

Infinity

COLOR FRONT PANEL ULTRASONIC PRESS SYSTEM

Servo Automation Interface Guidelines



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System Inputs/Outputs Connector Pinouts

Pin	Color	Description
J5-1	BLK/RED	+22VDC CURRENT LIMITED POWER SUPPLY (500mA MAX)
J5-2	RED/BLK	+22VDC RETURN (CHASSIS GROUND)
J5-3	BLK/WHT	REMOTE SETUP BIT 0 INPUT (PROGRAMMABLE)
J5-4	WHT/BLK	REMOTE SETUP BIT 1 INPUT (PROGRAMMABLE)
J5-5	BLK/GRN	REMOTE SETUP BIT 2 INPUT (PROGRAMMABLE)
J5-6	GRN/BLK	REMOTE SETUP BIT 3 INPUT (PROGRAMMABLE)
J5-7	BLK/BLU	REMOTE SETUP BIT 4 INPUT (PROGRAMMABLE)
J5-8	BLU/BLK	AUTOMATION CYCLE STOP INPUT
J5-9	BLK/YEL	FRONT PANEL LOCKOUT INPUT
J5-10	YEL/BLK	SYSTEM LATCH RESET INPUT
J5-11	BLK/BRN	ISOLATED INPUT COMMON (SOURCING OR SINKING INPUTS)
J5-12	BRN/BLK	ULTRASOUND ACTIVATION / CYCLE START INPUT
J5-13	BLK/ORN	ISOLATED ULTRASOUND INPUT COMMON (SOURCING OR SINKING INPUTS)
J5-14	ORN/BLK	E-STOP STATUS OUTPUT
J5-15	RED/WHT	READY STATUS OUTPUT
J5-16	WHT/RED	HOME STATUS OUTPUT
J5-17	RED/GRN	TOP OF STROKE STATUS OUTPUT
J5-18	GRN/RED	TRIGGER STATUS OUTPUT
J5-19	RED/BLU	ULTRASOUND STATUS OUTPUT
J5-20	BLU/RED	IN-CYCLE STATUS OUTPUT (PROGRAMMABLE)
J5-21	RED/YEL	ANY FAULT STATUS OUTPUT (PROGRAMMABLE)
J5-22	YEL/RED	OVERLOAD STATUS OUTPUT (PROGRAMMABLE)
J5-23	RED/BRN	SERVO ALARM STATUS OUTPUT (PROGRAMMABLE)
J5-24	BRN/RED	BAD PART STATUS OUTPUT (PROGRAMMABLE)
J5-25	RED/ORN	GOOD PART STATUS OUTPUT (PROGRAMMABLE)
J5-26	ORN/RED	ISOLATED OUTPUT COMMON (SOURCING OR SINKING INPUTS)

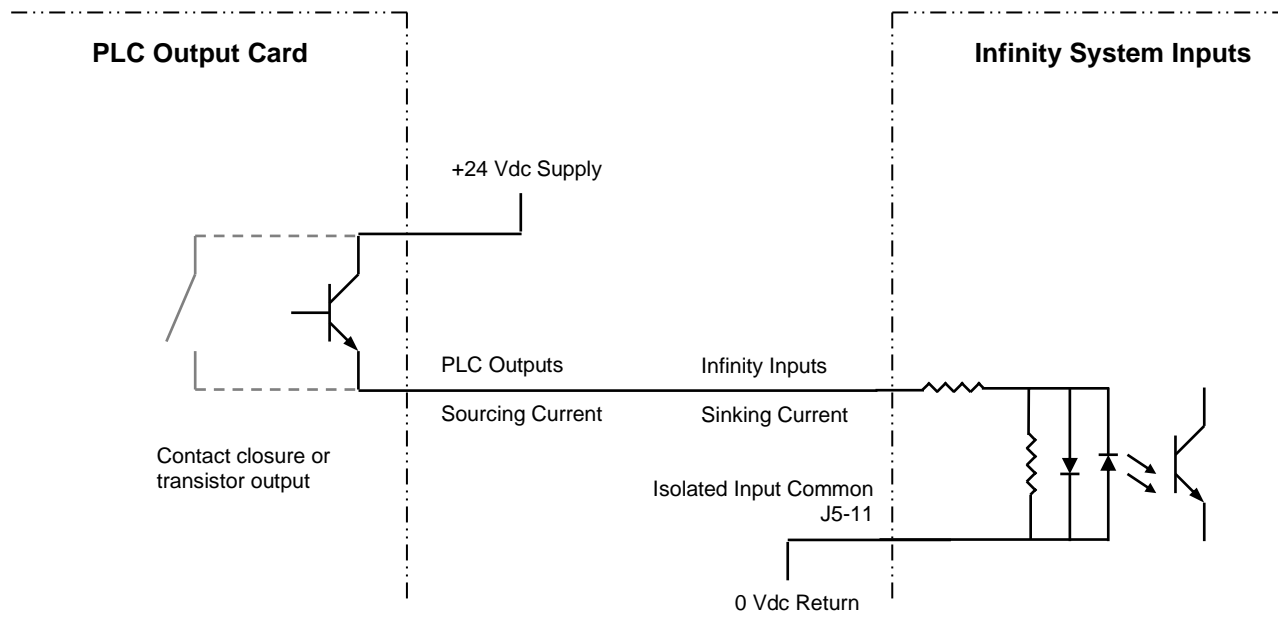
Note: The descriptions shown are for the default I/O settings. Almost all Inputs are programmable to other input functions and all outputs to other output functions. The exception is the ULTRASOUND ACTIVATION / CYCLE START INPUT which cannot be programmed to another function.

System Input/Output Cable Part Numbers

Part Number	Length
200-2119-03M	3 meters
200-2119-05M	5 meters
200-2119-07M	7 meters
200-2119-09M	9 meters
200-2119-11M	11 meters
200-2119-13M	13 meters

Connecting an Input to a PLC Sourcing Output Card

All System Inputs are optically isolated from the internal circuits and can be connected to sinking or sourcing PLC output cards. The inputs will draw approximately 10mA with a 24Vdc supply. The Systems Inputs can also be configured for a contact closure, if necessary.

