



**BW100
Backwash Controller**

**1-4 Filters
Plus Status**

**INSTALLATION and
OPERATION GUIDE**

Released Software Version BW100A5 – 07/29/05

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CHAPTER 1 INFORMATION

1.1 SAFETY PRECAUTIONS ⚡

PLEASE READ THIS USER MANUAL completely before installing or operating the equipment. The **BW100** is a Class 1 product for protection against electric shock and a Type 1 product with regards to disconnection of the control circuits.

Be sure to observe the following safety precautions:

- ⚡ – Do not permit anyone untrained or under the age of 18 to use this product.
- ⚡ – Unit must be properly connected to earth ground.
- ⚡ – Never apply power when front panel is not secured in the closed position.
- ⚡ – Never service unit with power applied, always turn OFF main circuit breaker to unit and all equipment when servicing.
- ⚡ – Touching the controller's internal parts could result in injury and or damage to the controller. In case of a malfunction, only a qualified technician should repair the controller.
- ⚡ – Risk of Electric Shock. Connect only to a grounding type receptacle protected by a ground-fault circuit interrupter (GFCI).
- ⚡ – Do not bury cord. Route cord to eliminate abuse from heater exhaust, lawn mowers, hedge trimmers, and other equipment.
- ⚡ – Be careful not to damage any of the insulation on control wires or the power cord. Should the control wires or power cord be damaged, return it to your dealer for a replacement. Continued use could result in fire or electric shock.
- ⚡ – To reduce the risk of electric shock, do not use an extension cord to connect the unit to the electric supply; provide a properly located GFCI.
- ⚡ – Never remove or install any cables between the circuit cards when power is applied, damage to the components may occur.

SAVE THIS INSTRUCTION GUIDE

1.2 WARRANTY

Acu-Trol, Inc. warrants the BW100 to be free from defects in manufacturing and workmanship for a period of ONE (1) YEAR from the date of manufacture for the electronic module. All sensors have a warranty of ONE (1) YEAR from the date of manufacture. Other equipment is covered by manufacturer's own warranty. During the warranty period, any defective parts will be repaired or replaced when necessary by Acu-Trol, Inc.

This warranty does not cover: (a) the buyers' labor or any servicing fees related to replacement of the Product; (b) damage resulting from the use of this Product in other than its normal manner; (c) damage from misuse, accident or neglect; (d) damage from improper testing, operation, or installation; (e) not operating the Product on a dedicated (separate) circuit or under conditions other than those recommended or at voltages or amperages other than the voltage or amperage indicated on the Product; and (f) acts of Mother Nature (i.e. lightning, electrical storms, floods, etc.). In addition, attempting to service or modify the Product will render this Warranty Void. Defective parts should be returned immediately to the local Acu-Trol dealer, any parts returned to the factory require a return of material authorization code to subsequently generate an RMA (Return Material Authorization form). An Acu-Trol Technician will analyze the returned part and determine the cause of failure and process accordingly.

**WARRANTY CARD MUST BE COMPLETED AND
RETURNED AT ONCE TO BE KEPT ON FILE**

1.3 INTRODUCTION

The BW100 INSTALLATION AND OPERATION MANUAL explains the procedures for proper installation and operation of the BW100 series controller.

The BW100 is a backwash controller that can handle from 1 to 4 filters with an additional status output that may be used to control a circulation pump. Typically, backwashing is the reversal of water flow through a sand filtration system for the purpose of cleaning. Each output of the BW100 is dedicated to controlling each of up to four filters.

If there are any questions after reading through this manual, please call your local Acu-Trol dealer or Acu-Trol directly. Your input is appreciated.

CHAPTER 2 SPECIFICATIONS

- AC Power Input/Output 120VAC or 230VAC, 1 Amp max dry contact, 50/60 Hz, single phase, Voltage input selectable with switch
- Operating Temperature 0°C to +70°C
- 5 Output Relay Modules Compatible with standard Acu-Trol relay modules.
(4) 24VAC, primary VAC, or dry contact selectable
(1) STATUS as normally open or normally closed selectable, Other combinations may be supported without modification
- 1 Input P/D Gauge Murphy Differential Pressure for Filter Restriction Gauge
Part # A20DP-K-30, 0 to 30psi, 1/8-27 NPTM Ports
- Fused Protection Input primary fused with 5Amps on both legs
Output fused with 1Amp on both legs
- Maximum Output Drive Sourced maximum 0.5Amps AC, Pump control or other heavy load requires external contactor
- Security Enclosure has a latch that can accept a padlock
No security built into the user interface (no password protection)
- Units English units are supported where appropriate.
- Day Timer and P/D Day Timer initiated backwash based on built in real time clock, P/D initiated backwash based on differential pressure threshold exceeded
- Manual Backwash Backwash cycle can be initiated manually from the key pad
- 16 Button Keypad For the entry of configuration information
- 20 Column x 4 Row Display Includes a status screen with active information and backlight.
- Computer Control Software driven system that can be updated in the field

CHAPTER 3 INSTALLATION

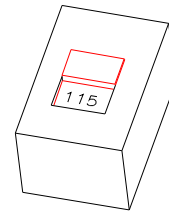
3.1 PREPARATION

Receipt Inspection: Upon receiving the controller from shipping, check the carton carefully. Report any damaged items directly to the shipping company. Examine the shipping list and verify that all items are present. Please contact your local Acu-Trol dealer if any items are missing or have been damaged. Use care when unpacking equipment to avoid damage or loss of small parts. Verify that the fuses are the correct values and that the Voltage select switch is in the proper position.

3.2 INSTALLATION SUMMARY

The following steps are required to completely install a BW100:

1. Plan and review intended installation before starting. See CHAPTER 7 Typical Installation and Configuration for an example of a typical installation
2. Identify new and existing equipment to be connected.
3. Determine the supply voltage, 110 VAC or 220 VAC, and set the supply voltage switch as necessary.
4. Determine if the control to the equipment uses the same voltage as the supply voltage. All controlled equipment must be compatible. Install the desired number of relay modules, see Table 2 Supported Relay Module Installation PCB Locations.
5. Mount the BW100 away from direct sunlight and on a flat vertical surface.
6. Connect the supply voltage with main breaker off. Primary power supply circuit must be a separate, dedicated circuit with GFCI protection.
7. Connect the loads.
8. Connect the pressure differential sensor.
9. Test the plumbing for leaks.



10. Turn on the BW100 for the first time.
11. Configure the BW100 with the desired mode of operation, see Table 3 Configuration Parameters
12. Test the equipment, using the Manual Backwash mode, see Figure 10 Manual Backwash Delay Screen.
13. If the Pressure Differential switch will be used to initiate backwashes, the set point needs to be adjusted. Turning the black adjustment knob on the front of the Gauge sets the pressure trip point. This adjustment is done inside of the enclosure.
14. Visit the controller over the next few days to insure the backwashes are proceeding as desired. Fine-tune the setup if necessary.

