

signal



Automatic calibration system

Save months by not trying to invent your own standard scanner systems. As a world wide supplier, JOFRA has been dedicated in this line of business for more than 25 years

Calibrate up to 24 temperature sensors

Design your own calibration procedure s- start calibrating and leave for other tasks. Save precious time and calibrate all sensors under exactly the same conditions

Prepared for future expansions

8 more channels for every ASM800. 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 other JOFRA equipment

Combine ASM with any JOFRA dry-block, JOFRA DTI reference thermometer or JOFRA 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

ISO 9001 Manufacturer

JOFRA™ ASM Series

Advanced

Signal

Multi-scanner

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Functional signal multi-scanner adding flexibility to your calibration needs

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

The ASM800 series is designed for use where ever temperature measurement is critical and/or there is a need for traceable calibration documentation.

Easy, flexible and time-saving!



PRODUCT DESCRIPTION

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 software JOFRACAL 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 ASM800 or use your existing JOFRA temperature reference device.

AMETEK®
CALIBRATION INSTRUMENTS

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 fixed 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.

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



The ASM800 will fit into a lot of process industries and especially pharmaceutical, oil & gas and power plants. Original equipment manufacturers (OEM) will also benefit from calibrating and documenting multiple temperature sensors before final installation.

Models

The ASM multi-scanner is made in an A and a B model.

The ASMB model is the complete solution with integrated scanner and high accuracy multi signal measuring circuits. The ASMA model is less expensive and 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 model, JOFRA ASC300 signal calibrator, DTI-1000 reference thermometer or an ASM B model.

A model

The A model use 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 approx. 15 seconds on each measurement, when connected to an ATC B model.

The B models is able to measure voltage up to 10V, resistance up to 4K Ω and current up to 24mA.

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.

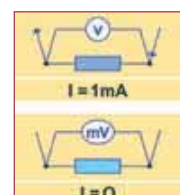
Both models are able to perform / transmit the following measurements: 2-, 3- and 4-wire RTD, TC signals with or without cold junction (CJ) compensation, thermistors, transmitters, current, voltage, and ohm sources / loads.

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

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".



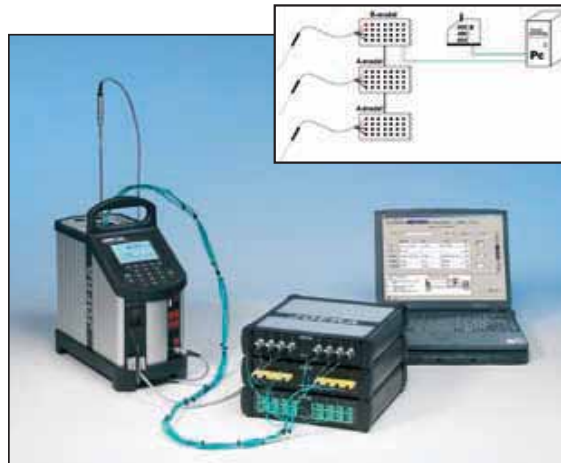


Picture 1: ASM-803 A connected to the input's of a JOFRA ATC B model and controlled by JOFRACAL.

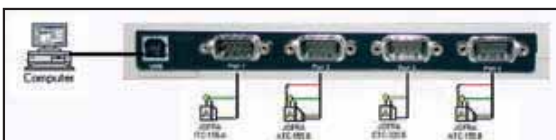
Combine the ASM signal multi-scanner with any of your existing JOFRA dry-block or liquid bath calibrators, You can also use your JOFRA DTI reference thermometer or even the JOFRA ASC300 signal calibrator, which adds further value to your existing JOFRA equipment.



Picture 2: ASM-803 B performing its own measurements in a JOFRA ITC-320 A including an STS reference sensor in channel one all controlled by JOFRACAL.



Picture 3: 2 ASM A models connected to the ASM B model, in order to obtain 24 channels. In this set-up the JOFRA ATC B model is used as a dry-block with the reference sensor connected to the reference input of the ATC. All controlled by JOFRACAL.



Edgeport converter - Order number 125005

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

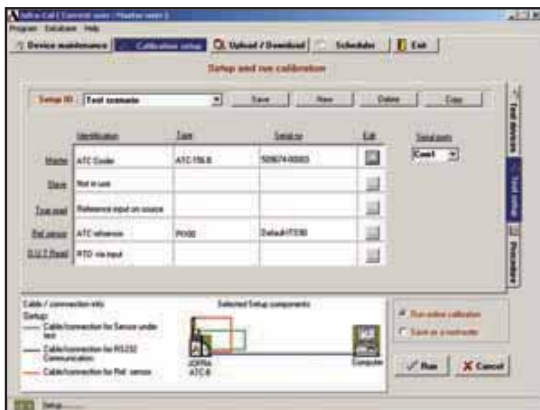


JOFRACAL temperature calibration software ensures easy calibration of RTD's, thermocouples, transmitters and thermostats.

