

## Automation Interface Requirements for System I/O Interface of a DPC I Welding System

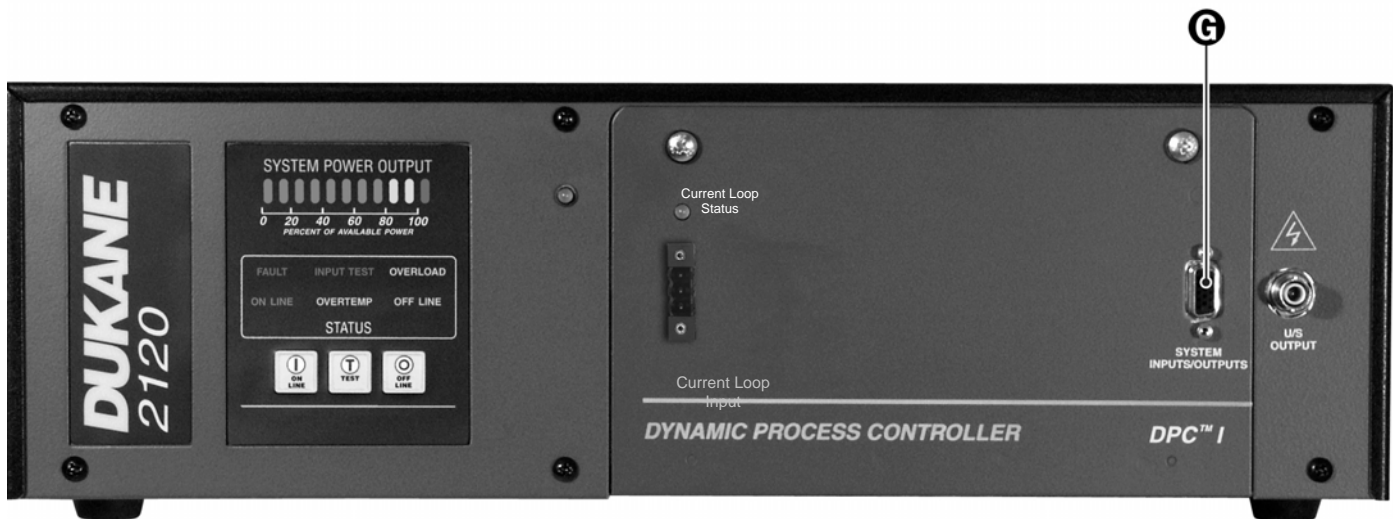
The DPC I welding system offer several features that are intended to communicate with automation. These features allow the automation to control and respond to events that occur during the welding process. This document will provide guidelines that will help you interface automation to a DPC welding system per Dukane Corporation's requirements. Information within this document is intended to supplement the information in the DPC I manual (Dukane part # 403-543).

### Application Note Topics:

- The System Inputs/Outputs Pin assignments
- The 200-1203 System I/O Cable
- Status Output Signal Descriptions
- Status Output Interface Examples
- System Input Signal Descriptions
- System Input Interface Examples

Please note that the DPC I welding system is available in both a vertical chassis and a horizontal chassis. The information within this document applies to both models.

System I/O Interface



## System Input/Output Interface Connector

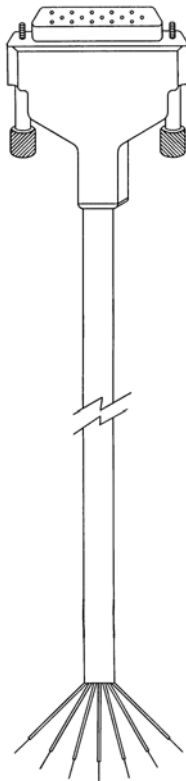
The System I/O connector is the primary communications link between the DPC I and the users automation equipment. This connector provides status signals that confirm the proper operation of the DPC as well as status signals that allow the user to monitor the timing of weld cycle events. The DPC I which is equipped with the standard System I/O connector can be identified as a DPC I with no Current Loop Input connector on the front panel (see diagram on page one). Dukane also offers a DPC I model with optional power monitor and remote amplitude control features. This model can be identified as a DPC I with a Current Loop Input connector on the front panel.

Pin Number	DPC Signal Name	DPC Signal Type
1	Power Supply	+22 VDC (0.25 amp max)
2	Ground	Power Supply Return
3	Ground	Output Common for pins 4-6, 9-10
4	Status Driver	Output
5	Ultrasound Status	Output
6	Overload Fault Status	Output
7	Input Common	Isolated Common for pin 8
8	Cycle Start	Input
9	Over Temperature Fault Status	Output
10	System Fault Status	Output
11	Not Used	Not Used
12	Amplitude Setting Monitor	Output
13	Status Relay Common	Isolated Common for pin 14 and 15
14	Status Relay Normally Open	Output
15	Status Relay Normally Closed	Output

### *System Input connector pin assignments for DPC without optional current loop connector on the front panel.*

Pin Number	DPC Signal Name	DPC Signal Type
1	Power Supply	+22 VDC (0.25 amp max)
2	Ground	Power Supply Return
3	Ground	Non Isolated Common for pins 4-6, 9-10 , 13
4	Status Driver	Output
5	Ultrasound Status	Output
6	Overload Fault Status	Output
7	Input Common	Isolated Common for pin 8
8	Cycle Start	Input
9	Over Temperature Fault Status	Output
10	System Fault Status	Output
11	Not Used	Not Used
12	Amplitude Setting Monitor	Output
13	Power Signal Common	Output Common for pin 14
14	Power Signal Monitor	Output
15	Amplitude Control Fault Status	Output

### *System Input connector pin assignments for DPC with optional current loop connector on the front panel.*



Pin #	Conductor Color
1	Red
2	Black
3	Blue / Black
4	Green / White
5	Blue / White
6	Red / Black
7	White / Black
8	White
9	Orange
10	Blue
11	Orange / Black
12	Red / White
13	Green Black
14	Black / White
15	Green

Part Number	Length
200-1203	10 FT
200-1203-15	15 FT
200-1203-20	20 FT
200-1203-25	25 FT
200-1203-30	30 FT

## The DPC I Output Signals:

The DPC I is equipped with one following system interface board configurations.

