



AquaServ™

System Administrator's Guide

v1.6

(Revision 2)

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AUDIENCE

This guide is intended for information technology professionals who will be installing, configuring, and administering AquaServ systems. Some familiarity with administering and configuring Microsoft Windows is assumed.

TYPOGRAPHIC CONVENTIONS

Literal text which appears on the computer screen is printed in *this font*.

Directions for accessing specific configuration pages in the Windows Control Panel are abbreviated as:

Control Panel → [*“Category name”* (if *“Category View”* is enabled)] → *“Applet name”* → *“Tab name”* → *“Gadget name”*.

In the PDF version of this document, all cross-references to Sections, Chapters, Tables, and Figures are clickable. Click on the Section/Chapter/Table/Figure number to access the referenced page.

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1.1 – Choosing and Configuring a PC for AquaServ

If you did not purchase AquaServ as part of a turnkey system, then you are probably planning to purchase a new personal computer (PC) for AquaServ or to install AquaServ on an existing PC in your facility. Before attempting this, there are a few important guidelines to consider.

AquaServ Minimum System Requirements

AquaServ runs on top of Windows XP Professional (Service Pack 2 or later recommended) or Windows Embedded and is thus subject to the minimum system requirements for that operating system:

- Intel Pentium, Intel Celeron, AMD K6, AMD Athlon, AMD Duron, or newer CPU
- 233 MHz CPU speed (or faster)
- 128 MB RAM (512 MB recommended for AquaServ)
- Hard drive or solid state drive (SSD)
*[Size will depend on how much data you need to store—
See TABLE 1, TABLE 2, and TABLE 3]*
- Video card capable of displaying 1024 x 768 pixels with 256 or more colors
[See Section 1.3]
- Standard PC keyboard
- Standard 2-button mouse
- Standard PC monitor (17” or larger diagonal recommended if using a screen resolution larger than 1024 x 768 pixels)

Additional Requirements/recommendations for AquaServ systems:

- One RS-232 serial port or USB-to-serial converter
- **OPTIONAL:** One color inkjet or laser printer
[300 DPI or better resolution recommended—See Section 1.3]
- **RECOMMENDED:** Uninterruptible power supply (UPS)
[See Section 1.2]
- **RECOMMENDED:** USB flash drive
*[Size will depend on how much data you wish to back up—
See TABLE 1, TABLE 2, and TABLE 3]*
- **RECOMMENDED:** Three available Universal Serial Bus (USB) ports (one for the printer, one for the UPS, and one for the flash drive)

TABLE 1 - AquaServ 1000 Disk Space Requirements

Amount of Stored Data									
Sampling Interval	1 wk.	1 mo.	2 mo.	3 mo.	6 mo.	1 yr.	2 yrs.	3 yrs.	5 yrs.
5 sec.	3.5 MB	15 MB	31 MB	45 MB	91 MB	181 MB	361 MB	542 MB	903 MB
10 sec. (default)	1.7 MB	7.7 MB	15 MB	23 MB	45 MB	90 MB	181 MB	271 MB	452 MB
15 sec.	1.2 MB	5.1 MB	10 MB	15 MB	30 MB	60 MB	120 MB	181 MB	301 MB
30 sec.	0.58 MB	2.6 MB	5.1 MB	7.6 MB	15 MB	30 MB	60 MB	90 MB	151 MB
1 min.	0.29 MB	1.3 MB	2.6 MB	3.8 MB	7.6 MB	15 MB	30 MB	45 MB	75 MB
2 min.	0.14 MB	0.64 MB	1.3 MB	1.9 MB	3.8 MB	7.5 MB	15 MB	23 MB	38 MB
5 min.	0.06 MB	0.26 MB	0.51 MB	0.76 MB	1.5 MB	3.0 MB	6.0 MB	9.0 MB	15 MB
10 min.	0.03 MB	0.13 MB	0.26 MB	0.38 MB	0.76 MB	1.5 MB	3.0 MB	4.5 MB	7.5 MB
15 min.	0.02 MB	0.09 MB	0.17 MB	0.25 MB	0.51 MB	1.0 MB	2.0 MB	3.0 MB	5.0 MB
30 min.	0.01 MB	0.04 MB	0.09 MB	0.13 MB	0.25 MB	0.50 MB	1.0 MB	1.5 MB	2.5 MB

(1 MB = 1 Megabyte = 1,048,576 bytes)

