JOFRA calibration

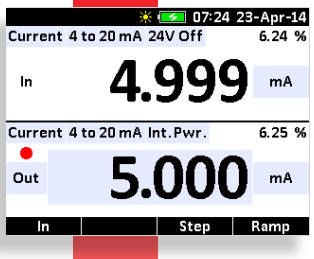
Advanced Signal Calibrator

ASC-400

User friendly and **innovative**

AMETEK®
TEST & CALIBRATION INSTRUMENTS

Advanced Simplicity



Optimal read out visibility and high accuracy

Large full color display and extremely user friendly interface. The ASC-400 accuracy is designed to meet high demands from modern sensores and transmitters

Input and output

RTD: 16 different types, TC: 13 different types, Current 0-24 mA DC, Voltage 0-20 VDC, Frequency 0.05 to 10,000 Hz, Pulse train out-put, Resistance 5 to 4000 Ohm

Simultaneoues read-back and fast RTD simulation

Including isolated read-back from device-under-test of mA, V, and pressure. The RTD simulation feature is fast enough to work with pulsed transmitters and PLC´s

Calibrate pressure and temperature

Full featured pressure calibrator, just apply an APM, and benefit from, automatic leak-test, pressure-switch calibration and more… Use the ASC-400 together with JOFRA temperature calibrators, add measurement channels for sensors or temperature switches

Measure temperature

ASC-400 can be used as high accuracy thermometer, ASC-400 works with RTD´s and CvD equations, to obtain true temperature, based on “true ohm” technology!

ASC-400 is a portable process signal calibrator that provides the functionality and accuracy you expect from a laboratory calibration system, but compact enough to fit into the tool box and be operated with one hand for easy field calibration.

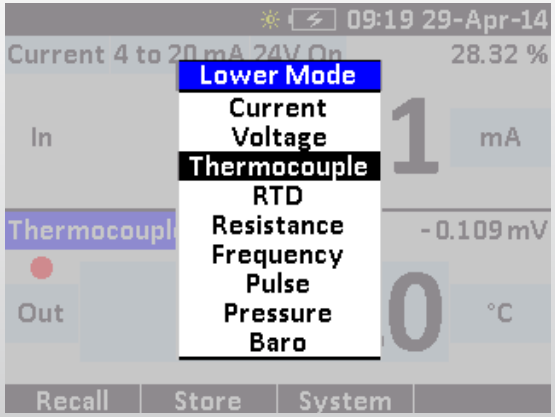
The ASC-400 is more than just a signal calibrator. Combined with our APM external pressure modules or our dry-block calibrator, it will calibrate pressure and temperature.

The full numerical keypad with a series of function keys and the cursor keys, provide a simple and quick user interface. The new full color display offers the best visibility and overview.

The high accuracy of ASC-400 has not been achieved on account of fragile measurements or source circuitries, the ASC-400 has fuse less protection – no lost replacement fuses...

Unique “non-menu” user interface

Easy to use, single layer user interface, no deep menu structure! Operate and set up ASC-400 to perform your tasks, fast and intuitive.



Simultaneous input and output

ASC-400 offers simutaneous input and output, which makes it possible to calibrate and adjust a transmitter with no need for additional equipment.

Temperature reading at reference level

The ASC-400 offers the possibility to charaterize a RTD sensor. This feature is used to add a missing special curve or to characterize a reference RTD. This together with “true ohm” technology, eliminating thermo voltage in the RTD loop, makes ASC-400 a true reference thermometer.

If you choose a reference RTD from the accurate and stable JOFRA STS temperature sensors, they are delivered with a traceable calibration certificate including the neccessary Callendar-Van Dusen coefficients. Enter the figures into the unit and you have a temperature reference. Complement this with a dry-block temperature calibrator and your ASC-400 becomes the heart of your portable calibration lab.

Read-back display

The upper half of the full color 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 pressure modules in this display section.

Primary display

This part is used for all input or output combinations. The primary display plus the read-back display gives a full comprehensive and simultaneous input-output functionality and an excellent overview of the test in progress.

Function keys

The function of the keys is clearly explained in the bottom of the display.

Terminal block

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

We call it the wireless keyboard…

Cursor keys

Set-up navigation, fine tuning of output values, for convenient “analog” feeling.

