Contents

1 Introduction

The PICO ADC-10, ADC-12, ADC-40 and ADC-42 are very compact single channel analog to digital converters

The units are supplied with a range of ready-to-use Virtual Instrument and data logging software: alternatively, you can use the ADC driver software to develop your own programs to collect and analyse data from the unit. The software includes:

- PicoScope for DOS and Windows: virtual instrument programs which enable you to use the ADC like an Oscilloscope, Spectrum Analyser or Voltmeter
- PicoLog (optional): DOS program for data logging and analysis
- Clipboard: Windows program to collect data and write it to the clipboard- you can then analyse the data using a spreadsheet
- adcxx.exe: DOS program to read in large amounts of data and write it to a text file.

This manual describes the physical and electrical properties of the ADCs, and explains how to install the software. For information about the software supplied with the unit, please refer to the following documents:

Product	Document
PicoScope for DOS	PicoScope manual
PicoScope for Windows	PicoScope for Windows help file
PicoLog	PicoLog manual Section 8 of this manual
ADC-xx clipboard program	Clipboard help file
ADCxx drivers	Driver help file or ADCxx.ASC (text file)

2 Safety warning

For all Pico ADCs, the ground input (BNC outer shell) is connected directly to the ground of your computer. This is done in order to minimise interference. As with most oscilloscopes, you should take care not to connect the ground input of the ADC to anything which may be at some voltage other than ground: doing so may cause damage to the ADC. If in doubt, use a meter to check that there is no significant AC or DC voltage.

For computers that do not have an earth connection (for example laptops), it must be assumed that the ADC is not protected by an earth. For such computers, we recommend that only class II (double insulated) oscilloscope probes should be used.

The maximum input voltage range of the ADC is ±5V. Any voltages in excess of ±30V may cause permanent damage to the unit.

The unit contains no user serviceable parts: repair or calibration of the unit requires specialised test equipment and must be performed by Pico Technology Limited or their authorised distributors.

3 Specification

	ADC-10	ADC-12	ADC-40	ADC-42
Resolution	8 bits	12bits	8 bits	12 bits
Input voltage range	0 to 5V	0 to 5V	±5V	±5V
Input impedance	200kS		1MS	
Repeatability at 25EC	±1lsb	±4lsb	±1lsb	±4lsb
Number of input channels	1			
Maximum sampling rate on 386/33	20ksps	15ksps	20ksps	15ksps
Absolute accuracy at 25EC	±1%			
Overvoltage protection	±30V			
Input connectors	BNC			
Output connector	25 way male D-type to computer printer port			
Power requirements	No power supply required			
Environmental conditions	0 to 70EC 0 to 95% humidity NOT water resistant			

4 EMC

These instruments are designed to comply with the requirements of the EMC directive 89/336/EEC. The following standards were applied:

Emissions
EN50081-1(1992) Generic emission standard for residential, commercial and light industry.

- EN55022 Conducted, class B
- EN55022 Radiated, class B

Immunity
These products have demonstrated a satisfactory level of immunity in the field.

5 Installation

5.1 Package Contents

The ADC-10, ADC-12, ADC-40 and ADC-42 packages should contain the following items:

- ADC unit
- PicoScope diskette
- ADC manual
- PicoScope for DOS manual

If you ordered PicoLog, the package will also contain the following items:

- PicoLog diskette
- PicoLog manual

5.2 Software

The software diskette contains easy-to-use installation programs for DOS and for Windows that take you, step by step, through the process of setting up the software.

The Windows software creates a program group for Pico software and help files: if you wish to use any part of the software under Windows, you should therefore use the Windows installation program. If you only intend to use the DOS software, you can use either installation program.

Installing under DOS

1. Insert the software diskette into drive A
2. type A:INSTALL
3. press the Enter key
4. Follow the instructions given to you by the program

Installing under Windows

1. Insert the software diskette into drive A
2. Select File from the program manager main menu
3. Select Run from the File menu
4. Type A:WINSTALL
5. Press the Enter key
6. Follow the instructions given to you by the program

6 Operation

To use the ADC, you should connect the ADC to the printer port on your computer, either directly or using a good quality extension cable. Next, connect a voltage source to the BNC connector. The ADC has the same connectors as an oscilloscope, so you can use standard oscilloscope probes.

The ADC-40 and ADC-42 have the same input impedance as an oscilloscope, so the x10 function on a scope probe will give the expected result. **THIS IS NOT TRUE FOR THE ADC-10 AND ADC-12.**

To check that the unit is working, start up the PicoScope program. PicoScope should now display the voltage that you have connected. If you are using scope probes, when you touch the scope probe tip with your finger, you should see the a small 50Hz mains signal on the screen.