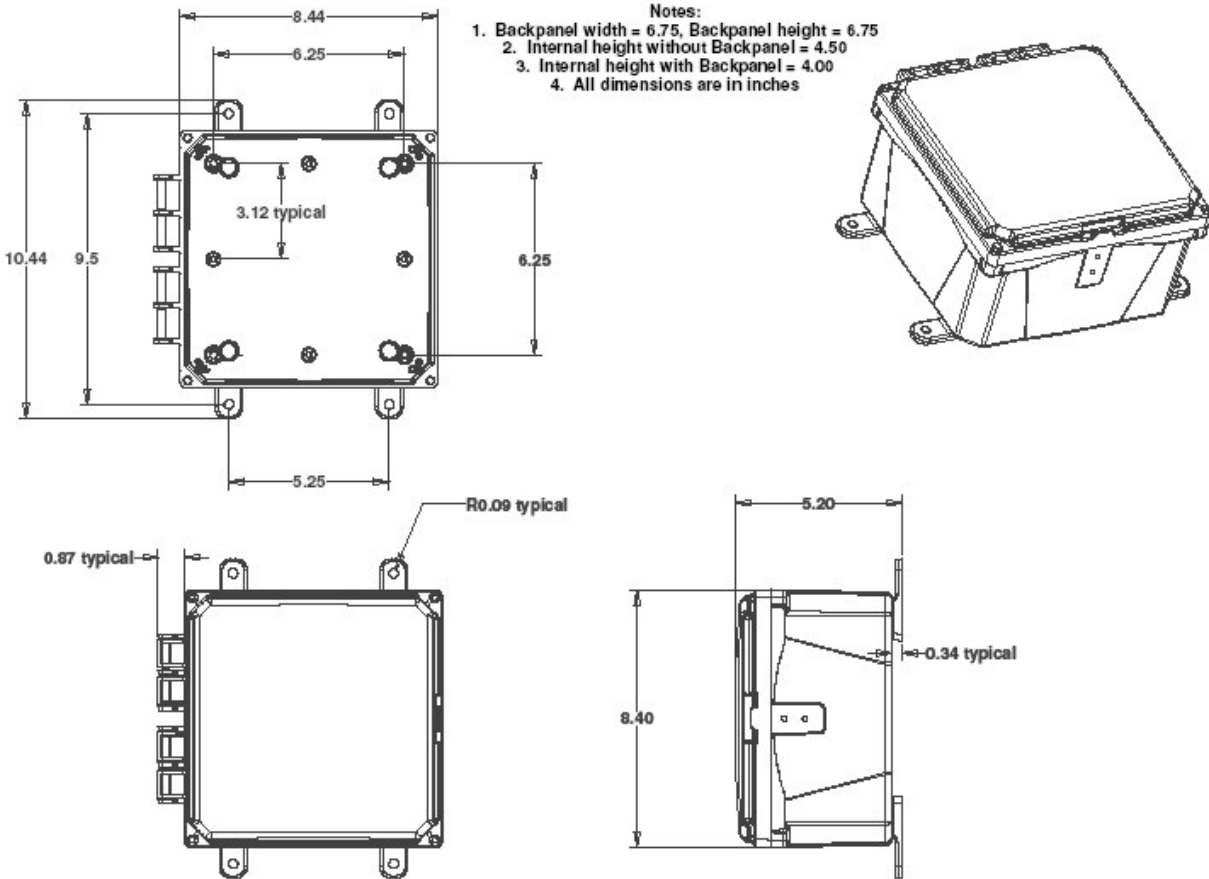
3.2.1 MOUNTING THE BW100

Select a location for mounting the **BW100**, meeting the following recommendations and the dimension specifications in Figure 1.

1. At least ten (10) feet from open water.
2. Close enough for the supplied 8 foot power cord to reach the supply voltage. The controller will not operate properly without a solid earth ground connection.
3. **WARNING:** Proper and safe operation requires an earth ground connection.
4. Supply power must be routed to the BW100 in accordance with the applicable codes in the area. Plug and cord connected units may not meet the building codes in some areas.
5. **WARNING:** Keep the BW100 out of direct sunlight and if possible inside a room, a shade screen must be used for outdoor installations.
6. The installation surface should be solid and vertical.
7. Maintain adequate clearance for opening the enclosure door.
8. The environment should be free of chemical fumes and excessive heat. The maximum recommended room temperature is 110°F.
9. Mount as far as possible from sources of electrical interference.
10. Attach the four (4) mounting brackets to the back of the controller, using the supplied hardware.
11. Hold the controller against the mounting surface with a closed lid and mark the four (4) holes located in the top and bottom brackets connected to the controller. Prepare holes as necessary and secure

controller. Make sure the controller box is not distorted by an uneven mounting surface.

Figure 1 Mounting Dimensions for the BW100 Controller



3.2.2 INPUT VOLTAGE SECTION 110V/220V

The **BW100** will operate on primary input voltages of 110VAC or 220VAC. The supply power is commonly used to power the pumps and other external loads. If all the loads are 110VAC then use 110VAC primary power or if the loads are 220VAC then use 220VAC as the primary input power voltage.

WARNING: IF THE BW100 IS CONNECTED TO 220 VAC THE VOLTAGE SWITCH MUST BE CHANGED TO 220 VAC BEFORE CONNECTING POWER TO THE UNIT OR DAMAGE WILL OCCUR.

Note: It is not possible to have the BW100 powered with 110VAC, and control 220VAC loads or vice versa.

3.2.3 CONNECTING POWER

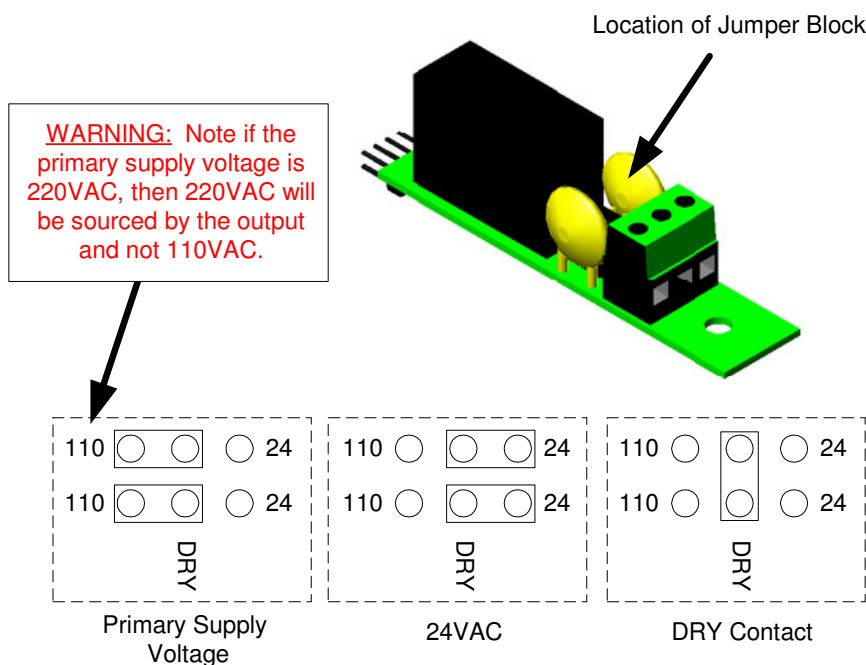
For cord connected installations, wait to plug the cord in as the last step in the installation. For hard-wired installations make sure the circuit breaker is off and turn it on as the last step in the installation.