Numeric keyboard

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

Fuseless protection

If you by mistake connect the ASC-400 to over voltage, the unit is protected with a fuseless protection feature. This feature protects the unit and prevents expensive repairs and recalibration of the unit.

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

5 “intelligent” memories

Full storage, all settings on both upper & lower channel are stored. Customer defined memory names.

Useful large soft case (Option C)

As an option you can get the ASC-400 delivered with a large padded soft case. The spacey soft case is designed for protection during transport. The soft case has separate compartments for the unit, test leads, test hoses, temperature probe, and APM pressure modules. A shoulder strap ensures convenient and safe transportation when climbing ladders, etc.

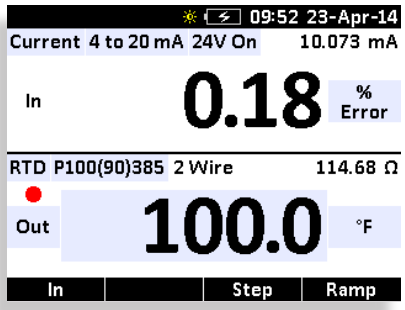
Power Supply / Charger (Option A or B)

As standard the ASC-400 is delivered with 6 AA alkaline batteries.

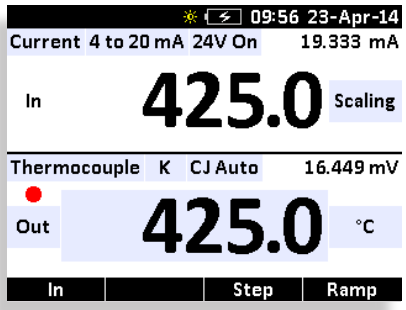
Additionally two power supply options are available;

Option A, mains adapter, used as battery eliminator to preserve batteries in long term workshop testing & calibration.

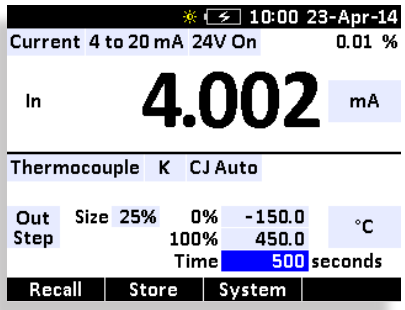
Option B, like Option A, but supplemented with 6 x AA Ni-MH chargeable batteries, which are charged while mounted in the ASC-400.



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

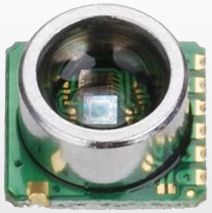


User configurable scaling, compare values in the same format, easer than ever



Set up span, step size and timing, step and ramp times up to 999 seconds.

Gauge or Absolute pressure? (Option BARO)



The choice is yours!

The BARO option turns any gauge measuring APM into an absolute measuring device.

Accuracy: ± 0.5 mbarA / 0.00725 psiA
Range: 700 to 1100 mbarA / 10.153 to 15.954 psiA

Includes all effects of linearity, hysteresis, temperature (-10 to 50°C / 14 to 122°F) and stability for one year.

Please note the BARO option is factory installed.

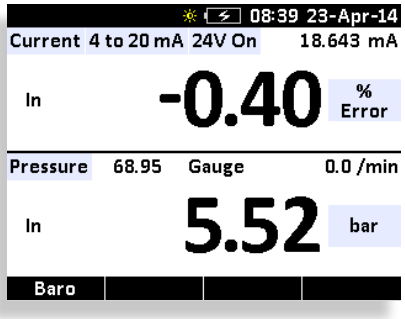
APM Pressure Modules (Accessory)

When used with APM CPF Series pressure modules the ASC-400 becomes a true pressure calibrator with features such as; leak test, switch test, scaling and online % error calculations.

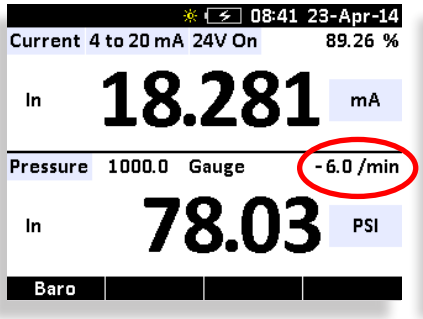
Pressure range from vacuum to 1 000 bar / 15 000 psi, accuracies down to 0.025% RDG, fully temperature compensated, and stability for one year.

