

signal

**JOFRA**<sup>®</sup>  
calibration **KK**

» **Multi-function signal calibrator**

With its robust custom housing, the ASC series is ideal for both field and workshop use. These calibrators are the process engineer's best friend

» **Documenting calibrator**

The ASC321 provides a paperless calibration flow when combined with our well-known JOFRACAL calibration software

» **Input and output**

RTD: 14 types, TC: 13 types, Current: 0-24 mA DC, Voltage: 0-20 VDC, Frequency: 0 to 10 KHz, Pulse: train output, Resistance: 5 to 4000 Ohm

» **Simultaneous read-back**

Including isolated read-back from device-under-test of mA, V and pressure

» **Calibrate pressure**

Add on a JOFRA APM pressure module to create a full-featured pressure calibrator that can perform a semi-automatic leak-test, pressure-switch calibration and more

» **Calibrate temperature**

Use the ASC together with a JOFRA temperature calibrator to add measurement channels for sensors or temperature switches

» **Measure temperature**

The ASC series can be used as a high-accuracy thermometer that works with RTDs and CvD equations, to obtain true temperatures

» **Optimal read out visibility**

Large ClearBrite™ display

» **Fast RTD simulation**

Quick enough to work with pulsed transmitters and PLCs

**ISO 9001 Manufacturer**

Specification Sheet  
SS-ASC Series

## Advanced Signal Calibrator **ASC Series**



The JOFRA ASC301 & ASC321 are portable process signal calibrators that provide the functionality and accuracy you expect from a laboratory calibration system, yet packed in a compact design that can fit into your tool box. These calibrators are easy to use and can be operated with one hand for field use.

The ASC321 is a full documenting calibrator, using predefined work orders from JOFRACAL. This ensures easy documentation and reduces the possibilities for errors when calibrating in the field.

The ASC series does more than just calibrate signals. Combined with the APM external pressure module or a JOFRA dry block calibrator, an ASC will calibrate pressure and temperature and, if used together with JOFRACAL, document it as well. For workshop use a DC power supply/charger is available.

The full numerical keypad, series of function keys and cursor keys, provide a simple and quick user interface. The new ClearBrite™ graphical display offers the best possible viewing.

The high accuracy of the ASC series has not been achieved on account of fragile measurements or source circuitries, both the ASC301 & ASC321 have fuseless protection – this might save you a calibrator, as well as lowers your cost of ownership.

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

**Read-back display**

The upper half of the graphical display is dedicated to the read-back signal from the device-under-test. This input section is electrically isolated from the circuitry. You can also read pressure from the JOFRA APM pressure modules in this section of the display.

**Primary display**

This part of the display is used for all input or output combinations.

The primary display plus the read-back display gives a comprehensive and simultaneous input-output functionality and an excellent overview of the test in progress.

**Menu keys**

The three navigation keys' functions are clearly explained at the bottom of the display.



**Terminal block**

All input and output connectors are placed away from the display and keyboard to give you maximum freedom to operate the unit.

We call it "wireless" keyboard.

**Cursor keys**

Set increment / decrement outputs and step & ramp range.

**Numeric keyboard**

A full numeric keyboard gives you the fastest way to reach your desired set point values.

**Simultaneous input and output**

The ASC series offers simultaneous input and output. This means that you can calibrate and adjust a temperature transmitter on the table without the use of other instruments.

Source the sensor signal loop and input the mA from the transmitter. If you select mA loop the ASC will also supply the 24 VDC for the loop. In the display you will see both your output temperature and the return mA from the transmitter. Enter the zero and full scale values and you can make quick 10% or 25% steps or go direct to zero or full span values. The ASC has dedicated keys for these operations so adjustment on the transmitter is easy.

**Temperature reading at reference level**

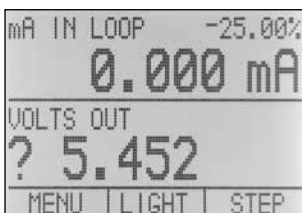
The ASC offers the possibility to characterize an RTD sensor. Use this feature to add a missing special curve or to characterize a reference RTD.