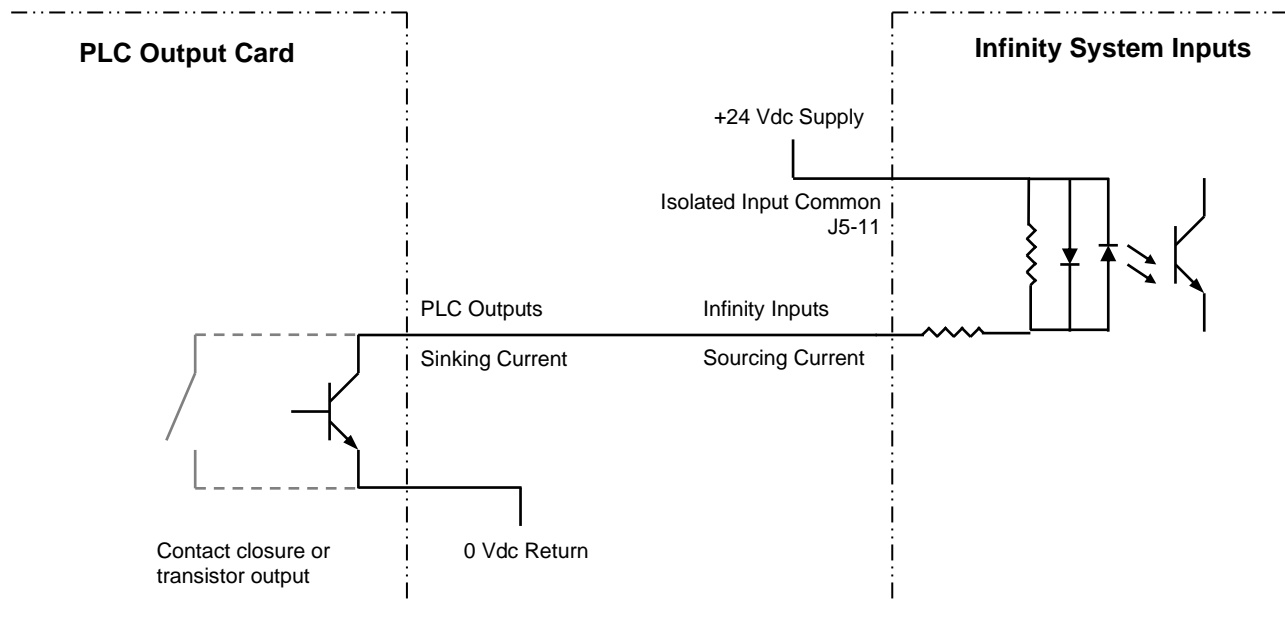


Notes:

1. All system inputs share the same Isolated Input Common (J5-11) except for the Ultrasound Activation/Cycle Start Input (J5-12) which has a separate Isolated Ultrasound Common (J5-13).
2. When using an external +24 Vdc power supply, connect the Isolated Input Common (J5-11) to the power supply 0 Vdc Return (and/or the Isolated Ultrasound Common (J5-13) for ultrasound activation).
3. If an external supply is unavailable, the internal +22VDC power supply can be substituted. Connect the +22VDC Return (J5-2) to the Isolated Input Common (J5-11) and/or to the Isolated Ultrasound Common (J5-13).

Warning: Any connection to the Ultrasound Activation/Cycle Start Input (J5-12) should be disabled during an emergency stop (E-Stop) condition.

Connecting an Input to a PLC Sinking Output Card

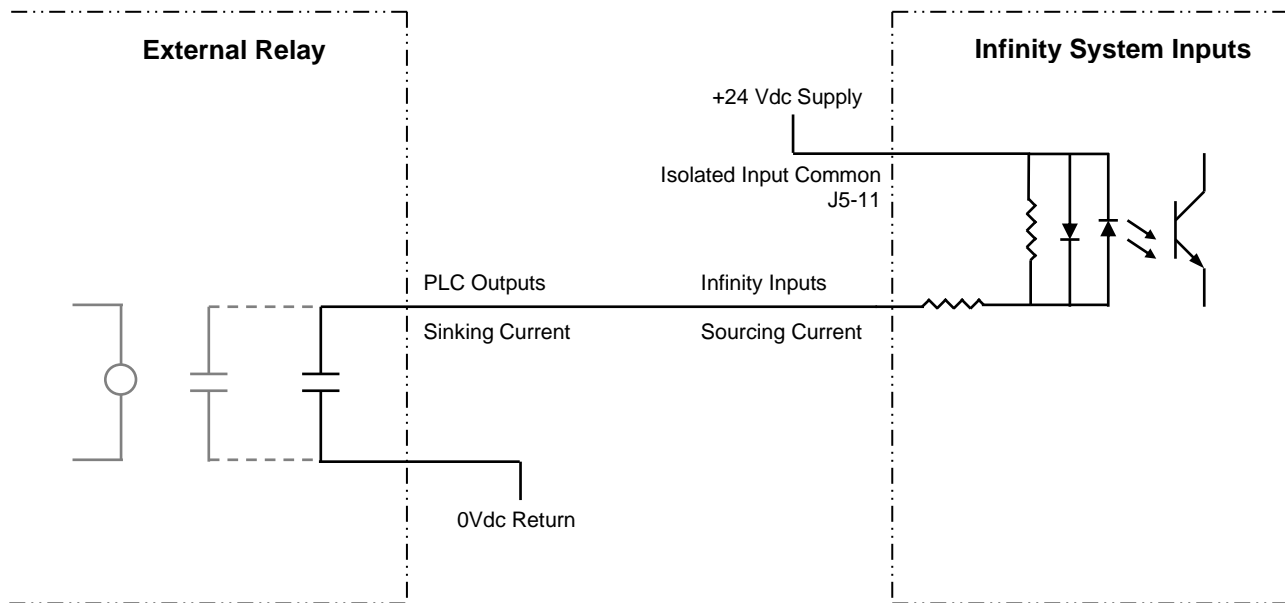


Notes:

1. All system inputs share the same Isolated Input Common (J5-11) except for the Ultrasound Activation/Cycle Start Input (J5-12) which has a separate Isolated Ultrasound Common (J5-13).
2. When using an external +24 Vdc power supply, connect the Isolated Input Common (J5-11) (and/or the Isolated Ultrasound Common (J5-13) for ultrasound activation) to the +24 Vdc power supply.
3. If an external supply is unavailable, the internal +22VDC power supply can be substituted. Connect the +22VDC (J5-1) to the Isolated Input Common (J5-11) and/or to the Isolated Ultrasound Common (J5-13). Connect the +22VDC Return (J5-2) to the PLC 0 Vdc Return.

