# EN6001


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RWMA®
MEMBER

# Important Safety Instructions

## READ THIS MANUAL COMPLETELY

**BEFORE ATTEMPTING TO INSTALL OR OPERATE THE CONTROL.**
**STORE THIS TECHNICAL INFORMATION IN A PLACE**
**TO WHICH ALL USERS HAVE ACCESS AT ANY TIME**

ENTRON Controls follows the practices of the RWMA for precautionary labeling. See RWMA Bulletins #1 and #5 for a complete description. Observe the WARNING, DANGER, and CAUTION labels affixed to control to maintain safe operation. ENTRON Controls, LLC. and its affiliates are not responsible for any harm caused by non-compliance of instructions associated with the aforementioned labels or signal words to follow.

The signal word **DANGER** is used to call attention to immediate or imminent hazards which if not avoided ***will result*** *in immediate, serious, or personal injury or loss of life. Examples are: exposed high voltage; exposed fan blades.*

The signal word **WARNING** is used to call attention to potential hazards which ***could result*** *in personal injury or loss of life. Examples are: not using proper personal protection; removal of guards.*

The signal word **CAUTION** is used to call attention to hazards which ***could result*** *in non-life threatening personal injury or damage to equipment.* ***CAUTION*** *may also be used to alert against unsafe practices.*

The term **NOTICE** is used for making recommendations on use, supplementary information, or helpful suggestions. Non-compliance with these recommendations ***may result*** *in damage to control, welding machine, or workpiece.* ENTRON Controls, LLC. and its affiliates are not responsible for damage caused by such non-compliance, and warranties may be voided accordingly at the discretion of ENTRON Controls.

WARNING: Individuals with cardiac devices should maintain a safe distance due to strong magnetic fields arising from resistance welding. The function of cardiac pacemakers and defibrillators may be disturbed, which may cause death or considerable health damages to persons concerned! These persons should avoid the welding system unless authorized by a licensed physician.

# My Control Information

Filling out the following information (and keeping it readily available) may allow for future technical service of equipment to be conducted more efficiently:

Model #: EN6001

Serial #: _____

OEM/Distributer: _____

Contact #: _____

Purchase Date: _____

## Hardware Connections

P1—2, Foot Switch #1 _____

P1—3, Foot Switch #2 _____

P1—4, Emergency Stop _____

P1—5, No Weld Signal _____

P1—6, Programmable Input #1 _____

P1—7, Programmable Input #2 _____

P1—8, Programmable Input #3 _____

P1—9, Programmable Input #4 _____

P1—10, Programmable Input #5 _____

P1—11, Programmable Input #6 _____

P2—2, Solenoid Valve #1 _____

P2—3, Solenoid Valve #2 _____

P2—4, Solenoid Valve #3 _____

P2—5, Programmable Output #1 _____

P2—6, Programmable Output #2 _____

P2—7, Programmable Output #3 _____

P2—8, Programmable Output #4 _____

P3 Sensing Coil ☐ Not Used ☐ Primary ☐ Secondary

# Weld Schedule Worksheet

Filling out the following information (and keeping it readily available) may allow for future technical service of equipment to be conducted more efficiently. Please duplicate and complete this page for each utilized schedule:

## SCHEDULE #: _____

| | | | |
|---|---|---|---|
| Squeeze Delay: | _____ cycles | _____ KVA or | _____ % |
| **Squeeze:** | **_____ cycles** | **Valves:** | **_____** |
| Weld 1: | _____ cycles | _____ KVA or | _____ % |
| Cool 1: | _____ cycles | | |
| Slope: | _____ cycles | | |
| **Weld 2:** | **_____ cycles** | **_____ KVA or** | **_____ %** |
| Cool 2: | _____ cycles | | |
| Impulses: | _____ cycles | | |
| **Hold:** | **_____ cycles** | | |
| **Off:** | **_____ cycles** | | |
| Cycle Mode: | _____ | | |

Comments: _____

_____

_____

_____

_____

_____

_____

_____

_____

Tap Setting: _____ Pressure: _____ Machine: _____

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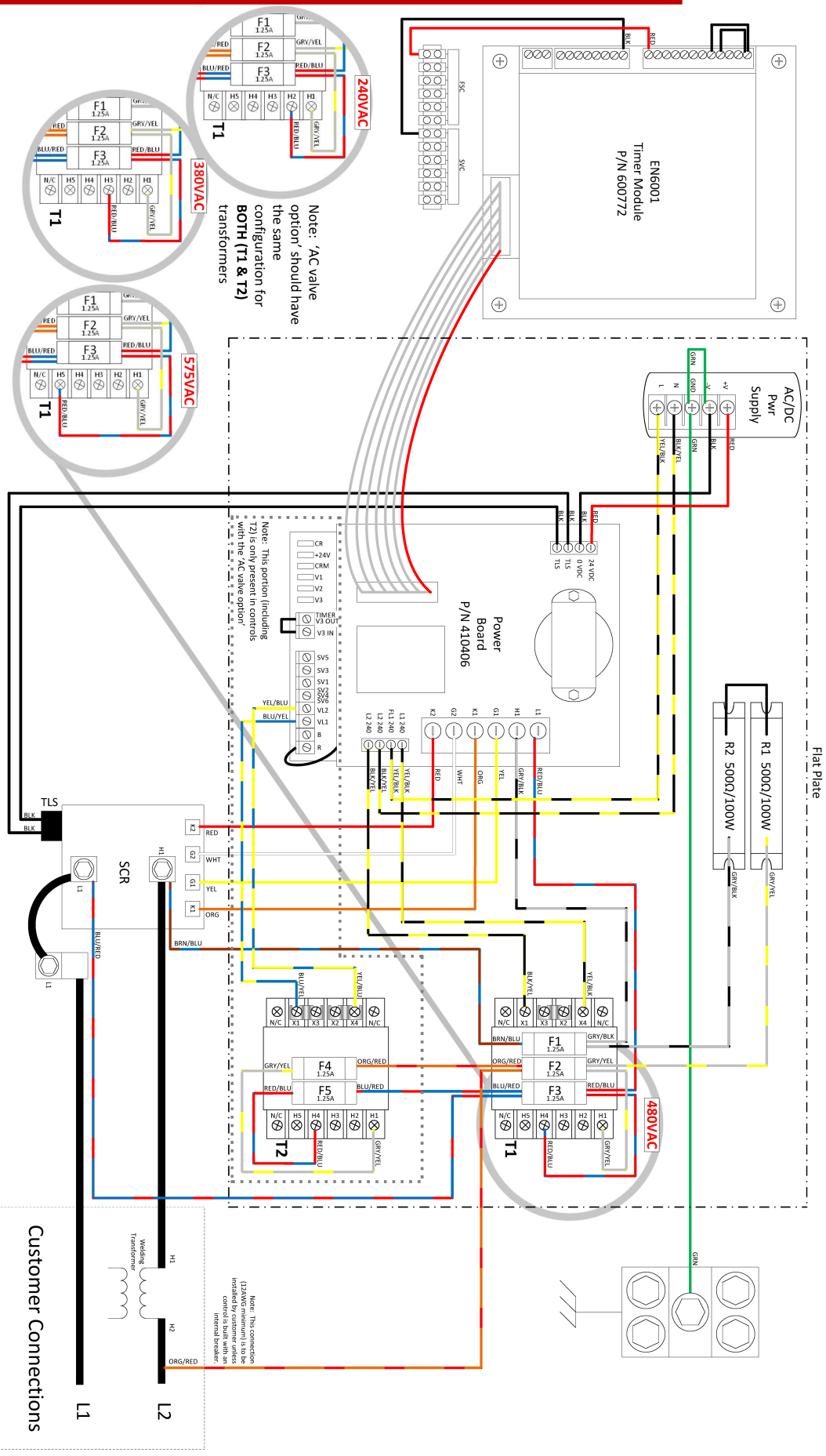
# Functions

