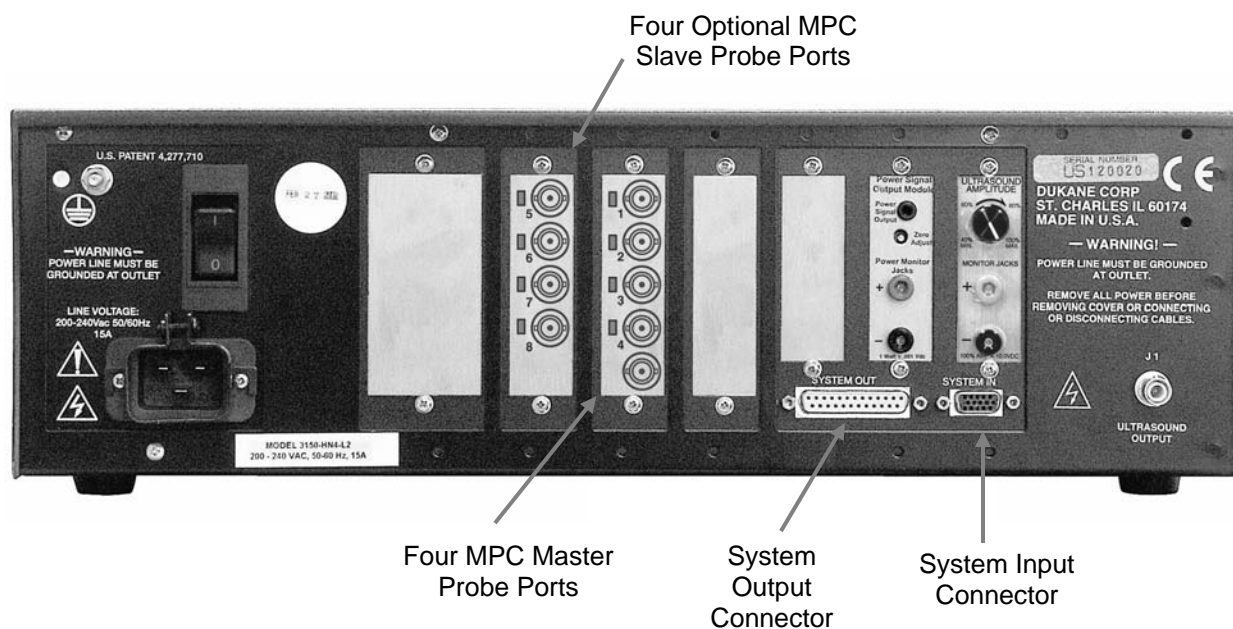


Automation Interface Requirements for the MPC Feature of a DPC II / II+ Welding System

The MPC (Multiple Probe Controller) feature gives the DPC II / II+ welding systems the capability to use one DPC for welding applications with up to eight compatible Dukane probes. This feature supports activation of one probe at a time with the probe sequence defined by a binary code produced within the users automation. This document will provide guidelines that will help you interface automation to a DPC welding system equipped with the MPC feature per Dukane Corporation's requirements. Information within this document is intended to supplement the information in the DPC II (Dukane part # 403-558) and DPC II+ (Dukane part # 403-551) manuals. Application notes are available on Dukane's internet web page that explain the requirements for features of the DPC System Input and System Output connectors which are available but are not directly related to the use of the MPC feature. Features of the System Input and System Output connectors that are directly related to the use of the MPC feature are discussed within this document.

