

signal

**JOFRA**<sup>®</sup>  
calibration **»K**

» Superior calibration accuracy to  $\pm 0.003\%$  of reading  $\pm 0.001\%$  F. S.

» Source/Read 13 thermocouples, 9 RTD's, Voltage, Current, Pressure (read only)

» Custom RTD and SPRT profiles

» 9 setpoints for each output range and type

» **Isolated measurement channel**

Two voltage ranges: 10V and 100 V DC  
MilliAmp range 0 to 50 mA  
MilliAmp range with simultaneous 24 VDC power  
Selectable 250 Ohm HART™ resistor  
Accuracy of 0.005% of reading on voltage ranges

» **Pressure reference capability**

Increases the flexibility of the instrument with the addition of external pressure modules. Accuracies up to 0.01%

» **Fully remote controllable**

External PC control is possible via RS232, IEEE-488 or optional USB interface cable

» **Direct keyboard entry or cursor entry with decade control**

## Advanced Multi-purpose Calibrator **AMC910**



The AMC910 multi-purpose calibrator is the right solution for high precision signal, temperature, and pressure calibrations, as it combines the power and features of a laboratory calibrator, with the addition of an isolated measurement channel.

It offers laboratory grade accuracy, high performance and simple-to-use functionalities. With the optional external pressure modules, the system may be tailored to address all possible calibration needs.

The AMC910 not only offers temperature and pressure calibration features, it combines sourcing of current and voltage, measurement of millivolts and resistance with a second completely isolated measurement channel for a single laboratory calibration instrument unmatched in versatility, performance, and value. This flexibility means that only one unit is needed for calibration or verification giving the confidence needed for test instruments as well as for field calibrations.

Furthermore the AMC910 has the ability to store up to 9 setpoints for each output range. The setpoints can be selected manually or automatically stepped at timed intervals. It features an intuitive, easy-to-operate user interface and computer control through the RS232 or IEEE-488 interface for automated production testing. The unit sources DC voltage and current for multifunction workload coverage, enabling calibration of data loggers, strip chart recorders, multi-meters, handheld calibrators, and other industrial instruments. This is the cost-effective solution for multiple calibration needs.

ISO 9001 Manufacturer

Specification Sheet  
SS-AMC910

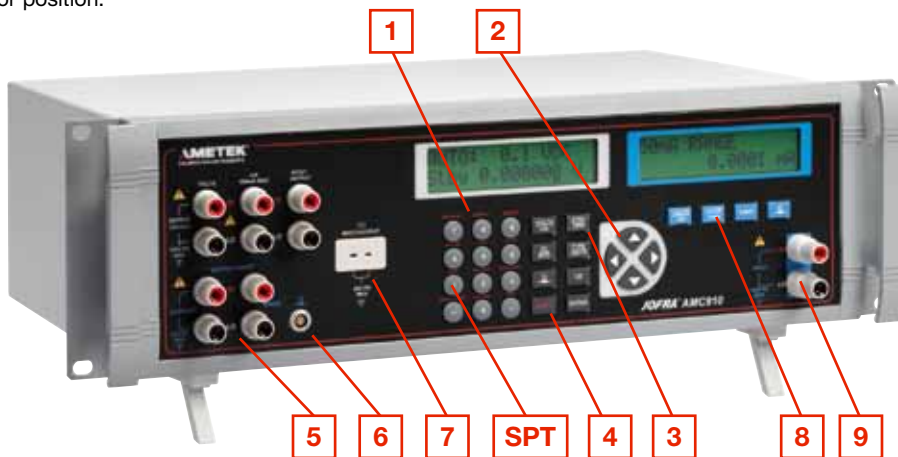
**AMETEK**<sup>®</sup>  
TEST & CALIBRATION INSTRUMENTS

### Direct keyboard entry (1)

The JOFRA AMC910 provides simple, front-panel entry of mode, range, and value. Using direct keyboard entry (1), the exact value desired is entered using the numeric keys, and the ENTER key is pressed to set the output to that value. Whichever way you choose, setup is simple and fast. In the voltage output mode, the JOFRA AMC910 auto-ranges on the entered value for maximum accuracy at all times.

### Cursor entry (2)

Using cursor entry (2), the LEFT/RIGHT arrow keys are used to move the cursor under the digit in the display to be changed. The UP/DOWN arrow keys increment/decrement the value at the cursor position.



