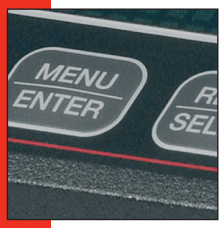
AMETEK®
TEST & CALIBRATION INSTRUMENTS

Remote Communication Manual
Advanced Signal Calibrator

ASC-400





Remote Communication Manual
Advanced Signal Calibrator

JOFRA ASC-400

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1.0 USB driver installation and remote Operation

The calibrator can be remotely controlled using a PC terminal, or by a computer program running the calibrator in an automated system. It uses an USB port connection for remote operation. With this connection the user can write programs on the PC, with Windows languages like Visual Basic to operate the calibrator, or use a Windows terminal, such as Hyper Terminal(Windows XP), to enter single commands. Typical USB remote configurations are shown in Figure 1.

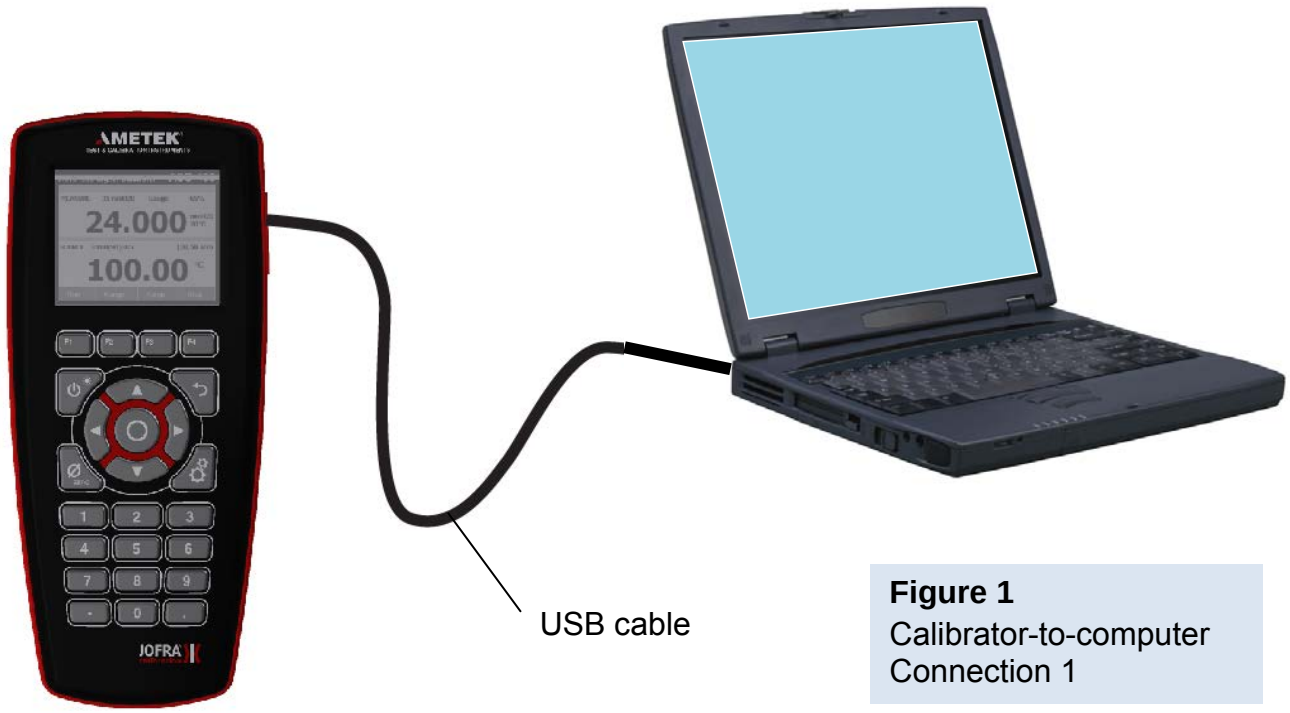
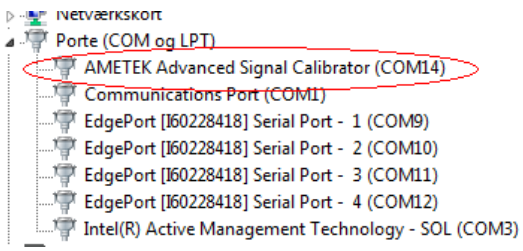


Figure 1
Calibrator-to-computer Connection 1

1.1 Installation of USB communications driver

When the ASC-400 is connected for the first time Windows identifies the Device and will request the location of the driver which is found on the AMETEK software thumb drive supplied with the calibrator.