- The 110-4004 (Standard) System interface PCB. – No current loop input connector on the front panel.
- The 110-4061 (Optional) System interface PCB. – Equipped with the current loop input connector on the front panel. (May also be equipped with optional 110-4118 power signal interface PCB).

The 110-4004 System interface PCB provides two configurable status output signals . The optional 110-4061 System interface PCB provides one configurable status output signal and one status output signal that is dedicated to the remote amplitude control feature. It also provides an amplitude monitor and optional power monitor feature. Output signals are accessible on the DPC I front panel System I/O connector.

## Output Signal Descriptions:

- Status Driver - (Pin 4) This status output will activate per the jumper settings described within the configuration information on the following pages. The default jumper settings for this status output will produce a contact closure to the status driver ground on pin 3 when a DPC overload conditions occurs.
- Ultrasound Status- (Pin 5) This status output will produce a contact closure to the status driver ground on pin 3 when the  
the DPC I ultrasound signal is active. This output will deactivate when the DPC I ultrasound signal deactivates.
- Overload Fault Status - (Pin 6) This status output will produce a contact closure to the status driver ground on pin 3 when the  
the power level of the process exceeds the maximum power level of the DPC I. A DPC I front panel indicator will also activate at this time. This output will deactivate when the DPC I cycle activation signal is deactivated.
- Over Temperature Status - (Pin 9) This status output will produce a contact closure to the status driver ground on pin 3 when the temperature of the DPC I exceeds it's maximum temperature rating. A DPC I front panel indicator will also activate at this time. This output will deactivate when the DPC I returns to temperatures within it's specified operating range.
- System Fault Status- (Pin 10) This status output will produce a contact closure to the status driver ground on pin 3 when the AC voltage or internal DPC power supplies do not comply with the DPC's specified voltage range. A DPC I front panel indicator will also activate at this time.
- Amplitude Monitor - (Pin 12) This Monitor signal is proportional to the amplitude setting of the DPC I. The scale for this signal is 10.0V = 100% (e.g. a loop current of 10mA yields 6V). Please refer to the DPC I manual for further details on the functionality of the remote amplitude control feature.
- Note: This feature is used when the DPC is equipped with the Current Loop Input connector on the DPC I front panel.*
- Status Relay Common - (Pin 13) This status common is used with pin 14 and 15 of the system I/O connector. It is an isolated bi-directional common with a maximum rating of 24 VDC and 2 A.
- Note: This feature is only available when the DPC is not equipped with the Current Loop Input connector on the DPC I front panel. Units with the Current Loop Input connector are equipped with a non-isolated power supply ground on pin 13 of the System I/O connector.*

## Output Signal Descriptions (Continued):

Status Relay N/O - (Pin 14) This status output will activate per the jumper settings described within the configuration information on the following pages. The default jumper settings for this status output will produce a contact closure to the status relay common on pin 13 when a DPC overload conditions occurs. This status output is bi-directional.

*Note: This feature is only available when the DPC is not equipped with the Current Loop Input connector on the DPC I front panel.*

Power Monitor - (Optional) (Pin 14) This Monitor signal is proportional to the true RMS ultrasonic output power being drawn from the DPC. The scale for this signal is 1mV = 1 Watt on the 20kHz, 30kHz, and 40kHz models. The maximum full scale output is 4.095V (4095 Watts). On the 50kHz and 70kHz models, the scale factor is 10mV = 1 Watt with a maximum full scale output of 409.5 Watts.

*Note: This feature is only available when the DPC is equipped with the Current Loop Input connector on the DPC I front panel and the optional power monitor feature has been installed.*

Status Relay N/C - (Pin 15) This status output will activate per the jumper settings described within the configuration information on the following pages. The default jumper settings for this status output will remove a contact closure to the status relay common on pin 13 when a DPC overload conditions occurs. This status output is bi-directional.

*Note: This feature is only available when the DPC is not equipped with the Current Loop Input connector on the DPC I front panel.*

Current Loop Fault- (Optional) (Pin 15) This status output will produce a contact closure to the status ground on pin 3 when the remote amplitude control signal from the customers equipment fails to comply with the specified range of 4mA to 20 mA for that feature. The front panel status display will indicate a fault.

*Note: This feature is only available when the DPC is equipped with the Current Loop Input connector on the DPC I front panel.*

## Configuring the Status Output signal on pin #4 of the 110-4004 DPC I interface PCB:

The DPC I provides a unidirectional status output (System I/O connector pin 4) on the System I/O connector. This output can be configured to activate during one of five user selectable process events. This status signal can also be configured to either activate or deactivate during the selected status process event. Configuration of this status output requires the positioning of two DPC I internal jumpers on the 110-4004 circuit board which is located inside of the DPC I front panel access door. Please reference the jumper configuration information below to properly configure these status output signals.

