

TECH NOTE :: ClipX Adjustment Assistant

Version: 2018-10-18
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Status: HBM: Public

Brief description

This is an instruction for adjusting a sensor with the ClipX. The adjustment assistant is especially useful if a sensor is not calibrated, or assembled in a construction, for example in force bypass. There are two approaches available to adjust sensors using the ClipX: A reference channel from the ClipX can be used, or a reference value can be entered manually. Furthermore, the measurement can be carried out statically or dynamically. The result in each case is a linear two-point scaling (see figure 1).

Note: Other scaling methods (e.g. polynomial scaling) are only manual but not with the adjustment assistant possible.

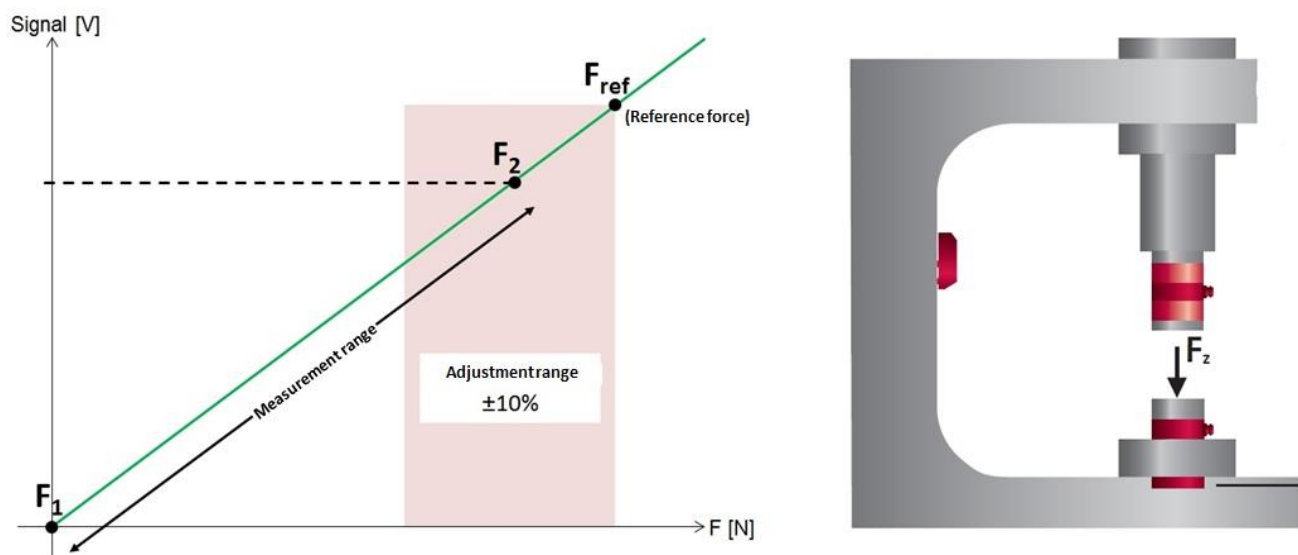
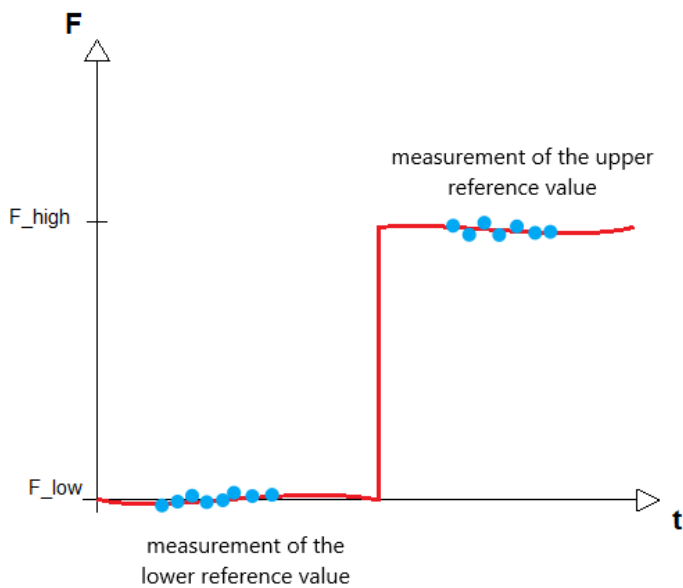


