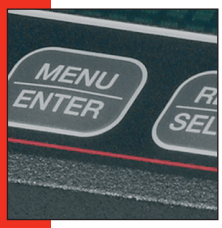
AMETEK®
TEST & CALIBRATION INSTRUMENTS

Adjustment Manual
Advanced Signal Calibrator

ASC-400



Adjustment Manual
Advanced Signal Calibrator
JOFRA ASC-400

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1.0 Overview

The ASC-400 Advanced Signal Calibrator has a built in adjustment function for readjustment of the calibrator. This adjustment function is based on a simple ASCII protocol, and you can get access to that function by the USB interface.

You can use a terminal program like HyperTerminal by accessing the instrument via the USB interface, or you can develop your own dedicated adjustment program in Visual Basic, Labview, etc.

There is no front panel adjustment available on the ASC-400.

In this manual only the terminal mode will be described.

2.0 Initiating Communication

Before you can initiate the Communication needed for a readjustment, you have to install a USB-driver. You can find the USB-driver on the memory stick which was included together with the instrument. The driver will be located in the subfolder: utilities.

To install the driver you have to connect the instrument to your computer and then turn on the calibrator. After a while the computer will ask for a driver and you have to locate the driver on the USB-stick in the subfolder utilities.

When the driver is installed you will get a virtual COMPORT named AMETEK Advanced Signal Calibrator. Start up your preferred terminal program and locate this Virtual COMPORT in the terminal setup. Now you are ready to recalibrate the instrument.

As long as the calibrator has been within at a stable temperature within the range of 18°C to 28°C for an hour or more, the calibrator only needs 5 minutes to warm up. If temperature conditions were previously below 10°C or higher then 40°C, then the unit must be allowed to stabilize for a minimum of 3 hours prior to adjustment. To initiate the calibration mode use the terminal to send the CAL_START command. The following will be displayed on the terminal.

```
Calibration is password protected Enter Password:
```

The password is 900. Enter the password correctly and the following will be displayed on the terminal.

```
Calibration Menu
  0: Exit
  1: ISO Current Input (mA)
  2: ISO Voltage Input (volts)
  3: Current Input (mA)
  4: Current Output (mA)
  5: Voltage Input (volts)
  6: Voltage Output (volts)
  7: Low Resistance Source (ohms)
  8: High Resistance Source (ohms)
  9: Resistance Measure (ohms)
 10: Thermocouple Output (mV)
 11: Thermocouple Input (mV)
 12: Thermocouple CJC
 13: Barometric Pressure
 14: System Calibration Date
 15: Barometric Pressure Calibration Date
Enter Selection:
```

3.0 Adjusting and calibrating the ASC-400

You should recalibrate the ASC-400 at the required calibration interval (defined by the factory as 1 year) and adjust if necessary.
Adjustment of the ASC-400 is a menu driven process. It consists of 15 different menu selections for calibration of the different functions. The only requirement being that mV must be adjustment before CJC.

Once a particular adjustment menu selection has been made the user is prompted to either input a signal into the ASC-400 or enter the output value of a signal from the ASC-400.

When inputting signals into the ASC-400, the readings are taken after the {enter} key is pressed and before the next prompt. Make sure the input to the ASC-400 is stable before the {enter} key is pressed and remains stable until the next prompt appears.

When entering the outputted value of a signal, make sure that value is stable before you enter it; there is no backspace.

4.0 Test equipment

Recommended test equipment is listed in the table below. Equipment with similar or better specifications can be used if the listed equipment is not available.

Equipment	Manufacturer	Model	Quantity	Purpose
Digital Multimeter	Fluke	8508A	1	All functions except CJC and ohm measure.
Calibrator	Fluke	5520A	1	All source functions and CJC.
Low thermal EMF banana to banana leads (red).	Multi Contact	28.0074-100-22	2	All functions except mV and CJC.
Low thermal EMF banana to banana leads (black).	Multi Contact	28.0074-100-21	2	All functions except mV and CJC.
TC – banana cable			1	mV source and measure.
Thermocouple type J TC – TC cable.			1	CJC.
Tube for barometric reference.			1	Barometric reference.

For the barometric reference in ASC-400-1, a barometric reference with an accuracy of 0.125 mbar or better is required.