- Constant current regulation
- Primary or Secondary feedback
- Current Monitoring with high, low, and pre-limits
- Up to 64 programs (internal or external selection)
- On Timer Membrane Keyboard with backlit 128x64 (8 lines) LCD graphic display
- Six (6) inputs and four (4) outputs with output protection on CPU
- Electrode management functions; including stepping, current counting, tip-dressing, and preset curves
- Welding programs may be linked together for complex spot schedules (chained or successive)
- USB-capable firmware refresh
- AC 60/50 Hz welding support
- Spot / Pulsation / Seam welding / Flash or Butt welding / Brazing
- Multiple weld intervals plus pulsation, upslope and downslope
- Air-over-oil gun operation
- Water Saver (contactor timer)
- Head lock function
- Program lockout (key switch) function
- Operation mode switch (program lockout and Weld/No Weld)
- Error reset switch
- Optional plug-in Ethernet card provides PLC compatibility with Modbus and EtherNet/IP

# Specifications

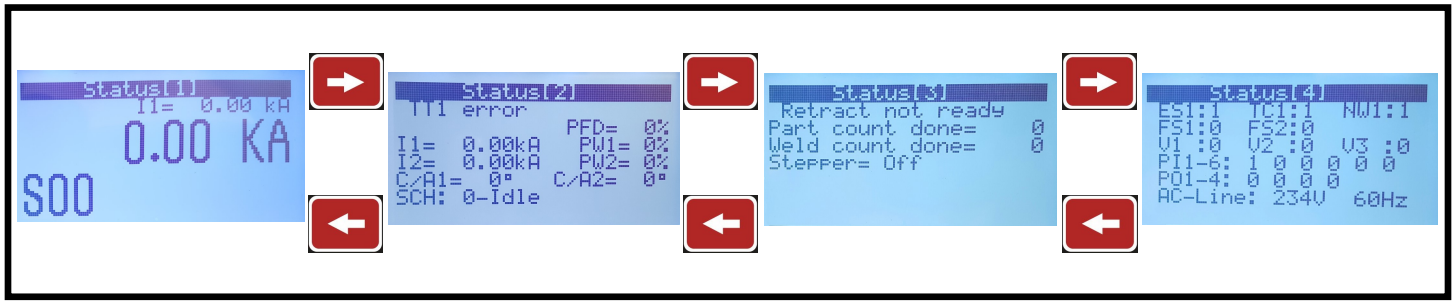
| | |
|---|---|
| **Environmental Conditions:** | |
| Operating Temperature | 0°C to 60°C |
| Storage/Transport Temperature | -25°C to 70°C |
| Air pressure | 0 to 2000m above sea level |
| Humidity | no dew point excursion allowed |
| Enclosure Ratings | NEMA 1 and NEMA 12 |
| | |
| **Electronics Ratings:** | |
| CPU operating voltage (without I/O) | 24 VDC ±5% at 220 mA |
| Rated current (without I/O) at 24V | SV1-SV3: ~500 mA<br>PO1-PO4: ~500 mA |
| Discrete I/O: | |
| Input | +24V ±15% |
| DC Output | 24 VDC, 0.5A max |
| AC Output | 120 VAC, 1A max |
| Supply I/O: | 24 VDC ±5% |
| | |
| **General Operating:** | |
| Operating Voltage<br>(see wiring diagram for details) | 240VAC or<br>380VAC or<br>480VAC or<br>575VAC |

# Wiring and Connectivity



# Menu Navigation

Status Page List (Default)



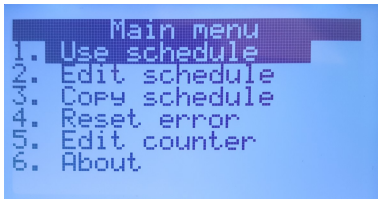

F

ESC

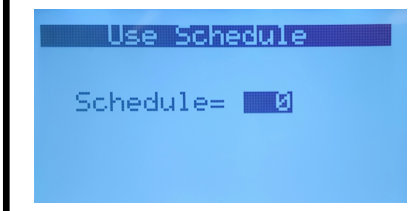
Main Menu

ESC

Schedule Select




1. Use Schedule
2. Edit Schedule
3. Copy Schedule
4. Reset Error
5. Edit counter
6. About

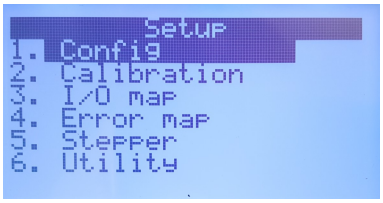




AND

ESC

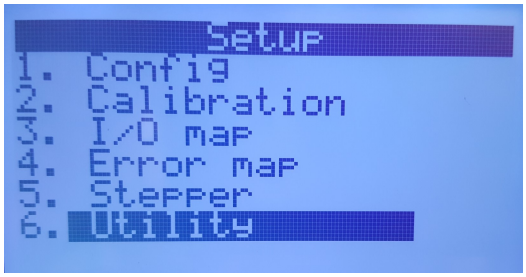
Setup Menu



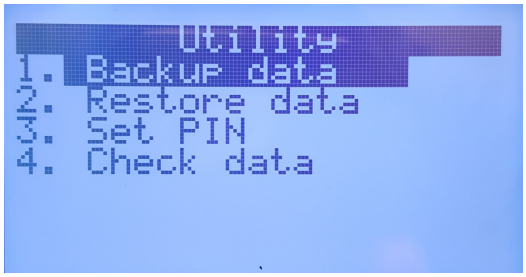
# Saving Weld Schedules

Step 1: Insert a formatted USB drive into USB port on the control panel

Step 2: From the 'Setup Menu' (see Menu Navigation for details) select "Utility".