### Choose the mode you want (3)

#### Voltage Mode

The JOFRA AMC910 offers four precision voltage output ranges (100mV, 1V, 10V, and 100V) all with  $\pm 0.003\%$  of reading  $\pm 0.001\%$  F. S. accuracy. These ranges are ideal for calibrating a broad range of DC voltage instrumentation. Additionally all voltage outputs settle to full specification in less than 200ms making the JOFRA AMC910 ideal for automated calibration systems.

An automatic stand-by mode (3) assures that output voltages above 30VDC must be acknowledged by the operator before the voltage appears at the output jacks. The stand-by mode is also triggered if the output current compliance is exceeded, thereby protecting the device under calibration.

#### Current Mode

The JOFRA AMC910 features a precision current output range (100mA) that offers 0.01% accuracy, which is ideal for calibrating process instrumentation especially 4 to 20mA equipment. With a full 12 volts of compliance at 100mA virtually any precision DC current measuring device can be calibrated using the JOFRA AMC910. Like the voltage ranges the current range offers quick settling time and an operate/stand-by mode.

#### Thermocouple Mode

The JOFRA AMC910 can read and source any of 11 types of thermocouples. Its T/C input and output is Cold Junction Compensated, using an ultra-stable PT-1000 sensor.

#### RTD Mode

The JOFRA AMC910 can read and source 9 RTD types as well as YSI-400 and Ohms for non-standard curves. Probe coefficients (A, B, C, and R0) can be entered directly, with storage for up to five custom curves and one SPRT curve. The performance of the JOFRA AMC910 in the RTD mode compares to dedicated RTD measurement instruments. Unlike low-cost, less accurate RTD instruments, the display in the JOFRA AMC910 is always active, reading to three decimal places, using polynomial averaging to extract a high accuracy signal. The result is a very high accuracy reading.

### Pressure Mode

Signal calibration capabilities of the JOFRA AMC910 include, current, voltage and resistance. In temperature mode, the unit can read and source any of 11 types of thermocouples and 9 RTD types as well as YSI-400 and Ohms for non-standard curves. In pressure mode, the instrument operates with all JOFRA APM modules and covers pressure ranges from vacuum to 700 bar / 10,000 psi, selectable through more than 60 different pressure modules, representing vacuum, absolute, gauge and compound pressure types as well as all relevant pressure units with up to 0,01% Full Scale accuracy.

### Setpoint Control (4 and SPT)

A SHIFT key (4) provides easy access to the setpoint controls of the JOFRA AMC910. Up to nine setpoints can be defined for each output mode and each thermocouple and RTD type. Setpoints are recalled individually at the touch of three buttons, SHIFT (4), SETPOINT (SPT) button and then the corresponding numeric keys 1-9. Any number of sequential setpoints can be stepped through automatically, with complete control of dwell time. Either way, for rapid setup of repeatable tests, no other instrument comes close to the JOFRA AMC910.

### Remote Control (4)

All of the JOFRA AMC910 operating functions can be accessed via RS232, IEEE-488 or optional USB interface cable using a standard PC running Windows® HyperTerminal or other software using an ASCII protocol. Custom control programs may be written using programming software such as C++. Switching between LOCAL and REMOTE is as simple as touching the SHIFT (4) and LOCAL buttons.

### Rock-Solid Stability

The accuracy of the JOFRA AMC910 is specified for both 90-day and one-year intervals. Manual zero calibrations can be made on all T/C and pressure functions to eliminate offsets.

### Flexible Output (5, 6 and 7)

Five-way copper alloy binding posts (5) provide a wide range of connection options. A standard pressure module connector is provided (6), as is the CJC T/C mini-jack (7).