The modules are engineered for in-plant, field, or laboratory use. They are ready-to-use with immediate recognition and use of the module once plugged into the calibrator. All units are welded, with a permanent filled diaphragm seal. Metal to metal cone seal, and O-ring. CPF adapters to various threading available.

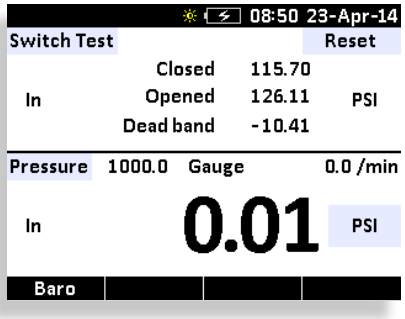
Up to 14 built-in engineering units



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



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



Automatic pressure switch test, records automatically, open, close and deadband values

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Specifications

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 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

Ambient temperature specifications

Operating temperature	-10 to 50°C / 14 to 122°F
Storage temperature	-20 to 60°C / -4 to 140°F
Humidity	0 to 80% R.H. non-condensing
Case protection	IP40
All specs 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	6 x AA batteries
1.5V AA	Alkaline (non rechargeable) or AA NiMh (rechargeable)
Mains adapter	(option) 9VDC/500mA - 230VAC/115VAC
Low battery warning	Yes
Battery lifetime (Alkaline)	
Backlight low no, loop power	30 hours
Backlight hight, 12 mA loop	13 hours
Charging current (optional charger)	85 mA
Use only NiMH cells with capacity larger than	1700 mAh

Display

Display size	2,8"
Resolution	320 x 240 pixels
Type	TFT / Color
Update rate	2.5 readings/sec.

RS232 communication interface

Connector	Mini USB female (B)
Communication rate	USB 2.0 / ASCII

Switch test output

Maximum current	1 mA
Maximum voltage	24 VDC

Physical specifications (LxHxW)

Unit	220x55x96 mm / 8.66x2.17x3.78 in
Weight incl. batteries	584 g / 20.6 oz
Unit in soft case	235x95x115 mm / 9.25x3.74x4.53 in
Weight incl. test leads & test chips	933 g / 32.91oz
Shipping size	275x100x175 mm / 10.83x3.94x6.89 in
Shipping weight	1233 g / 43.49 oz

Miscellaneous

CE - EMC	EN61326-1:2012

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Specifications

Thermocouple mV	Range min	Range max	Accuracy ± 12 months
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 3 mA Output impedance 0.010 ohm.

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

Maximum current output in voltage ranges is 3 mA Output impedance 0.050 ohm / Input resistance 1 Mohm

Frequency Pulse	Range min	Range max	Accuracy ± 12 months
CPM read	2.0	600.0	0.05% rdg +0.1CPM
Hz read	0.050	10.000	0.05% rdg +0.001Hz
	10.000	100.00	0.05% rdg +0.01Hz
	100.00	1000.0	0.05% rdg +0.1Hz
	1000.0	10000	0.05% rdg +1Hz
KHz read	1.000	10.000	0.05% rdg +0.001KHz
CPM source	2.0	600.0	0.05% rdg
Hz source	0.050	1000.0	0.05% rdg
	1000.0	10000	0.06% rdg
KHz source	1.000	10.000	0.06% rdg
Pulse (source only) Rate: 1 Hz to 10KHz	1	99999	

Input voltage amplitude range on frequency is 1 to 20 V, Trigger level 0.2 to 10 volt. Minimum pulse with 10 µS. 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 min	Range max	Accuracy ± 12 months
Ohm read (low)	0.00	400.00	0.015% rdg +0.03 ohm
Ohm read (high)	400.0	4000.0	0.015% rdg +0.3 ohm
Ohm source (low)			
@ 0.1 to 0.5 mA	5.0	400.0	0.015% rdg +0.10 ohm
@ 0.2 to 0.5 mA	5.0	400.0	0.015% rdg +0.05 ohm
@ 0.5 to IE max	5.0	400.0	0.015% rdg +0.03 ohm
Ohm source (high)			
@ 0.05 to 0.1 mA	400.0	4000.0	0.015% rdg +0.5 ohm
@ 0.01 to IE max	400.0	4000.0	0.015% rdg +0.3 ohm

True Ohm Measurement current (pulsed) 0.25 mA. 3W measurement current match 1% Source exitation current IEXI(max) = 2.0 V / R, IEXI must never exceed 3 mA. Pulsed current (source) Unit is compatible with smart transmitters and PLCs with pulse > 5 ms.