5.0 ASC-400 Adjustment procedures

5.1 Adjusting Isolated current (mA) Input:

1. Connect Calibrator mA output to Digital Multimeter mA input and to ASC-400 Isolated mA measure terminals.
2. Type “1” in the Calibration menu.
   Prompt = “Input 0 mA to ASC400 - Press <enter> when stable”
3. Apply 0.000 mA (Digital Multimeter reading) to the input and press “enter” when stable.
   Prompt = “Input 24 mA to ASC400 - Press <enter> when stable”
4. Apply 24.000 mA (Digital Mulimeter reading) to the input and press “enter” when stable. ASC-400 now returns to the Calibration menu.

5.2 Adjusting Isolated voltage Input:

1. Connect Calibrator V output to Digital Multimeter V input and to ASC-400 Isolated V measure terminals.
2. Type “2” in the Calibration menu.
   Prompt = “Input 0 Volt to ASC400 - Press <enter> when stable”
3. Apply 0.000 V (Digital Multimeter reading) to the input and press “enter” when stable.
   Prompt = “Input 30 Volt to ASC400 - Press <enter> when stable”
4. Apply 30.000 V (Digital Multimeter reading) to the input and press “enter” when stable. ASC-400 now returns to the Calibration menu.

5.3 Adjusting current (mA) Input:

1. Connect Calibrator mA output to Digital Multimeter mA input and ASC-400 mA measure terminals.
2. Type “3” in the Calibration menu.
   Prompt = “Input 0 mA to ASC400 - Press <enter> when stable”
3. Apply 0.000 mA (Digital Multimeter reading) to the input and press “enter” when stable.
   Prompt = “Input 24 mA to ASC400 - Press <enter> when stable”
4. Apply 24.000 mA (Digital Multimeter reading) to the input and press “enter” when stable. ASC-400 now returns to the Calibration menu.

5.4 Adjusting current (mA) Output:

1. Connect Digital Multimeter mA input to ASC-400 mA source terminals.
2. Type “4” in the Calibration menu.

   Prompt = “First calibration point. Enter mA output:”
3. Enter multimeter read value when stable (example: 0.0000) and press “enter”.

   Prompt = “Second calibration point. Enter mA output:”
4. Enter multimeter read value when stable (example: 24.0000) and press “enter”. ASC-400 now returns to the Calibration menu.

5.5 Adjusting Voltage input:

1. Connect Calibrator V output to Digital Multimeter V input and ASC-400 V measure terminals.
2. Type “5” in the Calibration menu.

   Prompt = “Input 0 volt to ASC400 - Press <enter> when stable”
3. Apply 0.000 V (Digital Multimeter reading) to the input and press “enter” when stable.

   Prompt = “Input 20 volt to ASC400 - Press <enter> when stable”
4. Apply 20.000 V (Digital Multimeter reading) to the input and press “enter” when stable. ASC-400 now returns to the Calibration menu.

5.6 Adjusting Voltage Output:

1. Connect Digital Multimeter V input to ASC-400 V source terminals.
2. Type “6” in the Calibration menu.
3. Follow the menu prompts.

   Prompt = “First calibration point. Enter V output:”
4. Enter multimeter read value when stable (example: 0.0000) and press “enter”.

   Prompt = “Second calibration point. Enter V output:”
5. Enter multimeter read value when stable (example: 20.0000) and press “enter”. ASC-400 now returns to the Calibration menu.

5.7 Adjusting Low Resistance Output:

1. Connect Digital Multimeter ohm input (4-wire) to ASC-400 Ohms source terminals.
2. Set up Digital Multimeter for True ohm mode, 1 mA (3 mA max.) excitation current.
3. Type “7” in the Calibration menu.

   Prompt = “First calibration point. Enter ohms output:”
4. Enter multimeter read value when stable (example: 5.000) and press “enter”.

   Prompt = “Second calibration point. Enter ohms output:”
5. Enter multimeter read value when stable (example: 400.000) and press “enter”. ASC-400 now returns to the Calibration menu.

5.8 Adjusting High Resistance Output:

1. Connect Digital Multimeter ohm input (4-wire) to ASC-400 Ohms source terminals.
2. Set up Digital Multimeter for True ohm mode, 0.1 mA (0.3 mA max.) excitation current.
3. Type “8” in the Calibration menu.

   Prompt = “First calibration point. Enter ohms output:”
4. Enter multimeter read value when stable (example: 400.00) and press “enter”.

   Prompt = “Second calibration point. Enter ohms output:”
5. Enter multimeter read value when stable (example: 4000.00) and press “enter”. ASC-400 now returns to the Calibration menu.

5.9 Adjusting Resistance input:

1. Connect Calibrator to ASC-400 Ohms measure terminals using 4-wire connection.
2. Set up Calibrator for 4-wire connection.
3. Type “9” in the Calibration menu.