JOFRACAL software presents the means for an entirely automatic calibration of sensors and a semi-automatic calibration of the complete process loop through the use of a PC. The software provides the comparison between the process readout value and the reference value; a measurement that is typically required within ISO9000, GMP, or HACCP systems. Additionally, this evaluation may be performed on-site without electrical interruption of the loop.

A variety of screens presents the user with information in an easy-to-read format. This provides the technician with an optimal overview to allow for setting up the calibration procedure as well as performing the calibration. Furthermore, JOFRACAL also includes facilities for generation and printing of detailed certificates.

This feature even provides tools which allow you to customize the certificate content and format to comply with accepted norms and standards including: company-specific information, numbering, and terminology. We have also designed functions to permit the incorporation of specific requirements from your ISO program to make the documentation a direct part of your existing quality system.



Simplified calibration documentation

All ASM series multi-scanners are provided with the JOFRACAL calibration software. This software 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. Only exception being channel 1, which can always be used for the temperature reference sensor.

The JOFRACAL calibration software supports automatic calibration of all JOFRA dry-block calibrators equipped with an RS232 serial data interface including the JOFRA DTI-1000 digital thermometer. For semi-automatic calibrations, the software also supports liquid baths, ice points, or other dry-block heating and cooling sources. Using the software's "SCENARIO" function allows for combining instruments in virtually any configuration.

The calibration data collected may be stored on a PC for later recall, analysis or printing of certificates.



JOFRACAL calibration software

Easy to use

Various screens provide easy-to-read information and instructions

Multiple sensor input

Combined with JOFRA ASM signal multi-scanners JOFRACAL let you calibrate up to 24 sensors simultaneously

Clear view of calibration

Graphic presentation allows you to follow the calibration while in progress

User-friendly database registration

Calibration procedures and results are stored in a user-friendly database structured like Explorer including searching and sorting facilities

Flexible calibration

Choose between different temperature sources, such as dry-block calibrators, liquid baths, and ovens

Reduce calibration time

Control two dry-blocks simultaneously and reduce your overall calibration time significantly

Scheduler feature

Plan upcoming calibrations with the scheduler function; list the tag, location, and calibration due date for the instrument

Automatic calibration

Automatic calibration of all JOFRA dry-blocks equipped with an RS232 interface, JOFRA ASM signal multi-scanner, JOFRA ASC300 signal calibrator and the JOFRA DTI-1000 reference thermometer

JOFRA STS REFERENCE SENSORS

The ASM series handles signals from 2-, 3- and 4 wire RTD's, TC's, transmitters, thermisters, 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.

The reference sensor can also be connected to a JOFRA DTI-1000 reference thermometer or the reference input on a JOFRA ATC-B dry-block or even the JOFRA ASC300 signal calibrator.

JOFRA industrial temperature reference probes are based on more than 50 years of industrial temperature sensor manufacturing experience. The main requirement of a reference probe is stability: The less the probe drifts, the lower the measurement uncertainty.

The JOFRA STS-100A industrial temperature reference probes are built to last. All JOFRA Superior Temperature Standard probes 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 probe.

In addition to straight probes, AMETEK offers a 90° angled version specifically developed for use with dry-block temperature calibrators.

This probe allows the user to have both the sensor-under-test and the reference probe in the thermowell at the same time: even if the sensors have a connection or a transmitter head.

All probes are subjected to a long approval process. This includes mechanical stress reduction of the entire assembly as well as aging the sensor element itself. The purpose of aging the sensor is to remove the initial drift. The procedure involves cycling the sensor to 650°C / 1202°F a number of times and monitoring the drift. Finally all sensors are exposed to maximum temperature for 16 hours and again monitored for drift. To be accepted for final calibration and certification, the probe must meet our minimum tolerance.



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)

Note: 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 1 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.

FUNCTIONAL SPECIFICATIONS

Power supply

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

Scanning rate

Scanning rate	Max. 5 channels per seconds
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JOFRACAL software

Minimum hardware requirements for JOFRACAL calibration software.