WARNING: A LICENSED ELECTRICIAN OR OTHER QUALIFIED PERSONNEL SHOULD PERFORM THE INSTALLATION IN ORDER TO ENSURE THE LOCAL CODES AND OTHER SAFETY REGULATIONS AND STANDARDS ARE MET.

3.2.4 RELAYS MODULES 1-4

The 4 relay modules can be configured to supply 24VAC, the Primary Supply Voltage, or as a DRY Contact.

Figure 2 Relay Modules 1-4 Output Configuration



For **Primary Supply Voltage** operation put both jumpers vertically across the left sets of pins as indicated by the label **110** on the relay module. Note that if the primary supply voltage is 220VAC, then 220VAC will be sourced by the output and not 110VAC.

For **24VAC** operation put both jumpers across the right sets of pins as indicated by the label **24** on the relay module.

For **DRY Contact** operation place one jumper vertically in the center position as indicated by the label **DRY** on the relay module. This shorts the NOB to the NOW output when the relay is ON. Otherwise, the NOB to the NOW is open circuit.

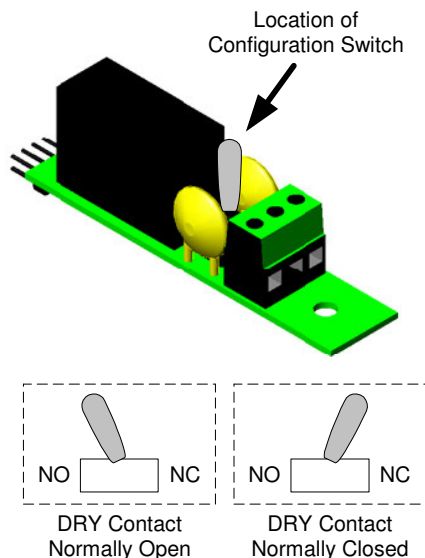
⚠ WARNING ⚠: UNDER NO CIRCUMSTANCES SHOULD THE JUMPER SETTINGS BE MODIFIED WHILE THE PRIMARY SUPPLY POWER IS TURNED ON. INJURY OR EQUIPMENT DAMAGE MAY RESULT. TURN THE POWER OFF.

3.2.5 RELAYS MODULE 5, STATUS

The Status Relay Module is always configured with a **DRY Contact** type of output. The mode is set with a board-mounted switch.

When the relay is ON in the Normally Open (NO) mode, the two DRY contact outputs are shorted. When the relay is ON in the Normally Closed (NC) mode, the two DRY contact outputs are open.

Figure 3 Status Relay Module Output Configuration

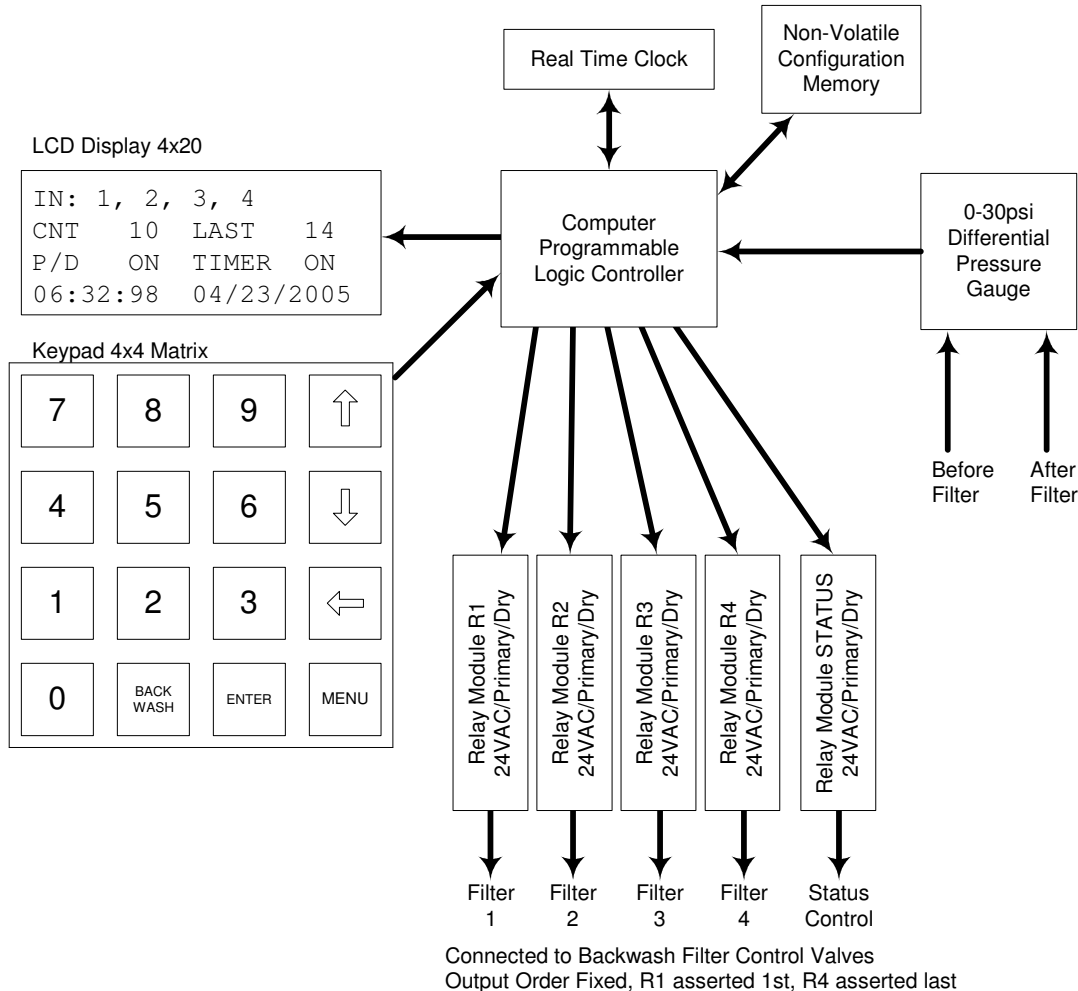


⚠ WARNING ⚠: UNDER NO CIRCUMSTANCES SHOULD THE SWITCH SETTINGS BE MODIFIED WHILE THE PRIMARY SUPPLY POWER IS TURNED ON. INJURY OR EQUIPMENT DAMAGE MAY RESULT. TURN THE POWER OFF.

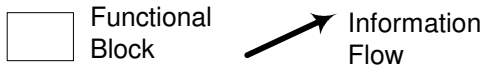
CHAPTER 4 SYSTEM DESCRIPTION

Figure 4 is the top level block diagram for the BW100.

Figure 4 System Block Diagram



Legend FILE: BW100 SPEC top level block v1.vsd



4.1 LCD DISPLAY

The LCD screen will be capable of displaying alpha-numeric characters in a 4 row by 20 column matrix. It will include a backlight with an automatic shut off feature. When the backlight is off, the first key to be pressed will turn on the backlight, but otherwise will not be used. See CHAPTER 6 for a complete listing of all possible display screen outputs.