TABLE 2 - AquaServ 2000 Disk Space Requirements

Amount of Stored Data									
Sampling Interval	1 wk.	1 mo.	2 mo.	3 mo.	6 mo.	1 yr.	2 yrs.	3 yrs.	5 yrs.
5 sec.	6.3 MB	28 MB	56 MB	83 MB	167 MB	332 MB	663 MB	993 MB	1656 MB
10 sec. (default)	3.2 MB	14 MB	28 MB	42 MB	83 MB	166 MB	331 MB	497 MB	828 MB
15 sec.	2.1 MB	9.4 MB	19 MB	28 MB	56 MB	111 MB	221 MB	331 MB	552 MB
30 sec.	1.1 MB	4.7 MB	9.4 MB	14 MB	28 MB	55 MB	110 MB	166 MB	276 MB
1 min.	0.53 MB	2.3 MB	4.7 MB	6.9 MB	14 MB	28 MB	55 MB	83 MB	138 MB
2 min.	0.26 MB	1.2 MB	2.3 MB	3.5 MB	6.9 MB	14 MB	28 MB	41 MB	69 MB
5 min.	0.11 MB	0.47 MB	0.94 MB	1.4 MB	2.8 MB	5.5 MB	11 MB	17 MB	28 MB
10 min.	0.05 MB	0.23 MB	0.47 MB	0.69 MB	1.4 MB	2.8 MB	5.5 MB	8.3 MB	14 MB
15 min.	0.04 MB	0.16 MB	0.31 MB	0.46 MB	0.93 MB	1.8 MB	3.7 MB	5.5 MB	9.2 MB
30 min.	0.02 MB	0.08 MB	0.16 MB	0.23 MB	0.46 MB	0.92 MB	1.8 MB	2.8 MB	4.6 MB

(1 MB = 1 Megabyte = 1,048,576 bytes)

TABLE 3 - AquaServ 4000 Disk Space Requirements

Amount of Stored Data									
Sampling Interval	1 wk.	1 mo.	2 mo.	3 mo.	6 mo.	1 yr.	2 yrs.	3 yrs.	5 yrs.
5 sec.	12 MB	54 MB	107 MB	159 MB	318 MB	633 MB	1265 MB	1896 MB	3161 MB
10 sec. (default)	6.1 MB	27 MB	54 MB	80 MB	159 MB	317 MB	632 MB	948 MB	1581 MB
15 sec.	4.0 MB	18 MB	36 MB	53 MB	106 MB	211 MB	422 MB	632 MB	1054 MB
30 sec.	2.0 MB	8.9 MB	18 MB	27 MB	53 MB	106 MB	211 MB	316 MB	527 MB
1 min.	1.0 MB	4.5 MB	8.9 MB	13 MB	27 MB	53 MB	105 MB	158 MB	263 MB
2 min.	0.50 MB	2.2 MB	4.5 MB	6.6 MB	13 MB	26 MB	53 MB	79 MB	132 MB
5 min.	0.20 MB	0.89 MB	1.8 MB	2.7 MB	5.3 MB	11 MB	21 MB	32 MB	53 MB
10 min.	0.10 MB	0.45 MB	0.89 MB	1.3 MB	2.7 MB	5.3 MB	11 MB	16 MB	26 MB
15 min.	0.07 MB	0.30 MB	0.60 MB	0.88 MB	1.8 MB	3.5 MB	7.0 MB	11 MB	18 MB
30 min.	0.03 MB	0.15 MB	0.30 MB	0.44 MB	0.88 MB	1.8 MB	3.5 MB	5.3 MB	8.8 MB

(1 MB = 1 Megabyte = 1,048,576 bytes)

1.2 – Uninterruptible Power Supplies

An Uninterruptible Power Supply (UPS) is a device which contains electrical power conditioning equipment and a large battery. A UPS plugs into a standard electrical outlet and provides additional outlets for plugging in computers and other electronic equipment that you wish to protect. When the electrical power coming from the outlet is within an acceptable range, the UPS is inactive and will use that power to recharge its internal battery. When the electrical signal coming from the outlet experiences a spike, surge, low voltage condition, phase shift, or other anomaly, then the UPS will use its internal circuitry to correct the flaw in the power signal before it reaches your equipment. The UPS also uses its battery to provide uninterrupted power to your equipment during brief power outages (usually up to 15 or 30 minutes, depending on how much power the equipment is using and the size of the battery.)

When choosing an uninterruptible power supply (UPS), it is recommended that you choose one with a Volt-Amp (VA) rating of at least 1.8 times the maximum power intake of all of the equipment that will be connected to the battery. For example, if your computer has a 200-Watt power supply, at least a 360 VA UPS is needed. Likewise, a 230 Watt power supply would require at least a 420 VA UPS, etc. A larger UPS would be required if additional equipment, such as the monitor and printer, is also connected to the battery. UPS models ranging from 320 VA to well over 1000 VA are readily available at retail electronics and computer stores at very reasonable prices.

