JOFRA calibration

ASM

Advanced Signal Multi-Scanner

AMETEK
SENSORS, TEST & CALIBRATION

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Product Description

The ASM SERIES (Advanced Signal Multi-scanner) offers a unique timesaving and automatic solution to calibrate multiple temperature sensors simultaneously.

The ASM-800 series is designed for use wherever temperature measurement is critical and/or there is a need for traceable calibration documentation.

Easy, flexible and time-saving!

The ASM series is a series of 8-channel scanners controlled by JOFRACAL software through a PC. Up to 3 ASM units can be stacked to calibrate up to 24 sensors at the same time. It can handle signals from 2-, 3- and 4 wire RTD's, TC's, transmitters, thermistors, temperature switches, and voltage.

The solution includes the easy-to-use JOFRACAL software to set up, execute, print, and save the valuable traceable calibration data—just connect the ASM to a PC through a RS232 cable.

JOFRACAL controls all JOFRA dry-block heating/cooling sources and includes the flexibility to use manual liquid baths, ice-points, or dry-blocks. Connect the reference temperature sensor directly to the ASM-800 or use your existing JOFRA temperature reference device.

Furthermore the JOFRALOG software allows the user to use the ASM scanner as a data-logging device for up to 24 sensors.




Key Features

- **Calibrate 24 Temperature Sensors**
  Design your own calibration procedures—start calibrating and leave for other tasks. Save precious time and calibrate all sensors under exactly the same conditions.
- **Data Logging For Multiple Sensors**
  Software for data logging of up to 24 sensors with user-defined interval.
- **Prepared For Future Expansions**
  8 more channels for every ASM-800. Expand the system when required and save the investment until it is necessary.
- **Calibrate Any Temperature Sensor**
  Universal input to handle: 2-, 3-, 4-wire RTD's, TC's, transmitters, thermistors, thermo switches, and voltage.
- **Integrate With JOFRA Instruments**
  Combine ASM with any JOFRA dry-block, DTI reference thermometer or ASC300 signal calibrator. Adds value to your existing JOFRA equipment.
- **Reference Sensor Input Included**
  Dedicate one input channel for your temperature reference sensor with an accuracy to 0.026°C / 0.047°F.
- **Reduce The Human Factor Uncertainty**
  Automatic procedures leave no space for operation errors.
- **Documentation Made Easy**
  RS232 communication and JOFRACAL calibration software are included in the standard delivery.

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Basic Versions

The ASM Series is available in 3 versions depending on the kind of sensors to be measured.

ASM-801 has 8 universal plugs. This is a screw terminal solution used to measure RTD's, TC's, mA, voltage, ohm, and transmitters. It measures the cold junction (CJ) temperature for each channel and is able to supply a very accurate cold junction (CJ) temperature compensation.

ASM-802 has 8 small TC plugs for measurement of TC sensors. This model also measures the cold junction (CJ) temperature for each channel and is able to supply a very accurate cold junction (CJ) temperature compensation.

ASM-803 has 8 LEMO plugs, which are primarily for measurement of RTD sensors. This solution makes it possible to measure current, voltage and ohm. It has built-in loop power supply for each channel.

Models

The ASM multi-scanner is made in an A and a B model. The ASM B model is the complete solution with integrated scanner and high accuracy multi signal measuring circuits. The ASM A model is designed to add 8 channel scanning capabilities to an existing instrument. The A model therefore needs the measuring capabilities from a JOFRA dry-block ATC B, PTC B, or RTC B model, a JOFRA ASC300, ASC-301, ASC321, or ASC-400 signal calibrator, a DTI050 or DTI-1000 reference thermometer, or an ASM B model.

A Model

The A model uses the measuring circuit of an existing instrument. This means that the normal set-up of the measuring equipment is used, and the multi-scanner then makes it possible to calibrate up to 8 sensors simultaneously. The built-in cold junction temperature measuring circuit ensures high accuracy when calibrating thermocouples. The A model is also capable of working without the JOFRACAL with a manual channel selector at the back.

The A model may transmit an analogue signal of up to 8 sensors to one connected measuring device. It is able to transmit signals up to 30VDC, 30 mA.

B Model

The B model has the same functions as the A model, but it differs as it is not necessary to include a measuring instrument in the set-up, as the multi-scanner has build-in measurement capabilities.

