



DEWESoft™

measurement innovation

DEWESoft™ DEWESoft™

Bridge operations

Strain gauges

AppNote

v 1.4



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Introduction

Scope of this document is to explain how the bridge operations like "Balance", "Reset", "Short", "Shunt", "Shunt cal check", "Compensate" ... work in DEWESoft X. It also covers using bridge sensors with TEDS interface.

Set up the sensor (with TEDS)

For using the benefits of automatic sensor detection (automatic reading of scaling, serial number, ...) please activate the checkbox "MSI adapters/TEDS sensors" in DEWESoft -> Settings -> Hardware Setup:

A Hardware setup						×
Analog CAN GPS	Video Math Tir	ning Alarms & Events	Analog out NET	Plugins Registration	on	
Analog device		Amplifiers				
DEWESoft USB	• ?					
Card FOUND	1	MSI adap	ters/TEDS sensors			
Card setup Grouping		Dewesoft	USB hardware			
Index Name	FW Versio	SN (System SN)	Descr	iption	Sync 🗒	Setup
A SIRIUS-I	4.3.1.16 D09A	71E5 (-)	8×24 bits AI@200 kH	iz, 3 DI, 1 CNT	Standalone	Set Card
Registration status PROF			Auto Detect]	ОК	Cancel

Start DEWESoft; here the sensor with TEDS (a tuning fork with strain gauge applied + TEDS chip inside sensor connector) is plugged into channel 8:

Devic	e preview			Dynamic acquisiti	on rate Channel	actions									
	0/0/0		à 7 7	20000 💌	Freq. span: Select a	I Deselect all B	alance sensors	Balance a	mplifiers	Short or	h Shunt on	Shunt cal check	Zero all	Reset zero a	•
Â	07 07 07			[Hz/ch]											
_					Search	\otimes									
Ĩ₫	Used	с	Name	Ampl. name	Measurement	Range	Physic	al qua.	Units	Min	Values	Max	Zero 🔳	Group 🔳	Setup
1	Unused		AI 1	SIRIUS-HV	Voltage	1000 V			v	-1000	0,00	1000	Zero	•	Setup
2	Unused		AI 2	SIRIUS-HV	Voltage	1000 V			v	-1000	0,00	1000	Zero	-	Setup
3	Unused		AI 3	SIRIUS-HV	Voltage	1000 V			V	-1000	0,00	1000	Zero	-	Setup
4	Unused		AI 4			0,1V			v	-0,1	0,000 NOT DETECT	0,1	Zero	-	Setup
5	Unused		AI 5			0,1V			v	-0,1	0,000 NOT DETECT	0,1	Zero	-	Setup
6	Unused		AI 6	SIRIUS-ACC	Voltage	10 V			v	-10	0,000	10	Zero	-	Setup
7	Unused		AI 7	SIRIUS-MUL	Voltage	10 V			V	-10	-0,015	10	Zero	-	Setup
8.0	Used		AI 8	SIRIUS-STG	Bridge	10 mV/V	Strain		um/m	-20000	810	20000	Zero	-	Setup

All the settings like "Measurement Type", "Bridge mode", "Excitation" and "Scaling" are read out and set automatically. Note the greyed, locked fields, which cannot be changed (at first):



A Channel setup for channel	3					×
Channel settings						
Used	Channel name AI 3	Description -	Color	Min value Auto	Max value Auto	Sample rate << >> 20000 ▼
Amplifier STRUUSI-STG StirzDd General Info Connector Measurement Bridge Range 2 Lowpass filter OFF Bridge mode Quarter bridge Bridge shunt Internal 59,88 Excitation 5	00904E24E Rev:1.5.0.0	Shunt 350 Ohm	Exc+(1) Sns+(6) R+(5) In+(2)		Sensor	General Edit sensor Teds Used sensor 10203040 Q.V Physical quantity Strain V Unit um/m V Shunt cal target 2914 um/m Use custom shunt resistor 59,88 kOhm Use custom 1 Compensate
Sensor unbalance Balance Rese	tt 0 mV/V		Sns-(3) Exc-(8) In-(7)		• Strain scaling	
2,00000 mV/V	Scope	ta alum da sura tra da		ptions	Gage facto Gage type Material	tor (k) 2 e Single element Stainless Steel 18-8
-0,00566 mV/V	,0 ms	50,0	um/m	Display or	Bridge fact	um/m Zero

Balance the bridge

From the screenshot above you see that the current sensor offset (stored in the TEDS) is 0 %.