Most UPS's have two sets of plugs: a set which is backed by the internal battery (thus providing uninterrupted power) and a set which provides surge protection only. In most cases, it is recommended that you plug only the computer and A/D converter equipment into the battery-backed set of plugs and plug other equipment (such as the monitor and printer) into the non-battery-backed plugs. If the power goes out, then the transmitter supplying the input signal to the AquaServ system will probably go out as well. If the transmitter goes out, then the AquaServ system is rendered useless, so there is no need to run the monitor and printer during the power outage (which would cause the UPS battery to drain more quickly.) The UPS's main purpose is to prevent the AquaServ system from rebooting during power outages that last only a few seconds or minutes and to protect it against electrical surges and spikes.

Many UPS's come with a software program that runs in the background and monitors the amount of battery power left in the UPS. Those that don't come with such a program usually include instructions on how to use the built-in UPS service in Windows to monitor the UPS. It is recommended that you configure some form of software UPS monitoring prior to installing AquaServ, since this will ensure that Windows shuts down cleanly if the battery power becomes too low to run the AquaServ system.

1.3 – Screen and Printer Resolution

AquaServ supports any video card, monitor, and printer that Windows supports, including wide-screen (16:9 aspect ratio) flat panel displays. It is recommended that you use a screen resolution of at least 1024 x 768 pixels (or 1280 x 720 pixels on a wide-screen monitor) with AquaServ.

The horizontal screen resolution determines the smallest period of time that AquaServ's display is able to accurately represent, referred to as its “temporal resolution.” The temporal resolution for the AquaServ display is:

$$\frac{86400}{w \cdot 0.75} \text{ seconds}$$

where w is the screen width in pixels. For example, a 1024 x 768-pixel screen is capable of displaying changes in the input signals that occurred 113 seconds apart. Higher display resolutions have better temporal resolution. For instance, a 1920 x 1200 wide-screen display would be capable of displaying changes in the input signals that occurred 60 seconds apart.

The vertical screen resolution determines the smallest change in the input signals that AquaServ is able to accurately represent, referred to as its “signal resolution”. The signal resolution for the AquaServ display is approximately:

$$\frac{100}{(h - 47) \cdot 0.94} \text{ percent}$$

where h is the screen height in pixels. For example, a 1024 x 768-pixel screen is capable of displaying changes in the input signals that are within 0.15% of full scale.

The resolution of AquaServ's printouts is determined by the resolution of the printer (expressed in “dots per inch”, or DPI.) The temporal resolution of AquaServ's printouts is:

$$\frac{86400}{dpi \cdot 8.25} \text{ seconds}$$

where dpi is the printer resolution in dots per inch. For example, a 600 DPI printer is capable of displaying changes in the input signals that occurred 17 seconds apart. Printer resolutions greater than 600 DPI will generally not produce any further visible benefit due to limitations in the resolving power of the human eye.

The signal resolution of AquaServ's printouts is approximately:

$$\frac{100}{dpi \cdot 7.1} \text{ percent}$$

where dpi is the printer resolution in dots per inch. For example, a 600 DPI printer is capable of displaying changes in the input signals that are within 0.023% of full scale. This may exceed the accuracy of the A/D converter hardware, depending on the type of converter used. For instance, using a printer with more than 600 DPI of resolution would have no benefit with a 12-bit A/D converter, since these converters are only accurate to within 0.03% of full scale.

1.3.1 – Screen Refresh Rate

The screen refresh rate determines how many times per second the image on the monitor is updated from the image on the video card. For flat panel monitors, a refresh rate of 60 Hz (60 cycles per second) is sufficient. However, traditional CRT monitors, particularly those with a 17” or larger diagonal, require a refresh rate of 75 Hz or above to avoid flicker.

1.3.2 – Configuring the Screen Resolution and Refresh Rate

- Access
Control Panel → [*“Appearances and Themes” category*] → *“Display” applet* → *“Settings” tab* → *“Advanced” button* → *“Adapter” tab* → *“List All Modes” button*.
- Select the screen resolution and refresh rate that you wish to use from the list.
- Click “OK” three times.

1.4 – A/D Converter Hardware

1.4.1 – Opto 22 (TCP)

Opto 22 (<http://www.opto22.com>) manufactures a variety of modular, industrial-grade data acquisition products which can communicate with a PC using various serial and network protocols. The SNAP series, in particular, allows mixing and matching of different controllers (“brains”), I/O modules, and module racks to suit a specific purpose. Opto 22 manufactures analog I/O modules which can produce a digital signal from a variety of analog signal standards, including 20 mA, 1 mA, 50 mV, and ICTD-compliant temperature probe output. These modules can be plugged into an existing rack to easily expand the number of available inputs, and they are available with full optical isolation between inputs. AquaServ supports any of Opto 22's Ethernet brains that use the OptoMMP protocol. The SNAP-PAC-EB2 has been specifically tested.

