

AVS-48SI PICOBIDGE

avs48data.csv - OpenOffice.org Calc

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	0	99.9972	-0.0072	1	0	0	2	7	2014	12	2	13	24	5.2	
2	3	99.9321	-0.1724	1	0	0	2	7	2014	12	2	13	24	11.7	
3	4	99.9767													

Terminal Window Content:

```

Command History
idn?
hw?
ch?:ran?:exc?
refid?
adc10:adc?
res10:res?
err?

Text Received
PICOWATT_AVS-48SI,0R0
PICOWATT_RS232PB_A1
0;2;7
3
0.999898
99.989754
0
    
```

AVS-48SI PICOBIDGE Software Interface:

CHANNEL	RESISTANCE	TEMPERATURE	CHANNEL NAME
CH0			Calibrators
CH1	117.498 ohm	045.0977 C	PT-100
CH2			
CH3			
CH4			
CH5			
CH6			
CH7			

Control Error: 0, Heater Power %: 0

Channel Settings (CH1): RANGE 300R, AUTORANGE DISABLED, EXCITATION 1mV, FILTER LENGTH 20, 2/4-WIRE Four wire, SENSOR GROUNDING Floating sensor, SCAN ENABLE DISABLED.





AVS-48SI PICOBRIDGE

The **AVS-48SI** is a high-performance cryogenic AC Resistance Bridge with an optional PID Temperature Controller. It is mainly intended for resistance thermometry and control at very low temperatures. PICOBRIDGE offers an unprecedented and breathtakingly long list of features - many of them are not needed in daily routine. However, as experienced scientists know, if the experimental system does not behave as expected, all tools that help in finding out what is happening can be invaluable. That is where the AVS-48SI excels.

Most scientific instruments are used for years, often longer than a decade. They can maintain their accuracy well or not so well, but nothing warns about a possible change in calibration. Few low-temperature laboratories have resources for calibrating their instruments, and sending them to manufacturers on a regular basis would be a nuisance. Here the PICOBRIDGE offers a new solution. It can be calibrated without moving it away from its normal operating place and temperature, without any external standards and without user intervention. Only one command is needed to start an automatic process, which measures seven ultra-stable resistors carefully using 128 combinations of settings and takes about 3.5 hours.

The AVS-48SI is a resistance bridge front end: it requires an external controlling computer. It has a versatile serial USB/RS232 interface for writing your own programs on any language and platform that support RS232 communication. A full-featured resistance bridge and temperature controller without need to write a line of program code is offered by a LabView VI. This program offers direct temperature readout, automatic scanning, intelligent filtering and more. It requires at least the base version of LabView2012 or later.

PICOBRIDGE is based on world's longest tradition in making resistance bridges: VS-2, VS-3 and VS-4 (Instruments for Technology Oy, Ab 1972-1981), then AVS-45, AVS-46, and three generations of AVS-47 (RV-Elektron-iikka Oy 1981-).

For a more detailed discussion, full specifications and operating instructions download the user guide from our WEB site.

PICOBRIDGE FEATURES

ANALOG BRIDGE HARDWARE

- 7 inputs for sensors. Each can be either 2- or 4-wire connected.
- Input connector is compatible with channels 0-6 of the AVS-47, AVS-47A and AVS-47B.

- (2-wire reading – 4-wire reading) is the lead resistance of a 4-wire connected sensor.
- 8 resistance ranges from 0-3Ω to 0-30MΩ.
- 8 nominal square-wave excitations from 3μV to 10mVrms.
- Any sensor can be floating or its I- terminal can be grounded.
- Standard operating frequency 12.5/13.64(default)/15.0 Hz.
- External oscillator input for an arbitrary operating frequency.
- High insensitivity to input capacitance, active compensation.
- Typical input noise voltage 5nV/sqrt(Hz).
- 7 ultra-stable wirewound resistors for automatic recalibration in situ.
- Amplified AC signal is available at a monitor output. Differential connection is not needed.
- Accurate stepless analog output from the self-balancing bridge circuit (0..+3V).
- Accurate stepless analog control error or deviation output (-3...+3V).
- Two accurately calibrated DAC outputs 0.005...2.99V. One is used as set point when controlling temperature, the other is always free.
- Extremely low RF emissions.

ANALOG TEMPERATURE CONTROLLER OPTION

- 18 logarithmically spaced power ranges 1μW...1.8W into 100Ω.
- 3W maximum into 50Ω.
- Current source output, no limits to heater resistance.
- Heater power, not current, depends linearly on error signal.
- 14 logarithmically spaced proportional gains.
- 12 logarithmically spaced integrator gains.
- 11 logarithmically spaced derivator gains.
- BNC outputs for set point and error signal.
- Heater current and voltage at heater output are measured for calculating true $P=U*I$ power.