Figure 1: Two-point scaling and force bypass

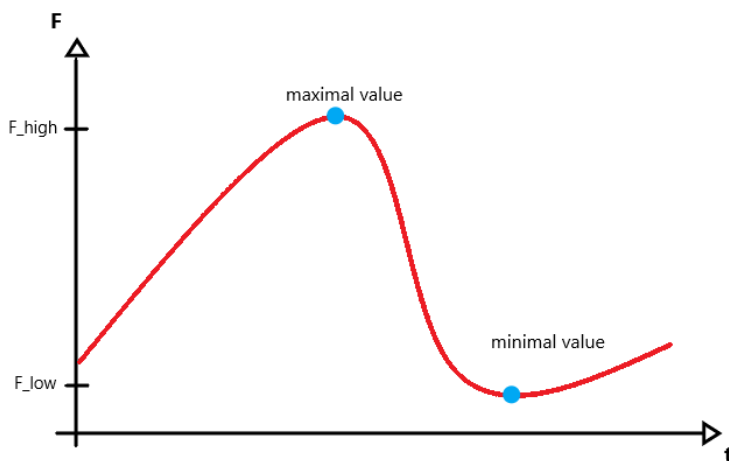
Static Measurement



With the static measurement, the signal of the loaded sensor is measured first (here: F_{high}). The assistant automatically determines an average value from the measured values and assigns this to the reference value in the loaded state.

Then the sensor is loaded with a certain force (F_{high}) and also measured. Again the mean value is calculated and assigned to the reference value in the unloaded state.

Dynamic Measurement



In dynamic measurement, the maximum and minimum values are recorded over a period of time determined by the user. These are then assigned to the reference values in the loaded and unloaded states.

Preparations

In order to be able to adjust a sensor with the adjustment assistant, your measurement chain must be put into operation. Connect your sensor for this purpose.

Then switch to the menu item "Amplifier" in your ClipX and set your sensor type and filter here. In our example, we use an HBM S9M force sensor. Our settings for this are as follows:

ClipX > Amplifier

ClipX-2 (1.2.0) | Default name of parameter set (01)

Electrical Value

Field value

-0.005 mV/V

Name	Decimal Places
Electrical Value	.000

16 / 22

S9M/1kN ClipX

Gross - Zero Value: 0 N - Full bri

TEDS

Name	
S9M/1kN ClipX	

14 / 22

Sensor Type
Full bridge 2.5mV/V (DC)

Physical Unit
N

Filter Type
Bessel

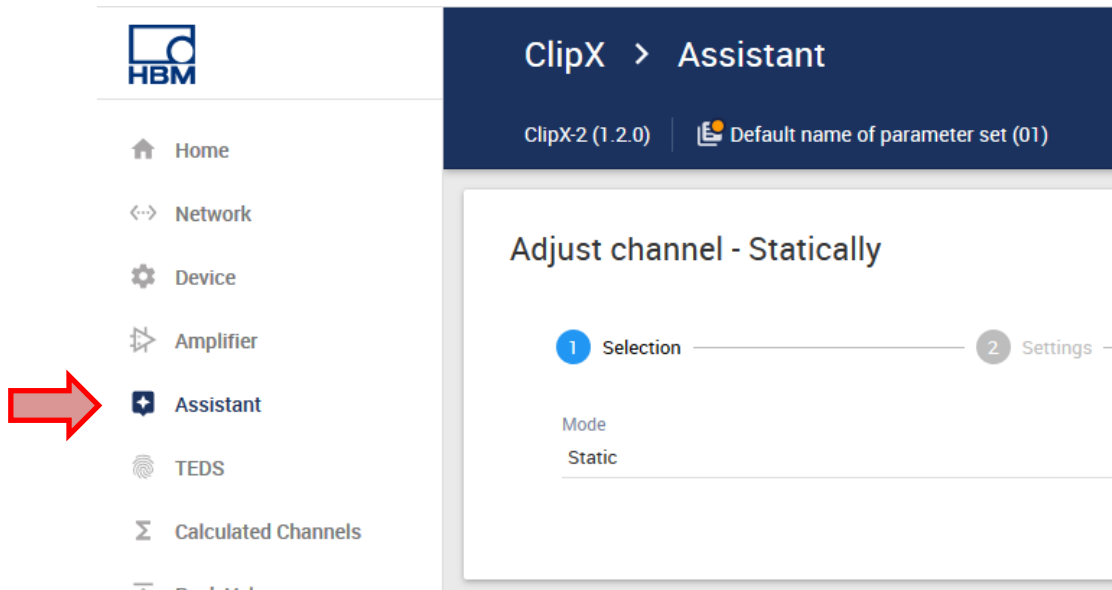
Cut-off Frequency (-3dB)
100 Hz

Invalid Signal Value
0 N

Test Signal Value
5 N

Adjustment assistant

To start the adjustment assistant, select "assistant" from the menu of your ClipX:



Note: The calibration weight used below is for illustration and representation of the reference force only and is not required.