AquaServ uses the following default settings for communicating with Opto22 Ethernet brains:

IP Address	192.168.1.150
IP Port	2001

These settings can be different for each input, allowing different inputs to be mapped to different Opto 22 brains. See the [Plant Setup: Configure Inputs](#) menu for more details. To change the IP address of a brain, connect it to the AquaServ computer using a CAT 5 cable, then install and run the Ethernet IP Configurator. The Ethernet IP Configurator ships with new Opto 22 Ethernet brains and is also available as a free download from Opto 22's web site.

For standalone installations, in which the AquaServ computer and the Opto 22 Ethernet brain will communicate with each other but not with an outside network, then both devices can be assigned different static IP addresses from the range of 192.168.1.1 through 192.168.1.254. The IP address of the AquaServ computer can be configured by accessing

Control Panel → [*“Network and Internet Connections” category*] → *“Network Connections” applet* → *“Local Area Connection”* → *“General” tab* → *“Properties” button* → *“Internet Protocol (TCP/IP)”*.

Click “Use the following IP address”, enter the desired IP address for the AquaServ computer into

the “IP address” field, enter “255.255.255.0” for the Subnet mask, and enter “192.168.1.1” for the “Default gateway”. Click “Use the following DNS server addresses”, and enter “192.168.1.1” for the “Preferred DNS server.” Click “OK” twice, then click “Close”.

1.4.2 – Opto 22 (Serial)

AquaServ also supports any of the legacy Opto 22 brains which use the mystic or Optomux serial protocols. Specifically, it has been tested with the B3000. AquaServ can communicate with multiple brains on the same RS-485 loop, as long as the brains all use the same protocol (mistic or Optomux) and are configured to use different addresses. An RS-232 to RS-485 converter is used to connect the AquaServ computer to the RS-485 loop. Since the AquaServ computer is communicating with the Opto 22 brain using RS-485, the brain can be located as much as 4000 feet away from the computer.

Depending on the protocol used, the Opto 22 brain should be configured as follows:

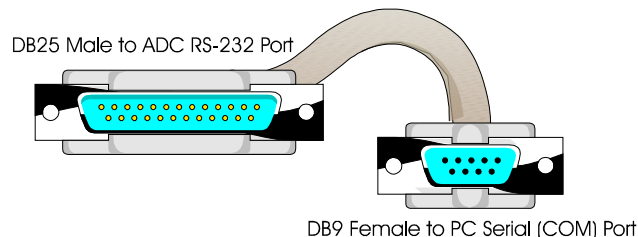
	<i>mistic Protocol</i>	<i>Optomux Protocol</i>
Baud Rate	115200	38400
Binary/ASCII	Binary	ASCII
Data Verification	CRC16	Checksum

1.4.3 – B&B 232SDA12

AquaServ also supports the 232SDA12 11-channel 12-bit serial A/D converter from B&B Electronics (<http://www.bb-elec.com>). The 232SDA12 is a low-cost A/D converter solution which is ideal for use in temporary or portable AquaServ configurations.

The 232SDA12 connects to one of the serial (COM) ports on the AquaServ computer using a 25-pin male to 9-pin female serial cable (see FIGURE 1 below.) If the AquaServ computer does not have a built-in RS-232 serial port, then a USB-to-serial converter can also be used to connect the 232SDA12 to the computer.

