



SVF[™] | STAINLESS
VERTICAL
FIRETUBE

Series 1

*Models 1500 - 3000
Commercial Condensing
Gas-fired water boilers*

Advanced Manual

Multiple boiler installation & settings + Single boiler advanced settings



This manual must only be used by a qualified heating installer/service technician. Read all instructions, including this manual and all other information shipped with the boiler, before installing. Perform steps in the order given. Failure to comply could result in severe personal injury, death or substantial property damage.

Part number 550-100-252/0619



Contents

- Unity™ Control — Advanced mode 3**
- Multiple boiler installations 6**
- Multiple boiler water piping 7**
- Fast-Track Setup — Requirements by Boiler . . . 11**
- Fast-Track Setup — Steps. 12**
- Fast-Track Setup — The WIZARD 13**
- Fast-Track Setup — Typical Application A 16**
- Fast-Track Setup — Typical Application B 18**
- Fast-Track Setup — Typical Application C 20**
- Fast-Track Setup — Typical Application D 22**
- Fast-Track Setup — Typical Application E 24**
- Fast-Track Setup — Typical Application F 26**
- Additional heat demand 28**
- Field wiring 25**
- Field wiring Single Phase Schematic Diagram . . 30**
- Field wiring Single Phase Ladder Diagram . . . 32**
- Field wiring Three Phase Schematic Diagram . . 34**
- Field wiring Three Phase Ladder Diagram 36**
- Zoning with the Unity™ Control 42**
- Control operation and setup 48**
- Unity™ Control — INITIAL SCREENS. 46**
- Available control settings – Advance Mode. . . . 52**
- System Type presets 54**
- CONTRACTOR menus. 55**
- BOILER SETTINGS menu 56**
- NETWORK SETTINGS menu. 57**
- ROTATION AND SEQUENCE 58**
- Network Boiler PRIORITY menus 61**
- Single Boiler PRIORITY menus. 63**
- ASSIGN INPUTS menu 65**
- AUX PUMP/OUTPUT options 66**
- MAINTENANCE, DATE AND TIME menus 67**

WARNING Follow all instructions for installation, start-up and servicing in the **SVF™ boiler manual**.

Use this **Advanced Manual** for multiple boiler installation guidelines and control settings and for single boiler advanced control settings.

HAZARD DEFINITIONS

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels or to important information concerning the life of the product.

DANGER Indicates presence of hazards that will cause severe personal injury, death or substantial property damage.

WARNING Indicates presence of hazards that can cause severe personal injury, death or substantial property damage.

CAUTION Indicates presence of hazards that will or can cause minor personal injury or property damage.

NOTICE Indicates special instructions on installation, operation or maintenance that are important but not related to personal injury or property damage.

IMPORTANT

THE OUTDOOR SENSOR SUPPLIED WITH THE BOILER IS RECOMMENDED.

NOTICE If the outdoor sensor is **not used**, the following changes must be made to control settings during control setup:

TARGET ADJUST (in priority menus) must be set either to NONE (constant supply temperature) or 0–10VDC (remote target).

WWSD must be set to OFF.



Unity™ Control — Advanced mode

Unity™ control setup

1. Set control parameters using the WIZARD option provided on initial start-up or manually enter parameters using control menus explained later in this manual.
2. See **Fast-Track setup** instructions beginning on page 11 for example applications and minimum settings required (using factory defaults).
3. This manual provides set-up information for a single-boiler advanced settings and for all multiple boiler applications.

⚠ WARNING

Boiler Model and Altitude are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

Temperature settings — You must ensure that the SVF™ control is set for the proper water temperatures for the system. Excessive water temperature can cause significant property damage in some applications.

Multi-temperature systems — If the heating system includes circuits that require lower temperature water (radiant slab circuits, for example) as well as higher temperature circuits (DHW, finned tube baseboard, etc.), it is recommended to protect low-temperature circuits with limit controls that are wired to one of the external limit circuits on the boiler control. Failure to provide regulation can result in substantial property damage.

Unity™ control overview

Basic Boiler Features:

- Easy configuration with WIZARD step-by-step setup including on-screen help.
- BASIC boiler settings mode for streamlined menu navigation of essential settings.
- Three customizable input/output pairs—use as a 3-Zone control or a 3-Priority control.
- Configure outputs to control System Pumps or 120VAC Auxiliary equipment.
- System type presets simplify system temperature selection.
- 0-10VDC Input can modulate boiler firing rate or target.
- Integral outdoor reset with warm weather shutdown.

Advanced Boiler Features:

- ADVANCED boiler settings mode unlocks all features and customizable parameters.
- Manage multiple types of System Pumps or 120 VAC Auxiliary accessories.
- Manage staged heating sources using the Additional Heat Demand feature.
- BMS integration with MODBUS standard.

Multiple Boiler (Network) Features:

(see next page for explanation of Priorities)

- Create a network of up to eight (8) boilers using built-in controls.
- Master boiler controls the modulation and sequencing of boilers on the network to achieve desired system supply temperature.
- Use ALL boiler inputs, not just the first and last boilers, up to 24 customizable inputs across boiler network (3 per unit, maximum of eight (8) boilers on network).

- Two (2) available Network Priorities allow multiple system types/temperature zones.
- Direct-connected DHW tanks (or other heating zones) can be piped and wired locally to any boiler in the system, not just the first or the last.
- Three system modulation types—SERIES, PARALLEL, AND SMART.
- Three (3) Lead boiler rotation modes (plus OFF).
- Limit the firing rate for each Network Priority independently when heat demands are mismatched using the Max System Rate parameter.
- Fire multiple boilers at initial call for heat to start up quickly for high demand applications using the Minimum Boilers parameter.
- Won't interrupt a Local heat demand (such as direct-connected DHW tank) to satisfy Network heat demand unless all available boilers are at maximum input.
- Simple, 3-wire boiler-to-boiler communication connection.

Additional Heat Demand Features:

- Provides contact and modulating output to activate other boilers or heating sources (SVF™ boiler collaborating with a heat pump or a different boiler, for example).
 - Modulating output limited to 10VDC; 108 μA.
- Configure to operate additional heat demand functionality 1st (before SVF™ boiler) or 2nd (after SVF™ boiler).
- Select the response time that the primary source is allowed to function before the additional heat demand activates the secondary source.
- Switch between 1st and 2nd based on a set outdoor temperature for use in base loading applications.
- Select if the additional heat source is activated based on the system temperatures being monitored by the SVF™ boiler (system temperature dependent YES).

Unity™ control operation

- The control responds to signals from:
 - Room thermostats
 - DHW aquastats (if used)
 - Temperature sensors — boiler return, boiler supply, flue temperature and, when used, system supply and system return, outdoor temperature. **For optimal performance, it is recommended to install the system supply and return sensors.**
- The control automatically adjusts blower speed (and gas flow rate) to match boiler output to space heating and/or DHW heating demand.
- The control provides three inputs and three outputs (for circulators or auxiliary devices) plus a boiler circulator output.
- Outdoor reset are recommended to be used in all application.
 - The outdoor temperature is used for supply temperature reset operation and for the warm weather shutdown (WWSD) option.
 - See “Outdoor reset operation” on page 4 for complete explanation of outdoor reset settings.
- System presets
 - The Unity™ control provides presets by System Type (see Figure 33, page 54 for complete list).



Unity™ Control — ADVANCED mode (continued)

Unity™ control Priorities & Input/Outputs

- For heating installations with multiple systems, the **Unity™** control uses **PRIORITIES** to determine the order of operation of the systems.
 - The control's MAX and MIN time settings determine the maximum and minimum times a system will be operated before being turned off to allow another system to operate.
 - A typical example is DHW priority — heat demand from the DHW system is given preference over space heating if assigned to Priority 1.
- Each **PRIORITY** has its own set of operating parameters.
 - The control prompts the user to select the system type (finned tube baseboard, DHW, etc.) and is factory programmed with parameters suited to each of these system types.
 - The user can also choose **CUSTOM** to create a system type.
- The **Unity™** control provides up to three **PRIORITIES** for single boiler applications and up to four priorities for network boiler applications. The order of operation is:
 - Single boilers: **PRIORITY 1**, **PRIORITY 2**, **PRIORITY 3**.
 - Network boilers: **LOCAL PRIORITY 1**, **NETWORK PRIORITY 1**, **NETWORK PRIORITY 2**, **LOCAL PRIORITY 2**.
 - For each boiler in a network, this provides up to two **LOCAL** priorities, used for heating systems piped directly to the boiler, such as DHW tanks.
 - NETWORK** priorities are used for heating systems connected in the primary heating loop and supplied by the boiler network.
- Each boiler has three **INPUT/OUTPUT** pairs (INPUT/OUTPUT 1, 2 and 3).
 - Control setup prompts the user to assign each of these I/O pairs to a **PRIORITY**. The **Unity™** control then knows which system (priority) to operate when any input assigned to that priority receives a call for heat.
 - The **Unity™** controls respond to heat calls based on the order of the assigned priorities and the timings set for each priority's operation.

Boiler circulator

- The boiler circulator must be supplied by others.
- The 120VAC Dry contact for the boiler circulator is located on the boiler's Expansion Module. For each of the priorities, the control can be setup to run the boiler pump or to leave it off. It is recommended to set Boiler Circulator to OFF for directly piped DHW systems with its own circulator.

⚠ WARNING The boiler circulator must be installed and connected. Flow through the boiler must be provided during all times of operation. Failure to do so can result in severe personal injury, death or substantial property damage.

Multiple boiler operation

- The **SVF™** boiler has an auto detection feature for multiple boiler networks. The Master will automatically detect the presence of the other boilers wired to the network.
- There will be a 30 - 60 second period until the Master may see the shadow boilers.
- Each shadow boiler must be assigned a network address, from 2 through 8. The address for each boiler must be unique, NOT selected for any other boiler.
- Afterwards, the Master will build a network based on the communications shared. If a boiler loses communication, the Master will automatically re-assign the lost boiler to where it was before once it is back on the network.
- When network inputs turn on, the Master boiler will enter the Network Modulation routine.
- Using system sensors, the Master will modulate the entire network to meet the energy requirements of Network Priority 1 and Network Priority 2 inputs when they are on.
- When a Local Priority input becomes active (switch closes), modulation for that input is not controlled by the Master, but instead is left to that local boiler using its own local Boiler Inlet and Outlet sensors.
- Each of the three (3) inputs on the Master or any of the Shadow boilers can be assigned as Network Priority 1 or 2 or assigned as Local Priority 1 or 2. Network Priority settings are common across all the boilers. These Network Priority settings can only be adjusted from the Master boiler.

Sequence of operation

- Figure 29, page 48 is a summary of the operating sequence for the **Unity™** control.
 - The statuses shown appear on the display as the **SVF™** control cycles the boiler.
 - The display will display red (solid or flashing) if a problem has been detected.

Outdoor reset operation

- Calculates target temperature for space heating zones based on outdoor temperature.
- For an explanation of the target temperatures and associated outdoor temperatures, see Figure 1, page 5.
- The temperature settings discussed below are accessed in the priority menu for the applicable system. For detailed explanations of the priority menus, see Figure 40, page 61.

SUPPLY MAX

- Set **SUPPLY MAX** to the required supply water temperature for the system at design maximum heat loss (typically 180°F for finned tube baseboard on new installations).

SUPPLY MIN

- SUPPLY MIN** should equal the desired minimum supply water temperature for the system.
- This could be set as low as 70°F, which would supply “zero heat” when outdoor temperature is 70°F, because supply water temp would equal room temp.



Unity™ Control — ADVANCED mode (continued)

3. See examples in Figure 1.

OD RESET MAX

1. OD RESET MAX means the outdoor temperature at which the target temperature reaches its minimum (SUPPLY MIN).
2. In the examples of Figure 1, this occurs at 70 °F (the factory default).

OD RESET MIN

1. OD RESET MIN means the outdoor temperature at which the target temperature reaches its maximum value (SUPPLY MAX).
2. In the examples of Figure 1, this occurs at 0°F outside (the factory default setting).
3. OD RESET MIN should equal the ODT (outdoor design temperature) for the installation's location.

Remote target operation (0–10VDC input)

1. This function allows a remote analog input to regulate the supply temperature for control operation/modulation. This can be done for any priority, including network and local priorities for multiple boiler networks.
2. The settings discussed below are accessed in the priority menu for the applicable system. For detailed explanations of the priority menus, see Figure 40, page 61.
3. See Figure 2 for an explanation of target temperature vs voltage when using remote target operation.
4. In the priority menu for the applicable system, select 0-10V for the TARGET ADJUST setting.
5. In the same priority menu, select the VOLTS FOR MIN and VOLTS FOR MAX values. VOLTS FOR MIN sets the voltage value for the desired minimum supply temperature. VOLTS FOR MAX sets the voltage value for the desired maximum supply temperature.

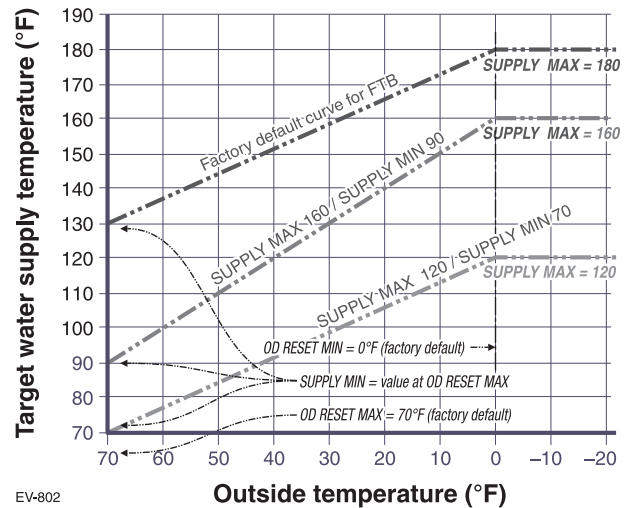
Remote modulation operation (0–10VDC input) — Single boilers only

⚠ WARNING Using an external multiple boiler controller — Remote modulation using an external controller only works with each boiler set up as a SINGLE boiler in the Unity™ Control setup.

1. Use this option for single boilers only. To use 0–10VDC for remote modulation, go to Contractor Menu -> Assign Inputs. Then change Input 1's source to 0–10V. The priority that is assigned to Input 1 cannot be used by any other Input.
2. The boiler comes on at 0.9VDC and turns off at 0.8VDC.
 - 2 VDC = 20% input.
 - 10 VDC = 100% input.

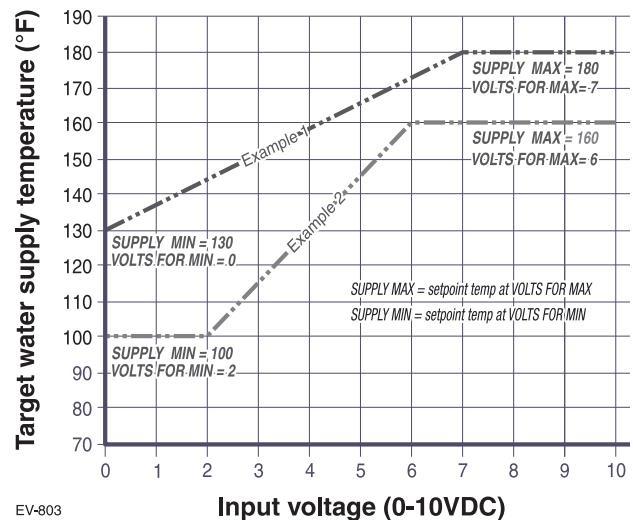
These voltage settings are not adjustable.

Figure 1 Outdoor reset operation



EV-802

Figure 2 Remote target curve operation



EV-803



Multiple boiler installations

Placing multiple boilers

1. Locate multiple boilers in boiler room to provide the clearances shown in:
 - a. Figure 3 (side-to-side).
 - b. Other layouts can be used if all required clearances are maintained.
2. Provide indicated clearances around boilers for access and servicing. If recommended dimensions are not

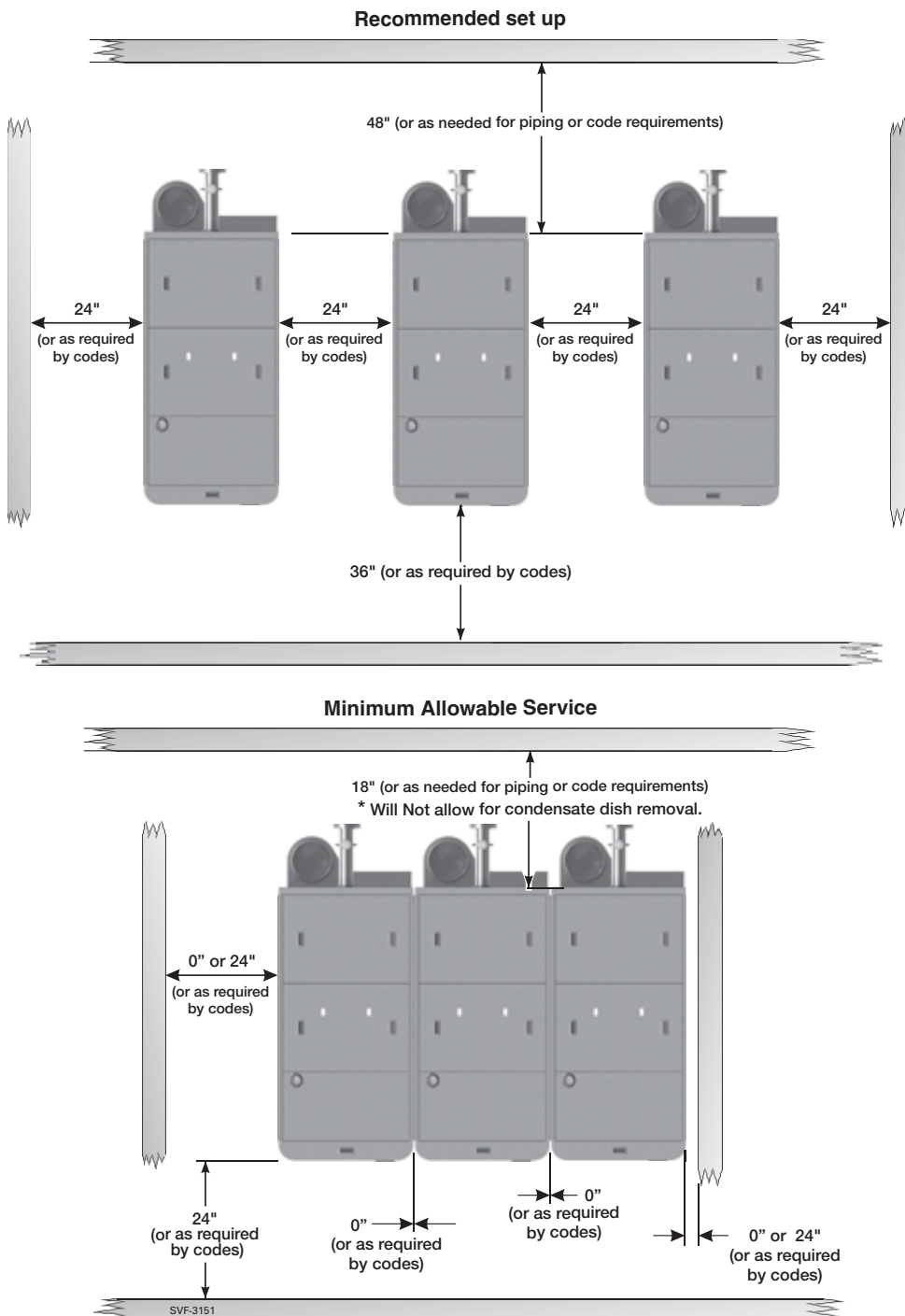
- possible, provide at least the minimum clearances given in boiler manual. Also follow local codes.
3. Construct boiler foundation if boiler room floor is uneven or if there is a danger of flooding. Size foundation to allow for clearance and spacing dimensions shown in either Figure 3.

NOTICE

Verify that boiler placement and clearances comply with all applicable codes.

4. Chalk-line boiler locations on foundation or boiler room floor.
5. Uncrate and assemble boilers according to instructions in this manual.
6. Provide clearance for installation of venting, air piping, gas piping, condensate piping and components, expansion tank, boiler pump and other accessories.

Figure 3 Side-to-side mounting of multiple boilers





Multiple boiler water piping

Multiple boiler piping

1. Primary/secondary piping
 - a. Use primary/secondary piping, as shown on the following pages when flow rates are outside the ranges shown in Figure 10, page 15 in the boiler manual.
 - b. Primary/secondary piping ensures flow only through operating boilers.
2. Provide a flow/check valve in the supply piping of each boiler as shown in piping diagrams in this manual. Install an isolation valve on the supply and return of each boiler as shown.
3. Install main system air eliminator and primary pump in supply piping as shown in piping diagrams.
4. Place expansion tank on suction side of system pump as shown.
5. Install system accessories as shown in drawings.
6. Piping recommendation drawings:
 - a. Figure 7, page 10 is a schematic piping drawing showing the locations of typical boiler piping and system piping, including limits and other devices often required by local codes.
 - b. Figure 7, page 10, Figure 8, page 16 and Figure 10, page 18 are three-dimensional piping drawings of typical multiple boiler installation.
 - c. Figure 12, page 20 shows recommended piping when an isolating heat exchanger is needed.
7. If desired, other primary/secondary piping arrangements can be used.

Boiler loop pipe sizing

1. Use no smaller than 3-inch schedule 40 steel pipe (or 3-inch copper pipe) on all boiler loop piping.
2. Size boiler loop pumps to provide flow for a 30°F temperature rise. See Figure 10, page 15 in the boiler manual, for the corresponding flow rate and head loss through the boiler.
3. Total head loss for the boiler loop pumps must include the loss through all piping and fittings from the boiler to the system main piping.



Multiple boiler water piping *(continued)*

Recommended pipe sizing

⚠ WARNING **DO NOT design the piping and components for a boiler flow rate above or below** the ranges given in Figure 5 without using one of the piping strategies listed below. Insufficient flow will cause nuisance outages due to limit operation. Excessive flow can damage the boiler heat exchanger from erosion.

For systems with flow rates outside the range provided in Figure 5.

Higher flow rates:

- Use Primary/Secondary piping (see pages 17, 18, 21, 22 & 23).
- In a Variable/Primary flow system (see Figures 16, page 19 and Figure 17, page 20) in the boiler manual, a differential pressure by-pass valve should be added to by-pass the excessive flow, or provide an alternate engineered solution.

Lower flow rates:

- Use Primary/Secondary piping (see pages 17, 18, 21, 22 & 23).
- In a Variable/Primary flow system (see Figures 16, page 19 and Figure 17, page 20) in the boiler manual, a flow switch is recommended to be installed and set at the boilers mini-

imum flow rate. This will prevent the boiler from firing with a flow rate that is too low. Once the system load increases the resultant higher water flow will make the flow switch.

Figure 4 Boiler head loss vs flow rate for SVF™ boilers

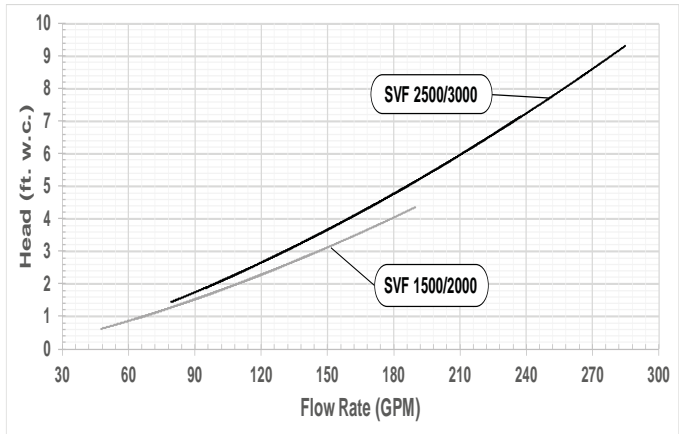


Figure 5 Flow rate and pressure drop data for SVF™ boilers

SVF 1500				SVF 2000			
Minimum Water Pressure	GPM	100% Rate	Boiler head loss (Feet w.c.)	Minimum Water Pressure	GPM	100% Rate	Boiler head loss (Feet w.c.)
		Temperature Rise (°F)				Temperature Rise (°F)	
10 PSI	146	20	3.0	10 PSI	190	20	4.4
	116	25	2.2		152	25	3.2
	97	*30	1.7		127	*30	2.5
	83	35	1.4		109	35	2.0
	73	40	1.1		95	40	1.6
15 PSI	65	45	1.0	15 PSI	84	45	1.4
	58	50	0.8		76	50	1.2
	53	55	0.7		69	55	1.0
	49	60	0.6		63	60	0.9
	—	—	—		54	**70	0.7
—	—	—	51	**75	0.7		

* Suggested design flow rate (30°F temp. rise, water only)

** Notice: The SVF 1500/2000 control will reduce the firing rate when the temperature rise exceeds 60°F, at 68°F it will turn off the burner. For modulating pumps a minimum flow rate of 49 gpm can be used, but the variable speed pump must be controlled to increase flow rate between minimum and full firing rate.

SVF 2500				SVF 3000			
Minimum Water Pressure	GPM	100% Rate	Boiler head loss (Feet w.c.)	Minimum Water Pressure	GPM	100% Rate	Boiler head loss (Feet w.c.)
		Temperature Rise (°F)				Temperature Rise (°F)	
10 PSI	242	20	7.4	10 PSI	285	20	9.3
	194	25	5.3		228	25	6.7
	162	*30	4.1		190	*30	5.2
	139	35	3.3		163	35	4.1
	121	40	2.7		143	40	3.4
15 PSI	108	45	2.3	15 PSI	127	45	2.9
	97	50	1.9		114	50	2.5
	88	55	1.7		104	55	2.1
	75	**65	1.3		95	60	1.9
	—	—	—		81	**70	1.5
—	—	—	76	**75	1.4		

* Suggested design flow rate (30°F temp. rise, water only)

** Notice: The SVF 2500/3000 control will reduce the firing rate when the temperature rise exceeds 60°F, at 68°F it will turn off the burner. For modulating pumps a minimum flow rate of 75 gpm can be used, but the variable speed pump must be controlled to increase flow rate between minimum and full firing rate.



Multiple boiler water piping *(continued)*

Figure 6 Recommended pipe sizing vs flow rate

Sch 40 Pipe Diameter	Maximum Flow rate GPM	Sch 40 Pipe Diameter	Maximum Flow rate GPM
2	45	6	800
3	140	8	1650
4	290	10	3000
5	500	12	4750

NOTICE

The SVF 1500/2000/2500/3000 have 3" class 150 connections, provide reducers to adapt from external piping to the boiler supply and return flanged connections.

WARNING

System design and sizing information in this manual are intended as suggested guidelines only.

Apply recognized engineering design practices when designing the system and selecting components.

NOTICE

Each boiler is equipped with an internal low water cutoff and limit control. Check local codes to see if additional controls may be needed.

Temperature limiting — The control module uses temperature sensors to provide both high limit protection, operating limit, and modulating temperature control, and is UL353 Limit Controls certified to meet ASME CSD-1 and Section IV requirements.

Low water protection — The boiler is equipped with a low water cut-off and the manual reset is performed through the control module.

WARNING

DO NOT design for flow rates above or below the range listed in Figure 10, page 15 in the boiler manual. The boiler and system components can be damaged by excessive or insufficient flow. Temperature rises shown below apply to water only. For glycol/water applications, the temperature rise will be different, but the flow rate must be maintained within the range listed below.

Backflow preventer

1. Use backflow check valve in cold water supply as required by local codes.

Install relief valve

1. Install relief valve (shipped loose with the boiler) in the $\frac{3}{4}$ or $1\frac{1}{4}$ -inch tapping on top of the boiler supply outlet pipe.
2. Connect discharge piping to safe disposal location, following guidelines in the **WARNING** below.

Installing relief valve

WARNING

DO NOT install a relief valve with a pressure higher than 160 PSIG. This is the maximum allowable relief valve setting for the SVF™ boiler. The boiler is shipped with a 30 PSIG relief valve. See Replacement parts in the back of the boiler manual for alternate pressure setting relief valves.

To avoid water damage or scalding due to relief valve operation, as per local or state codes:

Discharge line must be connected to relief valve outlet and run to a safe place of disposal. Terminate the discharge line in a manner that will prevent possibility of severe burns or property damage should the valve discharge.

Discharge line must be as short as possible and be the same size as the valve discharge connection throughout its entire length.

Discharge line must pitch downward from the valve and terminate at least 6" above the floor drain where any discharge will be clearly visible.

The discharge line shall terminate plain, not threaded, with a material serviceable for temperatures of 375 °F or greater.

Do not pipe the discharge to any place where freezing could occur.

No shutoff valve shall be installed between the relief valve and boiler, or in the discharge line. Do not plug or place any obstruction in the discharge line.

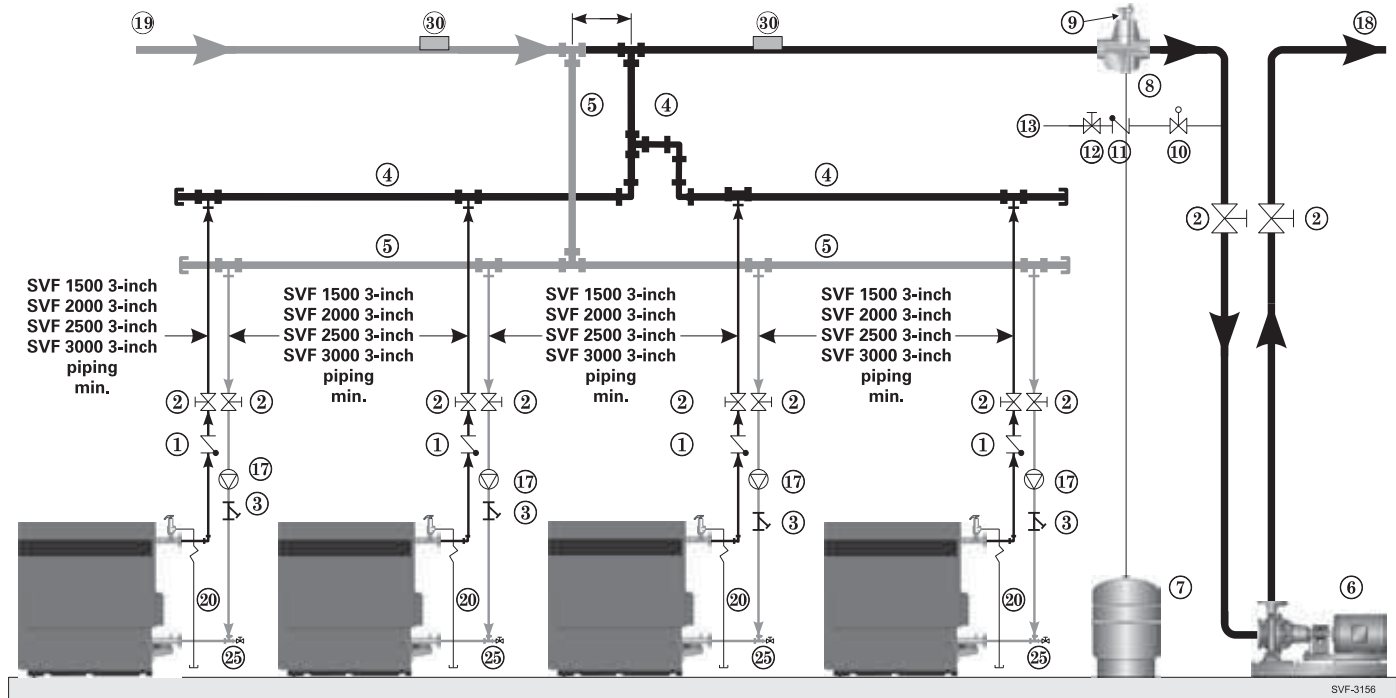
Test the operation of the valve after filling and pressurizing system by lifting the lever. Make sure the valve discharges freely. If the valve fails to operate correctly, replace it with a new relief valve.

Failure to comply with the above guidelines could result in failure of the relief valve to operate, resulting in the possibility of severe personal injury, death or substantial property damage.