In the scope screen above the scaled value currently read (right side) is -11,3 um/m. That is because the strain gauge does not have exactly 350 ohms, which is normal, due to mechanical tolerances.

Click on "Balance" to zero the bridge.



The unbalance will be measured and shown.

If it is out of limit, the field will get red. Check the strain gauge. Wrong resistance value? Sensor unbalance Reset -0,0075929 mV/V

The input signal is now 0 mV/V.



Balance is done. That's all! Now you can START your MEASUREMENT!

To perform it on a number of channels at the same time, use the >> Group operations.



Reset the balancing

Click on "Reset"

The sensor offset is removed, initial state...

Sensor unbalance Balar	nce Reset	D	mV/

... and you see the unbalance of the sensor again.



"Balance" and "Reset" are opposite operations.

Short

The Short and Shunt operations are mainly thought for checking if the connected strain gage and the measurement amplifier are OK.

When using the Short operation, the pins 2 and 7 (the input pins of the amplifier) are internally shorted and you see the offset of the amplifier.

First perform a "Reset" to cancel the stored offset.



Sensor unbalance Balarice Reset 0 mV/V

If the output (see left side) is close to 0, the amplifier is OK.



Disable the short again by clicking "Short off".

Amplifier	Short off Shunt on	AO	
Sensor unbalance	Balance Reset	0	mV/V



Shunt

The Shunt operation is thought for checking if the connected strain gauge is OK. From the wiring schematic in DEWESoft X you see, that the amplifier already comes with the integrated shunt resistor.



The idea behind is to "shunt" a resistor of known value parallel to one resistor of the bridge to achieve a known, calculateable unbalance.

With the "Shunt calibration" we can automatically check the measured value against a predefined one (from sensor database or TEDS).

For the measurement, this internal resistor is disconnected again, of course.

Let's check out the formulas:



("Shunt calibration for Dummies; a reference guide" by LaVar Clegg, Interface Inc.)

R3 and R4 are part of the bridge completion, internally of the amplifier. The upper Rb is the connected strain gauge, the lower Rb is also internally of the amplifier together with the shunt Rs.

With a 350 ohms quarter bridge and an internal shunt resistor of 59k88 (SIRIUS STG module) the expected unbalance should be: Vs = 250 / (59880/350 + 0.5) = 1,45699775 mV/V



First click on "Balance", because the formula is only valid on a balanced bridge (both Rb = 350 ohms).



Then click	"Shunt on".		
Amplifier	Short on Shupt on	AO	
Sensor unbalance	Balance Reset)	mV/V

The output value comes very close to the expected value (1,4566 mV/V).



But how big exactly is the error?

Shunt cal check – preparation

Shunt cal check is done on scaled values, therefore we take a look on the strain scaling. The max input from the graph above is 10 mV/V; the max scaled output signal is 20 000 um/m.

So, the scaling factor is 2000.

Our target value of 1,45699775 mV/V would equal (x 2000) = 2913,9955 um/m.

In the right upper section of the channel setup window, unlock the TEDS settings (or settings of the sensor database if you don't have TEDS).

General Edit sense	or		
Used sensor	10203040	5	Q.~
Physical quantity	Strain		•
Unit	um/m		•
Shunt cal target	2914	um/m	Check
Use custom shunt resistor	59,88	kOhm	
Lead wire compensation	1		Compensate

Enter the calculated 2913,9955 um/m in the field "Shunt cal target" and press <Enter>. The resistor is OK with 59,88k.



Then switch to the "Edit sensor" tab and click "Write to TEDS" (or "Save Sensor" if you don't have TEDS).

Of course this procedure has only to be done the first time.

General Edit sensor			(ſ
Serial number	10203040	5		
Model	tuningfork	STG		
Manufacturer	Dewesoft		•	
Calibration date	19.11.201	12]
Calibration period	365	Cal initials	KS	
Allow user to define	offset to sensor			_
Save sensor		Write to Not sta	TEDS ndard Ted	N.

Shunt cal check

Now perform the "Shunt cal check":

General Edit sens	or Mea	surement	in progress	đ
Used sensor	10203040)5		Qv
Physical quantity	Strain 💌			
Unit	um/m		_	-
Shunt cal target	2914	um/m	Check	
Use custom shunt resistor	59,88	kOhm		
Lead wire	1		Compensa	ate
compensation				

The result is shown, and looks very promising in this case (-0,0294 %). Strain gauge is OK.