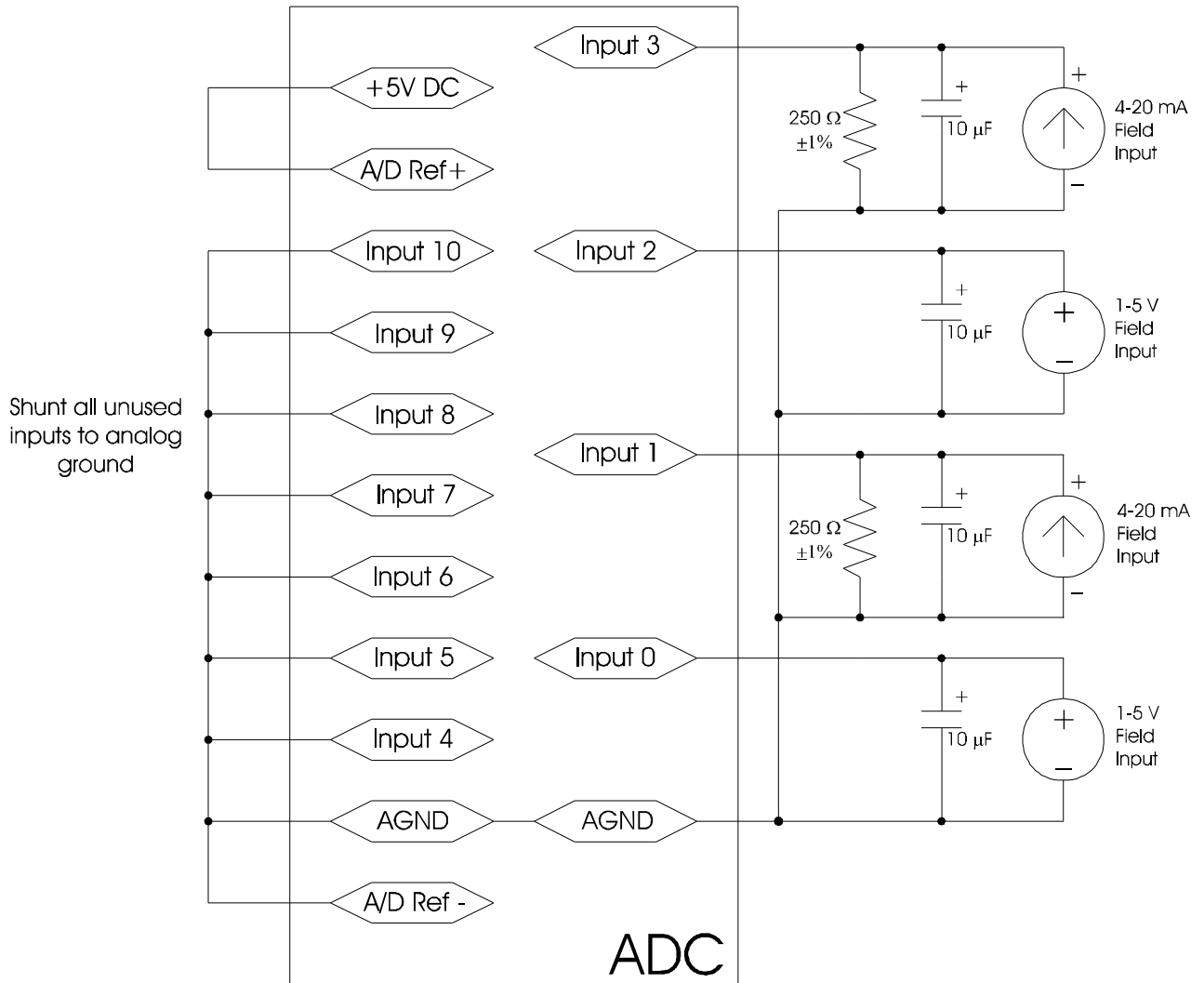
FIGURE 1 - Serial Cable Configuration for B&B 232SDA12



If the input signals from the transmitter use the 1-5 Volt signal standard, then they can be connected directly to the 232SDA12. If the input signals are from a 4-20 mA current loop, however, then they

must be passed through a 250 Ω precision resistor to analog ground in order to convert them into 1-5 Volt signals. In addition, it is recommended that a 10 μF (or larger) electrolytic capacitor be attached across each active input to reduce noise. FIGURE 2 below shows an example wiring diagram.

FIGURE 2 - Example Wiring for the B&B 232SDA12 with a Mixture of 1-5 V, 4-20 mA, and Unused Inputs



2.1 – AquaServ: An Embedded System

Although AquaServ runs on top of Windows, it is important to realize that AquaServ systems are not meant to be used as general purpose computers. This section explains why.

Most Windows-based industrial process control (IPC) software relies on an external piece of hardware— usually a Programmable Logic Controller (PLC)— to handle time-critical tasks such as sampling data and totalizing flow. Typically, the Windows software portion of these systems is simply a HMI (Human-Machine Interface) to the external hardware. These systems are usually quite costly and complicated to set up and use.

AquaServ is not meant to compete with these high-end IPC systems. Rather, it is a self-contained chart recorder and data acquisition solution which uses software to perform some of the functions which might normally be performed by a PLC. The AquaServ software runs on PC hardware and Windows because that platform is inexpensive and widely available. However, once AquaServ is installed on a PC, that PC ceases to be a general-purpose computer. It instead becomes an “embedded system.” An embedded system is a single-purpose device built on top of general-purpose hardware and software. Cable TV set-top boxes are an example of embedded systems, as are the cash registers at most supermarkets. These devices use hardware which is the same or similar to PC hardware, but even though some of these embedded systems might run Windows, they cannot be used as Windows PC's.