Multiple boiler water piping (continued)

Figure 7 Piping schematic — typical piping for multiple SVF™ boilers, using multiple boiler manifolds



Legend — Figure 7

- | | |
|--|---|
| <ul style="list-style-type: none"> 1 Flow/check valve (each boiler). 2 Isolation valves (when used). 3 Strainer (recommended one each boiler on return line). 4 Multiple boiler manifold (supply) — layout and size per Figure 6, page 9. 5 Multiple boiler manifold (return) — layout and size per Figure 6, page 9. 6 Primary pump. 7 Expansion tank (diaphragm type). 8 System air eliminator. 9 System automatic air vent. 10 Pressure reducing valve. | <ul style="list-style-type: none"> 11 Check valve or backflow preventer, as required by applicable codes 12 Isolation valve. 13 Cold water supply. 17 Boiler circulator (each boiler). 18 System supply. 19 System return. 20 Boiler relief valve and discharge piping, installed per SVF™ Boiler Manual. 25 External drain/blowdown valve, when used, 3/4" NPT or larger. 30 System supply and return immersion sensors, at least 6 pipe diameters (but no more than 3 feet) from boiler connection tees. |
|--|---|



Fast-Track Setup — Requirements by Boiler

Fast-Track Setup

Unity™ control **Fast-Track Setup** takes advantage of the SVF control **WIZARD** to provide the shortest possible method to set up the control.

Perform the **Fast-Track Setup** steps on page 12 to ensure the minimum adjustments needed for **ADVANCED** mode control operation are completed.

The remainder of this manual provides detailed information about control setup and operation available for fine tuning, troubleshooting and custom setup applications.

⚠ WARNING

Temperature settings — You must ensure that the **Unity™** control is set for the proper water temperatures for the system. Excessive water temperature can cause significant property damage in some applications.

Multi-temperature systems — If the heating system includes circuits that require lower temperature water (radiant slab circuits, for example) as well as higher temperature circuits (DHW, finned tube baseboard, etc.), it is recommended to protect low-temperature circuits with limit controls that are wired to one of the external limit circuits on the **SVF™** boiler control. Failure to provide regulation can result in substantial property damage.

Setup for single boilers

For single boilers not operated as part of an **SVF™** network, follow the single-boiler setup procedures in the **SVF™** boiler manual.

NOTICE

Using an external multiple boiler controller — Remote modulation using an external controller only works with each boiler set up as a **SINGLE** boiler in the **SVF™** Control setup. Follow instructions in this manual to setup the control using **ADVANCED** mode.

Multiple boiler networks

Multiple boiler networks are configured with a **MASTER** boiler and one or more **SHADOW** boilers. (See above for applications using external controller.)

- The **MASTER** boiler control regulates the firing of all boilers when providing heat to the system zones.
- **SHADOW** boilers respond to heat demand from the master control except when operating for local (direct-connected) heat calls.

Priorities

The **SVF™** control allows assigning multiple priorities. These priorities will be given preference in the order below:

- Multiple boilers: LOCAL PRIORITY 1, NETWORK PRIORITY 1, NETWORK PRIORITY 2, LOCAL PRIORITY 2.
- Single boilers: PRIORITY 1, PRIORITY 2, PRIORITY 3.

NOTICE

DHW circuit in system — For high-demand DHW circuits, the control setting for MIN BOILERS must be set using the NETWORK 1 or NETWORK 2 priority menu after the WIZARD is completed to ensure quick response to demand. See page 62 for a description of the MIN BOILERS setting.

Timings

Timing settings regulate boiler sequencing and ensure minimum and maximum operating times for heating calls on each system. Timings can be adjusted during the Wizard setup or manually, as explained elsewhere in this manual.

Also see page 58 for additional information on control timings and rotation and sequencing methods.

NET MIN ON TIME (multiple boilers only)

- This parameter is available during the Wizard or manually in the NETWORK SETTINGS menu (Figure 36, page 57).
- When a boiler is being called on by the master boiler to satisfy a **network** demand, the boiler will fire for at least as long as the MIN TIME ON NET before it switches to satisfy a Local Priority if one is active.
- This timing avoids short cycling due to changes in demand.

MIN ON TIME

- This parameter is available during the Wizard or manually in the PRIORITY SETTINGS menu (Figure 41, page 62).
- When the boiler is being called on to satisfy a higher priority, the boiler will fire for at least as long as the MIN ON TIME before it switches to satisfy that priority.
- This timing avoids short cycling due to changes in demand.

NET MAX ON TIME (multiple boilers only)

- This parameter is available during the Wizard or manually in the NETWORK SETTINGS menu (Figure 36, page 57).
- When a boiler is being called on by the master boiler to satisfy a **network** demand, the boiler will fire for no longer than the MAX TIME ON NET before it switches to satisfy a Local Priority if one is active.
- This timing avoids a long-duration call from preventing other demands from being met for too long a duration.

MAX ON TIME

- This parameter is available during the Wizard or manually in the PRIORITY SETTINGS menu (Figure 41, page 62).
- When a boiler is being called on by to satisfy a lower priority, the boiler will fire for no longer than the MAX ON TIME before it switches to satisfy that priority.
- This timing avoids a long-duration call from preventing other demands from being met for too long a duration.



Fast-Track Setup — Steps

WARNING

The **WIZARD** must be used when using the **Fast-Track Setup** procedure. This is necessary to ensure that all required settings are made. In addition, all instructions in the **SVF™** boiler manual must be followed completely. Failure to comply could result in severe personal injury, death or substantial property damage.

<p>Step 1 Mechanical</p>	<ul style="list-style-type: none"> • Install boiler(s) per SVF™ boiler manual and all applicable codes, including vent/air piping and water piping. • See suggested piping in this manual and boiler manual. Each boiler must be connected with primary/secondary piping and supplied with a boiler circulator. 	<ul style="list-style-type: none"> • As shown in the suggested piping examples, DHW tanks can be either piped directly off of individual boilers or as a separate zone in the heating system. • See page 6 for additional information on multiple boiler installation options.
<p>Step 2 Electrical</p>	<p>For details, see FIELD WIRING information beginning on page 29.</p> <p>BOILER POWER SUPPLY</p> <ul style="list-style-type: none"> • Connect minimum 120 VAC power to boiler as directed on the boiler wiring diagram (on boiler and on page 38). <p>INPUTS & OUTPUTS</p> <ul style="list-style-type: none"> • Each boiler provides three input/output pairs. Input circuits are 24 VAC. DO NOT apply voltage. Use dry contacts only. Outputs are 120 VAC, 2.2-amps max (use relays if loads exceed 2.2 amps or if outputs must be 24 VAC or must be isolated contacts). • The input/outputs can be used with zone thermostats and zone circulators or zone valves (requires isolation relays unless valves are 120 VAC), providing up to three zones per boiler on a multiple system. • Each boiler also provides an unpowered output for its boiler circulator. Use an external relay if circulator requires more than 10.0 amps at 120 VAC. • If a system pump is to be operated by the Unity™ controls, connect the pump to any of the available outputs. The system pump can be activated by a remote contact or can be automatically activated on heat demand. Set up for pump operation is done in the ACTIVATE OUTPUT screen of the WIZARD. 	<p>SENSORS</p> <ul style="list-style-type: none"> • Connect an outdoor sensor, system supply sensor and system return sensor to at least one of the boilers in a multiple boiler system. • Preferably, connect outdoor, system supply and system return sensors to more than one boiler to provide redundancy. If one of the sensors fails, the master boiler Unity™ control automatically looks for an available sensor. <p>MULTIPLE BOILER COMM CABLES</p> <ul style="list-style-type: none"> • For multiple boilers, connect boiler-to-boiler communication cables as directed on page 45. <p>ADDITIONAL INFORMATION</p> <ul style="list-style-type: none"> • For flow switch or combustion air damper interlock wiring, see page 42. • For external limit connections, see page 41. • For 0–10VDC inputs, see page 44. <p>ZONING METHODS</p> <ul style="list-style-type: none"> • See wiring and control setup information for typical zoning applications beginning on page 46. • See example systems beginning on page 16.
<p>Step 3 POWER ON</p>	<p>NOTICE Follow all instructions in the SVF™ boiler manual, including all pre-start-up inspections and final checks.</p> <ul style="list-style-type: none"> • Turn OFF the manual gas cock at the boiler to prevent gas flow during setup. 	<ul style="list-style-type: none"> • Turn the boiler ON/OFF switch to ON. • Follow the prompts on the screen to reach the BOILER SETTINGS initial start-up screen. • See Figure 30, page 50 for navigation information. Note that the screen sequence changes after initial setup, as shown.
<p>Step 4 WIZARD</p>	<ul style="list-style-type: none"> • Select the START WIZARD option from the initial screen BOILER SETTINGS menu (see Figure 30, page 50). • Use on-screen help as needed. For additional information, see details in this manual. • DO NOT select SKIP WIZARD unless the control is to be configured manually. 	<p>NOTICE SINGLE BOILERS — Set up the control following instructions in the SVF™ boiler manual. If ADVANCED settings are required, change to ADVANCED mode from the CONTRACTOR menu. See ADVANCED mode setup information elsewhere in this manual.</p>
<p>Step 5 Finish setup</p>	<ul style="list-style-type: none"> • Some additional control settings may need to be changed, depending on the application. • See explanation of Unity™ control operation and settings, beginning on page 48. 	<ul style="list-style-type: none"> • For high-demand loads requiring fast response, such as network DHW, access the NETWORK PRIORITY screen for the assigned priority (see Figure 40, page 61). Change the MIN BOILERS to the number of boilers needed for peak load.
<p>Step 6 Start-up</p>	<ul style="list-style-type: none"> • Apply the SVF™ boiler manual instructions to verify the installation and to start up the boiler, using combustion test instruments as directed. 	



Fast-Track Setup — The WIZARD

- The **WIZARD** is available only on initial setup of the boiler. It cannot be accessed later. If the **WIZARD** is accidentally by-passed, follow navigation sequences shown on page 55 and page 56. Select **RESET FACTORY DEFAULTS** on the Boiler Settings menu. Follow screen directions. Boiler setup must then be started over from the beginning.
- The **WIZARD** leads through a step-by-step setup procedure designed for the application chosen.
- Context-sensitive help is available to explain the purpose of key setup items.

```

BOILER SETTINGS
HIGH ALTITUDE:          NO
WWS D TEMP:            ### ° F

START WIZARD
SKIP WIZARD

FOR DETAILS ON ANY
SELECTED LINE, PRESS
THE ► BUTTON.
                                HELP ►
                                SELECT ▲▼ EDIT ■
    
```

- This screen appears on initial start-up.
- Perform the **WIZARD** steps for every boiler.
- **HIGH ALTITUDE** parameters are critical. They must be entered correctly for each boiler before proceeding.
- Enter the **WWS D** temperature — This sets the outside temperature below which space heating systems will be disabled. **WWS D** must also be selected during system setup to enable it.
- Select **START WIZARD**.

- **DO NOT** select **SKIP WIZARD**. Selecting **SKIP WIZARD** will take the screen to the **USER MENU**. All setup would then have to be done manually.
- **NOTICE** — Once **SKIP WIZARD** has been selected, the **WIZARD** will no longer be available unless the control is set to **FACTORY DEFAULT** and control start-up is begun again.

```

SVF WIZARD
## OF ##
WHAT IS THE USE OF
INPUT/OUTPUT - # ?

HEAT/DHW DEMAND
AUX/PUMP OUTPUT
NOT USED

NOTE:
120V OUTPUTS HAVE A
2.2 AMP LIMIT. IF MORE
CURRENT IS REQUIRED,
USE AN EXTERNAL
CONTACT.

◀BACK SELECT ▲▼ NEXT ■
    
```

- Each boiler provides three input/output pairs. Each pair can be setup to function as a call for heat with output or to perform an auxiliary function, such as operating a system pump.
- After the **WIZARD** screens are completed for **INPUT 1**, the **WIZARD** starts over with **INPUT/OUTPUT 2**, then to **INPUT/OUTPUT 3** after **2** is completed.
- Select **HEAT/DHW DEMAND** if the input/output is connected to a heating or DHW zone or system. The input could be a zone thermostat or end switch. The output could be 120 VAC to a circulator (2.2 amps or less) or isolation relay.

- Select **AUX PUMP/ OUTPUT** if the input is to be used for a system pump, combustion air damper interlock, etc.
- To operate a **system pump**, setup the input as **AUX PUMP/OUTPUT**. Connect the corresponding output to the system pump or pump relay (if pump load exceeds 2.2 amps). When the **ACTIVATE OUTPUT #** screen appears, select **ANY INPUT BY ITS PRIORITY SETTINGS** as the operating mode.
- Select **NOT USED** if the input/output is not needed.

```

SVF WIZARD
## OF ##
WHAT PRIORITY IS
INPUT/OUTPUT - # ?

PRIORITY 1 - LOCAL 1
PRIORITY 2 - NETWORK 1
PRIORITY 3 - NETWORK 2
PRIORITY 4 - LOCAL 2

                                HELP ►
                                SELECT ▲▼ NEXT ■
    
```

- For multiple boiler applications, the **Unity™** control provides up to four priorities, as listed on this screen. Preference is given to these priorities in the order shown (Priority 1 through 4).
- Select which priority will be operated by this input/output.
- All boilers can operate on demand from **Network priorities**.
- **NETWORK PRIORITIES**
 - Any input on any boiler can be assigned to a network priority (**NETWORK PRIORITY 1** or **NETWORK PRIORITY 2**).
 - The **WIZARD** will only allow setting up a

Network Priority on the Master boiler. It will skip setting up a Network Priority on all shadow boilers.

- All boilers on the network will fire to meet network demands
- **LOCAL PRIORITIES**
 - Any boiler can use its input/outputs to operate up to two local priorities (**LOCAL PRIORITY 1** and **LOCAL PRIORITY 2**). This applies only for heating loops directly piped to the boiler.
 - Local demands are only satisfied by the boiler to which the input is wired. Local heating loops must be directly piped to the boiler.

```

SVF WIZARD
## OF ##
WHAT SYSTEM TYPE IS
PIPED TO OUTPUT - # ?

FAN COIL
FINNED TUBE BASEBOARD
CAST IRON BASEBOARD
CAST IRON RADIATOR
RADIANT - SLAB ON GRADE
RADIANT - THIN SLAB
RADIANT - BELOW FLOOR
RADIANT - ABOVE FLOOR
DHW
CUSTOM - #####

                                HELP ►
                                SELECT ▲▼ NEXT ■
    
```

- Use this screen to select the **system type** for this priority.
- The control will automatically set operating parameters to suit the system type chosen.
- To see factory default settings for each system, see Figure 33, page 54.
- Operating parameters can be customized in the next screen, if desired.
- Select **CUSTOM** to manually configure the operating settings for the system.

- **NETWORK PRIORITY 1 or 2** — This screen will not show on a shadow boiler if the input/output is assigned to a network priority. The screen will only appear on the Master boiler, where the priority must be configured.



Fast-Track Setup – The WIZARD (continued)

If TARGET ADJUST = ODT

```

SVF      WIZARD
## OF ##
SYSTEM TYPE : #####
TARGET MOD SENSOR :
                BOILER OUT
TARGET ADJUST : ODT
SUPPLY MAX :   ### °F
SUPPLY MIN :   ### °F
OD RESET MAX : ### °F
OD RESET MIN : ### °F
BOOST TIME :   ## MIN
RUN BOILER PUMP? YES
RUN AUX/PUMP OUT? YES
MAX ON TIME :  ## MIN
◀BACK SELECT▶▼  HELP▶
                    NEXT■
    
```

If TARGET ADJUST = 0-10V

```

SVF      WIZARD
## OF ##
SYSTEM TYPE : #####
TARGET MOD SENSOR :
                BOILER OUT
TARGET ADJUST : 0-10V
SUPPLY MAX :   ### °F
SUPPLY MIN :   ### °F
VOLTS FOR MAX : ### °V
VOLTS FOR MIN : ### °V
BOOST TIME :   ## MIN
RUN BOILER PUMP? YES
RUN AUX/PUMP OUT? YES
MAX ON TIME :  ## MIN
◀BACK SELECT▶▼  HELP▶
                    NEXT■
    
```

If TARGET ADJUST = NONE

```

SVF      WIZARD
## OF ##
SYSTEM TYPE : #####
TARGET MOD SENSOR :
                BOILER OUT
TARGET ADJUST : NONE
SUPPLY MAX :   ### °F

RUN BOILER PUMP? YES
RUN AUX/PUMP OUT? YES
MAX ON TIME :  ## MIN
◀BACK SELECT▶▼  HELP▶
                    NEXT■
    
```

```

SVF      WIZARD
## OF ##
ACTIVATE OUTPUT - # :
- ALWAYS ON
- EXTERNAL SWITCH
- OUTDOOR BELOW WWS D
- ANY INPUT
- ANY INPUT BY ITS
  PRIORITY SETTINGS
- ANY BURNER DEMAND

◀BACK SELECT▶▼  HELP▶
                    NEXT■
    
```

- **SYSTEM TYPE** – Read only (assigned in previous step).
- **TARGET MOD SENSOR** – Read only for network boilers, adjustable for single boilers – Shows which sensor reading is used for modulation. Boiler sensor is default for local priorities. System sensor is default for network priorities.
- **TARGET ADJUST** – Select how target temperature is calculated —
 - NONE** (no reset, fixed target temperature = SUPPLY MAX)
 - ODT** (outdoor reset operation; default setting). Target temperature is calculated from the outdoor reset curve. SUPPLY MAX is target temperature when outside temperature equals OD RESET MAX. SUPPLY MIN is target temperature when outside temperature equals OD RESET MIN. At outdoor temperatures in between, target temperature is scaled proportionally. See Figure 1, page 5 for details.
 - 0-10V** (target temperature based on input from remote source). SUPPLY MAX is target temperature at VOLTS FOR MAX value. SUPPLY MIN is target temperature at VOLTS FOR MIN value. For voltage values between max and min, target temperature is scaled proportionally. See Figure 2, page 5 for details.
- **SUPPLY MAX** – Set SUPPLY MAX to the required supply water temperature for the system at design maximum heat loss (typically 180°F for finned tube baseboard on new installations.)
- **SUPPLY MIN** – SUPPLY MIN should equal the desired minimum supply water temperature for the system. This line will not show if Target Adjust is selected as NONE.
- **OD RESET MAX** – means the outdoor temperature at which the target temperature reaches its minimum (SUPPLY MIN). (Does not appear if 0-10V is selected for Target Adjust.)
- **OD RESET MIN** – means the outdoor temperature at which the target temperature reaches its maximum value (SUPPLY MAX). (Does not appear if 0-10V is selected for Target Adjust.)
- **VOLTS FOR MAX** – Appears if 0-10V is selected for Target Adjust. Set the voltage at which SUPPLY MAX temperature is required.
- **VOLTS FOR MIN** – Appears if 0-10V is selected for TARGET ADJUST. Set the voltage at which SUPPLY MIN temperature is required. For voltages between Min and Max, the target temperature will be adjusted on a linear curve.
- **BOOST TIME** – Every time the call for heat surpasses this duration of time the target temp will boost up 10F. It will cap off at Supply Max.
- **RUN BOILER PUMP** – Selects whether the Boiler Pump is turned on while running on this call for heat. This setting is YES for network priorities and is not adjustable.
- **RUN AUX PUMP/ OUT** – Selects whether Inputs/Outputs in the system configured as AUX PUMP/OUTPUT are turned on while running on this call for heat.
- **MAX ON TIME / MIN ON TIME** – Maximum or minimum time the network will run on this priority if it is being asked to run on another network priority. MAX shows for Network Priority 1, MIN shows for Network Priority 2. This line ONLY shows on the Master boiler Wizard. It does not appear on Shadow boilers.

- Use this screen to set when a SYSTEM PUMP/AUX output is activated. For detailed explanation, see Figure 45, page 66 and Figure 46, page 66.



Fast-Track Setup – The WIZARD (continued)

```

SVF WIZARD
## OF ##
LOCAL NETWORK
SWITCHING TIMES
LP1 MAX ON TIME: ###M
NET MIN ON TIME: ###M
NET MAX ON TIME: ###M
LP2 MIN ON TIME: ###M
NEXT STEP HELP
BACK SELECT EDIT
    
```

- The timings set on this screen prevent the boiler from operating too long on one demand if another demand is present. They also prevent short cycling on a demand.
- LP1 and LP2 are times for local priorities.
- MIN NET ON TIME and MAX NET ON TIME are the maximum and minimum times this boiler will dedicate to a call from a network demand.

```

SVF WIZARD
## OF ##
BOILER SEQUENCING
SEQUENCE TYPE:
BASERATE HIGH: SMART
BASERATE LOW: ###%
LEAD BOILER ROTATE:
INCREMENTAL HOURS
ROTATE FREQ: ##DAYS
FORCE LEAD ROTATE: YES
NEXT STEP HELP
BACK SELECT NEXT
    
```

- Use this screen to set how boilers are sequenced and how usage is rotated between boilers on the network.
- For a complete explanation of sequencing and rotation, see page 58 and page 59.
- **Sequencing** means the way in which boiler firing rate is controlled as boilers are turned on and off by the master boiler.
 - Three **SEQUENCE TYPES** are available:
 - **SERIES** sequencing allows each boiler to reach full input before bringing on the next boiler in sequence. **PARALLEL** sequencing uses a limiter, called BASERATE HIGH, to limit the firing rate before adding additional boilers. **SMART** sequencing (factory default setting) uses a low firing rate setting, called BASERATE LOW, to keep boilers at a low firing rate, bringing on additional boilers at reduced rate until all boilers are on if necessary. Boilers are then allowed to modulate together as high as necessary to meet demand.
- **Rotation** means how and how often the boiler firing order is changed.
 - **LEAD BOILER ROTATE** options are based on how long a boiler has operated. Select either **OFF**, **BY BOILER ID**, **TOTAL HOURS** or **INCREMENTAL HOURS**. See detailed explanation of options on page 58.
 - Use the **ROTATE FREQ** setting to control how often the rotation sequence is changed.
 - **FORCE LEAD ROTATE** – If set to YES, then when the frequency timer expires and the new order is calculated, this forces the new boiler order to take effect while a heat demand is currently active.

```

SVF WIZARD
## OF ##
SET DATE & TIME
TIME: HH:MM AM
DATE: MM/DD/YY
BACK SELECT NEXT
    
```

- This screen appears ONLY on the master boiler, not on shadow boilers.
- Set the time and date to ensure that control logs accurately record time/date of occurrences.
- Time and date information is provided to the shadow boilers by the master boiler.

```

SVF WIZARD
## OF ##
MAINTENANCE INFO
NAME: #####
PHONE: ###-###-####
MODEL: #####-##
CP#: #####
INSTALLED: DD/MM/YY
LAST DATE: DD/MM/YY
NEXT DATE: DD/MM/YY
INTERVAL SET: 12MONTHS
WIZARD COMPLETE
BACK SELECT HELP
NEXT
    
```

- Use this screen to enter relevant data about the installer and boiler.
- See Figure 47, page 67 for full explanation of the inputs on this menu.

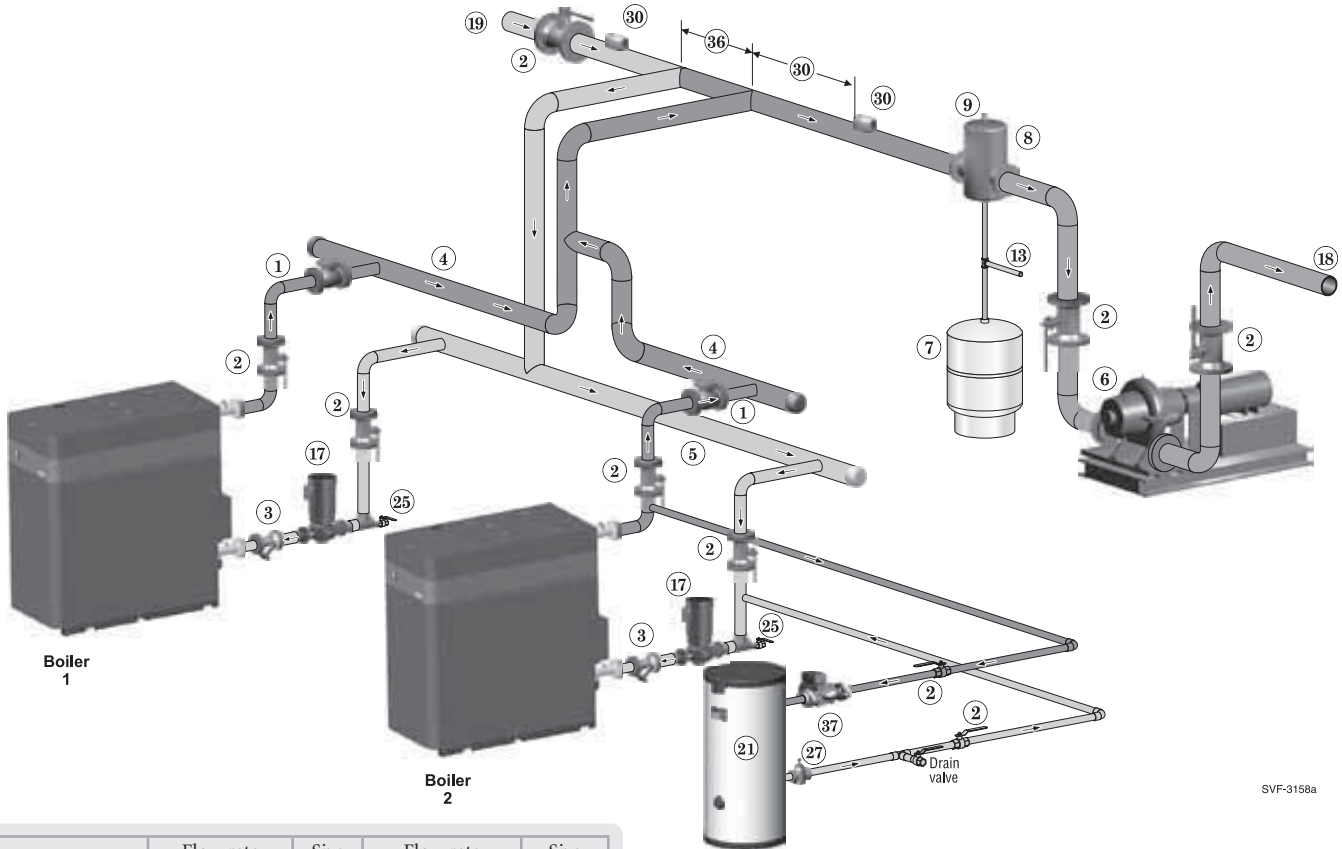


Fast-Track Setup — Typical Application A

Figure 8 Typical Application A — Piping layout — typical piping for multiple SVF™ boilers, with DHW storage heater (or heaters) direct-piped to one of the boilers

NOTICE:

This method does not provide DHW redundancy. DHW can only be supplied when Boiler 2 is operational.



SVF-3158a

Suggested DHW boiler-side pipe sizing (for max 0.04 feet head loss per foot of total equivalent length, TEL)	Flow rate	Size	Flow rate	Size
	1 – 3.9 gpm	¾	24 – 45 gpm	2
	3.9 – 7.1 gpm	1	45 – 75 gpm	2½
	7.1 – 16 gpm	1¼	75 – 140 gpm	3
	16 – 24 gpm	1½	140 – 290 gpm	4

See Figure 9, page 17 for setting up an alternate configuration if DHW is located in the system as a zone instead of being directly connected.

WARNING DHW tanks piped using this arrangement need to be sized for the required load, with a DHW pump selected to provide a flow rate through the boiler and tank that is within the allowable flow rate range listed in Figure 5, page 8.

- NOTICE**
- Follow all sizing guidelines on pages 8 and page 9. Pumps must provide flow rates required.
 - Use recognized engineering design practices throughout.

Legend — Figure 8

- | | | |
|--|--|---|
| 1 Check valve (each boiler). | 17 Boiler circulator (each boiler). | 30 System supply and return immersion sensors, at least 6 pipe diameters (but no more than 3 feet) from boiler connection tees. |
| 2 Isolation valves. | 18 System supply. | 36 Secondary connection to boiler manifolds — space no greater than 8 pipe diameters apart. |
| 3 Strainer (recommended on return line to each boiler). | 19 System return. | 37 DHW pump. |
| 4 Multiple boiler manifold (supply) — layout and size per Figure 5, page 8. | 20 Boiler relief valve and discharge piping (not shown) — install per page 9 and all applicable codes. | |
| 5 Multiple boiler manifold (return) — layout and size per Figure 5, page 8. | 21 Indirect-fired storage water heaters (Weil-McLain AQUA PLUS shown). See water heater manual for DHW piping. | |
| 6 Primary pump. | 25 External drain/blowdown valve, when used, ¾" NPT or larger. | |
| 7 Expansion tank (diaphragm type shown). | 27 Flow/check valve in DHW piping. | |
| 8 System air eliminator. | | |
| 9 System automatic air vent. | | |
| 13 Cold water supply (requires items 10, 11 and 12 as shown in Figure 7, page 10). | | |

NOTICE

Set the control so the boiler pumps, item 17, operate on any call for heat, whether heating system or DHW. Offset the DHW boiler-side supply and return manifolds as shown so the total run of pipe and fittings to each of the water heaters is approximately equal.



Fast-Track Setup — Typical Application A (cont.)

⚠WARNING **Boiler Model, Altitude are critical settings.** Failure to set correctly could result in severe personal injury, death or substantial property damage.

Figure 9 Typical Application A — multiple boiler system — setup requirements (parameters not listed below can be left at factory default settings unless special needs indicate different settings)

SETUP FOR Figure 8, page 16 AS SHOWN (DHW directly connected)						
Boiler Wiring and Control Settings (See Figure 8, page 16 for items referenced)						
Boiler ID	TT input	Wired from:	Input Assignment	Aux Option	Output	Wired to: ***
1 Master	1	Zone 1 Tstat	Priority 2 - Network 1	N/A	1	Zone 1 Circ/Valve
	2	Zone 2 Tstat	Priority 2 - Network 1	N/A	2	Zone 2 Circ/Valve
	3	No Wire	Aux Pump/Output *	Any TT Input By It's Priority Settings	3	System Circ Relay (Item 6) *
2 Shadow	1	DHW Tstat	Priority 1 - Local 1	N/A	1	DHW Circ. (Item 24)
	2	Zone 3 Tstat	Priority 2 - Network 1	N/A	2	Zone 3 Circ/Valve
	3	Zone 4 Tstat	Priority 2 - Network 1	N/A	3	Zone 4 Circ/Valve

* System circulator will not be used if system is circulator zoned. Aux Pump/Output would not be required.
 *** Outputs are 120 VAC maximum 2.2 amps. Use relay for other voltages or higher amperages.