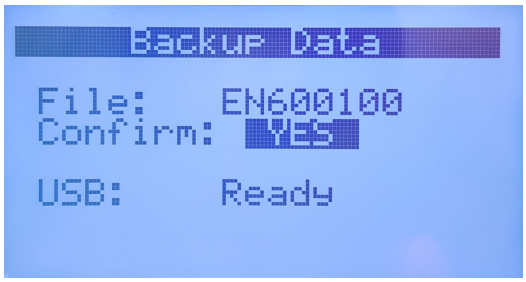



Step 3: Select "Backup data"

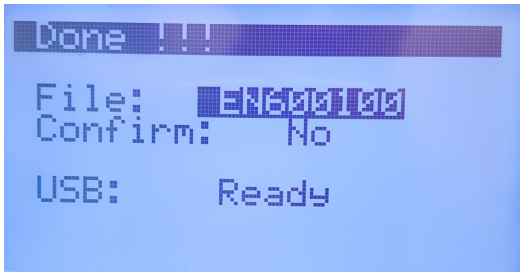



Step 4: Rename file (desired) using + and −

Step 5: Set "Confirm" to "YES" using + and −



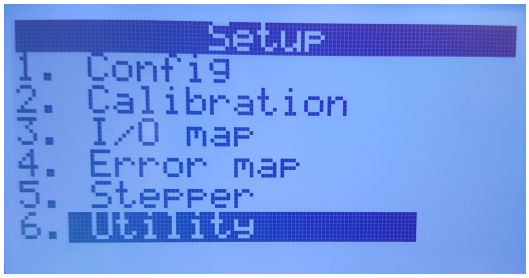

Step 6: Press ↩ and verify that "DONE!!!" appears in the top left corner of the title bar.



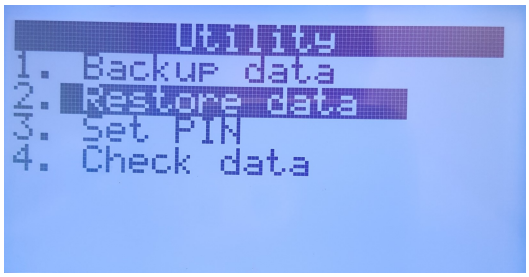
# Loading Weld Schedules

Step 1: Insert USB drive with a previously saved backup file* into the USB port on the control panel.

Step 2: From the 'Setup Menu' (see Menu Navigation for details) select "Utility".

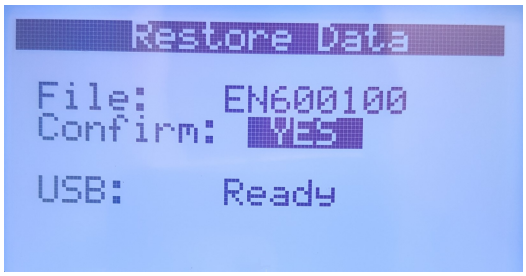



Step 3: Select "Restore data"

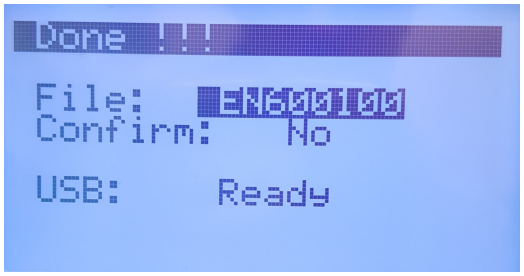



Step 4: Select the desired filename* using [+] and [−]

Step 5: Set "Confirm" to "YES" using [+] and [−]



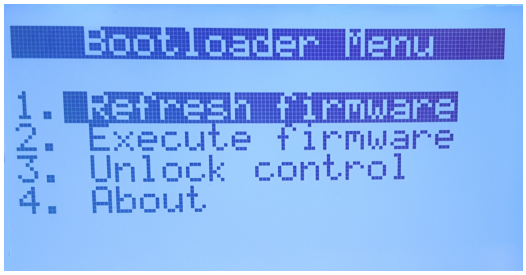

Step 6: Press [↩] and verify that "DONE!!!" appears in the top left corner of the title bar.




*Note: The backup file must be on the root directory of the USB drive. And the filename must be EN6001**00**.EN6 to EN6001**99**.EN6

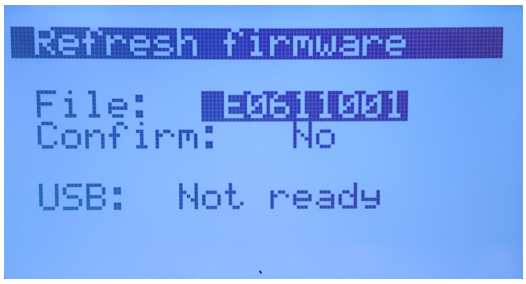
# Updating Firmware

Step 1: Ensure the control is completely powered down.
Step 2: Insert USB drive with EN6001 firmware file into USB port on the control panel.
Step 3: Press and hold [+] and [−]
Step 4: Power on the control. Once the Bootloader Menu (shown right) appears, release [+] and [−]



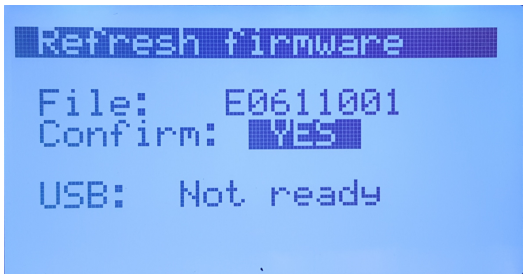

Step 5: Select “Refresh firmware”

Step 6: Select the desired filename* using [+] and [−]




Step 7: Set “Confirm” to “YES” using [+] and [−]

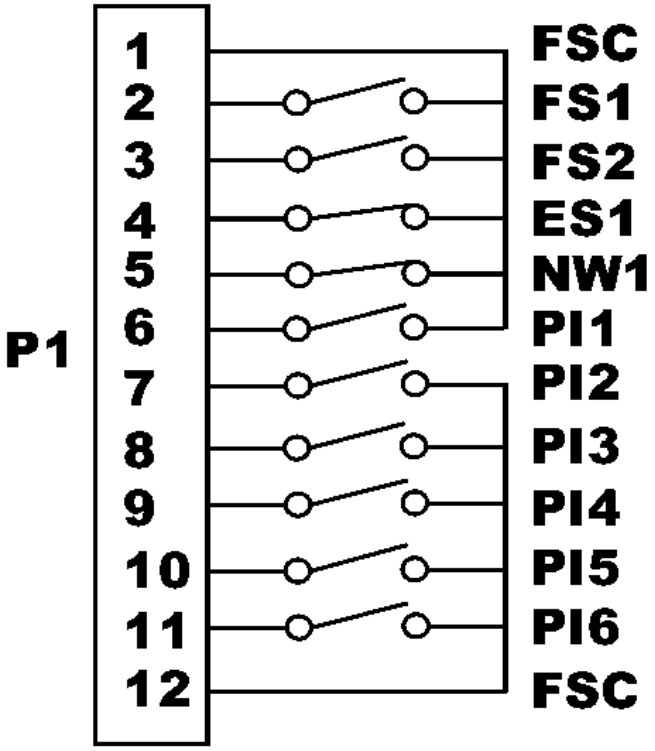
Step 8: Press and [↵] the control will begin updating.