Current - mA and loop

Range mA.....0 to 24 mA
Loop power for transmitters.....Yes, 24 VDC / ± 10 %
Isolated input.....Yes

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

Hart resistor 250 ohm (On/Off in software). Maximum loop resistance source (Hart on/ Hart off) 700 ohm / 950 ohm. mA source voltage input range (external power/HART resistor off) 1V - 30V

Specifications

Thermocouple - TC

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

Thermo couple Type	Resolution		Range				Accuracy	
	Source	Measure	Min. °C	Max. °C	Min. °F	Max. °F	°C	°F
B	0,1	0,1	250	300	482	572	4,02	7,24
			300	400	572	752	3,36	6,05
			400	600	752	1112	2,47	4,45
			600	800	1112	1472	1,60	2,88
			800	1000	1472	1832	1,39	2,51
			1000	1820	1832	3308	1,07	1,93
BP	0,1	0,1	0	1200	32	2192	0,89	1,61
			1200	2000	2192	3632	1,39	2,51
			2000	2500	3632	4532	1,96	3,53
C	0,1	0,1	0	200	32	392	0,75	1,35
			200	800	392	1472	0,64	1,16
			800	1200	1472	2192	0,78	1,41
			1200	1600	2192	2912	0,97	1,75
			1600	2000	2912	3632	1,24	2,24
			2000	2316	3632	4200,8	1,70	3,06
E	0,1	0,01	-200	-100	-328	-148	0,46	0,83
			-100	0	-148	32	0,26	0,47
			0	400	32	752	0,20	0,36
			400	1000	752	1832	0,30	0,54
J	0,1	0,01	-210	-150	-346	-238	0,59	1,07
			-150	0	-238	32	0,34	0,62
			0	660	32	1220	0,26	0,47
			660	1200	1220	2192	0,36	0,65
K	0,1	0,01	-200	-100	-328	-148	0,72	1,30
			-100	0	-148	32	0,35	0,63
			0	400	32	752	0,30	0,54
			400	800	752	1472	0,37	0,67
			800	1000	1472	1832	0,42	0,76
			1000	1372	1832	2501,6	0,53	0,96
L	0,1	0,01	-200	-100	-328	-148	0,37	0,67
			-100	900	-148	1652	0,26	0,47

Thermo couple Type	Resolution		Range				Accuracy	
	Source	Measure	Min. °C	Max. °C	Min. °F	Min. °F	[°C	°F
N	0,1	0,01	-200	-100	-328	-148	1,08	1,95
			-100	0	-148	32	0,50	0,90
			0	1000	32	1832	0,41	0,74
			1000	1300	1832	2372	0,49	0,89
R	0,1	0,1	-50	0	-58	32	2,72	4,90
			0	200	32	392	1,89	3,41
			200	660	392	1220	1,17	2,11
			660	1600	1220	2912	0,95	1,71
			1600	1768,1	2912	3214,58	1,07	1,93
S	0,1	0,1	-50	0	-58	32	2,51	4,52
			0	200	32	392	1,86	3,35
			200	400	392	752	1,21	2,18
			400	1600	752	2912	1,10	1,98
			1600	1768,1	2912	3214,58	1,23	2,22
T	0,1	0,01	-200	-100	-328	-148	0,70	1,26
			-100	0	-148	32	0,38	0,69
			0	200	32	392	0,26	0,47
			200	400	392	752	0,22	0,40
U	0,1	0,01	-200	0	-328	32	0,54	0,98
			0	600	32	1112	0,26	0,47
XK	0,1	0,01	-200	-100	-328	-148	0,43	0,78
			-100	0	-148	32	0,23	0,42
			0	400	32	752	0,18	0,33
			400	800	752	1472	0,24	0,44

Does not include thermocouple wire error and CJC.