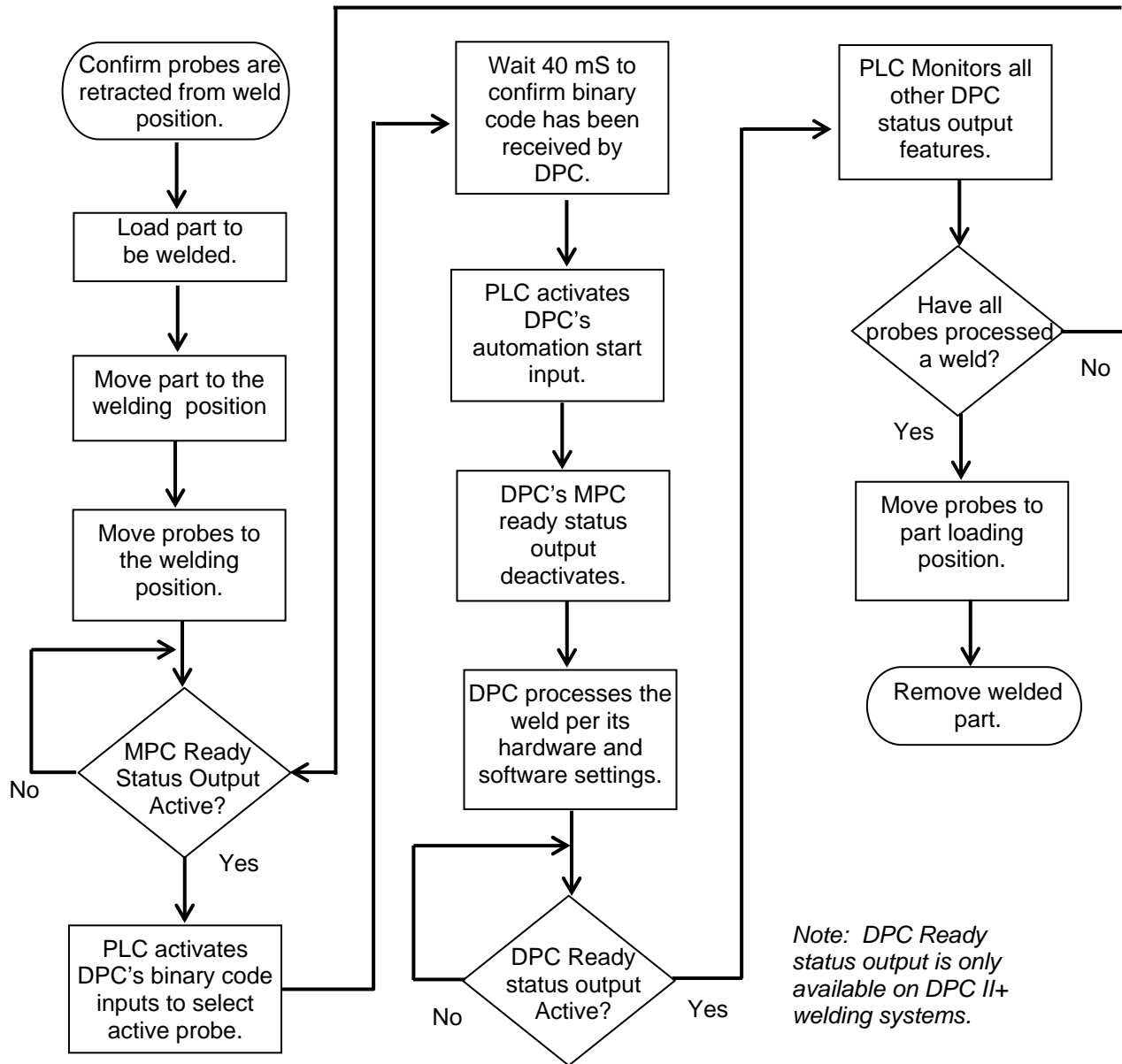
Application Note Topics:

- The System Input Connector Pin assignments.
- The 200-1203 System Input Interface Cable.
- MPC Related System Input Signal Descriptions.
- The System Output Connector Pin Assignments.
- The 200-1302 System Output Interface Cable.
- MPC Related System Output Signal Descriptions.
- System Input and Output Interface Examples.



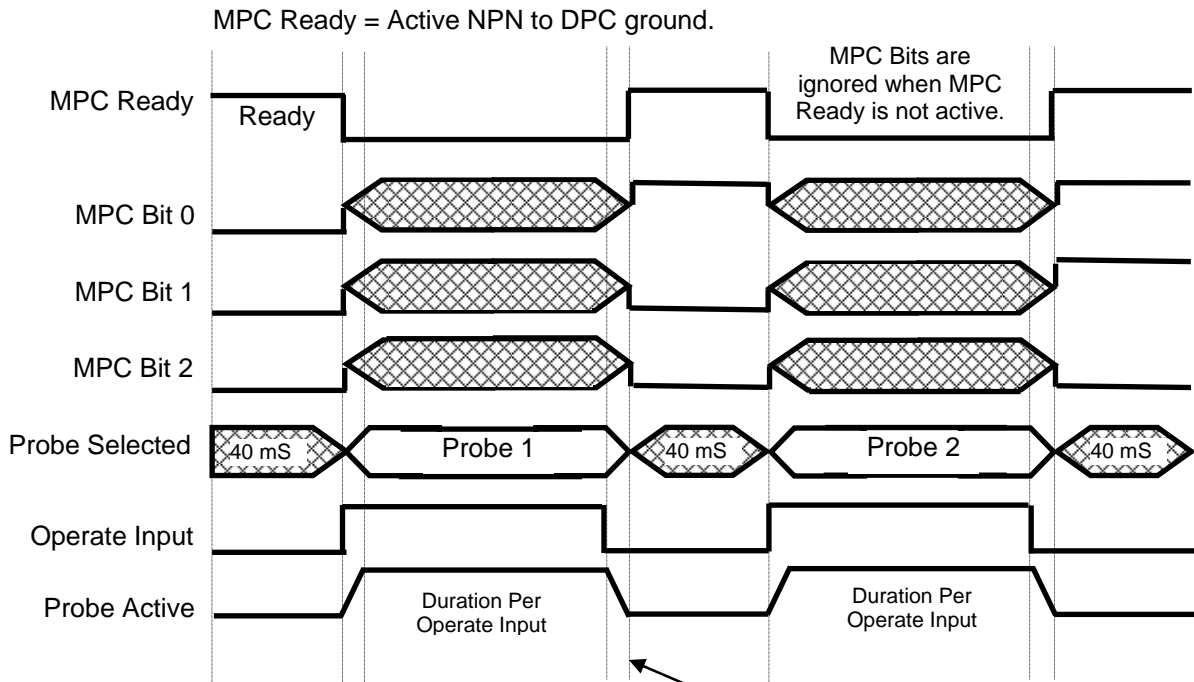
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<http://www.dukane.com/us>

The MPC feature is an optional feature that can be added to either a DPC II or DPC II+ welding system. The DPC II weld duration is controlled by the duration of the cycle activation input (Operate Input) while the DPCII+ weld duration is controlled by the user defined process control parameters of the DPC II+ controller. The MPC feature is available in a four probe version that can be upgraded to an eight probe version. Each MPC port accommodates one Dukane ultrasonic probe. The operation of the MPC feature consists of connecting each of the attached probes to the DPC II or DPC II+ on an individual basis. The MPC feature supervises this process to ensure that the probe selection occurs only during valid segments of a DPC welding cycle. The flow chart below describes a typical welding cycle when using the MPC feature.