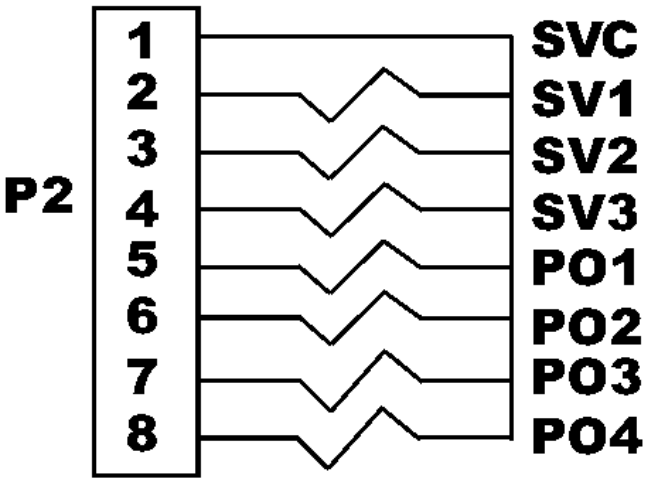

Step 9: In order to return to the “Main Menu”, either
1. Temporarily power down the control
2. Go back to “Bootloader Menu” by pressing [ESC] Then, select “Execute firmware”, then select “YES”.


*Note: The firmware file must be on the root directory of the USB drive, and the filename will be E061**1001**.BIN to E061**9999**.BIN
(this may requiring the extraction of a zip file)

# User Connections (DC)

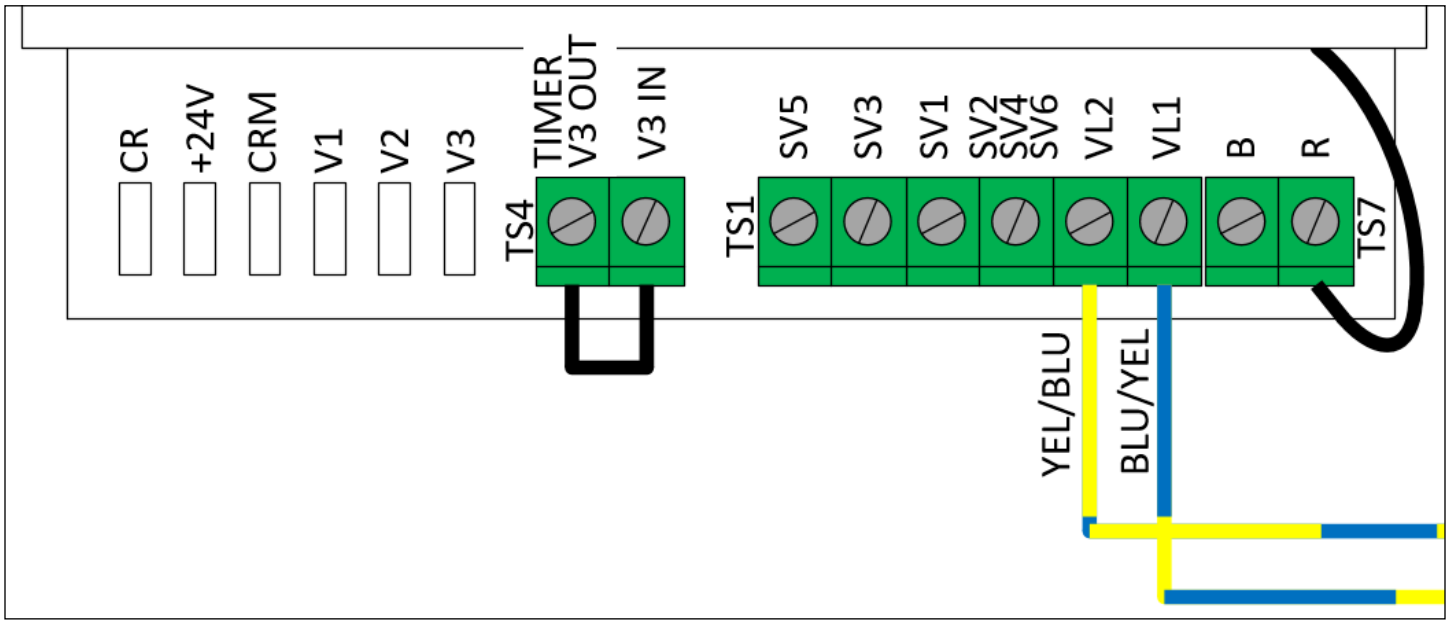



| Port | Designation | Switch |
|---|---|---|
| P1—1 | Foot Switch Common | 24VDC |
| P1—2 | Foot Switch #1 | N.O. |
| P1—3 | Foot Switch #2 | N.O. |
| P1—4 | Emergency Stop | N.C. |
| P1—5 | No Weld Signal | N.C. |
| P1—6 | Programmable Input #1 | N.O. |
| P1—7 | Programmable Input #2 | N.O. |
| P1—8 | Programmable Input #3 | N.O. |
| P1—9 | Programmable Input #4 | N.O. |
| P1—10 | Programmable Input #5 | N.O. |
| P1—11 | Programmable Input #6 | N.O. |
| P1—12 | Foot Switch Common | 24VDC |




| | | |
|---|---|---|
| P2—1 | Solenoid Valve Common | 0VDC |
| P2—2 | Solenoid Valve #1 | 24V Digital |
| P2—3 | Solenoid Valve #2 | 24V Digital |
| P2—4 | Solenoid Valve #3 | 24V Digital |
| P2—5 | Programmable Output #1 | 24V Digital |
| P2—6 | Programmable Output #2 | 24V Digital |
| P2—7 | Programmable Output #3 | 24V Digital |
| P2—8 | Programmable Output #4 | 24V Digital |