Static adjustment

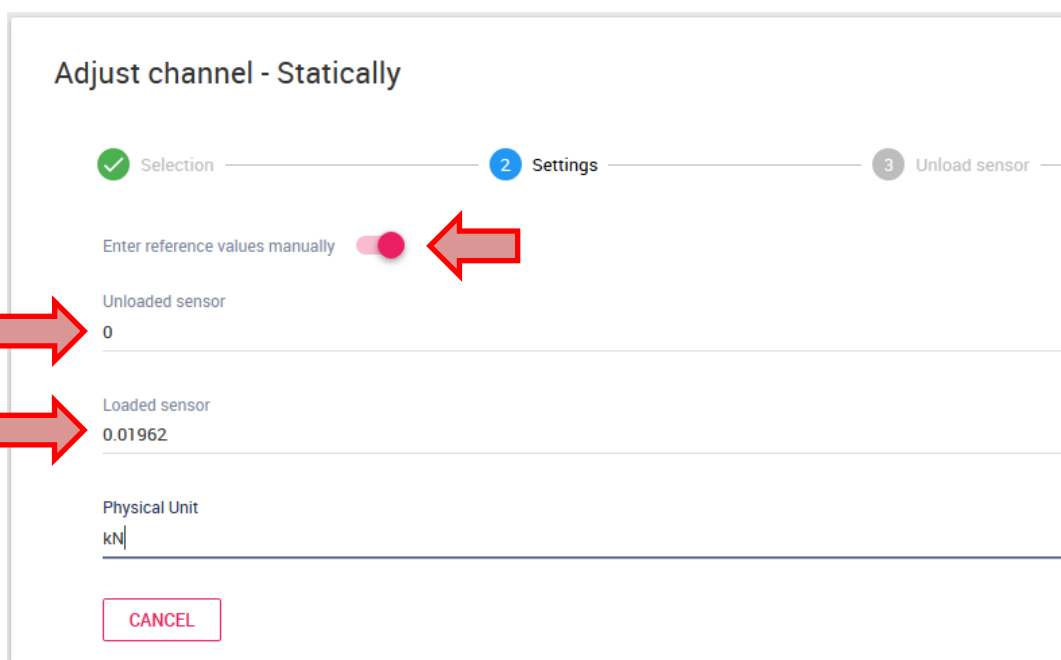
Select, as you see in the picture above, the mode “Static” to carry out a static adjustment and confirm with “Continue”. In the following menu “Settings” it can be decided if the reference value should be entered manually or a reference channel (e.g. ClipX-Bus, Calculated Channel ...) should be used. In our example, a 2kg calibration weight is used, to represent the reference force:

$$F(m = 2kg) = m * g = 2kg * 9.81 \frac{N}{kg} = 19.62N = 0.01962kN$$

For the loaded case follows $F(m = 0kg) = 0N$

Note: If possible, a value at the end of the measuring range of the sensor should be selected as the reference value in the loaded case. (See illustration on page 1)

These values need to be entered now:

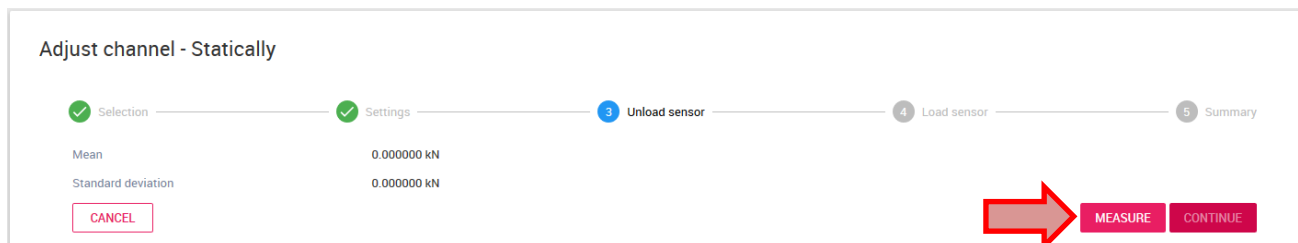


After that, press “Continue”.