### Isolated Measurement Channel (8 and 9)

The JOFRA AMC910 features a fully isolated measurement channel which allows the user to calibrate process transmitters and signal isolators. In reality it's like having two instruments in one! This channel also incorporates a 24 volt loop power supply to power 2-wire transmitters and a HART interface resistor enabling direct connection to HART communicators. Key features are:

- Two voltage ranges 10V and 100V DC
- Milliamp range 0 to 50mA
- Milliamp range with simultaneous 24 volt power (0 to 24ma)
- Selectable 250 ohm HART resistor
- Accuracy of 0.005% of reading on all ranges

## SPECIFICATIONS AMC910

(1 year at 23°C ±5°C; % of reading, unless otherwise noted)

### Output Voltage

#### Range

...0 to 100.000 mV, 0 to 1.00000 V, 0 to 10.0000 V, 0 to 100.000 V

#### Resolution

0 to 100 mV Range ..... 1 µV  
0 to 1 V Range ..... 10 µV  
0 to 10 V Range ..... 100 µV  
0 to 100 V Range ..... 1 mV

#### Accuracy (% of reading)

0 to 100 mV Range ..... ±0.003% (30ppm) ± 3 µV  
0 to 1 V Range ..... ±0.003% (30ppm) ± 10 µV  
0 to 10 V Range ..... ±0.003% (30ppm) ± 100 µV  
0 to 100 V Range ..... ±0.003% (30ppm) ± 1 mV

#### Maximum Burden (~ 1 Ohm output impedance)

0 to 100 mV Range ..... 10 mA  
0 to 1 V Range ..... 10 mA  
0 to 10 V Range ..... 10 mA  
0 to 100 V Range ..... 1 mA

### Output Current

Range ..... 0 to 100.000 mA  
Resolution ..... 1 µA  
Accuracy (% of reading) ..... ± 0.005% ± 1 Count  
Maximum Burden ..... 10 V

### Thermocouples

#### Output

Types ..... J, K, T, E, R, S, N, B, L, U, C, BP, XK  
Range ..... mV  
Resolution ..... 0.1 °C/°F  
Accuracy ..... 0.14 °C; Type J, typical

#### Input

Types ..... J, K, T, E, R, S, N, B, L, U, C, BP, XK  
Range ..... mV  
Resolution ..... 0.01 °C/°F  
Accuracy ..... 0.14 °C; Type J, typical

### RTD

#### Output

Range ..... Pt385 (100, 200, 500, 1000), Pt392,  
..... Pt3916 (JIS), Ni120, Cu 10, YS I400  
Resolution ..... 0.01 °C/°F; Pt385-100, typical  
Accuracy ..... ±0.05°C / 0.09°F; Pt385-100, typical

#### Input (All RTD inputs are 4 wire)

Range ..... Pt385 (100, 200, 500, 1000), Pt392,  
..... PT3916 (JIS), Ni120, Cu10, YSI400, 25 Ohm SPRT  
Resolution ..... 0.001°C/°F; Pt385-100, typical  
Accuracy ..... ±0.02°C / 0.04°F; Pt385-100, typical

### Ohms

#### Output

Range ..... 5 to 4000.0 Ω  
Resolution ..... 5 to 400.00 Ω ..... 0.001 Ω  
..... 5 to 4000.0 Ω ..... 0.01 Ω  
Accuracy ..... 5 to 400.00 Ω ..... ±0.05 Ω  
..... 5 to 4000.0 Ω ..... ±0.3 Ω

#### Input (4 wire connection)

Range ..... 0 to 4000.00 Ω  
Resolution ..... 0 to 400.00 Ω ..... 0.001 Ω  
..... 0 to 4000.0 Ω ..... 0.01 Ω  
Accuracy ..... 0 to 400.00 Ω ..... 40 PPM ±0.002 Ω  
..... 0 to 4000.00 Ω ..... 40 PPM ±0.02 Ω

### Pressure

Range ..... 0 to 700 bar / 10,000 psi  
Compatibility ..... All JOFRA APM pressure moduels

### Isolated Measurement Channel

Range ..... Accuracy  
0-10.0000V ..... ±0.005% ± 0.2mV  
0-100.000V ..... ±0.005% ± 2.0mV  
0-52.0000mA ..... ±0.01% ± 1µA  
Loop power: ..... 24 V ± 10%  
HART™ resistor: ..... 250Ω ± 3%  
Maximum current: ..... 24 mA

### Stability

Warm-up Time ..... 30 minutes to rated accuracy  
Temp. coefficient (t<18°C/t>28°C) ..... 10% of accuracy spec/°C  
Temp. coefficient (t<64°C/t>82°C) ..... 5% of accuracy spec/°F

### Environmental

Operating Temperature ..... 0 to 50°C / 32 to 122°F  
Storage Temperature ..... -20 to 70°C / -4 to 158°F  
Operating humidity ..... < 80% to 30°C / 86°F  
..... < 70% to 40°C / 104°F  
..... < 40% to 50°C / 122°F  
Storage humidity ..... <95%, non-condensing