4.2 REAL TIME CLOCK

The real time clock (RTC) will be backed up by an internal battery. The battery will be capable of maintaining clock information whenever the primary power is turned off. The purpose of the RTC is to provide a time and date reference for the day timer function.

4.3 NON-VOLATILE CONFIGURATION MEMORY

There are various configuration parameters that will need to be set by the user and maintained by the BW100. The non-volatile memory must be capable of maintaining programmed parameters for a minimum of 10 years without primary power.

4.4 KEYPAD

This is a common membrane keypad with a 4x4 matrix. The membrane is built into an overlay that mounts to the front of the enclosure. There will be no special features such as auto-repeat.

4.5 RELAY MODULE

Each output is intended to control one filter. Since a typical backwash may require 2 or 4 water valves to divert the flow of water, there will be support devices to achieve this end from a single output, see CHAPTER 7.

The relay modules will be removable and replaceable in the field. They will fit the standard Acu-Trol relay module format so that configurations other than those recommended in CHAPTER 7 may be supported in the future. Generally, in this document, whenever a relay output module is shown as asserted, this could result in either an open or closed output depending on the configuration. Referring to Table 1, ON/OFF is applicable if the relay module is configured to source 24VAC or 110VAC. Closed/Open is applicable if the relay module is configured as a dry contact.

The BW100 always sends the same information state to the relay modules. It is the relay module configuration that determines the actual output that is connected to the valve equipment. In order to avoid confusion, the output state that will always be used in this document will be either asserted or unasserted, which is the output from the BW100 to the relay module.

Table 1 Definition of Assertion

Output State	Normally Open Output	Normally Closed Output
Asserted	closed=ON	open=OFF
Unasserted	open=OFF	closed=ON

The relay modules are capable of being controlled independently by the BW100. However, they have a specific acceptable output pattern that is detailed in CHAPTER 5.

Refer to Table 2 when considering how to install relay modules. The Status Control relay module is a specific purpose output and will always be installed. 1 to 4 relay modules may be installed. Software configuration by the user is required to tell the computer how many relay modules are installed. The modules must be installed in the correct order.

Table 2 Supported Relay Module Installation PCB Locations

# Filters	PCB Label "Filter 1"	PCB Label "Filter 2"	PCB Label "Filter 3"	PCB Label "Filter 4"	PCB Label "Status"
1	INSTALLED	empty	empty	empty	INSTALLED
2	INSTALLED	INSTALLED	empty	empty	INSTALLED
3	INSTALLED	INSTALLED	INSTALLED	empty	INSTALLED
4	INSTALLED	INSTALLED	INSTALLED	INSTALLED	INSTALLED

4.6 PRESSURE GAUGE

One of the standard mechanisms to determine if a filter needs to be backwashed is to measure the difference in water pressure between the input and the output of the filter. The BW100 does this with a built in pressure differential gauge, (P/D). Typically, as the filter gets more impacted with filtered particulates, the pressure will increase. There are circumstances where this process may not be effective, such as when a sand filter develops water tunnels, thereby eliminating the correlation between pressure and pollution level. In some circumstances, it may be possible for a filter to develop these tunnels if it is left too long, and the pressure builds to an unsupported level. In this case, the pressure would increase to some point, and then drop suddenly. None of these special circumstances are considered by the BW100. The P/D is simply used to determine if a set pressure point has been exceeded so that a backwash cycle can be initiated. The gauge pressure point can be set by the user and has a range of 0 to 30psi.

Because of the physical dimensions, the inputs from the gauge to the logic control board are required to exit the enclosure. As a result, the voltage on these lines should not exceed +5VDC to ground. Although not specifically supported, if an external pressure gauge device is desired, it must have a dry contact that is closed when the pressure threshold is exceeded. **DO NOT** connect the P/D switch input to an external voltage.

CHAPTER 5 OUTPUT SEQUENCING AND FUNCTIONAL OPERATION

The BW100 output sequencing is fixed with the exception of some specific parameters that can be set by the user.

5.1 CONFIGURATION PARAMETERS

Table 3 includes a complete list of all configurable parameters for the BW100. This list is in the same order as it appears in the configuration menu. All of these parameters are stored in non-volatile memory.

Table 3 Configuration Parameters

Parameter	Range	Description
FILTERS	0-4	0 BW100 disabled 1-4 number of filters installed
B/W TIME	1-30	number of minutes each filter will be in backwash mode each filter will use the same value
DWELL	0-30	number of minutes of pause between filters being asserted each filter will use the same value
TIME	HH:MM:SS	current time of day that is held in the RTC, 24 hour format
DATE	MM/DD/YY	current day of the year that is held in the RTC, year 2100 is not supported, only a 2 digit year is supported
P/D	ON/OFF	ON: pressure differential switch may initiate a backwash OFF: pressure switch is ignored
P/D DELAY	0-30	number of minutes that the P/D switch must be asserted continuously before the P/D can initiate a backwash
TIMER	ON/OFF	ON: day timer may initiate a backwash OFF: day timer is disabled and time of day is ignored
TIMER SET	1/4, 1/3, 1/2 1-7 days	partial day settings, 6 hours, 8 hours, and 12 hours number of days between day timer initiated backwashes
TIME START	HH:MM:SS	time of day in 24 hour format at which the day timer will initiate a backwash, see section 5.2
CLEAR COUNT	0-9999	parameter displayed is the number of backwash cycles that have been initiated since the last time the counter was cleared this parameter can only be cleared, it cannot be set

5.2 THE DAY TIMER

The day timer function requires more clarification than Table 3 provides.

If the TIMER SET parameter is set to 1/4, 1/3, or 1/2 then the day timer uses the parameter TIME START to establish at what time the first backwash cycle will start. After that, backwash cycles will be initiated 4, 3, or 2 times per day 6, 8, or 12 hours after the start of the first cycle.

If the TIMER SET parameter is set to 1 to 7 days then the day timer uses the TIME START parameter in order to know at what time of day to initiate a backwash. At most one backwash will be initiated per day in these modes.

Table 4 Examples of Day Timer Settings

TIMER SET	TIME START	last backwash start date	Initiated Date	Initiated Time
1/4	11:23:50	1/1/05	1/1/05	11:23:50
			1/1/05	17:23:50
			1/1/05	23:23:50
			1/2/05	05:23:50
			1/2/05	11:23:50
1/3	11:23:50	1/1/05	1/1/05	11:23:50
			1/1/05	19:23:50
			1/2/05	03:23:50
			1/2/05	11:23:50
1/2	11:23:50	1/1/05	1/1/05	11:23:50
			1/1/05	23:23:50
			1/2/05	11:23:50
1	11:23:50	1/1/05	1/2/05	11:23:50
			1/3/05	11:23:50
2	11:23:50	1/1/05	1/3/05	11:23:50
			1/5/05	11:23:50
7	11:23:50	1/1/05	1/8/05	11:23:50
			1/15/05	11:23:50

The time between backwash cycles is calculated based on the backwash start time for all cycles. In other words, the next backwash will start the given number of hours from the start of the current backwash.

Whenever a change is made in the configuration menu to one of the day timer parameters, (TIMER, TIMER SET, or TIME START), then the next backwash will start as soon as the current time reaches the TIME START.