In the following, the adjustment is carried out:

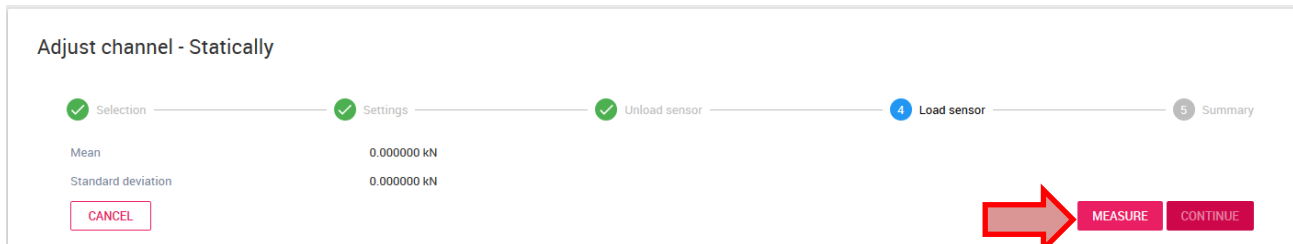
First the unloaded case is measured, so it is necessary to ensure that the sensor is unloaded.

As soon as the precautions have been taken, select the "Measure" button:



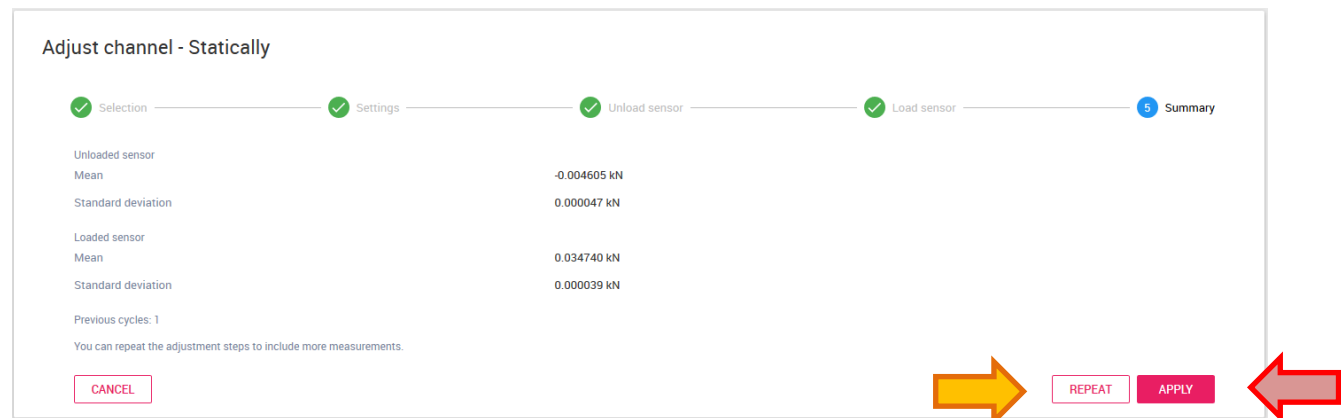
The process takes about 5 seconds. When finished, click "Next".

Now the loaded case is measured. For this purpose, load the sensor (in our example: place the calibration weight) and press "Measure":