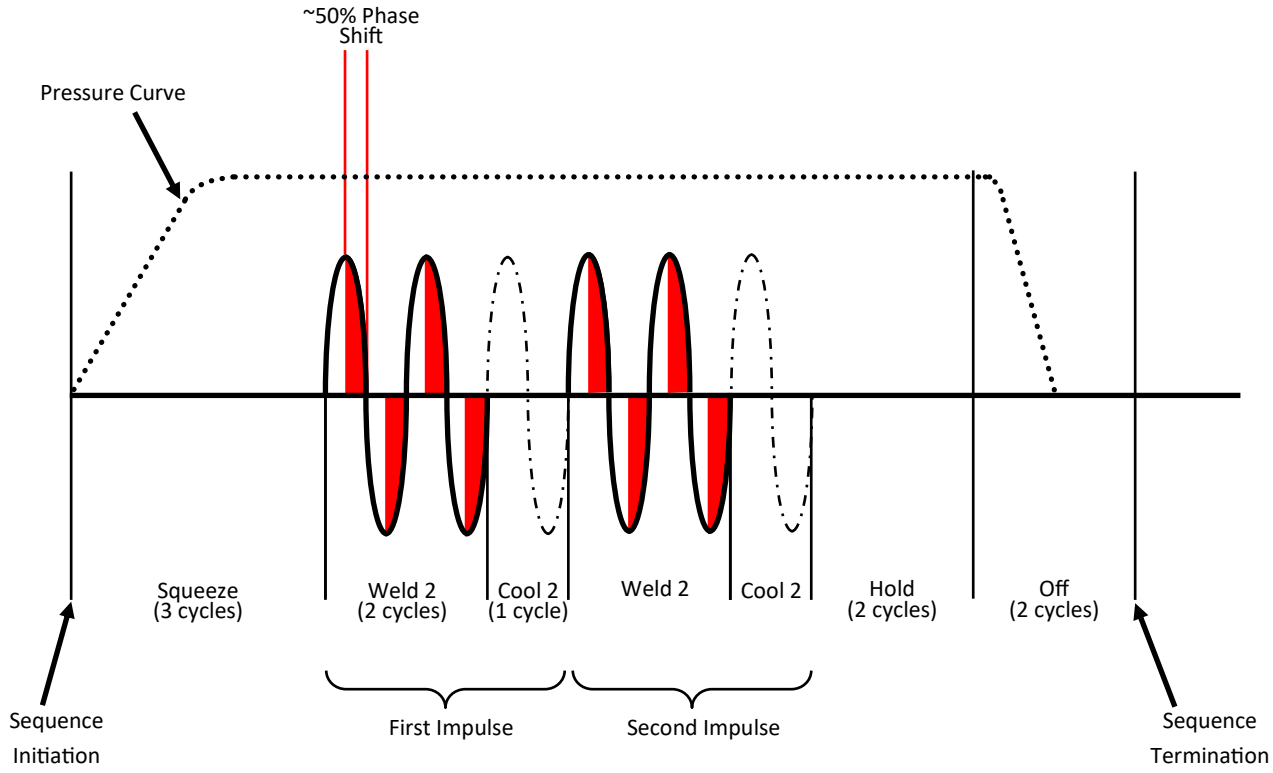
# User Connections (AC option)




| Port | Designation | Switch |
|---|---|---|
| TS1 - SV1 | Solenoid Valve #1 | AC Analog |
| TS1 - SV2 | Solenoid Valve #1 Common | 0VAC |
| TS1 - SV3 | Solenoid Valve #2 | AC Analog |
| TS1 - SV4 | Solenoid Valve #2 Common | 0VAC |
| TS1 - SV5 | Solenoid Valve #3 | AC Analog |
| TS1 - SV6 | Solenoid Valve #3 Common | 0VAC |
| TS4 - TIMER V3 OUT | Output from P2 - 4 (Valve #3 control signal) | 24V Digital |
| TS4 - V3IN | Optional connection to replace "P2 - 4" signal from timer module with an alternatively desired 24VDC signal. (For example, "P2 - 5" programmed to "Retraction" could be connected when using an AC retraction valve.) | Default - Jumper Connected to TS4 - TIMER V3 OUT |
| TS7 - B | **B**ypass Solenoid Valve #3 Safety Relay | Default - JW6 Disconnected |
| TS7 - R | Solenoid Valve #3 Safety **R**elay | Default - JW6 Connected |

**WARNING** Bypassing the safety relay will result in the valve 3 control being independent of FS1 or FS2 after initiation. This should NOT be done with valves connected to pinch points such as the primary welding force valve.

# Weld Timing Cycle




| PARAMETER | SETTING |
|---|---|
| Squeeze Delay | 0 cycles |
| Squeeze | 3 cycles |
| Weld 1 | 0 cycles |
| Cool 1 | 0 cycles |
| Slope | 0 cycles |
| Weld 2 | 2 cycles |
| >Mode | Phase Shift |
| >Heat | 50 % |
| Cool 2 | 1 cycle |
| Hold | 2 cycles |
| Off | 2 cycles |
| Impulses | 2 cycles |

The diagram above is intended to demonstrate a resulting welding timing cycle using the attached parameters; it is not recommended as part of a functional weld schedule.

# Parameter List

## Main Menu

| Sub Menu | Parameter | Input Range | Description |
|---|---|---|---|
| 1. Use Schedule | | | |
| | Schedule | [0-63] | Default = 0 |
| 2. Edit Schedule | | | |
| | Advance | [0-99] cycles | Default = 0<br>This option only appears when 'air-over-oil' configuration is selected. |
| | Intensify | [0-99] cycles | Default = 0<br>This option only appears when 'air-over-oil' configuration is selected. |
| | Block Delay | [0-99] cycles | Default = 0<br>This option only appears when 'air-over-oil' configuration is selected. |
| | Schedule Number | [0-63] | Default = 0<br>In order to accept changes made to any field, the  button must pressed. It is important to make sure that the correct schedule number is selected AND accepted BEFORE completing all of the corresponding settings to follow. |
| | Squeeze Delay | [0-99] cycles | Default = 0<br>Additional time delay to be added to 'Squeeze'. This is usually utilized when 'Cycle Mode' is set to repeat. The squeeze delay will only be applied to the first weld of the repeating cycle. |
| | Squeeze | [0-99] cycles | Default = 0<br>Time delay between the signal to the programmed valve(s) and weld initiation. |
| | >Valve | **None**<br>1 2 3<br>1+2 1+3 2+3<br>1+2+3 | Selection of valve(s) to be activated |
| | Weld 1 | [0-99] cycles | Default = 0<br>Also referred to as "pre-heat" |
| | >Mode | **Phase Shift**<br>Const Current | |
| | >Heat | [0-99] % | Phase shift %; does not apply when 'Mode' is set to Const Current |
| | or | | |
| | >Current | [0.00-60.00] kA | Weld current setting does not apply when Mode is set to Phase Shift |
| | >I1 Monitor | On<br>**Off** | Must be enabled in order to track/report current errors |
| | >PW1 Monitor | On<br>**Off** | Must be enabled in order to track/report phase shift abnormalities. |
| | Cool 1 | [0-99] cycles | Default = 0<br>Time delay between 'Weld 1' and 'Weld 2'. Designed to give an impulse effect. |

# Parameter List

## Main Menu (continued)

| Sub Menu | Parameter | Input Range | Description |
|---|---|---|---|
| 2. Edit Schedule (continued) | | | |
| | Slope | [0-99] cycles | Default = 0<br>The number of additional cycles between 'Weld 1' and 'Weld 2' in order to transition between the two gradually. A larger 'Weld 1' will result in a downslope; whereas a larger 'Weld 2' will result in an upslope. |
| | Weld 2 | [0-99] cycles | Default = 0 |
| | >Mode | **Phase Shift**<br>Const Current | |
| | >Heat | [0-99] % | Phase shift %; does not apply when '>Mode' is set to Const Current |
| | or | | |
| | >Current | [0.00-60.00] kA | Weld current setting does not apply when Mode is set to Phase Shift |
| | >I2 Monitor | On<br>**Off** | Must be enabled in order to track/report current errors |
| | >PW2 Monitor | On<br>**Off** | Must be enabled in order to track/report phase shift abnormalities. |
| | Cool 2 | [0-99] cycles | Default = 0<br>Primarily used when applying multiple impulses; time delay following each 'Weld 2' impulse. |
| | Hold | [0-99] cycles | Default = 0<br>Time delay during which the electrodes remain in contact with the part being welded to allow weld nugget to congeal. |
| | Off | [0-99] cycles | Default = 0<br>Time delay following 'Hold' cycle in which the valve(s) release; the next schedule/sequence will not begin until the 'Off' cycle is complete. |
| | Impulses | [1-99] cycles | Default = 1<br>Number of times to deliver Weld 2, Cool 2.<br>(Impulses do NOT apply to Weld 1, Cool 1) |
| | I offset | -1 %<br>**0 %**<br>+1 % | Adjustable increase or decrease to total current delivered by a sequence. This is one of the few adjustable parameters when control is locked.<br>Parameter is only visible when 'Max I offset' is not "0". |
| | >Change all | **No**<br>Yes | No – 'I offset' will be applied to the current schedule<br>Yes – 'I offset' will be applied to all schedules' |
| | Block Delay | [0-99] cycles | Default = 0<br>This option only appears when ‘air-over-oil’ configuration is selected. |