If you choose a reference RTD from the accurate and stable STS100 temperature sensors, they will be delivered with a traceable calibration certificate including the necessary Callender Van Duesen coefficients. Enter the figures into the ASC and you have a temperature reference. Complement this with a JOFRA dry block temperature calibrator and your ASC becomes a central part of your portable calibration lab.

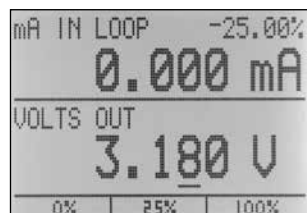
**Fuseless protection**

If you by accident connect the ASC to the mains supply, the instrument is protected. The fuseless protection feature protects the instrument up to 250 VAC on any combination of connections made on the test lead connectors. This prevents expensive repairs and recalibration of the instrument.

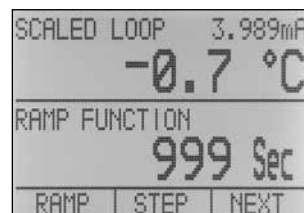
To avoid injury never connect the instrument to the mains supply!



Direct input, full numeric keypad. Easy output entry of specific values



Easy single digit adjustment, with the cursor keys. Ideal for gauges and tweaking tasks



User adjustable ramp and step time. Very wide range - from 5 to 999 seconds



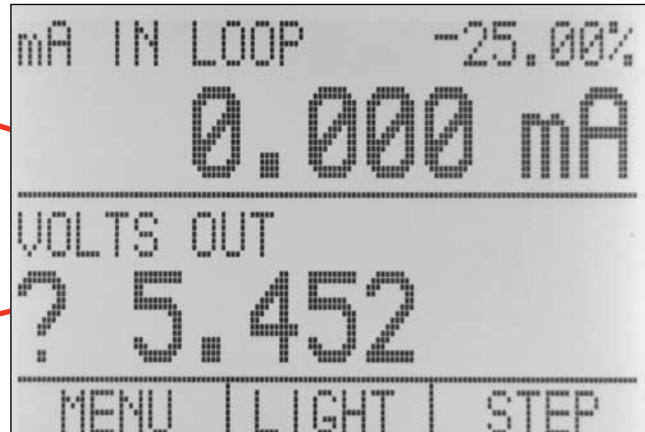
Dual pressure display measurements enable easy pressure conversion

mA IN  
mA LOOP  
VOLTS IN  
PRESSURE  
SCALING  
% ERROR  
SWITCH TEST

Isolated read back channel

mA IN  
mA OUT  
mA simulation / sink  
VOLTS IN  
VOLTS OUT  
TC IN CJC ON/OFF  
TC OUT CJC ON/OFF  
RTD IN 2, 3, 4 wire  
RTD OUT  
FREQ IN  
FREQ OUT  
PULSE OUT  
PRESSURE

Primary channel

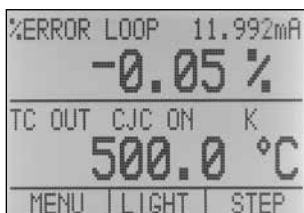


**Padded soft case (optional)**

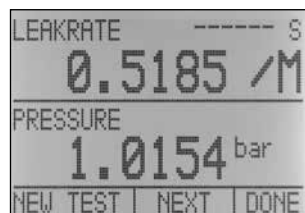
ASC series calibrators can be delivered with a padded soft case as an option. This case is designed for protection during transport. The soft case has separate compartments for the ASC (w/velcro strap), test leads, test hoses, temperature probe and JOFRA APM pressure module. A shoulder strap ensures convenient transportation when climbing ladders, etc. The manual and calibration documents fit into a pocket on the front of the case.

**Charger for rechargeable batteries (optional)**

ASC series calibrators use 4 AA batteries. To save energy and always have charged batteries, it is possible to buy a set of rechargeable NiMi batteries and a mains adapter/charger.