Since AquaServ must handle the time-critical functions of a PLC as well as act as a HMI and data acquisition system, it needs to have exclusive control of the computer at all times. In a complex operating system such as Windows that is capable of running more than one program at a time, other programs could steal CPU time away from AquaServ, thus affecting its accuracy. The recommended way to run AquaServ is as a Windows system service (see Section 3.1.) Installing AquaServ as a Windows system service converts the PC into an embedded system and thus ensures that AquaServ will be as stable and accurate as possible.

2.2 – Power Management

If AquaServ is run as a Windows system service, it will automatically configure the computer's power management settings as follows:

- Pressing the computer's power button will shut down Windows and then power off the system. You can also hold down the power button for more than 4 seconds to power off the system without shutting down Windows, but this should be done only in the case of a system lock-up or other situation in which the system cannot be shut down normally.
- If the computer has a Sleep button, AquaServ disables it. AquaServ also prevents the computer from going to sleep or hibernating during periods of inactivity.
- AquaServ prevents the hard disks from going to sleep when the system is idle.

AquaServ allows you to configure whether or not the display should be automatically powered off during periods of inactivity. This is configured in the [Plant Setup: Hardware](#) menu. AquaServ also provides a regular screen blanker, which prevents monitor burn-in but does not power down the display. See the AquaServ User's Guide for further details.

2.3 – Security

AquaServ is designed to be run as a Windows system service using the SYSTEM account. AquaServ can also be run as a regular application using a regular user account. The latter is useful for maintenance and testing purposes, since it allows access to network-connected printers and drives. However, running AquaServ under a regular user account is not a supported or recommended configuration for production environments.

When running AquaServ as a Windows system service, the SYSTEM account must have full access to the hard drive on which AquaServ is installed. This is the default for newly-installed Windows systems.

The AquaServ system service starts during the Windows boot process. You may see the Windows logon screen appear briefly before AquaServ switches control away from it. Once AquaServ has launched, there is no way to access any Windows functions without exiting AquaServ (see Section 2.5.) When AquaServ exits, it will return control to the Windows logon prompt, allowing you to log in to the system.

When AquaServ is installed as a system service, it disables auto-logon if auto-logon is enabled. Thus, you will have to enter the Windows administrator password in order to log into the system after exiting AquaServ. Be sure that you know the Windows administrator password before installing AquaServ as a system service.

2.4 – Networking

As with any Windows system, the AquaServ system can be configured to participate on a local-area network. Due to security limitations imposed by Windows, AquaServ cannot access remote drives and printers when it is run as a system service. However, putting the AquaServ system on a local-area network is still advantageous for the following reasons:

1. The AquaServ system can be configured to synchronize its clock with a central time server.

The time server can be specified in the “Date and Time Properties” dialog. Enter the [Plant Setup](#) menu and choose [Set Date/Time](#) to bring up this dialog.

2. The AquaServ screen can be viewed remotely.

AquaServ works with remote display solutions that use a “screen scraping” technique. AquaSoft supports and recommends Remote Administrator from Famatech (<http://www.radmin.com/>). AquaServ will also work with RealVNC Server, if the “Capture Method” on the server is set to “Poll for Changes to the Desktop.” Using AquaServ with RealVNC is not recommended,

however. Other solutions may work as well, but they have not been tested.

When AquaServ is run as a system service, the AquaServ system cannot be accessed remotely using Windows Remote Desktop. It would not be desirable to use AquaServ with Remote Desktop anyhow, because Remote Desktop can reroute printer output, USB devices, etc. This could potentially interfere with the correct operation of AquaServ.

3. If using an Ethernet brain from Opto 22, then the AquaServ computer need not be directly connected to the brain. The two can be located anywhere on the plant's internal network. The Opto 22 brain must be assigned a static IP address, but the AquaServ computer can obtain an IP address using DHCP.

2.5 – Accessing the Operating System After AquaServ Is Installed

When AquaServ is running as a system service, it starts whenever the computer boots up. The computer is effectively locked down while AquaServ is running, which prevents anyone from logging in or running any other programs. AquaServ provides interfaces which can be used to select the default printer, change display power management settings, and adjust the system date and time. From time to time, however, it may be necessary to access the operating system for other maintenance tasks, such as changing the display resolution or upgrading the AquaServ software. To do this, bring up either the [Plant Setup](#) or the [Calibration](#) menu and type the word “quit”. Click “Yes” when prompted. When AquaServ exits, it will return control to the normal Windows logon screen, from which you can log in to the system and perform maintenance.

Once you have finished performing maintenance on the AquaServ computer, reboot the computer to bring up AquaServ again.

3.1 – Installing AquaServ

AquaServ is distributed as an installer program, which is named

`aquaserv-1000-install.exe`,
`aquaserv-2000-install.exe`,
or
`aquaserv-4000-install.exe`,

depending on which version of AquaServ you purchased. This installer may have been provided to you on a CD, a USB flash drive, or as a download from the AquaSoft web site. If you received an AquaServ demo CD or downloaded the AquaServ demo from the web, then the installer is named `aquaserv-demo-install.exe`.