When installation is complete the ASC-400 is allocated a virtual port number in the device manager as displayed below.



Note…
The recommended length of the USB connection cable is 2m (max 3m).

1.2 Setting up the ASC-400 for Remote Control

To set up remote operation of the calibrator the remote terminal of your choice the only configuration required is the selection of the serial comport used by the ASC-400.

The ASC-400 USB interface creates a virtual comm. Port and the data flow parameters are irrelevant as they are handled by the USB.

Commands should end with EOL (End of Line) character or CR (Carriage Return) or both.

Echo typed characters locally

Wrap lines that exceed terminal width

To test the communication, key in the identification request command.

*idn?

This command will return information on the unit.

”**AMETEK, ASC-400-R, 111111-00333, 1.07.2**”

1.3 Changing between Remote and Local Operation

There are three modes of operation of the calibrator, Local, Remote, and Remote with Lockout.

Local mode is the default mode. Commands may be entered using the keypad on the unit or using a computer.

In Remote mode the keypad is disabled, and commands may only be entered using a computer, but choosing [GO TO LOCAL] from the menu on the calibrator display will restore keypad operation.

In Remote with Lockout, the keypad can not be used at all. To switch modes proceed as follows:

1. To enable Remote mode, type in the serial command **REMOTE** at the computer terminal.
2. To enable Remote with Lockout, type in **REMOTE** and **LOCKOUT** in either order.
3. To switch back to local operation enter **LOCAL** at the terminal. This command also turns off LOCKOUT if it was on. For more information on commands refer to the Remote Commands section.

2.0 Using commands

Command types

Refer to the Section on Remote Commands for all available commands.

The calibrator may be controlled using commands and queries. All commands may be entered using upper or lower case.

Calibrator Commands

Configure the calibrator.

LOWER MEAS DCV

Sets the ASC-400 to measure voltage on the lower display

Query Commands

Commands that ask for information. They always end with a "?".

FUNC?

Returns the current modes of the upper and lower displays

2.1 Command categories

Common Commands

Standard commands used by most devices. These commands always begin with an "*". For example:

*IDN?

tells the calibrator to return its identification.

Calibrator Commands

Standard commands used by the device to configure or always query calibration configuration

LOWER MEAS DCV (measure voltage on the lower display)

CAL_START (Puts the ASC-400 in calibration mode)

Compound Commands

Commands that contain more than one command on one line. For example:

LOWER_MEAS RTD; RTD_TYPE CU10

Sets the calibrator to measure RTD in the lower display and sets RTD type to Cu 10.

Overlapped Commands

Commands that require more time to execute than normal. The command *WAI can be used after the overlapped command to tell the calibrator to wait until the command finishes before executing the next command. For example:

TRIG; *WAI

Triggers the pulse train. Once the pulse train has been triggered, the calibrator can proceed to the next command.

3.0 Data Processing and Response Data

3.1 Character Processing

The data entered into the calibrator is processed as follows:

- ASCII characters are discarded if their decimal equivalent is less than 32 (space), except 10 (LF) and 13 (CR)
- Data is taken as 7-bit ASCII
- The most significant data bit is ignored.
- Upper or lower case is acceptable.

3.2 Response Data Types

The data returned by the calibrator can be divided into four types: er **Integer**

For most computers and controllers they are decimal numbers ranging from -32768 to 32768. For example:

*ESE 140; *ESE? returns 140

Floating

Numbers that have up to 15 significant figures and exponents. For example:

CPRT_COEFA? returns 3.908000E-03

Character Response Data (CRD)

Data returned as keywords. For example:

RTD_TYPE? returns PT385_10

Indefinite ASCII (IAD)

Any ASCII characters followed by a terminator. For example:

*IDN? returns JOFRA, ASC-400-1-R, 0000000000/362866, 1.14

4.0 Calibrator Status

Status registers, enable registers, and queues provide status information on the calibrator. Each status register and queue has a summary bit in the Serial Poll Status Byte. Enable registers generate summary bits in the Serial Poll Status Byte. The following is a list of registers and queues along with their function.

Serial Poll Status Byte (STB)

The STB is sent when the calibrator responds to the *STB? command. Cleared when power is reset.

Service Request Enable Register (SRE)

Enables or disables the bits of the STB. Cleared when power is reset.
Setting bits to 0 disables them in the STB. Setting the bits to 1 enables them. Bit assignments for the SRE and the STB are shown below.

7	6	5	4	3	2	1	0
0	MSS	ESB	0	EAV	0	0	0

MSS

Master Summary Status. Set to 1 when ESB or EAV are 1 (enabled). Read using the *STB? command.