Shunt cal target	2914	um/m	Check
Use custom shunt resistor	59,88	kOhm	Result: - 0,0294 %

If the value is bigger than 2%, it will become red.

Adjusting the 2% limit is now possible in DEWESoft: go to Settings -> Global setup -> General -> Advanced settings -> Hardware -> Amplifiers -> ShuntCal error limit [%]

4 Hardware	Name	Property
Amplifiers	Scan only first time	False
DEWEUSB	Calibration mode	False
> Visuals	Write log	False
Math	ShuntCal error limit [%]	2.00



Shunt cal check – with custom shunt

What do you do if the expected shunt cal result is already calculated in the datasheet / calibration sheet of the sensor, but for a different shunt resistance, e.g. 100 k?

You can just use it!

For this example, we take the well known formula from the "Shunt" chapter, and calculate the shunt result with 100k shunt resistor.

Vs = 250 / (100000/350 + 0,5) = 0,873 mV/V, with scaling of 2000 -> 1746,943 um/m

Enter the values as shown below. When entering the resistor value, the field gets yellow. Please confirm the value with pressing <Enter>.

Use custom shunt resistor	100]	kOhm	
---------------------------	-------	------	--

Then perform the "Check".

Unit um/m ✓ Shunt cal target 1746 um/m Check ✓ Use custom 100 kOhm Result: 0,0 %* Lead wire 1 Compensate	hysical quantity	Strain		•
Shunt cal target 1746 um/m Check Use custom shunt resistor 100 kOhm Result: 0,0 %* Lead wire compensation 1 Compensate	Init	um/m		•
Use custom shunt resistor 100 kOhm Result: 0,0 %* Lead wire 1 Compensate	hunt cal target	1746	um/m	Check
Lead wire 1 Compensate	Use custom shunt resistor	100	kOhm	Result: 0,0 %*
	ead wire ompensation	1		Compensate

As you see, the software automatically takes care about different resistor values. The asterisk (*) symbol after the result indicates that the check has been performed with a different resistor value than physically available.



Lead wire compensation

If you have a long cable to the sensor and "quarter bridge 3 wire mode", DEWESoft can also cancel out the wire resistance. (In the other modes the wire loss is cancelled already because Sense and Excitation lines are connected directly at the sensor)

Here you see a quarter bridge strain gage with 3-wire connection. In each of the 3 lines we have built in a resistor of 11 ohms for showing the principle. Click the "Compensate" button.



The correction factor is calculated (1,031 in our case) and the measured resistance (10,8 ohms) displayed.

(Please take into accout, that this function is only available, if the Shunt resistor inside the module is connected to the Exc+ line, which is the default)

Zero

There is also a function called "Zero", let's look at the difference to "Balance".



Imagine, we have a force transducer with strain full bridge output. It will measure the weight in our experiment.

In the first picture, we measure just the unbalance of the bridge sensor, e.g. 35 N. Let's do a "Balance". The output is now 0 N.

A vehicle is put on the test bed. We measure the weight, it is 12 000 N. For our measurement only the changing of the weight is of interest (e.g. vibrations of the vehicle), so we cancel out the fix offset with the Zero function.

Physical qua.	Units	Min	Values	Max	Zero 🔳	Setup
	V	-10	0,000	10	Zero	Setup
	V	-10	0,000	10	Zero	Setup
Force	N	-52000	0	28000	Zero	Setup
	V	-50	0,001	50	Zero	Setup
	V	-10	0,011	10	Zero	Setup



Click the "Zero" button in Channel Setup (can be reset by right mouse-click). The output is now zero again.

Note, that this is a pure software subtraction. If the range was set to "Automatic", the range is automatically adapted to -52000...+28000.

The range can be set to "Automatic" in the channel setup window of the appropriate channel (right mouse-click).

Channel setup for	channel 3						
Channel settings							
	Channel name		Color	Min value	Max value	Sample	rate divider
Used	AI 3	-		Auto	Auto	1	- Skip -
	•	~		5	Set to Auton	natic	
Amplifier - SIRIUS-ST	G SNr:D00904AF72 Rev:	1.5.0.0			Sensor		_
General Info Co	onnector						General Edit sensor

Now all offsets are cancelled and we start the measurement.