### STATUS OUTPUT DRIVER SELECTION

(Associated with Pin 4 of System I/O connector)

Reference jumper block – SH704

- JU703 – Ultrasound Active Status
- JU704 – Overload Fault (Factory Default)
- JU705 – Over Temperature Fault
- JU706 – System Fault
- JU707 – Any Fault

(Please refer to DPC I manual for further descriptions of fault functionality.)

### STATUS DRIVER NORMAL STATE SELECTION

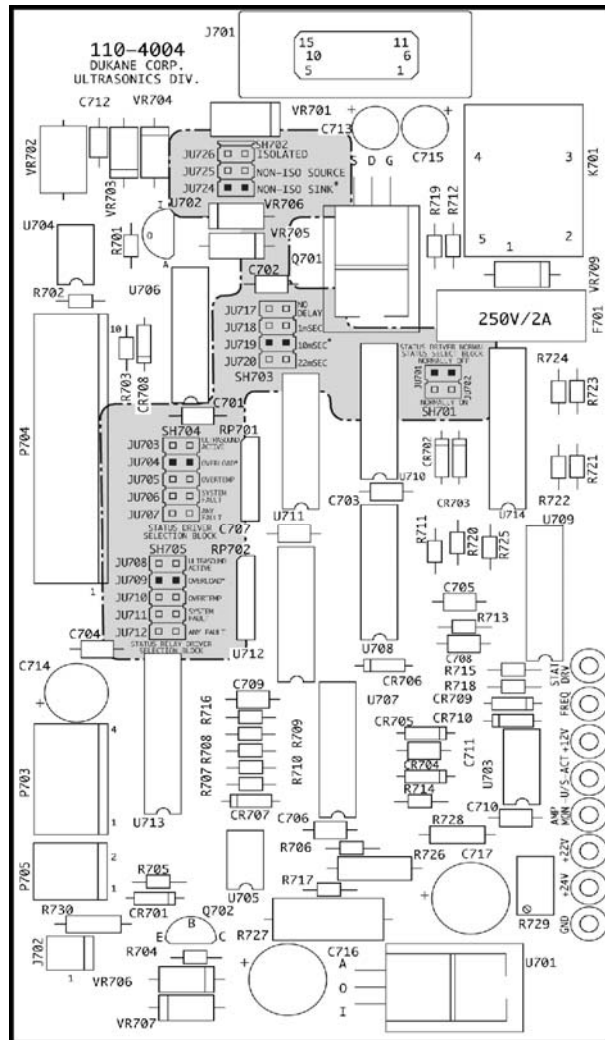
(Associated with Pin 4 of System I/O connector)

Reference jumper block – SH701

- JU701 – Normally OFF (Factory Default)
- JU702 – Normally ON

### Warning

Disconnect DPC I power cord from the AC voltage supply and allow fifteen minutes for the DPC circuits to discharge before opening the front panel of the DPC I. Failure to allow the DPC I to discharge can result in serious personal injuries.





## Configuring the Status Output signals on pin #14 and #15 of the 110-4004 DPC I interface PCB:

The DPC I also provides a bi-directional relay status output (System I/O connector pin 14 and 15 are referenced to the status relay common on pin 13). This output can be configured to activate during one of five user selectable process events. Configuration of this status output requires the positioning of one DPC I internal jumper on the 110-4004 circuit board which is located inside of the DPC I front panel access door. Please reference the jumper configuration information below to properly configure these status output signals.

### STATUS OUTPUT DRIVER SELECTION (Associated with Pin 13, 14, and 15 of System I/O connector)

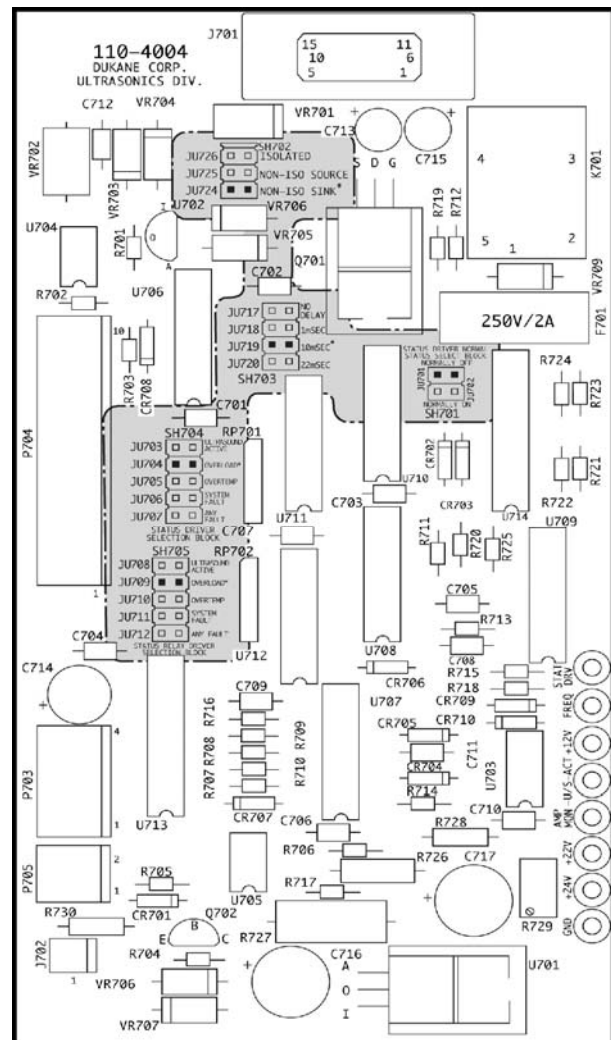
Reference jumper block – SH705

- JU708 – Ultrasound Active Status
- JU709 – Overload Fault (Factory Default)
- JU710 – Over Temperature Fault
- JU711 – System Fault
- JU712 – Any Fault

(Please refer to DPC I manual for further descriptions of fault functionality.)