Warning: Any connection to the Ultrasound Activation/Cycle Start Input (J5-12) should be disabled during an emergency stop (E-Stop) condition.

Connecting an Input to a Relay Contact Closure



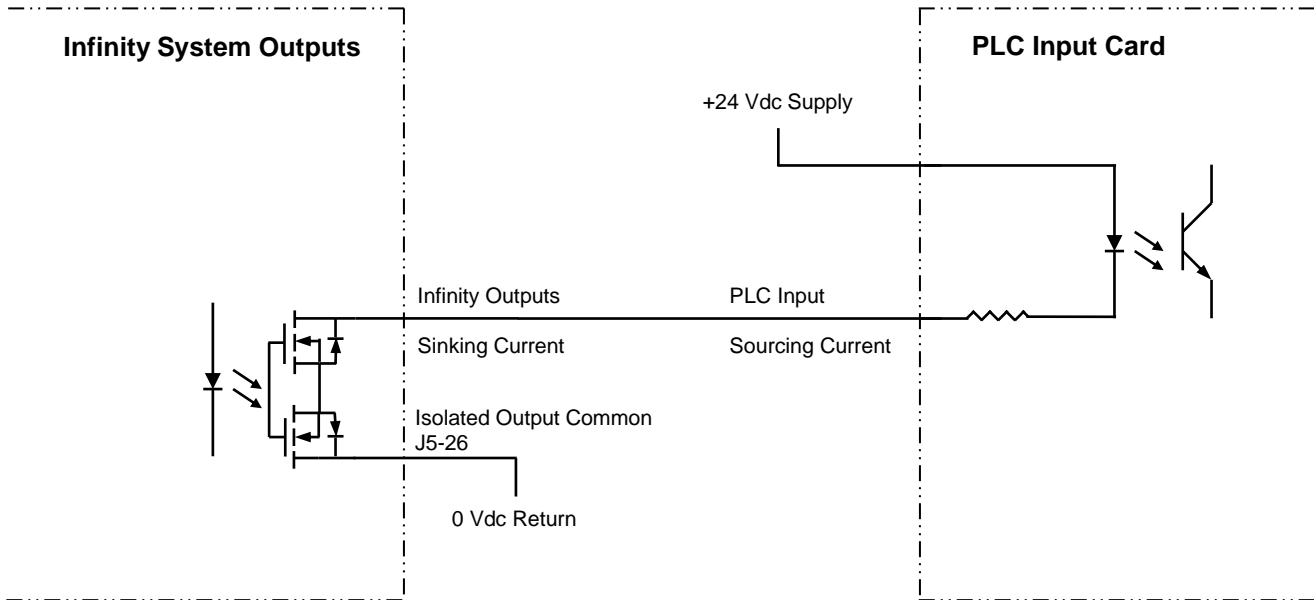
Notes:

1. All system inputs share the same Isolated Input Common (J5-11) except for the Ultrasound Activation/Cycle Start Input (J5-12) which has a separate Isolated Ultrasound Common (J5-13).
2. When using an external +24 Vdc power supply, connect the Isolated Input Common (J5-11) (and/or the Isolated Ultrasound Common (J5-13) for ultrasound activation) to the +24 Vdc power supply.
3. If an external supply is unavailable, the internal +22VDC power supply can be substituted. Connect the +22VDC (J5-1) to the Isolated Input Common (J5-11) and/or to the Isolated Ultrasound Common (J5-13). Connect the +22VDC Return (J5-2) to the PLC 0 VDC Return.

Warning: Any connection to the Ultrasound Activation/Cycle Start Input (J5-12) should be disabled during an emergency stop (E-Stop) condition.

Connecting an Output to a PLC Sourcing Input Card

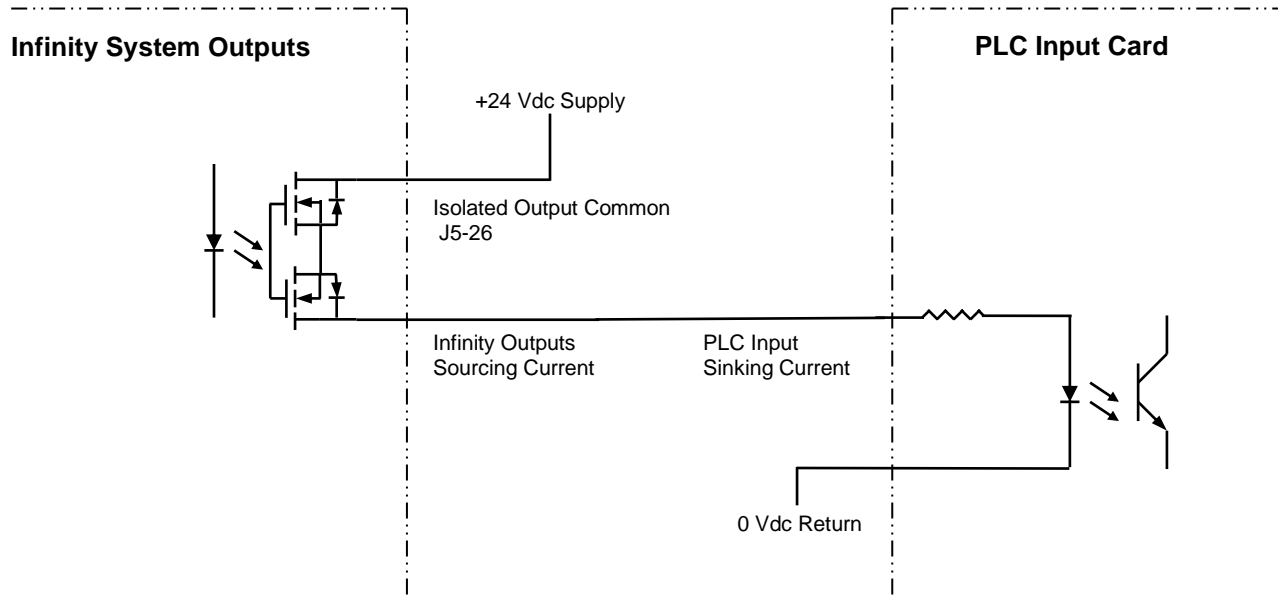
All System Outputs are optically isolated from the internal circuits and can be connected to sinking or sourcing PLC input cards. When J5-1 is used to power the outputs, the total maximum output current for all outputs combined is 500mA. If an external supply is used, as shown in the drawing below, each output can sink or source up to 500mA.