The most important advantage of the B model is the fact that it is possible to obtain huge reductions in time of the calibration procedure. The B model is able to perform several measurements each second, whereas the A model as an example will spend approximately 15 seconds on each measurement, when connected to an RTC B model.

The B model is able to measure voltage up to 10V, resistance up to 4KΩ and current up to 24mA.

True Ohm Measurement

The ASM-801 and ASM-803 employ state-of-the-art DC measuring techniques. To achieve high accuracy, the measuring principle used by the ASM is True Ohm Measurement thus eliminating the EMF from cables, sockets, and sensors.

True Ohm Measurement is a proven method to achieve accurate compensation for errors induced by thermal effects. The resistance is measured through the 4-wire system at 0.8 mA, after which the instrument takes a reading without any applied current. The second reading is the "error EMF".

Measurement Of Up To 24 Sensors At The Same Time

For both ASM models it is possible to connect up to 3 ASM multi-scanners, enabling you to measure up to 24 sensors simultaneously. Both models are able to perform / transmit the following measurements: 2-, 3- and 4-wire RTD, TC signals with or without cold junction (CJ) compensation, thermistors, transmitters, current, voltage, and ohm sources / loads.

ASM-801 A/B and ASM 803 A/B both have built-in 24 V loop power for 4-20 mA transmitter.

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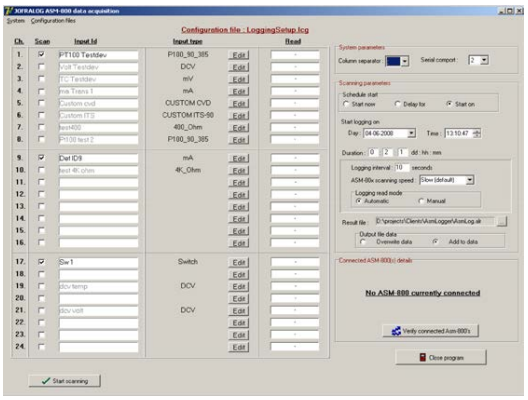
Data-Logging For Multiple Sensors



The data acquisition software JOFRALOG allows the user to utilize the ASM multi-scanner as a datalogging device for multiple sensors. The JOFRALOG program allows the configuration and execution of a logging procedure collecting data from up to 24 sensors saving the data in a format compatible to Microsoft Excel.

JOFRALOG works with an ASM B model for collecting data from 8 channels. By adding 1 or 2 ASM A models, the number of channels may be expanded to 16 or 24. When the user has defined a scanning job, the user may store the configuration including sensor definitions for every channel in a configuration file. Whenever required the information may be loaded and reused. On start-up the previous configuration used is always loaded automatically saving the user a lot of time. Furthermore the uploaded information will be checked against the configuration to determine any conflicts. JOFRALOG can be downloaded at ametekcalibration.com.

JOFRA STS Reference Sensors

The ASM series handles signals from 2-, 3- and 4 wire RTD's, TC's, transmitters, thermistors, temperature switches and voltage.

All sensors under test are compared to a temperature reference sensor. The reference sensor can be the internal reference sensor in a dry-block or an external reference sensor, which is connected to channel one on the ASM multi-scanner.

To get an ideal reference system, JOFRA offers a range of reference sensors. All JOFRA Superior Temperature Standard sensors are economical and offer fast response times, low immersion depths, compact physical sizes, and specified low drift rates: even at high temperatures. These are all important considerations when selecting a reference sensor.

System Accuracy—STS Sensor

-50 to 400°C / -58°F to 752°F .....**±0.050°C / ±0.090°F** (1) (2)

-50 to 400°C / -58°F to 752°F .....**±0.070°C / ±0.126°F** (1) (3)

-50 to 650°C / -58°F to 1202°F .....**±0.080°C / ±0.144°F** (1) (2)

-50 to 650°C / -58°F to 1202°F ..... **±0.110°C / ±0.198°F** (1) (3)

System accuracy using STS-100 sensor, 12 months use-order system calibration for full documentation/traceability.

(1) Specified at 95% confidence interval k=2, over full range, including calibration uncertainty, excluding 1 LSD (Least Significant Digit).

(2) Excl. sensor drift (please see long term stability at page 5)

(3) Incl. sensor drift (please see long term stability at page 5) after 100 hours at max. temperature.