Specifications

Resistance - RTD

RTD types Pt10/50/100/200/400/500/1000, Cu10/50/100, Ni120, YSI400
Response time.....Less than 5 mSec.
Connection .....2, 3 and 4-wire

RTD Type	Resolution		Range				Accuracy	
	Source	Measure	Min. °C	Max. °C	Min. °F	Max. °F	°C	°F
Pt10(90)385	0,1	0,1	-200	100	-328	212	0,85	1,53
			100	400	212	752	0,98	1,77
			400	660	752	1220	1,12	2,02
			660	850	1220	1562	1,23	2,22
Pt50(90)385	0,1	0,01	-200	100	-328	212	0,22	0,40
			100	400	212	752	0,29	0,53
			400	660	752	1220	0,35	0,63
			660	850	1220	1562	0,41	0,74
Pt100(90)385	0,1	0,01	-200	100	-328	212	0,12	0,22
			100	400	212	752	0,20	0,36
			400	660	752	1220	0,26	0,47
			660	850	1220	1562	0,31	0,56
Pt200(90)385	0,1	0,01	-200	265	-328	509	0,14	0,26
			265	400	509	752	0,55	0,99
			400	660	752	1220	0,64	1,16
			660	850	1220	1562	0,72	1,30
Pt400(90)385	0,1	0,01	-200	0	-328	32	0,09	0,17
			0	400	32	752	0,34	0,62
			400	660	752	1220	0,41	0,74
			660	850	1220	1562	0,47	0,85
Pt500(90)385	0,1	0,01	-200	100	-328	212	0,22	0,40
			100	400	212	752	0,29	0,53
			400	660	752	1220	0,35	0,63
			660	850	1220	1562	0,41	0,74
Pt1000(90)385	0,1	0,01	-200	100	-328	212	0,14	0,26
			100	400	212	752	0,20	0,36
			400	660	752	1220	0,26	0,47
			660	850	1220	1562	0,31	0,56

RTD Type	Resolution		Range				Accuracy	
	Source	Measure	Min. °C	Max. °C	Min. °F	Max. °F	°C	°F
P50(90)391	0,1	0,01	-200	100	-328	212	0,21	0,38
			100	400	212	752	0,28	0,51
			400	660	752	1220	0,35	0,63
			660	850	1220	1562	0,40	0,72
			850	1100	1562	2012	0,49	0,89
P100(90)391	0,1	0,1	-200	100	-328	212	0,15	0,27
			100	400	212	752	0,20	0,36
			400	660	752	1220	0,26	0,47
			660	850	1220	1562	0,31	0,56
			850	1100	1562	2012	1,38	2,49
P100(90)392	0,1	0,01	-260	100	-436	212	0,13	0,24
			100	400	212	752	0,19	0,35
			400	630	752	1166	0,25	0,45
M10(90)427	0,1	0,1	-200	260	-328	500	0,85	1,53
M50(90)428	0,1	0,01	-200	200	-328	392	0,21	0,38
M100(90)428	0,1	0,01	-200	200	-328	392	0,14	0,26
H100(90)617	0,1	0,01	-60	180	-76	356	0,11	0,20
H120(90)672	0,1	0,01	-80	260	-112	500	0,10	0,18
P100(90)JIS	0,1	0,01	-200	100	-328	212	0,14	0,26
			100	500	212	932	0,22	0,40
YSI-400	0,1	0,01	15	150	59	302	0,02	0,04

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

Specifications

Pressure modules, Barometric option (BARO) and APM CPF

APM CPF Type (s)	Gauge						12 month Accuracy ± 0 to 30 % range	12 month Accuracy ± 30 to 110% range	12 month Accuracy ± Vacuum % FS
	Bar		MPa		psi				
3 bar 300 kPa 30 psi	-1	3	-0.099	0.300	-14.5	30	0.0075% FS	0.025% RDG	0.06% FS + 1 LSD
10 bar 1 MPa 100 psi	-1	10	-0.099	1.0	-14.5	100	0.0075% FS	0.025% RDG	0.06% FS + 1 LSD
30 bar 3 MPa 300 psi	-1	30	-0.099	3.0	-14.5	300	0.0075% FS	0.025% RDG	0.06% FS + 1 LSD
100 bar 10 Mpa 1 kpsi	0	100	0	10.0	0	1 000	0.015% FS	0.05% RDG	N/A
300 bar 30 MPa 3 kpsi	0	300	0	30.0	0	3 000	0.015% FS	0.05% RDG	N/A
700 bar 70 MPa 10 kpsi	0	700	0	70.0	0	10 000	0.03% FS	0.1% RDG	N/A
1000 bar 100 MPa 15 kpsi	0	1000	0	100.0	0	15 000	0.03% FS	0.1% RDG	N/A