Priority Settings					
Priority #	Setting	Value	Priority #	Setting	Value
Priority 1 – Local 1 (Boiler 2 only)	System Type	DHW	Priority 2 – Network 1 (Boiler 1 only)	System Type	Select heating system type
	Run Blr Pump	NO		Run Blr Pump	YES
	Run Aux Output	NO		Run Aux Output	YES

SETUP IF DHW IS LOCATED IN SYSTEM AS A ZONE						
Boiler Wiring and Control Settings (See Figure 8, page 16. for items referenced)						
Boiler ID	TT input	Wired from:	Input Assignment	Aux Option	Output	Wired to: ***
1 Master	1	Zone 1 Tstat	Priority 3 - Network 2	N/A	1	Zone 1 Circ/Valve
	2	Zone 2 Tstat	Priority 3 - Network 2	N/A	2	Zone 2 Circ/Valve
	3	No Wire	Aux Pump/Output *	Any TT Input By It's Priority Settings	3	System Circ (Item 6) *
2 Shadow	1	DHW Tstat (Item 26)	Priority 2 - Network 1	N/A	1	DHW Circ/Valve
	2	Zone 3 Tstat	Priority 3 - Network 2	N/A	2	Zone 3 Circ/Valve
	3	Zone 4 Tstat	Priority 3 - Network 2	N/A	3	Zone 4 Circ/Valve

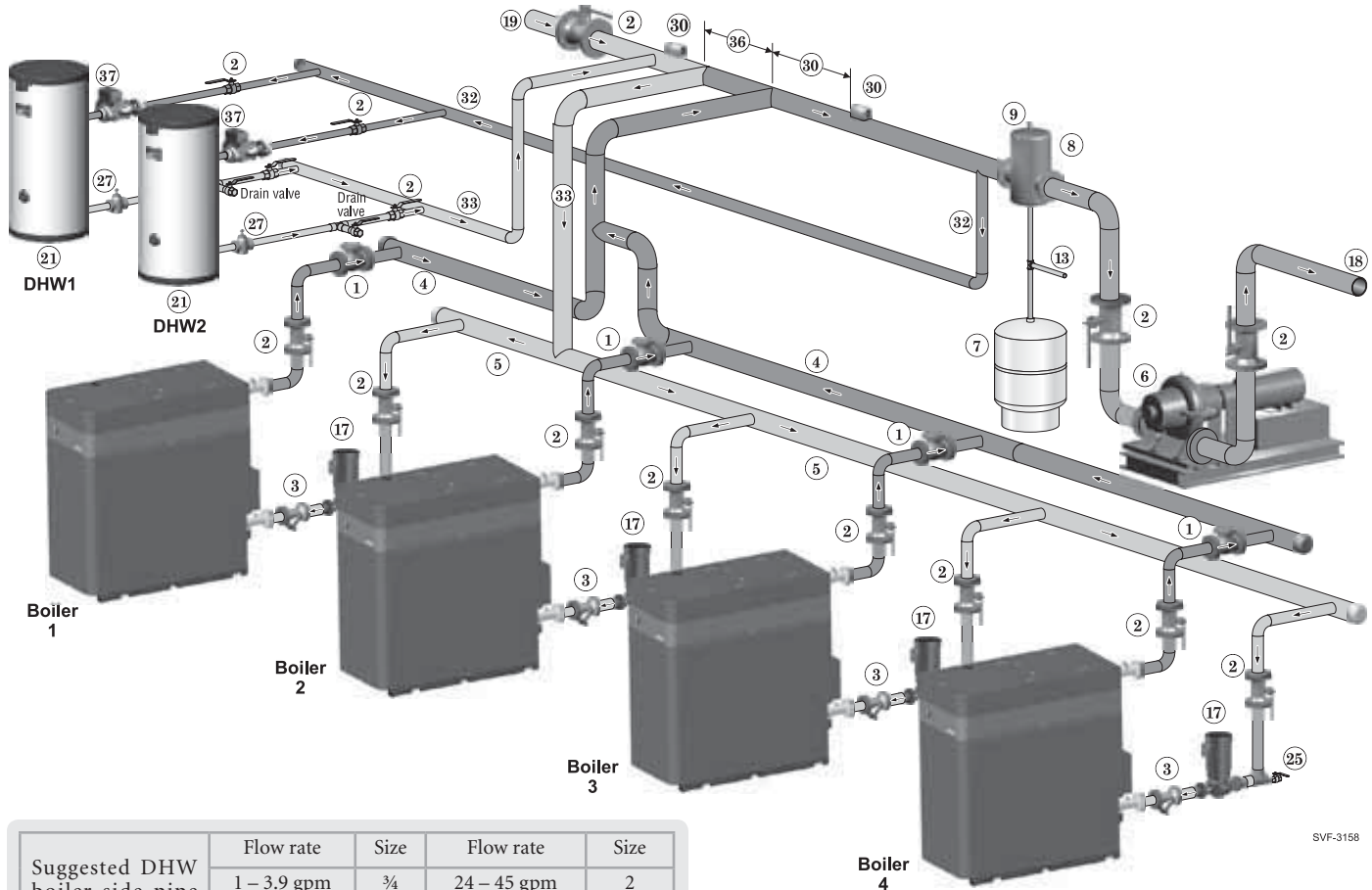
* System circulator will not be used if system is circulator zoned. Aux Pump/Output would not be required.
 *** Outputs are 120 VAC maximum 2.2 amps. Use relay for other voltages or higher amperages.

Priority Settings					
Priority #	Setting	Value	Priority #	Setting	Value
Priority 2 – Network 1	System Type	DHW	Priority 3 – Network 2	System Type	Select heating system type
	Run Blr Pump	YES		Run Blr Pump	YES
	Run Aux Output	YES		Run Aux Output	YES



Fast-Track Setup — Typical Application B

Figure 10 Typical Application B — Piping layout — typical piping for multiple SVF™ boilers, with DHW storage heaters (4-boiler system) (adjust boiler connections as required for other boiler models)



Suggested DHW boiler-side pipe sizing (for max 0.04 feet head loss per foot of total equivalent length, TEL)	Flow rate	Size	Flow rate	Size
	1 – 3.9 gpm	¾"	24 – 45 gpm	2"
	3.9 – 7.1 gpm	1"	45 – 75 gpm	2½"
	7.1 – 16 gpm	1¼"	75 – 140 gpm	3"
	16 – 24 gpm	1½"	140 – 290 gpm	4"

SVF-3158

Legend — Figure 10

- 2 Isolation valves.
- 3 Strainer (recommended on return line to each boiler).
- 6 System pump.
- 7 Expansion tank (diaphragm type shown).
- 8 System air eliminator.
- 9 System automatic air vent.
- 13 Cold water supply (requires items 10, 11 and 12 as shown in Figure 7, page 10).
- 17A Boiler - 2 Way Motorized Isolation Valve (recommended).
- 17B By-Pass - 2 Way Motorized Isolation Valve (recommended).
- 18 System supply.
- 19 System return.
- 20 Boiler relief valve and discharge piping (not shown) — install per page 9 and all applicable codes.
- 21 Indirect-fired storage water heaters (Weil-McLain AQUA shown). See water heater manual for DHW piping.
- 25 External drain/blowdown valve, when used, ¾" NPT or larger.
- 27 Flow/check valve in DHW piping.
- 30 System supply and return immersion sensors, at least 6 pipe diameters (but no more than 3 feet) from first and last boiler connection tees.

- 34 Flow switch is recommended if flow could drop below the minimum flow specified in Figure 5, page 8. A 1" FNPT connection is located on the boiler return pipe.
- 37 DHW pump.

NOTICE

Set the control so the boiler pumps, item 17, operate on any call for heat, whether heating system or DHW.

Offset the DHW boiler-side supply and return manifolds as shown so the total run of pipe and fittings to each of the water heaters is approximately equal.



Fast-Track Setup — Typical Application B (cont.)

WARNING Boiler Model, Altitude are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

Figure 11 Typical Application B — multiple boiler system — setup requirements (parameters not listed below can be left at factory default settings unless special needs indicate different settings)

Boiler Wiring and Control Settings (See Figure 10, page 18 for items referenced)						
Boiler ID	TT input	Wired from:	Input Assignment	Aux Option	Output	Wired to: ***
1 Master	1	No Wire	Aux Pump/Output **	Any TT Input By It's Priority Settings	1	System Circ (Item 6) **
	2	Zone 1 Tstat	Priority 3 - Network 2	N/A	2	Zone 1 Circ/Valve
	3	Zone 2 Tstat	Priority 3 - Network 2	N/A	3	Zone 2 Circ/Valve
2 Shadow	1	Zone 3 Tstat	Priority 3 - Network 2	N/A	1	Zone 3 Circ/Valve
	2	Zone 4 Tstat	Priority 3 - Network 2	N/A	2	Zone 4 Circ/Valve
	3	Zone 5 Tstat	Priority 3 - Network 2	N/A	3	Zone 5 Circ/Valve
3 Shadow	1	Zone 6 Tstat	Priority 3 - Network 2	N/A	1	Zone 6 Circ/Valve
	2	Zone 7 Tstat	Priority 3 - Network 2	N/A	2	Zone 7 Circ/Valve
	3	Zone 8 Tstat	Priority 3 - Network 2	N/A	3	Zone 8 Circ/Valve
4 Shadow	1	DHW1 Tstat	Priority 2 - Network 1	N/A	1	DHW1 Circ
	2	DHW2 Tstat	Priority 2 - Network 1	N/A	2	DHW2 Circ
	3	DHW3 Tstat	Priority 2 - Network 1	N/A	3	DHW3 Circ

** System circulator will not be used if system is circulator zoned. Aux Pump/Output would not be required.
 *** Outputs are 120 VAC maximum 2.2 amps. Use relay for other voltages or higher amperages.

Priority Settings					
Priority #	Setting	Value	Priority #	Setting	Value
Priority 2 – Network 1	System Type	DHW	Priority 3 – Network 2	System Type	Select heating system type
	Run Blr Pump	YES		Run Blr Pump	YES
	Run Aux Output	NO		Run Aux Output	YES
	Min Blrs *	Select as needed for quick response			

* Min Blrs setting is accessible in the Priority menus (see Figure 36, page 57). It is not included in the Wizard setup options.

NOTICE **Alternate piping: DHW circuit piped elsewhere in system** — If the DHW circuit is piped elsewhere in the system, the above settings will work only if the System Pump is activated during DHW calls for heat. To set the control for this, set PRIORITY 2 — NETWORK 1 with RUN AUX PUMP/ OUTPUT set to YES instead of NO.

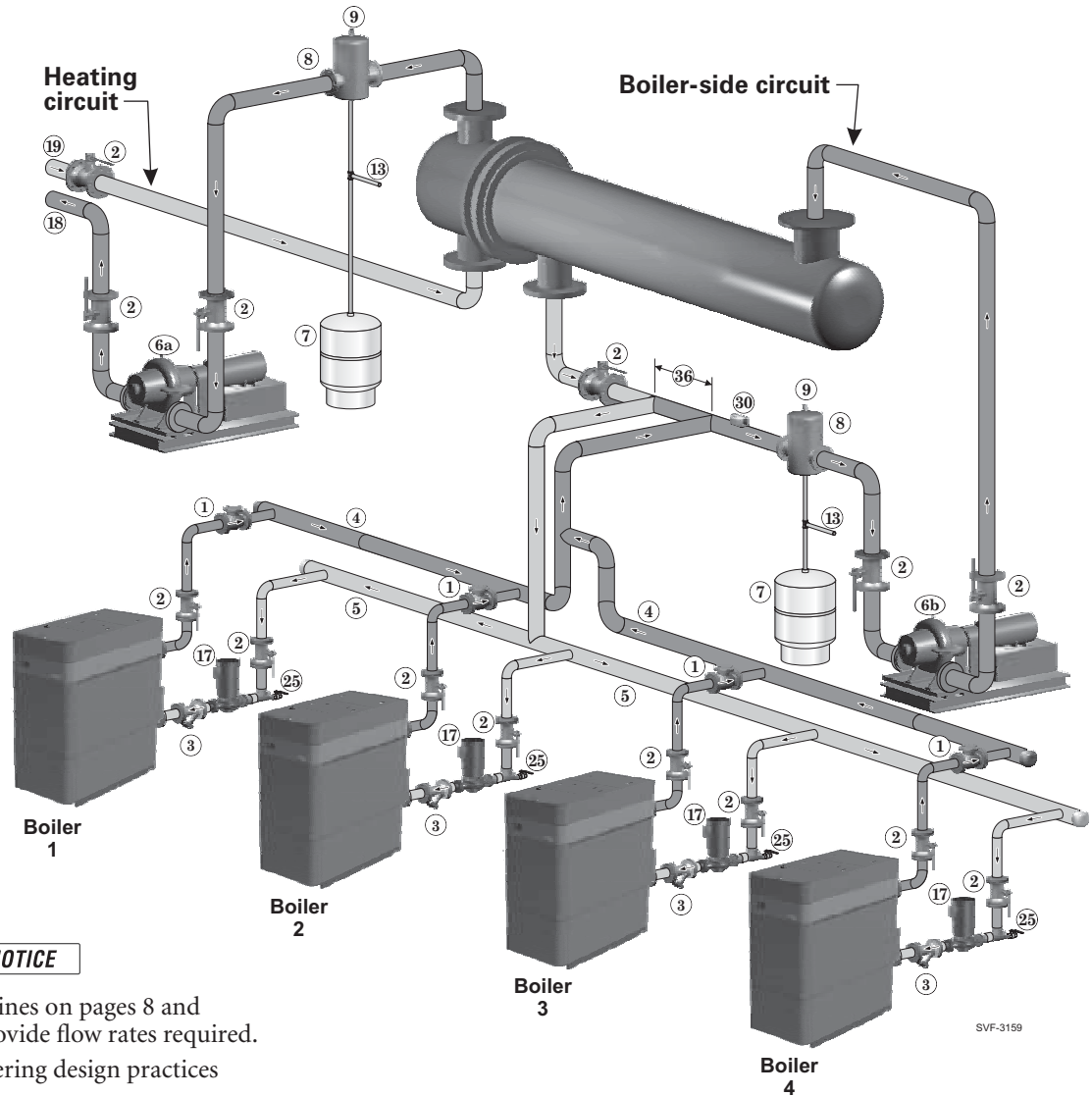


Fast-Track Setup — Typical Application C

Figure 12 Typical Application C — Piping layout — typical piping for multiple SVF™ boilers, using isolation exchanger (adjust boiler connections as required for other boiler models)

Use an isolation heat exchanger for:

- Large volume systems with high mineral content in water.
- Systems exposed to untreated quantities of makeup water.
- Old systems severely contaminated with scale and rust buildup inside piping and heat distribution units.
- Process applications.
- Commercial service water applications.
- High water pressure applications, requiring pressure relief setting in heating system more than 160 PSIG (tall buildings).



NOTICE

- Follow all sizing guidelines on pages 8 and page 9 Pumps must provide flow rates required.
- Use recognized engineering design practices throughout.

Legend — Figure 12

- | | |
|--|---|
| 1 Check valve (each boiler). | 17 Boiler circulator (each boiler). |
| 2 Isolation valves. | 18 System supply. |
| 3 Strainer (recommended on return line to each boiler). | 19 System return. |
| 4 Multiple boiler manifold (supply) — layout and size per Figure 6, page 9. | 20 Boiler relief valve and discharge piping (not shown) — install per page 9 and all applicable codes. |
| 5 Multiple boiler manifold (return) — layout and size per Figure 6, page 9. | 25 External drain/blowdown valve, when used, 3/4" NPT or larger. |
| 6a Heating system pump (exchanger tube-side). | 30 System supply and return immersion sensors, at least 6 pipe diameters (but no more than 3 feet) from boiler connection tees. |
| 6b Heat exchanger shell-side pump. | 36 Secondary connection to boiler manifolds — space no greater than 8 pipe diameters apart. |
| 7 Expansion tanks (diaphragm type). | |
| 8 System air eliminator. | |
| 9 System automatic air vent. | |
| 13 Cold water supply (requires items 10, 11 and 12 as shown in Figure 7, page 10). | |

NOTICE

1. Contact heat exchanger manufacturer for heat exchanger shell-side and tube-side piping and pump requirements. Tube-side flow and temperatures must meet heating system requirements.
2. Contact heat exchanger manufacturer for sizing heat exchanger.
3. Heat exchanger shell-side circuit requires its own expansion tank as shown.
4. Heating system circuit requires its own expansion tank, as shown, plus its own relief valve set to protect heating system and heat exchanger piping and components.



Fast-Track Setup — Typical Application C (cont.)

⚠WARNING **Boiler Model, Altitude are critical settings.** Failure to set correctly could result in severe personal injury, death or substantial property damage.

Figure 13 Typical Application C — multiple boiler system — setup requirements (parameters not listed below can be left at factory default settings unless special needs indicate different settings)

Boiler Wiring and Control Settings (See Figure 12, page 20 for items referenced)						
Boiler ID	TT input	Wired from:	Input Assignment	Aux Option	Output	Wired to: ***
1 Master	1	No Wire	Aux Pump/Output **	Any TT Input By It's Priority Settings **	1	System Circ (Item 6a)
	2	No Wire	Aux Pump/Output	Any TT Input By It's Priority Settings	2	Shell-side Circ (Item 6b)
	3	Zone 1 Tstat	Priority 2 - Network 1	N/A	3	Zone 1 Circ/Valve
2 Shadow	1	Zone 2 Tstat	Priority 2 - Network 1	N/A	1	Zone 2 Circ/Valve
	2	Zone 3 Tstat	Priority 2 - Network 1	N/A	2	Zone 3 Circ/Valve
	3	Zone 4 Tstat	Priority 2 - Network 1	N/A	3	Zone 4 Circ/Valve
3 Shadow	1	Zone 5 Tstat	Priority 2 - Network 1	N/A	1	Zone 5 Circ/Valve
	2	Zone 6 Tstat	Priority 2 - Network 1	N/A	2	Zone 6 Circ/Valve
	3	Zone 7 Tstat	Priority 2 - Network 1	N/A	3	Zone 7 Circ/Valve
4 Shadow	1	Zone 8 Tstat	Priority 2 - Network 1	N/A	1	Zone 8 Circ/Valve
	2	Zone 9 Tstat	Priority 2 - Network 1	N/A	2	Zone 9 Circ/Valve
	3	Zone 10 Tstat	Priority 2 - Network 1	N/A	3	Zone 10 Circ/Valve

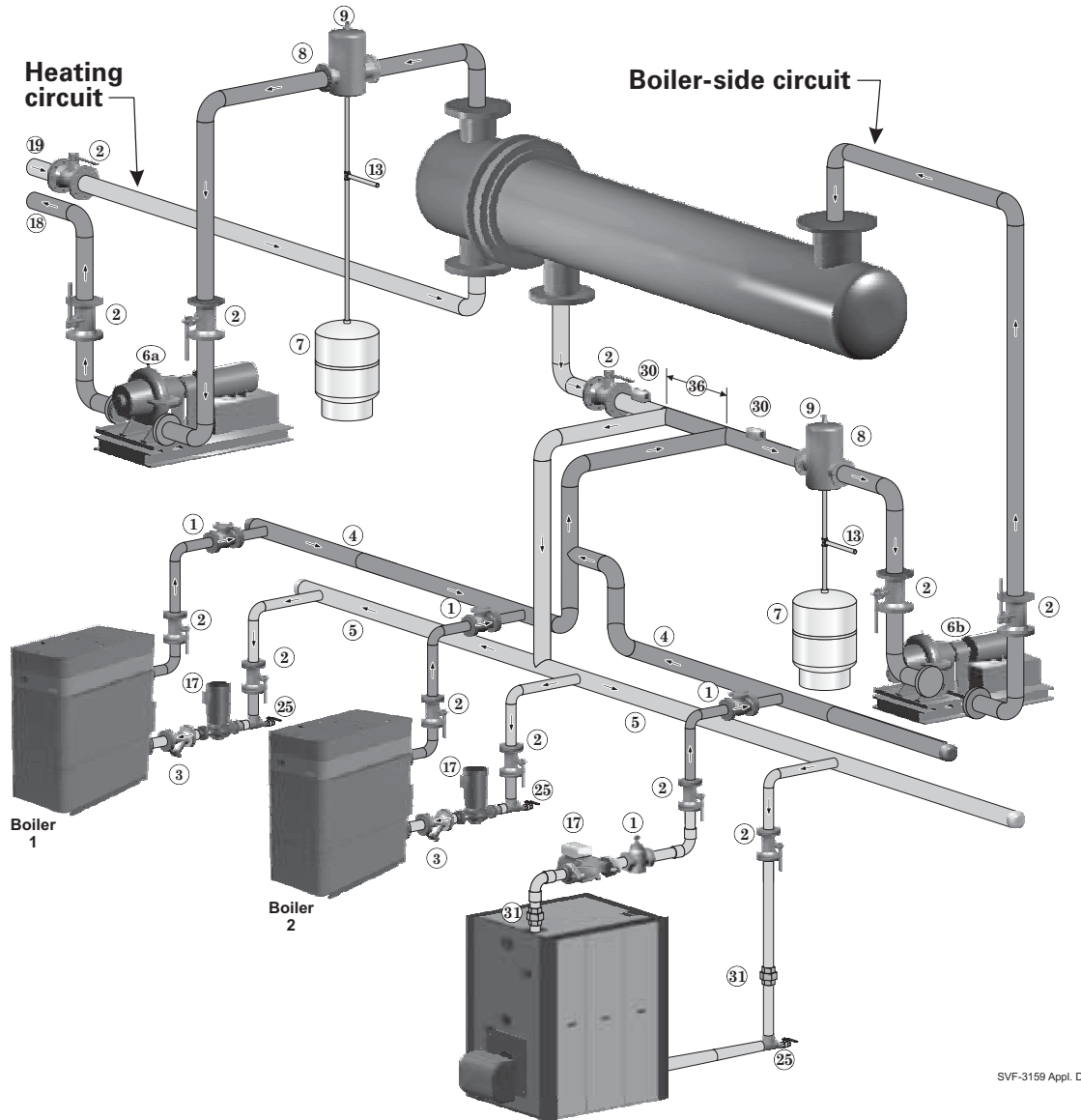
** System circulator will not be used if system is circulator zoned. Aux Pump/Output would not be required.
 *** Outputs are 120 VAC maximum 2.2 amps. Use relay for other voltages or higher amperages.

Priority Settings					
Priority #	Setting	Value	Priority #	Setting	Value
Priority 2 – Network 1	System Type	Select CUSTOM and set temperatures and other as needed for heat exchanger			
	Run Blr Pump	YES			
	Run Aux Output	YES			



Fast-Track Setup — Typical Application D

Figure 14 Typical Application D — Piping layout — typical piping for multiple SVF™ boilers, using isolation exchanger (adjust boiler connections as required for other boiler models)



SVF-3159 Appl. D

Legend — Figure 14

- | | | |
|---|--|--|
| <p>1 Flow/check or spring check valve.</p> <p>2 Isolation valves (when used).</p> <p>3 Strainer (recommended on return line to each boiler).</p> <p>4 Multiple boiler manifold (supply)</p> <p>5 Multiple boiler manifold (return)</p> <p>6a Heating system circulator (exchanger tube-side).</p> <p>6b Heating system shell-side circulator</p> <p>7 Expansion tanks (diaphragm type).</p> <p>8 System air eliminator.</p> <p>9 System automatic air vent.</p> <p>12 Boiler drain valves.</p> <p>13 Cold water supply connections (per applicable codes).</p> <p>14 Primary/secondary connections (tees no more than eight (8) pipe diameters apart.</p> | <p>17 Boiler circulator — Boiler circulators are piped to pump into the SVF™ boiler for best results with the higher pressure drop of the boiler. Boiler circulators on the High Mass boilers are piped to pump away from the boiler.</p> <p>18 Heating system supply.</p> <p>19 Heating system return.</p> <p>20 Boiler relief valve and discharge piping, installed per SVF™ boiler manual. All other boiler's relief valves and discharge piping installed per manufacturer's instructions.</p> <p>25 External drain/blowdown valve, when used, 3/4" NPT or larger.</p> <p>27 Flow/check or spring check valves (to prevent induced or gravity flow in heating system or DHW piping).</p> <p>28 Check valve.</p> <p>30 System supply and return immersion sensors, at least 6 pipe diameters (but no more than 3 feet) from boiler connection tees. For redundancy, you can install multiple sensors, each connected to a different boiler.</p> | <p>31 Unions.</p> <p>36 Secondary connection to boiler manifolds — space no greater than 8 pipe diameters apart.</p> |
|---|--|--|

NOTICE

1. Contact heat exchanger manufacturer for heat exchanger shell-side and tube-side piping and pump requirements. Tube-side flow and temperatures must meet heating system requirements.
2. Contact heat exchanger manufacturer for sizing heat exchanger.
3. Heat exchanger shell-side circuit requires its own expansion tank as shown.
4. Heating system circuit requires its own expansion tank, as shown, plus its own relief valve set to protect heating system and heat exchanger piping and components.



Fast-Track Setup — Typical Application D (cont.)

⚠WARNING Boiler Model, Altitude are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

Figure 15 Typical Application D — multiple boiler system — setup requirements (parameters not listed below can be left at factory default settings unless special needs indicate different settings)

Boiler Wiring and Control Settings (See Figure 14, page 22 for items referenced)						
Boiler ID	TT input	Wired from:	Input Assignment	Aux Option	Output	Wired to: ***
1 Master	1	No Wire	Aux Pump/Output **	Any TT Input By It's Priority Settings **	1	System Circ (Item 6b)
	2	Zone 1 Tstat	Priority 3 - Network 2	N/A	2	Zone 1 Circ/Valve
	3	Zone 2 Tstat	Priority 3 - Network 2	N/A	3	Zone 2 Circ/Valve
2 Shadow	1	Zone 3 Tstat	Priority 3 - Network 2	N/A	1	Zone 3 Circ/Valve
	2	Zone 4 Tstat	Priority 3 - Network 2	N/A	2	Zone 4 Circ/Valve
	3	Zone 5 Tstat	Priority 3 - Network 2	N/A	3	Zone 5 Circ/Valve

** System circulator will not be used if system is circulator zoned. Aux Pump/Output would not be required.
 *** Outputs are 120 VAC maximum 2.2 amps. (Except Boiler Pump Output). Use relay for other voltages or higher amperages.

Priority Settings					
Priority #	Setting	Value	Priority #	Setting	Value
Priority 3 – Network 2	System Type	Select heating system type	N/A	N/A	N/A
	Run Boiler Pump	YES	N/A	N/A	N/A
	Run Aux Output	YES	N/A	N/A	N/A
	Additional Heat Demand	ODT	N/A	N/A	N/A
	ODT Setpoint	As required for application	N/A	N/A	N/A
	Activate Contact Below Setpoint	1st or 2nd based on system sizing	N/A	N/A	N/A

System Function Notes:

Combine Weil-McLain condensing boilers and large-mass boilers in one system controlled by the **Unity™** control. Use condensing boilers during LOW-LOAD periods (spring, fall) and high-mass boilers during HIGH-LOAD periods. The **Unity™** control will sequence the high mass boiler when needed.

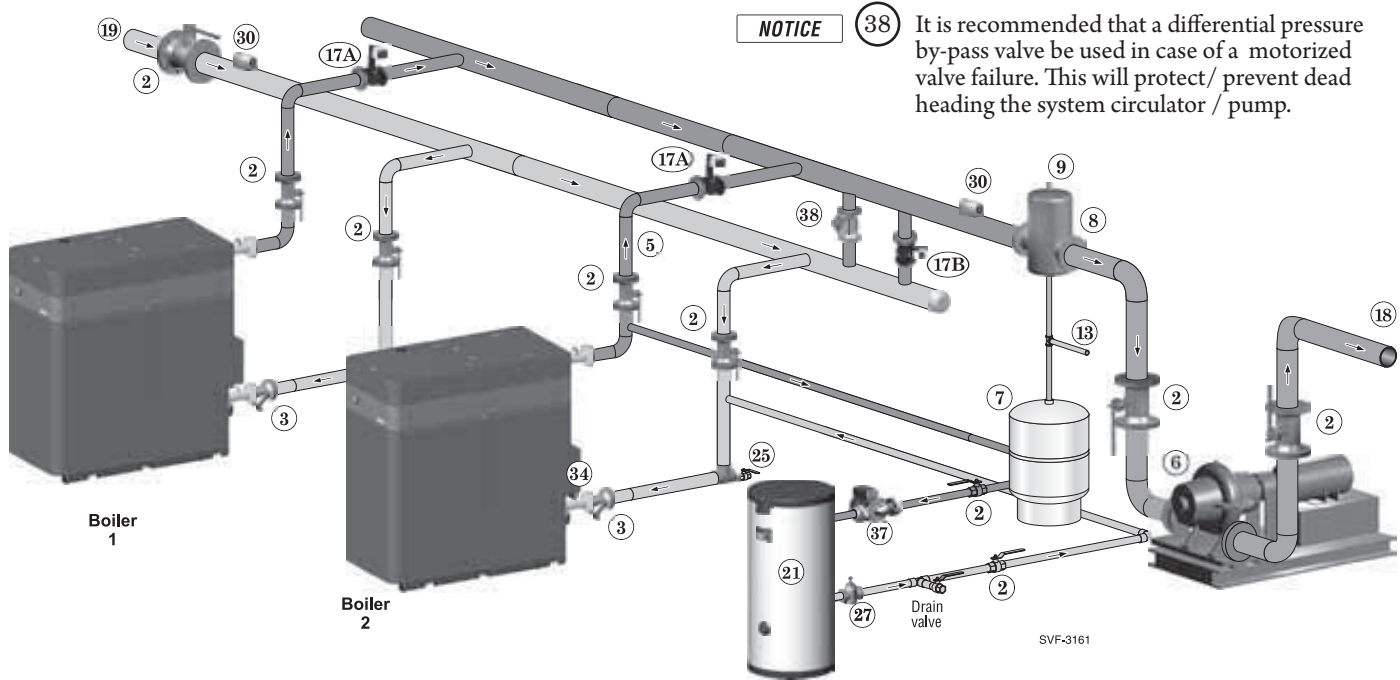
NOTICE Use accepted engineering methods to design this system for desired system efficiency and behavior. Ensure that settings for ODT SETPOINT and ACTIVATE CONTACT BELOW SETPOINT are adjusted to the design conditions of the system for proper operation.



Fast-Track Setup — Typical Application E

Figure 16 Typical Application E — Piping layout — typical piping for multiple SVF™ boilers, with DHW storage heater (or heaters) direct-piped to one of the boilers.

NOTICE This method does not provide DHW redundancy. DHW can only be supplied when Boiler 2 is operational.



NOTICE 38 It is recommended that a differential pressure by-pass valve be used in case of a motorized valve failure. This will protect/ prevent dead heading the system circulator / pump.

NOTICE 17A It is recommended to use a 2-way motorized valve with an end switch to indicate when the valve is in the open position. This should be wired into the proof of closure circuit of the SVF boiler.

Suggested DHW boiler-side pipe sizing (for max 0.04 feet head loss per foot of total equivalent length, TEL)	Flow rate	Size	Flow rate	Size
	1 – 3.9 gpm	¾	24 – 45 gpm	2
	3.9 – 7.1 gpm	1	45 – 75 gpm	2½
	7.1 – 16 gpm	1¼	75 – 140 gpm	3
	16 – 24 gpm	1½	140 – 290 gpm	4

WARNING DHW tanks piped using this arrangement need to be sized for the required load, with a DHW pump selected to provide a flow rate through the boiler and tank that is within the allowable flow rate range listed in Figure 5, page 8.

See Figure 9, page 17 for setting up an alternate configuration if DHW is located in the system as a zone instead of being directly connected.

- NOTICE**
- Follow all sizing guidelines on pages 8 and page 9. Pumps must provide flow rates required.
 - Use recognized engineering design practices throughout.

Legend — Figure 8

<p>2 Isolation valves.</p> <p>3 Strainer (recommended on return line to each boiler).</p> <p>6 System pump.</p> <p>7 Expansion tank (diaphragm type shown).</p> <p>8 System air eliminator.</p> <p>9 System automatic air vent.</p> <p>13 Cold water supply (requires items 10, 11 and 12 as shown in Figure 7, page 10).</p> <p>17A Boiler - 2 Way Motorized Isolation Valve (recommended).</p> <p>17B By-Pass - 2 Way Motorized Isolation Valve Required if isolation valves are used on individual boilers, or a differential pressure by-pass valve if designed to do so.</p>	<p>18 System supply.</p> <p>19 System return.</p> <p>20 Boiler relief valve and discharge piping (not shown) — install per page 9 and all applicable codes.</p> <p>21 Indirect-fired storage water heaters (Weil-McLain AQUA PLUS shown). See water heater manual for DHW piping.</p> <p>25 External drain/blowdown valve, when used, ¾" NPT or larger.</p> <p>27 Flow/check valve in DHW piping.</p> <p>30 System supply and return immersion sensors, at least 6 pipe diameters (but no more than 3 feet) from first and last boiler connection tees.</p>	<p>34 Flow switch is recommended if flow could drop below the minimum flow specified in Figure 5, page 8. A 1" FNPT connection is located on the boiler return pipe.</p> <p>37 DHW pump.</p> <p>38 Differential pressure by-pass valve.</p>
---	---	---

NOTICE

Set the control so the boiler pumps, item 17, operate on any call for heat, whether heating system or DHW. Offset the DHW boiler-side supply and return manifolds as shown so the total run of pipe and fittings to each of the water heaters is approximately equal.



Fast-Track Setup — Typical Application E (cont.)

⚠ WARNING **Boiler Model, Altitude are critical settings.** Failure to set correctly could result in severe personal injury, death or substantial property damage.

Figure 17 Typical Application E — multiple boiler system — setup requirements (parameters not listed below can be left at factory default settings unless special needs indicate different settings).

SETUP FOR Figure 8, page 16 AS SHOWN (When DHW directly connected to Boiler 2, that boiler must have a 2-way motorized isolation valve.)