### Warning

Disconnect DPC I power cord from the AC voltage supply and allow fifteen minutes for the DPC circuits to discharge before opening the front panel of the DPC I. Failure to allow the DPC I to discharge can result in serious personal injuries.



## Configuring the Status Output signal on pin #4 of the 110-4061 DPC I interface PCB:

The DPC I provides a unidirectional status output (System I/O connector pin 4) on the System I/O connector. This output can be configured to activate during one of five user selectable process events. This status signal can also be configured to either activate or deactivate during the selected status process event. Configuration of this status output requires the positioning of two DPC I internal jumpers on the 110-4061 circuit board which is located inside of the DPC I front panel access door. Please reference the jumper configuration information below to properly configure these status output signals.

### STATUS OUTPUT DRIVER SELECTION

(Associated with Pin 4 of System I/O connector)

Reference Jumper Block – SH704

- JU703 – Ultrasound Active Status
- JU704 – Overload Fault (Factory Default)
- JU705 – Over Temperature Fault
- JU706 – System Fault
- JU707 – Any Fault

### STATUS DRIVER NORMAL STATE SELECTION

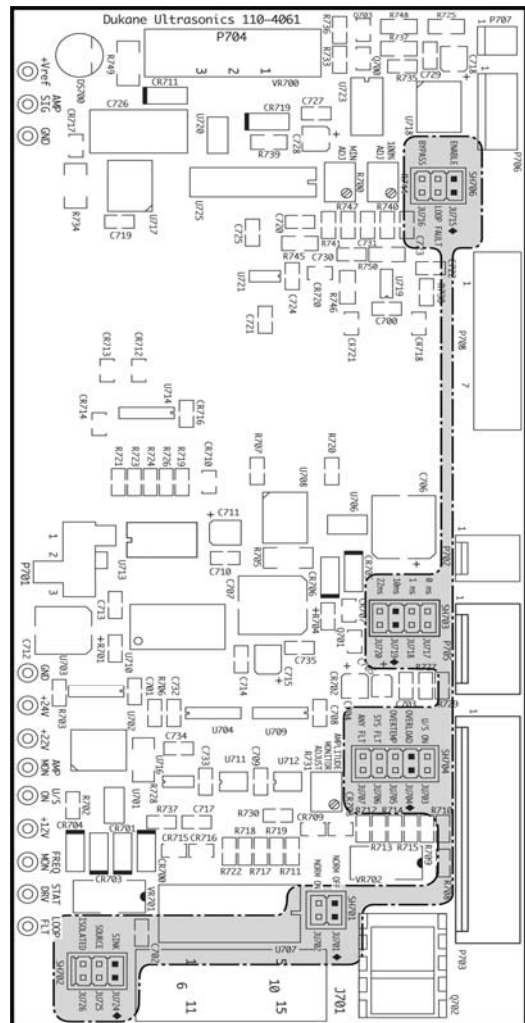
(Associated with Pin 4 of System I/O connector)

Reference Jumper Block – SH701

- JU701 – Normally OFF (Factory Default)
- JU702 – Normally ON

### Warning

Disconnect DPC I power cord from the AC voltage supply and allow fifteen minutes for the DPC circuits to discharge before opening the front panel of the DPC I. Failure to allow the DPC I to discharge can result in serious personal injuries.





## Configuring the Status Output signal on pin #15 of the 110-4061 DPC I interface PCB :

The DPC I also provides a dedicated status signal which indicates that the amplitude control signal being provided by the customers equipment has failed to comply with the requirements of the remote amplitude control feature. Configuration of this status output requires the positioning of one DPC I internal jumper on the 110-4061 circuit board which is located inside of the DPC I front panel access door. Please reference the jumper configuration information below to properly configure these status output signals.

### Current Loop Fault Status

(Associated with Pin 15 of System I/O connector)

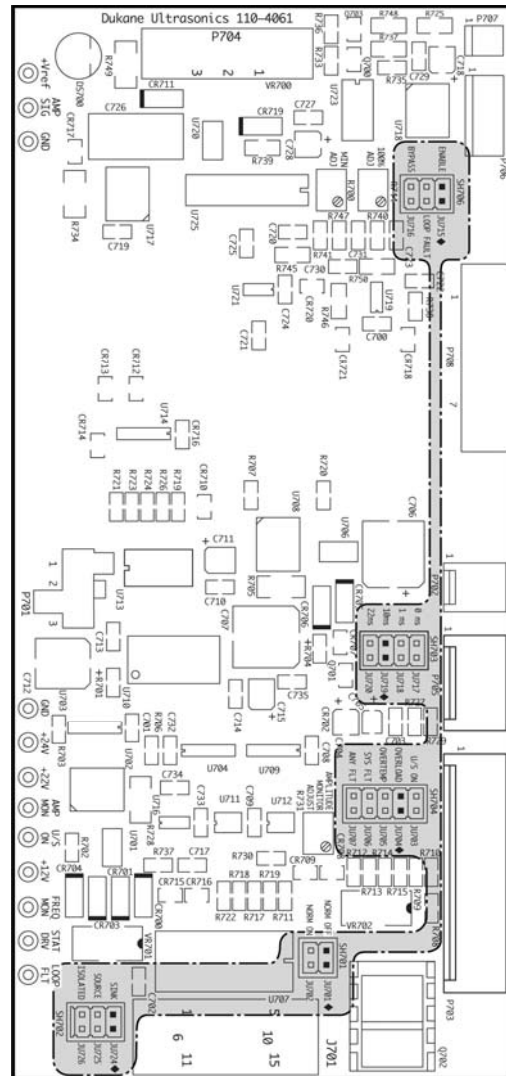
Reference jumper block – SH706

- JU715 – Enable Fault (Factory Default)
- JU716 – Disable Fault (Sets amplitude to 36% of maximum in absence of appropriate amplitude control signal).