After the measurement you can go back to channel setup and remove the Zero. If it still shows the same weight, you can be sure, the sensor is still OK.

This function can also be accessed in the Measure mode (but NOT while storing!), see >> Group operations.

Group operations

On top of the Channel setup there is a bar with channel actions.

Setup	files	Ch. setup	Mea	asure							
File details	s Stor	ing Ar	nalog	() Counter	Liti Ctrl out	میں CAN	Analog out	O O O O Math	DS NET		
Chan	iel actio	ns									
Sele	ct all	Deselect a	Bal	ance sensors	Balance	amplifiers	Short on	Shunt on	Shunt cal check	Zero all	Reset zero all

Depending on which amplifiers are used, more or less buttons are visible. Clicking on a button performs an action on ALL the channels.

For the following steps, please activate some more columns on the channel setup table. Click on one of the small icons, and select "Edit columns":

Measurement	Input type		Range 📑	Physical qua.	Units	Min	Va	lues	Мах	Zero 🔳	Setup
Voltage	_		Set highest range					00	10	Zero	Setup
Voltage			Set best range					00	10	Zero	Setup
Bridge	Quarter bridge 3 wire 350		Set highest filter					2,1	4200	Zero	Setup
Bridge	Quarter bridge 3 wire 350		Set filters to 40% of	of sample rate				1,4	4200	Zero	Setup
Voltage	Single ended		Set filters to custor	m value				11	10	Zero	Setup
Voltage	Single ended	1	Rescan modules					10	10	Zero	Setup
Voltage		1	Bridge amplifiers				۱.	01	1000	Zero	Setup
Voltage			Set actual settings	as PowerOnDefault				00	1000	Zero	Setup
			Edit columns	N							
			Sort by this colum	in S							
			Unsort								
		_									



Select the fields "ShCal target", "ShCal result", "ShCal error" and "Group":

A Choose columns			
Select columns you wish to display			
Ampl. name Ampl. S.Nr.		*	Move up
✓ Measurement ✓ Input type			Move down
Range Dual-core Exc.			Show
LP filter HP filter		_	Hide
✓ Physical qua. ✓ Units Scale Scale Sensitivity Offset ✓ Min ✓ Values ✓ Max ✓ ShCal target ✓ ShCal result ✓ ShCal error ✓ Zero ✓ Zero ✓ Setup		m	Default
Midth of all and all may (in all all)	64		Dendart
wiam or selected Column (in pixels)	OK		Cancel

Group – Bridge balance

In the custom SIRIUS slice below there are 2 STG modules, each with a sensor connected. Click on the "Balance sensors" button.

Devid					cquisition ra														
A	ē ē/	ð í	7 7 🖓	20000 [Hz/ch]	▼ ^{Fn} 84 ▼	eq. span: 00 Hz Select all Search	Deselect	all Bala	ance sensors	Balance	e amplifiers	Short on Shunt	on Shunt	cal check Zero	all Reset zer	o all			
Ĩ₫	Used	с	Name	Ampl. name 🔳	Meas	Input type	. 🔳 R	ange 🔳	Physical q	Units	Min	Values	Max	ShCal target	ShCal result	ShCal error	Zero 🔳	Group 🔳	Setup
1	Unused		AI A-1	SIRIUS-ACC	Voltage		10	D V		mV/V	-10	0,000	10				Zero	•	Setup
2	Unused		AI A-2	SIRIUS-ACC	Voltage		10	D V		mV/V	-10	0,000	- 10				Zero	-	Setup
3	Used		AI A-3	SIRIUS-STG	Bridge	Quarter bridge 3 wire	350 10	0 mV/V	Stress	N/mm²	-4200	0,0	4200	611,94 N/mm²			Zero	-	Setup
4	Used		AI A-4	SIRIUS-STG	Bridge	Quarter bridge 3 wire	350 10	0 mV/V	Stress	N/mm²	-4200	0,0	4200	611,94 N/mm²			Zero	-	Setup
5.,	Unused		AI A-5	SIRIUS-MUL	Voltage	Single ended	10	0 V		V	-10	0,011	10				Zero	•	Setup
6	Unused		AI A-6	SIRIUS-STG-M	Voltage	Single ended	10	0 V		V	-10	0,009	10				Zero	•	Setup
7	Unused		AI A-7	SIRIUS-HV	Voltage		10	000 V		V	-1000	0,01	1000				Zero	•	Setup
8	Unused		AI A-8	SIRIUS-HV	Voltage		10	000 V		۷	-1000	0,00	1000				Zero	-	Setup

As you see, all bridges are balanced with one click, input values become 0.