Boiler Wiring and Settings (See Figure 8, page 16 for items referenced)						
Boiler ID	TT input	Wired from:	Input Assignment	Aux Option	Output	Wired to: ***
1 Master	1	Zone 1 Tstat	Priority 2 - Network 1	N/A	1	Zone 1 Circ/Valve
	2	Zone 2 Tstat	Priority 2 - Network 1	N/A	2	Zone 2 Circ/Valve
	3	No Wire	Aux Pump/Output *	Any TT Input By It's Priority Settings	3	System Circ Relay (Item 6) *
2 Shadow	1	DHW Tstat	Priority 1 - Local 1	N/A	1	DHW Circ. (Item 37)
	2	Zone 3 Tstat	Priority 2 - Network 1	N/A	2	Zone 3 Circ/Valve
	3	No Wire	AuxPump / Output	Any Burner Demand	3	By-pass 2-way valve (Item 17B) **

* System circulator will not be used if system is circulator zoned. The Aux Pump/Output would not be required, for the system pump.
 ** The 120VAC output from boiler should be wired in such a way that when energized the valve should close. May require external relay by others.
 *** Outputs are 120VAC maximum 2.2 amps. Use relay for other voltages or higher amperages.

Priority Settings					
Priority #	Setting	Value	Priority #	Setting	Value
Priority 1 – Local 1 (Boiler 2 only)	System Type	DHW	Priority 2 – Network 1 (Boiler 1 only)	System Type	Select heating system type
	Run Blr Pump (Note 1)	NO		Run Blr Pump (Note 1)	YES
	Run Aux Output	NO		Run Aux Output	YES

Note 1 : BLR Pump dry contact used for 2-way motorized isolation valve.

SETUP IF DHW IS LOCATED IN SYSTEM AS A ZONE

Boiler Wiring and Control Settings (See Figure 8, page 16. for items referenced)						
Boiler ID	TT input	Wired from:	Input Assignment	Aux Option	Output	Wired to: ***
1 Master	1	Zone 1 Tstat	Priority 3 - Network 2	N/A	1	Zone 1 Circ/Valve
	2	Zone 2 Tstat	Priority 3 - Network 2	N/A	2	Zone 2 Circ/Valve
	3	No Wire	Aux Pump/Output *	Any TT Input By It's Priority Settings	3	System Circ (Item 6) *
2 Shadow	1	DHW Tstat	Priority 2 - Network 1	N/A	1	DHW Circ/Valve
	2	Zone 3 Tstat	Priority 3 - Network 2	N/A	2	Zone 3 Circ/Valve
	3	No Wire	AuxPump / Output	Any Burner Demand	3	By-pass 2-way valve (Item 17B) **

* System circulator will not be used if system is circulator zoned. The Aux Pump/Output would not be required, for the system pump.
 ** The 120VAC output from boiler should be wired in such a way that when energized the valve should close. May require external relay by others.
 *** Outputs are 120VAC maximum 2.2 amps. Use relay for other voltages or higher amperages.

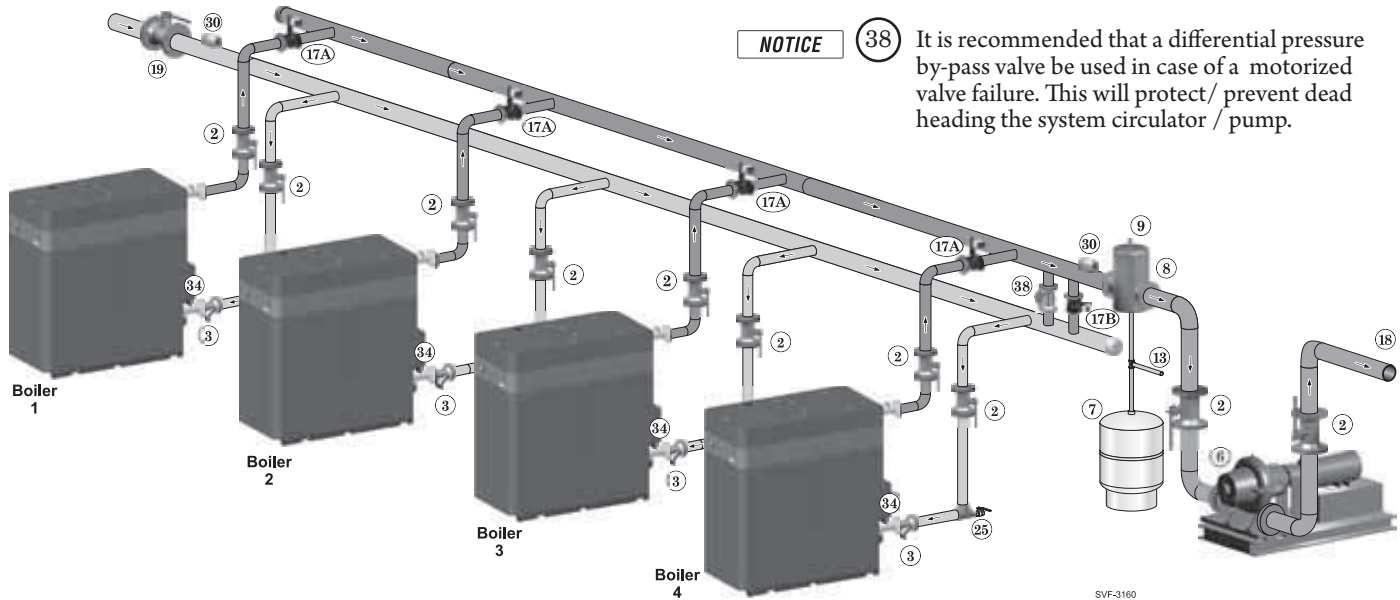
Priority Settings					
Priority #	Setting	Value	Priority #	Setting	Value
Priority 2 – Network 1	System Type	DHW	Priority 3 – Network 2	System Type	Select heating system type
	Run Blr Pump (Note 1)	YES		Run Blr Pump (Note 1)	YES
	Run Aux Output	YES		Run Aux Output	YES

Note 1 : BLR Pump dry contact used for 2-way motorized isolation valve.



Fast-Track Setup — Typical Application F

Figure 18 Typical Application F — Piping layout — typical piping for multiple SVF™ boilers, (4-boiler system) (adjust boiler connections as required for other boiler models).



NOTICE (38) It is recommended that a differential pressure by-pass valve be used in case of a motorized valve failure. This will protect/ prevent dead heading the system circulator / pump.

NOTICE (17A) It is recommended to use a 2-way motorized valve with an end switch to indicate when the valve is in the open position. This should be wired into the proof of closure circuit of the SVF boiler.

Suggested DHW boiler-side pipe sizing (for max 0.04 feet head loss per foot of total equivalent length, TEL)	Flow rate	Size	Flow rate	Size
	1 – 3.9 gpm	¾	24 – 45 gpm	2
	3.9 – 7.1 gpm	1	45 – 75 gpm	2½
	7.1 – 16 gpm	1¼	75 – 140 gpm	3
	16 – 24 gpm	1½	140 – 290 gpm	4

Legend — Figure 10

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> 2 Isolation valves. 3 Strainer (recommended on return line to each boiler). 6 System pump. 7 Expansion tank (diaphragm type shown). 8 System air eliminator. 9 System automatic air vent. 13 Cold water supply (requires items 10, 11 and 12 as shown in Figure 7, page 10). | <ul style="list-style-type: none"> 17A Boiler - 2 Way Motorized Isolation Valve (recommended). 17B By-Pass - 2 Way Motorized Isolation Valve Required if isolation valves are used on individual boilers, or a differential pressure by-pass valve if designed to do so. 18 System supply. 19 System return. 20 Boiler relief valve and discharge piping (not shown) — install per page 9 and all applicable codes. | <ul style="list-style-type: none"> 25 External drain/blowdown valve, when used, ¾" NPT or larger. 30 System supply and return immersion sensors, at least 6 pipe diameters (but no more than 3 feet) from first and last boiler connection tees. 34 Flow switch is recommended if flow could drop below the minimum flow specified in Figure 5, page 8. A 1" FNPT connection is located on the boiler return pipe. 38 Differential pressure by-pass valve. |
|--|--|--|



Fast-Track Setup — Typical Application F (cont.)

⚠WARNING **Boiler Model, Altitude are critical settings.** Failure to set correctly could result in severe personal injury, death or substantial property damage.

Figure 19 Typical Application F — multiple boiler system — setup requirements (parameters not listed below can be left at factory default settings unless special needs indicate different settings)

Boiler Wiring and Control Settings (See Figure 10, page 18 for items referenced)						
Boiler ID	TT input	Wired from:	Input Assignment	Aux Option	Output	Wired to: ***
1 Master	1	No Wire	Aux Pump/Output **	Any TT Input By It's Priority Settings	1	System Circ (Item 6) **
	2	Zone 1 Tstat	Priority 3 - Network 2	N/A	2	Zone 1 Circ/Valve
	3	Zone 2 Tstat	Priority 3 - Network 2	N/A	3	Zone 2 Circ/Valve
2 Shadow	1	Zone 3 Tstat	Priority 3 - Network 2	N/A	1	Zone 3 Circ/Valve
	2	Zone 4 Tstat	Priority 3 - Network 2	N/A	2	Zone 4 Circ/Valve
	3	Zone 5 Tstat	Priority 3 - Network 2	N/A	3	Zone 5 Circ/Valve
3 Shadow	1	Zone 6 Tstat	Priority 3 - Network 2	N/A	1	Zone 6 Circ/Valve
	2	Zone 7 Tstat	Priority 3 - Network 2	N/A	2	Zone 7 Circ/Valve
	3	No Wire	Aux Pump / Output	Any Burner Demand	3	By-pass 2-way valve (Item 17B) ****
4 Shadow	1	Zone 8 Tstat	Priority 3 - Network 2	N/A	1	Zone 8 Circ/Valve
	2	Zone 9 Tstat	Priority 3 - Network 2	N/A	2	Zone 9 Circ/Valve
	3	Zone 10 Tstat	Priority 3 - Network 2	N/A	3	Zone 10 Circ/Valve

** System circulator will not be used if system is circulator zoned. The Aux Pump/Output would not be required, for the system pump.
 *** Outputs are 120 VAC maximum 2.2 amps. Use relay for other voltages or higher amperages.
 **** The 120VAC output from boiler should be wired in such a way that when energized the valve should close. May require external relay by others.

Priority Settings					
Priority #	Setting	Value	Priority #	Setting	Value
Priority 3 – Network 2	System Type	Select heating system type	N/A	N/A	N/A
	Run Blr Pump (Note 1)	YES		N/A	N/A
	Run Aux Output	YES		N/A	N/A
	Min Blrs *	Select as needed for quick response		N/A	N/A

* Min Blrs setting is accessible in the Priority menus (see Figure 36, page 57). It is not included in the Wizard setup options.
 Note 1 : BLR Pump dry contact used for 2-way motorized isolation valve.



Additional heat demand

Additional heat demand

1. This settings acts as a contact to activate other boilers or heating sources, such as a different boiler or a furnace.
 - a. OFF – Function disabled.
 - b. 1st – The additional heat demand contact will be activated before the SVF™ boiler.
 - i. When the SVF™ boiler receives a call for heat, it immediately activates the “Additional Heat Demand contact”, terminals P16 #6 and #7. This contact is used to start the next heat source.
 - ii. If “0-10v Output” is being used, “Temp Dependent” must be set to YES. If the Priority configured for Additional Heat Demand is currently active 2 volts will be immediately sent from P16 #1 and #2 to the next heating source.
 - iii. After 1 minute, the 0-10v output will begin to modulate, based on the system temperature. When the Response Time is reached, the SVF™ boiler begins its startup sequence and continues to heat until the demand is satisfied.
 - c. 2nd – The additional heat demand contact will be activated after the SVF™ boiler.
 - i. When the SVF™ boiler receives a call for heat, it begins its startup sequence and also starts the Response Time.
 - ii. After the Response Time expires, the Additional Heat Demand contact is closed and the 0-10v Output (if used, w/Temp Dependent set to YES) sends 2 volts from P16 #1 and #2 to the next heating source.
 - iii. The 0-10v Output will modulate based on the requested SVF™ boiler modulation rate. If a boiler lockout occurs, the 0-10v Output will continue to modulate based on this requested rate.
 - d. ODT - A user defined ODT SETPOINT is used as a switching point to operate Additional Heat Demand (AHD) as 1st or 2nd as defined by the user setting ACTIVATE CONTACT BELOW SETPOINT.
 - i. If ACTIVATE CONTACT BELOW SETPOINT is set to 1st, additional heat demand functionality will operate as AHD 1st below the ODT SETPOINT temperature and operate as AHD 2nd above the ODT SETPOINT temperature.
 - ii. If ACTIVATE CONTACT BELOW SETPOINT is set to 2nd the functionality would be reversed.
 - iii. If the ODT sensor fails; default AHD to activate based on the user setting for ACTIVATE CONTACT BELOW SETPOINT.
2. Temperature Dependent
 - a. When System Temperature Dependent is set to YES, the SVF™ boiler must have system supply and return sensors connected and the target modulation sensor will be set to the supply sensor.
 - b. If system supply and return sensors are not connected, the System Temperature Dependent cannot be selected.
 - c. With this option selected to YES, the boiler and additional heat demand/0-10v output will modulate based on the

system temperature. If the system temperature becomes higher than setpoint temperature + system off differential, the boiler and additional heat demand/0-10v output will turn off. The boiler and Additional Heat Demand will become active again when the system temperature becomes lower than setpoint temperature – System on Differential.

3. 0-10v Output – The boiler will output a voltage signal equivalent to the modulation rate of the SVF™.
 - a. Max/Min Rate Volts
 - i. The MAX RATE VOLTS and MIN RATE VOLTS are used to scale the analog output such that the 20% minimum modulation rate will output MIN RATE VOLTS and the 100% modulation rate will output MAX RATE VOLTS.

Field wiring

See wiring diagrams, Figure 21, page 30 & Figure 28, page 37

⚠ WARNING **ELECTRICAL SHOCK HAZARD**
— For your safety, turn off electrical power supply at service entrance panel before making any electrical connections to avoid possible electric shock hazard. Failure to do so can cause severe personal injury or death.

NOTICE The installation must comply with: National Electrical Code and any other national, state, provincial or local codes or regulations. In Canada, CSA C22.1 Canadian Electrical Code Part 1, and any local codes.

NOTICE Wiring must be N.E.C. Class 1. If original wiring as supplied with boiler must be replaced, use only type 105 °C wire or equivalent. Boiler must be electrically grounded as required by National Electrical Code ANSI/NFPA 70 – latest edition, and/or the Canadian Electrical Code Part I, CSA C22.1, Electrical Code.

NOTICE The boiler when installed, must be electrically bonded to ground in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements, with the National Electrical Code, ANSI/NFPA 70 – latest edition, and/or the Canadian Electrical Code Part I, CSA C22.1, Electrical Code.

NOTICE Do not use 24V from transformer to power any external devices that are not listed in this manual.

Wire entrances

Twelve (12) knockouts are provided in the rear of terminal box for line and low voltage wiring. See Figure 20 for locations.

⚠ WARNING

Installer MUST use a strain relief through jacket knockouts. Failure to do so can cause severe personal injury, death or substantial property damage.

Wiring overview

See details on the following pages for the wiring connections outlined below:

Required wiring connections:

SVF 1500/2000 Single phase

- 120VAC power to boiler; 120VAC power out to boiler circulator; system supply and return temperature sensors.
- Boiler load: **SVF 1500/2000** — 23.17 Amps

SVF 2500/3000 Three phase

- 208VAC -3 phase Wye - transformer with neutral and ground for power to blower; 120VAC power out to boiler circulator; system supply and return temperature sensors.
- Boiler load: **SVF 2500/3000** — 16.22 Amps on L1;
6.90 Amps on L2;
6.90 Amps on L3.

Connections as needed by systems

- Thermostat, end switch or other inputs for call for heat.
- System zone circulators, valves, relays, etc.
- System circulator, when required.
- Outdoor temperature sensor.

Optional wiring connections

- External limits; Closure switch interlocks (combustion air damper, flow switch, etc.); 0–10VDC for target or

Figure 20 Wiring entrances in terminal box rear of boiler



modulation control; remote alarm; additional heat demand contact; and communication cables for boiler networking and/or building management system interface (MODBUS).

Line voltage power input

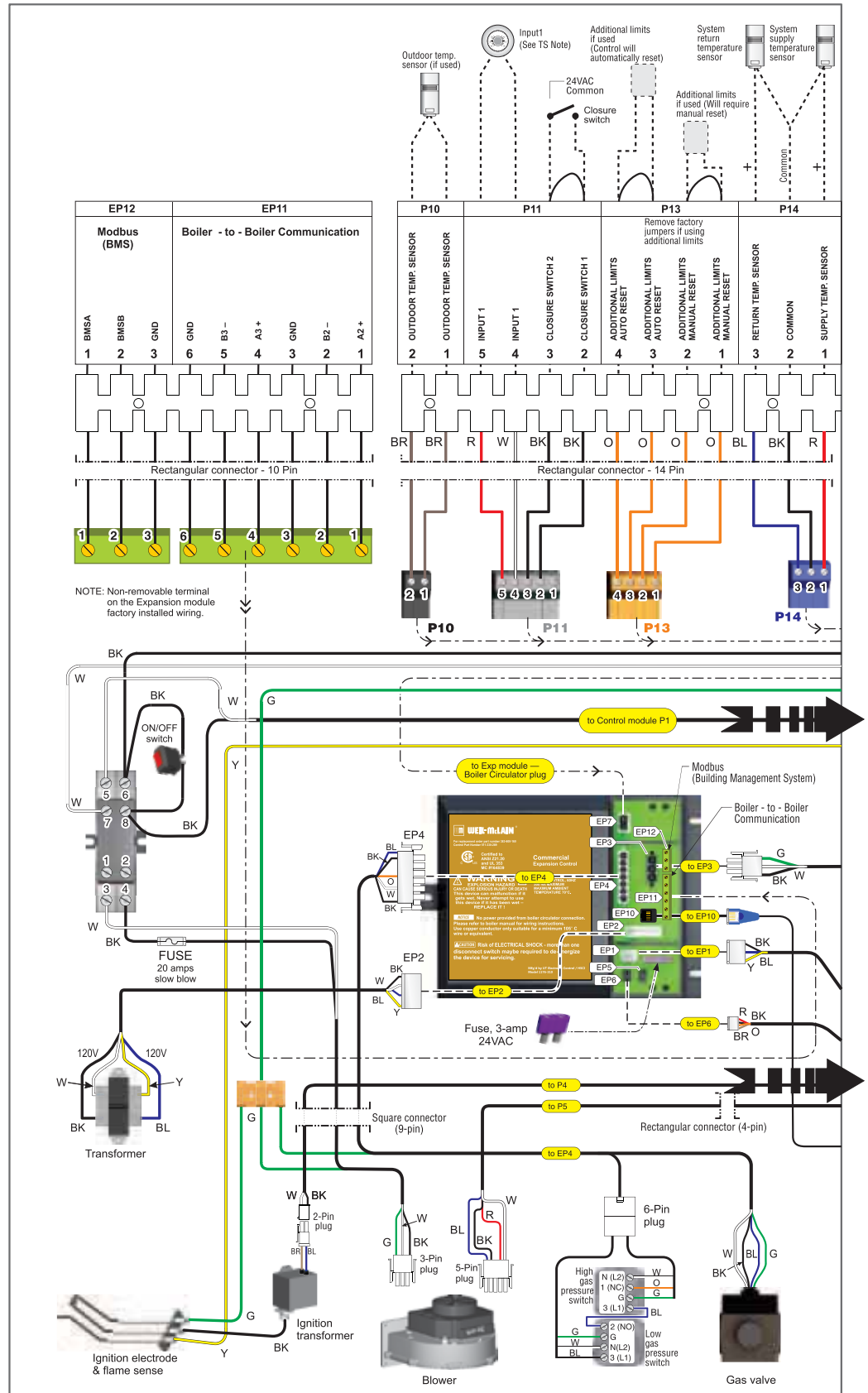
1. Boiler line voltage power — Provide and install a fused disconnect or service switch as required by applicable codes. Fuse or breaker rating must be sized accordingly.
2. Boiler Circ activation circuit — Provide external power for pump's, 120VAC/single-phase, size as required for the pump load. Interrupt pump's hot line or enable circuit with the connections on EP7 screw rear terminal block. Maximum current rating of relay is 10 Amps.

Continued after page 38



Field wiring Single Phase Schematic Diagram

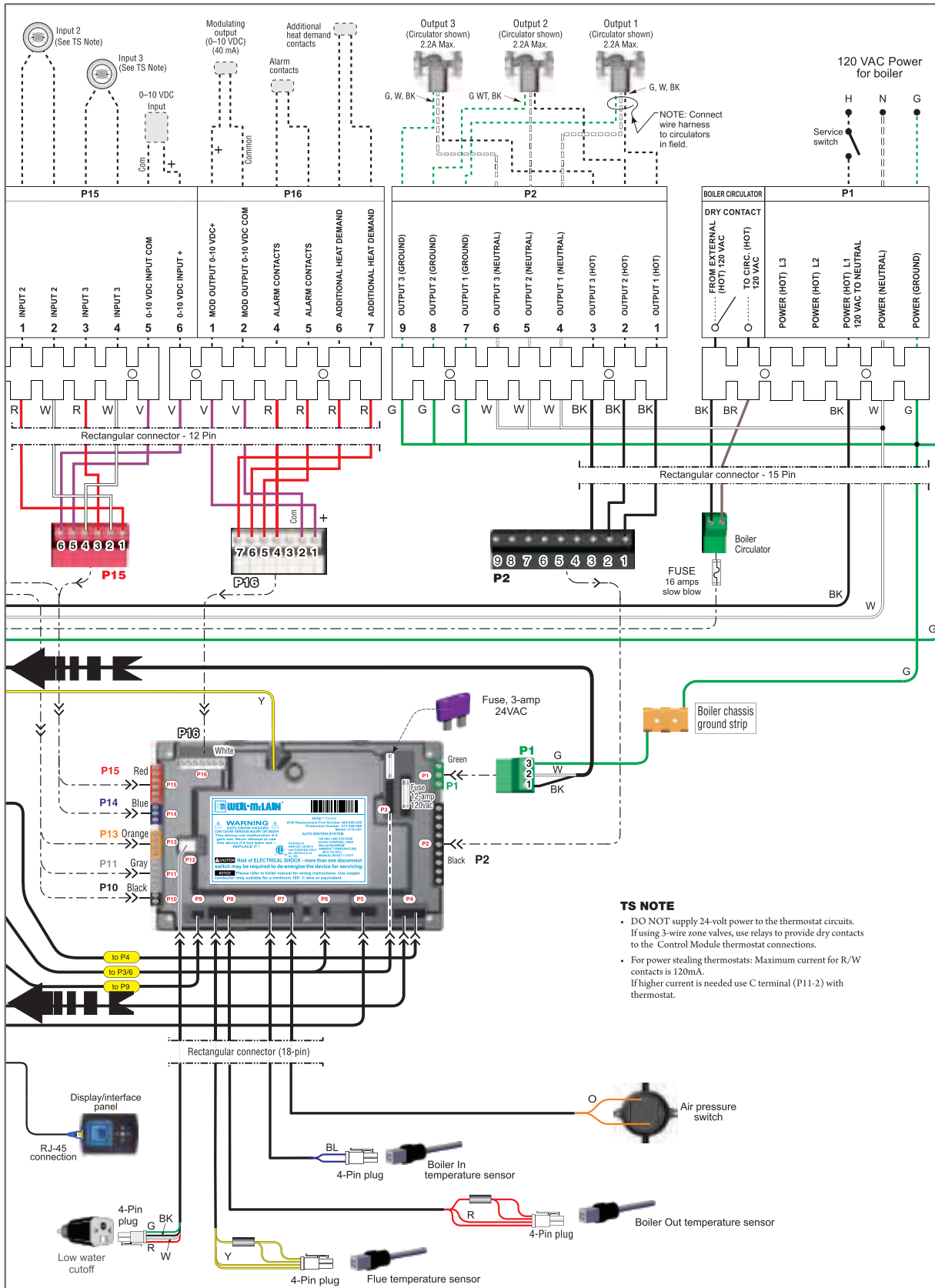
Figure 21 Single Phase Schematic wiring diagram — SVF™ boilers (continued on next page)





Field wiring Single Phase Schematic Diagram (continued)

Figure 22 (continued from previous page) Single Phase Schematic wiring diagram — SVF™ boilers



WEIL-McLAIN
Weil-McLain • 500 Blaine St. • Michigan City, IN 46360-2388
Part Number 550-201-481/0519

Schematic Wiring Diagram

Factory wiring

Field wiring

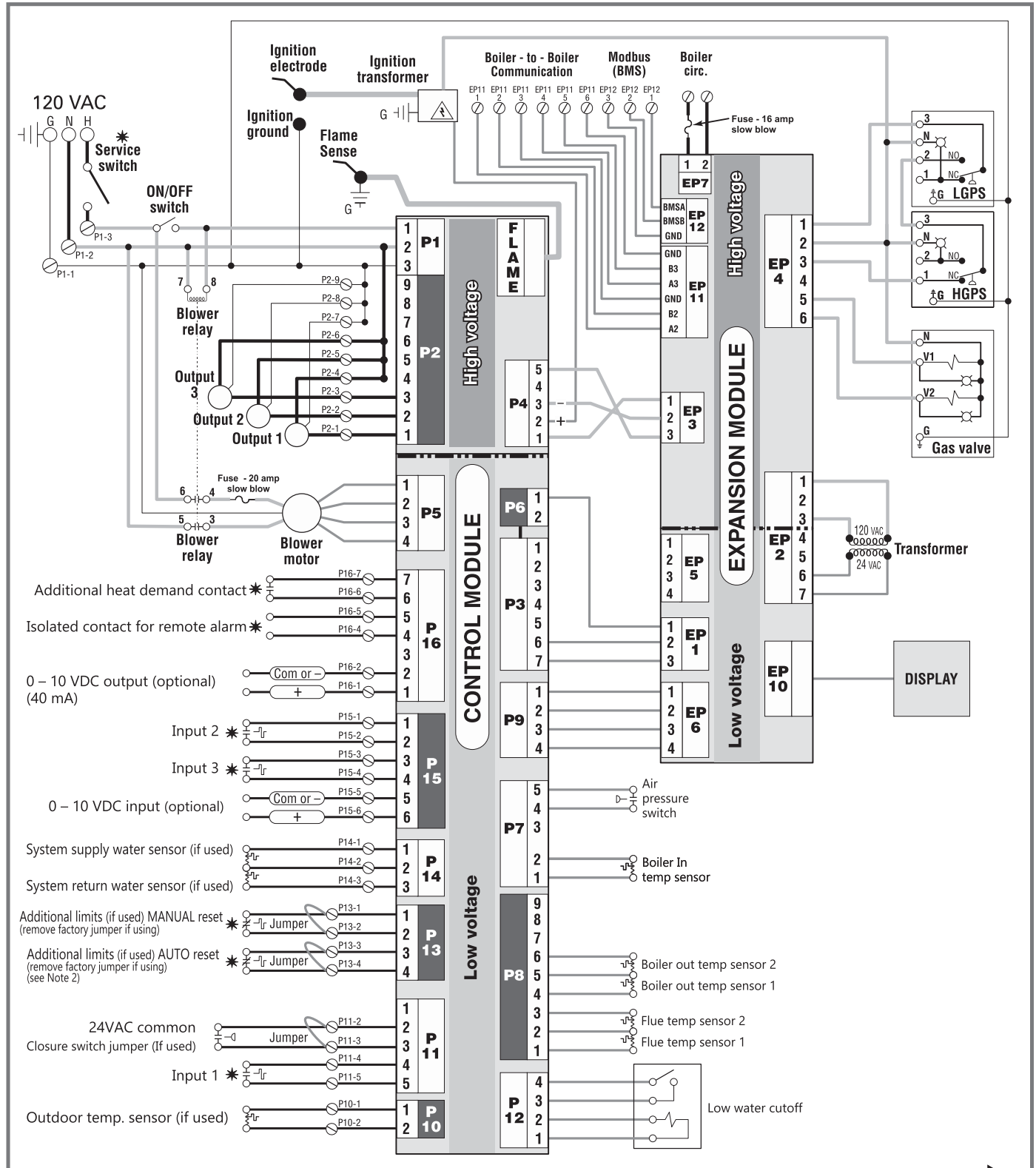
See ladder wiring diagram for notes

SVF™ Commercial Boiler
Single Phase Series 1



Field wiring Single Phase Ladder Diagram

Figure 23 Single Phase Ladder wiring diagram — SVF™ boilers (continued on next page)





Field wiring Single Phase Ladder Diagram (continued)

Figure 24 (continued from previous page) Single Phase Ladder wiring diagram — SVF™ boilers

SVF™ Commercial Boiler Single Phase Series 1 Ladder Wiring Diagram

⚠ WARNING

Electrical shock hazard — can cause severe injury or death. Disconnect power before installing or servicing.

NOTICE

All contacts shown without power applied.
 ✱ Indicates items not provided

Legend for ladder wiring diagram only

	120 vac field wiring
	Low voltage field wiring
	120 vac factory wiring
	Low voltage factory wiring
	High voltage spark ignition wiring
	Ground connectors

Notes for Schematic and Ladder Diagrams

1. All wiring must be installed in accordance with:
 U.S.A. — N.E.C. And any other national, state, or local code requirements.
 Canada — C.S.A. C22.1 C.E.C. Part 1 and any other national, provincial, or local code requirements.
2. Connect additional limits (if used) between terminals P13-1 and P13-2 if the boiler control module is to manual reset on limit action. Connect between terminals P13-3 and P13-4 for automatic reset. Remove jumper across terminals used.
3. If any of the original wire as supplied with the appliance must be replaced, use minimum 105 °C wire or equivalent. Exceptions: Ignition lead wire must be obtained from Weil-McLain only.
4. Thermostat anticipator setting (single zone) — set anticipator for 0.1 amps.
5. For multiple zoning, use either zone valves or circulators. Refer to the component manufacturer's instructions and this manual for application and wiring suggestions. Boiler circulator must remain with boiler, and cannot be used for system circulation in any way.
6. Refer to control component instructions packed with the boiler for application information.
7. Provide power source to boiler that is protected by a surge protector. Amperage requirements for boilers are:
 - SVF 1500 — 23.17 amps
 - SVF 2000 — 23.17 amps

Fuse or breaker rating must be sized accordingly.