Absolute pressure	APM CPF with ASC-400 BARO option / 12 month Accuracy ±				
3 bar APM CPF	**Accuracy ±**	**300 kpA APM CPF**	**Accuracy ±**	**30 psi APM CPF**	**Accuracy ±**
0.0138 to 1 barA	0.0008 barA	1.38 to 100 kPaA	0.08 kPaA	0.2 to 14.5 psiA	0.011 psiA
1 to 4 barA	0.025% RDG + 0.0003 barA	100 to 400 kPaA	0.025% RDG + 0.03 kPaA	14.5 to 44.5 psiA	0.025% RDG + 0.003 psiA
10 bar APM CPF	**Accuracy ±**	**1 MPa APM CPF**	**Accuracy ±**	**100 psi APM CPF**	**Accuracy ±**
0.0138 to 1 barA	0.0008 barA	0.00138 to 0.1 MPaA	0.00008 MPaA	0.2 to 14.5 psiA	0.011 psiA
1 to 4 barA	0.001 barA	0.1 to 0.4 MPaA	0.0001 MPaA	14.5 to 44.5 psiA	0.011 psiA
4 barA to 11 barA	0.025% RDG	0.4 MPaA to 1.1 MPaA	0.025% RDG	44.5 to 114.5 psiA	0.025% RDG
30 bar APM CPF	**Accuracy ±**	**3 MPa APM CPF**	**Accuracy ±**	**100 psi APM CPF**	**Accuracy ±**
0.014 to 1 barA	0.001 barA	0.0014 to 0.1 MPaA	0.001 MPaA	0.2 to 14.5 psiA	0.01 psiA
1 to 10 barA	0.003 barA	0.1 to 1.0 MPaA	0.003 MPaA	14.5 to 104.5 psiA	0.03 psiA
10 barA to 31 barA	0.025% RDG	1.0 MPaA to 3.1 MPaA	0.025% RDG	104.5 to 314.5 psiA	0.025% RDG

Specified temperature range -10 to 50°C / 14 to 122°F (APM CPF & BARO option) Vacuum FS, 1 bar / 100 kPA / 14.5 psi. F.S. (full scale) is the numerical value of the positive pressure range. Accuracy includes hysteresis, nonlinearity, repeatability and reference standard uncertainty, 1 Year typical longterm stability, operated inside the rated temperature span and pressure range. Requiring frequently zeroing.

Standard delivery

- ASC-400 unit
- Battery set (6 x AA)
- Electronic Manual (USB)
- 2 sets of test leads & test clips (black & red)
- Handy soft case, with pocket for the test leads and an opening in the top to provide easy access to the test terminals
- Full international traceable calibration certificate

Ordering

Order No.				Description
ASC-400				Multi-function Signal Calibrator
	BARO			Barometric module to absolute pressure mode (optional)
				Certificate
		F		Traceable Certificate to International Standards
		H		Accredited Certificate - ISO17025 (optional)
				Accessories (Optional)
			A	External Power Supply
			B	Power Supply /Charger plus 6 x Ni-MH rechargeable AA
			C	Large padded soft case with shoulder strap
			T	Temperature Sensor Pt100 incl. traceable certificate
ASC-400	BARO	F	C	ASC-400 with barometric module, traceable certificate and soft case

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
124720	External Power Supply / Charger 9VDC/200mA - 230VAC/115VAC
128859	6x 1.5V AA Ni-MH rechargeable batteries

65-PT100-LB-CABLE - Cable 2 m (6.6 ft.) with LEMO/Banana connectors

XXXX **Various APM CPF Series - Advanced Pressure Modules**

CE

JOFRA® calibration

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Pub code: SS-ASC400 Issue: 1504

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