# Parameter List

## Main Menu (continued)

| Sub Menu | Parameter | Input Range | Description |
|---|---|---|---|
| 2. Edit Schedule (continued) | | | |
| | Cycle Mode | **Non-Repeat**<br>Repeat<br>Chained<br>Successive<br>Wait Here | Non-repeat – Control can be initiated for only one sequence/ schedule even if initiation remains closed.<br>Repeat – Sequences/ schedules will continue if initiation remains closed.<br>Chained – Schedules are chained together so that consecutive schedules can be sequenced from one initiation.<br>Successive – Schedules are chained together so that consecutive schedules will be sequenced from separate initiations.<br>Wait-Here – only applies when 'Weld2' is set to 99 cycles. This allows infinite Weld 2 duration until Escape is triggered. 'Beat_Mode' is authorized to "Wait-Here" if desired. |
| 3. Copy Schedule | | | |
| | Copy From | [0-63] | Schedule # to be copied |
| | Copy To | [0-63] | Schedule # to be replaced |
| | Confirm | Yes<br>No | Must select "Yes" and press the  key to complete the above copy/replace. "DONE!!!" appear in the title bar once complete. |
| 4. Reset Error | | | |
| | Confirm | Yes<br>No | Must select "Yes" and press the  key to complete the above copy/replace. "DONE!!!" appear in the title bar once complete. |
| 5. Edit Counter | | | |
| | Counter | Enable<br>**Disable** | Enable – 'Weld count done' will increment with each weld delivered. Error "ER25" will be reported when 'Max part count' = 'Part count done' |
| | Max part Count | [0-60,000] | Default = 60,000<br>Number at which the 'part count done' reports error "ER25" |
| | Weld per part | [1-9,999] | Default = 1<br>The number of welds to increment 'part count done' by one. |
| | RST Counter | **None**<br>PCTR<br>WCTR<br>Both | Resets counter<br>PCTR – part counter<br>WCTR – weld counter |

# Parameter List

## Setup Menu

| Sub Menu | Parameter | Input Range | Description |
|---|---|---|---|
| 1. Config | | | |
| | Weld Mode | **Spot**<br>Seam1<br>Seam2 | Spot – Standard squeeze, weld, hold and off sequence.<br>Seam1 – When FS1 or FS2 input is toggled, control will run 'schedule' from 'Squeeze Delay' through 'Cool 2'. If FS1 or FS2 input is held, control will repeat 'Weld 2' and 'Cool 2'.<br>Seam2–FS1 initiation implements same function as in Seam1. FS2, schedule 20, schedule 40 and schedule 60 will always initiate "Spot" Weld Mode |
| | Retraction | **Off**<br>Maintained<br>Momentary | Maintained – Retraction output directly reflects retraction input<br>Momentary – Retraction output changes state with a toggled impulse to the retraction input.<br>This parameter is ignored if 'Beat_Mode' is enabled. |
| | On Error | **Continue**<br>Head Lock<br>Stop | Continue – Further welds are permitted regardless of previous weld status<br>Head Lock – On error, valve signal(s) are held on. Additional welds are not permitted until Error Reset occurs.<br>Stop – On error, valve signal(s) turn off as normal. Additional welds are not permitted until Error Reset occurs. |
| | Sch Select | **Internal**<br>External | Internal – FS1 will initiate the programmed weld schedule number<br>External – FS1 will initiate the weld schedule number according to the binary value represented by PI3, PI4, PI5, and PI6.<br>(FS2 will always initiate weld schedule 20.) |
| | I-Feedback | Primary<br>**Secondary** | This setting should correspond to the physical location of the sensing coil. |
| | Air-over-oil | **Off**<br>Mode 1<br>Mode 2 | Mode 1: air-over-oil setting without retraction<br>Mode 2: air-over-oil setting with retraction enabled using 'Retract Open' and 'Retract Close' settings |
| | Retract Open | [0-99] cycles | Default = 0<br>Time delay to allow for retraction from "pre-weld" position to "fully open" position<br>Sub Menu only appears when 'air-over-oil' is set to "Mode 2" |
| | Retract Close | [0-99] cycles | Default = 0<br>Time delay to allow for closure from "fully open" position to "pre-weld" position<br>Sub Menu only appears when 'air-over-oil' is set to "Mode 2" |

# Parameter List

## Setup Menu (continued)

| Sub Menu | Parameter | Input Range | Description |
|---|---|---|---|
| 1. Config (continued) | | | |
| | Beat mode | **Off**<br>Squeeze<br>Sqz. + Weld<br>Wait-Here | Off – Sequence/Schedule will complete with a momentary activation of FS1 or FS2<br>Squeeze – Sequence/Schedule requires continuous activation of FS1 or FS2 until the squeeze sequence is complete, otherwise the sequence will terminate.<br>Sqz. + Weld – Welding sequence requires continuous activation of FS1 or FS2 until the weld sequence is complete, otherwise the sequence will terminate.<br>Wait-Here – Welding sequence requires continuous activation of FS1 or FS2 until the weld sequence is complete, otherwise the sequence will temporarily pause (retraction will not occur). This setting requires the active schedule's 'Cycle Mode' to also be set to "Wait-Here". |
| | AVC | **Disabled**<br>Max [1-10] % | Automatic Voltage Compensation – Will add additional percentage to phase shift in order to compensate for diminished supply voltage. (only works with schedules using "Phase Shift" Mode to regulate current) |
| | AVC nom. | [187-633] volts | Default = 480<br>Supply voltage on which the control is designed to operate.<br>Parameter is only visible when 'AVC' is enabled. |
| | Voltage monitor | **Off**<br>On | On – High and Low Voltage errors are enabled using the following parameters. |
| | >High | [160-690] volts | Default = 690<br>Error "ER23" will be triggered if supply voltage is above the set value<br>Parameter is only visible when 'Voltage Monitor' is "On" |
| | >Low | [160-690] volts | Default = 160<br>Error "ER24" will be triggered if supply voltage is below the set value<br>Parameter is only visible when 'Voltage Monitor' is "On" |
| | Max I offset | [0-15] % | Determines the input range for 'I offset' parameter. For example, if 'Max I offset' is 6%, 'I offset' input range is -6% to +6% |
| | Water Saver | [0-199] sec | Default = 0<br>Time duration that the water flow signal will remain on following a weld. Feature available on PO4 |
| | 87° delay | **Off**<br>On | On – The first half cycle is delayed 87degrees (51.6% max) phase shift in order to minimize saturation of the weld transformer |
| | Half Cycle | **Off**<br>+<br>-<br>AC | + – Only the positive half cycle is output<br>- – Only the positive half cycle is output<br>AC – Alternating positive/negative half cycles are output |