Notes:

1. All system outputs share the same Isolated Output Common (J5-26).
2. When using an external +24 Vdc power supply, connect the Isolated Output Common (J5-26) to 0 VDC Return.
3. If an external supply is unavailable, the internal +22VDC power supply (J5-1) can be substituted. Connect the Isolated Output Common (J5-26) to the +22VDC Return (J5-2).

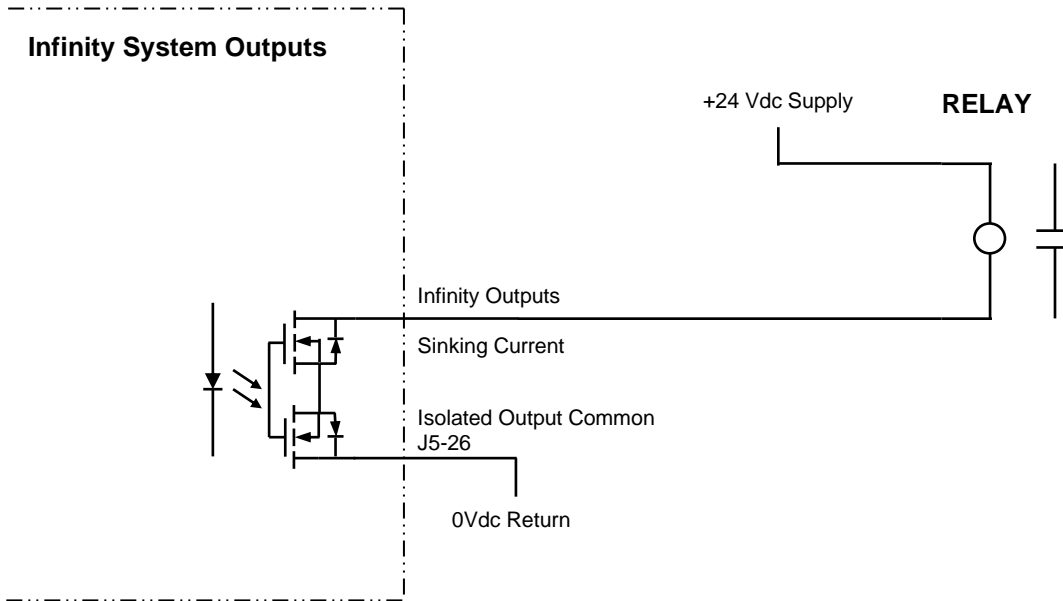
Connecting an Output to a PLC Sinking Input Card



Notes:

1. All system outputs share the same Isolated Output Common (J5-26).
2. When using an external +24 Vdc power supply, connect the Isolated Output Common (J5-26) to the +24 Vdc power supply.
3. If an external supply is unavailable, the internal +22VDC power supply (J5-1) can be substituted. Connect the +22VDC Return (J5-2) to the 0 Vdc Return.

Connecting an Output to a Relay Contact Closure



Notes:

1. All system outputs share the same Isolated Output Common (J5-26).
2. If an external supply is unavailable, the internal +22VDC power supply (J5-1) can be substituted. Connect the +22VDC Return (J5-2) to the 0 Vdc Return.

STO Safety Modes

Safe Torque Off, known as STO for short is a safety feature that turns off power on the servo amplifier output to prevent the motor from producing torque. This is done through the servo amplifier hardware to ensure fault tolerance.

There are two modes of operation, which are selectable via a panel key switch located on the back of the press. If a support is provided with the press, the column lock handles and right side panel between the press and the column will have to be removed to access the switch.

1. **STO Mode:** The servo is in STO (safe torque off) when the E-STOP switch is activated or the safety switches on the base are inactive. This mode requires the safety switches to be active for any motion to take place. This means the safety switches must remain active the entire weld cycle.
2. **STO Override Mode:** The servo is in STO when the E-STOP switch is activated but not when the safety switches are inactive. This means the safety switches can be released when trigger occurs.

Notes:

1. STO Mode is an enhanced safety mode intended for manual operation.
2. STO Override Mode is recommended for automated environments, and is required when cycles are initiated with the ULTRASOUND ACTIVATION / CYCLE START INPUT (J5 Pin 12) or a networked automation control.