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JOFRACAL Calibration Software

JOFRACAL calibration software ensures easy calibration of RTD´s, thermocouples, transmitters, thermoswitches, pressure gauges, and pressure switches. JOFRACAL can be used with JOFRA HPC501, HPC502, IPI, or Crystal XP2i pressure calibrators, all JOFRA temperature calibrators, as well as JOFRA AMC910 and ASC300, ASC301, ASC321, or ASC-400 multi signal calibrators, and the ASM-800 signal multi scanner. When used with the JOFRA ASM-800 signal multi scanner, JOFRACAL can perform a simultaneous semi automatic calibration on up to 24 pressure and/or temperature devices under test in any combination.

JOFRACAL software controls the complete calibration procedure, stores the results and provides a calibration audit trail through hard-copy certificates. All calibration data is stored for each sensor to monitor drift and optimize recalibration intervals. A scheduler feature allows planning of future calibrations.

Using JOFRACAL together with the ASM multi-scanner allows the user to customize all calibration routines. The software is easy to use so you do not have to be a programmer to configure your own calibration procedures. The software features prompts, menus, and help functions that guide you through the configuration process.

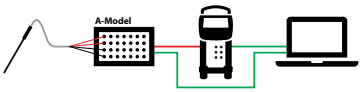
If up to three ASM multi-scanners are connected, the software enables the instruments to measure sensors of the same type simultaneously. When working with the ASM series, the sensors connected need to be of the same type. The only exception being channel 1, which can always be used for the temperature reference sensor.

Combine the ASM signal multi-scanner with any of your existing JOFRA dry-block or liquid bath calibrators. You can also use your JOFRA DTI reference thermometer or even the JOFRA ASC300 signal calibrator, which adds further value to your existing JOFRA equipment.

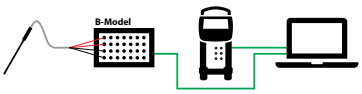
Minimum Software Requirements

- Windows XP, Vista, 7, 8, or 10 - 32 or 64 bit.

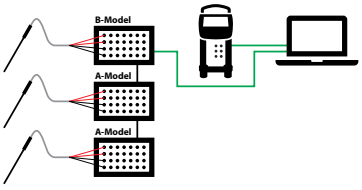
An ASM-803 A connected to the inputs of a JOFRA RTC calibrator, and controlled by JOFRACAL.



ASM-803 B performing its own measurements in a JOFRA CTC calibrator, including an STS reference sensor in channel one, all controlled by JOFRACAL.



ASM A models connected to the ASM B model, in order to obtain 24 channels. The JOFRA RTC calibrator is used as a dry-block with the reference sensor connected to the reference input of the ATC, all controlled by JOFRACAL.



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Specifications

Functional Specifications

Power Supply

Power Supply ..... **External AC/DC adapter**
Input ..... **90 – 254V, 45 – 65Hz**
Output ..... **30V ±2% regulated DC, max. 30W**

Scanning Rate

Maximum 5 channels per second

Physical Specifications

Weight and Instrument Size

Weight ..... **2.3 kg /5.07 lb**
(LxWxH) ..... **250 x 249 x 69 mm /9.8 x 9.8 x 2.7 in**

Shipping (with carrying case)

Weight ..... **6.3 kg /13.9 lb**
(LxWxH) ..... **350 x 560 x 180 mm /13.8 x 22.1 x 7.1 in**

Shipping (without carrying case)

Weight ..... **4.4 kg /9.7 lb**
(LxWxH) ..... **350 x 560 x 180 mm /13.8 x 22.1 x 7.1 in**

Miscellaneous

Serial Data Interface **RS232**
Specification Temperature ..... **20 to 26°C (68 to 79°F)**
Operating (Ambient) Temperature ..... **0 to 40°C (32 to 104°F)**
Storage (Ambient) Temperature ..... **-20 to 50°C (-4 to 122°F)**
Humidity ..... **0 to 90% RH @ 30°C**
CE Conformity **EN61326**

A-Model Input Specifications

All input specifications apply to the instrument connected.

Transmitter Supply

Output Voltage ..... **24VDC +10%**
Output Current ..... **Maximum 28 mA**
8 individual current sources. Permanent on, no switching.

