



ADQ-1000

Set Up Guide

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1 INTRODUCTION

The ADQ-1000 is a stand-alone data acquisition server designed to acquire high-level analogue voltages from up to 32 channels. It can also acquire digital data from AWP-300 digital wave height gauges. The server is managed through WaveGen-Studio – a graphical user-interface client application that runs on a Windows PC. Both the server and the Windows PC running WaveGen-Studio are connected to a wired LAN (Local Area Network). This is shown in Figure 1-1.

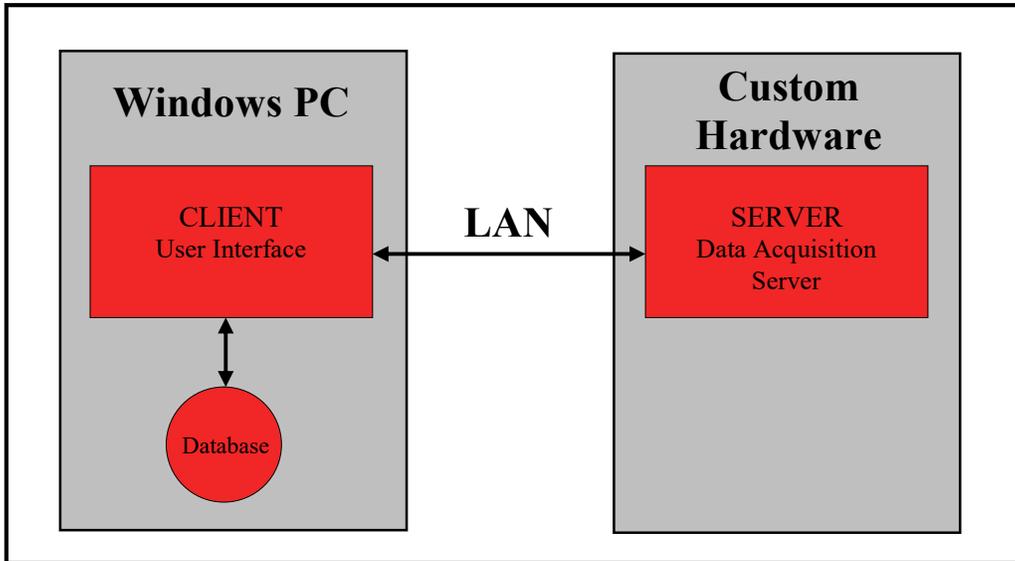
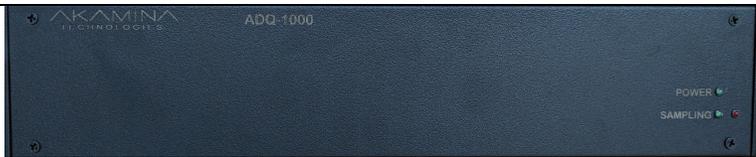


Figure 1-1: ADQ-1000: WaveGen-Studio with Data Acquisition Server

1.1 Server

The server consists of acquisition hardware and software running on a hard real time operating system. The server collects data from the analogue input and serial input channels and stores the data internally until downloaded through WaveGen-Studio. The server hardware is enclosed in a 2U (3.5”, 8.9 cm) or 3U (5.25, 13.9 cm), 19 inch rack mountable chassis. The chassis can also be placed on a desktop.

Analogue input connections are located at the front of the chassis. The number and arrangement of the connections at the front of the chassis depends on the configuration selected by the user. Example front panel configurations are shown in Table 1-1 and example read panel configurations are shown in Table 1-2.

<i>Description</i>	<i>Image</i>
ADQ-1000 without analogue input	
ADQ-1000 with 8 analogue input channels	

ADQ-1000 with 16 analogue input channels	
ADQ-1000 with 32 analogue input channels	
ADQ-1000 with powered sensor connectors	

Table 1-1 Sample Front Panel Configurations

<i>Description</i>	<i>Image</i>
with power, network, monitor, keyboard and CAN Bus connectors	
with power, network, single CAN Bus connector and a IP address reset switch	
with power, network, dual CAN Bus connectors and a IP address reset switch	

with power, network, dual analog output connectors and an IP reset switch in a 2U chassis



Table 1-2 Sample Rear Panel Configurations

1.1.1 Analogue Input Connectors

For configurations with analogue input support, an array of labelled BNC connectors are available for use to connect analogue voltage signals. Each connector is a standard BNC connector to which a co-axial cable carrying a voltage signal can be quickly connected. All unused channels should be terminated with 50 ohm terminators (supplied) to eliminate any effects on adjacent channels.

1.1.2 Powered Sensor Connectors

Optional powered sensor connector pairs (visible in one of the configurations shown in Table 1-1) can be used to provide a clean mechanism for connecting both power and signals to external sensors. Internal wiring routes the signals from the sensor connector (IN) to the BNC connector (OUT). A short length of co-axial cable can then be used to connect the signals from an OUT connector to any open analogue input connector.