Online % error calculation, fast and responsive reading for calibration and adjustment tasks



Automatic leak test, adjustable timer and automatic calculation to leak rate / minute



Quasi-automatic pressure switch test, records automatically, open, close and deadband values



Online scaling, difference shown in the actual unit, saves calculation time and potential errors in the field



**JOFRA ASC321 a TRUE Documenting Multifunction Calibrator system**

The ASC321 is supplied with JOFRACAL calibration software, and can perform automated workshop and field calibrations.

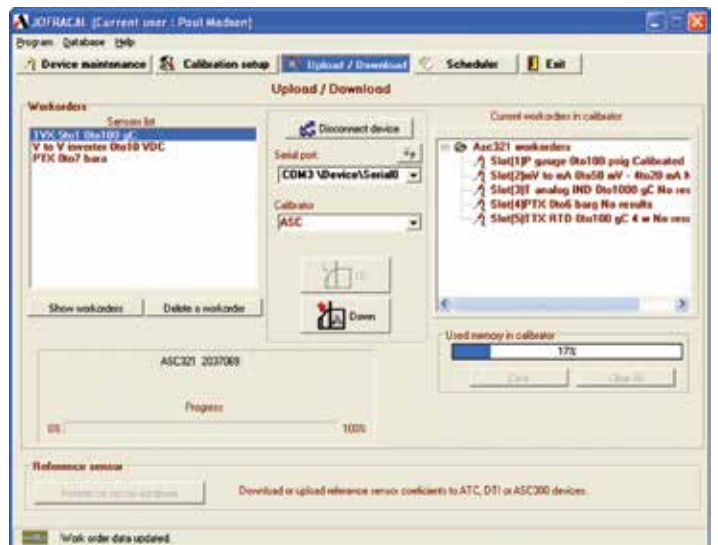
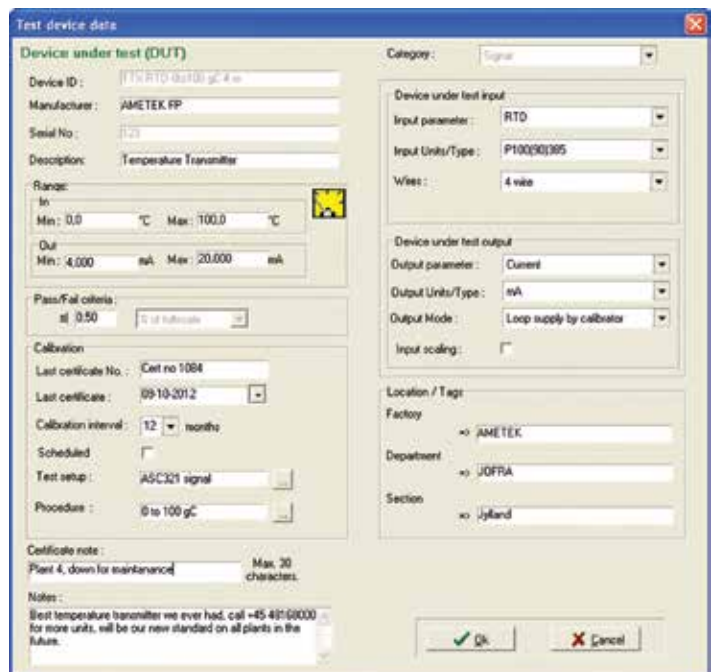
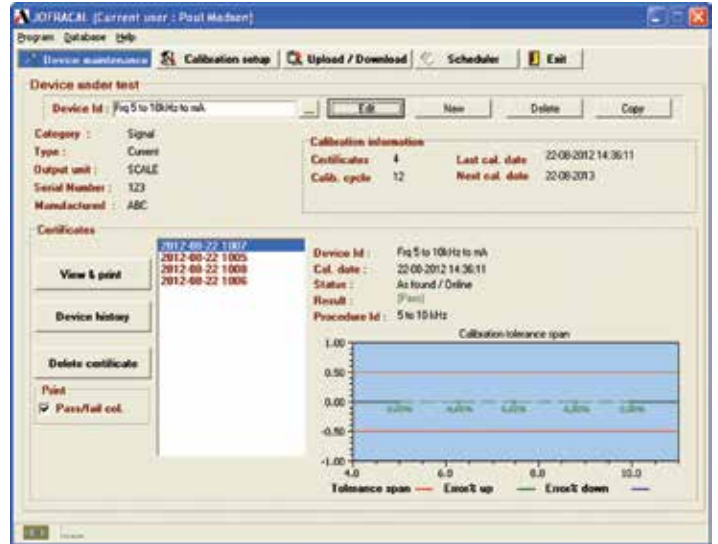
Using this functionality can reduce your costs, minimize error possibilities and remove the need for additional paper-work during calibration.