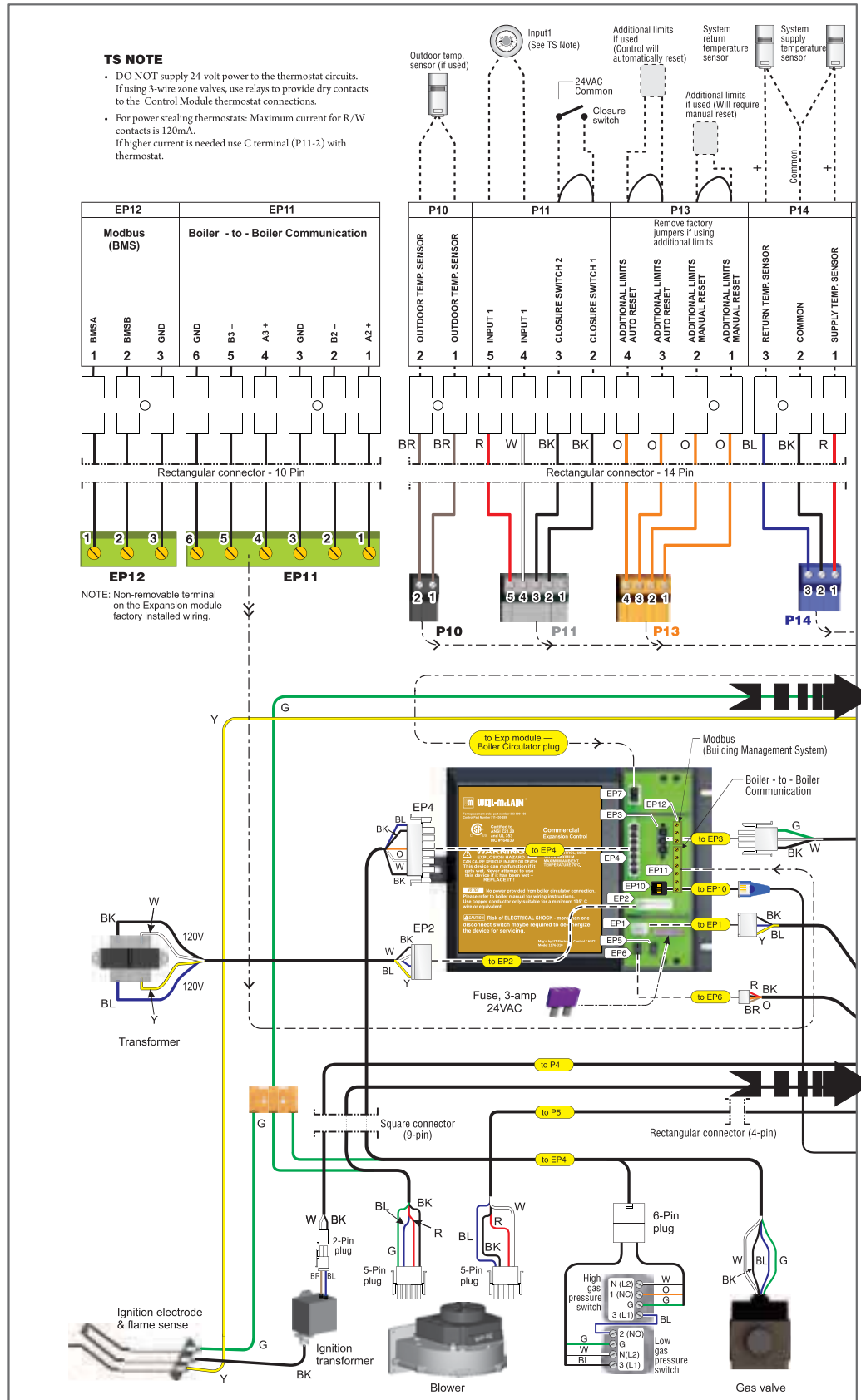
WEIL-McLAIN
Weil-McLain • 500 Blaine St. • Michigan City, IN 46360-2388

Part Number **550-201-482/0519**



Field wiring Three Phase Schematic Diagram

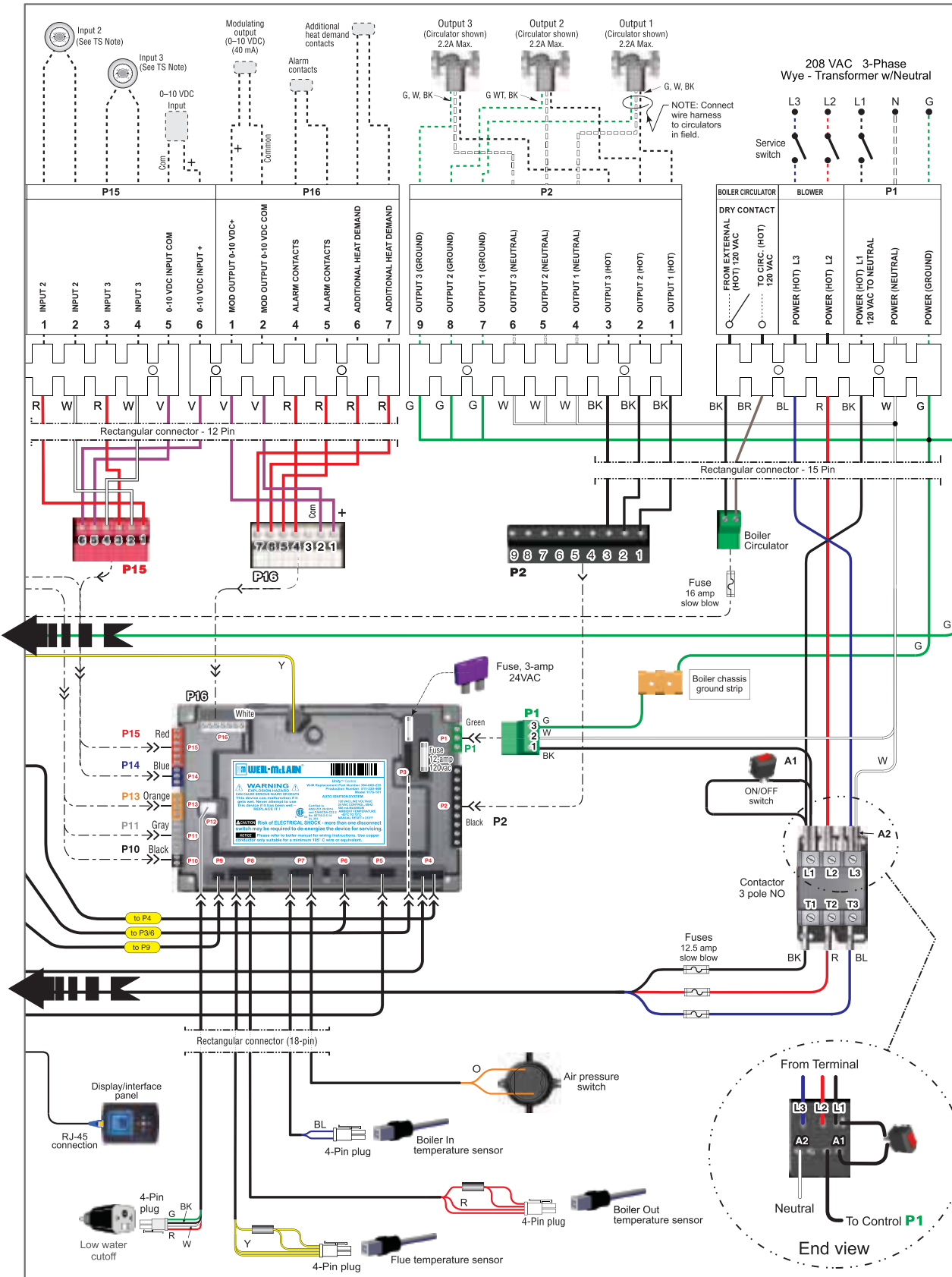
Figure 25 Three Phase Schematic wiring diagram — SVF™ boilers (continued on next page)





Field wiring Three Phase Schematic Diagram (continued)

Figure 26 (continued from previous page) Three Phase Schematic wiring diagram — SVF™ boilers



WEIL-McLAIN
Weil-McLain • 500 Blaine St. • Michigan City, IN 46360-2388
Part Number 550-201-486/0519

Schematic Wiring Diagram

See ladder wiring diagram for notes

Factory wiring

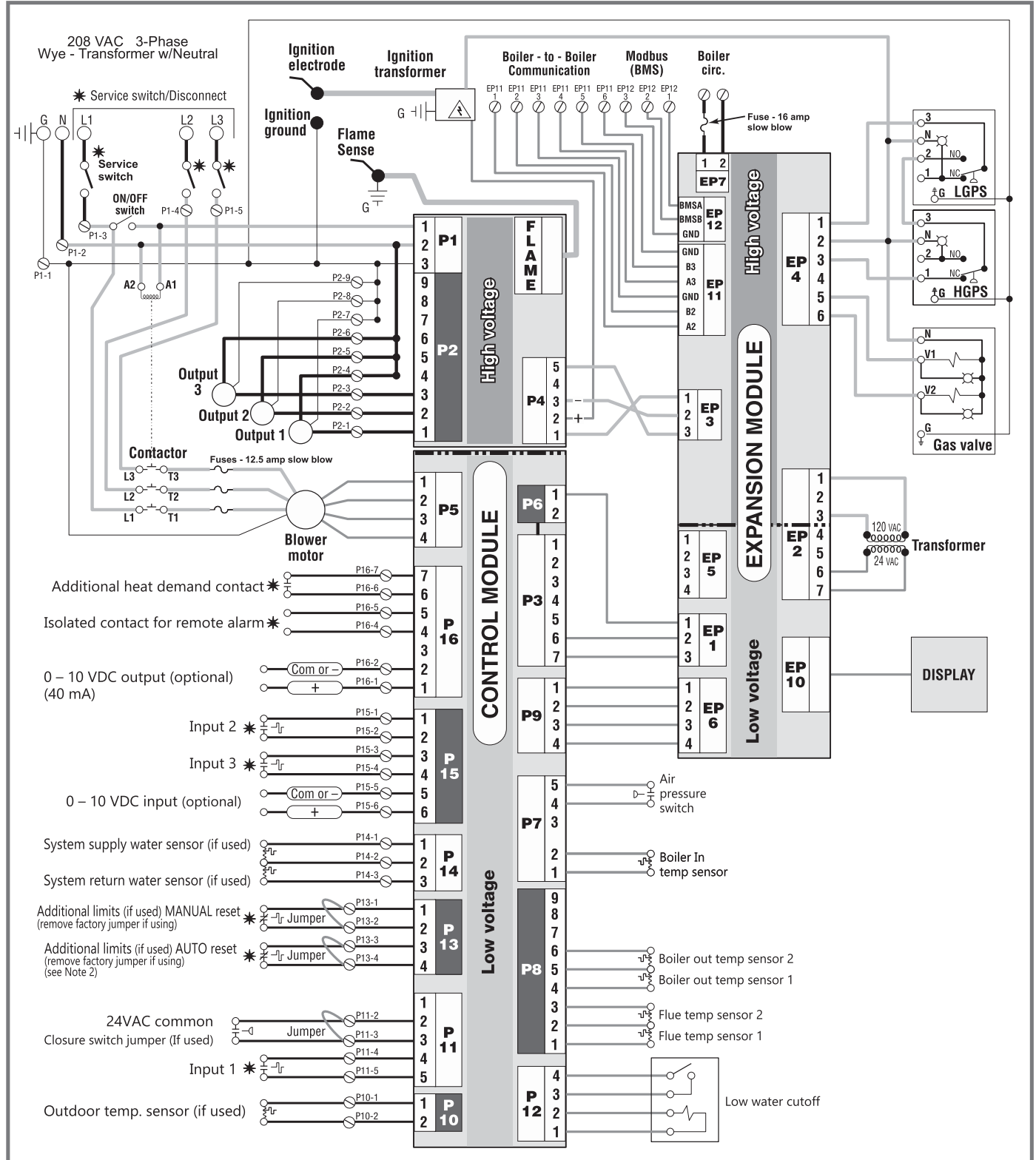
Field wiring

SVF™ Commercial Boiler
Three Phase Series 1



Field wiring Three Phase Ladder Diagram

Figure 27 Three Phase Ladder wiring diagram — SVF™ boilers (continued on next page)





Field wiring Three Phase Ladder Diagram (continued)

Figure 28 (continued from previous page) Three Phase Ladder wiring diagram — SVF™ boilers

SVF™ Commercial Boiler Three Phase Series 1 Ladder Wiring Diagram

⚠ WARNING

Electrical shock hazard — can cause severe injury or death. Disconnect power before installing or servicing.

NOTICE

All contacts shown without power applied.
 ✱ Indicates items not provided

Legend for ladder wiring diagram only

	120 vac field wiring
	Low voltage field wiring
	120 vac factory wiring
	Low voltage factory wiring
	High voltage spark ignition wiring
	Ground connectors

Notes for Schematic and Ladder Diagrams

1. All wiring must be installed in accordance with:
 - U.S.A. — N.E.C. And any other national, state, or local code requirements.
 - Canada — C.S.A. C22.1 C.E.C. Part 1 and any other national, provincial, or local code requirements.
2. Connect additional limits (if used) between terminals P13-1 and P13-2 if the boiler control module is to manual reset on limit action. Connect between terminals P13-3 and P13-4 for automatic reset. Remove jumper across terminals used.
3. If any of the original wire as supplied with the appliance must be replaced, use minimum 105 °C wire or equivalent. Exceptions: Ignition lead wire must be obtained from Weil-McLain only.
4. Thermostat anticipator setting (single zone) — set anticipator for 0.1 amps.
5. For multiple zoning, use either zone valves or circulators. Refer to the component manufacturer's instructions and this manual for application and wiring suggestions. Boiler circulator must remain with boiler, and cannot be used for system circulation in any way.
6. Refer to control component instructions packed with the boiler for application information.
7. Provide power source to boiler that is protected by a surge protector. Amperage requirements for boilers are:
 - SVF 2500/3000 — 16.22 amps on L1;
 - 6.90 amps on L2;
 - 6.90 amps on L3;

Fuse or breaker rating must be sized accordingly.

WEIL-McLAIN
Weil-McLain • 500 Blaine St. • Michigan City, IN 46360-2388

Part Number **550-201-487/0519**



Field wiring

See wiring diagrams, Figure 21, page 30 & Figure 23, page 32 (continued)

A. Power Supply – REQUIRED

Terminal Block P1

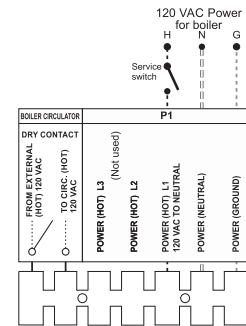
- Boiler line voltage power — Boiler loads are listed below. Provide and install a fused disconnect or service switch as required by applicable codes.
- Connect properly sized **120VAC** power wiring to **SVF™** boiler line voltage terminal strip as shown at right.
- If possible, provide a surge suppressor in the supply power line. This will reduce the possibilities of control damage due to line surges.
- Must wire ground to this terminal to provide boiler grounding.

SVF 1500/2000 — 23.17 amps; Single Phase
120VAC

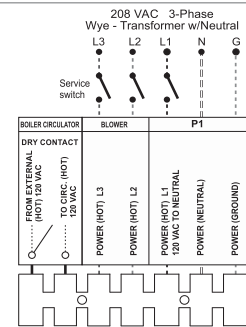
SVF 2500/3000 — 16.22 amps on L1; Three Phase
6.90 amps on L2; 208VAC 3-Phase
6.90 amps on L3; Wye- Transformer w/Neutral

NOTICE When all three (3) circulators outputs are used at 2.2 amps each.

Single Phase



Three Phase

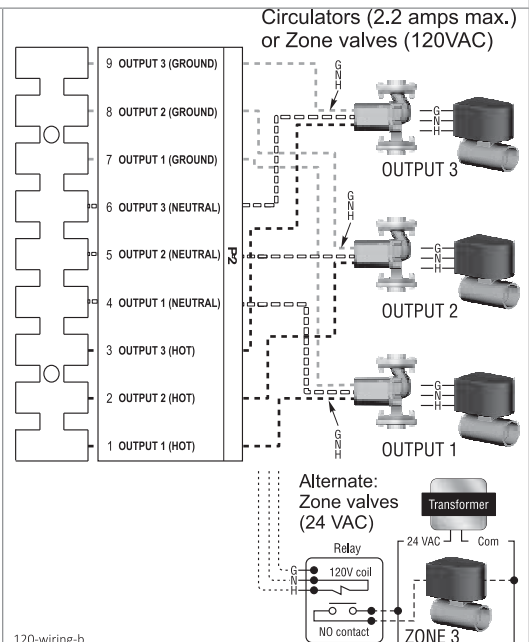


B. 120 VAC Outputs 1, 2 & 3 – On each boiler – As needed for systems

Terminal Strip P2

- Output 1: P2 Terminals 1 (H), 4 (N), 7 (G).
- Output 2: P2 Terminals 2 (H), 5 (N), 8 (G).
- Output 3: P2 Terminals 3 (H), 6 (N), 9 (G).
- Maximum load: 2.2 amps (use relay if circulator load is higher). See WARNING below.
- Each boiler has three outputs (Output 1, Output 2, and Output 3) that provide 120VAC to the following listed below.
 - A zone circulator.
 - A system circulator.
 - A DHW circulator (used to circulate through an indirect tank).
 - An auxiliary item that must be energized during an input call, such as an air damper.
- When using inputs/outputs for heat/DHW demands, each input (Input 1, Input 2, and Input 3) controls its respective 120VAC output (Output 1, Output 2, and Output 3). Outputs are energized only when BOTH conditions below are met:
 - The corresponding input indicates a call for heat/DHW (i.e., contact closure).
 - The PRIORITY assigned to the Input/Output pair is ACTIVE (i.e., the zone may be calling but the pump won't activate unless the boiler is currently running on that system/priority).
- When using the inputs/outputs for the AUX PUMP/OUTPUT function, the output is controlled by selectable conditions set up in the control.
 - Use the AUX PUMP/OUTPUT function for devices such as system pumps, combustion air dampers, and other auxiliary equipment to activate when the boiler is on/running.
 - See page 65 and page 66 for more information on the setup and selection of operating conditions.

NOTICE **For Priority DHW Application:**
The DHW aquastat can be connected to any one of the three input/output pairs. The selected input should be assigned to PRIORITY 1 during the WIZARD setup or manually in the ASSIGN INPUTS menu.



See Figure 21, page 30 for details.

WARNING Output circuits are 120VAC. If an output is to operate a low voltage circuit or must be an isolated contact, use an isolation relay. See example above for 24VAC zone valves.

WARNING **CIRCULATOR POWER** — The maximum allowable current for each powered circulator output is 2.2 amps at 120VAC.

For circulators with higher amp ratings, install a circulator relay or starter. Connect only the 120VAC coil to the **SVF™** circulator terminals.



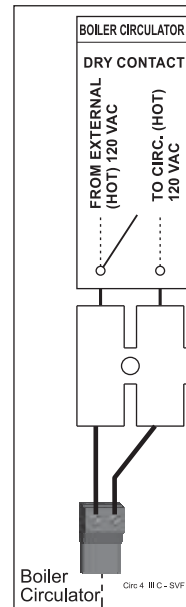
Field wiring See wiring diagrams, Figure 21, page 30 & Figure 23, page 32 (continued)

C. 120 VAC to Boiler Circulator – REQUIRED

Terminal Strip EP7 (BOILER CIRC) (Expansion module, top right)

1. Provides 120VAC Dry Contact for boiler circulator.
2. Terminals are: 1 (H), 2 (H).
3. Maximum load: 10 amps (use relay if circulator load is higher).
4. Provide and install a fused disconnect or service switch (15-ampere rated recommended) as required by applicable codes for circulator with maximum load of 10 amps.
5. The boiler circulator is used in the boiler loop of the primary / secondary piping. Primary / secondary piping is recommended to be used with the SVF™ boiler to ensure proper flow through the heat exchanger.

NOTICE Other designed piping arrangements will work as long as water flow requirements are met from pages 8 and page 9, contact your local Weil-McLain commercial representative for assistance.



See Figure 21, page 30 for details.

D. 24 VAC Inputs 1, 2 and 3 (tstats, end switches, etc.) – As needed for systems

Terminal Strip P11 (input 1) & Terminal Strip P15 (inputs 2 & 3)

1. Input 1 – Terminal Strip P11 – 4 & 5 (SVF™ terminal bus).
2. Input 2 – Terminal Strip P15 – 1 & 2 (SVF™ terminal bus).
3. Input 3 – Terminal Strip P15 – 3 & 4 (SVF™ terminal bus).
4. These three inputs on each boiler can indicate a call for heat to the control by means of a dry contact closure (thermostat, aquastat, or switch). (See right and Figure 21, page 30).
5. The control provides inputs for up to three zones or three systems (priorities).

NOTICE The control default setting is for three space heating zones tied to PRIORITY 2, which is defaulted to FINNED TUBE BASEBOARD system type.

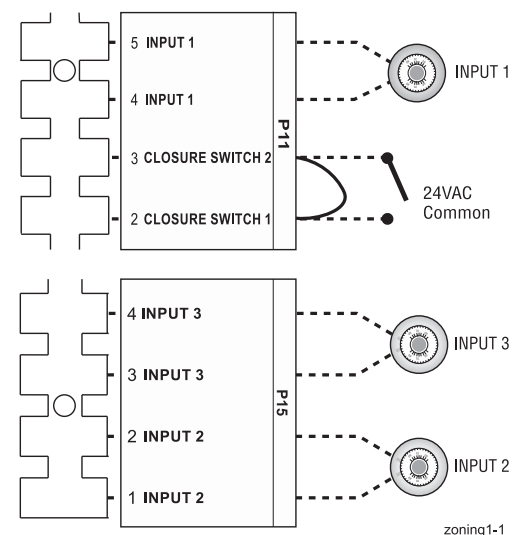
6. For DHW applications, the aquastat can be connected to one of the three input/output pairs. Take advantage of factory default settings by using PRIORITY 1 for the DHW system. The default control setting for PRIORITY 1 is a direct-piped DHW system type.

7. The default control setting uses each input (INPUT 1, INPUT 2, and INPUT 3) to control its respective 120VAC output (OUTPUT 1, OUTPUT 2, and OUTPUT 3).

NOTICE Use of 0–10VDC input for modulation disables Input 1 from creating calls for heat. See page 44 for instructions.

An input can be assigned to an AUX PUMP/OUTPUT function to operate a system pump or interlock with a combustion air damper. Inputs assigned for this function cannot be used for heat demand operation. See page 65 and page 66 for more information on the setup and selection of operating conditions.

TT or end switch inputs



See Figure 21, page 30 for details.

WARNING **Thermostats** — DO NOT supply 24-volt power to the thermostat circuits (Input1, Input2 and Input3 in Figure 21, page 30) or attempt to supply 24 volts for any other application. For thermostats that require a continuous 24-volt power source, connect the common wire (“C”) to P11 Pin 2 (see Figure 21, page 30). Do NOT exceed 160mA draw per thermostat.

Zone valves — If using 3-wire zone valves, use relays to provide dry contacts to the Control thermostat connections. The zone valve end switches of 3-wire valves carry 24VAC from the valve.

Thermostat anticipator setting — 0.1 amps.



Field wiring (See wiring diagrams, Figure 21, page 30 & Figure 23, page 32 (continued))

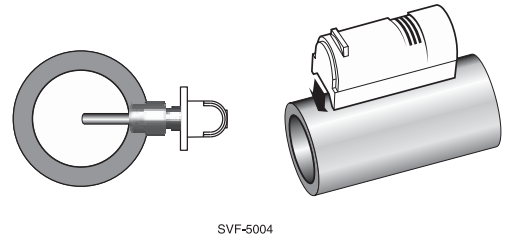
E. System supply and return temperature sensors – REQUIRED

Terminal Block P14 #1 & #2

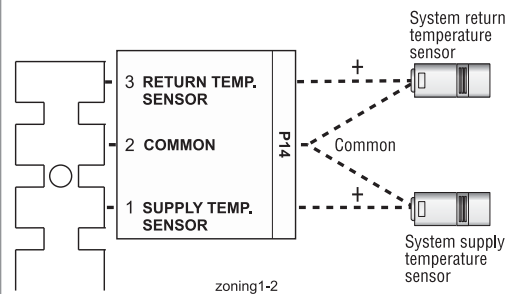
- Two (2) immersion temperature sensors are shipped with each boiler. Install one to the system supply piping and the other to the system return piping. See SVF™ boiler manual replacement parts section for available replacement immersion sensors or strap on sensors.
- Locate the supply sensor at least six pipe diameters, but no further than 3 feet, downstream from the boiler connection to the main to ensure adequate mixing.
- Supply sensor – wire between P14 #1 and #2 (common).
- Return sensor – wire between P14 #3 and #2 (common).
- Thermostat wire can be used to connect these sensors.
- The Control compares the system return temperature with the system supply temperature. Should the return temperature ever exceed the supply temperature, the Control knows there is likely a sensor failure and will report this problem on the display.

NOTICE

All heating systems shown in this manual require the System Supply and Return sensors to be installed for proper control function. System will not properly provide heat if sensors are not installed according to these instructions.



1/2" NPT -4" long Immersion sensors standard. Optional strap on sensors available in Replacement Part section.

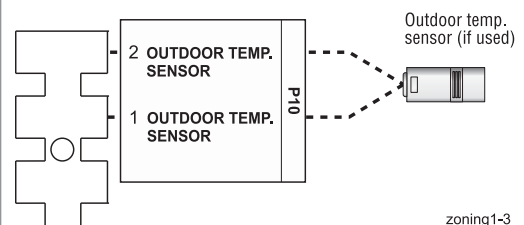


See Figure 21, page 30 for details.

F. Outdoor temperature sensor – OPTIONAL

Terminal Block P10 #1 & #2

- The control provides programmable options if using an outdoor temperature sensor. This sensor is supplied with the boiler.
- Mount the outdoor sensor on an exterior wall, shielded from direct sunlight or flow of heat or cooling from other sources.
- The wire outlet on the sensor must be oriented DOWN to prevent water entry.
- Connect the sensor leads to the terminal shown at right and in the wiring diagrams (see Figure 21, page 30). Thermostat wire can be used to connect the sensor.



See Figure 21, page 30 for details.



Field wiring See wiring diagrams, Figure 21, page 30 & Figure 23, page 32 (continued)

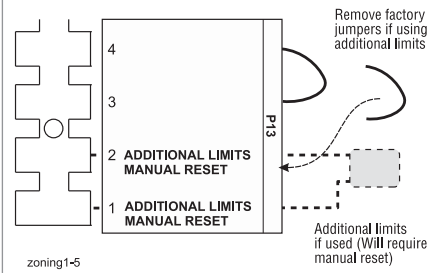
G. External limits – OPTIONAL

To cause **MANUAL** reset: Terminal Block P13 #1 & #2

Unity™ control will require manual reset after circuit is interrupted

1. Remove factory-installed jumper and connect isolated contacts of external limits across P13 pins 1 and 2 to cause the control to enter manual reset lock-out if the limit circuit opens. The limit must close and the control must be manually reset using the procedure given in this manual. See drawing at right and wiring diagram (Figure 21, page 30).

NOTICE The control will lockout when a limit in its manual reset circuit opens (P13 pins 1 & 2). The control activates its alarm terminals and shuts the boiler off. An operator (user or technician) must manually reset the control to resume heating. Cycling power on and off will NOT reset the control.

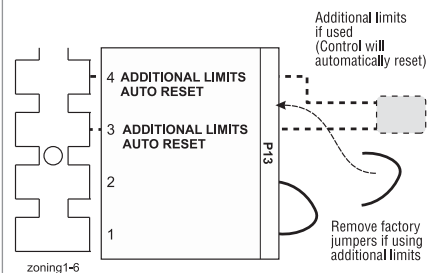


See Figure 21, page 30 for details.

To cause **AUTOMATIC** reset: Terminal Block P13 #3 & #4

Unity™ control will reset automatically after circuit is interrupted

1. Remove factory-installed jumper and connect isolated contacts of external limits across P13 pins 3 and 4 to cause the control to shut down the burner on limit opening, then automatically restart 150 seconds after the limit closes.
2. See drawing at right and wiring diagram (Figure 21, page 30).

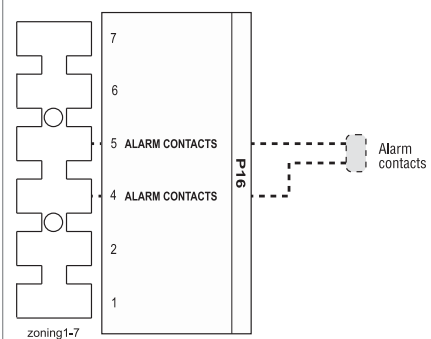


See Figure 21, page 30 for details.

H. Alarm contacts – OPTIONAL

Terminal Block P16 #4 & #5

1. The control's alarm dry contact (P16, terminals 4 and 5) closes when the boiler enters manual lockout only.
2. Connect these terminals for remote alarm notification.
3. Contact electrical ratings: 24VAC or less; 0.5 amp or less.



See Figure 21, page 30 for details.



Field wiring See wiring diagrams, Figure 21, page 30 & Figure 23, page 32 (continued)

I. Closure switch (flow switch and/or CAD) – OPTIONAL

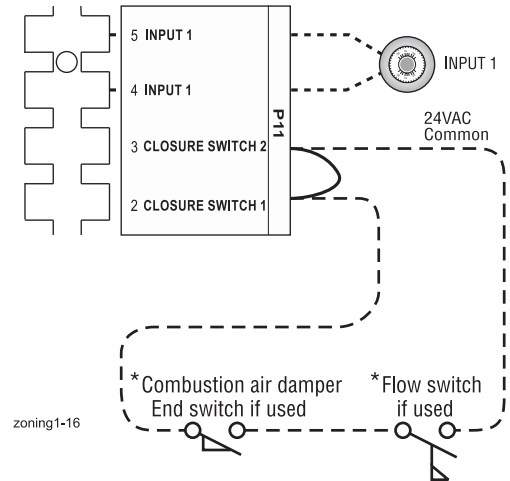
Jumper on Terminal Strip P11

1. A flow switch or combustion air damper (CAD) interlock can be configured by removing jumper.
2. No control settings are required when using a flow switch.
3. Recommended configuration of the **Unity™** control for a CAD interlock:
 - a. Assign **INPUT 3** as a **AUX PUMP/ OUTPUT** function.
 - b. For the **AUX PUMP/OUTPUT** operating mode, select **Damper Control**. This ensures the damper will be activated any time the boiler is called on to fire.
 - c. **OUTPUT 3** will provide 120VAC to the damper motor. Use an isolation relay if damper motor requires another voltage or more than 2.2 amp if using 120VAC.

NOTICE * The devices used must provide electrically isolated contacts, because the P11 jumper circuit carries 24VAC.

4. When a call for heat occurs, the corresponding output(s) energize, and the blower does not activate until the closure switch is made. The boiler is given four (4) minutes to make the closure switch. If the switch opens prior to ignition, the timer continues with the blower remaining active. After four (4) minutes, if the closure switch is not made, or if the closure switch opens during burner firing, the control locks out. The fault will clear when the closure switch makes. The corresponding output(s) will remain energized in an attempt to close the switch.

Flow switch and/or combustion air damper



See Figure 21, page 30 for details.

J. Closure switch (flow switch and/or CAD) – with shared end switch – OPTIONAL

1. A flow switch or combustion air damper (CAD) interlock can be configured by removing jumper.
2. No control settings are required when using a flow switch.
3. Recommended configuration of the **Unity™** control for a CAD interlock installed on individual boiler.
 - a. Assign **INPUT 3** as a **AUX PUMP/ OUTPUT** function.
 - b. For the **AUX PUMP/OUTPUT** operating mode, select **Damper Control**. This ensures the damper will be activated any time the boiler is called on to fire.
 - c. **OUTPUT 3** will provide 120VAC to the damper motor. Use an isolation relay if damper motor requires another voltage or more than 2.2 amp if using 120VAC.

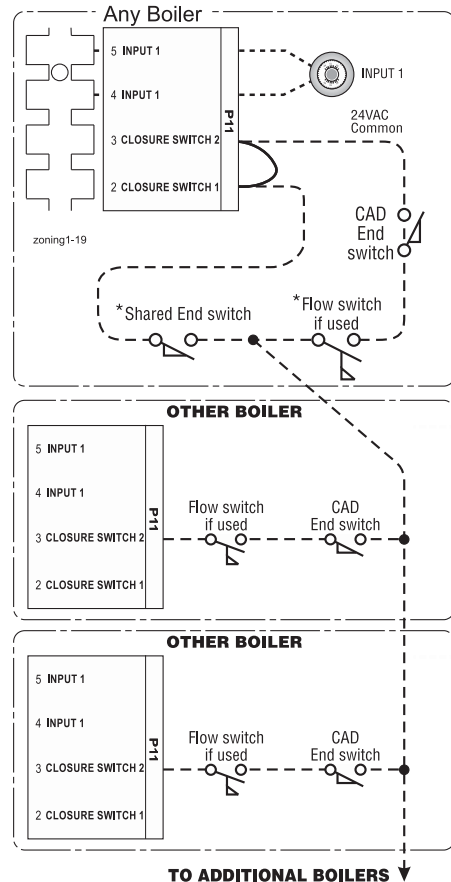
NOTICE * The devices used must provide electrically isolated contacts, because the P11 jumper circuit carries 24VAC.

4. Recommended configuration of the **Unity™** control for a shared end switch device:
 - a. Assign **INPUT 2** as a **AUX PUMP/ OUTPUT** function on the boiler with the end switch.
 - b. For the **AUX PUMP/OUTPUT** operating mode, select **ANY Burner Demand**. This ensures the end switch will be activated any time any burner is called on to fire. See other **AUX PUMP/ OUTPUT** options in Figure 45, page 66.
 - c. **OUTPUT 2** will provide 120VAC to the shared device. Use an isolation relay if shared device requires another voltage or more than 2.2 amp if using 120VAC.
5. When a call for heat occurs, the corresponding output(s) energize, and the blower does not activate until the closure switch is made. The boiler is given four (4) minutes to make the closure switch. If the switch opens prior to ignition, the timer continues with the blower remaining active. After four (4) minutes, if the closure switch is not made, or if the closure switch opens during burner firing, the control locks out. The fault will clear when the closure switch makes. The corresponding output(s) will remain energized in an attempt to close the switch.