POWER INPUTS

- 90-250V 50-60Hz universal power supply.
- Alternative input for 18V AC safety voltage.
- Alternative input for 12V DC input.

CPU UNIT

- Digital intelligence has been placed in an external CPU unit for keeping its RF emissions outside the shielded cryostat room. Grounding the cable shield to the conducting wall eliminates antenna effects.
- CPU is based on the very popular Arduino Mega2560.
- CPU firmware can be upgraded in the field (Windows).

OPTICAL FIBRE CONNECTION

- Wire cable between the bridge and the CPU can be replaced by an optional 5 or 10 meter long optical fibre link. It provides the utmost EMI safety.

OPERATION USING SERIAL COMMANDS

- Not limited to a Windows-PC running LabView
- Instead of a physical Com: port one can use a USB-232 converter
- Serial format is standard 9600,8,N,1 . Only TxD, RxD and Ground. No handshaking.
- Wide command set for bridge and controller (≈ 60 commands/queries).
- Automatic calibration in situ – no external devices needed.
- Each channel's measuring settings can be saved. The saved properties can be recalled together with the channel, or same properties can be used for any channel. Properties are: range, excitation, 2/4-wire, sensor grounding and autoranging.
- A/D conversions are averages of 1..1000 samples
- Statistics from one average: Min, Max and Standard Deviation (\approx rms noise).

CALIBRATION

- Automatic calibration program is based on 7 wire-wound resistors. They have excellent temperature stability and the best available long-term stability. The bridge can be calibrated in situ in its real operating place and temperature.

- The analog outputs can be calibrated so that they are compliant with your own DVM.
- The calibrator resistors can be measured by an external ohmmeter. Maintaining or checking calibration is independent of the factory.

LABVIEW OPERATION

BRIDGE

- All features of the analog bridge and controller are supported.
- Sensors can be named.
- Every channel's measuring and filtering properties can be saved automatically for later recalling.
- Direct temperature readout for sensors that have R/T conversion files.
- Easy non-formatted .txt structure of the R/T conversion files
- Smart filter reduces errors due to settling, autoranging or interference spikes.
- Smart filter has an output mode for eliminating time lag when data has a trend.
- Automatic scanning of selected sensors. Smart filter takes care of settling times.
- Any of the calibrator resistors can be included in a scan sequence.
- The calibrators' true values are shown for comparison.
- Large and bright display shows all scanned channel's names, resistances and temperatures at a single glance.
- Display resolution 5 $\frac{3}{4}$ digits (300000).

TEMPERATURE CONTROLLER OPTION

- Temperature control set point can be given as resistance or temperature.
- Changing heater range when in balance does not change output power.
- Hold mode for maintaining output constant. When holding, other sensors can be measured or scanned.
- Control sensor's measuring range can be changed in hold mode without changing output power.
- Non-linearized animated error meter shows trend when error is large but has high sensitivity near to balance.



- Animated heater power meter shows percentage of the range's maximum output. The U*I heating power and the calculated maximum are shown as numbers.
- Heating power can be limited by disabling high power ranges.

CALIBRATION

- Similar as with serial operation, but the calibration VIs offer more information.

SAVING RESULTS

- Measured or scanned results are made available to other LabView VIs by means of a Functional Global Variable (FG).
- Results can be saved to disk as a CSV file in two alternative forms: a single line which is rewritten by a new result, or a multiline file where new results are appended as they become available.

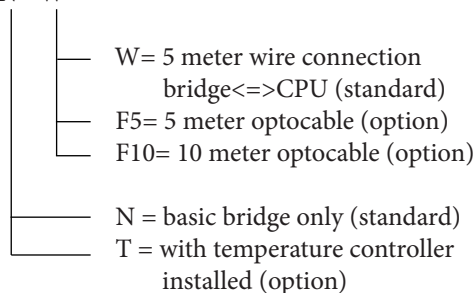
OTHER

- The A/D converter of the bridge can measure 26 different internal voltages = an aid for remote diagnostics.
- Standard deviation of readings in the smart filter is shown for quality control.
- LabView source code is not protected
- Simple installation by copying the LV programs into one directory.

ORDERING INFORMATION

The AVS-48SI has a universal power supply for 90-250V 50-60Hz

AVS-48SI - N - W



RV-Elektroniikka Oy Picowatt
Veromiehentie 14
FI-01510 VANTAA
FINLAND
telephone +358 50 337 5192
email: reijo.voutilainen@picowatt.fi
Internet: www.picowatt.fi