- Assuming that Windows is already installed and running, log in to the AquaServ computer using the administrator account.
- Using Windows Explorer, open the drive or directory containing the AquaServ installer. This may be the CD or USB flash drive you received, or it may be a directory to which you downloaded the AquaServ installer from the web.
- Open the AquaServ installer program.

The installer works like most Windows installers. The first screen asks you to accept a standard End User License Agreement (EULA.) If you are installing the full version of AquaServ (not the demo), then the next screen contains a list of install options, described in detail below.

- **Convert PC into AquaServ Embedded System**

This enables or disables the four options below. The options can also be enabled/disabled individually.

- 1. Install AquaServ as a System Service**

If this option is checked, then AquaServ will be installed as a system service and will start when Windows starts. This option converts the PC into an AquaServ embedded system, and no other programs will be able to run on the system while AquaServ is running.

You can also choose to install AquaServ as a system service at a later date. Links are provided in the “AquaServ” program group under the Start Menu which will allow you to install AquaServ as a system service or remove the AquaServ system service.

- 2. Disable Indexing Service**

If this option is checked, then content indexing will be disabled whenever the system is rebooted. The Windows Indexing Service normally runs in the background on Windows

XP and creates an index of all files on the hard disk. This is unnecessary on an AquaServ system and will steal valuable system resources away from AquaServ. If, for any reason, you need to re-enable the Indexing Service at a later date, then you can do so by setting its Startup Type to “Manual” under

Control Panel → [“Performance and Maintenance” category] → “Administrative Tools” folder → “Services” applet → “Indexing Service”.

3. Disable Automatic Updates

If this option is checked, then automatic updates will be disabled. The Windows Automatic Updates Service normally runs in the background on Windows XP, downloading and installing operating system patches from Microsoft's web site (if the computer is connected to the Internet.) This will steal valuable system resources away from AquaServ, so it is strongly recommended that you disable automatic updates and install operating system patches manually on an as-needed basis (note that it should not generally be necessary to patch the operating system unless the AquaServ computer is on a network.)

If, for any reason, you need to re-enable automatic updates at a later date, then you can do so by accessing

Control Panel → [“Performance and Maintenance” category] → “System” applet → “Automatic Updates” tab.

4. Disable System Restore Service

If this option is checked, then system restores will be disabled. The Windows System Restore service normally runs in the background on Windows XP and takes periodic snapshots of the operating system state, so it can later be restored if an errant program corrupts some of the files. This is unnecessary on an AquaServ system and will steal valuable system resources away from AquaServ. If, for any reason, you need to re-enable the System Restore Service at a later date, then you can do so by setting its Startup Type to “Manual” under

Control Panel → [“Performance and Maintenance” category] → “Administrative Tools” folder → “Services” applet → “System Restore Service”.

You will also need to uncheck “Turn Off System Restore” in

Control Panel → [“Performance and Maintenance” category] → “System” applet → “System Restore” tab.

- **Configure Screen Resolution and Refresh Rate**

This will open the “Display” applet of the Control Panel, allowing you to set the screen resolution and refresh rate to appropriate values (see Section 1.3.)

The AquaServ software installs to a directory named `aquaserv` (or `aquademo`, if you are installing the demo version) on the same drive on which Windows is installed (usually `c:`).

3.2 – Uninstalling AquaServ

To uninstall AquaServ, select the “Uninstall AquaServ” link in the “AquaServ” program group under the Windows Start Menu. This will automatically remove the AquaServ system service, if it is installed.

Note that uninstalling AquaServ removes only the AquaServ program. Any chart data or configuration files are left in tact in the `c:\aquaserv` (or `c:\aquademo`) directory.

3.3 – Upgrading AquaServ

From time to time, AquaSoft will release updates of the AquaServ software in order to add additional features and fix bugs. These software updates can be obtained from an AquaSoft authorized reseller or directly from AquaSoft. Bug-fix releases are provided free of charge for existing customers.

Upgrading the AquaServ software is also necessary if you wish to convert your system from an AquaServ 1000 (4-input) system to an AquaServ 2000 (8-input) or 4000 (16-input) system or to convert your system from an AquaServ 2000 system to an AquaServ 4000 system.

Upgrading AquaServ works the same as installing AquaServ. The only difference is that the installer will detect that a previous version of the AquaServ software is already installed and will ask you to confirm that you wish to replace it with the new version.