ESB

Set to 1 when at least one bit in ESR is 1.

EAV

Error Available. An error has been entered into the error queue, and may be read using the Fault? command.

Event Status Register (ESR)

A two-byte register, in which the lower bits represent conditions of the Calibrator.
Cleared when read and when power is reset.

Event Status Enable Register (ESE)

Enables and disables bits in the ESR. Setting a bit to 1 enables the corresponding bit in the ESR, and setting it to 0 disables the corresponding bit. Cleared at power reset. Bit assignments for the ESR and the ESE respectively are shown below.

15	14	13	12	11	10	9	8
0	0	0	0	0	0	0	0

7	6	5	4	3	2	1	0
PON	0	CME	EXE	DDE	QYE	0	OPC

PON

Power On. Set to 1 if power was turned on and off before the Event Status Register was read.

CME

Command Error. Set to 1 when the calibrator receives an invalid command. Entering an unsupported RTD type may cause such an error.

EXE

Execution Error. Set to 1 when the calibrator runs into an error while executing is last command. A parameter that has too significant figures may cause such an error.

DDE

Device-dependent Error. Set to 1 when, for example, the output of the calibrator is overloaded.

QYE

Query Error.

OPC

Operation Complete. Set to 1 when the calibrator has finished executing all commands before the command *OPC was entered.

Error Queue

If an error occurs due to invalid input or buffer overflow, its error code is sent to the error queue. The error code can be read from the queue with the command FAULT?. The error queue holds 15 error codes. When it is empty, FAULT? returns 0. The error queue is cleared when power is reset or when the clear command *CLS is entered.

Input Buffer

Calibrator stores all received data in the input buffer. The buffer holds 250 characters. The characters are processed on a first in, first out basis.

5.0 Remote Commands and Error Codes

The following tables list all commands, and their descriptions, that are accepted by the calibrator.

Table 1: Common Commands

Command	Description
*CLS	*CLS (Clear status.) Clears the ESR, the error queue, and the RQS bit in the status byte. Terminates pending Operation Complete commands
*ESE	Loads a byte into the Event Status Enable register.
*ESE?	Returns the contents of the Event Status Enable register.
*ESR?	Returns the contents of the Event Status register and clears the register.
*IDN?	Identification query. Returns manufacturer, model number, Installed BARO module -1, (0 = not present) Russian configuration (-R) (otherwise blank) serial numbers – Calibrator/BARO module, (if Baro installed) Firmware revision level of the Calibrator. JOFRA, ASC-400-1-R, 0000000000/362866, 1.14
*OPC	Enables setting of bit 0 (OPC for "Operation Complete") in the Event Status Register to 1 when all pending device operations are complete.
*OPC?	Returns a 1 after all pending operations are complete. This command causes program execution to pause until all operations are complete.
*RST	Resets the state of the instrument to the power-up state. This command holds off execution of subsequent commands until it is complete.
*SRE	Loads a byte into the Service Request Enable register.
*SRE?	Returns the byte from the Service Request Enable register.
*STB?	Returns the status byte.
*WAI	Prevents further remote commands from being executed until all previous remote commands have been executed.