Group – Shunt Cal Check

From the picture above, note that there has to be a ShCal Target entered before doing the check (1,45699775 * 210 * 2 = 611,939 N/mm²; see section "Shunt"). Now click on the "Shunt cal check" button.

Devie					quisition ra	te Channel acti														
A	ē ē 🏹	ō,	ð ð 우	20000 [Hz/ch]	▼ 84	eq. span: Select all	Deseler	ct all Bala	ance sensors	Balance	e amplifiers	Short on S	Shunt on S	Shunt cal ch	eck Zero	all Reset zer	o all			
_				_		Search		Q												
Ĩ₫	Used	С	Name	Ampl. name 🔳	Meas 🔳	Input type		Range 🔳	Physical q	Units	Min	Values	P	Max ShC	Cal target	ShCal result	ShCal error	Zero 🔳	Group 🔳	Setup
1	Unused		AI A-1	SIRIUS-ACC	Voltage			10 V		mV/V	-10	0,000	10)				Zero	•	Setup
2	Unused		AI A-2	SIRIUS-ACC	Voltage			10 V		mV/V	-10	0,000	10	1				Zero	-	Setup
3.,	Used		AI A-3	SIRIUS-STG	Bridge	Quarter bridge 3 wire	350	10 mV/V	Stress	N/mm²	-4200	0,0	420	00 611	L,94 N/mm²	611,76 N/mm²	-0,0302%	Zero		Setup
4	Used		AI A-4	SIRIUS-STG	Bridge	Quarter bridge 3 wire	350	10 mV/V	Stress	N/mm²	-4200	0,0	420	00 611	1,94 N/mm²	612,21 N/mm²	0,0436%	Zero	•	Setup
5	Unused		AI A-5	SIRIUS-MUL	Voltage	Single ended		10 V		V	-10	0,011	10					Zero	-	Setup
6	Unused		AI A-6	SIRIUS-STG-M	Voltage	Single ended		10 V		V	-10	0,009	10	1				Zero	-	Setup
7	Unused		AI A-7	SIRIUS-HV	Voltage			1000 V		V	-1000	0,01	100	00				Zero	-	Setup
8	Unused		AI A-8	SIRIUS-HV	Voltage			1000 V		۷	-1000	0,00	100	00				Zero	-	Setup

After a few seconds, you see the result in the additional columns we added.



Group – Balance amplifiers

The "Balance amplifiers" operation is applied on all channels at once. It is used to correct the amplifier offset before measurement, e.g. the drift on long-term measurements, or if the device is put to extremely different temperature conditions in short time (e.g. performing a measurement at -20°C, and immediately after that at +40°C). Depending on the usage, it does not have to be done before each test, generally only from time to time.

1. Let's assume we have a SIRIUS STGM amplifier in bridge mode, set to the smallest range of 2mV/V. When there is nothing connected, we will see only noise, so please click the "Short on" button. The IN- and IN+ will be shorted internally to determine the amplifier offset, in this case 51,1 μ V.

Amplifier - SIRIU	S-STGM SNr:D0086C4FBD Rev:2.5.0.1	Scope FF	T Scaling
General Info	Connector	2,00000 mV/V	Scope
Measurement	Bridge 🔹		
Range	2		Caracity all contracts and the fillence
Lowpass filter	OFF	57	2. As not off the rath definition what the a reduced shot on that the back
Bridge mode	Full bridge 🔹	0,05112 mV/V	0,05111 mV/V
Bridge shunt	Internal 59,88 kOhm 👻	2	function design files of the set
Excitation	1 🔹		1. Carly be fitting in the anti-anti-anti-anti-anti-anti-anti-anti-
Amplifier	Short on Shunt on AO		
Sensor unbalance	Balance Reset 0 mV/V	-2,00000 mV/V	-500,00000 ms 500,00000