NOTICE * The devices used must provide electrically isolated contacts, because the P11 jumper circuit carries 24VAC.

- Shared devices could be a louvered wall or other shared device that end switch verification is required.

Shared End Switch





Field wiring See wiring diagrams, Figure 21, page 30 & Figure 23, page 32 (continued)

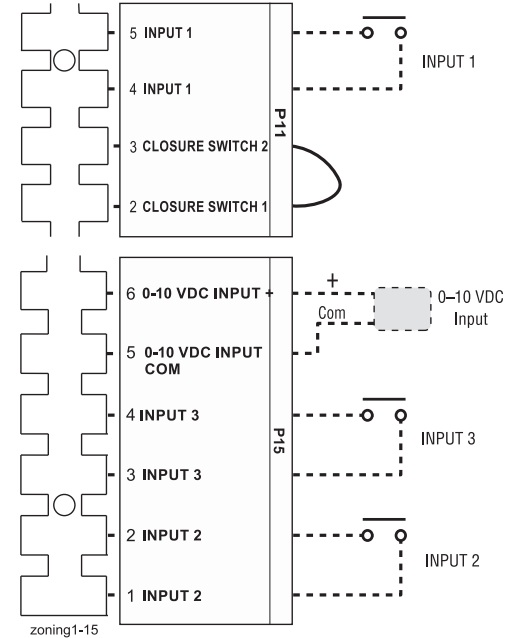
K. 0–10 VDC Remote TARGET input – OPTIONAL

Terminal Block P15 #5 & #6

1. See illustration at right and Figure 21, page 30 (wiring diagram) for details.
2. Remote target using 0–10VDC input requires a 0–10VDC input signal at P15-4/5 as shown at right.
 - a. The input positive connection must be at P15 terminal 6 and the common connection at terminal 5.
3. This illustration also shows how to connect TT or end switch contacts at INPUT 1, INPUT 2 and INPUT 3.
 - a. If a Heat/DHW demand is required, connect the demand’s dry contact to an unused input on the control and its pump/valve to the respective output. Then assign and setup a priority to the input using the Wizard or manually through the contractor menu.
 - b. A dry contact heat demand must be applied to one of the inputs in order to initiate a call for heat.
4. The 0–10VDC signal is used to adjust the supply target temperature, using the TARGET ADJUST setting. Set TARGET ADJUST during the WIZARD or manually in the PRIORITY SETTINGS menu for the desired PRIORITY.
 - a. Many options are available for configuring the control. The following is a suggested setup that uses factory default settings as much as possible.
 - b. Use PRIORITY 1 for the DHW heating system when used. This priority’s default values are set for DHW, direct-piped to the boiler. Verify that settings are suitable for the application, change if needed.
 - c. Use PRIORITY 2 for the heating systems.
 - For single boilers, the factory default settings for PRIORITY 2 make this priority a good choice for space heating applications. Set PRIORITY 2 values to the following:
 - Set TARGET ADJUST value to 0–10V.
 - Set VOLTS FOR MAX at the voltage that will call for the highest target temperature. Set SUPPLY MAX at this temperature.
 - Set VOLTS FOR MIN at the voltage that will call for the lowest target temperature. Set SUPPLY MIN at this temperature.
 - For voltages between VOLTS FOR MAX and VOLTS FOR MIN, the target temperature will range proportionately between SUPPLY MAX and SUPPLY MIN.

NOTE: The 0–10VDC signal replaces the ODT sensor as the target temperature modifier (TARGET ADJUST setting). The control does not decide target temperature. It now interpolates the target temperature based upon incoming voltage and the priority settings.

TT or end switch inputs
(INPUTS 1, 2, and 3)
With External 0–10VDC input



See Figure 21, page 30 for details.



Field wiring

See wiring diagrams, Figure 21, page 30 & Figure 23, page 32 (continued)

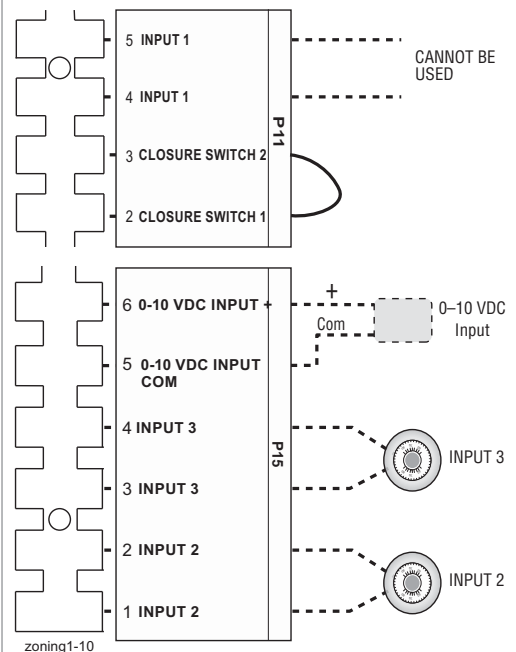
L. 0–10 VDC Remote MODULATION input – OPTIONAL

Terminal Block P15 #5 & #6 (*Unity™* control module, left side)

⚠ WARNING **Using an external multiple boiler controller** — Remote modulation using an external controller only works with each boiler set up as a SINGLE boiler in the *Unity™* Control setup.

1. See illustration at right and Figure 21, page 30 for details.
2. This illustration also shows how to connect TT or end switch contacts at INPUT 2 and INPUT 3 for other uses.
3. This function can only be used with a single boiler, NOT for a boiler in a network.
4. Note that using 0–10VDC input replaces INPUT 1 to generate a heat demand as shown at right.
5. Remote modulation requires a 0–10VDC input signal at P15-4/5 as shown at right.
 - a. The 0–10VDC input positive connection must be at terminal 6 and common connection at terminal 5.
6. Control setup:
 - a. Many options are available for configuring the control. The following is a suggested setup that uses factory default settings as much as possible.
 - b. If DHW is required, use PRIORITY 1 to minimize setup steps.
 - Connect the DHW aquastat to INPUT 2 or INPUT 3 and assign the input used to PRIORITY 1.
 - Verify that control settings are suitable for the application, changing if necessary.
 - c. Use PRIORITY 2 for the system to be remote modulated.
 - The factory default settings for this priority are best suited for space heating.
 - Assign INPUT 1 to the priority chosen. Accept all defaults for INPUT 1 — no changes should be necessary during the WIZARD.
 - After the WIZARD has been completed, go to the ASSIGN INPUTS menu for INPUT 1. Change SOURCE to 0–10V (default setting is TT1). See page 65 for ASSIGN INPUTS menu information.
7. Operation:
 - a. A heat demand is activated at 0.9VDC and turns off at 0.8VDC.
 - 2 VDC = 10% input.
 - 10 VDC = 100% input.
 These voltage settings are not adjustable.
 - b. OUTPUT 1 (120VAC) is activated and deactivated as the heat demand is turned on and off. This output is a good choice to operate the system pump.
8. NOTE: The *Unity™* control can be configured to use either 0–10VDC for target operation (see previous section) or modulation, **but not both**.

TT or end switch inputs (INPUTS 2 and 3) With External 0 10 VDC input



See Figure 21, page 30 for details.



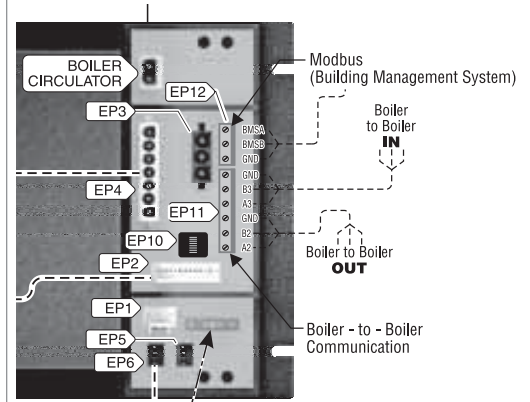
Field wiring

See wiring diagrams, Figure 21, page 30 & Figure 23, page 32 (continued)

M. Multiple Boiler and BMS Connections

Terminal Strips EP11 and EP12 on Expansion Module (Expansion module, right side)

1. The boiler control is capable of multiple boiler communication and control of up to eight (8) SVF™ boilers in one installation.
2. The expansion module is capable of BMS (Building Management System) communication.
3. See wiring at right and in the wiring diagram (Figure 21, page 30).
4. Use shielded 3-wire cable. Do not exceed 1,000 feet wire length.
5. Boiler to Boiler wiring connections
 - a. Connect 3-wire cable between Boiler-to-Boiler OUT (EP11-GND,B2,A2) on one boiler to Boiler-to-Boiler IN (EP11-GND,B3,A3) on the next boiler.
 - b. Continue this wiring until all boilers are interconnected.
6. MODBUS to BMS (Building Management System)
 - a. The control is equipped with MODBUS communication to communicate with a BMS.
 - b. Use terminal EP12 (EP12-BMSA +, BMSB -, GND) to wire to the BMS control.
 - c. If the BMS uses BACnet protocol, install a BACnet converter between the BMS and the SVF™ MODBUS-to-BMS terminals (EP12).

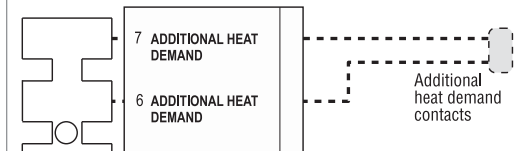


See Figure 21, page 30 for details.

N. Additional heat demand contacts – OPTIONAL

Terminal Block P16 Pins #6 & #7 (Unity™ control module, top left)

1. Each boiler's control module can be set to activate another heat source using its additional heat demand dry contacts through terminal block P16 pins 6 & 7.
2. Connect these terminals to call for heat from the other heat source.
3. Set the control to activate the heat demand contacts as needed.
4. The setup is done in the priority menu for the priority that will call for the additional heat operation. See page 64 for details.
5. Contact electrical ratings: 24VAC or less; 0.5 amp or less.
6. See "Add'l Heat Demand" on page 62 regarding which boilers may use this function, depending on the priority being used.

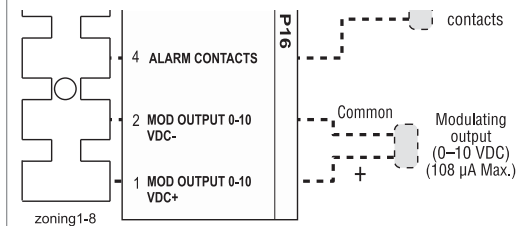


See Figure 21, page 30 for details.

O. 0-10 VDC Output Section

Terminal Block P16 Pins #1 & #2 (Unity™ control module, top left)

1. The control module can be set to activate another heat source using its 0-10VDC Output through terminal block P16 pins 1 & 2.
2. Connect these terminals to 0-10VDC inputs on another heat source to control its modulation rate.
3. Maximum electrical ratings: 10VDC; 108µ A.
4. Set the control to activate the output as needed.
5. See page 28 to configure.



See Figure 21, page 30 for details.

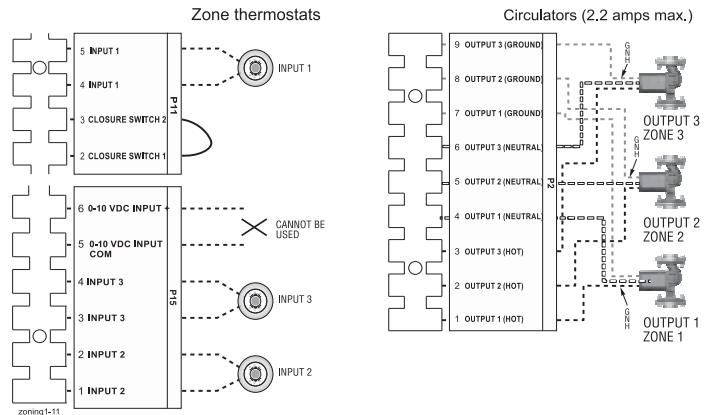


Zoning with the Unity™ Control

A. Zoning with CIRCULATORS, suggested applications

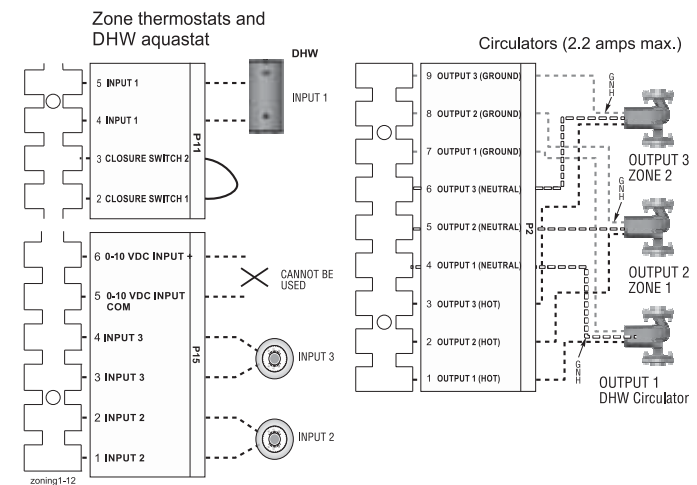
Three space heating zones (no DHW)

1. Review wiring information on page 30 (120VAC outputs) and page 39 (24VAC inputs).
2. The configuration at right uses the three input/output pairs to receive thermostat inputs on P11-4/5, P15-1/2, and P15-3/4; and circulator outputs on P2 as shown.
3. The factory default settings assign all inputs 1, 2 and 3 to PRIORITY 2.
4. Choose the space heating system type that matches the heating system during the WIZARD setup or manually in the PRIORITY 2 menu.
5. Use the factory default settings for the system type chosen, or change if needed.
6. Factory defaults should work for other settings not listed above.



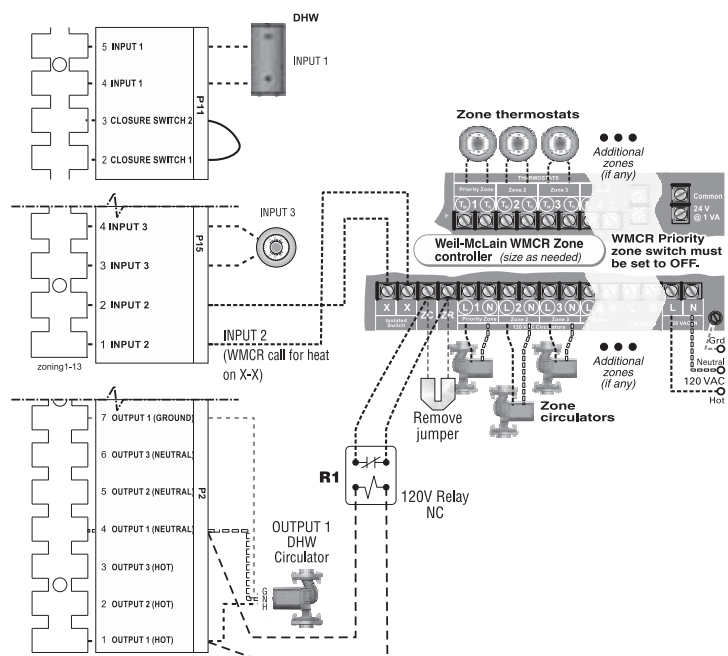
Two space heating zones plus DHW piped directly to boiler

1. Review wiring information on page 30 (120VAC outputs) and page 39 (24VAC inputs).
2. The configuration at right uses INPUT 2 and 3 for space heating thermostats. INPUT 1 uses the input from a DHW aquastat.
3. The factory default settings assign inputs 1, 2 and 3 to PRIORITY 2. Keep inputs 2 and 3 assigned to PRIORITY 2. To set up PRIORITY 2, choose the space heating system type that matches the heating system during the WIZARD setup or manually in the PRIORITY 2 menu.
4. Assign INPUT 1 to PRIORITY 1, which is factory default configured for DHW applications.
5. Use the factory default settings for DHW and for the heating system type chosen, or change if needed.
6. Factory defaults should work for other settings not listed above.



WMCR circulator zone controller plus DHW controlled by boiler, DHW piped directly to boiler

1. Review wiring information on page 30 (120VAC outputs) and page 39 (24VAC inputs).
2. To shut down Space Heating during DHW operation: Provide and connect relay R1 (120VAC coil with NC contact) to interrupt the Zone controller's ZC-ZR (120VAC operating circuit).
3. The configuration at right uses INPUT 2 for space heating with the call for heat coming from the zone controller (X-X). INPUT 1 uses the input from a DHW aquastat.
4. The factory default settings assign inputs 1, 2 and 3 to PRIORITY 2. Keep input 2 assigned to PRIORITY 2. To set up PRIORITY 2, choose the space heating system type that matches the heating system during the WIZARD setup or manually in the PRIORITY 2 menu.
5. Assign INPUT 1 to PRIORITY 1, which is factory default configured for DHW applications. Wire the DHW circulator to OUTPUT 1.
6. Use the factory default settings for DHW and for the heating system type chosen, or change if needed. Factory defaults should work for other settings not listed above.





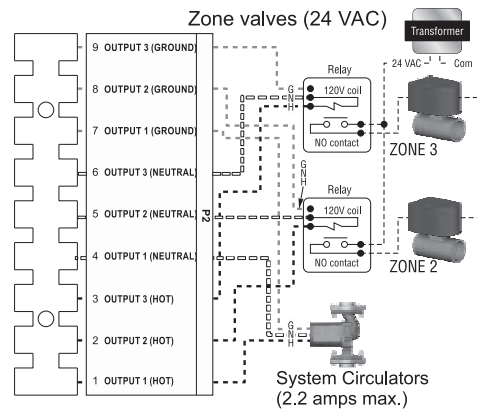
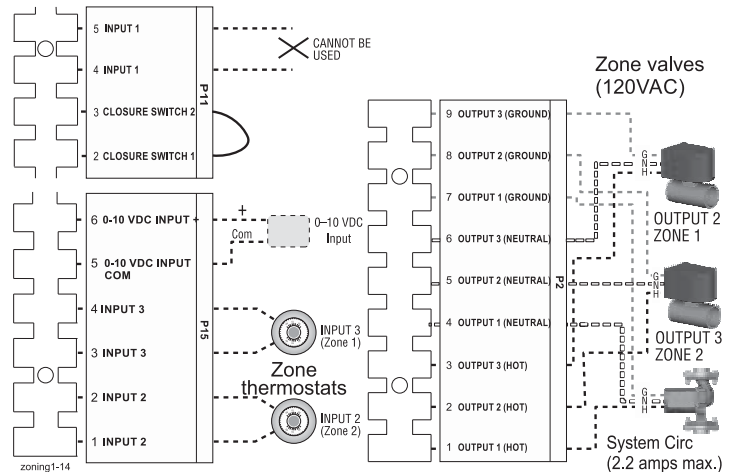
Zoning with the Unity™ Control (continued)

B. Zoning with ZONE VALVES, suggested applications

Two space heating zones (no DHW)

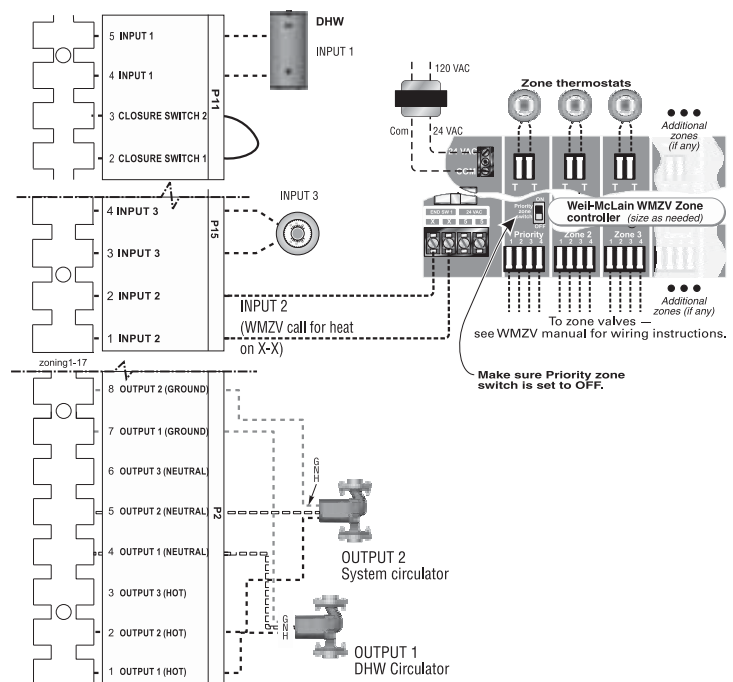
1. Review wiring information on page 30 (120VAC outputs) and page 39 (24VAC inputs).
2. The configuration at right uses INPUT 2 and 3 for space heating thermostats. INPUT 1 is reserved here for configuring the operation of the system circulator.
3. The factory default settings assign inputs 1, 2 and 3 to PRIORITY 2. Keep inputs 2 and 3 assigned to PRIORITY 2. To set up PRIORITY 2, choose the space heating system type that matches the heating system during the WIZARD setup or manually in the PRIORITY 2 menu.
4. Use the factory default settings for the heating system type chosen, or change if needed.
5. Assign INPUT 1 to AUX PUMP/OUTPUT. Then select ANY INPUT BY ITS PRIORITY when prompted for when to activate the output. This will cause the system pump to run when either of the zones calls for heat. Confirm that Priority 2 RUN AUX PUMP/OUT is set to YES.
6. INPUT 1 (P11-4/5) cannot be used for a wired connection (as shown at right) because it is being used in the control setup to run the system circulator.
7. Factory defaults should work for other settings not listed above.

WARNING The system must be equipped with a by-pass pressure regulating valve. Flow can occur with zone valves closed.



WMZV zone valve zone controller plus DHW controlled by boiler, DHW piped directly to boiler

1. Review wiring information on page 30 (120VAC outputs) and page 39 (24VAC inputs).
2. The configuration at right uses INPUT 2 for space heating with the call for heat coming from the zone controller (X-X). INPUT 1 uses the input from a DHW aquastat.
3. The factory default settings assign inputs 1, 2 and 3 to PRIORITY 2. Keep input 2 assigned to PRIORITY 2. To set up PRIORITY 2, choose the space heating system type that matches the heating system during the WIZARD setup or manually in the PRIORITY 2 menu.
4. The system circulator, wired to OUTPUT 2, will turn on whenever there is a call for heat from the zone controller.
5. Assign INPUT 1 to PRIORITY 1, which is factory default configured for DHW applications. Wire the DHW circulator to OUTPUT 1.
6. Use the factory default settings for DHW and for the heating system type chosen, or change if needed. Factory defaults should work for other settings not listed above.



P15, P11 and P2 are on the terminal strips



Control operation and setup

Control setup

1. Set control parameters using the WIZARD option provided on initial start-up or manually enter parameters using control menus (see Figure 34, page 55 and following pages for information.)
2. See instructions beginning on page 49 for basic systems and minimum settings required (using factory defaults).
3. This manual provides set-up information for a single boiler using BASIC control setting options. See the SVF™ Advanced Manual for single-boiler advanced settings and for all multiple boiler applications.

WARNING

Boiler Model, Altitude are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

Temperature settings — You must ensure that the Control is set for the proper water temperatures for the system. Excessive water temperature can cause significant property damage in some applications.

Multi-temperature systems — If the heating system includes circuits that require lower temperature water (radiant slab circuits, for example) as well as higher temperature circuits (DHW, finned tube baseboard, etc.), it is recommended to protect low-temperature circuits with limit controls that are wired to an Control external limit circuit. Failure to provide regulation can result in substantial property damage.

Control features

- Single or multiple boiler control (with lead boiler rotation).
- Graphic and robust text display for ease of operation monitoring and troubleshooting.
- Three programmable priority assignments for up to three heat inputs.
- Preset operating parameters for typical heating systems, including target temperatures, reset curves and circulator assignments.
- Integral outdoor reset option, with reset curves matched to the system type selected.
- ModBus communications for external communication and monitoring.
- 0-10VDC input modulation or remote target input.
- Four pump outputs, 3 – powered, 1 – dry contact.
- Additional heat demand operation to call a second heat source to help supply the energy required for heating.
- Advanced PI response to anticipate system needs.
- Flue temperature modifier to target temperature.
- Modulation based on flue sensor and boiler/system supply/return sensors.
- Dual temperature sensors on boiler outlet and flue, providing redundant protection.
- Boiler is shipped with an outdoor sensor and strap on system supply and return sensors.
- Blower speed modulation to control boiler firing rate.
- Alarm relay on error/fault for use with an audible safety.
- CSD-1 Valve seat leakage test feature (See Advanced Manual).
- Built-in 0–10 VDC signal generator to allow parallel modulation of multiple boilers; also capable of accepting 0–10 VDC input.
- The boiler is equipped with a low water cutoff, factory wired to the Control, manually reset through the Control.

Sequence of operation

1. Figure 29 is a summary of the operating sequence for the Control.
 - The statuses shown appear in the display as the Control cycles the boiler. See Figure 31, page 51 for screen shots.
 - The display will flash red if a problem has been detected.

Figure 29 Control sequence of operation

Display status text	Control action <i>(Also see Figure 31, page 51)</i>
POWER UP	<ul style="list-style-type: none"> • Check the boiler model listed on the power-up screen. If it is not correct, turn off the boiler. See page 56 for instructions to change setting. • When power is turned on, the screen lists sensors that are detected. If any sensor is not listed, make sure it is connected correctly. Turn off power and restart.
Standby	<ul style="list-style-type: none"> • Standby - no calls for heat. • Toggles through no dots, 1 dot, 2 dots, then 3 dots while in standby (wrench symbol will show instead if maintenance is needed).
Blower ON	<ul style="list-style-type: none"> • Call for heat detected. • Display on with BLUE light (space heating) or PURPLE light (DHW). • Start min/max timers if more than one system is calling - highest priority starts first. • Start circulators for this priority setup based upon settings. • Calculate target temp — If sensor temp is below target temp, begin firing sequence. • Wait on closure switch. • Blower to purge speed for prepurge. • Min air flow switch. • Pre-purge.
Ignition	<ul style="list-style-type: none"> • After prepurge times out, transition to ignition speed. • Begin ignition cycle. • Activate gas valve and ignition spark. • Continue ignition spark for ignition period. • Turn off spark and use flame rod to check for flame signal.
Space Heating	<ul style="list-style-type: none"> • Flame detected. • Release boiler to modulation. • NOTE: If flame is not detected, the gas valve is turned off, blower turns on (postpurge), and control starts cycle again. If permitted, SVF 3000 only has 1 ignition attempt per AMSE CSD-1. • If priority timer times out, switch to next priority and start priority timer. • If demand satisfied, go to postpurge.
DHW Heating	<ul style="list-style-type: none"> • Flame detected. • Release boiler to modulation. • NOTE: If flame is not detected, the gas valve is turned off, blower turns on (postpurge), and control starts cycle again. If permitted, SVF 3000 only has 1 ignition attempt per AMSE CSD-1. If priority timer times out, switch to next priority and start priority timer. • If demand satisfied, go to postpurge.
Blower OFF	<ul style="list-style-type: none"> • Demand satisfied (temperature reaches target temperature or limit setting). • Gas valve off. • Blower to ignition speed for postpurge. • Return to standby after purge.
Maintenance	<ul style="list-style-type: none"> • Display turns BLUE, toggling between graphic screen and maintenance screen (occurs if maintenance schedule timer times out). • Will show during standby only. • Boiler operates as normal.
Error/fault	<ul style="list-style-type: none"> • Display turns RED due to error or limit event. • Flashing display means lockout condition.
WWSD	<ul style="list-style-type: none"> • Warm weather shut down - the boiler will not be allowed to fire on space heating if the outside temperature is greater than the WWSD setting. • DHW operation is not affected by WWSD.



Control operation and setup (continued)

Control Priorities & Input/Outputs

- For heating installations with multiple systems, the Control uses PRIORITIES to determine the order of operation of the systems. The control's MAX and MIN time settings determine the maximum and minimum times a system will be operated before being turned off to allow another system to operate. A typical example is DHW priority — heat demand from the DHW system is given preference over space heating, if set to use Priority 1.
- Each PRIORITY has its own set of operating parameters. The control prompts the user to select the system type (finned tube baseboard, DHW, etc.) and is factory programmed with parameters suited to each of these system types. The user can also choose CUSTOM to create a system type.
- The Control provides up to three priorities for single boiler applications and up to four priorities for network boiler applications. The order of operation is: PRIORITY 1, PRIORITY 2, PRIORITY 3.
- The 120VAC power output to the boiler circulator is provided by a relay located on the boiler's Pump/Communications Board. For each of the priorities, the control can be setup to run the boiler pump or to leave it off. It is recommended to set Blr Circ to OFF for DHW that is directly piped with its own DHW Circ.
- Each boiler has three input/output pairs (INPUT/OUTPUT 1, 2 and 3). Control setup prompts the user to assign each of these I/O pairs to a PRIORITY. The Control then knows which system (priority) to operate when the input receives a call for heat. On a call for heat to an input, the Control closes the corresponding output (120VAC) and begins controlling the boilers according to the setup for the assigned priority.
- The MAX ON TIME setting controls the maximum time a priority will be allowed to run before switching to a lower priority's call for heat. The MIN ON TIME setting controls the minimum time a priority will be operated before switching to a higher priority's call for heat, or the next lower priority.
- When multiple inputs are set up on the same priority, they will run at the same time if the priority and inputs are active.

Control operation

- The control responds to signals from:
 - Room thermostats.
 - DHW aquastats (if used).
 - Temperature sensors (boiler return, boiler supply, flue temperature) and, when used, system supply and system return, outdoor temperature). **For optimal performance, it is recommended to install the system supply and return sensors.**
- The control automatically adjusts blower speed (and gas flow rate) to match boiler output to space heating and/or DHW heating demand.
- The control provides three inputs and three outputs (for circulators or auxiliary devices) plus a fourth boiler circulator output.
- The outdoor temperature is used for supply temperature reset operation and for the warm weather shut down (WWSD) option.
- System presets:
 - The Control provides presets by system type (see Figure 33, page 54 for complete list).

Setting Up the Boiler	
Step 1	<ul style="list-style-type: none"> DETERMINE input/output needs – What are the inputs? – Thermostats, remote contacts, end switches, etc. What does each control's output need to do? – operate a pump, activate an air louver, etc.
Step 2	<ul style="list-style-type: none"> Install the boiler following all instructions in the SVF™ Boiler Manual before proceeding further. Connect wiring to the control inputs and outputs to accomplish the purposes set in Step 1.
Step 3	<ul style="list-style-type: none"> Follow instructions in the Boiler Manual to start up and power the boiler.
Step 4	<ul style="list-style-type: none"> Use the WIZARD (below) or enter control parameters manually (skip Wizard).