Accuracy Automatic Cold Junction Compensation

ASM-801/802
±0.20°C (±0.36°F) ..... **20 to 26°C (68 to 79°F)**
@ ambient temperature

ASM-803
±0.50°C (±0.90°F) ..... **20 to 26°C (68 to 79°F)**
@ ambient temperature
Temperature drift outside 20 to 26°C. 0.05°C/°C 0.05°F/°F)

Input Specifications

A-Models When Used with Other Equipment *
RTD 4-wire ..... **2.5 ppm rdg. (0-400 ohm)**
15 ppm rdg. (400-4000 ohm)
RTD 3-wire ..... **2.5 ppm rdg. + 50 mohm (0-400 ohm)**
15 ppm rdg. + 50 mohm (400-4000 ohm)
mA ..... **1 ppm rdg. (0-24 mA)**
MV, V **2uV**
* Accuracies from the connected instruments has to be added.

B-Model Input Specifications

Transmitter Supply

Output Voltage ..... **24VDC +10%**
Output Current ..... **Maximum 28 mA**
8 individual current sources. Permanent on, no switching.

Transmitter Input mA

Range ..... **0 to 24 mA**
Accuracy (12 months) ..... **±0.01% Rdg. +0.01% F.S.**

Voltage Input VDC

Range ..... **0 to 12 VDC**
Accuracy (12 months) ..... **±0.005% Rdg. +0.01% F.S.**

Switch Input

Switch Dry Contacts
Test Voltage ..... **Maximum 2.5 VDC**
Test Current ..... **Maximum 0.8 mA**

RTD Input Specifications

Signal Type ..... **2-, 3-, 4-wire true ohm RTD input**
Signal Range ..... **0-400 Ω (PT10/PT50/PT100)**
Accuracy (12 months) ..... **±0.002% Rdg. +0.002% F.S.**
Signal Range ..... **0-4000 Ω (PT200/PT500/PT1000)**
Accuracy (12 months) ..... **±0.002% Rdg. +0.005% F.S.**

For 3-wire input add 50 mΩ assuming all three RTD leads are matched.
For 2-wire add 100 mΩ.

Thermocouple Specifications

Signal Range ..... **-10mV – 78 mV**
Accuracy ..... **±(0.005% of rdg. + 0.005% of F.S.)**

Accuracy Automatic Cold Junction Compensation

ASM-801/802
±0.20°C (±0.36°F) ..... **20 to 26°C (68 to 79°F)**
@ ambient temperature

ASM-803
±0.50°C (±0.90°F) ..... **20 to 26°C (68 to 79°F)**
@ ambient temperature
Temperature drift outside 20 to 26°C ..... **0.05°C/°C (0.05°F/°F)**

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Specifications

4wire RTC Type	Temperature Range °C From	To	°F From	To	12 Months Accuracy °C	°F
PT10 alpha 385	-200	-80	-328	-112	0.198	0.357
	-80	0	-112	32	0.210	0.378
	0	100	32	212	0.224	0.403
	100	155	212	311	0.225	0.405
	155	320	311	608	0.234	0.422
	320	420	608	788	0.250	0.450
	420	660	788	1220	0.263	0.473
	660	800	1220	1472	0.292	0.525
PT50 alpha 385	-200	-80	-328	-112	0.042	0.076
	-80	0	-112	32	0.046	0.083
	0	100	32	212	0.051	0.091
	100	155	212	311	0.052	0.093
	155	320	311	608	0.057	0.102
	320	420	608	788	0.062	0.112
	420	660	788	1220	0.069	0.124
	660	800	1220	1472	0.078	0.141
PT100 alpha 385	-200	-80	-328	-112	0.023	0.041
	-80	0	-112	32	0.026	0.046
	0	100	32	212	0.029	0.052
	100	155	212	311	0.030	0.054
	155	320	311	608	0.034	0.062
	320	420	608	788	0.038	0.069
	420	660	788	1220	0.044	0.080
	660	800	1220	1472	0.052	0.093