Table 2: Calibrator Commands

Command	Description
CAL_START	Puts the calibrator in calibration mode
CJC_STATE	Turns CJC on or off.
CJC_STATE?	Returns the state of the CJC
CPRT_COEFA	Sets the custom RTD coefficient A
CPRT_COEFA?	Returns the custom RTD coefficient A
CPRT_COEFB	Sets the custom RTD coefficient B
CPRT_COEFB?	Returns the custom RTD coefficient B
CPRT_COEFC	Sets the custom RTD coefficient C
CPRT_COEFC?	Returns the custom RTD coefficient C
CPRT_MIN_T	Sets the custom RTD minimum temperature
CPRT_MIN_T?	Returns the custom RTD minimum temperature
CPRT_MAX_T	Sets the custom RTD maximum temperature
CPRT_MAX_T?	Returns the custom RTD maximum temperature
CPRT_R0	Sets the custom RTD R0 resistance
CPRT_R0?	Returns the custom RTD R0 resistance
ERR_FUNC	Sets the Percent Error function to volts or mA
ERR_FUNC?	Returns the Percent Error function
ERR_MA_HI	Sets 100% value for mA Percent Error. ERR_MA_HI [0-24] MA
ERR_MA_HI?	Returns 100% value for mA Percent Error
ERR_MA_LO	Sets 0% value for mA Percent Error. ERR_MA_LO [0-24] MA
ERR_MA_LO?	Returns 0% value for mA Percent Error
ERR_V_HI	Sets 100% value for Volt Percent Error. ERR_V_HI [0-30] V
ERR_V_HI?	Returns 100% value for Volt Percent Error
ERR_V_LO	Sets 0% value for Volt Percent Error. ERR_V_LO [0-30] V
ERR_V_LO?	Returns 0% value for Volt Percent Error
FAULT?	Returns the error code of an error that has occurred
FREQ_LEVEL	Sets the frequency and pulse amplitude
FREQ_LEVEL?	Returns the frequency and pulse amplitude
FREQ_TYPE	Set the frequency output to continuous (frequency) or pulse.
FREQ_TYPE?	Returns frequency output type, continuous or pulse
FREQ_UNIT	Sets the unit for frequency and pulse
FREQ_UNIT?	Returns the unit for frequency and pulse
FUNC?	Returns the current mode of the upper and lower display
HART_ON	Turns the HART resistor on
HART_OFF	Turns the HART resistor off
HART?	Returns the state of the HART resistor
LOCAL	Returns user to manual operation of the calibrator
LOCKOUT	Locks out the keypad of the calibrator, and allows for remote operation only
LOOP_PWR_OFF	Turns 24V loop power off.
LOOP_PWR_ON	Turns 24V loop power on.
LOOP_PWR?	Returns the state of 24V loop power.
LOWER_MEAS	Sets the mode for measuring on the lower display.
L_PRES_UNIT	Sets the pressure unit on the lower display
OUT	Sets the output of the calibrator
OUT?	Returns the output of the calibrator
PRES?	Returns the details of the attached APM.
PRES_UNIT?	Returns the pressure unit for the upper and lower display
PULSE_CNT	Sets the number of pulses for the pulse train
PULSE_CNT?	Returns the number of pulses in the pulse train

REMOTE	Puts the calibrator in remote mode
RTD_TYPE	Sets the RTD type
RTD_TYPE?	Returns the RTD type
RTD_WIRE	Sets the number of wires used by the RTD mode.
RTD_WIRE?	Returns the wire number setting used in the RTD mode
SCL_FUNC	Sets the scaling function to volts or mA
SCL_FUNC?	Returns the scaling function
SCL_MA_HI	Sets 100% value for mA scaling
SCL_MA_HI?	Returns 100% value for mA scaling
SCL_MA_LO	Sets 0% value for mA scaling
SCL_MA_LO?	Returns 0% value for mA scaling
SCL_V_HI	Sets 100% value for volts scaling
SCL_V_HI?	Returns 100% value for volt scaling
SCL_V_LO	Sets 0% value for volts scaling
SCL_V_LO?	Returns 0% value for volt scaling
SIM	Sets the output for mA simulation
SIM?	Returns the output of the mA simulation
ST_START	Starts a new switch test if the unit is in switch test mode
ST_CLOSE?	Returns the value at which the switch closed
ST_OPEN?	Returns the value at which the switch opened
ST_DEAD?	Returns the value of the dead band of the switch
TC_TYPE	Sets the thermocouple type
TC_TYPE?	Returns the thermocouple type
TEMP_UNIT	Sets input/output temperature unit for RTD and TC
TEMP_UNIT?	Returns the temperature unit for RTD and TC
TRIG	Starts and stops the pulse train in pulse mode
TRIG?	Returns TRIGGERED when a pulse train is on. Returns UNTRIGGERED when the pulse train is off.
TSENS_TYPE	Sets temperature sensor type.
TSENS_TYPE?	Returns temperature sensor type
UPPER_MEAS	Sets the measuring mode for the upper display.
U_PRES_UNIT	Sets the upper pressure unit
VAL?	Returns the measured values
ZERO_MEAS	Zeros the pressure module
ZERO_MEAS?	Returns the zero offset of the pressure module

Table 3: Parameter units

Units	Meaning
DCI	milliamps of current
MV	Voltage in millivolts
DCV	Voltage in volts
SW_TEST	Switch test (upper window)
CPM	Frequency in cycles per minute
Hz	Frequency in Hertz
KHz	Frequency in kiloHertz
OHMS	Resistance in Ohms
RTD	Resistance temperature detector. Eg. P100(385)90
CEL	Temperature in Celsius
FAR	Temperature in Fahrenheit
KEL	Temperature in Kelvin
RAN	Temperature in Rankine
Psi	Pressure in pounds per square-inch
InH2O4C	Pressure in inches of water at 4°C
InH2O60F	Pressure in inches of water 6 degrees Cel
INH2O68F	Pressure in inches of water at 20°C
Bar	Pressure in bars
KPA	Pressure in Kilo Pascals
MPA	Pressure in Milli Pascals
Mbar	Pressure in millibars
InHg	Pressure in inches of mercury at 0°C
MMH2O4C	Pressure in mm of water at 4°C
MMH2O15.6C	Pressure in mm of water at 60°F (15.6°C)
MmHg	Pressure in millimeters of mercury at 0°C
INHG	Pressure in inches of mercury at 0°C
Kgcm2	Pressure in kilograms per square-centimeter
CUSTOM	CUSTOM