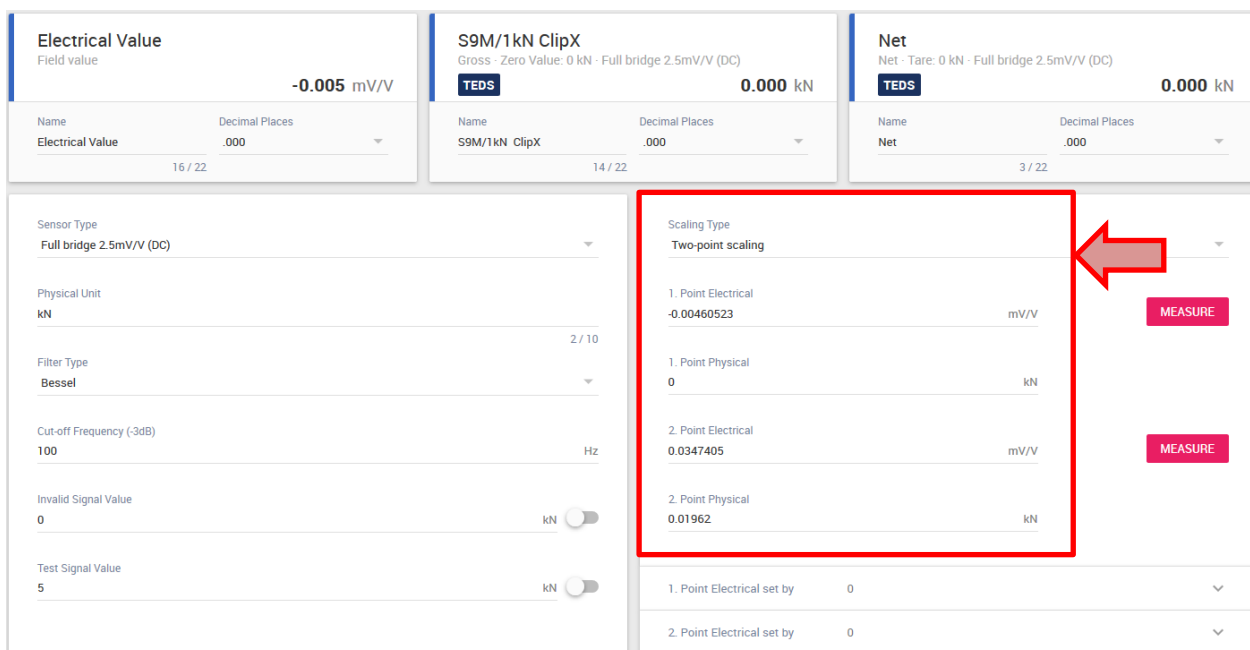
As soon as the process is completed, select "Continue".

In the following display, a summary of the recorded measured values is shown. Now you have the possibility to repeat the measurement to increase the accuracy of the measurement by taking more measured values. If that is required, click on "Repeat" (yellow arrow) and follow the steps described above again.



At the end of the process, press the "Apply" button (red arrow).

The measured values are then automatically entered in the amplifier settings:

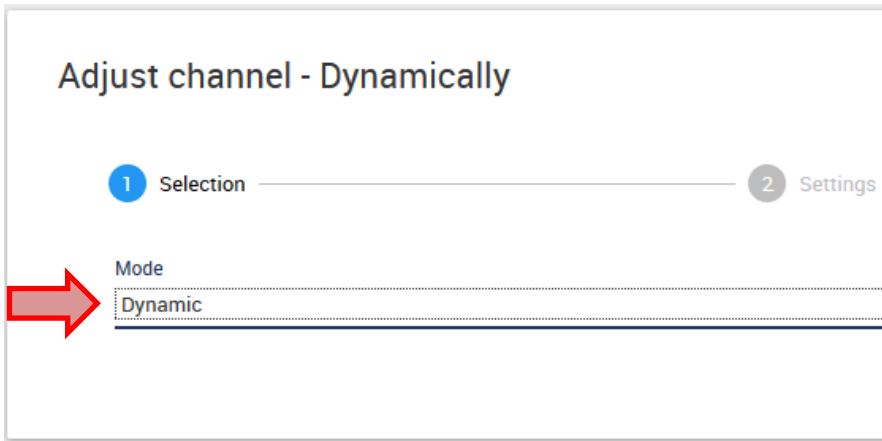


Dynamic adjustment

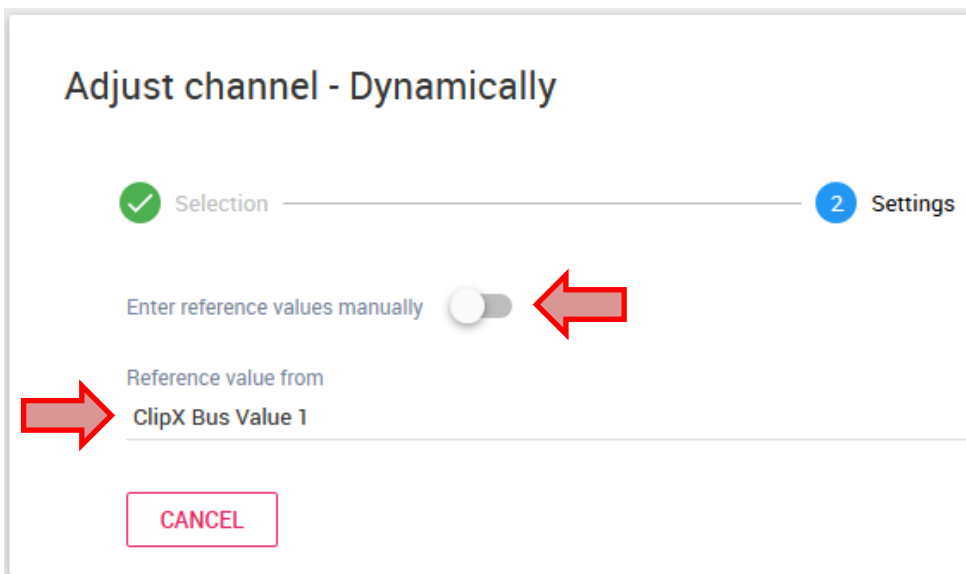
Dynamic adjustment is required if it is not possible to apply the reference force statically to the sensor (in dynamic processes e.g. a press).