The combination of the ASC321 and JOFRACAL calibration software ensures easy calibration of RTDs, thermocouples, transmitters, signal converters, temperature switches, pressure transmitters, pressure gauges and pressure switches.

Prepared work orders can be sent from JOFRACAL to the ASC321. By executing the work order offline, the ASC321 does the calibration and the setups and values are stored in the memory. Time and date are automatically stamped and afterwards, the calibration results are uploaded to JOFRACAL.

JOFRACAL software controls the complete calibration procedure, stores the results and provides calibration certificates in many formats – hard copies, PDF certificates, or text files. All calibration data is stored for each sensor, to monitor drift and optimize recalibration intervals. A scheduler feature allows planning of future calibrations.

JOFRACAL can be used with all JOFRA calibration instruments. When used with 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.



## JOFRA APM PRESSURE MODULES

When used with a pressure module the ASC series calibrators become true pressure calibrators with features such as: leak test, switch test, scaling and online % error calculations.

The APM external pressure module includes more than 24 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 and are complete calibrated units, ready to use with any compatible JOFRA calibrator. Optionally, they can be bought together with calibration pumps as “ready to go” systems.

### 17 built-in engineering units

(psi, inH<sub>2</sub>O@4°C, inH<sub>2</sub>O@20°C, inH<sub>2</sub>O@60°F, inHg@0°C, ftH<sub>2</sub>O@4°C, ftH<sub>2</sub>O@20°C, ftH<sub>2</sub>O@60°F, bar, mbar, kPa, kg/cm<sup>2</sup>, cmH<sub>2</sub>O@4°C, cmH<sub>2</sub>O@20°C, mH<sub>2</sub>O@4°C, mH<sub>2</sub>O@20°C, mmHg@0°C)

APM Mk.II Type	Pressure range				12 month accuracy	
	Bar		PSI		%rdg	%FS
	From	To	From	To		
<b>Differential</b>						
025MD	-0.025	0.025	-0.4	0.4	-	0.100%
075MD	-0.070	0.07	-1	1	-	0.050%
350MD	-0.350	0.35	-5	5	-	0.050%
<b>Compound</b>						
001C	-0.960	1	-14	15	0.025%	0.010%
002C	-0.960	2	-14	30	0.025%	0.010%
007C*	-0.820	7	-12	100	0.025%	0.010%
020C*	-0.820	20	-12	300	0.025%	0.010%
035C*	-0.820	35	-12	500	0.025%	0.010%
<b>Gauge</b>						
001G*	0	1	0	15	0.025%	0.010%
002G*	0	2	0	30	0.025%	0.010%
007G*	0	7	0	100	0.025%	0.010%
020G*	0	20	0	300	0.025%	0.010%
035G*	0	35	0	500	0.025%	0.010%
070G*	0	70	0	1000	0.025%	0.010%
100G*	0	100	0	1500	0.025%	0.010%
200G*	0	200	0	3000	0.025%	0.010%
350G*	0	350	0	5000	0.025%	0.010%
400G*	0	400	0	6000	0.025%	0.010%
700G*	0	700	0	10000	0.025%	0.015%
<b>Absolute</b>						
001A	0.025	1.1	0.35	16	0.025%	0.010%
003A	0.025	3.5	0.35	50	0.025%	0.010%
007A*	0.070	7	1	100	0.025%	0.010%
020A*	0.070	20	1	300	0.025%	0.010%

\* Stainless steel isolated pressure sensor.