7 Scaling

PicoScope and PicoLog automatically convert the readings from the ADCs into voltages. If, however, you use the drivers, it is necessary to convert the readings within your program.

The ADC-10 is an 8-bit unipolar analog to digital converter. This means that it produces values in the range 0 to 255 to represent voltages between 0 and 5 volts. To convert from ADC readings to Volts, you should multiply by 5 and divide by 255. Thus, an ADC reading of 132 represents 132 x 5 / 255 = 2.588 Volts.

The ADC-12 is a 12-bit unipolar analog to digital converter. This means that it produces values in the range 0 to 4095 to represent voltages between 0 and 5 volts. To convert from ADC readings to Volts, you should multiply by 5 and divide by 4095. Thus, an ADC reading of 132 represents 132 x 5 / 4095 = 0.1612 Volts.

The ADC-40 is an 8-bit bipolar analog to digital converter. This means that it produces values in the range 0 to 255 to represent voltages between -5 and +5 volts. 128 represents zero volts. To convert from ADC readings to Volts, you should subtract 128, then multiply by 5 and divide by 128. Thus, an ADC reading of 132 represents ((132-128) x 5)/128 = 0.156 Volts.

The ADC-42 is a 12-bit bipolar analog to digital converter. This means that it produces values in the range 0 to 4095 to represent voltages between -5 and +5 volts. 2048 represents 0 volts. To convert from ADC readings to Volts, you should subtract 2048, then multiply by 5 and divide by 2048. Thus, an ADC reading of 132 represents ((132-2048) x 5) / 2048 = -4.677 Volts.

8 Picolog support for ADC-10/12/40/42

This section covers the functions of PicoLog which are specific to the ADC-10, ADC-12, ADC-40 and ADC-42. This description refers to the ADC-10 only, but the same procedures apply for the other ADCs.

It describes:

- edit ADC-10 setup: specify which printer port the ADC-10 is connected to
- Display voltages: display the parameters that can be measured using the ADC-10
- Add or edit channel: specify details for a channel

8.1 Edit ADC-10 setup

```
?4444UEDIT ADC-10 SETUP 44444@
*                            *
* Printer port:     LPT1     *
*                            *
B4444444444444444444444444444A
```

This option is used to specify which printer port the ADC-10 is connected to. The port must be **LPT1**..**LPT3**.

8.2 Display Voltages

```
?444UDISPLAY ADC-10 VALUES 44444@
*                                *
*    ADC counts:         132     *
*    DC volts:         2.588     *
*    AC volts:         0.301     *
*    dB                -1.65     *
*    Frequency         135.5     *
B4444444444444444444444444444444A
```

This option shows you the current value for each of the measurement modes that you can select using the **ADC-10**.

It is useful when checking that the ADC-10 is connected correctly, before starting a run.

Press **Escape** to return to the main menu.

8.3 Edit ADC-10 channel

```
?444444U EDIT ADC-10 CHANNEL W444444444444@
*                                          *
* Name:                   Inlet temp       *
*                                          *
* Heading line 1:         Inlet            *
* Heading line 2:         Temp             *
*                                          *
* Measurement mode:       DC Volts         *
* Min frequency:          100  Hz          *
*                                          *
* No of readings:         10               *
* Combination method:     Average          *
*                                          *
* Total measurement time: 2500  ms         *
*                                          *
B4444444444444444444444444444444444444444444A
```

This is used to specify how you wish to collect data from the ADC-10, and what it is to be called within the program.

The **channel name** will appear on parameter menus. The two lines of **heading** will appear in the headings of tabulation reports.

The **measurement mode** can be one of the following:
- ADC counts
- Instantaneous (Inst) Volts
- AC volts, DC volts
- frequency or dB.

ADC counts and Inst Volts are based on a single measurement: the others are based on a number of measurements dependent on the minumum frequency. if you wish to collect data at a sampling rate less than a second, it is advisable to use ADC counts or Inst Volts.

The **min frequency** specifies the cut-off frequency for the averaging and frequency measurement techniques use in measurement modes AC and DC volts, frequency and dB measurements. The lower the minimum frequency, the longer the time required to take each reading.

The **number of readings** specifies how many readings will be taken for this channel during each sample interval. This is useful if the measured value may change during the sample interval: for example, you might wish to take several readings of a noise level, but only record the maximum value.

The **combination method** defines how the readings will be combined to form a sample. It can be **minimum**, **maximum** or **average**. **Average** is useful to reduce the effects of noise: **Minimum** and **Maximum** can be used to identify extreme values during the sample interval.

The **total measurement time** is the total time to collect all the readings for this sample: it must be less than the sample interval.