- INTEL™ 486 processor (PENTIUM™ 800 MHz recommended)
- 32 MB RAM (64 MB recommended)
- 80 MB free disk space on hard disk prior to installation
- Standard VGA (800 x 600, 16 colors) compatible screen (1024 x 786, 256 colors recommended)
- CD-ROM drive for installation of the program
- 1 free RS232 serial port

PHYSICAL SPECIFICATIONS

Instrument dimensions

L x W x H:	250 x 249 x 69 mm (9.8 x 9.8 x 2.7 in)
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Instrument weight

Net weight	2.3 kg (5.07 lb)
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Shipping (including carrying case)

Weight:	6.3 kg (13.9 lb)
Size: L x W x H	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)
Size: L x W x H	.....	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

INPUT SPEC'S (A MODELS ONLY)

All input specifications apply to the instrument connected

Transmitter supply

Output voltage 24VDC +10%
 Output current Maximum 28 mA

Accuracy automatic cold junction compensation

ASM-801/802 ±0.20°C (±0.36°F) @ ambient temperature
 20 to 26°C (68 to 79°F)
 ASM-803 ±0.50°C (±0.90°F) @ ambient temperature
 20 to 26°C (68 to 79°F)
 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

INPUT SPEC'S (B MODELS ONLY)

Transmitter supply

Output voltage 24VDC +10%
 Output current Maximum 28 mA

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 □ (PT10/PT50/PT100)
 Accuracy (12 months) ±0.002% Rdg. +0.002% F.S.
 Signal range 0-4000 □ (PT200/PT500/PT1000)
 Accuracy (12 months) ±0.002% Rdg. +0.005% F.S.

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

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

4-wire RTD Type	Temperature range				12 months accuracy	
	°C		°F		°C	°F
	From	To	From	To		
Pt10	-200	-80	-328	-112	0.198	0.357
alpha 385	-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	-200	-80	-328	-112	0.042	0.076
alpha 385	-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	-200	-80	-328	-112	0.023	0.041
alpha 385	-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
Pt200	-200	-80	-328	-112	0.247	0.445
alpha 385	-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	-200	-80	-328	-112	0.101	0.182
alpha 385	-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	-200	-80	-328	-112	0.052	0.094
alpha 385	-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
M50	-200	-80	-328	-112	0.039	0.070
alpha 428	-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	-200	-80	-328	-112	0.021	0.038
alpha 428	-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

TCType	Temperature range				12 month accuracy	
	°C		°F		°C	°F
	From	To	From	To		
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
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

TCType	Temperature range				12 month accuracy	
	°C		°F		°C	°F
	From	To	From	To		
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
	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
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
T	1600	1768	2912	3214,4	0.46	0.83
	-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



ORDERING INFORMATION

Order number	Description
ASM801	Base model number - 1st thru 6th characters 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 - 7th character
A	Basic model no built-in measuring circuit
B	Including built-in measuring circuit
	Options - 8th thru 10th characters
C	Carrying case
F	Traceable certificate
H	Accredited certificate
X	No option used
ASM801BCFX	Sample order number JOFRA ASM-801 B with standard accessories, carrying case and traceable certification.

When ordering an A model or you want to connect several ASM scanners please remember to order connection cables (see below).

STANDARD DELIVERY

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

ACCESSORIES

Connection cables:

122823	Cable with banana / LEMO connection (ASM-A to ATC / ASC300 - RTD / Volt / mA)
125534	Cable (1150 mm) with male LEMO / LEMO connection (ASM-A to AMC900 / DTI-1000 - RTD)
125587	Cable with minicompensation / LEMO connection (ASM-A to ATC / ASC300 / AMC900 - TC)
125618	Kit with RS232 cable and cable (650 mm) with male LEMO / LEMO connection (ASM to ASM)

Other accessories:

120517	Thermocouple male plug type K (ASM-802)
120514	Thermocouple male plug type N (ASM-802)
120515	Thermocouple male plug type T (ASM-802)
120519	Thermocouple male plug type TYPE Cu-Cu (ASM-802)
125620	Loose LEMO connection with strain relief (ASM-803)
60E151	1 meter 4-core cable w/shield for Pt100 (ASM-803)
125002	Edgeport converter with 4 RS232 ports. Connected and powered by the USB connection to the PC.

Tested with JOFRA calibrators



AMETEK Calibration Instruments offers a complete range of calibration equipment for temperature, pressure, and signal - including calibration software.

JOFRA Temperature Instruments
Portable precision thermometers. Dry-block and liquid bath calibrators: 4 series, with more than 25 models and temperature ranges from -90° to 1205°C / -130° to 2200°F. All featuring speed, portability, accuracy and advanced documenting functions with JOFRACAL calibration software.

JOFRA Pressure Instruments
Convenient electronic systems ranging from -1 to 1000 bar (25 inHg to 14,500 psi) - multiple choices of pressure ranges, pumps and accuracies, fully temperature-compensated for problem-free and accurate field use.

JOFRA Signal Instruments
Process signal measurement and simulation for easy control loop calibration and measurement tasks - from handheld field instruments for multi or single signals to laboratory reference level bench top instruments.

JOFRA / JF Marine Instruments
A complete range of calibration equipment for temperature, pressure and signal, approved for marine use.

FP Temperature Sensors
A complete range of temperature sensors for industrial and marine use.

M&G Primary pressure standards
Pneumatic floating-ball or hydraulic piston deadweight testers - easy-to-use with accuracies to 0.015% of reading.

...because calibration is
a matter of confidence

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