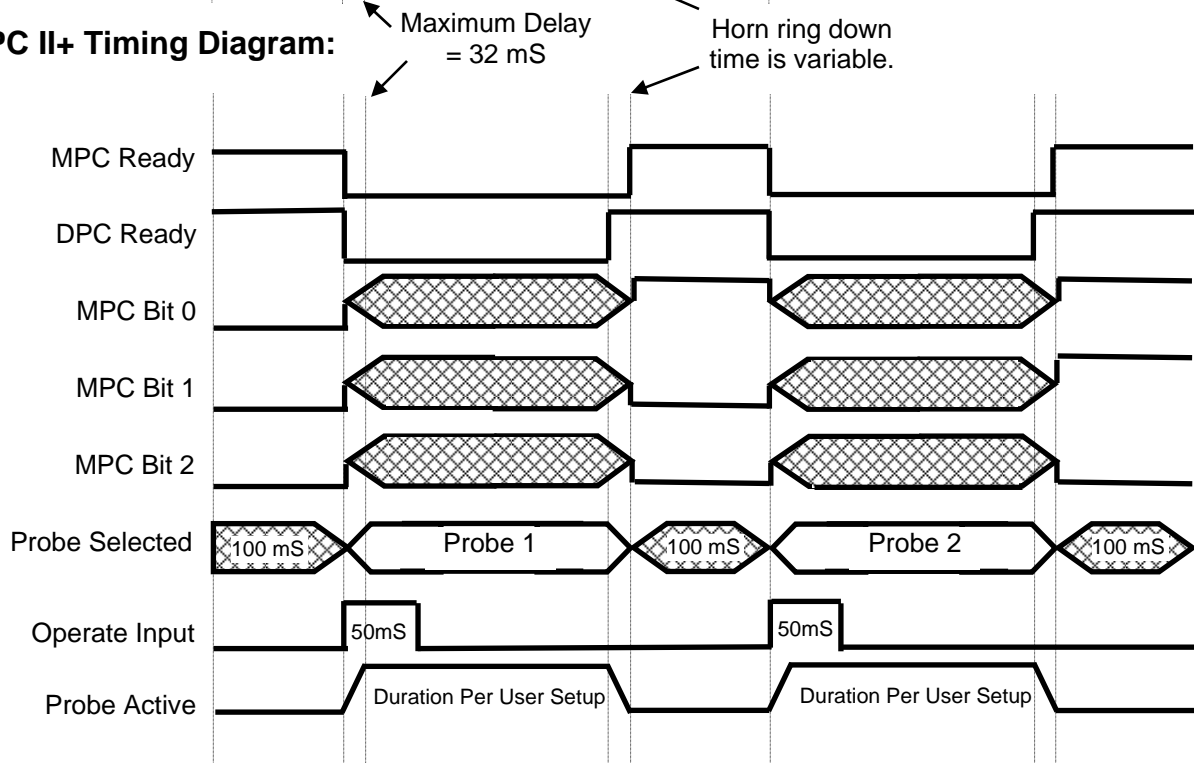


Note: DPC Ready status output is only available on DPC II+ welding systems.

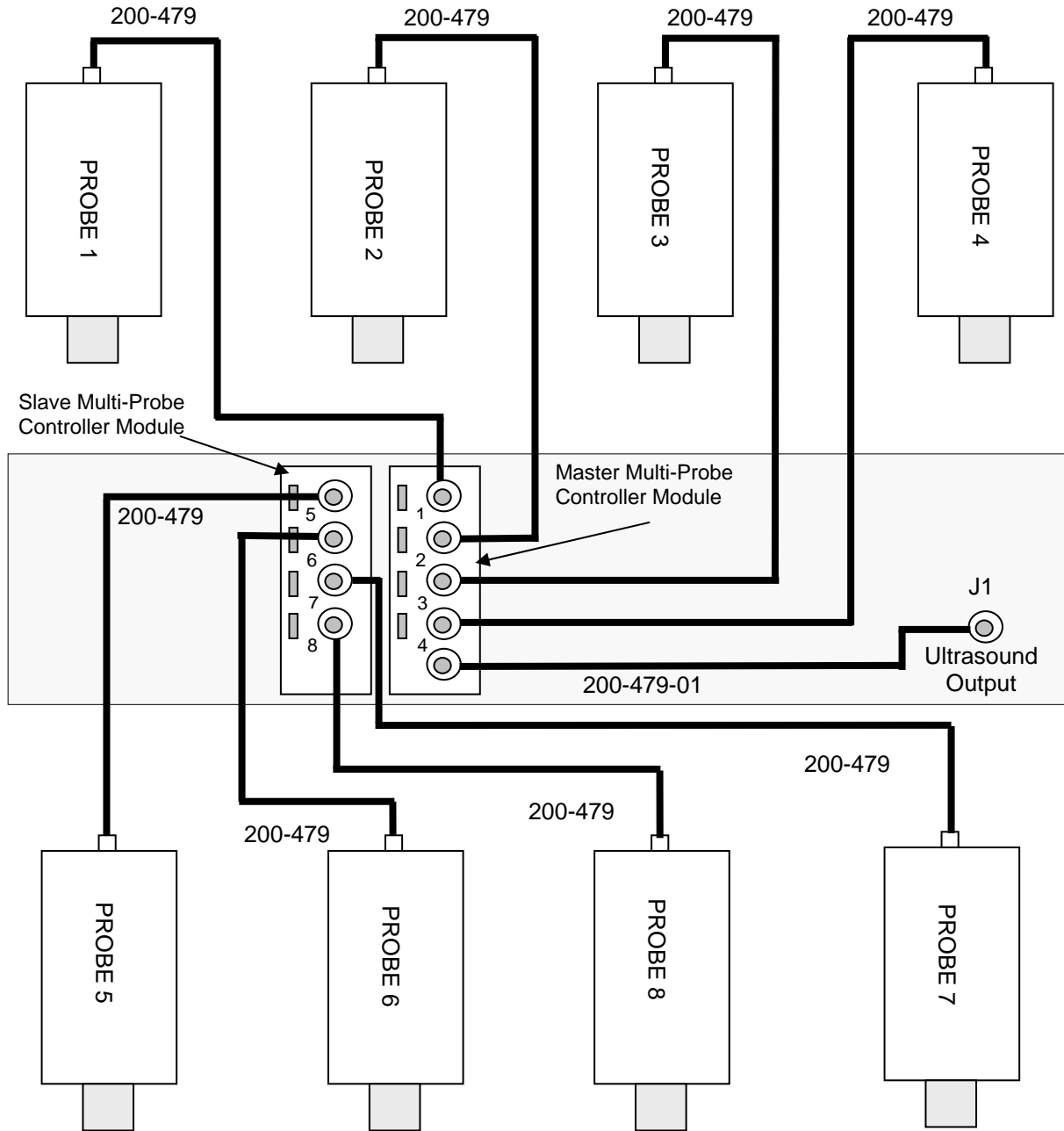
DPC II Timing Diagram:



DPC II+ Timing Diagram:



MPC Coaxial Cable Connections:



System Input Connector

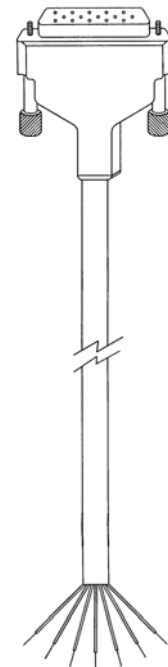
The MPC feature utilizes two System Input connector features during operation. The first required feature is the probe/setup selection feature which is available on pins 12 through 14 of the System Input connector. The second required feature is the isolated cycle activation signal that is available on pin 3 or the non-isolated cycle activation signal that is available on pin 8.

Pin Number	DPC Signal Name	DPC Signal Type
1	Power Supply	+22 VDC (250 mA max)
2	Ground	22VDC Return
3	Isolated Operate Input	Input
4	Isolated Input Common	Common for pin 3, 5, 9
5	Isolated Press Control	Input
6	Not Used	Not Used
7	Ground	+22VDC Return
8	Non Isolated Operate Input	Input
9	Isolated Automation Stop / Automation End of Weld	Input
10	Not Used	Not Used
11	Hand Probe Press Inhibit	Input
12	MPC Probe/Setup Bit 0	Input
13	MPC Probe/Setup Bit 1	Input
14	MPC Probe/Setup Bit 2	Input
15	Front Panel Control Lock	Input

The 200-1203 System Input Cable:

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

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



System Input signals required for the MPC Feature:

Isolated Operate Input - (Pin 3) This system input signal receives the cycle initiation signal from automation. When using the DPC II+, the minimum duration for the activation of this input is 50 mS. This input should be deactivated before the completion of the DPC II+ welding cycle. When using a DPC II, the activation duration will determine the duration of the weld. This system input can be reconfigured to accommodate sourced (PNP) and sinking (NPN) signals as described in the SH707 configuration section of this document. Please refer to the DPC manual for details on the activation and use of the Operate (cycle initiate) feature.

Operate Input - (Pin 8) This system input signal receives the cycle initiation signal from automation. When using the DPC II+, the minimum duration for the activation of this input is 50 mS. This input should be deactivated before the completion of the DPC II+ welding cycle. When using a DPC II, the activation duration will determine the duration of the weld. This system input signal can only accommodate a non-isolated sinking (NPN) signal to the DPC ground pin for activation.

MPC Probe / Setup Bit 0, 1, and 2 - (Pins 12, 13, 14) These system inputs receive a Binary code from the automation that is used to select a DPC setup and/or a DPC probe to be used for the next welding cycle. Please refer to the DPC manual for details on the activation and use of the MPC or Remote Setup Select (DPC II+ only) features. The Binary code provided will configure the DPC as follows:

Pin 14 ²	Pin 13	Pin 12	Active Probe	Active Setup ¹
0	0	0	1	1
0	0	1	2	2
0	1	0	3	3
0	1	1	4	4
1	0	0	5	5
1	0	1	6	6
1	1	0	7	7
1	1	1	8	8

1. Note: The binary code will only configure the active setup if the remote setup select feature of the DPC II+ is enabled. When the remote setup select feature is not enabled, all binary codes will utilize the setup that has been selected manually through the DPC front panel interface.
2. Note: Within the chart above, a value of "0" for pins 12 through 14 represents an open contact (NPN) to ground and "1" represents a closed contact (NPN) to ground.