Specified temperature range 23°C ± 5°C / 73°F ± 9°F.

Accuracy includes hysteresis, nonlinearity, repeatability, reference standard uncertainty and 1 year typical long-term stability; operated inside the rated temperature span and range. Requiring frequent zeroing (Gauge/diff.) or entering of reference pressure (Absolute).

## SPECIFICATIONS

### Ambient temperature specifications

Operating temperature..... -10 to 50°C / 14 to 122°F  
 Storage temperature.....-20 to 60°C / -4 to 140°F  
 All specifications specified at ambient temperature..... 23°C ±5°C / 73°F ±9°F  
 Outside ambient 23°C ±5°C .....±0.003% rdg/°C  
 Outside ambient 73°F ±9°F..... ±0.0017% rdg/°F

### Power specifications

Batteries ..... 4 x AA batteries  
 Battery operation..... Approx. 20 hours  
 Mains adapter/charger ..... 9VDC/200mA - 230VAC/115VAC  
 Rechargeable batteries..... NiMH, min. capacity 1700 mA  
 Charge current 60 to 85 mA, depending on cells and state of the charge (trickle charge less than C/20)  
 Low battery warning..... Yes

### Documenting system (ASC321 only)

Number of work-orders (procedures) ..... 20  
 Number of calibration storage ..... 40 (20 as found/as left)  
 Date / time..... Built-in real time clock

### RS232 communication interface

Connector: ..... 3.5 mm jack  
 Communication rate.....9600 baud, ASCII

### Physical specifications (LxHxW)

Instrument ..... 235x53x95 mm / 9.3x2.1x3.7 in  
 Weight inclusive batteries ..... 590 g / 21 oz  
 Instrument ..... 235x97x57 mm / 9.3x3.8x2.3 in  
 Weight incl. test leads & shoulder strap ....1030 g / 360 oz  
 Shipping cargo box size ..... 285x110x160 mm  
 .....11.2x4.3x6.3 in  
 Shipping weight ..... 1380 g / 38 oz

### Miscellaneous

CE - EMC ..... EN61326:2006  
 Safety: ..... CSA C22.2 No. 1010.1



**SPECIFICATIONS**

Thermocouple	Range		Accuracy ±
	min	max	12 months
mV			
TC mV read	-10.000 mV	75.000 mV	0.015% rdg+10µV
TC mV source	-10.000 mV	75.000 mV	0.015% rdg+10µV

Maximum current output is 1 mA with an output impedans of ≤ 1 ohm.

Thermocouple	Range		Accuracy ±
	min	max	12 months
Cold junction			
CJC compensation	18°C 64°F	28°C 83°F	0.2°C 0.36°F
CJC outside above			0.05°C/°C 0.03°F/°F

Volt V	Range		Accuracy ±
	min	max	12 months
Read (Isolated)	0.000 V	30.000 V	0.01% rdg +2 mV
Read (non-isolated)	0.000 V	20.000 V	0.01% rdg +2 mV
Source	0.000 V	20.000 V	0.01% rdg +2 mV

Maximum current output in voltage ranges is 3 mA with an output imped-ance of ≤ 1 ohm.

Frequency	Range		Accuracy ±
	min	max	12 months
Pulse			
CPM read	2.0	600.0	0.05% rdg +0.1 CPM
Hz read	1.0	1000.0	0.05% rdg +0.1 Hz
KHz read	1.00	10.00	0.05% rdg +0.01 KHz
CPM source	2.0	600.0	0.05% rdg
Hz source	1.0	1000.0	0.05% rdg
KHz source	1.0	10.0	0.125% rdg
Pulse (source only) Rate: 2CPM to 10KHz	1	30000	

Input voltage amplitude range on frequency is 1 to 20 V zero based square wave only.