Control WIZARD

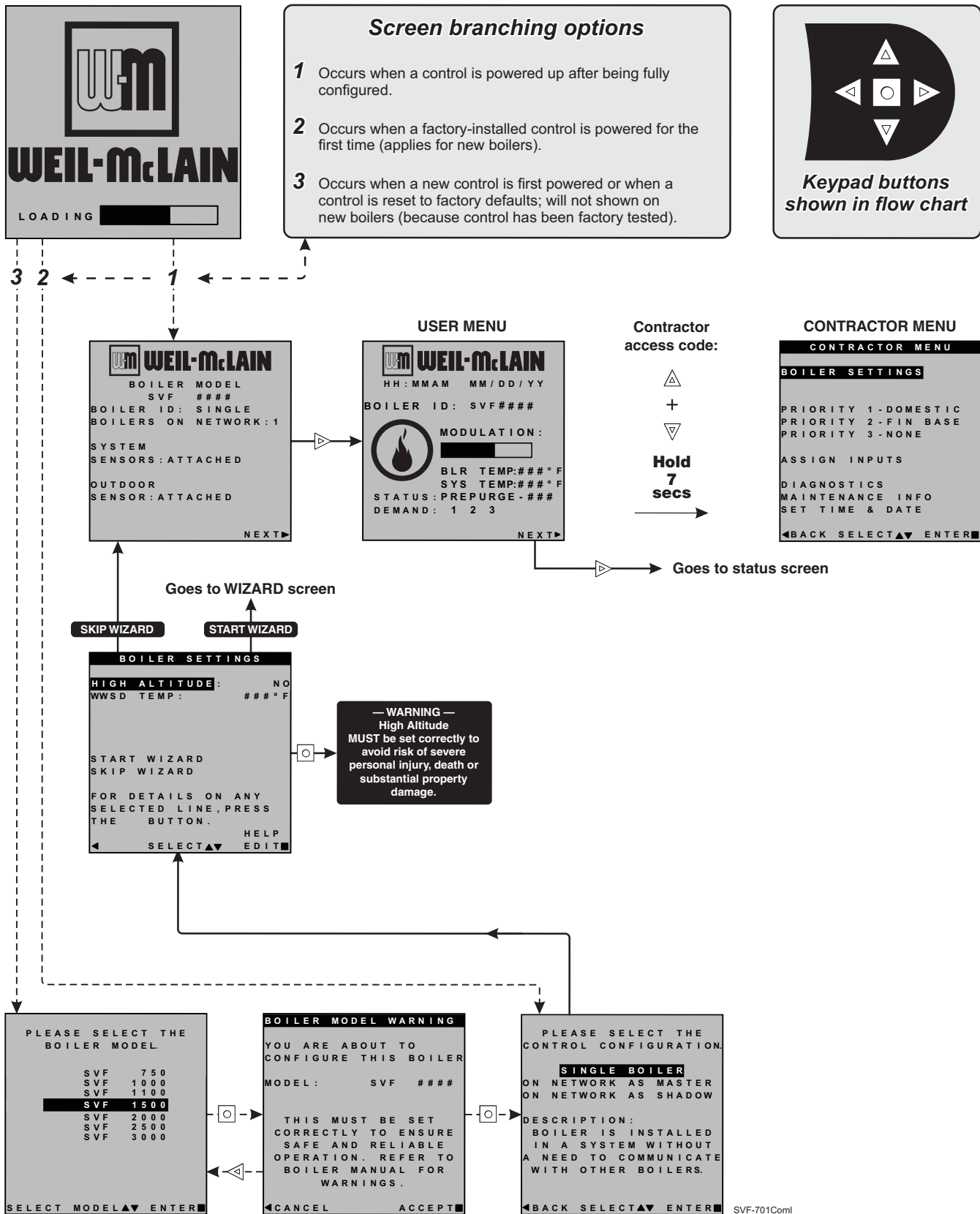
- The Wizard is available on initial setup of the boiler. It leads through a step-by-step setup procedure designed for the application chosen.
- Context-sensitive help is available to explain the purpose of key setup items.
- Advanced settings for single boiler applications can be accessed manually from the Contractor menu.

WIZARD Sequence	
Boiler Settings	<ul style="list-style-type: none"> Altitude – ▲WARNING – must be set correctly for proper operation. Fuel (natural gas or propane) – ▲WARNING – must be set correctly for proper operation – control will pause until this value is selected. WWSD – set outdoor temperature above which space heating will be deactivated.
Inputs/Outputs	<ul style="list-style-type: none"> Select the usage of inputs 1, 2 and 3. Determine usage of outputs 1, 2 and 3 (outputs correspond to inputs).
Set Priorities	<ul style="list-style-type: none"> Assign priorities 1, 2 and 3 to the inputs.
System Settings	<ul style="list-style-type: none"> Set system settings or leave at their defaults.
System Types	<ul style="list-style-type: none"> Specify what system type is connected to each of the three outputs; each system type causes the control to preset operating temperatures.
Output Activation	<ul style="list-style-type: none"> (When applicable) Select when to activate AUX PUMP/OUTPUT – by input, always on, external switch, etc.
Priority Switching	<ul style="list-style-type: none"> Set maximum and minimum timings for priorities.
Date/Time	<ul style="list-style-type: none"> Set date and time – important for control diagnostic logging.
Information	<ul style="list-style-type: none"> Set installer name and contact information. Enter CP#, install date, maintenance date, etc. Set automatic maintenance notification timing.



SVF™ Control — INITIAL SCREENS

Figure 30 Initial navigation — Accessing CONTRACTOR menus (multiple-boiler screens shown)





Control operation (continued)

Figure 31 Unity™ control display screens and typical navigation – Advanced mode, multiple boilers

LOADING

Operating Screen, typical

- Network status
- Boiler type and ID number
- Mod rate or Fault
- Boiler and system temperatures
- Current heat demands

Screen colors

(Blue = space heating or when any button is pressed)

(Screen will show solid red when in Standby if a non-shutdown failure occurs; i.e., failure of a non-critical sensor, such as outdoor or system supply or return sensor.)

- Boiler ID number
- Number of boilers on network
- Shows if system sensor is connected
- Shows if outdoor sensor is connected

NEXT ▶ Select to show Status screen, below

Display above is typical for normal operation. The center symbol changes to show operation status.

Press ▶ to switch to INFO screen.

The INFO screen, below is for at-a-glance information during normal operation.

BUTTONS

- Move selection up
- Move selection down
- Next screen
- Previous screen
- Enter

STATUS SCREEN

- Time and date (also flashes error code)
- Network status
- Current boiler status
- Outdoor air temperature
- Setpoint temperature
- Boiler out or system sensor (depending upon settings)
- Firing Rate or Fault Warning
- “Setpoint” or “Modulation” and voltage
- Input 1 status
- Input 2 status
- Input 3 status
- Pumps being energized
- Add'l heat demand contact status
- Shown only during a lockout/fault
- Press the right arrow button to go to the Settings screen

NO BACKLIGHT

BLUE BACKLIGHT

PURPLE BACKLIGHT

RED BACKLIGHT

NO BACKLIGHT

STANDBY
(Pressing any button changes background to blue, below.)

SPACE HEATING

DHW HEATING
(Domestic hot water heating)

BOILER IN LOCKOUT
(Attention required to restart boiler)

Alternating colors

Solid red screen with ... symbol means a warning; with ! symbol means auto reset action.



Available control settings – Advance Mode

Figure 32 Unity™ control settings available in ADVANCED MODE (see Boiler Manual for BASIC MODE settings)

Menus and Items	Default setting	Range/options
BOILER SETTINGS Menu (page 56)		
• BOILER MODEL	Factory set	All SVF™ models available
• CONTROL TYPE	Single	Single, Master or Shadow
• HIGH ALTITUDE	No	Yes or No
• LP GAS	No	Yes or No
• HIGH LIMIT TEMP	210°F	50 to 210°F
• WWSD TEMP	70°F	OFF, 50–100°F
• ADJUST OUTDOOR	0°F	-10 to +10°F
• CIRCULATOR EXERCISING	ALL ON	ON or OFF for each circulator
• FREEZE PROTECT CIRCS	ONLY BOILER CIRCULATOR ON	ON or OFF for each circulator
• RESET FACTORY DEFAULT	—	—
PRIORITY menus (page 61)		
• INPUTS ASSIGNED	Varies by priority	1, 2, 3
• SYSTEM TYPE	Varies by priority	See Figure 33, page 54 for choices
• TARGET MOD SENSOR	Varies	System Supply or Boiler Out
• TARGET ADJUST	Varies	None, 0–10V, or ODT
• SUPPLY MAX	Varies by system type	60 to 190°F
• SUPPLY MIN	Varies by system type	60 to 190°F
• OD RESET MAX	70°F	50 to 100°F
• OD RESET MIN	0°F	-20 to 50°F
• VOLTS FOR MAX	10V	5V-10V
• VOLTS FOR MIN	0V	0V-4.9V
• BOOST TIME	OFF	OFF, 1 to 240 minutes
• SYSTEM OFF DIFF	Varies (5 or 10°F)	2 to 15°F
• SYSTEM ON DIFF	10°F	2 to 15°F
• MAX BLR TEMP	Equals SUPPLY MAX	60 to 190°F
• ADD BLR DIFF	5°F	2 to 10°F
• DROP BLR DIFF	5°F	2 to 10°F
• MOD DELAY TIME	2 minutes	1 to 15 minutes
• STABILIZE TIME	5 minutes	3 to 30 minutes
• ADD DELAY TIMER	60 seconds	30 to 240 seconds
• DROP DELAY TIMER	60 seconds	30 to 240 seconds
• BOILER ON DIFF	5°F	2 to 20°F
• BOILER OFF DIFF	5°F	2 to 10°F
• MAX ON TIME	30 minutes	OFF, 1 to 240 minutes
• MIN ON TIME	15 minutes	OFF, 1 to 240 minutes
• RUN BOILER PUMP	Varies by system	YES or NO
• RUN AUX PUMP/OUTPUT	Varies by system	YES or NO
• PRE PUMP	OFF	OFF, 1 to 240 seconds
• POST PUMP	30 seconds	OFF, 1 to 240 seconds
• MAX RATE (Local priorities only)	96%	100% to 11%
• MIN RATE	10%	10% to 99%
• MAX SYS MBH (Network priorities only)	AUTO	AUTO or 100 to 32,000 MBTU's

NOTICE See detailed information about controls settings (parameters) on the following pages.



Available control settings – Advance Mode (continued)

Figure 26 *Unity™* control settings available in ADVANCED MODE, continued

Menus and Items	Default setting	Range/options
• MIN BOILERS <i>(Network priorities only)</i>	1	1 to 8
• ACTIVATE CONTACT (ADDITIONAL HEAT DEMAND)	OFF	OFF, 1st, 2nd, ODT
• RESPONSE TIME (ADDITIONAL HEAT DEMAND)	OFF	OFF, 1 to 240 minutes
• MAX RATE VOLTS	10V	5.0V - 10.0V
• MIN RATE VOLTS	2.0V	0.50V - 4.9V
• TEMP DEPENDENT	No	Yes or No
• ODT SETPOINT	15°	0° - 50°
• ACTIVATE CONTACT BELOW SET- POINT:	1st	1st or 2nd
NETWORK SETTINGS <i>(page 57)</i>	Default setting	Range/options
• CONTROL TYPE	—	Single, Master, Shadow
• BOILER ADDRESS	—	1 to 8
• NET MAX ON TIME	30	Off, 1 to 240
• NET MIN ON TIME	15	Off, 1 to 240
• MAX RATE ON NET	96%	100% to 21%
• MIN RATE ON NET	10%	10% to 99%
ROTATION AND SEQUENCE <i>(page 58)</i>	Default setting	Range/options
• SEQUENCE TYPE	Smart	Smart, Parallel, Series
• BASERATE HIGH	Auto	Auto, 10% to 100%
• BASERATE LOW	30%	30% to 100%
• LEAD BOILER ROTATE	Total Hours	Off, By Boiler, Total Hours, Incremental Hours
• ROTATE FREQ	7	1-30, 60, 90, 120, 150, 180, 210, 240, 270, 300, 330, 365
• FORCE LEAD ROTATE	Yes	Yes or No
• CURRENT ORDER	—	Shows current rotation sequence
ASSIGN INPUTS <i>(page 65)</i>	Default setting	Range/options
• INPUT 1	Single boiler – PRIORITY 2 Master or shadow boiler – NETWORK 2	NONE or Single boiler – PRIORITY 1, 2, or 3 Master or shadow boiler – NETWORK PRIORITY 1 or 2 or LOCAL PRIORITY 1 or 2
• INPUT 2	Single boiler – PRIORITY 2 Master or shadow boiler – NETWORK 2	
• INPUT 3	Single boiler – PRIORITY 2 Master or shadow boiler – NETWORK 2	
DIAGNOSTICS <i>(see Boiler Manual)</i>		
MAINTENANCE <i>(page 67)</i>		
SET DATE AND TIME <i>(page 67)</i>		
GAS VALVE TEST <i>(see Boiler Manual)</i>		

NOTICE

See detailed information about controls settings (parameters) on the following pages.



SYSTEM TYPE presets

Figure 33 System types available (each option provides factory presets for operating parameters)

System Type	8-Character Abbreviation	3-Character Abbreviation	Supply Max °F	Max Blr Temp °F)	OD Reset Min °F	Supply Min °F	OD Reset Max °F	Run Boiler Pump	Run System Pump/Aux
Fan-coil	FAN-COIL	FCL	180	180	0	140	70	YES	YES
Finned Tube Baseboard	FIN BASE	FTB	180	180	0	130	70	YES	YES
Cast Iron Baseboard	IRONBASE	CIB	180	180	0	120	70	YES	YES
Cast Iron Radiators	RADIATOR	CIR	180	180	0	120	70	YES	YES
Radiant - slab on grade	RAD SLAB	RSG	120	120	0	80	70	YES	YES
Radiant - thin slab	RAD SLAB	RTS	140	140	0	80	70	YES	YES
Radiant - below floor (staple up)	RADFLOOR	RSU	160	160	0	90	70	YES	YES
Radiant - above floor (sleeper system)	RADFLOOR	RAF	140	140	0	90	70	YES	YES
Domestic Hot Water	DOMESTIC	DHW	180	180	N/A	N/A	N/A	NO	NO
Custom (user defined)	XXXXXXXX (user input)	first three of user input	180	180	0	70	70	YES	YES

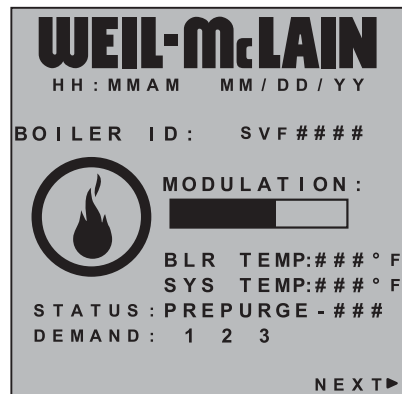


CONTRACTOR menus

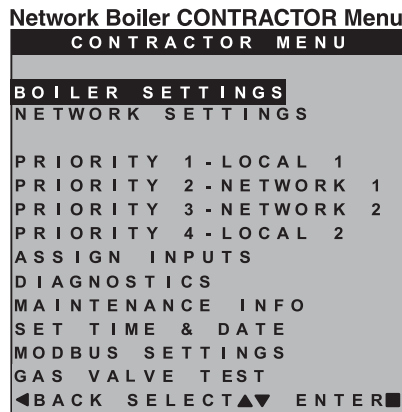
⚠ WARNING Boiler Model, Altitude are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

1. Access contractor menus by pressing and holding the UP and DOWN arrow keys at the same time for 7 seconds.
2. See the following pages for explanations of control setting options.

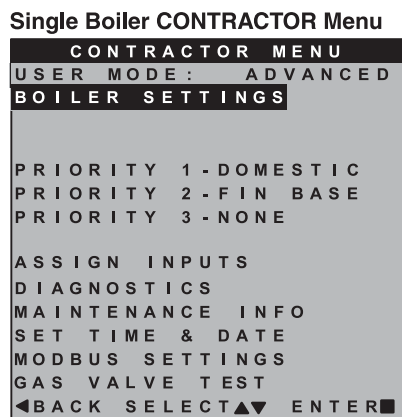
Figure 34 Unity™ control menu access — accessing CONTRACTOR menu



Hold 7 secs



OR



Highlight item, then press to select

MENU ITEM	PURPOSE	MORE INFORMATION
USER MODE	<ul style="list-style-type: none"> Set this to ADVANCED to access single boiler advanced settings. ADVANCED mode is automatic if configuring network boilers. 	
BOILER SETTINGS	<ul style="list-style-type: none"> Set/change boiler model, control type, high altitude setting, gas type NAT or LP gas, ODT sensor requirement, manual reset, high limit and WWSD temperature settings, outdoor sensor temp adjustment, circulator exercising, freeze protection setup, and restore to factory default option. 	See page 56
PRIORITY 1 (LOCAL PRIORITY 1)	<ul style="list-style-type: none"> These settings control operating temperatures and behaviors for inputs that are assigned to PRIORITY 1. 	See page 61
PRIORITY 2 (NETWORK PRIORITY 1 OR LOCAL PRIORITY 2)	<ul style="list-style-type: none"> These settings control operating temperatures and behaviors for inputs that are assigned to PRIORITY 2. 	See page 61
PRIORITY 3 (NETWORK PRIORITY 2 OR LOCAL PRIORITY 3)	<ul style="list-style-type: none"> These settings control operating temperatures and behaviors for inputs that are assigned to PRIORITY 3. 	See page 61
PRIORITY 4 (LOCAL PRIORITY 2)	<ul style="list-style-type: none"> Appears only on multiple boiler systems. These settings control operating temperatures and behaviors for inputs that are assigned to PRIORITY 4. 	See page 61
ASSIGN INPUTS	<ul style="list-style-type: none"> These settings assign Priority 1, 2, 3 or 4 to each of the three inputs to the control. 	See page 65
DIAGNOSTICS	<ul style="list-style-type: none"> View error counters and historical information including previous lockouts. View current status of temperatures, inputs, outputs and runtimes; View network information; View MODBUS communication info; View software versions; Access manual test mode screen; Initiate manual reset. 	See Boiler Manual
MAINTENANCE INFO	<ul style="list-style-type: none"> Used to set contractor contact information, boiler information and maintenance dates. 	See page 67
SET TIME & DATE	<ul style="list-style-type: none"> Use to set date and time — important since fault occurrences are date/time stamped. 	See page 67
MODBUS SETTINGS	<ul style="list-style-type: none"> Use to enter Modbus communications information (enable/disable, range, parity and stop bits, and baud rate). For Modbus addressing information, see SVF™ Modbus Supplement. 	See SVF™ MODBUS Supplement
GAS VALVE TEST	<ul style="list-style-type: none"> Use to enable/disable gas valve relay 1 and 2 for troubleshooting purposes. 	

Screens shown above are typical only. Actual screens depend on control settings chosen.

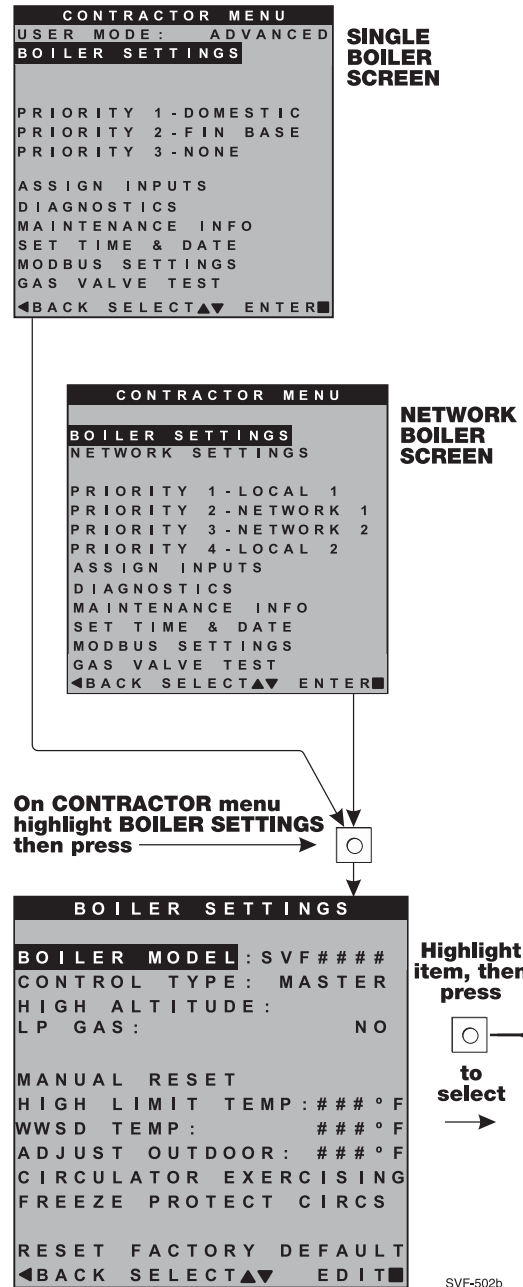


BOILER SETTINGS menu

⚠WARNING Boiler Model, Altitude are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

1. Access contractor menus by pressing and holding the UP and DOWN arrow keys at the same time for 7 seconds.
2. See Figure 34, page 55 for the screen sequences up to the CONTRACTOR menu.

Figure 35 SVF™ ADVANCED mode BOILER SETTINGS options (see Figure 34, page 55 to access CONTRACTOR menu)



MENU ITEM	DESCRIPTION
BOILER MODEL	<ul style="list-style-type: none"> • ⚠WARNING MUST be set to correct model. • Check the boiler model against the model listed on the boiler's rating plate. Change the selection to the correct model if not. Also verify the model number on the <i>Unity</i>™ control display at power-up. Failure to correct would result in severe personal injury, death or substantial property damage.
CONTROL TYPE	<ul style="list-style-type: none"> • Select single, master or shadow.
HIGH ALTITUDE	<ul style="list-style-type: none"> • ⚠WARNING If the boiler is installed at an altitude above 5500 feet, select YES for high altitude. The control will automatically adjust firing rates (blower speeds) to compensate for altitude. Altitude MUST be set correctly to avoid risk of severe personal injury, death or substantial property damage.
LP GAS	<ul style="list-style-type: none"> • ⚠WARNING MUST be correct – YES if LP Gas is used or NO if Natural Gas is used. Follow screen instructions to change if necessary.
MANUAL RESET HIGH LIMIT TEMP	<ul style="list-style-type: none"> • If boiler outlet water temperature exceeds this temperature, the <i>Unity</i>™ control will shut down the boiler and enter lockout. Changing this setting is NOT recommended, unless required by code.
WWSD TEMP	<ul style="list-style-type: none"> • WWSD stands for warm weather shutdown. It means the boiler will not be allowed to fire if the outside temperature is greater than the WWSD setting. When the boiler is kept off because the outside temperature is above WWSD, the graphic display will show WWSD, and the boiler will remain in standby until the outside temperature drops below WWSD temperature. WWSD does not apply to DHW systems. The outdoor sensor must be installed to use this function. Any setting other than OFF will cause the control to look for a sensor. It will display an error if a sensor is not detected.
ADJUST OUTDOOR	<ul style="list-style-type: none"> • Use this setting to calibrate the outdoor sensor when needed to compensate for variations in lead length or other factors that could affect total resistance in sensor circuit.
CIRCULATOR EXERCISING	<ul style="list-style-type: none"> • For each circulator, select whether you want the control to automatically start the circulator and run for 10 seconds for each 72-hour period of inactivity.
FREEZE PROTECT CIRCS	<ul style="list-style-type: none"> • This function automatically starts the circulators chosen if the heat exchanger sensors detect a temperature less than 45°F. In addition, the burner is turned on if temperature drops below 40°F. Circulators and burner turn off when the temperature rises above 48°F.
RESET FACTORY DEFAULTS	<ul style="list-style-type: none"> • Use this function to restore all control settings to factory default values — will require complete restart and setup of control after resetting. Record information from the MAINTENANCE screen and any history information that may be of use in the future. ALL stored data is eliminated when reset to defaults, except for boiler model number.

Screens shown above are typical only. Actual screens depend on control settings chosen.



NETWORK SETTINGS menu

WARNING Boiler Model and Altitude are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

1. Access contractor menus by pressing and holding the UP and DOWN arrow keys at the same time for 7 seconds.
2. See Figure 34, page 55 for the screen sequences up to the CONTRACTOR menu.

Figure 36 SVF™ NETWORK SETTINGS menu (see Figure 34, page 55 to access CONTRACTOR menu)

CONTRACTOR MENU

```

BOILER SETTINGS
NETWORK SETTINGS
PRIORITY 1 - LOCAL 1
PRIORITY 2 - NETWORK 1
PRIORITY 3 - NETWORK 2
PRIORITY 4 - LOCAL 2
ASSIGN INPUTS
DIAGNOSTICS
MAINTENANCE INFO
SET TIME & DATE
MODBUS SETTINGS
GAS VALVE TEST
◀BACK SELECT▶▼ ENTER■
    
```

On CONTRACTOR menu highlight NETWORK SETTINGS then press

NETWORK SETTINGS

```

BOILER SETTINGS
CONTROL TYPE: MASTER
BOILER ADDRESS: #
NET MAX ON TIME: ###M
NET MIN ON TIME: ###M
MAX RATE ON NET: ###%
MIN RATE ON NET: ###%

ROTATION & SEQUENCE
◀BACK SELECT▶▼ EDIT■
    
```

Highlight item, then press to select

SVF-502d

MENU ITEM	PURPOSE	MORE INFORMATION
CONTROL TYPE	<ul style="list-style-type: none"> SINGLE, MASTER or SHADOW If another boiler has already been selected as master, a notice window will appear if MASTER is selected here. 	None
BOILER ADDRESS	<ul style="list-style-type: none"> Network address of boiler (can be changed here if desired, but every boiler must have a unique address). 	None
NET MAX ON TIME	<ul style="list-style-type: none"> Maximum amount of time this boiler will operate on a network call for heat from the Master boiler before switching to a LOCAL PRIORITY 2 demand (if no LOCAL PRIORITY 1 demand is present). 	None
NET MIN ON TIME	<ul style="list-style-type: none"> Minimum amount of time this boiler will operate on a network call for heat from the Master boiler before switching to a LOCAL PRIORITY 1 demand. 	None
MAX RATE ON NET	<ul style="list-style-type: none"> Maximum rate the boiler will run at during NETWORK calls. 	None
MIN RATE ON NET	<ul style="list-style-type: none"> Minimum rate the boiler will run at during NETWORK calls. 	None
ROTATION & SEQUENCE	<ul style="list-style-type: none"> Select the method by which the boilers will turn on and off. Choose between SMART, PARALLEL, or SERIES. (This setting is only accessible on Master boiler.) 	See Figure 38, page 59 for explanation of sequencing options

Screens shown above are typical only. Actual screens depend on control settings chosen.

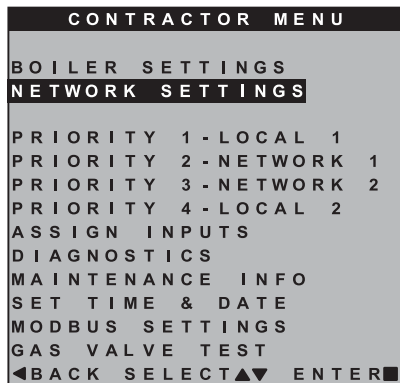


ROTATION AND SEQUENCE

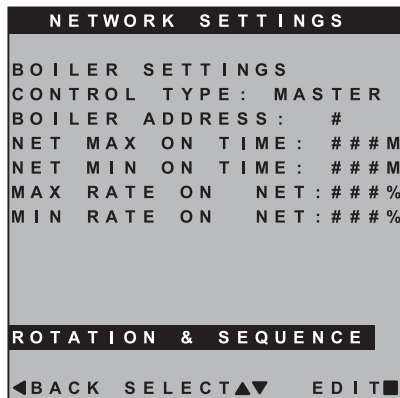
⚠WARNING Boiler Model, Altitude are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

1. Access contractor menus by pressing and holding the UP and DOWN arrow keys at the same time for 7 seconds.
2. See Figure 34, page 55 for the screen sequences up to the CONTRACTOR menu.

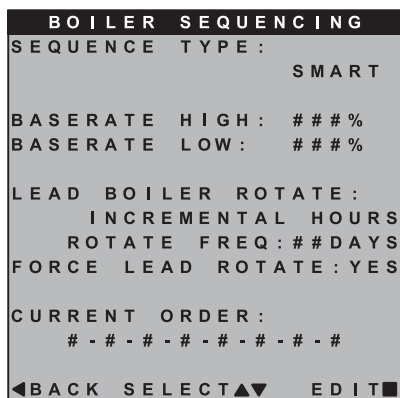
Figure 37 SVF™ NETWORK SETTINGS menu (see Figure 34, page 55 to access CONTRACTOR menu)



Highlight NETWORK SETTINGS, then press



Highlight ROTATION AND SEQUENCE, then press



SVF-502c

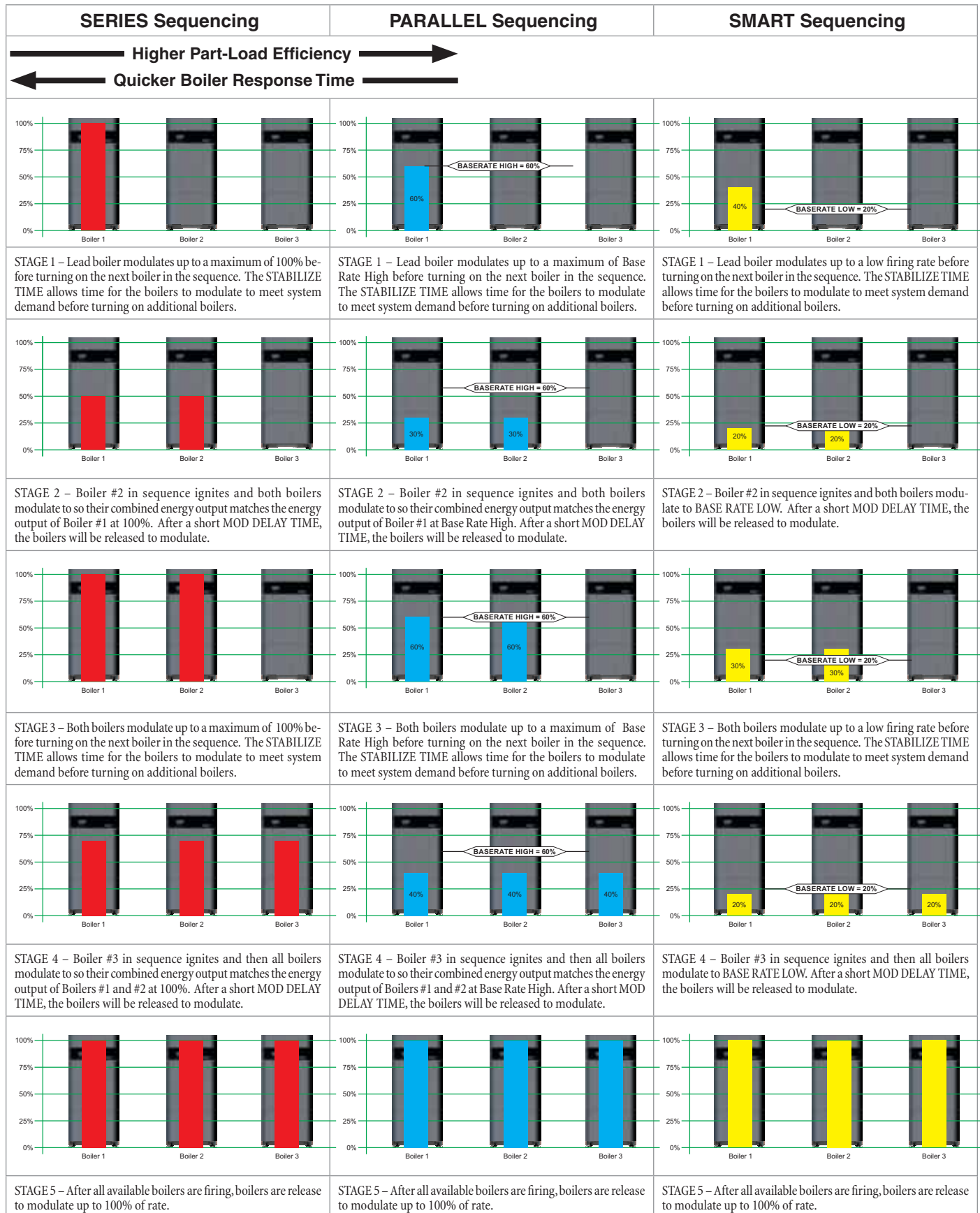
MENU ITEM	PURPOSE
SEQUENCE TYPE	<ul style="list-style-type: none"> Select the method of which the boilers will turn on and off. Choose between SERIES, PARALLEL, or SMART. SERIES sequencing allows each boiler to reach full input before bringing on the next boiler in sequence. PARALLEL sequencing uses a limiter, called BASERATE HIGH, to limit the firing rate before adding additional boilers. SMART sequencing (factory default setting) uses a low firing rate setting, called BASERATE LOW, to keep boilers at a low firing rate, bringing on additional boilers at reduced rate until all boilers are on if necessary. Boilers are then allowed to modulate together as high as necessary to meet demand.
BASERATE HIGH	<ul style="list-style-type: none"> This sets highest modulation rate before turning on the next boiler. This is read-only if in SMART mode.
BASERATE LOW	<ul style="list-style-type: none"> This sets rate that the next boiler in sequence is going to turn on when called. This is only visible if the Sequence Type is selected as SMART. It is recommended that Baserate Low be set at least 10% greater than the Min Rate of any boiler on the network.
LEAD BOILER ROTATE	<ul style="list-style-type: none"> Choose how to rotate the boiler sequencing. Choose either OFF, BY BOILER ID, TOTAL HOURS, or INCREMENTAL HOURS. Firing sequence is changed every rotation period (ROTATE FREQ – see setting explanation below). OFF — Master boiler is always the first to fire. Others fire in the order of their network ID. BY BOILER ID — Lead boiler toggles in the sequence of network ID numbers (changes from boiler number 1 to number 2, then boiler number 2 to number 3, etc.). TOTAL HOURS — The boiler with the most <i>lifetime</i> operating hours is moved to the last in the firing sequence. The boiler with the least <i>lifetime</i> operating hours is made first in the sequence. Others are ordered by their respective <i>lifetime</i> operating hours. INCREMENTAL HOURS — Firing sequence is based on the operating time <i>during the previous rotation period</i>. The boiler with the least operating time is started first; the boiler with the most operating time is started last; all others are started in order of their operating time.
ROTATE FREQ	<ul style="list-style-type: none"> Recalculates the boiler order every ## days based on LEAD BOILER ROTATE setting.
FORCE LEAD ROTATE	<ul style="list-style-type: none"> Select YES or NO. When the rotation frequency timer expires and the new order is calculated, this forces off the boiler lowest in the sequence. Then the boiler highest in the sequence fires to replace it.
CURRENT ORDER	<ul style="list-style-type: none"> Shows the current firing order of the boilers on the network. This list updates based on how many boilers are detected and the order of sequence based on the above settings. Sequence is shown as left-most boiler is first to turn on. Right-most boilers are the first to turn off.