4wire RTC Type	Temperature Range °C From	To	°F From	To	12 Months Accuracy °C	°F
PT200 alpha 385	-200	-80	-328	-112	0.247	0.445
	-80	0	-112	32	0.262	0.471
	0	100	32	212	0.278	0.500
	100	155	212	311	0.279	0.502
	155	320	311	608	0.290	0.522
	320	420	608	788	0.309	0.556
	420	660	788	1220	0.323	0.582
	660	800	1220	1472	0.358	0.645
PT500 alpha 385	-200	-80	-328	-112	0.101	0.182
	-80	0	-112	32	0.108	0.194
	0	100	32	212	0.116	0.208
	100	155	212	311	0.117	0.210
	155	320	311	608	0.123	0.222
	320	420	608	788	0.133	0.239
	420	660	788	1220	0.141	0.254
	660	800	1220	1472	0.158	0.285
PT1000 alpha 385	-200	-80	-328	-112	0.052	0.094
	-80	0	-112	32	0.056	0.102
	0	100	32	212	0.062	0.111
	100	155	212	311	0.063	0.113
	155	320	311	608	0.068	0.122
	320	420	608	788	0.074	0.133
	420	660	788	1220	0.081	0.145
	660	800	1220	1472	0.092	0.165

4wire RTC Type	Temperature Range °C From	To	°F From	To	12 Months Accuracy °C	°F
M50 alpha 428	-200	-80	-328	-112	0.039	0.070
	-80	0	-112	32	0.042	0.076
	0	100	32	212	0.045	0.081
	100	155	212	311	0.045	0.081
	155	200	311	392	0.046	0.083
M100 alpha 428	-200	-80	-328	-112	0.021	0.038
	-80	0	-112	32	0.023	0.041
	0	100	32	212	0.026	0.047
	100	155	212	311	0.026	0.047
	155	200	311	392	0.027	0.049

The ASM-800 fits nicely in many process industries, especially pharmaceutical, oil & gas, and power plants. Original equipment manufacturers (OEMs) will also benefit from calibrating and documenting multiple temperature sensors before final installation.

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Specifications

JOFRA calibration

TC Type	Temperature Range °C From	Temperature Range °C To	Temperature Range °F From	Temperature Range °F To	12 Months Accuracy °C	12 Months Accuracy °F
B	250	320	482	608	1.31	2.35
	320	420	608	788	0.99	1.77
	420	660	788	1220	0.65	1.17
	660	800	1220	1472	0.56	1.01
	800	1000	1472	1832	0.44	0.78
	1000	1200	1832	2192	0.41	0.74
	1200	1400	2192	2552	0.39	0.70
	1400	1600	2552	2912	0.38	0.69
	1600	1820	2912	3308	0.40	0.72
E	-250	-200	-418	-328	0.74	1.34
	-200	-100	-328	-148	0.18	0.32
	-100	0	-148	32	0.09	0.17
	0	155	32	311	0.06	0.11
	155	320	311	608	0.06	0.12
	320	420	608	788	0.07	0.12
	420	660	788	1220	0.08	0.14
	660	800	1220	1472	0.09	0.16
	800	1000	1472	1832	0.10	0.19
J	-210	-100	-346	-148	0.23	0.41
	-100	0	-148	32	0.10	0.18
	0	155	32	311	0.08	0.14
	155	320	311	608	0.09	0.16
	320	420	608	788	0.09	0.17
	420	660	788	1220	0.09	0.17
	660	800	1220	1472	0.09	0.17
	800	1000	1472	1832	0.11	0.21
	1000	1200	1832	2192	0.13	0.23

TC Type	Temperature Range °C From	Temperature Range °C To	Temperature Range °F From	Temperature Range °F To	12 Months Accuracy °C	12 Months Accuracy °F
K	-250	-200	-418	-328	0.94	1.69
	-200	-100	-328	-148	0.27	0.49
	-100	0	-148	32	0.14	0.24
	0	155	32	311	0.10	0.19
	155	320	311	608	0.11	0.20
	320	420	608	788	0.11	0.20
	420	660	788	1220	0.13	0.23
	660	800	1220	1472	0.14	0.24
	800	1000	1472	1832	0.15	0.28
	1000	1200	1832	2192	0.17	0.31
	1200	1372	2192	2501.6	0.20	0.36
N	-250	-200	-418	-328	1.37	2.47
	-200	-100	-328	-148	0.41	0.74
	-100	0	-148	32	0.20	0.35
	0	155	32	311	0.15	0.27
	155	320	311	608	0.13	0.23
	320	420	608	788	0.12	0.22
	420	660	788	1220	0.13	0.23
	660	800	1220	1472	0.14	0.24
	800	1000	1472	1832	0.15	0.27
	1000	1200	1832	2192	0.16	0.29
	1200	1300	2192	2372	0.17	0.31
R	-50	0	-58	32	1.30	2.35
	0	155	32	311	0.78	1.40
	155	320	311	608	0.47	0.84
	320	420	608	788	0.40	0.73
	420	660	788	1220	0.39	0.70