3.3.1 – Adding More Inputs

If you are upgrading from AquaServ 1000 to AquaServ 2000, from AquaServ 2000 to AquaServ 4000, or from AquaServ 1000 to AquaServ 4000, then your existing data files will be expanded to accommodate the new number of inputs (8 or 16.) Your existing totalizer files will also be expanded, so you should receive a message saying “4 totalizers restored” or “8 totalizers restored” upon loading AquaServ 2000 or 4000 for the first time. All configuration information for existing inputs will be preserved during the upgrade, and the new inputs will start out with factory default settings. So, for example, if you were upgrading from AquaServ 1000 to 2000, you would not need to change any settings for Inputs 1-4 following the upgrade.

WORD OF CAUTION:

If you are using almost all of the disk space on your existing system, then there may not be enough room to expand your existing data files to accommodate more inputs. Before upgrading to a larger number of inputs, you should consult TABLE 1, TABLE 2, or TABLE 3 to see how much disk space will be required to store the number of days of data that you wish to store. If your hard disk is 10 GB or larger, then this should not be an issue unless you wish to store considerably more than 5 years of data. The amount of free disk space is always listed in the [Plant Setup: Data Acquisition](#) menu.

APPENDIX A – AQUASERV SPECIFICATIONS

A/D CONVERTER:	<p>Opto 22 SNAP I/O Controllers:</p> <ul style="list-style-type: none"> • 16 bits per sample • 20,000 levels of resolution, 0.005% maximum quantization error (when used with 4-20 mA field inputs) • Ethernet: <ul style="list-style-type: none"> ▶ 300-foot maximum distance between PC and controller (can be extended using Ethernet switches) • Serial: <ul style="list-style-type: none"> ▶ Interfaces to PC serial port with RS-485 to RS-232 converter at 38,400 bits/second (Optomux) or 115,200 bits/second (mistic) ▶ 4000-foot maximum distance between PC and controller <p>B&B Electronics 232SDA12 A/D Converter (ADC):</p> <ul style="list-style-type: none"> • 12 bits per sample • 3276 levels of resolution, 0.031% maximum quantization error (when used with 4-20 mA or 1-5 V field inputs) • Interfaces to PC serial port with RS-232C cable at 9600 bits/second • 50-foot maximum distance between PC and ADC using shielded cable (additional distance requires an RS-232C repeater or conversion to RS-485 or fiber optics) 				
TEMPORAL ACCURACY:	<p>ADC polling interval: 0.1 seconds (a moving average of 5 samples is used with the B&B 232SDA12, making the effective polling interval 0.5 seconds)</p> <p>Real-time totalizer: Updated every 1/10 second Active Virtual Chart: Updated every 5 seconds Data Acquisition: Data stored to disk every 5-1800 seconds (default: every 10 seconds)</p> <p>Temporal resolution of chart:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px; vertical-align: top;"> $\frac{86400}{w \cdot 0.75} \text{ seconds}$ <p>where <i>w</i> is the screen width in pixels</p> <p><i>Example:</i> 90 seconds on a 1280x720 display</p> </td> <td style="padding: 5px; vertical-align: top;"> $\frac{86400}{dpi \cdot 8.25} \text{ seconds}$ <p>where <i>dpi</i> is the resolution of the printer in dots per inch</p> <p><i>Example:</i> 35 seconds on a 300 DPI printer</p> </td> </tr> </table> <p>Signal resolution of chart:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px; vertical-align: top;"> $\frac{100}{(h - 47) \cdot 0.94} \text{ percent}$ <p>where <i>h</i> is the screen height in pixels</p> <p><i>Example:</i> 0.16% of full scale on a 1280x720 display</p> </td> <td style="padding: 5px; vertical-align: top;"> $\frac{100}{dpi \cdot 7.1} \text{ percent}$ <p>where <i>dpi</i> is the resolution of the printer in dots per inch</p> <p><i>Example:</i> 0.047% of full scale on a 300 DPI printer</p> </td> </tr> </table>	$\frac{86400}{w \cdot 0.75} \text{ seconds}$ <p>where <i>w</i> is the screen width in pixels</p> <p><i>Example:</i> 90 seconds on a 1280x720 display</p>	$\frac{86400}{dpi \cdot 8.25} \text{ seconds}$ <p>where <i>dpi</i> is the resolution of the printer in dots per inch</p> <p><i>Example:</i> 35 seconds on a 300 DPI printer</p>	$\frac{100}{(h - 47) \cdot 0.94} \text{ percent}$ <p>where <i>h</i> is the screen height in pixels</p> <p><i>Example:</i> 0.16% of full scale on a 1280x720 display</p>	$\frac{100}{dpi \cdot 7.1} \text{ percent}$ <p>where <i>dpi</i> is the resolution of the printer in dots per inch</p> <p><i>Example:</i> 0.047% of full scale on a 300 DPI printer</p>
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