(Please refer to DPC I manual for further descriptions of fault functionality).

### Warning

Disconnect DPC I power cord from the AC voltage supply and allow fifteen minutes for the DPC circuits to discharge before opening the front panel of the DPC I. Failure to allow the DPC I to discharge can result in serious personal injuries.



## DPC I Status Output Interface Example:

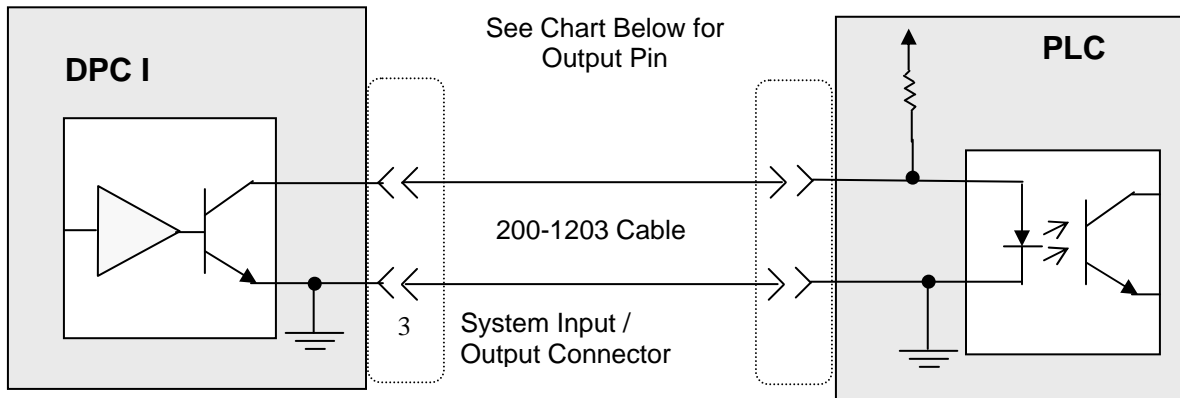
(DPC I configured to accommodate PLC sinking inputs)

DPC I status output device ratings:

Maximum Voltage = 24 VDC  
Maximum Current Rating = 100mA

Note: Pin 4 output device ratings:

Maximum Voltage = 24 VDC  
Maximum Current Rating = 1A



Pin Number	Signal Description
4	Status Driver
5	Ultrasound Active Status
6	Overload Fault Status
9	Over Temperature Fault Status
10	System Fault Status
14	Status Relay Normally Open Contact <sup>(1)</sup>
15	Status Relay Normally Closed Contact <sup>(1)</sup> / Amplitude Control Fault Status <sup>(2)</sup>

Note: (1) This signal is only available on DPC I units that are not equipped with the Current Loop Input connector.

Note: (2) This signal is only available on DPC I units that are equipped with the Current Loop Input connector.

Note: This diagram provides a simplified representation of the DPC I output device for the purpose of demonstrating circuit functionality.

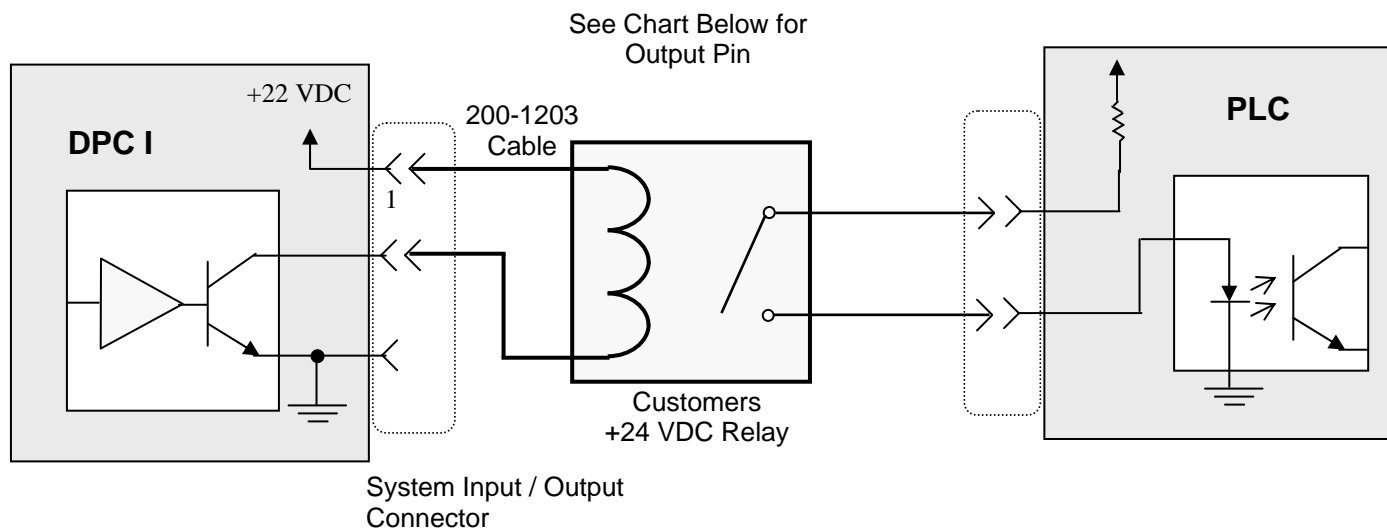
### DPC I Status Output Interface Example:

(DPC I configured to accommodate PLC sourcing inputs)

DPC I status output device ratings:

Maximum Voltage = 24 VDC

Maximum Current Rating = 100mA



Pin Number	Signal Description
4	Status Driver
5	Ultrasound Active Status
6	Overload Fault Status
9	Over Temperature Fault Status
10	System Fault Status
14	Status Relay Normally Open Contact <sup>(1)</sup>
15	Status Relay Normally Closed Contact <sup>(1)</sup> / Amplitude Control Fault Status <sup>(2)</sup>

1. Note: This signal is only available on DPC I units that are not equipped with the Current Loop Input connector.
2. Note: This signal is only available on DPC I units that are equipped with the Current Loop Input connector.

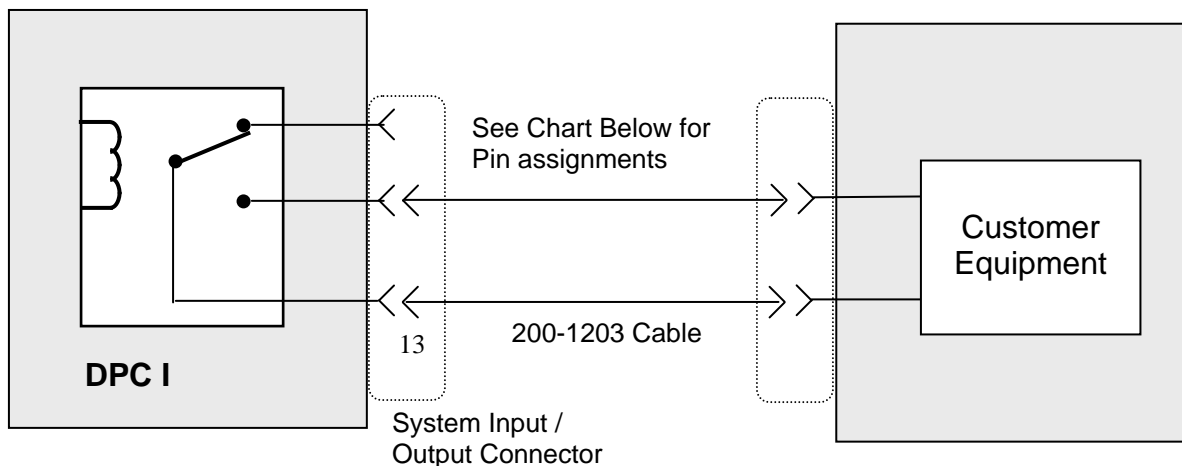
Note: This diagram provides a simplified representation of the DPC I output device for the purpose of demonstrating circuit functionality.

## DPC I Status Output Interface Example:

(DPC I configured to switch higher currents)

DPC I status output device ratings:

Maximum Voltage = 24 VDC  
Maximum Current Rating = 2 A



Pin Number	Signal Description
14	Status Relay Normally Open Contact
15	Status Relay Normally Closed Contact

*Note: These signals are only available on DPC I units that are not equipped with the Current Loop Input connector.*

*Note: This diagram provides a simplified representation of the DPC I output device for the purpose of demonstrating circuit functionality.*

### System Input Signal Description:

The DPC I offers one system input that can be reconfigured by selecting the required jumper location on the DPC I system I/O PCB. Each DPC I is equipped with one of the boards illustrated below. It will be located behind the DPC I front panel access door.

**Isolated Operate In -(Pin 8)** This system input receives a maintained activation signal from the user equipment which activates the ultrasound signal of the DPC I welding system. This system input can be reconfigured to accommodate the signal requirements of the user equipment. Please refer to the information below for information on reconfiguring this system input.

### System Input Configuration

(Associated with pin 8 of the System I/O connector)

### Activation Type

Reference Jumper Block – SH702

- JU724 – Non-Isolated Sinking / Contact to DPC ground on pin 2 of the system I/O connector. (Factory Default)
- JU725 – Non-Isolated Source / Contact to DPC +22V DC on pin 1 of the system I/O connector.
- JU726 – Isolated Source / DPC input activated by a sourced signal (12.5 mA at 5 VDC to 24 VDC).