For example, consider the following sequence:

1. one or more of the day timer configuration parameters are modified resulting in the following configuration:
 TIMER ON, TIME SET = 1 day
 START TIME = 13:50:00
2. if the current time is 13:40:00, then a backwash cycle will be initiated in 10 minutes today
3. if the current time is 14:00:00, then a backwash cycle will be initiated tomorrow at 13:50:00

5.3 FUNCTIONAL OUTPUT SEQUENCE

Three functions can initiate a backwash cycle: day timer, P/D gauge, and backwash key. The backwash cycle is identical for each of these initiator functions. Refer to Figure 5 and Figure 6 for an illustration of the backwash sequence.

5.3.1 HOLDOFF MODE

The HOLDOFF mode follows a backwash cycle. It forces a minimum time between backwashes regardless of the parameter settings or what function initiates the backwash.

Backwash cycles initiated by the manual backwash key are not followed by HOLDOFF periods.

The HOLDOFF mode can be suspended by the user from the front panel, see CHAPTER 6.

5.3.2 P/D GAUGE INPUT DELAY

The BW100's response to the P/D gauge is controlled by the P/D DELAY parameter. When this parameter is set to a non-zero number of minutes, the P/D switch must be asserted continuously for that period until a backwash cycle can be initiated. The P/D switch input is sampled by the BW100 once per second. If the P/D switch drops out during the period, the delay timer is restarted.

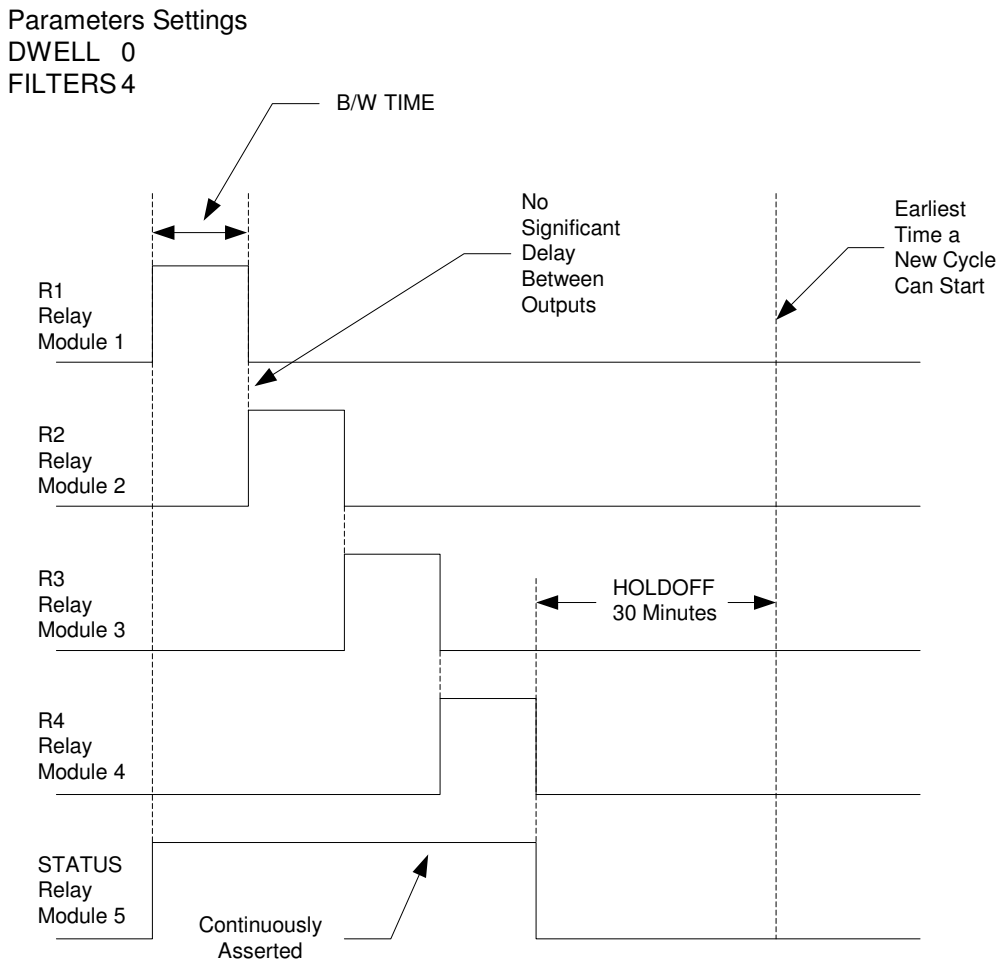
If the P/D DELAY parameter is set to zero, then the BW100 will respond to the P/D input in 2 seconds by initiating a backwash cycle.

5.3.3 DWELL PARAMETER BEHAVIOR

Figure 5 illustrates a backwash sequence that has DWELL set to 0. This is a significant case in part because it should be noted that the HOLDOFF period starts immediately after the last relay is unasserted.

Figure 6 illustrates a backwash sequence that has DWELL set to some non-zero value between 1 and 30 minutes. It should be noted that there will be a DWELL period after the last relay is unasserted.

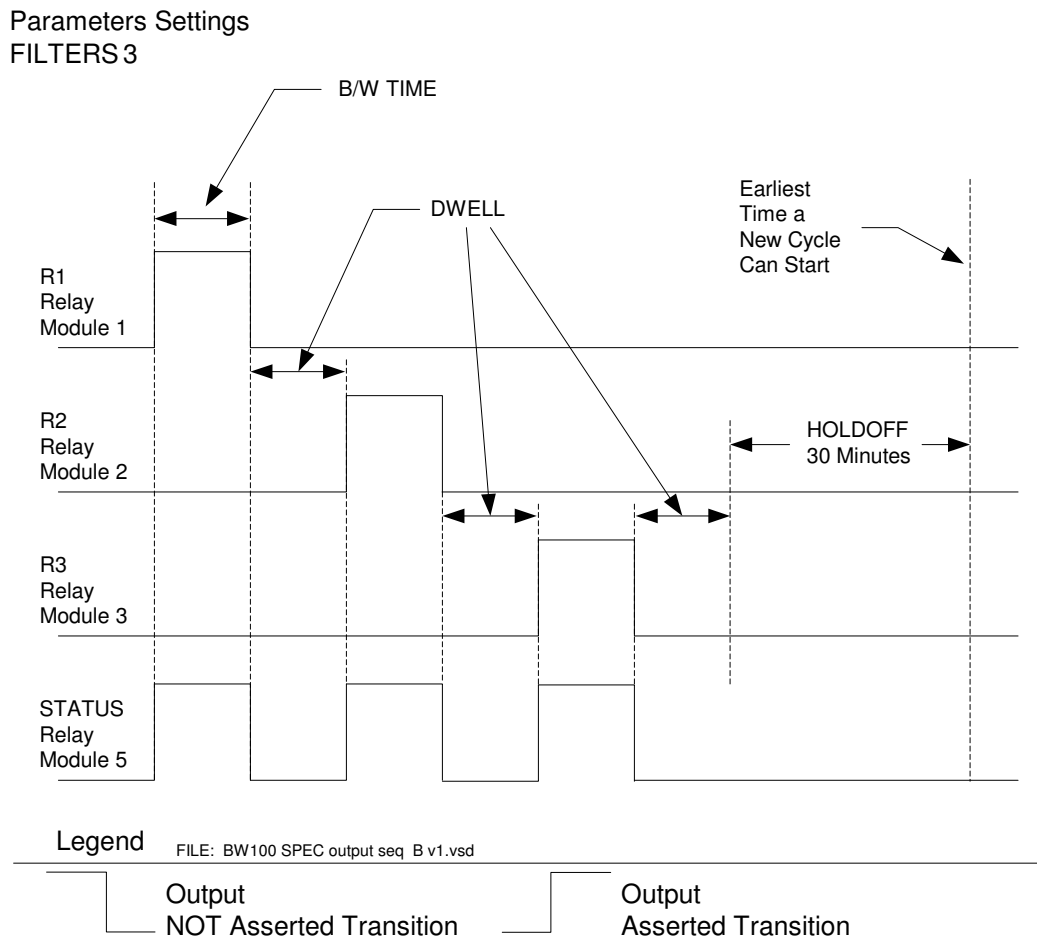
Figure 5 Output Sequence with DWELL set to Zero