The power available to the sensors is regulated 15 VDC. The power supply has the capacity to support an aggregate sensor loading of up to 1.5 A.

Amphenol PT02A-10-6P receptacles are used on the front panel for the powered sensor connectors. The mating connector is the Amphenol PT06E-10-6S. The pin-out information for the connector and the instrumentation cable is shown in Table 1-1 below.

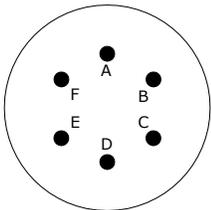
	<ul style="list-style-type: none"> • Pin A – N/C • Pin B – Output Signal High • Pin C – Output Signal Low • Pin D – Shield • Pin E – Power Low • Pin F – Power High
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Table 1-1: Powered Sensor Connector Signal Assignment

1.1.3 Analogue Output Connectors

The analogue output connectors (AOUT 1 and AOUT 2) shown in some of the configurations in Table 1-1 and Table 1-2 are typically not part of a data acquisition system; output is added when the system is used for wave generation or advanced data acquisition with analogue output capability.

1.1.4 Status LEDs

A power LED indicates the presence of the power rails within the chassis. A pair of green and red LEDs are used to indicate whether the server is sampling input channels or not.

1.1.5 CAN Bus Connectors

Amphenol PT02A-8-4P receptacles are provided on the rear panel for CAN Bus I/O. The mating connector is the Amphenol PT06A-8-4S-SR. The pin-out information for the connector and the instrumentation cable is shown in Table 1-2 below.

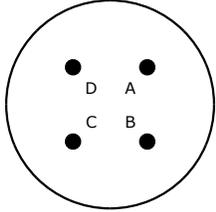
	<ul style="list-style-type: none"> • Pin A – CANH • Pin B – CANL • Pin C – Power Low • Pin D – Power High
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Table 1-2: CAN Bus Connector Signal Assignment

1.2 Features

The hardware and software features of the ADQ-1000 Data Acquisition System are:

- 8, 16 or 32 16-bit differential-input channels
- 75 Watt power supply with 85 to 265 VAC input
- analogue input voltage range of +/- 10 V
- 300 Hz analogue anti-aliasing and noise reducing filter on each analogue input channel
- convenient connection to BNC connectors mounted on the front panel
- optional integrated power and signal connectors for convenient connection of sensors that require a regulated 15V DC power source
- acquisition at 1000 scans per second or 500 Hz if used for control
- server is rack-mountable or can be placed on a desktop
- gigabit Ethernet connection to server for high data transfer rates
- networked server solution eliminates the real time burden on Windows clients
- up to 2 CAN Bus connections with up to 30 AWP-300 wave height gauges per CAN Bus connection
- up to 2 analogue output channels



2 SERVER SET UP PROCEDURES

2.1 Initial Set Up

The server is shipped ready to use. It requires a surge-protected, 15 Amp, 85 to 265 VAC power source and a wired connection to a network. The chassis can be mounted in a 19 inch rack or can be placed on a desktop.

The server is shipped with the latest version of software that has been configured for the hardware included in the server. The software running on the server can be upgraded through the WaveGen-Studio user interface.

Once power has been connected to the server, the green Power LED and the red SAMPLING LED should be illuminated. The server is now ready to use.

The server is shipped with a default IP address of 192.168.1.30. To change the IP address used by the server:

1. Connect the LAN port on the ADQ-1000 to the LAN port on a PC or laptop using a Cat 5E or CAT 6 network cable. The PC or laptop should not be actively connected to any other networks.
2. Set the IP address of the PC or laptop to a static IP address on the same subnet (e.g. 192.168.1.10).
3. Open a telnet connection to IP address 192.168.1.30, port 8000 (telnet 192.168.1.30 8000).
4. At the login prompt, login with the user id: admin with a password: admin.
5. Enter the command setIP a.b.c.d, where a, b, c and d are the elements of the IP address that is to be assigned to the server.
6. Use the Ctrl-Alt-Delete key grouping to reboot the server from the keyboard or power cycle the server to cause it to reboot.
7. The server will boot up with the IP address assigned in step 5.
8. Disconnect the ADQ-1000 from the PC or laptop and connected to the network from which it is to be accessed.

Note that the IP address can also be changed using WaveGen-Studio while the ADQ-1000 is connected to WaveGen-Studio. This procedure is documented in the WaveGen-Studio User's Guide.

2.2 IP Address Reset

Occasionally, it may be necessary to reset the IP address to the default value before setting the IP address. This would be the case if the IP address has been set to a value which has been forgotten making it impossible to telnet to the ADQ-1000.