Table 4: Error codes

Error Number	Error Description
100	A non-numeric entry received where it should be a numeric entry
101	Too many significant digits entered
102	Invalid units or parameter value received
103	Entry is above the upper limit of the allowable range
104	Entry is below the lower limit of the allowable range
105	A required command parameter was missing
106	An invalid pressure unit was received
107	An invalid CJC_STATE was received
108	An invalid TSENS_TYPE was received
109	Pressure module not connected
110	An unknown command was received
111	An invalid RTD or TC parameter value was received
112	The serial input buffer overflowed
113	Too many entries in the command line
114	The serial output buffer overflowed
115	Output is overloaded
116	Calibrator not in pulse train mode when TRIG was received
117	An invalid FREQ_TYPE was received
118	Indicates that the pressure module (APM) is not ready
119	Indicates the ASC is in the wrong mode to accept the command

6.0 Entering Commands

Following protocol must be followed when sending commands to the calibrator:

- Commands may be entered in upper or lower case.
- At least one space required between the command and parameter, all other spaces are optional.
- Almost all commands for the calibrator are sequential, any overlapped commands will be indicated as such.

This section will briefly explain each of the commands and describe their general use, which will include any parameters that may be entered with the command as well as what the output of the command is.

6.1 Common Commands *CLS

Clears the ESR, the error queue and the RQS bit. Also terminates all pending operations. When writing programs, use before each procedure to avoid buffer overflow.

***ESE**

Loads a byte into the Event Status Enable register. The command is entered with a decimal number that, when converted to binary, enables the right bits in the Event Status Register. For example:

*ESE 133

When 133 is converted to binary it is 10000101. Bits 7, 2, and 0 will be enabled.

***ESE?**

Returns the contents of the Event Status Enable register. The value returned is a decimal. For example, if the register has the following settings:

10000101than the value returned will be 133.

***ESR?**

Returns the contents of the Event Status Register in decimal form. For example:

If the ESR contains 10111001, *ESR? will return 185.

***IDN?**

Returns the manufacturer, model number, and firmware revision of the Calibrator. For example: *IDN? will return

JOFRA, ASC-400-1-R, 0000000000/362866, 1.14

OPC

Enables the Operation Complete setting in the ESR. This setting makes it possible to check if an operations is complete after it has been initialized.

For example this operation could be used with the command TRIG. ***OPC?**
Returns 1 when all operations are complete, and causes program execution to pause until all the operations are complete. For example:

TRIG ; *OPC? will return a 1 when the pulse train initiated by TRIG is complete.

***RST**

Resets the state of calibrator to the power-up state. All subsequent commands are held off until the execution of the command is complete.

***SRE**

Loads a byte into the Service Request Enable register. A decimal number must be entered, which when converted to binary, corresponds to the correct settings.

For example:
*SRE 8 enters the binary number 00001000 to the SRE. This enables bit 3. Bit 6 is not used.

***SRE?**

Returns a byte from the SRE. The byte is returned in decimal format. For example:

If 40 is returned, bits 5 and 3 are enabled. ***STB**

Returns the status byte in decimal form from the Serial Poll Status Byte. For example;

If 72 is returned, bits 6 and 3 are enabled. ***WAI**

Prevents further remote commands from being executed until all previous commands are executed. For example:
OUT 10 MA ; *WAI ; OUT 5 V will out put 10mA and wait until output settles, then volts command will be processed.

6.2 Calibrator Commands CAL_START

Puts the calibrator in calibration mode. The main display will say CALIBRATION MODE and a calibration menu will be displayed on the terminal.

CJC_STATE

Turns Cold Junction Compensation (CJC) on or off, when the calibrator is in thermocouple (TC) mode. The command is used by adding ON or OFF after it.

For example:

CJC_ STATE OFFturns CJC off.

CJC_STATE?

Tells whether the Cold Junction Compensation in thermocouple mode is turned on or turned off. The calibrator returns OFF if CJC is off, and ON if CJC is on.