Legend FILE: BW100 SPEC output seq A v1.vsd



Figure 6 Output Sequence with DWELL set to Non Zero Value



CHAPTER 6 USER INTERFACE

6.1 CANCELING BACKWASH IN PROGRESS

It is highly desirable to be able to quickly abort a backwash cycle in progress. There are two ways to do this in the BW100.

1. Power Down: turn off the primary power to the unit, the default, powered down state is all relays unasserted
2. MENU key: press the MENU key, then press the 7 key to cancel the current backwash cycle.

6.2 CANCELING HOLDOFF MODE

It may be desirable to stop the HOLDOFF mode that forces a minimum period of 30 minutes between backwash cycles regardless of the configuration. There are two ways to do this in the BW100.

1. BACK WASH key: press and momentarily hold the BACK WASH key, this will initiate the manual backwash cycle count down. To prevent the cycle from starting, do not let the count down finish.
2. MENU key: press the MENU key which will open the parameter configuration menu, then press the MENU key again to go back to the main status screen.

6.3 USER INTERFACE EXAMPLE SCREENS

Figure 7 Startup Boot ID Screen

01234567890123456789	
Initializing	⇐ system is booting
4-Tank Backwash Control System	⇐ software configured for BW100
Real Time Clock	⇐ RTC is installed

This screen only appears for a few seconds during power up.

Figure 8 Main Status Screen

01234567890123456789	
IN: 1, 2, 3, 4	⇐ active filter states, all are "IN" system filtering water
CNT 9999 LAST 9999	⇐ number of backwashes, hours passed since last cycle
P/D ON TIMER ON	⇐ P/D mode enabled, TIMER mode enabled, Table 3
23:59:59 12/31/99	⇐ RTC current time in 24 hour format, RTC current date

CNT: a count of the number of backwash cycles that have been initiated. CNT can be cleared from the configuration menu by using the CLEAR COUNT parameter function

- CNT is stored in non-volatile configuration memory
- range 0 to 9999

LAST: the number of hours since the last backwash, cleared each time a cycle is initiated

- LAST is stored in non-volatile configuration memory
- range 0 to 9999

01234567890123456789	
IN: 2, 3, 4 OUT 1	⇐ filter 1 has output relay module asserted
CNT 9999 LAST 9999	⇐ relay modules 2, 3, 4 are unasserted
P/D ON TIMER ON	⇐ filter 1 is "OUT" of the system, it is not filtering water
23:59:59 12/31/99	⇐ filter 1 is backwashing

01234567890123456789	
IN: 1, 2, 3, 4 DWELL	⇐ in DWELL mode as defined in Figure 6
CNT 9999 LAST 9999	⇐ relay modules 1, 2, 3, 4 are unasserted
P/D ON TIMER ON	
23:59:59 12/31/99	

Figure 9 Version Control Screen

01234567890123456789	
Acu-Trol, SN99999999	← unit serial number, factory set, max 99999999
4-Filter Automatic Backwash Controller	← name of unit
BW100A2, 02/02/05	← software version and date

Pressing the UP ARROW from Figure 8 Main Status Screen will show this screen. Press any key to leave.

Figure 10 Manual Backwash Delay Screen

01234567890123456789	
Starting in 30	← count down to 0 then backwash cycle will be initiated count down is in 10ths of seconds count is from 30, 29, to 01, 00 it takes a total of 3 seconds to complete

Pressing and holding the BACK WASH key from Figure 8 Main Status Screen will bring up this screen.

Figure 11 Configuration Menu Screen

01234567890123456789		
>FILTERS	4	⇐ ENTER key goes to Figure 13 Parameter Value Entry Screen
B/W TIME	30min	⇐ ENTER key goes to Figure 13 Parameter Value Entry Screen
DWELL	30min	⇐ ENTER key goes to Figure 13 Parameter Value Entry Screen
TIME	23:59:59	⇐ ENTER key goes to Figure 14 Time Value Entry Screen
DATE	12/31/99	⇐ ENTER key goes to Figure 15 Date Value Entry Screen
P/D	OFF	⇐ ENTER key alternates selection between ON and OFF
P/D DELAY	30min	⇐ ENTER key goes to Figure 13 Parameter Value Entry Screen
TIMER	OFF	⇐ ENTER key alternates selection between ON and OFF
TIMER SET	1/4 Days	⇐ ENTER key scrolls all possible parameters, 1/4 to 7
TIME START	23:59:59	⇐ ENTER key goes to Figure 14 Time Value Entry Screen
CLEAR COUNT	9999	⇐ ENTER key to clear the current CNT count

NOTE: Only 4 of the 11 lines of this screen can be displayed at any one time. Use the UP and DOWN ARROW keys to scroll through the list of parameters.

Press the MENU key from Figure 8 Main Status Screen to show the configuration menu.

Press the MENU key to exit the configuration menu.

The current parameter line is identified by the ">" character. Refer to Table 3 Configuration Parameters for a description of the parameters.

Figure 12 Cancel the Current Backwash Cycle Screen

01234567890123456789		
CANCEL THE CURRENT		
BACKWASH CYCLE? PD=1		⇐ PD indicates the P/D gauge input assertion state
7 TO CANCEL = YES		PD=1 indicates asserted, PD=0 indicates unasserted
ANY OTHER KEY = NO		

If a backwash or P/D DELAY period is currently in progress, then pressing the MENU key will cause the BW100 to display this screen. Changes to the parameter configuration cannot be performed while the unit is performing a backwash.

Pressing the 7 key will stop the backwash cycle and proceed to the parameter configuration menu.

Pressing any other key will return to Figure 8 Main Status Screen.