# Parameter List

## Setup Menu (continued)

| Sub Menu | Parameter | Input Range | Description |
|---|---|---|---|
| 1. Config (continued) | | | |
| | Power factor | [0-99] % | Default = 75<br>0 – "Automatic Power Factor" mode<br>1-99 – Manual power factor delay. Value must be determined by the Power Factor Delay and will vary for each machine.<br>If a primary or secondary coil is NOT installed, a manual power factor of 80% is recommended. Automatic Power Factor may react abnormally if enabled without a coil. |
| | Blanking | [0-99] cycles | Default = 0<br>The number of weld cycles to exclude from measurement and limit testing |
| | Display return | [0-10] min | Default = 0<br>0 – Disabled<br>Length of time before the display returns to 'Status Page 1' |
| | Clear | None<br>I/O Map<br>Calibration<br>Config<br>Stepper<br>Counter<br>Schedule<br>All | Clearing data from this menu does not require a confirmation. "DONE!!!" will appear in the title bar as verification. |
| 2. Calibration | | | |
| | Toroid | [135-165] mV/kA | Default = 150<br>For accurate current monitoring |
| | Max I | [20-60] kA | Default = 20 |
| | AC line scale | [0.8-1.2] | Default = 1.0<br>For accurate voltage monitoring |
| 3. I/O Map | (see page 23) | | |
| 4. Error Map | (see page 24) | | |
| 5. Stepper | | | |
| | Stepper | **Disable**<br>Heat | Heat – Stepper function enabled with current compensation |
| | Tip dress | [0-9,999] | Default = 9,000<br>When 'Count Done'='Tip dress', error (ER31) will trigger |
| | RST stepper | No<br>Yes | Selecting "Yes" and pressing the  key will reset the 'Count done' to zero |

# Parameter List

## Setup Menu (continued)

| Sub Menu | Parameter | Input Range | Description |
|---|---|---|---|
| 5. Stepper (continued) | | | |
| | [01-10]:Count | [0-9,999] | Default = 0<br>The number of welds required to move onto the next step |
| | >Heat+ | [0-99] % | Default = 0<br>Additional phase shift to be added to Weld 1 and Weld 2 'Heat' settings<br>Only applies when the weld 'Mode' is set to "Phase Shift." |
| | >Current+ | [0.00-99.99] kA | Default = 0<br>Additional current to be added to Weld 1 and Weld 2 'Current' settings<br>Only applies when the weld 'Mode' is set to "Const Current." |
| 6. Utility | | | |
| | Backup Data | (see page 10) | |
| | Restore Data | (see page 11) | |

# I/O Map

## Setup Menu (continued)

| Input/Output<br>(Location) | Options<br>**Default** | Description |
|---|---|---|
| PI1<br>(P1 - 6) | TT1<br>2nd stage<br>Back step<br>**PCTR** | TT1 – Temperature Limit Switch (also called TLS)<br>2nd stage – FS1/FS2 activates valve closure only; 2nd Stage input initiates weld<br>Back step – Return to previous schedule in "Successive" Cycle mode<br>PCTR – Part counter reset |
| PI2<br>(P1 - 7) | **Edit lock**<br>PS1<br>Interlock<br>WCTR Reset | Edit lock – closed = control locked; open = control unlocked<br>PS1 – Pressure switch signal<br>Interlock – Signal to authorize weld; used with PO4 Interlock<br>WCTR – Weld counter reset |
| PI3<br>(P1 - 8) | Error reset<br>Sch. Select 1<br>**Stepper reset**<br>2nd Stage | Error reset – Clear error in order resume function<br>Sch. Select 1 – Binary value of "one" for externally selecting schedule<br>Stepper reset – Return stepper to "Zero" position<br>2nd stage – FS1/FS2 activates valve closure only; 2nd Stage input initiates weld |
| PI4<br>(P1 - 9) | Interlock<br>Sch. Select 2<br>**Error Reset**<br>(Not Used) | Interlock – Signal to authorize weld; used with PO4 Interlock<br>Sch. Select 2 – Binary value of "two" for externally selecting schedule<br>Error reset – Clears error in order resume function |
| PI5<br>(P1 - 10) | **Back step**<br>Sch. Select 4<br>Retraction<br>(Not Used) | Back step – Return to previous schedule in "Successive" Cycle mode<br>Sch. Select 4 – Binary value of "four" for externally selecting schedule<br>Retraction – Retract input command for release of valves |
| PI6<br>(P1 - 11) | Stepper Reset<br>Sch. Select 8<br>Edit lock<br>**Escape** | Stepper reset – Return stepper to "Zero" position<br>Sch. Select 8 – Binary value of "eight" for externally selecting schedule<br>Edit lock – closed = control locked; open = control unlocked<br>Escape – Command to escape current weld schedule/sequence |
| | | |
| PO1<br>(P2 - 5) | **Any Error**<br>Retraction<br>Force Error<br>Major Error | Any Error – Major or minor error is detected<br>Retract Output – Command to retract (in addition to programmed valves)<br>Force Error – Pressure switch is not detecting proper electrode force<br>Major Error – Major error detected; determined by "Error Map" settings |
| PO2<br>(P2 - 6) | **AVC Error**<br>Contactor Error<br>Step End<br>EOS | AVC Error – Automated Voltage Compensation is insufficient<br>Contactor Error – Energy is being shunted; (typically set to trip a breaker)<br>Step End – Programmable step has completed its count<br>EOS – 0.5sec signal at the end of each weld sequence |
| PO3<br>(P2 - 7) | **Current Error**<br>Any Error<br>Count end<br>Water Saver | Current Error – Constant Current Control in insufficiently compensating<br>Any Error – Major or minor error is detected<br>Count end – 'Max part count' has been reached<br>Water Saver – signal turns off after a set time following the last weld |
| PO4<br>(P2 - 8) | **Step End**<br>Current Error<br>AVC Error<br>Interlock | Step End – Programmable step has completed its count<br>Current Error – Constant Current Control in insufficiently compensating<br>AVC Error – Automated Voltage Compensation is insufficient<br>Interlock – "Request to weld" signal from external source; used with PI4 |

# Error List

Note: All error defaults are set to “Minor error”. Error handling should be set under the configurations menu and by utilizing the “Any Error”, “Contactor Error”, and “Major Error” options available for the programmable outputs in the I/O Map.