CPRT_COEFA

This command is used for entering a custom RTD into the calibrator. The numeric value entered after the command will be set as the first coefficient of the polynomial used by the custom RTD.

For example:

CPRT_COEFA 3.9083E-3enters 3.9083E-3 as coefficient A.

CPRT_COEFA?

Returns the number which was entered for the first coefficient of the polynomial used in the custom RTD. Using the example above CPRT_ COEFA? Would return:

3.9083E-3

CPRT_COEFB

This command is used for entering a custom RTD into the calibrator. The numeric value entered after the command will be set as the second coefficient of the polynomial used by the custom RTD.

For example:

CPRT_COEFB -5.775x10-7 enters -5.775x10-7 as coefficient B.

CPRT_COEFB?

Returns the number, which was entered for the first coefficient of the polynomial used in the custom RTD. Using the example above, CPRT_ COEFB? Would return:

-5.775x10-7

CPRT_COEFC

This command is used for entering a custom RTD into the calibrator. The numeric value entered after the command will be set as the first coefficient of the polynomial used by the custom RTD.

For example:

CPRT_COEFC -4.183x10-12 enters -4.183x10-12 as coefficient C.

CPRT_COEFC?

Returns the number which was entered for the first coefficient of the polynomial used in the custom RTD. Using the example above CPRT_ COEFC? Would return:

-4.183x10-12

CPRT_MIN_T

Sets the minimum temperature of the custom RTD range. The temperature value must be entered with a degrees label, CEL for Celsius and FAR for Fahrenheit.

For example:

CPRT_MIN_T -260 CEL enters -260°C as the minimum temperature.

CPRT_MIN_T?

Returns the value entered for minimum temperature in the range for a custom RTD. Note that the Calibrator always returns numbers in scientific notation. The above example would return:

-2.600000E+02, CEL

CPRT_MAX_T

Sets the maximum temperature of the custom RTD range. The temperature value must be entered with a degrees label, CEL for Celsius and FAR for Fahrenheit.

For example:

CPRT_MAX_T 0.0 CEL enters 0.0°C as the maximum temperature.

CPRT_MIN_T?

Returns the value entered for minimum temperature in the range for a custom RTD. The above example would return:

0.000000E+00, CEL

CPRT_R0
Sets the 0° resistance, R0, in the custom RTD. The value must be entered with a units label. Refer to the Parameter Units table for assistance.

For example:

CPRT_R0 100 OHM sets R0 to 100 ohms. CPRT_R0?

Returns the value for the resistance in custom RTD. The above example would return:

1.000000E+02, OHM

ERR_FUNC

Sets the Percent error function to volts or mA.

ERR_FUNC?

Returns the Percent error function.

ERR_MA_HI

Sets 100% value for mA Percent Error.

E.g. ERR_MA_HI [0-24] MA.

ERR_MA_HI?

Returns 100% value for mA Percent Error

ERR_MA_LO

Sets 0% value for mA Percent Error.

E.g. ERR_MA_LO [0-24] MA

ERR_MA_LO?

Returns 0% value for mA Percent Error.

ERR_V_HI

Sets 100% value for volt Percent Error.

E.g. ERR_V_HI [0-24] Volts.

ERR_V_HI?

Returns 100% value for volt Percent Error

ERR_V_LO

Sets 0% value for volts Percent Error.

E.g. ERR_V_LO [0-24] Volts.

ERR_V_LO?

Returns 0% value for volt Percent Error.

FAULT?

Returns the error code number of an error that has occurred. The command may be entered when the previous command did not do what it was meant to do.

For example, if a value for current output is entered that is bigger than the supported range (0-24mA) FAULT? Would return:

103 which is the code number for an entry over range.

Refer to the Error Codes table for more information on error code numbers.

FREQ_LEVEL

Sets the amplitude of the wave used in the Frequency Out and Pulse modes. The range for amplitude entered may be found in the Specifications section.

For example:

FREQ_LEVEL 5 V sets the amplitude at 5Vpp.

FREQ_LEVEL?

Returns the amplitude of the wave used in Frequency Out and Pulse modes.
FREQ_LEVEL? with the above example would return:

5.000000E+00, V

FREQ_TYPE

When in frequency mode, sets the calibrator to output a continuous wave (Frequency Out), or a pulse train.

Parameter	Description
CONT	Continuous wave
PULSE	Pulse

For example:

FREQ_TYPE CONT will set the calibrator to FREQ OUT.

Note…
This command does not put the calibrator in frequency mode. Use the ***LOWER_MEAS FREQUENCY*** command to put the calibrator in frequency mode.