The assistant takes the lowest and the highest point of the measurement as measured values.

Start the adjustment assistant and select “dynamic” as mode. Confirm with “Continue”:



Now it can choose - just as with static adjustment - whether a manual reference value (e.g. a known maximum force value that occurs in a system) or a reference channel should be used.



After that, confirm with “Continue”.

The next step is to perform the measurement. Click on "Start measure" and then start the process to be measured (e.g. press → pass through a pressing process) and click on "Stop measure" as soon as it is finished.

Adjust channel - Dynamically

✓ Selection
✓ Settings
3 Measure
4 Summary

Minimum Value	0.000000 kN
Maximum Value	0.000000 kN

CANCEL

START MEASURE
CONTINUE

In the following display, a summary of the recorded measured values is shown. Now you have the possibility to repeat the measurement to increase the accuracy of the measurement by taking more measured values. If that is required, click on "Repeat" (yellow arrow) and follow the steps described above again.

Adjust channel - Dynamically

✓ Selection
✓ Settings
✓ Measure
4 Summary

Minimum Value	-0.004661 kN
Maximum Value	0.034841 kN

Previous cycles: 1
You can repeat the adjustment steps to include more measurements.

CANCEL

REPEAT
APPLY

At the end of the process, press the "Apply" button (red arrow).

The measured values are then automatically entered in the amplifier settings:

<p>Electrical Value Field value</p> <p style="text-align: right; font-size: large;">-0.005 mV/V</p> <p style="font-size: x-small;">Name: Electrical Value Decimal Places: .000 16 / 22</p>	<p>S9M/1kN ClipX Gross - Zero Value: 0 kN - Full bridge 2.5mV/V (DC)</p> <p style="text-align: right; font-size: large;">0.000 kN</p> <p style="font-size: x-small;">Name: S9M/1kN ClipX Decimal Places: .000 14 / 22</p>	<p>Net Net - Tare: 0 kN - Full bridge 2.5mV/V (DC)</p> <p style="text-align: right; font-size: large;">0.000 kN</p> <p style="font-size: x-small;">Name: Net Decimal Places: .000 3 / 22</p>
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<p>Sensor Type: Full bridge 2.5mV/V (DC)</p> <p>Physical Unit: kN</p> <p>Filter Type: Bessel</p> <p>Cut-off Frequency (-3dB): 100 Hz</p> <p>Invalid Signal Value: 0 kN</p> <p>Test Signal Value: 5 kN</p>	<div style="border: 2px solid red; padding: 5px;"> <p>Scaling Type: Two-point scaling</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">1. Point Electrical</td> <td style="text-align: right;">-0.00466135</td> <td style="text-align: right;">mV/V</td> <td style="text-align: right; border: 1px solid #ccc; padding: 2px 5px;">MEASURE</td> </tr> <tr> <td>1. Point Physical</td> <td style="text-align: right;">0</td> <td style="text-align: right;">kN</td> <td></td> </tr> <tr> <td>2. Point Electrical</td> <td style="text-align: right;">0.0348405</td> <td style="text-align: right;">mV/V</td> <td style="text-align: right; border: 1px solid #ccc; padding: 2px 5px;">MEASURE</td> </tr> <tr> <td>2. Point Physical</td> <td style="text-align: right;">0.01962</td> <td style="text-align: right;">kN</td> <td></td> </tr> </table> <p>1. Point Electrical set by: 0</p> <p>2. Point Electrical set by: 0</p> </div>	1. Point Electrical	-0.00466135	mV/V	MEASURE	1. Point Physical	0	kN		2. Point Electrical	0.0348405	mV/V	MEASURE	2. Point Physical	0.01962	kN	
1. Point Electrical	-0.00466135	mV/V	MEASURE														
1. Point Physical	0	kN															
2. Point Electrical	0.0348405	mV/V	MEASURE														
2. Point Physical	0.01962	kN															

Disclaimer

These examples are for illustrative purposes only. They cannot be used as the basis for any warranty or liability claims.