

Instruction Manual

**Calibration Manual
Transient Recorder
Type 2519A...**

Software
TR Control

KISTLER

measure. analyze. innovate.



Instruction Manual

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Transient Recorder
Type 2519A...**

Software
TR Control

Foreword

Thank you for choosing a Kistler quality product characterized by technical innovation, precision and long life.

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1. Introduction

Please take the time to thoroughly read this instruction manual. It will help you with the installation, maintenance, and use of this product.

To the extent permitted by law Kistler does not accept any liability if this instruction manual is not followed or products other than those listed under *Accessories* are used.

Kistler offers a wide range of products for use in measuring technology:

- Piezoelectric sensors for measuring force, torque, strain, pressure, acceleration, shock, vibration and acoustic-emission
- Strain gage sensor systems for measuring force and torque
- Piezoresistive pressure sensors and transmitters
- Signal conditioners, indicators and calibrators
- Electronic control and monitoring systems as well as software for specific measurement applications
- Data transmission modules (telemetry)

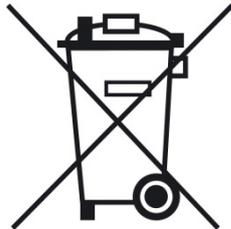
Kistler also develops and produces measuring solutions for the application fields of engines, vehicles, manufacturing, plastics and biomechanics sectors.

Our product and application brochures will provide you with an overview of our product range. Detailed data sheets are available for almost all products.

If you need additional help beyond what can be found either on-line or in this manual, please contact Kistler's extensive support organization.

2. Important Information

2.1 Disposal Instructions for Electrical and Electronic Equipment



Do not discard old electronic instruments in municipal trash. For disposal at end of life, please return this product to an authorized local electronic waste disposal service or contact the nearest Kistler Instrument sales office for return instructions.

2.2 Software Upgrades and Updates

Kistler may from time to time supply upgrades or updates for embedded software. Such upgrades or updates must always be installed.

Kistler declines any liability whatsoever for any direct or consequential damage caused by products running on embedded software which has not been upgraded or updated with the latest software supplied.

3. Activation of Calibrations

Select menu Calibration > Activate calibration



Enter password (currently KIWAG)

4. All Channels Offset Calibration

This calibration serves for suppression of DC shift of each input channel (amplifier and AD converter). Calibration is full automatic (for all channels and all ranges).

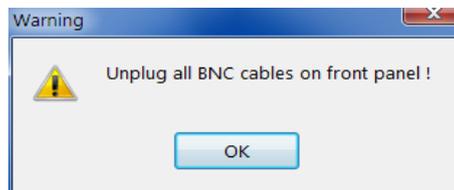
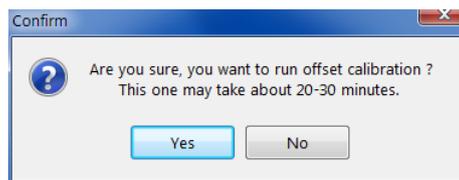
Recommended calibration interval: 1 year

Disconnect all BNC input connectors (TR 2519 front panel) and disconnect Signal Box (TR 2519 rear panel) due to elimination of interferences.

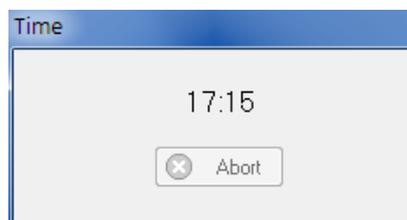
Select menu Calibration > All channels offset calibration.



Follow instruction in next windows:



The calibration takes approx. 20 ... 30 minutes.
Remaining time is displayed:





Do not touch TR 2519 case or connectors during calibration due to interferences!

The window with list of new calibration constants is automatically opened after successful calibration.
Result is possible to check in TEST mode (see chapter C 4.2 TR 2519: Panel of virtual TR 2519).

Connect all previously disconnected cables.

5. Auto Gain Calibration

This calibration serves for gain calibration of all ranges of selected charge amplifier.