FREQ_TYPE?

Tells whether calibrator is sourcing a pulse or a continuous wave. The command will return CONT if the calibrator is in FREQ OUT mode, and PULSE if the calibrator is in PULSE mode.

FREQ_UNIT

Sets the unit for frequency. There are three ranges of frequencies for frequency and pulse modes,. Use this command to select the right range.

Parameter	Description
CPM	Cycles per minute
Hz	Hertz
kHz	Kilo Hertz

For example:

FREQ_UNIT HZ sets the frequency to Hz range **FREQ_UNIT?**

Returns the frequency unit currently being used by the frequency and pulse modes.

FUNC?

Returns the current mode of the upper and lower displays. For example if the calibrator is set to volts on the upper display, and pressure on the lower display, FUNC? Would return:

DCV, PRESSURE **HART_ON**

Puts a 250Ω Hart resistor in series with the mA source circuit and the isolated mA read with loop power circuit.

HART_OFF

Removes the 250Ω Hart resistor from the mA source circuit and the isolated mA read with loop power circuit.

HART?

Returns the state of the Hart resistors.

LOCAL

Restores the calibrator to local operation if it was in remote mode. Also clears LOCKOUT if the unit was in lockout mode.

LOOP_PWR_OFF

Turns 24V loop power off for isolated mA read functions including %Error and Scaled mA.

LOOP_PWR_ON

Turns 24V loop power on for isolated mA read functions including %Error and Scaled mA.

LOOP_PWR?

Returns the state of the 24V loop power supply for isolated mA read functions including %Error and Scaled mA, either ON of OFF.

LOWER_MEAS

Sets the lower display to measure mode. The command is followed by any of the following parameters except for pulse and mA sim, which are source only.

Parameter	Description
DCI	Current [mA]
DCV	Volts [V] or [mV]
FREQUENCY	Hz or KHz
PRESSURE	Pressure
RTD	RTD
TC	Thermocouple
Resistance	OHMS

For example:

LOWER_MEAS DCV sets the lower display mode to VOLTS IN

L_PRES_UNIT

Sets the unit for measuring pressure on the lower display. Add the unit after the command. The available pressure units and their syntax are shown in the Table 3. (Parameter Units).
For example:

L_PRES_UNIT KPAL sets the pressure unit to kiloPascals

OUT

Sets the output of the calibrator. This command may be used to output mA, volts, frequency, temperature, and ohms. Frequency output, which is set by the command FREQ_TYPE, is either continuous or pulse. The calibrator is automatically set to source mode when OUT is entered. A number and its unit must follow the command. See Table 3. (Parameter Units) for a list of available units. For example:
OUT 10 MA sets the calibrator to mA OUT mode and sets the output to 10mA.

OUT?

Returns the output of the calibrator. Using the above example, OUT? Would return:

1.000000E-02, A

PRES?

Returns the model and serial number of the attached pressure unit. Returns NONE if no pressure unit is attached. For example:

PRES? Will return CRYSTAL, APM01KG, 364839, R130001.00/R090008.01

Note…
The ASC-400 must be in read pressure mode in either upper or lower window and the APM attached to use this command.

PRES_UNIT?

Returns the pressure units of both the upper and the lower display. For example if the unit on the upper display is bars, and on the lower it is psi, the command will return:
BAR, PSI

PULSE_CNT

Sets the number of pulses the calibrator will produce when it is triggered while in pulse mode. For example;

PULSE_CNT 3000 will set the number of pulses to 3000.

PULSE_CNT?

Returns the number of pulses in the pulse train. Using the above example, the returned value would be:

3000

REMOTE

Puts the calibrator in remote mode. From the remote mode the user can still use the keypad to get back to local unless the command LOCKOUT was entered before

REMOTE. Than the keypad is totally locked out, and the user has to send the LOCAL command to get back to local operation.

RTD_TYPE

Sets the RTD type. The following is a table of RTD types to be entered after the command:

P10(90)385	P50(68)391	M50(68)428
P50(68)385	P50(90)391	M50(90)428
P50(90)385	P50(06)391	M50(06)428
P100(68)385	P100(68)391	M100(68)428
P100(90)385	P100(90)391	M100(90)428
P200(90)385	P100(06)391	M100(06)428
P400(90)385	P500(06)391	100(90)617
P500(90)385	P1K(06)391	H120(90)672
P1K(68)385	P100(90)392	P100(90)JIS
P1K(90)385	M10(90)427	YSI(90)400

For example;

RTD_TYPE P50(68)385 sets RTD type to P50(68)385 **RTD_TYPE?**

Returns the RTD type.