Output amplitude is adjustable from 1 to 20 V and is a square wave with a 50% duty cycle.

For output frequency, a slight negative offset of approximately -0.1 V is present to assure zero crossing.

Ohm	Range		Accuracy ±
	min	max	12 months
Ohm read (low)	0.00	400.00	0.015% rdg +0.03 ohm
Ohm read (high)	401.0	4000.0	0.015% rdg +0.3 ohm
Ohm source (low) @ 0.1 to 0.5 mA	5.0	400.0	0.015% rdg +0.1 ohm
@ 0.5 to 3 mA	5.0	400.0	0.015% rdg +0.03 ohm
Ohm source (high) @ 0.05 to 0.8 mA	400	1500	0.015% rdg +0.3 ohm
@ 0.05 to 0.4 mA	1500	4000	0.015% rdg +0.3 ohm

Unit is compatible with pulsing transmitters.  
Pulse response is ≤ 5 mSec.

**Thermocouple - TC**

TC types ..... J K T E R S B C XK BP L U N  
Cold junction compensation ON/OFF control ..... Yes

TC Type	Temperature range				12 month accuracy	
	°C		°F		°C	°F
	From	To	From	To		
J	-210	-150	-346	-238	0.4	0.8
	-150	1200	238	2192	0.2	0.4
K	-200	-100	-328	-148	0.5	0.9
	-100	600	-148	1112	0.2	0.4
	600	1000	1112	1832	0.3	0.6
	1000	1372	1832	2501	0.4	0.8
T	-250	-200	-418	-328	1.5	1.7
	-200	0	-328	32	0.5	0.9
	0	400	32	752	0.2	0.4
E	-250	-200	-418	-328	1.0	1.8
	-200	-100	-328	-148	0.3	0.6
	-100	1000	-148	1832	0.2	0.4
R	0	200	32	392	1.7	3.1
	200	1767	392	3212	1.0	1.8
S	0	200	32	392	1.7	3.1
	200	1767	392	3212	1.1	2.0
B	600	800	1112	1472	1.5	2.7
	800	1000	1472	1832	1.2	2.2
	1000	1820	1832	3308	1.0	1.8
C	0	1000	32	1832	0.5	0.9
	1000	2316	1832	4200	1.5	2.7
XK	-200	800	-328	1472	0.2	0.4
BP	0	800	32	1472	1.9	3.5
	800	2500	1472	4532	0.6	1.1
L	-200	900	-328	1652	0.2	0.4
U	-200	0	-328	32	0.4	0.8
	0	600	32	1112	0.2	0.4
N	-200	-100	-328	-148	0.8	1.5
	-100	1300	-148	2372	0.3	0.6

Does not include thermocouple wire error and CJC.



**Resistance - RTD**

RTD types..... Pt10 Pt25 Pt50 Pt100 Pt200 Pt500 Pt1000  
 ..... Cu10 Cu50 Cu100 Ni120 YSI400  
 Response time ..... Less than 5 mSec.  
 Connection ..... 2, 3 and 4-wire