The MPC feature provides rear panel bi-color status indicator LEDs which activate according to the binary code received on pins 12, 13, and 14. A green LED indicates that the corresponding MPC port is selected by the binary code, but is not currently active with an ultrasound signal. A red LED indicates that the corresponding MPC port is selected by the binary code and is currently active with an ultrasound signal.

Internal DPC Jumper Block Configuration Options

The DPC II / II+ provides four internal jumpers that allow the user to configure the system inputs for compatibility with automation equipment. Only two of these jumpers are related to the MPC feature. Please refer to application note AN200 or the DPC II / II+ manual for further information regarding the jumpers that are unrelated to the MPC feature. The MPC related jumpers are located on the DPC II / II+ 110-3606 system interface board, which is located in bottom of the DPC near the rear panel. The 110-3606 system interface board can be identified as the board connected to the System Input and System Output connectors which extend from the back panel of the DPC II / II+ chassis.

Warning: The DPC chassis cover should not be removed until the DPC power cord has been removed from the AC voltage supply. After removing the DPC power cord from the AC voltage supply, the DPC requires two minutes to discharge to safe levels. Do not remove the DPC cover until the DPC has discharged to safe levels. Avoid contact with all internal DPC components that are not specified within the jumper configuration procedure below. Failure to comply with these requirements can result in serious personal injury and damage to the DPC welding system.

Switch Debounce Filter Delay for System Operate Inputs

(Associated with pins 3 and 8)

Jumper Block – SH705

JU717 – No Time Delay (used for solid state switches)

JU718 – 1 msec

JU719 – 10 msec (Factory Default)

JU720 – 22 msec

System Input Signal Type Configuration

(Associated with pins 3, 5, and 9)

Jumper Block – SH707 ¹

JU724 – Non Isolated Sink (Factory Default)

JU725 – Non Isolated Source

JU726 – Isolated

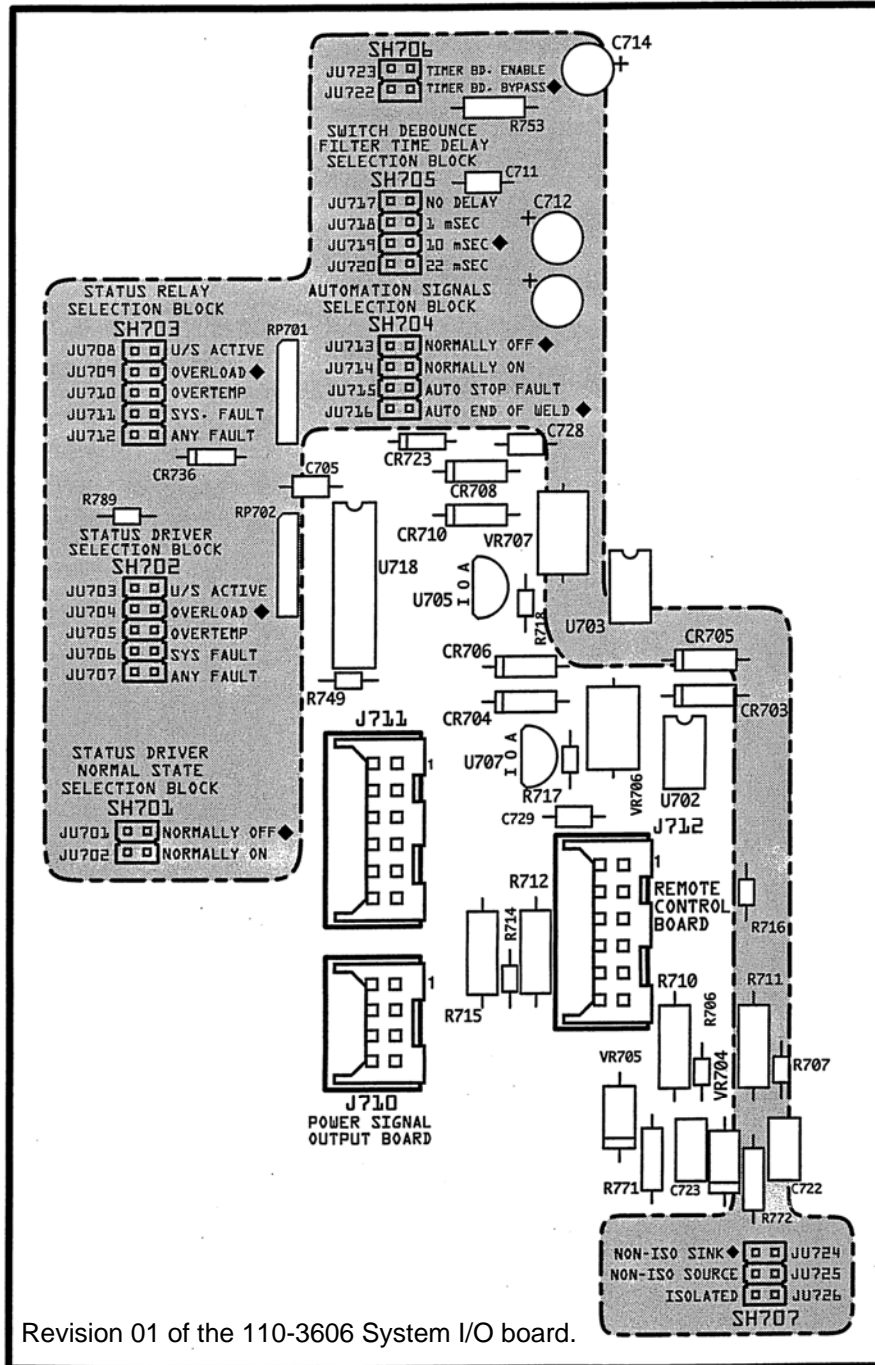
Dry contact between input and DPC ground.