Figure 13 Parameter Value Entry Screen

01234567890123456789		
Enter new value		
Current:	30	← the current parameter value
^-Delete	30	← the new parameter value being entered
v-Cancel	^	← cursor position

- DOWN ARROW key will cancel the current entry
- ENTER key will exit and save the new value
- LEFT ARROW moves the cursor left
- number keypad is used to enter the new value

Figure 14 Time Value Entry Screen

01234567890123456789		
Enter new value		
Current:	23:59:59	← the current time value
^-Delete	23:59:59	← the new time value being entered
v-Cancel	^	← cursor position

- DOWN ARROW key will cancel the current entry
- ENTER keys will exit and save the new value
- LEFT ARROW moves the cursor left
- number keypad is used to enter the new value

Figure 15 Date Value Entry Screen

01234567890123456789		
Enter new value		
Current:	12/31/99	← the current date value
^-Delete	12/31/99	← the new date value being entered
v-Cancel	^	← cursor position

- DOWN ARROW key will cancel the current entry
- ENTER keys will exit and save the new value
- LEFT ARROW moves the cursor left
- number keypad is used to enter the new value

Figure 16 Internal Timers Screen

01234567890123456789		
NAME	TMR00:00:00	⇐ name of timer, current time accumulator
	ID00:00:00	⇐ on time cycle accumulator – total day timer
CNT:	0	⇐ number of times timer was used
STS:OFF	TOT00000:00	⇐ current state ON/OFF, total time on hours:minutes

This screen is for field debugging and factory use only.

Pressing the 5 key from Figure 8 Main Status Screen will show this screen

- UP and DOWN ARROW keys will scroll through the various timers
- LEFT ARROW or MENU keys will exit

Figure 17 Factory Password Access Screen

01234567890123456789		
Enter new value		
Current:	0	⇐ the current password
^-Delete	0	⇐ new password entered here
v-Cancel	^	⇐ cursor position

This screen is for field debugging and factory use only.

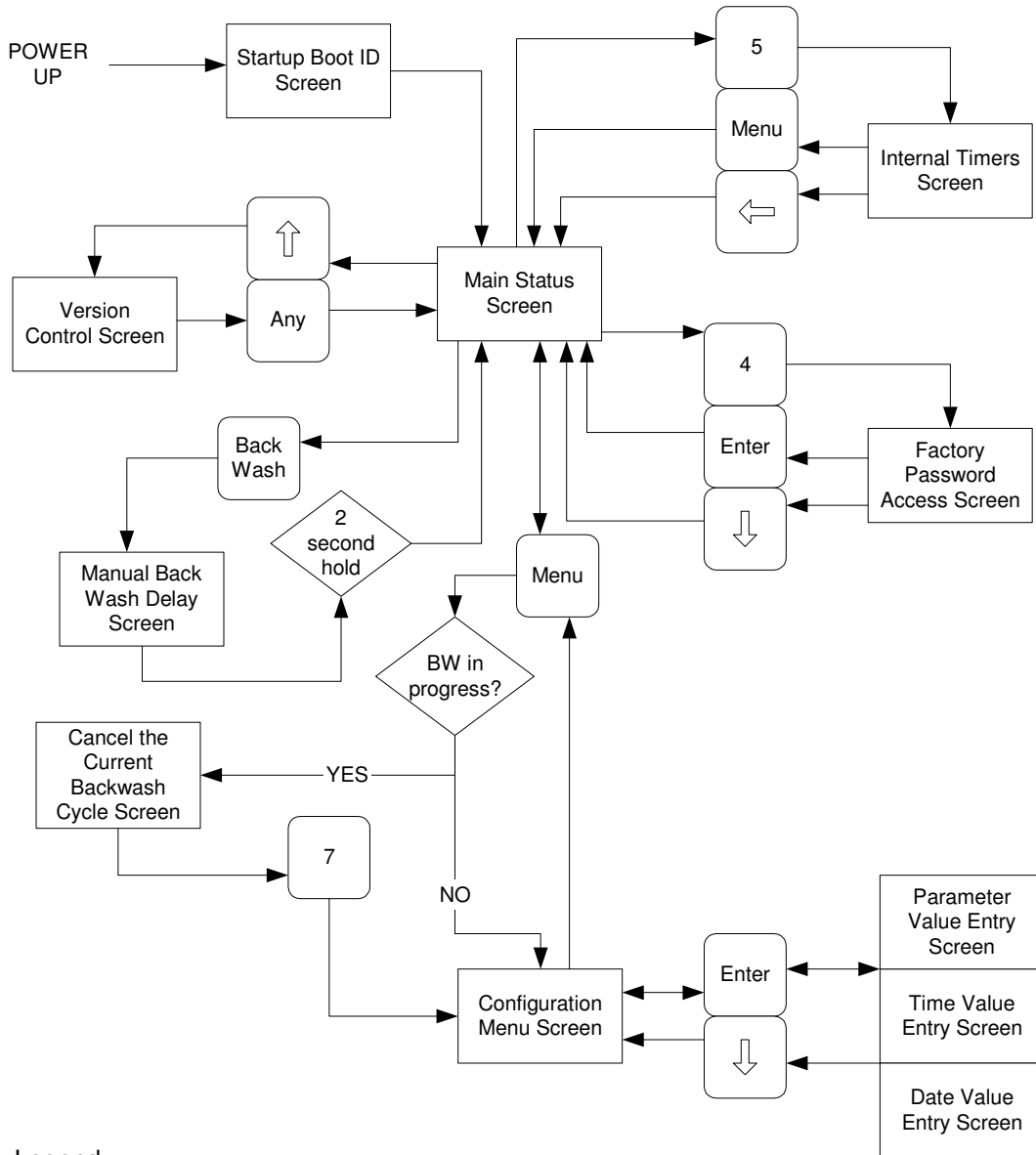
Only use this screen if directed to do so by Acu-Trol customer support. Pressing the 4 key from Figure 8 Main Status Screen will show this screen

- DOWN ARROW or ENTER keys will exit
- LEFT ARROW moves the cursor left

6.4 MENU TREE

Each screen name in Figure 18 is illustrated by a corresponding figure in section 6.3.

Figure 18 BW100 Menu Tree



Legend FILE: BW100_SPEC menu tree v1.vsd



CHAPTER 7 TYPICAL INSTALLATION AND CONFIGURATION

Figure 19 illustrates a typical BW100 installation. Each BW100 output is intended to electrically drive a pneumatic controller that in turn can control multiple valves. The ASCO 8551 is provided as a specific example of a pneumatic controller. The ASCO 8551 can be controlled with either 110VAC or 24VAC.