Recommended calibration interval: 1 year



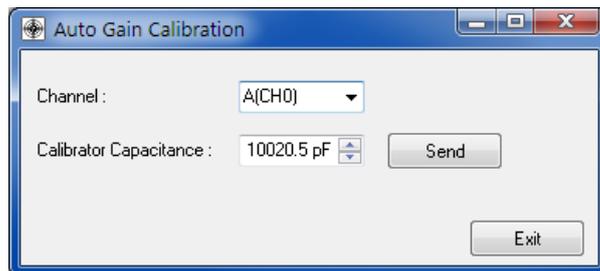
Accuracy of this calibration has direct influence on accuracy of measurement by means of piezoelectric sensor! Wrong measurement is non-repairable!

Disconnect all BNC input connectors (TR 2519 front panel) and disconnect Signal Box (TR 2519 rear panel) due to elimination of interferences.

Select menu Calibration > TR 2519 Auto Gain Calibration.

TR 2519 Auto Gain Calibration

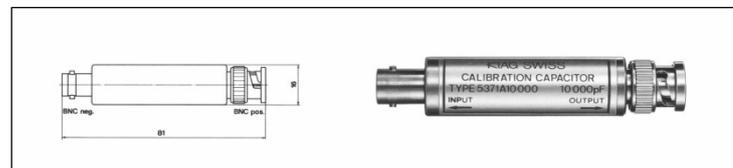
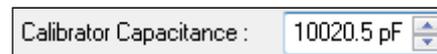
Set parameters in Auto Gain Calibration window:



Select channel you want to calibrate:



Set real value of calibration capacitor – see calibration protocol of the capacitor (recommended capacitor: KISTLER Type 5371A10000, 10 nF/0,5 %)



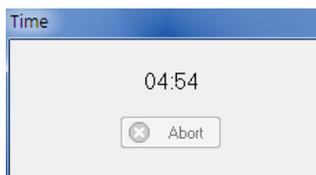
Plug in calibration capacitor directly to relevant input of charge amplifier. Connect second end of calibration capacitor by means of coaxial cable (BNC connectors, standard RG 58 cable, length less than 1 m) to TR 2519 calibrator output.

Complete interconnection for calibration of Channel A (CHO) is in the next picture:



Press button to start the calibration. The calibration takes approx. 5 minutes.

Remaining time is displayed:



Do not touch TR 2519 case or connectors during calibration due to interferences!

The window with list of new calibration constants is automatically opened after successful calibration.

Continue with calibration of next channel (then go to step 3) or exit Auto Gain Calibration (use Exit button).

Unplug calibration capacitor and connect all previously disconnected cables.

6. Manual Gain Calibration

This calibration serves for gain calibration of all ranges of selected charge amplifier.

Previous Auto Gain Calibration is most recommended method due to its simplicity, reproducibility and accuracy.

Manual Gain Calibration is recommended for correction of Auto Gain Calibration only if you have your own high precision charge calibrator.



Accuracy of this calibration has direct influence on accuracy of measurement by means of piezoelectric sensor! Wrong measurement is non-repairable!

Make measurement with your precision charge calibrator (like standard shooting, but do not forget to set sensor coefficient to 1 pC/bar). Make a note of measured average values of maximum values of charge/pressure (repeat measurement ten times for each range of calibrated charge amplifier). Charge/pressure value for calibration set approx. to 75 % of selected range of calibrated charge amplifier.

Select one item from menu:

Calibration > Charge amplifier A gain calibration
Calibration > Charge amplifier B gain calibration

Calibration > Charge amplifier E (CH4) gain calibration
Calibration > Charge amplifier F (CH5) gain calibration

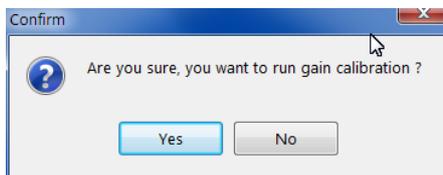
according to channel you want to calibrate.