Dry contact between input and +22VDC.

Input can be either sinking (NPN) or sourcing (PNP). A signal of 5 to 24 VDC is required at the isolated input pin. The current is internally limited to 12.5mA.

1. SH707 is only available on revision 01 and higher of the 110-3606 system interface board. The MPC feature is not supported by revision 00 of the 110-3606 system interface board.

Expanded view of jumper locations on the 110-3606 System I/O board of the DPC II / II+:



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System Output Connector

The MPC feature provides the MPC Ready status signal of DPC II and II+ welding systems. The DPC Ready status signal is also utilized during MPC operation on the DPC II+ welding system. Other features available on the System Output connector are optional for MPC operation. Please refer to application note AN202 and the DPC II / II+ manual for further details about these features.

DPC II / II+ Systems

Pin Number	DPC Signal Name	DPC Signal Type
1	Power Supply	+ 22 VDC .25 A max
2	Ground	Power Supply Return
3	Ground	Output Common for pin 4
4	Status Driver	Output
6	Ultrasound Active Status	Output
7	System Fault Status	Output
8	Over Temperature Fault Status	Output
9	Overload Fault Status	Output
10	On Line Status	Output
11	Ground	Output Common for pins 6-10, 12, 18, 19
12	Remote Amplitude Fault Status ¹	Output
13	Ground	Output Common for pins 14-16
14	Frequency Monitor	Output
15	Amplitude Monitor	Output
16	Power Signal Monitor ²	Output
18	Multi Probe (MPC) Ready Status ³	Output
19	Power Fail Status	Output

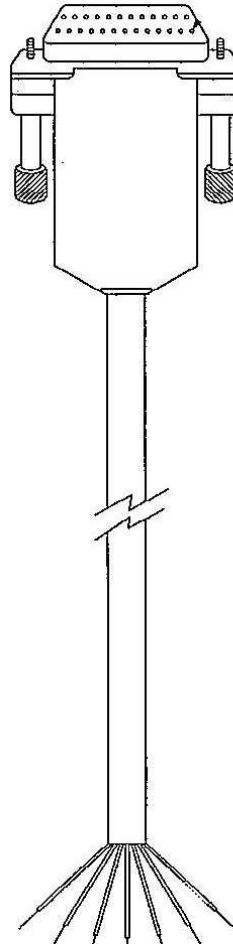
DPC II+ Only Systems

20	Bad/Suspect Part Status	Output
21	Good Part Status	Output
22	Ready (Cycle Ready) Status	Output
23	In Hold (In Dwell) Status	Output
24	Output Common	Output Common for pin 20-23

1. Requires an optional Remote Amplitude Control Module.
2. Requires an optional Power Signal Output Module.
3. Requires an optional Multi-Probe Controller Module. (Only compatible with Rev 01 DPC II System I/O board)

The 200-1302 System Output Cable:

COLOR CODE OF CABLE	
PIN #	COLOR
1	BLK
2	WHT
3	RED
4	GRN
5	ORN
6	BLU
7	WHT/BLK
8	RED/BLK
9	GRN/BLK
10	ORN/BLK
11	BLU/BLK
12	BLK/WHT
13	RED/WHT
14	GRN/WHT
15	BLU/WHT
16	BLK/RED
17	WHT/RED
18	ORN/RED
19	BLU/RED
20	RED/GRN
21	ORN/GRN
22	BLK/WHT/RED
23	WHT/BLK/RED
24	RED/BLK/WHT
25	GRN/BLK/WHT



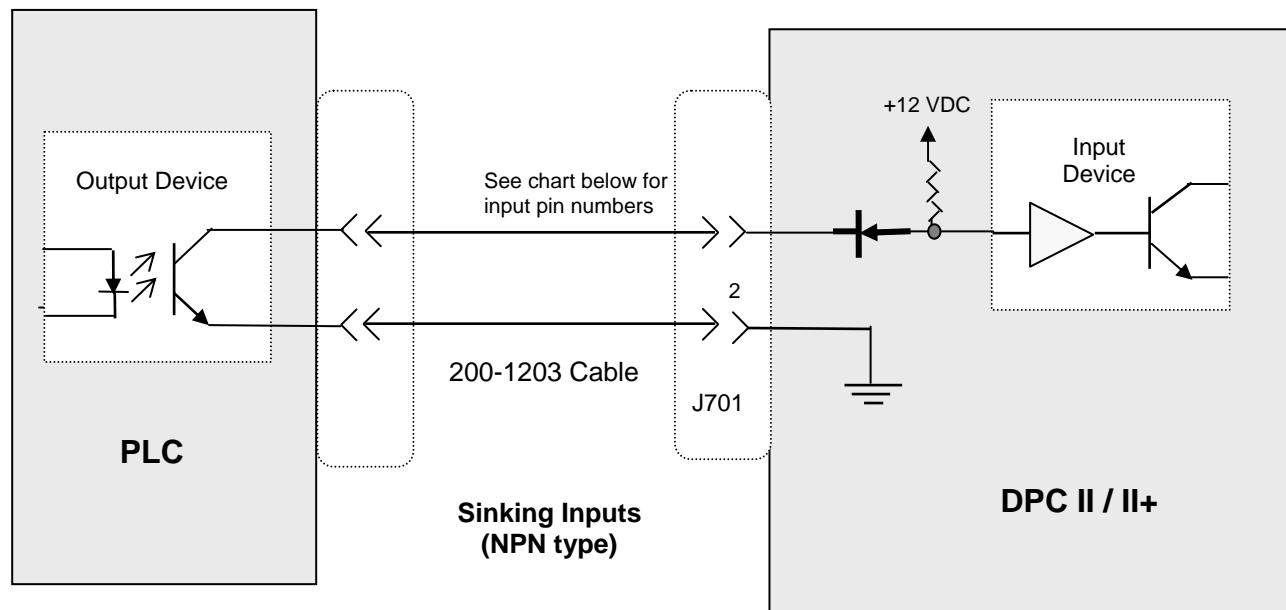
Cable Part Numbers	
PART #	LENGTH
200-1302	10 FT
200-1302-15	15 FT
200-1302-20	20 FT
200-1302-25	25 FT
200-1302-30	30 FT
200-1302-33	CUSTOM