   Prompt = “Input 15 ohm to ASC400 - Press <enter> when stable”
4. Apply 15.00 ohm to the input and press “enter” when stable.

   Prompt = “Input 400 ohm to ASC400 - Press <enter> when stable”
5. Apply 400.00 ohm to the input and press “enter” when stable.

   Prompt = “Input 4000 ohm to ASC400 - Press <enter> when stable”
6. Apply 4000.0 ohm to the input and press “enter” when stable. ASC-400 now returns to the Calibration menu.

5.10 Adjusting Thermocouple (mV) Output:

1. Connect Digital Multimeter V input to ASC-400 mV source terminals (use TC to banana cable).
2. Type “10” in the Calibration menu.
3. Follow the menu prompts.

   Prompt = “First calibration point. Enter mV output:”
4. Enter multimeter read value when stable (example: -10.0000) and press “enter”.

   Prompt = “Second calibration point. Enter mV output:”
5. Enter multimeter read value when stable (example: 75.0000) and press “enter”. ASC-400 now returns to the Calibration menu.

5.11 Adjusting Thermocouple (mV) input:

1. Connect Calibrator V output to Digital Multimeter V input and ASC-400 mV measure terminals (use TC to banana cable).
2. Type “11” in the Calibration menu.

   Prompt = “Input 0 mV to ASC400 - Press <enter> when stable”
3. Apply 0.000 mV (Digital Multimeter reading) to the input and press “enter” when stable.

   Prompt = “Input 75 mV to ASC400 - Press <enter> when stable”
4. Apply 75.000 mV (Digital Multimeter reading) to the input and press “enter” when stable.

5.12 Adjusting Thermocouple CJC:

1. Connect Calibrator TC output to ASC-400 TC measure terminals (use Thermocouple type J cable).
2. Type “12” in the Calibration menu.

   Prompt = “Input a type J thermocouple at 0.0 degrees C - Press <enter> when stable”
3. Apply 0°C to the input and press “enter” when stable (wait minimum 5 minutes).

5.13 Barometric reading (ASC-400-1 only):

1. Connect a Barometric reference source to ASC-400 barometric sensor using a tube (5 mm inner diameter / 8 mm outer diameter). ASC-400 barometric sensor is located below the batteries underneath a “Calibration void” label.
2. Type “13” in the Calibration menu.

   Prompt = “Apply 0.95 bar absolute - Press <enter> when stable”
3. Apply 0.95 bar absolute to the ASC-400 and press “enter” when stable.

   Prompt = “Apply 1.05 bar absolute - Press <enter> when stable”
4. Apply 1.05 bar absolute to the ASC-400 and press “enter” when stable. ASC-400 now returns to the Calibration menu.
5. Apply a new “Calibration void” label over the ASC-400 barometric sensor after calibration.

5.14 System Calibration Date:

1. Type “14” in the Calibration menu.
2. Follow the menu prompts.

   Prompt = “Calibration Date: 2014 9 5 13 1 24”
   Prompt = “Enter new date <year> <month> <day> <hour> <minute> <second>:”

   Example: 2014 09 05 13 55 14

5.15 Barometric Pressure Calibration Date:

1. Type “15” in the Calibration menu.
2. Follow the menu prompts.

   Prompt = “Calibration Date: 2014 9 5 13 1 24”
   Prompt = “Enter new date <year> <month> <day> <hour> <minute> <second>:”

   Example: 2014 09 05 13 55 14

6.0 Exiting calibration procedures

When you are finish with the adjustment type **0** to exit the calibration menu.

```
Calibration Menu
  0: Exit
  1: ISO Current Input (mA)
  2: ISO Voltage Input (volts)
  3: Current Input (mA)
  4: Current Output (mA)
  5: Voltage Input (volts)
  6: Voltage Output (volts)
  7: Low Resistance Source (ohms)
  8: High Resistance Source (ohms)
  9: Resistance Measure (ohms)
 10: Thermocouple Output (mV)
 11: Thermocouple Input (mV)
 12: Thermocouple CJC
 13: Barometric Pressure
 14: System Calibration Date
 15: Barometric Pressure Calibration Date
Enter Selection:
```

Note…

Adjustment Verification:

This procedure does not cover the verification of the unit. As a rule of thumb the unit should never use up more than 50% of its specifications immediately after adjustment. Also the person adjusting the ASC-400 can exit and enter calibration mode at will, while doing the verification as they go.

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