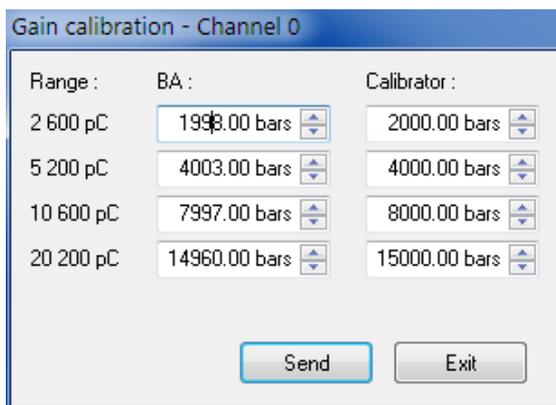
TR 2519 does not support Charge Amplifiers E and F!

Charge amplifier A (CH0) gain cal.
Charge amplifier B (CH1) gain cal.
Charge amplifier C (CH2) gain cal.
Charge amplifier D (CH3) gain cal.
Charge amplifier E (CH4) gain cal.
Charge amplifier F (CH5) gain cal.

Confirm or cancel calibration:



Set parameters in window – here for channel A:



- fill TR 2519 column with measured average values (of maximum values of charge/pressure)
- fill Calibrator column with values set on your precision charge calibrator
- press Send button to execute calibration or Exit to cancel calibration

Continue with calibration of next channel (then go to step 1 or 2).

Check accuracy of executed calibration – repeat step 1 and compare results.

7. Checking of Time Base Accuracy

Time base is internally derived from precision quartz oscillator. Calibration is impossible, but user can simply verify accuracy of time base by means of reference signal source. Appropriate reference signal source is precision waveform or pulse generator.

Recommended checking interval: 1 year

Parameters of reference clock signal:

- frequency = 10 Hz (accuracy better than 100 ppm i.e. 0,01 %)
- square-wave, P/W = approx. 1:1
- amplitude 0/5 V (CMOS) or ± 5 V (symmetrical)
- rise/fall edge max. 100 ns

Connect reference clock signal to voltage input E (CH4).

Start new measurement with following parameters (see picture below):

- Sample Rate = 1 MHz
- 12,5 %
- Rise
- Trigger source E (CH4)
- E, F (CH4, 5) data interval -10 ms/ $+120$ ms
- Voltage input E (CH4) Range 10 V

Ballistic analyser (BA06S / V12.30-11.12.11)

Sample Rate: 1 MHz | Name: C:\BAControl_Directories\BA_Data\Working\2011-12-29_0000 | Saved Data: 0 B | Round: 0

Trigger Level: 12.5% | Record: 100 / 100 / 130 000 / 100 points | 0.10 / 0.10 / 130.00 / 0.10 ms | 1 018.07 K

Trigger Edge: RISE

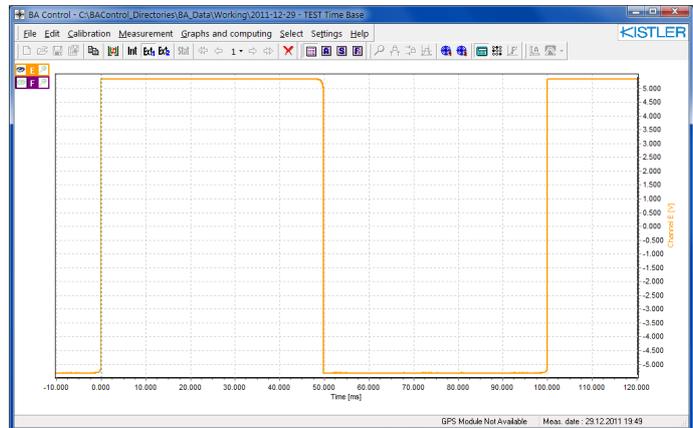
Settings:

LOAD	A,B (CH0,1)	0.00 ms	0.10 ms
SAVE	C,D (CH2,3)	0.00 ms	0.10 ms
	E,F (CH4,5)	-10.00 ms	120.00 ms
	G,H (CH6,7)	0.00 ms	0.10 ms

Channels:

- A** Charge amplifier CH0 IM06-0-CHGA: Range: 1.000e00 pC/bar, Filter: 20 kHz
- B** Charge amplifier CH1 IM06-0-CHGA: Range: 1.000e00 pC/bar, Filter: 20 kHz
- C** Charge amplifier CH2 IM06-0-CHGA: Range: 1.000e00 pC/bar, Filter: 20 kHz
- D** Charge amplifier CH3 IM06-0-CHGA: Range: 1.000e00 pC/bar, Filter: 20 kHz
- E** Voltage input CH4 IM07-0-D2SA: REFERENCE CLOCK, Range: 10 V, Filter: 20 kHz
- F** Voltage input CH5 IM07-0-D2SA: Range: 10 V, Filter: 20 kHz
- G** Voltage input CH6 IM07-0-D2SA: Range: 10 V, Filter: 20 kHz
- H** Voltage input CH7 IM07-0-D2SA: Range: 10 V, Filter: 20 kHz

Use command RUN to record one measurement. Signal must be like this:



By means of Computing tool Add Time/Velocity measure time interval between two consecutive rise edges of signal value must be close to 100 ms, maximum allowed tolerance is $\pm 0,05\%$. If not, contact service.

Example of data evaluation is in the picture – see below. Calculated result is 100,003 ms – it means, error is only 0,003 %.

Row	Type	Start Stop	Edge	Min. width	Description	Results	Extended values and results	Limits Max Limits Min	C.I.P. coeff. NATO coeff.
1		Start OK Stop OK		1 us	TIME	100.003 ms			C <input type="checkbox"/> N <input type="checkbox"/>

8. Checking Accuracy of TR 2519 Calibrator

TR 2519 Calibrator is set to maximum possible accuracy during factory calibration. Temperature and long-term stability is guaranteed by design and recalibration is not necessary for all lifetime of the instrument. In case of unexpected loss of accuracy it is necessary to send the instrument to service.

Recommended checking interval: 1 year or before Auto Gain Calibration

Disconnect all BNC input connectors (TR 2519 front panel) and disconnect Signal Box (TR 2519 rear panel) due to elimination of interferences.

Connect output of TR 2519 Calibrator (BNC connector CAL) to precision digital voltmeter with 6 or more digit resolution and accuracy better than 0,005 %.

Select Calibration > TR 2519 Calibrator Reset.



BA06 Calibrator Reset

Select Calibration > TR 2519 Calibrator Reset again (for switching of TR 2519 Calibrator output to DC output voltage mode).



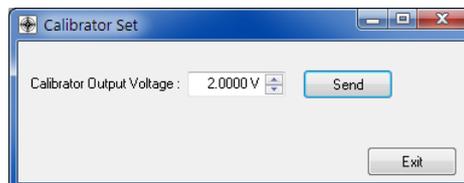
BA06 Calibrator Reset

Select Calibration > TR 2519 Calibrator Set.



BA06 Calibrator Set

In window Calibrator Set, set output voltage to +2,0000 V and press button Send.



Check output voltage by means of digital voltmeter. If voltage is not close to +2,0000 V, try to repeat step 4).

Tolerance of voltage for guaranteed accuracy of charge calibration is $\pm 0,05\%$ (voltage must be between +1,9990 V and +2,0010 V).

In window Calibrator Set, set output voltage to 0,0000 V and press button Send. Check output voltage by means of digital voltmeter.

Voltage must be between +0,0010 V and -0,0010 V.

In window Calibrator Set, set output voltage to -2,0000 V and press button Send. Check output voltage by means of digital voltmeter.

Tolerance of voltage for guaranteed accuracy of charge calibration is $\pm 0,05\%$ (voltage must be between -1,9990 V and -2,0010 V).