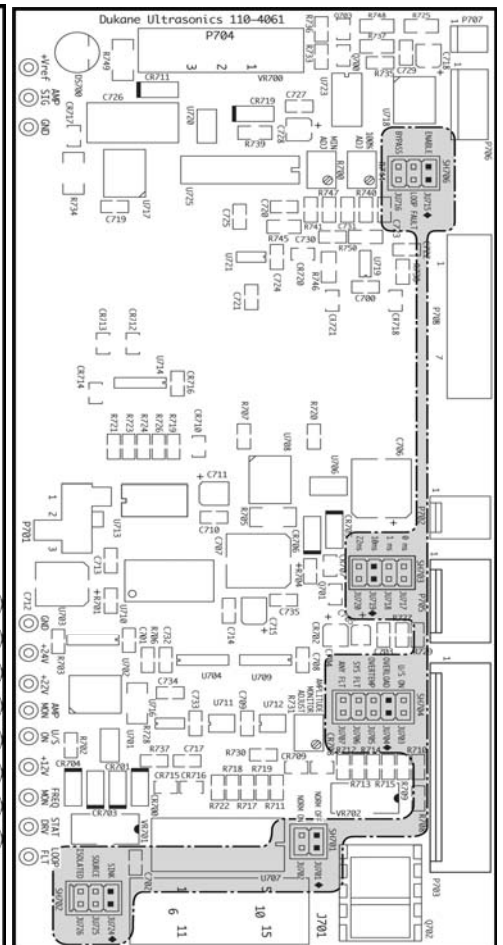
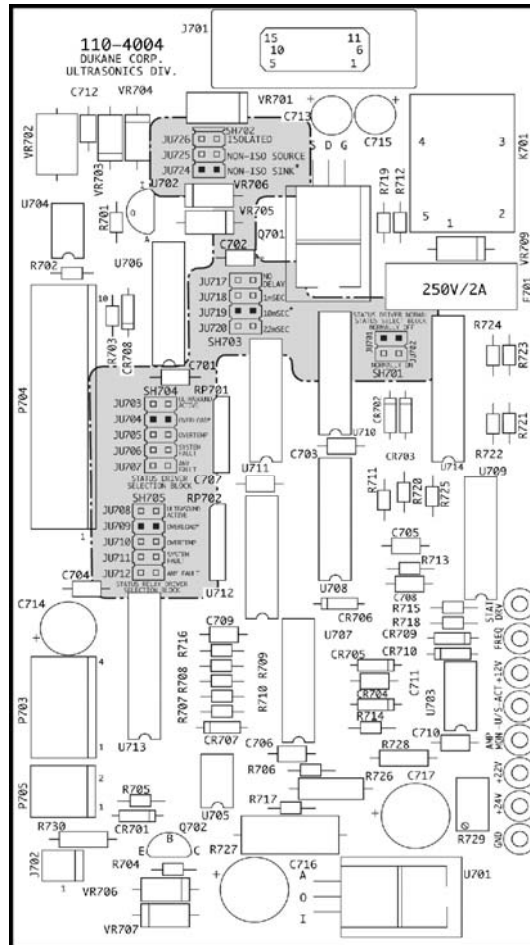
### SWITCH DEBOUNCE FILTER TIME DELAY

Reference Jumper Block – SH703

- JU717 – No Time Delay (Used for electronic switches)
- JU718 – 1 mS
- JU719 – 10 mS (Factory Default)
- JU720 – 22 mS

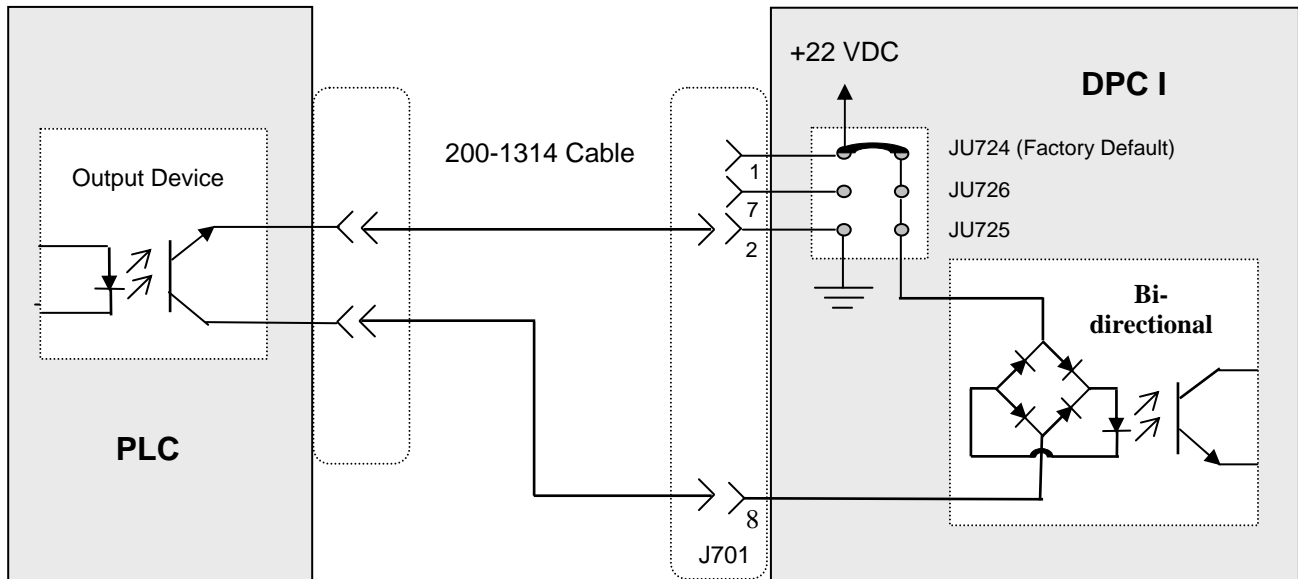
### Warning

Disconnect DPC I power cord from the AC voltage supply and allow fifteen minutes for the DPC circuits to discharge before opening the front panel of the DPC I. Failure to allow the DPC I to discharge can result in serious personal injuries.