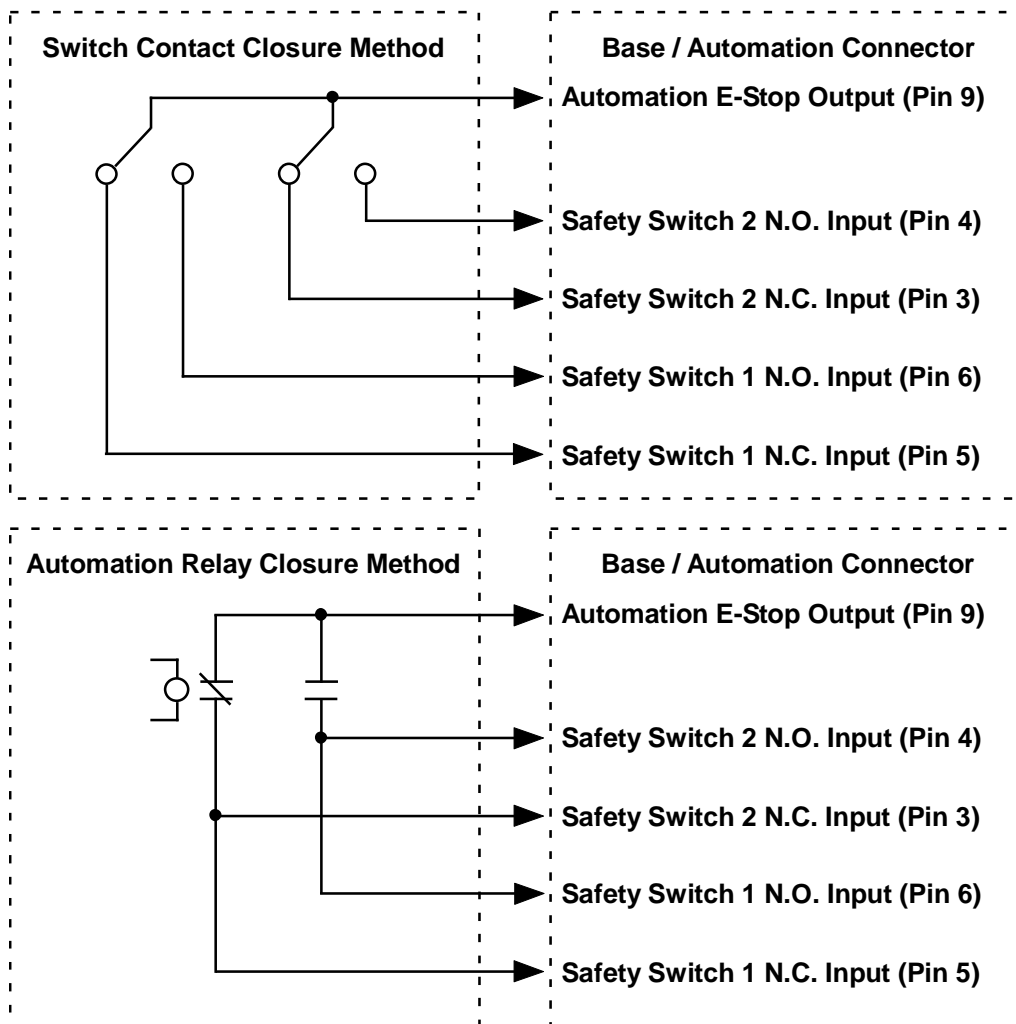
Base / Automation Connector Pinouts

Pin	Color	Function	Signal Description
1	BROWN	+24VDC OUTPUT	Internal +24VDC
10	BLUE	+24V RETURN	Internal Chassis Ground
5	PINK	SAFTEY SWITCH 1 (N.C. INPUT)	Normally Closed (N.C.) dry contact closure to Pin 9
6	GRAY	SAFTEY SWITCH 1 (N.O. INPUT)	Normally Open (N.O.) dry contact closure to Pin 9
3	YELLOW	SAFTEY SWITCH 2 (N.C. INPUT)	Normally Closed (N.C.) dry contact closure to Pin 9
4	GREEN	SAFTEY SWITCH 2 (N.O. INPUT)	Normally Open (N.O.) dry contact closure to Pin 9
2	WHITE	E-STOP ACTIVATION INPUT	Normally Open (N.O.) dry contact closure to Pin 9
8	VIOLET	AUTOMATION E-STOP INPUT	Normally Closed (N.C.) dry contact closure to Pin 9
9	RED	AUTOMATION E-STOP OUTPUT	Current Limited +24VDC Power Supply (40mA)

Base / Automation Cable Part Numbers

Part Number	Length
200-2242-03M	3 meters
200-2242-05M	5 meters
200-2242-10M	10 meters