| ERROR CODE | |
|---|---|
| 1 | Configuration error<br>Invalid data in the ‘Config’ menu. Review programming |
| 2 | Calibration error<br>Invalid data in the ‘Calibration’ menu. Review programming |
| 3 | Schedule error<br>Invalid data in the ‘Edit Schedule’ menu. Review programming |
| 4 | Sequencer error<br>Invalid data in the ‘Sequencer’ menu. Review programming |
| 6 | Counter error<br>Invalid data in the ‘Counter’ menu. Review programming |
| 7 | Stepper error<br>Invalid data in the ‘Stepper’ menu. Review programming |
| 8 | I/O Map error<br>Invalid data in the ‘I/O Map’ menu. Review programming |
| 9 | E-Stop error<br>The input is not seeing a closed signal from the Emergency Stop Switch. If this feature is unused, insert a jumper from ‘P1-1’ to ‘P1-4’. If the feature is being utilized, verify that E-Stop is functioning appropriately. |
| 10 | TC1 error<br>The ’TLS’ input on the power board is not seeing a closed signal from the contactor’s Thermal Limit Switch. If this feature is unused, insert a jumper from between the two TLS connections on the power board. If the feature is being utilized, verify that the SCR is not overheating. |
| 11 | No Weld error<br>The input is not seeing a closed signal from the external “No Weld” driver. If this feature is unused, insert a jumper from ‘P1-1’ to ‘P1-5’. If the feature is being utilized, verify that external driver is functioning appropriately. |
| 12 | PS1 error<br>The input is not seeing a closed signal from the external pressure switch. If this feature is unused, program ‘PI2’ to another option or insert a jumper from ‘P1-7’ to ‘P1-12’. If the feature is being utilized, verify that valve and pressure switch are functioning appropriately. |
| 13 | SCR short<br>Check SCR or weld transformer wiring. |
| 14 | Second Stage error<br>Control has timed out waiting for 2nd Stage input. Verify connection and signal to PI1 or PI3. |
| 15 | TT1 Error<br>The input is not seeing a closed signal from the Transformer Thermal Limit Switch. If this feature is unused, program ‘PI1’ to another option or insert a jumper from ‘P1-6’ to ‘P1-12’. If the feature is being utilized, verify that the transformer is not overheating. |

# Error List

| ERROR CODE | |
|---|---|
| 16 | Interlock Error<br>Control has timed out waiting for Interlock input. If this feature is unused, program 'PI2' and/or 'PI4' to another option or insert a jumper from 'P1-7' and/or "P1-9' to 'P1-12'. If the feature is being utilized, verify that the external weld interlock is functioning appropriately. |
| 19 | High Current 1<br>The control measured a higher current for Weld1 than the programmed upper limit. Verify that the impedances are normal and/or consider changing the programmed value under the 'Edit Schedule' menu. |
| 20 | Low Current 1<br>The control measured a lower current for Weld1 than the programmed lower limit. Verify that the impedances are normal and/or consider changing the programmed value under the 'Edit Schedule' menu. |
| 21 | High Current 2<br>The control measured a higher current for Weld2 than the programmed upper limit. Verify that the impedances are normal and/or consider changing the programmed value under the 'Edit Schedule' menu. |
| 22 | Low Current 2<br>The control measured a lower current for Weld2 than the programmed lower limit. Verify that the impedances are normal and/or consider changing the programmed value under the 'Edit Schedule' menu. |
| 23 | High Voltage<br>The AC line voltage is measured above the programmed upper limit under the "voltage monitor" parameter. Check the AC line voltage and/or adjust the parameter under the 'Config' menu. |
| 24 | Low Voltage<br>The AC line voltage is measured below the programmed lower limit under the "voltage monitor" parameter. Check the AC line voltage and/or adjust the parameter under the 'Config' menu. |
| 25 | Counter end<br>Reset the counter. If this feature is not being utilized, consider disabling it under the 'Edit Counter' menu. |
| 26 | Stepper end<br>Reset Stepper. If this feature is not being utilized, consider disabling it under the 'Stepper' menu. |
| 27 | High Pulse Width1<br>The pulse width for Weld 1 was above the programmed upper limit. Check transformer or secondary circuit to ensure that current is not shunting and/or adjust parameter under the 'Edit Schedule' menu. |
| 28 | Low Pulse Width1<br>The pulse width for Weld 1 was below the programmed lower limit. Check transformer or secondary circuit and/or adjust parameter under the 'Edit Schedule' menu. |
| 29 | High Pulse Width2<br>The pulse width for Weld 2 was above the programmed upper limit. Check transformer or secondary circuit to ensure that current is not shunting and/or adjust parameter under the 'Edit Schedule' menu. |

# Error List

| ERROR CODE | |
|---|---|
| 30 | Low Pulse Width2<br>The pulse width for Weld 2 was below the programmed lower limit. Check transformer or secondary circuit and/or adjust parameter under the 'Edit Schedule' menu. |
| 31 | Tip dress pre-warn<br>Dress tip |
| 32 | AVC error<br>Check AC line voltage and/or adjust the parameters under the 'Config' menu. |
| 33 | Starts/Retract @ RST<br>FS1, FS2, or PI5 programmed to retract was activated when the control was reset. Check the signals to ensure they are working properly. |
| 34 | SYNC error<br>The control cannot synchronize with the AC line voltage. Check AC line frequency. |
| 35 | PNW error<br>The front panel's 'Weld/No Weld' button is currently set to 'No Weld'. |
| 36 | DC Safety Relay error<br>The safety relay for the DC valves is not properly corresponding with the input commands. This could imply a hardware issue with the control. |
| 37 | AC Safety Relay error<br>The safety relay for the AC valves is not properly corresponding with the input commands. This could imply a hardware issue with the control. |
| 43 | Pre-high current1<br>The control measured a higher current for Weld1 than the programmed upper pre-limit. Verify that the impedances are normal and/or consider changing the programmed value under the 'Edit Schedule' menu. |
| 44 | Pre-low current1<br>The control measured a lower current for Weld1 than the programmed lower pre-limit. Verify that the impedances are normal and/or consider changing the programmed value under the 'Edit Schedule' menu. |
| 45 | Pre-high current2<br>The control measured a higher current for Weld2 than the programmed upper pre-limit. Verify that the impedances are normal and/or consider changing the programmed value under the 'Edit Schedule' menu. |
| 46 | Pre-low current2<br>The control measured a lower current for Weld2 than the programmed lower pre-limit. Verify that the impedances are normal and/or consider changing the programmed value under the 'Edit Schedule' menu. |
| 59 | Retract input closed<br>Retraction mode is set to "Momentary" which programs the control to expect a short toggle to activate a response. The momentary toggle has remained high for 10 seconds or more. Check the signal to PI5 to ensure proper function. |
| 60 | PS1 not ready<br>Control is waiting for a closed signal from the external pressure switch. |
| 61 | Retract not ready<br>Control is waiting for a closed retraction input to PI5 |
| 62 | 2nd Stage not ready<br>Control is waiting for a closed input to PI1 or PI3 for weld initiation. |
| 64 | Interlock not ready<br>Control is waiting for a closed interlock input to PI2 or PI4. |

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