### Power Requirements

Voltage Range ..... 90 to 240 VAC  
..... Max. 15 VA

### Mechanical

Dimensions (h x w x d): ..... 17.7 cm x 48.26 cm x 27.96 cm /  
..... 5 in x 19 in x 11 in  
Weight ..... 4.8 kg / 10.5 lbs  
Display 2 Large character 16 by 2 line alphanumeric backlit LCDs

## ORDERING INFORMATION

Order No.	Description
AMC910	AMC910 Advanced Multi-purpose Calibrator
	<b>Power supply</b>
115	115 VAC, 50/60 Hz
220	230 VAC, 50/60 Hz
	<b>Mains power cable type</b>
A	EUROPEAN, 230 V
B	USA/CANADA, 115 V
C	UK, 240 V
D	SOUTH AFRICA, 220 V
E	ITALY, 220
F	AUSTRALIA, 240 V
G	DENMARK, 230 V
H	SWITZERLAND, 220 V
I	ISRAEL, 230 V
	<b>Certificate</b>
G	NIST traceable certificate (standard)
H	Accredited certificate
AMC910115BG	<b>Sample order number</b> JOFRA AMC910 for 115 VAC with NIST traceable certificate.

## STANDARD DELIVERY

- JOFRA AMC910 calibrator
- Instruction manual
- AC line cord
- Thermocouple shorting jumper
- NIST traceable certificate

## ACCESSORIES

Part No.	Description
121985	Extension cable for Pt100 sensor, length 5.0 m
121983	Extension cable for Type K - 5 m
122523	Extension cable for Type N - 5 m
120519	Thermocouple Male Plug - Type Cu-Cu - White
120518	Thermocouple Male Plug - Type R / S - Green
120517	Thermocouple Male Plug - Type K - Yellow
120516	Thermocouple Male Plug - Type J - Black
120515	Thermocouple Male Plug - Type T - Blue
120514	Thermocouple Male Plug - Type N - Orange
2206011	Thermocouple plug + K wire + alligator
2206012	Thermocouple plug + T wire + alligator
126812	Cable for USB to serial
105366	Cable for RS232
104203	Test lead set

## JOFRA STS REFERENCE SENSORS

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.



## JOFRA APM PRESSURE MODULES

The APM series of pressure modules by JOFRA are compatible with the AMC910, ASC300 or HPC calibrators. The JOFRA APM external pressure modules includes more than 60 models available with gauge, absolute, differential, and vacuum pressure references and in metric and imperial engineering units. The modules are engineered for in-plant, field, or laboratory use. They are ready-to-use with the JOFRA AMC910 and the protocol allows for immediate recognition and use of the module once plugged into the calibrator.



**AMETEK Test & Calibration Instruments**  
A business unit of AMETEK Measurement & Calibration Technologies Division offering the following industry leading brands for test and calibration instrumentation.

### JOFRA Calibration Instruments

#### Temperature Calibrators

Portable dry-block calibrators, precision thermometers and liquid baths. Temperature ranges from -90°C(-130°F) to 1205°C(2200°F). Temperature sensors for industrial and marine use.

#### Pressure Calibrators

Convenient electronic systems ranging from -25 mbar to 1000 bar - fully temperature-compensated for problem-free and accurate field use.

#### Signal Instruments

Process signal measurement and simulation for easy control loop calibration and measurement tasks.

### M&G Pressure Testers & Pumps

Pneumatic floating-ball or hydraulic piston dead weight testers with accuracies to 0.015% of reading. Pressure generators delivering up to 1,000 bar.

### Lloyd Instruments

Materials testing machines and software from Lloyd Instruments guarantees expert materials testing solutions. The comprehensive program also covers Texture Analysers to perform rapid, general food testing and detailed texture analysis on a diverse range of foods and cosmetics.

### Davenport Polymer Test Equipment

Allows measurement and characterization of moisture-sensitive PET polymers and polymer density.

### Chatillon Force Measurement

The hand held force gauges and motorized testers have earned their reputation for quality, reliability and accuracy and they represent the de facto standard for force measurement.

### Newage Testing Instruments

Hardness testers, durometers, optical systems and software for data acquisition and analysis.

**AMETEK®**  
TEST & CALIBRATION INSTRUMENTS

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