Screens shown above are typical only. Actual screens depend on control settings chosen.



ROTATION AND SEQUENCE (continued)

Figure 38 SVF™ sequencing options — SMART, PARALLEL or SERIES (examples shown for 3-boiler network)

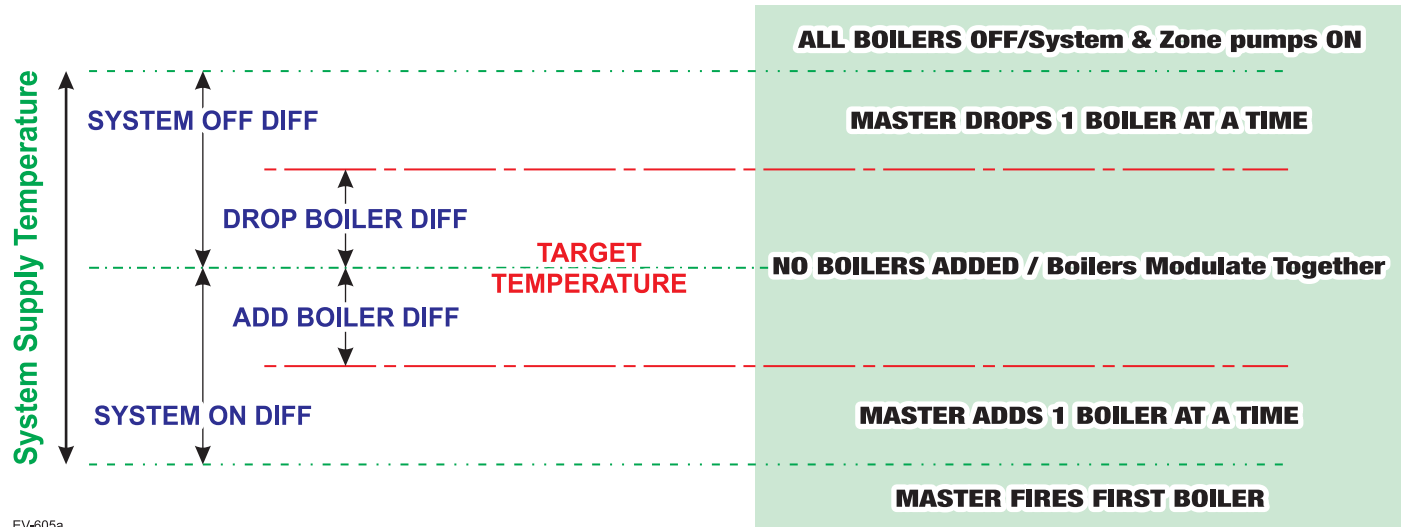




ROTATION AND SEQUENCE (continued)

Figure 39 Boiler sequencing — adding and dropping boilers

Control differential settings determine adding and dropping boilers



EV-605a



Network Boiler PRIORITY menus

⚠ WARNING Boiler Model, Altitude are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

1. Access contractor menus by pressing and holding the UP and DOWN arrow keys at the same time for 7 seconds.
2. See Figure 34, page 55 for the screen sequences up to the CONTRACTOR menu.

Figure 40 SVF™ Network Boiler PRIORITY menus (access menus from CONTRACTOR menu)

Local Priority 1	Local Priority 2	Network Priority 1	Network Priority 2	MENU ITEM	DESCRIPTION
x	x			INPUTS ASSIGNED	• List of inputs assigned to this priority/system on the local boiler (appears as 1, 2, 3).
x	x	x	x	SYSTEM TYPE	• Select the system type for this PRIORITY, based on the heating terminal units in the system. Use the CUSTOM selection to set the control for a different system type. The factory preset values for SUPPLY MAX, SUPPLY MIN, OD RESET MAX and OD RESET MIN are chosen based on the normal best setting for the terminal units. See page 54.
x	x			TARGET MOD SENSOR	• Read only — shows whether boiler modulates based on System Supply sensor (network priority) or Boiler Outlet sensor (local priority).
x	x	x	x	TARGET ADJUST	• Select how target temperature is calculated by control: NONE (no reset, fixed target temperature), 0–10V (target temperature based on analog input from remote source), ODT (outdoor reset operation).
x	x	x	x	SUPPLY MAX	• Set SUPPLY MAX to the required supply water temperature for the system at design maximum heat loss (typically 180°F for finned tube baseboard on new installations.)
x	x	x	x	SUPPLY MIN	• SUPPLY MIN should equal the desired minimum supply water temperature for the system. This line will not show if Target Adjust is selected as NONE.
x	x	x	x	OD RESET MAX	• Appears if TARGET ADJUST is set to ODT. Outdoor temperature at which the target temperature reaches its minimum value – usually set at the balance point temperature for the building. (Does not appear if 0–10V or NONE is selected for Target Adjust.)
x	x	x	x	OD RESET MIN	• Appears if TARGET ADJUST is set to ODT. Outdoor temperature at which the target temperature reaches its maximum value – usually set at the outdoor design temperature for the installation. (Does not appear if 0–10V or NONE is selected for Target Adjust.)
x	x	x	x	VOLTS FOR MAX	• Appears if 0–10V is selected for Target Adjust. Set the voltage at which SUPPLY MAX temperature is required.
x	x	x	x	VOLTS FOR MIN	• Appears if 0–10V is selected for Target Adjust. Set the voltage at which SUPPLY MIN temperature is required. For voltages between Min and Max, the target temperature will be adjusted on a linear curve.
x	x	x	x	BOOST TIME	• Every time the call for heat surpasses this duration of time the target temp will increase (boost) up 10°F to a maximum temperature of SUPPLY MAX.
		x	x	SYSTEM OFF DIFF	• This is the amount the temperature must rise above system target to turn the boiler(s) OFF.
		x	x	SYSTEM ON DIFF	• This is the amount the temperature must drop below system target to begin network modulation routine. (This line may NOT appear, depending on TARGET ADJUST setting.)
		x	x	ADD BLR DIFF	• If the system supply temperature has not reached target minus this differential at the end of the STABILIZE TIME, the control will turn on the next available boiler in the boiler firing order.
		x	x	DROP BLR DIFF	• If the system supply temperature rises to more than target plus this differential, the control will turn off the last firing boiler in the boiler firing order. Drop Delay Timer limits how quickly multiple boilers drop off.
		x	x	MOD DELAY TIME	• The time allowed for the boilers to adjust to the requested firing rate before beginning Stabilize Time and resuming modulation.
		x	x	STABILIZE TIME	• The time allowed for all boilers actively heating a network priority to reach target modulation rate requested by the master. If the timer expires and system temperature is less than target – ADD BLR DIFF, the master will add the next available boiler. If there are no more available boilers, the master will freely modulate the boilers to satisfy the heat demand.
		x	x	ADD DELAY TIMER	• Timer starts when the modulation rate of all boilers actively heating a network priority are at BASE RATE HIGH, MAX RATE FOR NET, or are being self-limited. If the timer expires and system temperature is less than target – ADD BLR DIFF, the master will add the next available boiler.
		x	x	DROP DELAY TIMER	• Minimum time before a boiler will be dropped off. This timer only begins after the first boiler has been dropped. It applies as each additional firing boiler is dropped.
		x	x	MAX BLR TEMP	• If the boiler outlet temperature approaches [MAX BOILER TEMP – BOILER ON DIFF] before the system supply temperature reaches its target, the control will modulate the boiler based on the boiler outlet temperature. The boiler will cycle and modulate based on the boiler ON and OFF differential settings. (This line does NOT appear if Target Mod Sensor is set to Boiler Out).
x	x	x	x	BOILER ON DIFF	• This is the amount the temperature must drop below target (or Boiler Max) to turn the boiler ON.



Network Boiler PRIORITY menus (continued)

Figure 41 SVF™ PRIORITY menus, continued

Local Priority 1	Local Priority 2	Network Priority 1	Network Priority 2	MENU ITEM	DESCRIPTION
X	X	X	X	BOILER OFF DIFF	<ul style="list-style-type: none"> This is the amount the temperature must rise above target (or Boiler Max) to turn the boiler OFF.
X		X		MAX ON TIME	<ul style="list-style-type: none"> Maximum time boiler will run on this priority if it is being asked to run on another priority. Will rotate among all priorities its being asked to run. Network boilers are also controlled by NET MAX ON TIME (see Figure 36, page 57). NETWORK PRIORITY 1 only — Maximum time master will operate the network on NETWORK PRIORITY 1 if NETWORK PRIORITY 2 is calling for heat. NOTICE When the master boiler detects a local call for heat from any boiler that is currently operating for a network demand, the master control will allow that boiler to switch to its local priority and replace the lost network energy of that boiler appropriately.
	X		X	MIN ON TIME	<ul style="list-style-type: none"> Minimum time the boiler will run on an existing priority before switching to a lower priority, or back to an existing higher priority. If a new higher priority is called during MIN ON TIME, the boiler will immediately switch to actively heat the higher priority. Network boilers are also controlled by NET MIN ON TIME (see Figure 36, page 57). NETWORK PRIORITY 2 only — Minimum time master will operate on a network priority 2 if network priority 1 is calling for heat.
X	X			RUN BOILER PUMP	<ul style="list-style-type: none"> Selects whether the Boiler Pump is turned on while running on this priority.
X	X	X	X	RUN AUX PUMP/ OUTPUT	<ul style="list-style-type: none"> When set to YES, input/output pairs on any network boiler assigned as AUX PUMP/ OUPUT -> ANY TT INPUT BY ITS PRIORITY, will activate. Set this to NO for priorities that do not need this AUX PUMP/OUTPUT to be active.
X	X	X	X	PRE PUMP	<ul style="list-style-type: none"> Time associated PUMPS and AUX PUMP/OUTPUT are run before entering prepurge.
X	X	X	X	POST PUMP	<ul style="list-style-type: none"> Time associated PUMPS and AUX PUMP/OUTPUT are run after the call for heat has ended and before switching to another call for heat.
		X	X	MAX SYS MBH	<ul style="list-style-type: none"> Limits the energy allowed by the boiler network to be put into this priority's system. The default is set to AUTO (the sum of all network boiler sizes). If the total size of the boiler network is too large for a system, adjust MAX SYS MBH lower to the appropriate energy. MAX SYS MBH can be set greater than AUTO if more SVF™ boiler are planned to be installed to the same network. This setting can be adjusted in 100 MBH increments (100 MBH = 100,000 BTU/hour).
		X	X	MIN BOILERS	<ul style="list-style-type: none"> The Master turns on this many boilers in the network on an initial call for heat in order to avoid delays due to accumulative wait times between boilers. When switching to another network priority, MIN BOILERS is re-evaluated based on the other priority's setting.
X	X			MAX RATE	<ul style="list-style-type: none"> Maximum rate this boiler will modulate up to while running on this priority.
X	X			MIN RATE	<ul style="list-style-type: none"> Minimum rate this boiler will modulate down to while running on this priority.
X	X	X	X	ADD'L HEAT DEMAND ACTIVATE CONTACT	<ul style="list-style-type: none"> If this is set to 1st: Immediately on a call for heat, the heat demand contacts close and the RESPONSE TIME timer starts. If the call for heat from this demand is still active at the end of the Response Time and the system has not reached [Target Temp - System On Diff], the boiler system will start. If the system temperature is within this range, the boiler system will not start unless the temperature drops below this value. The add'l heat demand contact opens when the heat demand turns off. If this is set to 2nd: The boiler system starts immediately on a call for heat and starts the RESPONSE TIME timer. If the call for heat is still active when the RESPONSE TIME expires, the boiler will close its additional heat demand contact. Timers reset when priorities are switched. If this is set to ODT: The boiler system and AHD will operate according to the setting of ACTIVATE CONTACT below setpoint and ODT setpoint temperature. See page 55 for more details of operation. NETWORK PRIORITY 1 or 2 — The additional heat demand must be wired to the master boiler. LOCAL PRIORITY 1 or 2 — The additional heat demand must be wired to the individual boiler. A master boiler cannot use additional heat demand on a local priority.
X	X	X	X	RESPONSE TIME	<ul style="list-style-type: none"> Time to wait for system to respond before taking the Activate Contact action. If ACTIVATE CONTACT is OFF, this line does not appear.
X	X	X	X	MAX RATE VOLTS	<ul style="list-style-type: none"> The voltage that correspond to the highest modulation rate the boiler will operate at.
X	X	X	X	MIN RATE VOLTS	<ul style="list-style-type: none"> The voltage that correspond to the lowest modulation rate the boiler will operate at.
X	X	X	X	TEMP. DEPENDENT	<ul style="list-style-type: none"> AHD will use system supply temperature as a shutoff point if system temperature gets to the priority specific Max. Supply temperature and SYS OFF DIFF.
X	X	X	X	ODT SETPOINT	<ul style="list-style-type: none"> Used as a switching point to operate AHD as first or second. If ACTIVATE CONTACT below setpoint is set to 1st, the AHD contact activates as 1st below the ODT setpoint temperature and as 2nd above it, the reverse is true if selected as 2nd.
X	X	X	X	ACTIVATE CONTACT BELOW SETPOINT	<ul style="list-style-type: none"> The ODT setpoint temperature and as 2nd above it, the reverse is true if selected as 2nd.



Single Boiler PRIORITY menus

⚠ WARNING Boiler Model, Altitude are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

1. Access contractor menus by pressing and holding the UP and DOWN arrow keys at the same time for 7 seconds.
2. See Figure 36, page 57 for the screen sequences up to the CONTRACTOR menu.

Figure 42 SVF™ single boiler PRIORITY menus (access menus from CONTRACTOR menu)

Priority 1	Priority 2	Priority 3	MENU ITEM	DESCRIPTION
x	x	x	INPUTS ASSIGNED	• List of inputs assigned to this priority/system on the local boiler (appears as 1, 2, 3).
x	x	x	SYSTEM TYPE	• Select the system type for this PRIORITY, based on the heating terminal units in the system. Use the CUSTOM selection to set the control for a different system type. The factory preset values for SUPPLY MAX, SUPPLY MIN, OD RESET MAX and OD RESET MIN are chosen based on the normal best setting for the terminal units. See page 54.
x	x	x	TARGET MOD SENSOR	• Select whether boiler modulates based on System Supply sensor or Boiler Outlet sensor.
x	x	x	TARGET ADJUST	• Select how target temperature is calculated by control: NONE (no reset, fixed target temperature), 0–10VDC (target temperature based on analog input from remote source), ODT (outdoor reset operation). This setting cannot be selected if system type is DHW.
x	x	x	SUPPLY MAX	• Set SUPPLY MAX to the required supply water temperature for the system at design maximum heat loss (typically 180°F for finned tube baseboard on new installations.)
x	x	x	SUPPLY MIN	• SUPPLY MIN should equal the desired minimum supply water temperature for the system. This line will not show if Target Adjust is selected as NONE.
x	x	x	OD RESET MAX	• Appears if TARGET ADJUST is set to ODT. Outdoor temperature at which the target temperature reaches its minimum value – usually set at the balance point temperature for the building.
x	x	x	OD RESET MIN	• Appears if TARGET ADJUST is set to ODT. Outdoor temperature at which the target temperature reaches its maximum value – usually set at the outdoor design temperature for the installation.
x	x	x	VOLTS FOR MAX	• Appears if 0–10V is selected for Target Adjust. Set the voltage at which SUPPLY MAX temperature is required.
x	x	x	VOLTS FOR MIN	• Appears if 0–10V is selected for Target Adjust. Set the voltage at which SUPPLY MIN temperature is required. For voltages between Min and Max, the target temperature will be adjusted on a linear curve.
x	x	x	BOOST TIME	• Every time the call for heat surpasses this duration of time the target temp will increase (boost) up 10°F to a maximum temperature of SUPPLY MAX.
x	x	x	SYSTEM OFF DIFF	• This is the amount the temperature must rise above system target to turn the boiler OFF. (This line does NOT appear if Target Mod Sensor is set to Boiler Out).
x	x	x	SYSTEM ON DIFF	• This is the amount the temperature must drop below system target to turn the boiler ON. (This line does NOT appear if Target Mod Sensor is set to Boiler Out).



Single Boiler PRIORITY menus (continued)

Figure 43 SVF™ single boiler PRIORITY menus, continued

Priority 1	Priority 2	Priority 3	MENU ITEM	DESCRIPTION
x	x	x	MAX BLR TEMP	<ul style="list-style-type: none"> If the boiler outlet temperature approaches [MAX BOILER TEMP – BOILER ON DIFF] before the system supply temperature reaches its target, the control will modulate the boiler based on the boiler outlet temperature. The boiler will cycle and modulate based on the boiler ON and OFF differential settings. (This line does NOT appear if Target Mod Sensor is set to Boiler Out).
x	x	x	BOILER ON DIFF	<ul style="list-style-type: none"> This is the amount the temperature must drop below target to turn the boiler ON.
x	x	x	BOILER OFF DIFF	<ul style="list-style-type: none"> This is the amount the temperature must rise above target to turn the boiler OFF.
x	x		MAX ON TIME	<ul style="list-style-type: none"> Maximum time this boiler will run on this priority if it is being asked to run on another priority. Will rotate among all priorities its being asked to run.
	x	x	MIN ON TIME	<ul style="list-style-type: none"> Minimum time the boiler will run on an existing priority before switching to a lower priority, or back to an existing higher priority. If a new higher priority is called during MIN ON TIME, the boiler will immediately switch to actively heat the higher priority.
x	x	x	RUN BOILER PUMP	<ul style="list-style-type: none"> Selects whether the Boiler Pump is turned on while running on this call for heat.
x	x	x	RUN AUX PUMP/ OUTPUT	<ul style="list-style-type: none"> When set to YES, any input/output pairs assigned as AUX PUMP/OUPUT -> ANY TT INPUT BY ITS PRIORITY, will activate. Set this to NO for priorities that do not need this AUX PUMP/ OUTPUT to be active.
x	x	x	PRE PUMP	<ul style="list-style-type: none"> Time associated PUMPS and AUX PUMP/OUTPUT are run before entering prepurge.
x	x	x	POST PUMP	<ul style="list-style-type: none"> Time associated PUMPS and AUX PUMP/OUTPUT are run after the call for heat has ended and before switching to another call for heat.
x	x	x	MAX RATE	<ul style="list-style-type: none"> Maximum rate this boiler will modulate up to while running on this priority.
x	x	x	MIN RATE	<ul style="list-style-type: none"> Minimum rate this boiler will modulate down to while running on this priority.
x	x	x	ADD'L HEAT DEMAND ACTIVATE CONTACT	<ul style="list-style-type: none"> If this is set to 1st: Immediately on a call for heat, the heat demand contacts close and the RESPONSE TIME timer starts. If the call for heat from this demand is still active at the end of the Response Time and the system has not reached [Target Temp - System On Diff], the boiler system will start. If the system temperature is within this range, the boiler system will not start unless the temperature drops below this value. The add'l heat demand contact opens when the heat demand turns off. If this is set to 2nd: The boiler system starts immediately on a call for heat and starts the RESPONSE TIME timer. If the call for heat is still active when the RESPONSE TIME expires, the boiler will close its additional heat demand contact. Timers reset when priorities are switched. If this is set to ODT: The boiler system and AHD will operate according to the setting of ACTIVATE CONTACT below setpoint and ODT setpoint temperature. See page 55 for more details of operation. NETWORK PRIORITY 1 or 2 — The additional heat demand must be wired to the master boiler. LOCAL PRIORITY 1 or 2 — The additional heat demand must be wired to the individual boiler. A master boiler cannot use additional heat demand on a local priority.
x	x	x	RESPONSE TIME	<ul style="list-style-type: none"> Time to wait for system to respond before taking the Activate Contact action. If ACTIVATE CONTACT is OFF, this line does not appear.
x	x	x	MAX RATE VOLTS	<ul style="list-style-type: none"> The voltage that correspond to the highest modulation rate the boiler will operate at.
x	x	x	MIN RATE VOLTS	<ul style="list-style-type: none"> The voltage that correspond to the lowest modulation rate the boiler will operate at.
x	x	x	TEMP. DEPENDENT	<ul style="list-style-type: none"> AHD will use system supply temperature as a shutoff point if system temperature gets to the priority specific Max. Supply temperature and SYS OFF DIFF.
x	x	x	ODT SETPOINT	<ul style="list-style-type: none"> Used as a switching point to operate AHD as first or second. If ACTIVATE CONTACT Below Setpoint is set to 1st, the AHD contact activates as 1st below
x	x	x	ACTIVATE CONTACT BELOW SETPOINT	<ul style="list-style-type: none"> The ODT setpoint temperature and as 2nd above it, the reverse is true if selected as 2nd.

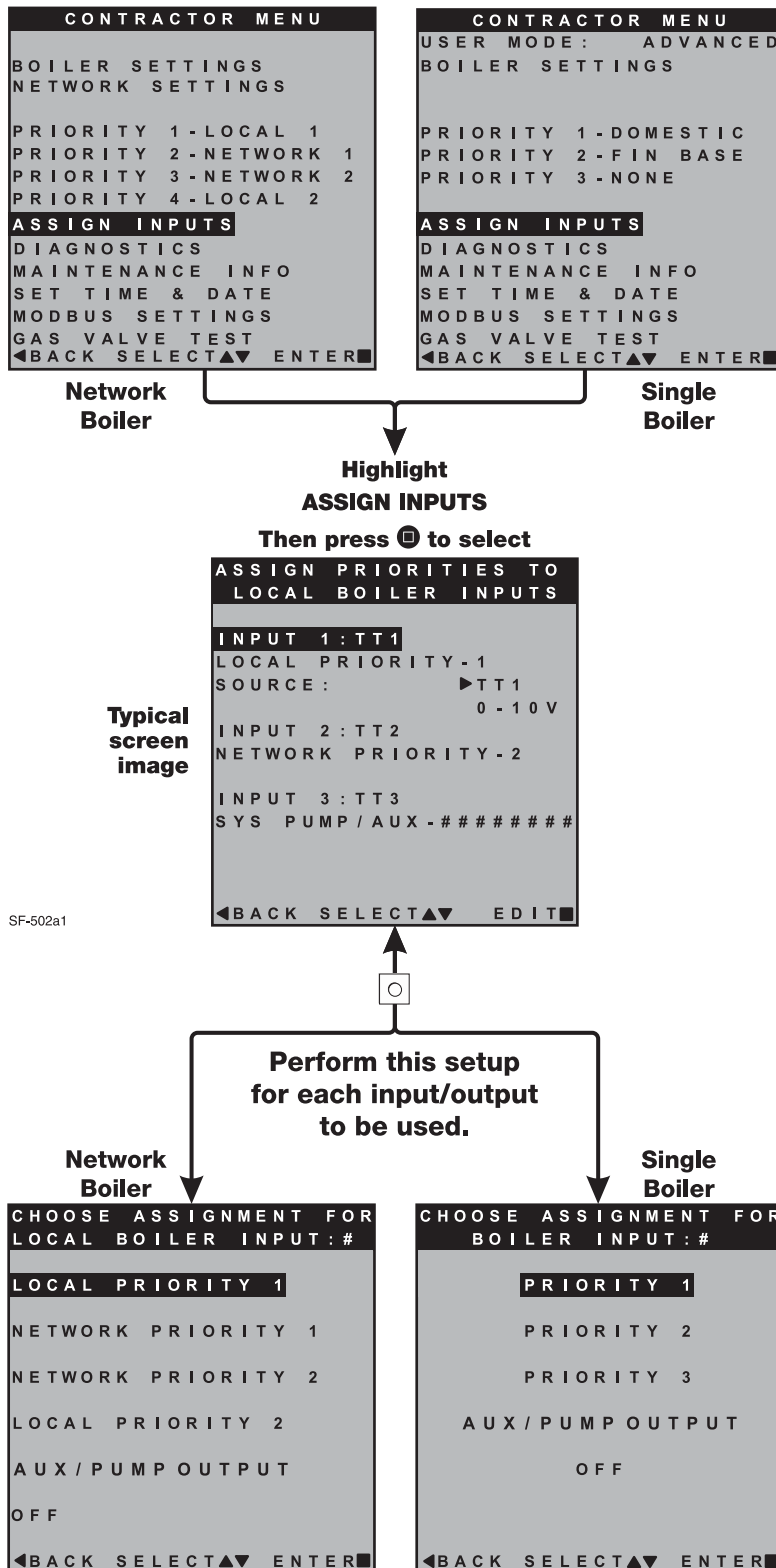


ASSIGN INPUTS menu

⚠WARNING Boiler Model, Altitude are critical settings. Failure to set correctly could result in severe personal injury, death or substantial property damage.

1. Access contractor menus by pressing and holding the UP and DOWN arrow keys at the same time for 7 seconds.
2. See Figure 36, page 57 for the screen sequences up to the CONTRACTOR menu.

Figure 44 Assign Inputs menu (see Figure 36, page 57 to access CONTRACTOR menu)



MENU ITEM	PURPOSE
Overview	<ul style="list-style-type: none"> • There are three inputs/outputs available on each boiler. This menu allows assignment of which inputs/outputs operate which priority/system.
INPUT 1	<ul style="list-style-type: none"> • See “Unity™ control Priorities & Input/Outputs” on page 4 for an explanation of priorities, inputs and outputs.
INPUT 2	<ul style="list-style-type: none"> • Priority settings are adjustable. See page 61 through page 64 for priority options.
INPUT 3	<ul style="list-style-type: none"> • The Assign Inputs menu is for designating priorities to the correct inputs according to the system installed. • Multiple inputs can use the same priority. • The Source line designates Input 1 as either thermostat controlled or 0–10V controlled. (On Master/Shadow systems, this line is not present and Input 1 is predetermined as a thermostat-controlled input.) • When choosing 0–10V as the Source, a NOTICE screen will pop up explaining the use of the 0–10V input. Press SAVE to use this option, or press cancel to return the input to TT1.
AUX PUMP/OUTPUT	<ul style="list-style-type: none"> • The AUX PUMP/OUTPUT function enables an output to turn on in a variety of selectable conditions. • See page 66 for explanations and recommended applications. • In network boiler applications, outputs assigned AUX PUMP/OUTPUT are controlled by the master boiler, based on the input/output and blower behaviors of all boilers on the network.

Screens shown here are typical only. Actual screens depend on control settings chosen.



AUX PUMP/OUTPUT options

Figure 45 AUX PUMP/ OUTPUT operation (accessed in ASSIGN INPUTS menu – see page 65)

Option	Activation conditions	Suggested uses
ALWAYS ON	<ul style="list-style-type: none"> Output is always energized whenever the control is powered. 	<ul style="list-style-type: none"> Hot loop for seasonal boilers that are manually shut down at end of season and started up at start of heating season.
EXTERNAL SWITCH	<ul style="list-style-type: none"> The output is energized on closure of an external switch wired to this input and is de-energized when the external switch opens. 	<ul style="list-style-type: none"> Hot loop for boilers whose CH is manually shut down at end of season and started up at start of heating season, but remain available for local calls (DHW, etc.).
OUTDOOR BELOW WWSD	<ul style="list-style-type: none"> This output is energized only when outdoor temperature is below the WWSD setting (see BOILER SETTINGS menu, Figure 35, page 56). This setting is non-selectable if WWSD is set to OFF or ODT is not connected at initial boiler power. If Outdoor Below WWSD is already chosen and WWSD is later set to OFF, Outdoor Below WWSD will behave as Always On. 	<ul style="list-style-type: none"> Hot loop for boilers whose CH is automatically shut down based on outdoor temperature (inferred heat loss), but remain on for local calls (DHW, etc.).
ANY TT INPUT	<ul style="list-style-type: none"> The assigned output is energized if there is an input closure on any of the network boilers. The assigned output will de-energize once there are; no input closures on any of the network boilers, post-purge has finished, and post-pump time has expired. If the closed input is configured for a heat demand, its output will de-energize after post-purge and post-pump. 	<ul style="list-style-type: none"> Energize a system pump relay if pump must run during all heating calls.
ANY TT INPUT BY ITS PRIORITY SETTINGS	<ul style="list-style-type: none"> The assigned output is energized: <ul style="list-style-type: none"> If there is an input closure on any of the network boilers. AND . . . <ul style="list-style-type: none"> RUN AUX PUMP/OUTPUT is set to YES for the priority assigned to the closed input. The assigned output will de-energize once there are; no input closures on any of the network boilers, post-purge has finished, and post-pump time has expired. 	<ul style="list-style-type: none"> Energize a system pump relay if pump must run only on some heat calls (such as systems with locally-connected DHW heating).
ANY BURNER DEMAND	<ul style="list-style-type: none"> The assigned output is energized when any boiler on the network receives a call for heat and starts to pre-purge. The assigned output is de-energized once all burners are off and post-purge is complete. 	<ul style="list-style-type: none"> Use for interlocking with combustion air damper, flow switch, etc.
DAMPER CONTROL	<ul style="list-style-type: none"> The assigned output is energized when the boiler receives a call for heat and starts to pre-purge. The assigned output is de-energized once the burner is off and post-purge is complete. 	<ul style="list-style-type: none"> Use for interlocking with combustion air louvers (ie louver wall), flow switch, etc. Individual combustion air damper kit.

Figure 46 AUX PUMP/ OUTPUT operation — start, run and stop, based on boiler status

Option	Standby	TT Closed	Pre-Pump	Pre-Purge	Burner Running	Post-Purge	Post-Pump	Standby	Comments
ANY TT INPUT OR ANY TT INPUT BY ITS PRIORITY SETTINGS	off	ON	→					off	<ul style="list-style-type: none"> See Figure 45 for explanation of differences between the ANY TT INPUT options.
ANY BURNER DEMAND	off	off	off	ON	→		off	off	



MAINTENANCE, DATE AND TIME menus

Figure 47 MAINTENANCE, DATE AND TIME menus — navigation (see Figure 26, page 45 for access information)

Maintenance Info	Comments
Name	Contractor name to appear in maintenance reminders and during lockouts
Phone	Contractor phone number
Model	Displays the boiler model selected in the boiler setup
CP Number	Enter the CP# of the boiler
Installed	Enter the date the boiler was installed
Last Date	Date automatically entered when Reset Reminder is chosen by contractor
Next Date	Date automatically calculated when Reset Reminder is selected by contractor
Interval Settings	Contractor selects maintenance reminder frequency based on service history
Reset Reminder	Contractor selects this to update Last maintenance Date and Next Date. Homeowner uses this to ignore the reminder and update only the Next Date.

Set Time and Date	Comments
Year	Set year (homeowner or contractor)
Month	Set month (homeowner or contractor)
Day	Set day (homeowner or contractor)
Hour	Set hour (homeowner or contractor)
Minute	Set minute (homeowner or contractor)

MAINTENANCE INFO

Use this section to enter contractor's information, CP number, install date and to enter an automatic notice for maintenance (default is 12 months). Because this shows on the display, it is an automatic means of notifying the homeowner of need for scheduled maintenance by the technician. Select RESET REMINDER to reset for the next maintenance date.

SET TIME AND DATE

Enter current date and time. This allows correct maintenance reminder timing and provides date and time stamp for lockout histories on ERROR screen in Diagnostic Menu.

Gas Valve Test

Select gas valve 1 or gas valve 2 to alter the state of the corresponding gas valve relay during burner fire.