4-wire RTD Type	Temperature range				12 months accuracy	
	°C		°F		°C	°F
	From	To	From	To		
P10(90)385	-200	100	-328	212	0.85	1.53
	100	400	328	752	1.00	1.80
	400	800	752	1472	1.20	2.16
P50(90)385	-200	100	-328	212	0.20	0.32
	100	400	212	752	0.30	0.54
	400	800	752	1472	0.40	0.72
P100(90)385	-200	100	-328	212	0.15	0.27
	100	400	212	752	0.20	0.36
	400	800	752	1472	0.30	0.54
P200(90)385	-200	100	-328	212	0.40	0.72
	100	630	212	1166	0.50	0.90
P400(90)385	-200	100	-328	212	0.20	0.36
	100	630	212	1166	0.25	0.45
P500(90)385	-200	100	-328	212	0.20	0.36
	100	630	212	1166	0.30	0.54
P1K(90)385	-200	100	-328	212	0.15	0.27
	100	630	212	1166	0.20	0.36
P50(90)391	-200	100	-328	212	0.20	0.36
	100	400	212	752	0.30	0.54
	400	800	752	1472	0.40	0.72
P100(90)391	-200	100	-328	212	0.15	0.27
	100	400	212	752	0.20	0.36
	400	800	752	1472	0.30	0.54
P100(90)392	-200	100	-328	212	0.10	0.18
	100	630	212	1166	0.20	0.36
M10(90)427	-100	260	-148	500	0.75	1.35
M50(90)428	-180	200	-292	392	0.15	0.27
M100(90)428	-180	200	-292	392	0.10	0.18
H120(90)672	-80	260	-112	500	0.10	0.18
P100(90)JIS	-200	100	-328	212	0.10	0.18
	100	630	212	1166	0.20	0.36
YSI(90)400	15	50	59	122	0.10	0.18

Read accuracy is based on 4-wire input.  
 Source accuracy in terminals 2-wire source.



**Current - mA and loop**

Range ..... 0 to 24 mA  
 Loop power for transmitters ..... 24 VDC  
 Isolated input..... Yes

Current mA	Range		Accuracy ±
	min	max	12 months
Read (Isolated)	0.000 mA	24.000 mA	0.010% rdg +2 µA
Read (non-isolated)	0.000 mA	24.000 mA	0.010% rdg +2 µA
Source	0.000 mA	24.000 mA	0.010% rdg +2 µA

Max. load on mA source is 1000 ohms.  
 Voltage input range on simulation mode is 5 to 30 V.

**OPTION T - Temperature Sensor**

- Option T, temperature sensor  
 -40 to 155°C (-40 to 311°F)
- Delivered with international traceable calibration certificate and CvD coefficients, ready to enter into any JOFRA ASC
- Sensor dimensions ø 4 x 200 mm + handle
- Calibration points, -40/-20/0/50/100/155°C (-40/-4/32/122/212/311°F)
- Calibration accuracy ± 0.030°C (0.054°F)



**STANDARD DELIVERY**

- JOFRA ASC301 or ASC321 instrument
- Battery set (4 x AA)
- Manual
- RS232 cable and JOFRACAL
- 2 sets of test leads
- Handy soft case, with pocket for the test leads and an opening at the top to provide easy access to the test terminals
- NIST traceable certificate

## ORDERING INFORMATION - ASC Series

Order No.	Description		
	<b>Base model number</b>		
ASC301	Multifunction calibrator		
ASC321	Documenting calibrator		
	<b>Certificate</b>		
	G	NIST traceable certificate (standard)	
	H	Accredited certificate (optional)	
	<b>Accessories (Optional)</b>		
	A	External Power Supply / Charger	
	B	Rechargeable Battery Pack	
	C	Softcase with shoulder strap	
	T	Temperature Sensor Pt100 incl. traceable certificate	
	<b>Sample order number</b>		
ASC321	G	C	JOFRA ASC321 with NIST traceable certificate and softcase

## ACCESSORIES

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
123958	RS232 cable with stereo Jack connector, 2m / 6ft
124720	Mains adapter/charger 9VDC/200mA - 230VAC/115VAC
124716	4x 1,5 Volt rechargeable batteries
124718	Charger for rechargeable batteries - 115/230 VAC
125002	Edgeport Converter with 4 pcs of RS232 ports
65-PT100-LB-CABLE	- Cable 2 m (6.6 ft.) with LEMO/Banana connectors



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

### Contact:

Industrial Process Measurement, Inc.  
3910 Park Avenue, Unit 7  
Edison, NJ 08820  
732-632-6400  
support@instrumentation2000.com  
<http://www.instrumentation2000.com>