To reset the IP address to the factory default value:

1. Turn off the power to the ADQ-1000.
2. Wait 5 seconds and turn on the power to the ADQ-1000.
3. After turning on the power, press and hold the circular reset switch on the rear panel.
4. Hold this reset switch in until the Sampling LEDs on the front panel begin to flash.
5. Once the LEDs flash, release the reset switch.
6. The ADQ-1000 will automatically reboot itself and restart with the default IP address.
7. Follow the telnet procedure outlined in section 2.1 to set the IP address of the ADQ-1000 to the desired value.

2.3 Rebooting the Server

The server can be rebooted by using the power switch located on the back panel directly above the power cord. It is important to note that if the power switch is used, the operator must allow a 5 second delay between turning the unit off and turning it back on to ensure the server boots correctly.

2.3.1 AWP-300 Connection

If AWP-300s are to be used they can be connected to one or both CAN Bus connectors in a daisy-chain fashion. The AWP-300s can be connected to a single CAN Bus connector (up to 30 of them) or they can be broken into two groups with one group connected to each CAN Bus connector. The last AWP-300 must have a terminator connector attached as the CAN Bus requires termination to work properly.

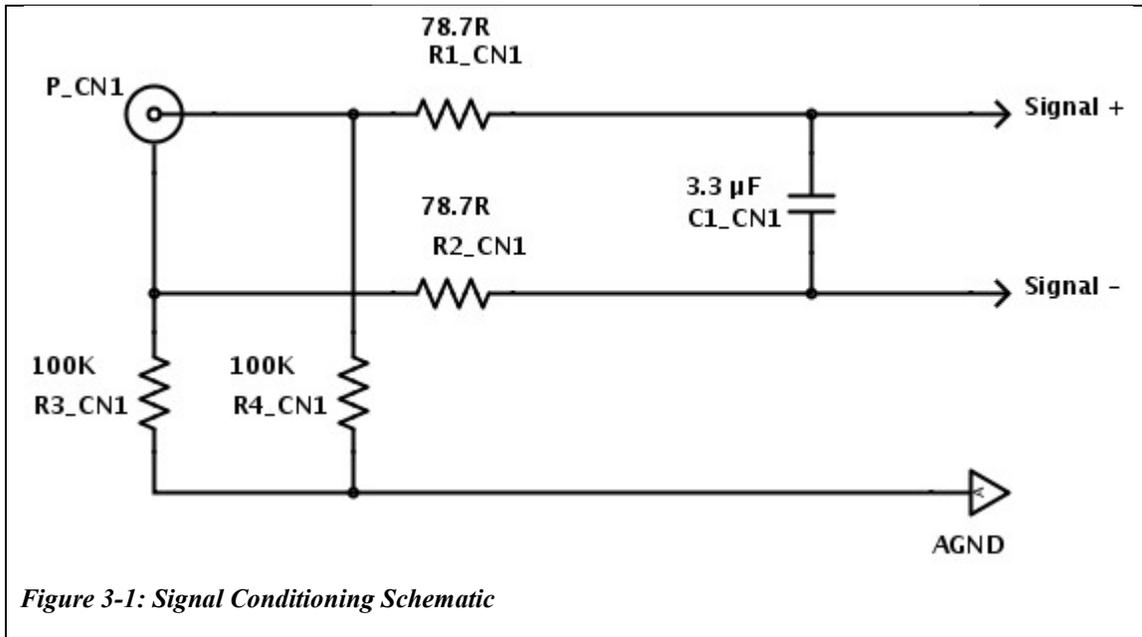
The AWP-300s and the ADQ-1000 CAN Bus ports are set to a bit rate of 500 kbps. This limits the length of the CAN Bus to a maximum of 100m.

3 ANALOGUE INPUT SIGNAL CONDITIONING

Signal conditioning circuitry has been included for each analogue input channel. This circuitry provides the following functionality:

- Differential input connection.
- Low pass filter the analogue input signal to eliminate aliasing,
- Bias resistors on the input lines.

The schematic for the circuit is shown in Figure 3-1.



The components R1, R2 and C1 create a passive low-pass filter. The corner frequency of the filter is approximately 306 Hz. The filter is designed to reduce the energy in the input signal before sampling to reduce aliasing without introducing unwanted attenuation in the frequency range of interest and without adding significant phase lag.

All of the components in the signal conditioning circuit are mounted on the inside of the 16-channel BNC panel. The surface-mount components are all the larger 0805 footprint to make it easier to change should it be necessary to do so.

The amplitude response of the filter is:

$$|H(f)| = \frac{1}{\sqrt{1 + (2\pi fRC)^2}}$$

and the phase response of the filter is:

$$\arg(H(f)) = -\tan^{-1}(2\pi fRC)$$

where: $R = 157.4$, $C = 3.3 \times 10^{-6}$ and f is the frequency of interest.