TC Type	Temperature Range °C From	Temperature Range °C To	Temperature Range °F From	Temperature Range °F To	12 Months Accuracy °C	12 Months Accuracy °F
R	660	800	1220	1472	0.35	0.63
	800	1000	1472	1832	0.36	0.64
	1000	1200	1832	2192	0.34	0.61
	1200	1400	2192	2552	0.34	0.60
	1400	1600	2552	2912	0.35	0.62
	1600	1768	2912	3214.4	0.41	0.74
S	-50	0	-58	32	0.98	1.76
	0	155	32	311	0.78	1.40
	155	320	311	608	0.49	0.89
	320	420	608	788	0.45	0.81
	420	660	788	1220	0.41	0.73
	660	800	1220	1472	0.40	0.72
	800	1000	1472	1832	0.39	0.70
	1000	1200	1832	2192	0.38	0.69
	1200	1400	2192	2552	0.38	0.69
	1400	1600	2552	2912	0.39	0.71
	1600	1768	2912	3214.4	0.46	0.83
T	-250	-200	-418	-328	0.65	1.17
	-200	-100	-328	-148	0.27	0.49
	-100	0	-148	32	0.15	0.26
	0	155	32	311	0.10	0.18
	155	320	311	608	0.08	0.15
	320	400	608	752	0.08	0.14

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Ordering Options & Accessories

Ordering Information

Base Model Number	
ASM801	ASM-801 series (with 8 universal screw plugs)
ASM802	ASM-802 series (with 8 TC plugs)
ASM803	ASM-803 series (with 8 LEMO plugs)

Model Version	
A	Basic model no built-in measuring circuit
B	Including built-in measuring circuit

Calibration Certificate	
F	Traceable certificate
H	Accredited certificate

Options	
C	Carrying case

ASM801 B F C

Sample Order Number: JOFRA ASM-801 B with standard accessories, traceable certification, and carrying case.

Standard Delivery

- ASM signal multi-scanner (user specified)
- Mains adapter
- RS232 cable
- JOFRACAL software
- JOFRALOG software (B models only)
- Reference manual
- Screw driver (ASM-801 only)

Accessories

Connection Cables

Cable with banana / LEMO connection. **122823**
(ASM-A to ATC B / PTC B / RTC B / ASC300 / ASC301 / ASC321 / ASC-400 - RTD / V / mA)

Cable (1150 mm) with male LEMO / LEMO connection (ASM-A to AMC910 / DTI-1000 - RTD) . . . **125534**

Cable with minicompensation / LEMO connection **125587**
(ASM-A to ATC B / PTC B / RTC B / ASC300 / ASC301 / ASC321 / ASC-400 - TC)

Kit with RS232 cable and cable (650 mm) with male LEMO /LEMO connection (ASM to ASM) . . . **125618**

Other Accessories

Thermocouple male plug type K (ASM-802) **120517**

Thermocouple male plug type N (ASM-802). **120514**

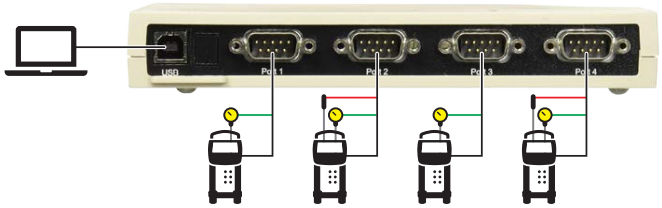
Thermocouple male plug type T (ASM-802) **120515**

Thermocouple male plug type TYPE Cu-Cu (ASM-802) **120519**

LEMO connection with strain relief (ASM-803) **125620**

1 meter, 4 Core cable with shield for Pt100 (ASM-803) **60E151**

Edgeport Converter with 4 RS232 ports. **125002**
Connected and powered by the USB connection to the PC. Tested with JOFRA calibrators.



The Edgeport Converter converts one USB port to four RS232 ports without external power supply. Tested with JOFRA calibrators and JOFRACAL calibration software.

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JOFRA calibration

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*ISO 17025 accredited calibration lab.

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