RTD_WIRE

Sets the number of wires used for connection in measuring RTDs. The calibrator measures RTDs using 2-, 3-, and 4-wire connections. After the command, enter 2W for 2- wire, 3W for 3-wire, and 4W for 4-wire. For example:

RTD_WIRE 4W sets the connection to 4-wire

RTD_WIRE?

Returns the number of wires used in the RTD connection.

SCL_FUNC

Sets the scaling function to volts or mA.

SCL_FUNC?

Returns the scaling function.

SCL_MA_HI

Sets 100% value for mA scaling calculation.

E.g. SCL_MA_HI 20 mA

SCL_MA_HI?

Returns 100% value for mA scaling

SCL_MA_LO

Sets 0% value for mA scaling calculation.
E.g. SCL_MA_LO 4 mA

SCL_MA_LO?

Returns 0% value for mA scaling calculation.

SCL_V_HI

Sets 100% value for volts scaling calculation.
E.g. SCL_V_HI 10 V

SCL_V_HI?

Returns 100% value for volt scaling

SCL_V_LO

Sets 0% value for volts scaling calculation.
E.g. SCL_V_HI 10 V

SCL_V_LO?

Returns 0% value for volt scaling calculation.

SIM

Sets the output for current simulation. This command also switches the calibrator into mA simulation mode. A number and a unit must be entered after the command. For example:
SIM 5 MA sets the current simulation at 5 **SIM?**

Returns the output of the current simulation. With the example above, the output would be:
5.000000E-03, mA

ST_START

Starts a new switch test if the unit is in switch test mode.
upper_meas sw_test

ST_CLOSE?

In switch test recall mode this command returns the value at which the switch closed.
+4.502745E+00, MA

ST_OPEN?

In switch test recall mode this command returns the value at which the switch opened.
+6.131598E+00, MA

ST_DEAD?

In switch test recall mode this command returns the dead band of the switch.

-1.628854E+00, MA

TC_TYPE

Sets the Thermocouple type. The following is a table of TC types to be entered after the command:

B	BP	C
E	J	K
L	N	R
S	T	U
XK		

For example:

TC_TYPE B sets thermocouple type to B

TC_TYPE?

Returns the type of thermocouple the calibrator is set to.

TEMP_UNIT

Sets the temperature unit for sourcing and measuring RTD and TC.

After the command add

CEL = Celsius

FAR = Fahrenheit.

KEL = Kelvin

RAN= Rankine

For example: “TEMP_UNIT CEL“ sets the temperature to be measured or sourced to Celsius.

TEMP_UNIT?

Returns the temperature unit that is currently used for measuring and sourcing RTD and TC.

TRIG

Starts and stops the pulse train when the calibrator is in pulse mode. The parameters of the pulse train are set by commands PULSE_CNT, and FREQ_LEVEL. Entering TRIG initializes the train. Entering the command while the pulse train is running stops it.

TRIG?

Returns TRIGGERED if the pulse train is running, and returns UNTRIGGERED when the pulse train is not running. Returns NONE when the calibrator is not in pulse mode.

TSENS_TYPE

Sets the temperature sensor type to thermocouple, or to RTD for temperature measurement. After the command add TC for thermocouple, or RTD for RTDs. For example:

TSENS_TYPE TC sets the sensor type to thermocouple

TSENS_TYPE?

Returns the type of sensor that is currently set to measure temperature, either TC or RTD.

UPPER_MEAS

Sets the measuring mode for the upper display. The command is followed by any of the following parameters.

Parameter	Description
DCI	Current [mA]
DCV	Volts [V]
SW_TEST	Switch test
PRESSURE	Pressure

For example:

UPPER_MEAS DCV sets the upper display to measure volts

U_PRES_UNIT

Sets the unit for measuring pressure on the upper display. Add the unit after the command. The available pressure units and their syntax are shown in Table 3. (Parameter Units).

For example:

U_PRES_UNIT MMHG

sets the pressure unit to millimeters of mercury at 0°C

VAL?

Returns the value of any measurement taking place on the upper and lower display. For example, if the upper display is measuring 3 mmH2O15.60°C, and the lower display is measuring 8mA, then VAL? will return:

+3.318778E+00, MMH2O15.6C, +6.583549E+00, MA

ZERO_MEAS

Zeroes the attached pressure module. Enter the zeroing value in PSI after the command when zeroing an APM.

ZERO_MEAS?

Returns the zero offset or the reference value for absolute pressure modules.

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