Figure 19 Typical Installation Configuration

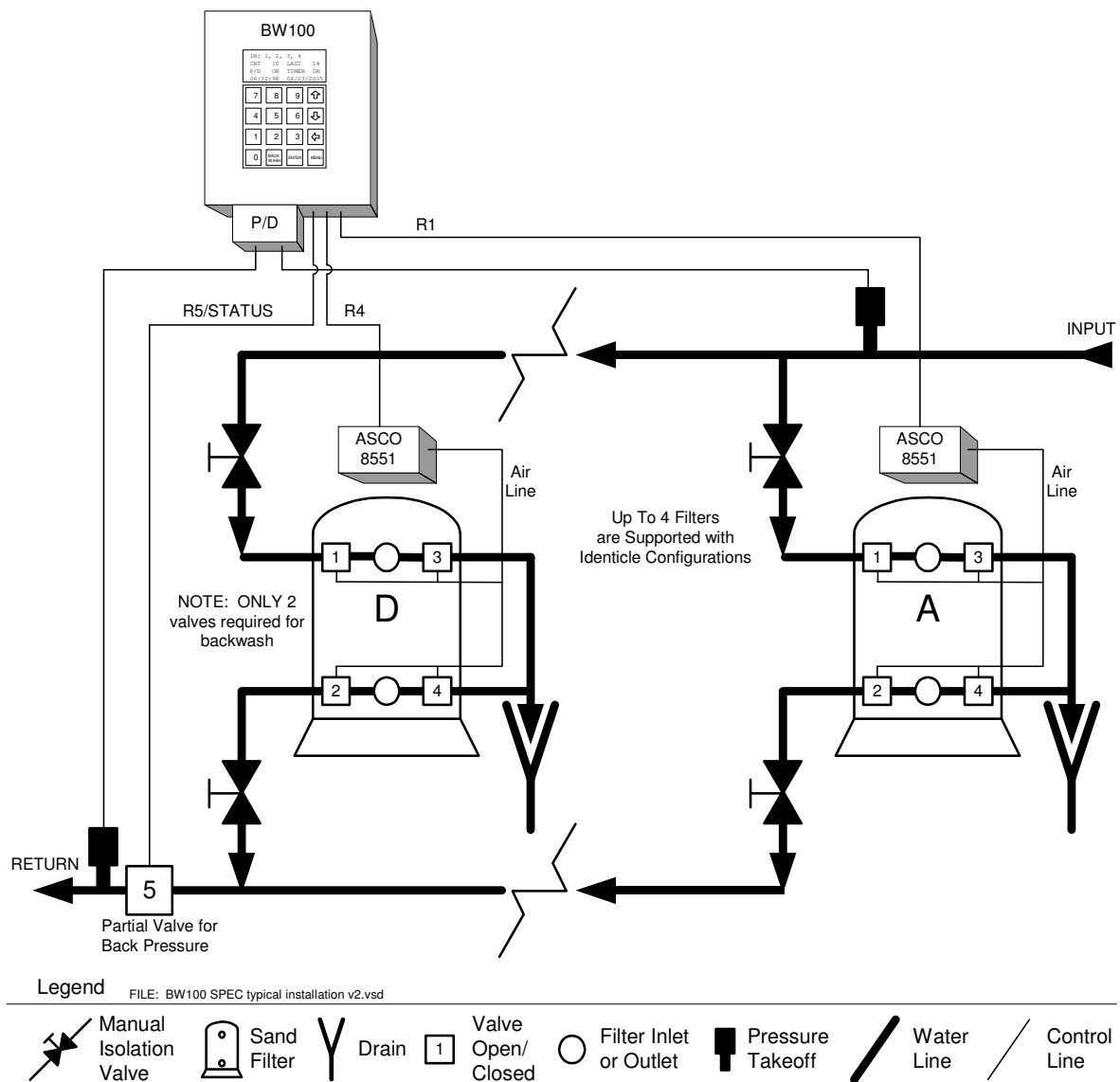


Table 5 documents the valve control sequence for executing a backwash cycle for the typical installation in Figure 19. In this case, only two valves need to be controlled, 1 and 3. Valve 3 would be configured to be in the opposite state as valve 1. This would most likely be accomplished by setting up valve 1 as normally open, (NO), and valve 2 as normally closed (NC). Valve 2 would always be open, valve 4 would always be closed.

The filter system designer may choose to use R5 to control valve 5 if configured as a modulating valve. In this case, valve 5 will only partially close and is used to create back pressure so water will flow up through the filters into the drain. Alternatively, R5 output might be connected to a separate backwash pump.

The default state (powered down state) must be all valves off.

Table 5 Valve Control Sequence Resolution

Backwash	State	V1	V2	V3	V4	Label
	BW1	OPEN	OPEN	closed	closed	S1
	BW2	closed	OPEN	OPEN	closed	S2
	BW3	OPEN	OPEN	closed	closed	S1

Formula V1 = NOT(V3)
 V2 = OPEN, V4 = closed

Table 6 Part Numbers for Typical Installation

Part Number	Description	Location
930000830	BW100 Unit	wall mounted
650000320	BW100 4x4 Keypad Overlay	outside enclosure door
800755000	BW100 Control Card	inside enclosure door
800745000	BW100 Relay Board	inside enclosure base
890565005	Relay Module 24/Primary VAC, dry contact	R1-R4 relay module
890860005	Relay Module, NO or NC dry contact	R5 relay module
A20DP-K-30	Differential Pressure for Filter Restriction, Murphy Gauge	enclosure lower wall
ASCO 8551	Direct Mount High Flow Valves, or equivalent selected by end user	used in filtration system

CHAPTER 8 ENVIRONMENTAL AND MECHANICAL SPECIFICATIONS

1. An On/Off primary power switch will be included
2. Enclosure is a NEMA Type 1, 2, 3, 4, 4X, 12 and 13 heat resistant plastic enclosure
3. Enclosure dimensions are 10" (25.4 cm) wide by 9" (22.8 cm) tall by 4" (10.1 cm) deep
4. Unit will weigh approximately 4.5 pounds (2 kilograms)
5. Internal operating temperature 0 to 70 °C, external operating temperature maximum recommended is 110 °C
6. The enclosure includes a latch that can accept a padlock

CHAPTER 9 TROUBLESHOOTING

This section lists common problems with the most likely solution.

Issue	Problem	Solution #1	Solution #2
1	No display	Make sure the power is on Check the Power LED on the power supply board	Check the fuses F1- F4
2	No display but Power is ON	Turn unit off, re-seat the relay board ribbon cable	Control card may be bad or need to be programmed
3	No response to buttons	Turn unit off, re-seat the front panel ribbon cable	Inspect the ribbon cable for physical damage
4	Backwash does not appear to be initiating	Use the Manual Backwash function to verify functionality	Verify parameters are set to appropriate values
5	Backwash does not start from P/D switch	Open enclosure and manually change P/D switch down to assert	Check the P/D switch is measuring the correct pressure by visual inspection

CHAPTER 10 CAVEATS

1. There is a power up delay of 10 seconds during which the BW100 will not initiate a backwash cycle. There is no indication that the unit is in this mode.
2. If the day timer's TIMER SET parameter is configured for 1 to 7 and if primary power is lost during the transition from 23:59:59 to 00:00:00 on the last day of the month, then the backwash cycle may start sooner than expected. It will start at the correct time of day, but may not start on the correct day.
3. If TIMER START parameter is set to 00:00:00 it will automatically be changed to 00:00:02.
4. The LAST screen parameter is not incremented if the unit is powered down. It will only increment at the top of the hour when the unit is powered on.
5. If the BW100 is not powered on when the DAY/TIMER would have started a backwash cycle, then the day timer's cycle will be skipped.
6. If a P/D initiated backwash is in progress during a time when the day timer would have initiated a backwash cycle, then the day timer's cycle will be skipped.
7. If a manually initiated backwash is in progress during a time when the day timer would have initiated a backwash cycle, then the day timer's cycle will be skipped.