2. Then exit the channel setup and do the "Balance amplifiers", it takes some seconds.

Devi	ce preview			Dynamic acquisit	ion rate	Channel	actions					
	a 10 7	70	a a .o a	20000	Freq. span: 8400 Hz	Select a	all Deselect all	Balance sensors	Rese	et sensors balance	Balance am	plifiers
A	0 8 9 9	2 8		[Hz/ch]	-					(2	
						Seard	h Q					
Id	Used	С	Name	Sensor S.Nr.	Ampl. nam	e 🔳	Measurement	Range		Physical qua.	Units	Min
1	Unused		AI 1		SIRIUSi-A	CC	Voltage	10 V			v	-10,00
2	Unused		AI 2		SIRIUSi-A	CC+	Voltage	10 V			v	-10,00
3	Used		AI 3		SIRIUSi-S	σtg	Bridge	2 mV/V			mV/V	-2,00

3. Repeat step 1 and check the amplifier offset again. In our example it is only 0,05 μ V.





4. If you want to reset the offsets again, please go to Settings -> Hardware Setup -> Analog -> and click the "Set card..." button on the right side. In the tab "Ampl. Balance" you see a list of all the applied offset corrections for each channel.

We used the STGM module on the last channel in Range3, as expected the offset is 51μ V. The HG (high-gain) and LG (low-gain) values show the offsets of both dual-core ADC stages.

The button "Reset offsets" below deletes all correction values and the whole tab disappears.

											_
Analog	CAN	GPS	Video	Math	Timing	Alarms & Events	Analog out	NET	Plugins	Registration	
Analog o	device					Amplifiers					
DEWESo	ft USB			💧 Settir	ngs					×	
Card FOU Card set	tup Gro Nar SIRIUS	ne	<u>FW \</u> 4.7.4.	Setting Rang Slot6 Rang Rang Rang Rang Rang Rang Rang Rang	Info 2 HG: 0, e3 HG: 0, SIRIUS-N e0 HG: 0, e1 HG: -0, e3 HG: -0 e3 HG: -0 sIRIUS-S e0 HG: -0 e1 HG: -0 e3 HG: -0	Ampl. balance 003 mV LG: 0,009 004 mV LG: 0,005 MUL offsets 0,05 mV LG: -0,121 0,008 mV LG: -0,02 0,015 mV LG: -0,02 0,017 mV LG: -0,02 0,058 mV LG: -0,14 0,058 mV LG: -0,05 0,051 mV LG: -0,05 ets	mV mV 35 mV 35 mV 25 mV 25 mV 55 mV 55 mV	Ok		E	Sync 🖹 Setup Master Set Card b
Registrat TRIA	ion status L (17.	02.20	14)								

Group operations with different groups

In the Group column assign one channel to "Group 1", the other to "Group 2".

ShCal target	ShCal result	ShCal error	Zero 🔳	Grou	p 🔳	Setup
			Zero	-		Setup
			Zero	-		Setup
611,94 N/mm²	611,76 N/mm²	-0,0302%	Zero	Group	1	Setup
611,94 N/mm²	612,21 N/mm²	0,0436%	Zero	Group	2 🔻	Setup
			Zero	Not se		elected
			Zero	Main g		group
			Zero	Group		01
			Zero	🖌 Group		2
				Group 3		
				Group 4		
					Group	5



Now you can apply (bridge) operations group-wise.

Channel acti	ons											
Select all	Deselect all	Bala	ance sensors	Balance	amplifiers	Short on	Shunt on	Shunt	cal check	Zero all	Reset zer	o all
Search	٩		All channel Main group	s D								
put type	🔳 Ran	Je 👘	Group 1		Min	Value	es	Max	ShCal ta	rget Sh	Cal result	ShC
	10 V		Group 2	63	.0	0,000	0	10				

Group operations in Measure mode

Now, with one channel assigned to Group1, another to Group2, let's go to the Measure mode. There are two new buttons called "Zero" and "Bridge".

Set	up files Cł	n. setup	Measure	Design	ı	Ø Zero	Bridge
	51	\sim		4			
ze	Recorder	Scop	e f	FFT	K		

If the "Zero" button is not there, most likely sensors from the sensor database / TEDS sensors are used, and changing the offset is not allowed. Check sensor settings in Channel setup or Sensor editor.

If the "Bridge" button is not there, no bridge amplifiers are set to "Used" in channel setup.

Now you can do a selective "Balance" on the group you want or on "All chs".