Connecting an Automation Two Hand Anti-Tie-Down Safety Switches

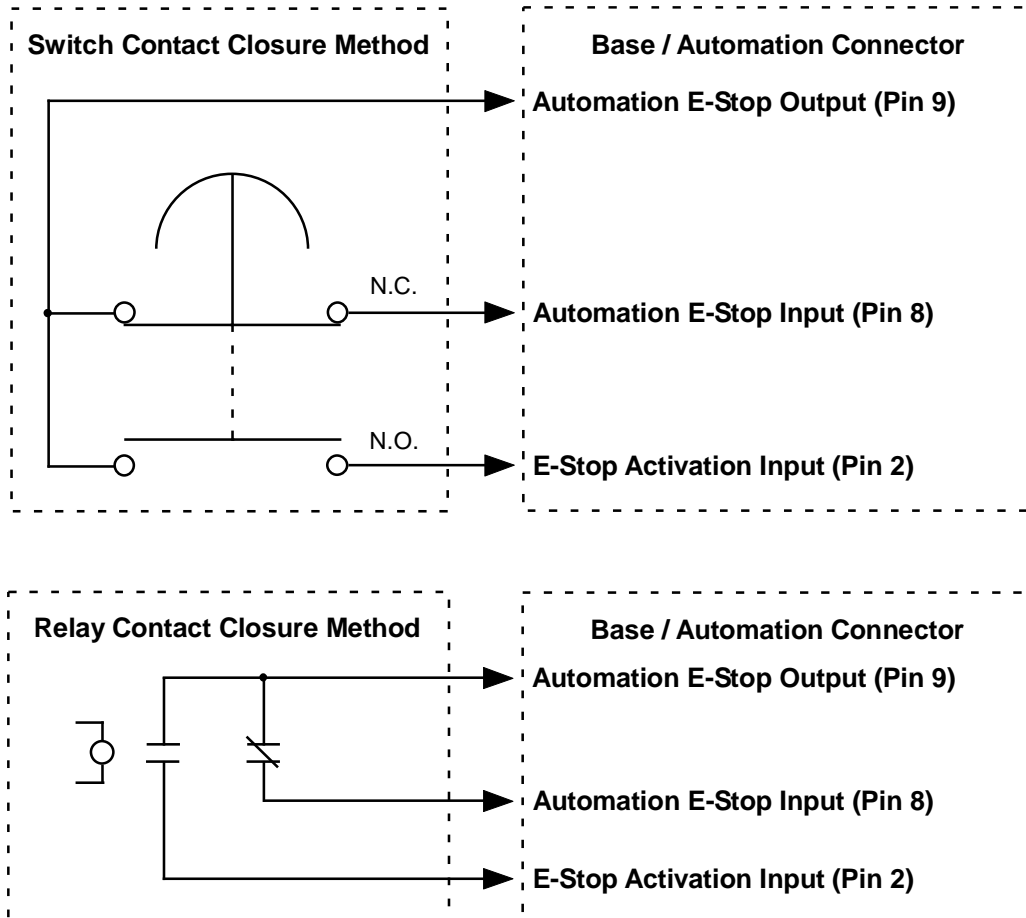


Notes:

1. The Infinity press has four Anti-Tie-Down switch inputs. Two are Normally Open (N.O.) and two are Normally Closed (N.C.).
2. To activate a weld cycle, simultaneously connect the N.O. inputs (Pins 4 and 6) to the Automation E-Stop Output (Pin 9) and disconnect the N.C. inputs (Pins 3 and 5).
3. These inputs must be returned to their idle state, N.C. inputs connected to Automation E-Stop Output (Pin 9) and N.O. inputs (Pins 4 and 6) disconnected, before the next cycle can be initiated.
4. The PLC can use a single relay to control both switch inputs. Tie the safety switch input pins 3 and 5 together to the relays N.C. contact and safety switch input pins 4 and 6 together to the relays N.O. contact.
5. The PLC should also use these inputs for "Jog" and "Teach" commands when the system requests the operator to activate both palm switches.
6. The safety switch inputs can also be tied to the internal +24VDC output (Pin 1) instead of the Automation E-Stop Output (Pin 9).

Connecting an Automation E-Stop Safety Circuit

WARNING: Consult the appropriate local regulatory agency (OSHA, UL, CE, etc.) regarding all of the safety requirements for your automated machine. Dukane is not responsible for injuries related to improper safety circuits or safety guarding used in an automated machine. EN 12100-1/-2 and EN 60204-1 safety standards are recommended.



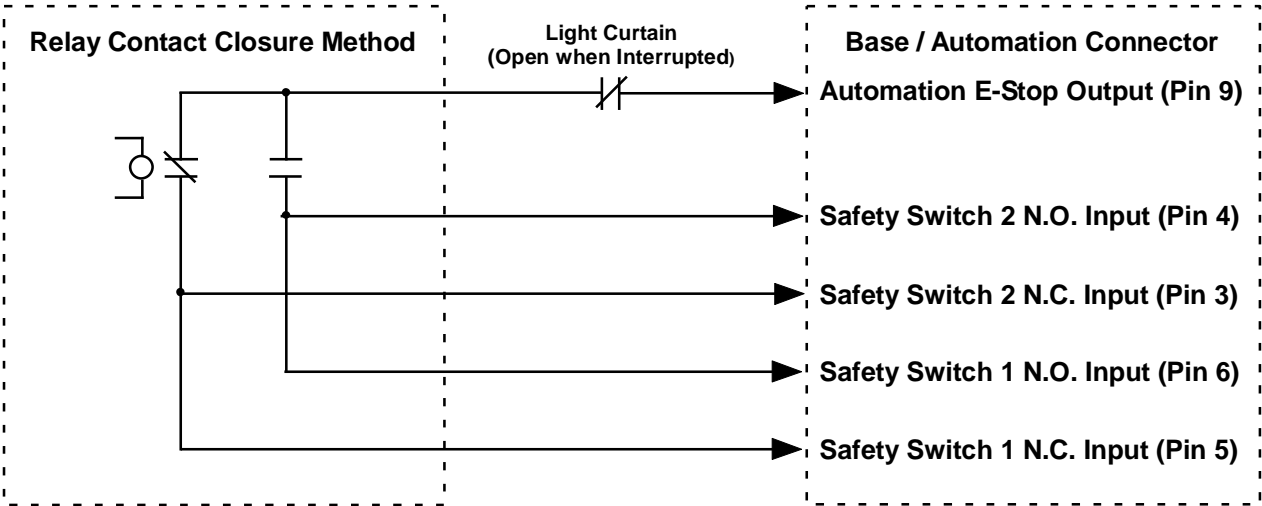
Notes:

1. To operate the Infinity Ultrasonic Press System, pins 8 and 9 must be maintained in a closed connection and pins 2 and 9 must be maintained in an open connection.
2. If the connection between pins 8 and 9 is opened, the ultrasonic output will be disabled and power will be removed from the actuator.
3. In the ES series generator, the E-Stop Status Input (also referred to as E-Stop Sense Input) uses a ground level connection. In the Infinity series press, the E-Stop Activation Input uses a +24VDC level connection.