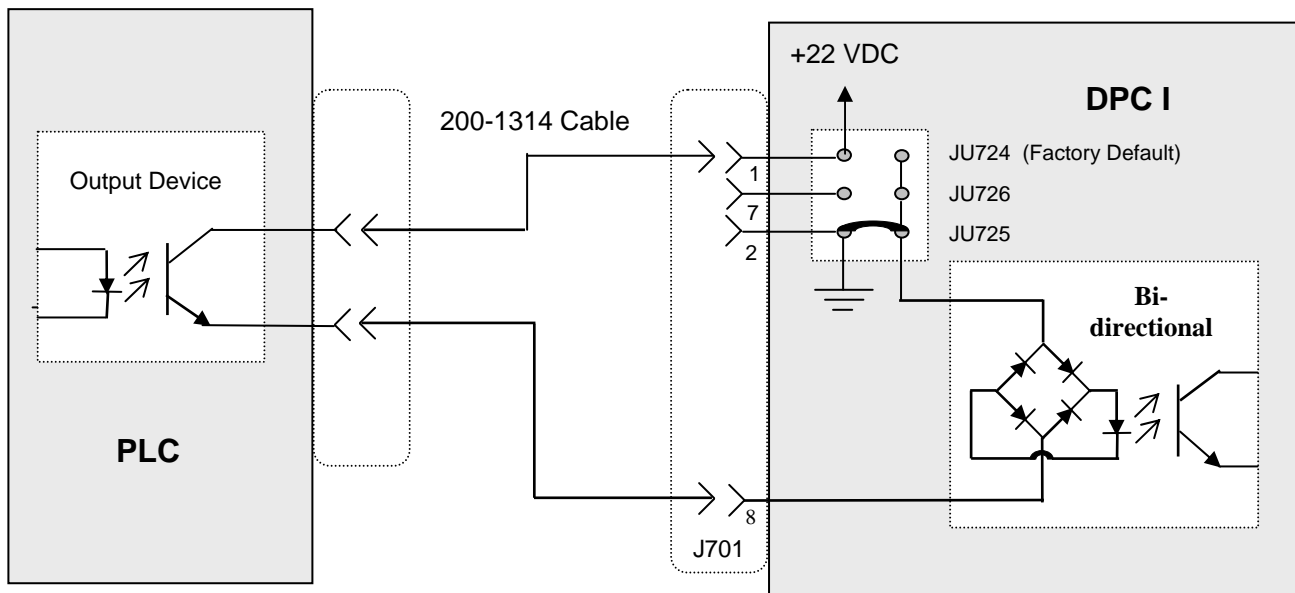
### DPC I System Input Interface Example:

(DPC I configured for a sinking system input)



### DPC I System Input Interface Example:

(DPC I configured for a sourcing system input using the DPC I supply)

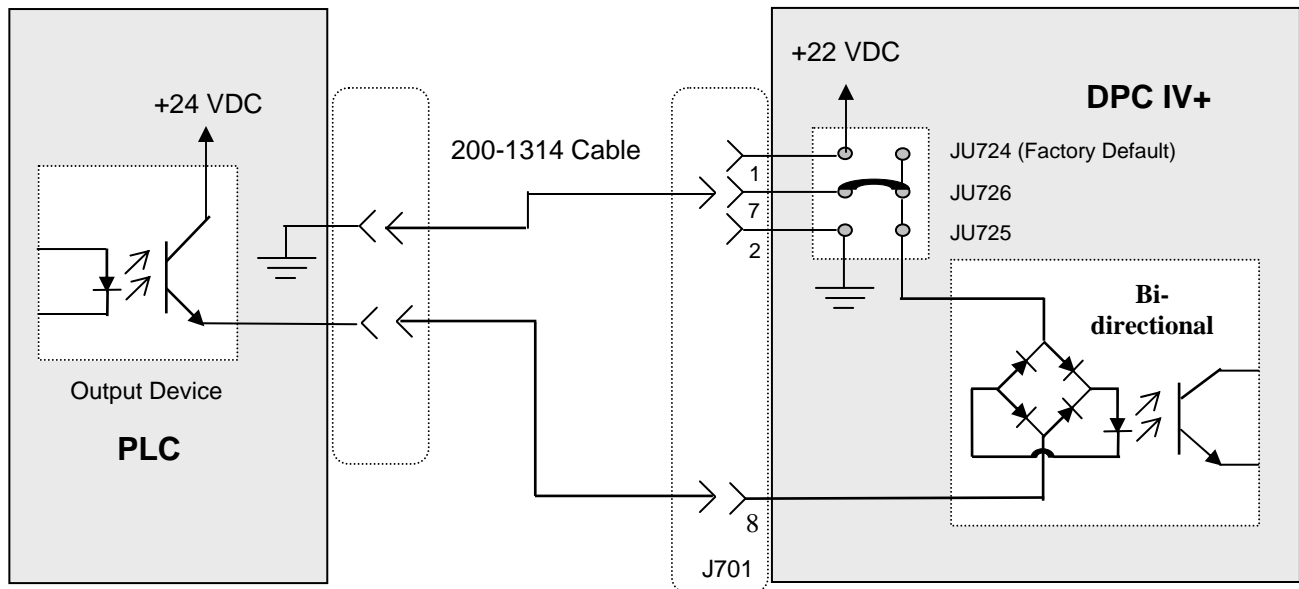


*Note: This diagram provides a simplified representation of the DPC I input device for the purpose of demonstrating circuit functionality.*



## DPC I System Input Interface Example:

(DPC I configured for an isolated system input)



*Note: This diagram provides a simplified representation of the DPC I input device for the purpose of demonstrating circuit functionality.*