PENKO sets high standards for its products and product performance which are tested, certified and approved by independent expert and government organizations to ensure they meet – and even – exceed metrology industry guidelines. A library of testing certificates is available for reference on:
http://penko.com/nl/publications_certificates.html

PENKO Professional Services

PENKO is committed to ensuring every system is installed, tested, programmed, commissioned and operational to client specifications. Our engineers, at our weighing center in Ede, Netherlands, as well as our distributors around the world, strive to solve most weighing-system issues within the same day. On a monthly basis PENKO offers free training classes to anyone interested in exploring modern, high-speed weighing instruments and solutions. A schedule of training sessions is found on: **www.penko.com/training**

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