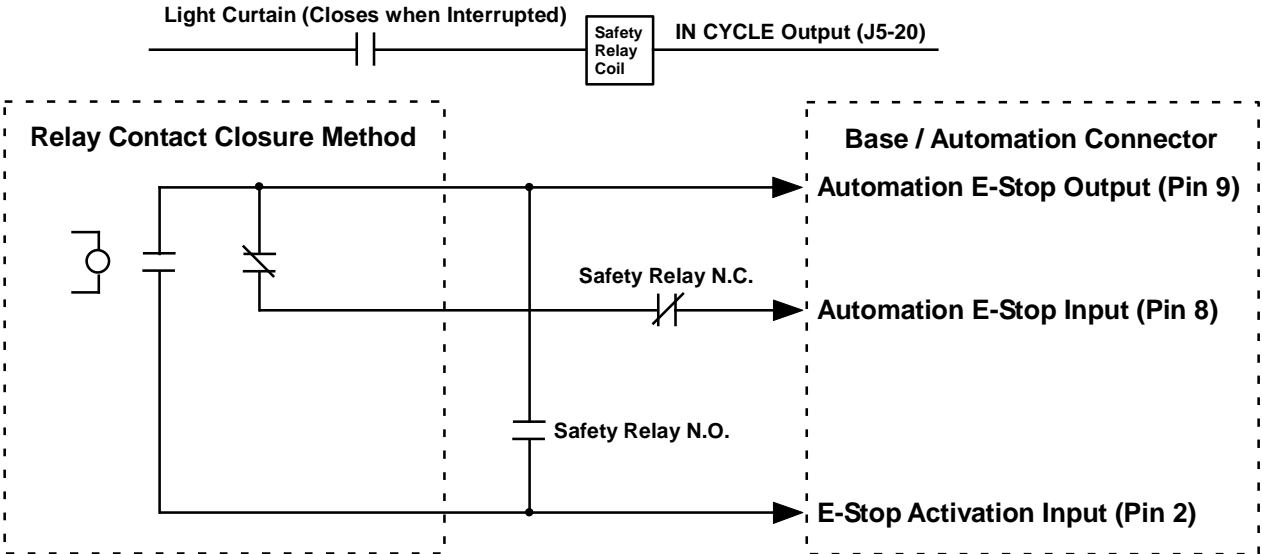
Connecting a Light Curtain

Some automated machines require light curtains to protect personnel from hazardous conditions, which includes the area where parts are loaded for ultrasonic welding. There are numerous ways to connect light curtains to Ultrasonic welders. The following schematic shows one of these ways. The essence of all connection schemes are to achieve safety while not causing nuisance tripping of the abort circuit. To do so, it is desirable to have the ABORT circuit activated by the light curtain ONLY after a press cycle is in progress. When the press is idle and parts are being loaded and unloaded, it is better to have the light curtains prevent a cycle from starting but to leave the ABORT circuit inactive.

Light Curtain connections to prevent a cycle from starting. Light curtain disconnects +22 VDC Relay Contacts

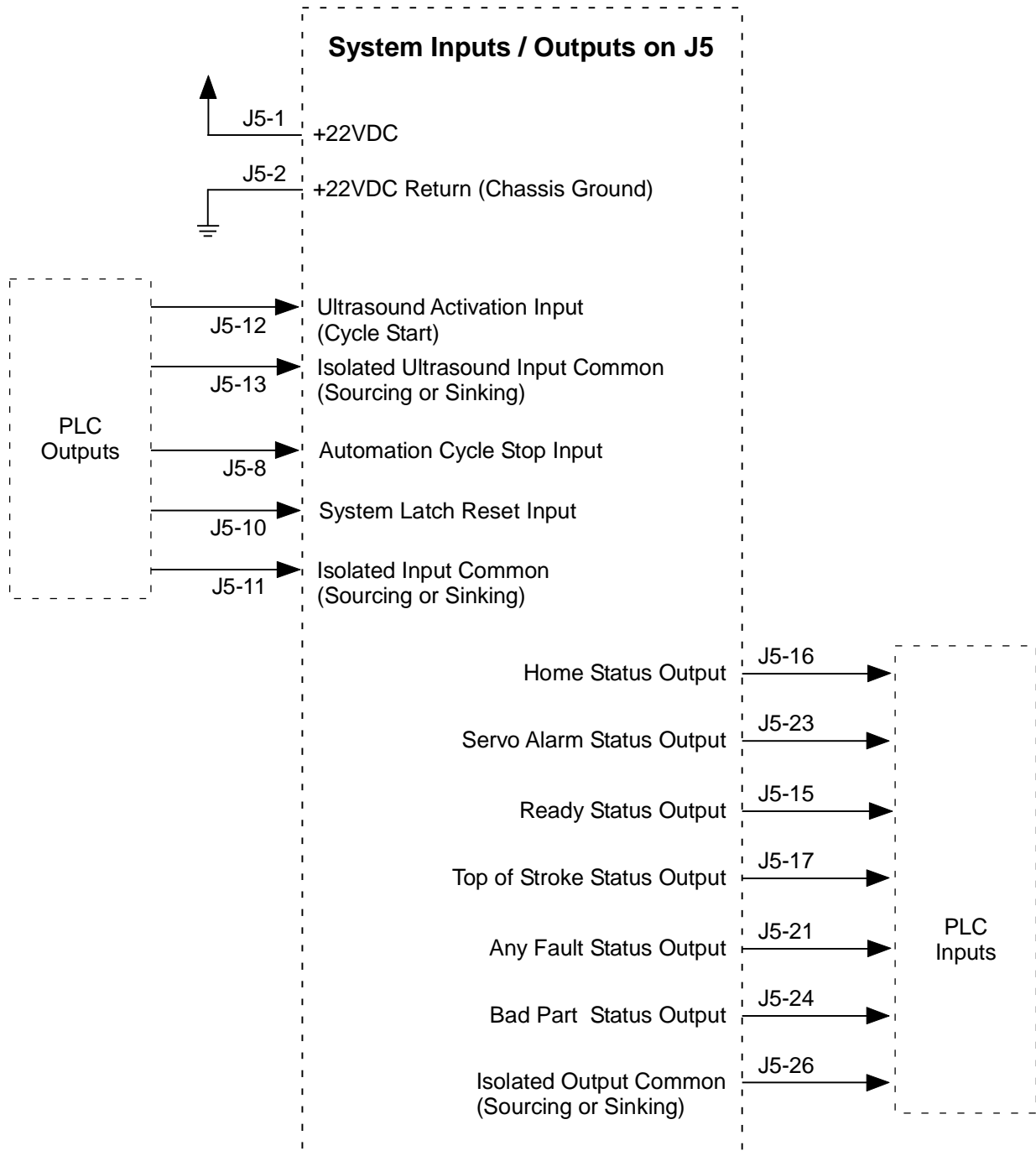


Light Curtain connections to cause an E-STOP after a cycle is in process



Note: Both the above circuits should be incorporated for safety and ease of use.