Acquisitio	n Analysis	DEWESoft Setup files	Ch. setup Measu	re Design	Ø Zero	Bridge	
Store Pause	O Stop	Freeze Record	rder Scope	FFT K		Short on for 1s Short on all	
		D:\DEWESo	ft7\Data\Test.	d7d		Shunt on for 1s Shunt on all	
Display name Recorder		Group1; - [N	/mm²] ACT Group	o2; - [N/mm²] A	ст	<u>B</u> ridge balance →	All chs
Icon		1	ШТ	28.1			Group 2

Note, that DEWESoft is in Acquisition mode, but NOT storing!

When pressing "Store", of course no balancing is possible during measurement any more.



Shunt/Short at beginning and end of measurement

At the end of a measurement you may want to check if the strain gage and the amplifier are still OK. Maybe you also want to see, if the bridge was drifting over time due to temperature or other effects.

Start the measurement, click the Store button.

The "Zero" button will disappear, because zeroing also changes the channel min/max limits, and that is not allowed during measurement. Also balancing the bridge is not possible at this state any more.

Do a "Short on for 1s", wait a little bit, then press "Shunt on for 1s".



At the end of the measurement – when you are still storing (!) – do again a "Short on for 1s" followed by a "Shunt on for 1s".

Stop the measurement and go to Analyze mode.

Activate the cursors in the properties of the recorder instrument (on the left side).

Time and values cursor	
Show cursor values	
dt = 00:01:27 🛛 🖓	
ົນ 1 ິນ 2	



Move the white cursor I to the Short position on start, and cursor II to the Short position at the end (grey arrows). You can also lock the cursors to not lose them when zooming in and out of a longer measurement.

On the right side the Delta will be shown. In our case it is 0,0 – measurement OK.



Then move the cursors to the Shunt positions (black arrows), repeat the procedure to also check the Delta of the Shunt measurement.



Hint : Strain gage configurations in DEWESoft X

Until now it was rather difficult to select the proper strain configuration. You had to find out the bridge factor in the tutorials table and look for materials coefficients.

MEASURES	TYPE	BRIDGE	EQUATION Vout/Vin	BRIDGE FACTOR	LINEAR	DESCRIPTION
tension, compression	quarter	E Vout Vin	$\frac{k \cdot \varepsilon}{4 + 2 \cdot k \cdot \varepsilon}$	1	no	Single gage measuring tension and compression - basic configuration
F tension, compression	half	Vout Vin	$\frac{k \cdot \varepsilon \cdot (1+\nu)}{4+2 \cdot k \cdot \varepsilon \cdot (1-\nu)}$	(1+1/)	no	One gage in principal direction and one in transverse direction - usually used for temperature compensation
bending	half	Vout Vin	$\frac{k \cdot \varepsilon}{2}$	2	yes	Two gages with opposite strain - usually used for measurement of bending
tension, compression	half	Vout Vin	$\frac{k \cdot \varepsilon}{2 + k \cdot \varepsilon}$	2	no	Two gages with same strain - usually used for bending cancellation
F tension, compression	full	Vout Vin -vE E	$\frac{k \cdot \varepsilon \cdot (1+\nu)}{2 + k \cdot \varepsilon \cdot (1-\nu)}$	2.(1+v)	no	Two pairs of gages where one is in the principal direction and the other one is in transverse direction used in temperature compensation and bending cancellation
bending	full	Vout Vin -E VE	$\frac{k \cdot \varepsilon \cdot (1 + \nu)}{2}$	2.(1+v)	yes	Two pairs of gages where one is in the principal direction and the other one is in transverse direction used in temperature compensation and tension cancellation
bending, torsion	full	Vout Vin -E E	k·ε	4	yes	Two pairs of gages in opposite strain - usually used for measurement of bending



Depending on the selected "Bridge mode" in the amplifier settings (Full, Half, QuarterBridge), it will now graphically show a various number of possible bridge configurations, and furthermore you can select the material for using the correct Young's modulus.

Another error source is eliminated.





Hint : Rosette Math

	-		DEWES	oft X1				
	Acquisit	tion Analysis	Setup f	iles Ch. setup	Measure			
	::-		(B)	3	entro 8	F6	00	
Store	Save	Save as	File details	Storing A	nalog Ala	arms Analog out	t Math	
				Basic				
√a³+b³ Formula	Filt	ters Statis	Refere	nce Other		Spectral *	Control -	Rosettes
ON/OFF	с	NAM	E			anaiyas	VALUE	

Included in the standard math function is the rosette math plugin.

Simply select the 3 strain or stress input channels and the orientation of the elements.



See webpage for more details and manual.