Common Automation I/O Connections



Note: See page 3 for a complete list of system inputs and outputs.

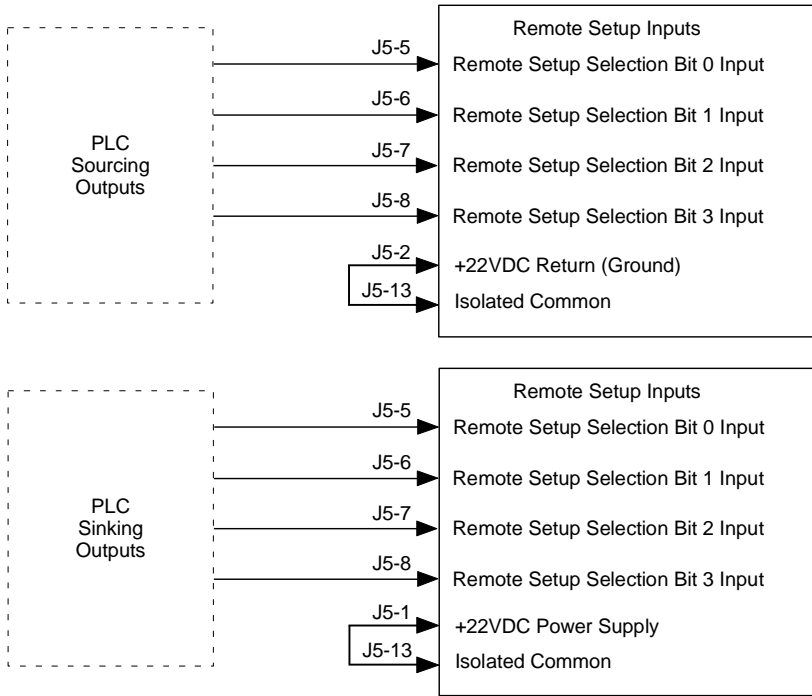
Remote Setup Switching

These system inputs receive a Binary code from the automation that is used to select a setup to be used for the next welding cycle. Selections 17-32 are reserved and are not available (N/A). An external +24VDC supply can be used instead of the generator internal +22VDC supply.

J2-7	J2-6	J2-5	J2-4	J2-3	Setup Selected
0	0	0	0	0	1
0	0	0	0	1	2
0	0	0	1	0	3
0	0	0	1	1	4
0	0	1	0	0	5
0	0	1	0	1	6
0	0	1	1	0	7
0	0	1	1	1	8
0	1	0	0	0	9
0	1	0	0	1	10
0	1	0	1	0	11
0	1	0	1	1	12
0	1	1	0	0	13
0	1	1	0	1	14
0	1	1	1	0	15
0	1	1	1	1	16

J2-7	J2-6	J2-5	J2-4	J2-3	Setup Selected
1	0	0	0	0	17
1	0	0	0	1	18
1	0	0	1	0	19
1	0	0	1	1	20
1	0	1	0	0	21
1	0	1	0	1	22
1	0	1	1	0	23
1	0	1	1	1	24
1	1	0	0	0	25
N/A	N/A	N/A	N/A	N/A	26
N/A	N/A	N/A	N/A	N/A	27
N/A	N/A	N/A	N/A	N/A	28
N/A	N/A	N/A	N/A	N/A	29
N/A	N/A	N/A	N/A	N/A	30
N/A	N/A	N/A	N/A	N/A	31
N/A	N/A	N/A	N/A	N/A	32

Note: Remote setup mode is enabled by selecting "Automation" from Setup Control found in the Process Utilities screen. These system inputs receive a Binary code from the automation that is used to select a setup to be used for the next welding cycle. Setup selections 26-32 are reserved and are not available (N/A). An external +24VDC supply can be used instead of the generator internal supply. See the drawings on pages 4 and 5 for more information.



Servo Specific Programmable I/O's

The following information describes the functionality of the servo specific programmable I/O's

Programmable Status Output 1 (J5 pin 23) = **Servo Error Status**

This output is active for the following errors:

- Servo Motor Over Temperature Alarm (U211)
- Servo Amplifier Error Alarm (U203)
- Servo Checksum Error Alarm (at power up) (U205)
- Servo Position Error Limit Exceeded Alarm (U202)
- Servo Command Error Alarm (U204)
- Upper Limit Switch Activated Alarm (U209)
- Lower Limit Switch Activated Alarm (U208)
- Force duration exceeded (U201)
- Part Detected Too Early by the Linear Encoder (U411)
- Part Detected Too Early by the Servo Controller (U206)

Programmable Status Output 2 (J5 pin 16) = **Home Servo Status**

- This output is active when automation needs to set the servo to its home position. This will happen when the system powers up or after an E-Stop.
- To home the servo, automation must activate all four safety switch inputs until the Home Servo Status output deactivates. See below for more information about the safety switch inputs.

Programmable Status Output Pin Assignments

Programmable Status Output 1 (J5 pin 23)

This output is programmable to the following assignments:

- **Servo Error Status (Default)**
- Over Temperature Status

Programmable Status Output 2 (J5 pin 16)

This output is programmable to the following assignments:

- **Home Servo Status (Default)**
- In Cycle Status
- In Cycle with No Afterburst
- Hold Status

Programmable Status Output 3 (J5 pin 20)

This output is programmable to the following assignments:

- **In Cycle Status (Default)**
- Servo Error Status
- Home Servo Status
- Teaching Status
- Stop Position Status
- Hold Status
- In Cycle with No Afterburst

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