Status Output Signal Descriptions:

MPC Ready Status - (Pin 18) This status output will sink current (NPN) to the status output ground on pin 11 when the DPC is ready to receive the MPC probe configuration code.

Ready (Cycle Ready) Status - (Pin 22) Available only on DPC II+ welding systems. This status output will activate at the completion of the Hold portion of the welding sequence. It should be noted that the activation of the Afterburst feature and the return of the pneumatic press to the home position will occur after the activation of the Ready Output status signal. Please refer to the Process Control section of the DPC manual for further information on the activation and use of the Afterburst feature.

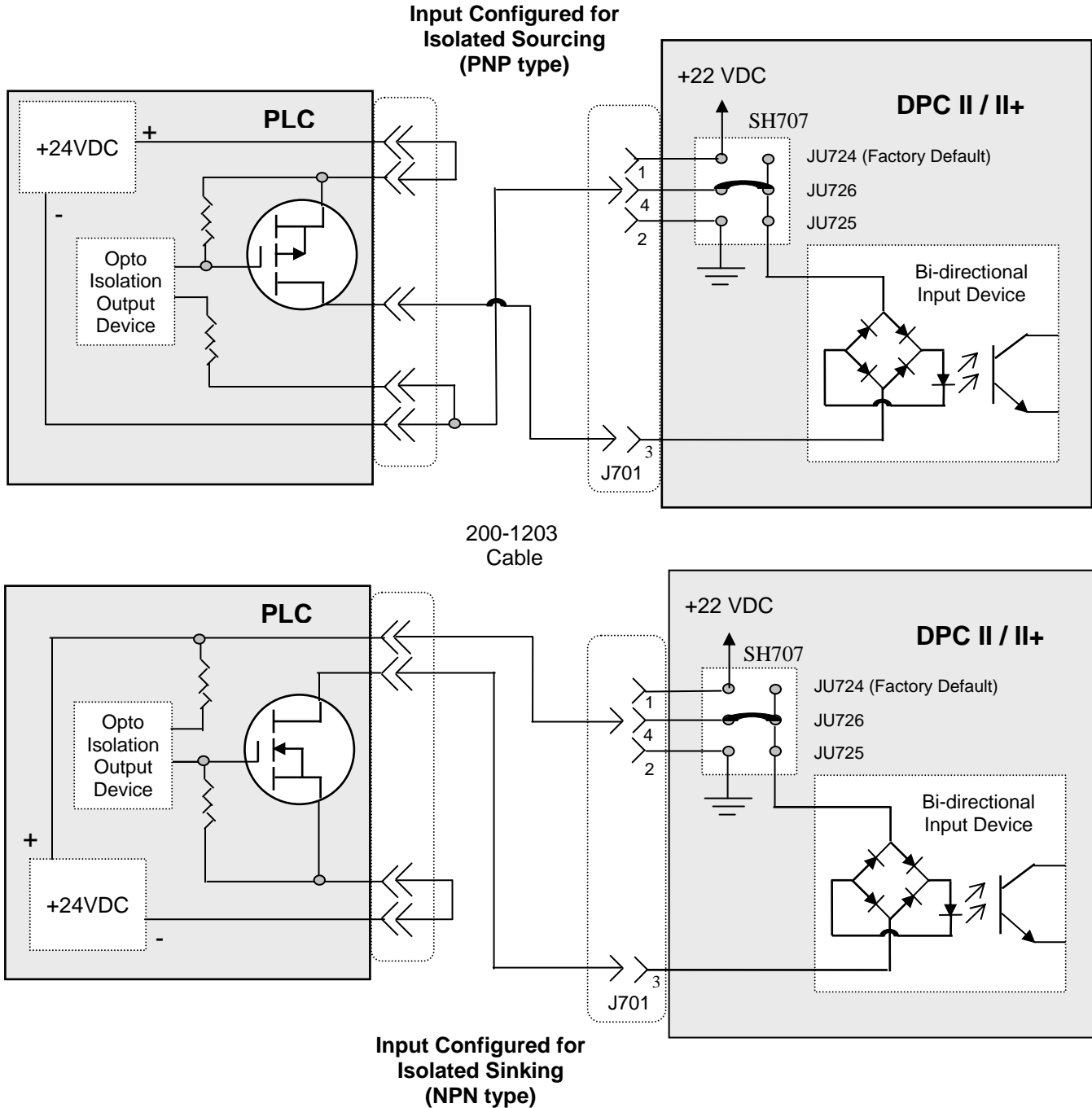
Interface Examples for the System Input Connector:



PIN #	PIN DESCRIPTION
8	Automation Start
12	Probe ID Bit 0
13	Probe ID Bit 1
14	Probe ID Bit 2

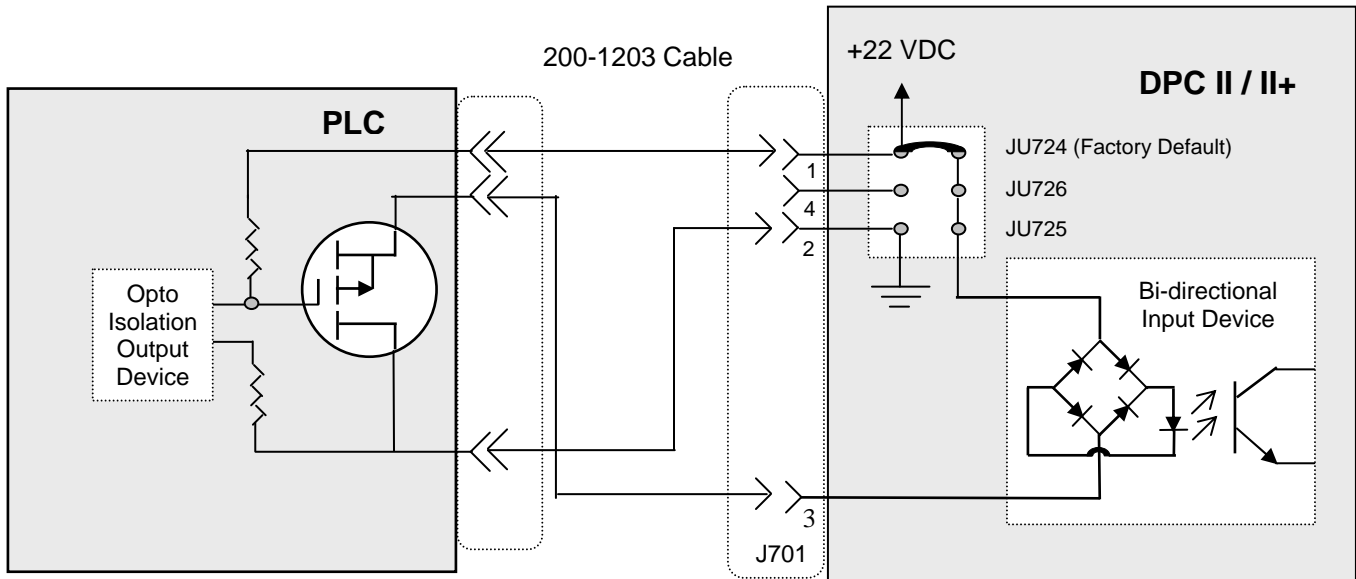
Note: This diagram provides a simplified representation of the DPC II / II+ input device for the purpose of demonstrating circuit functionality.

Interface Examples for Isolated Input Signal on pin 3 of the System Input Connector:



Note: These diagrams provide a simplified representation of the DPC II / II+ input device for the purpose of demonstrating circuit functionality.

Interface Examples for Non-Isolated input Signal For pin 3 of the System Input Connector:



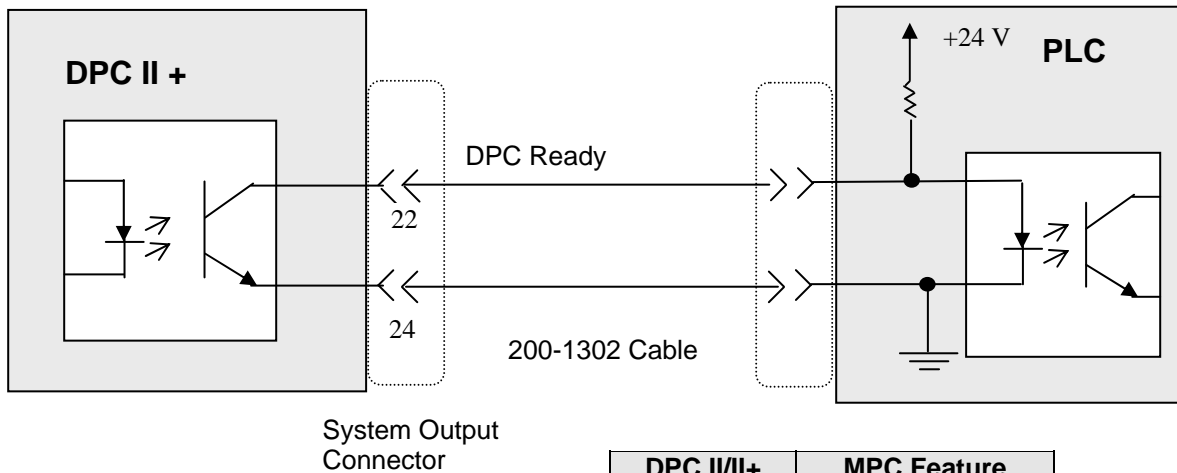
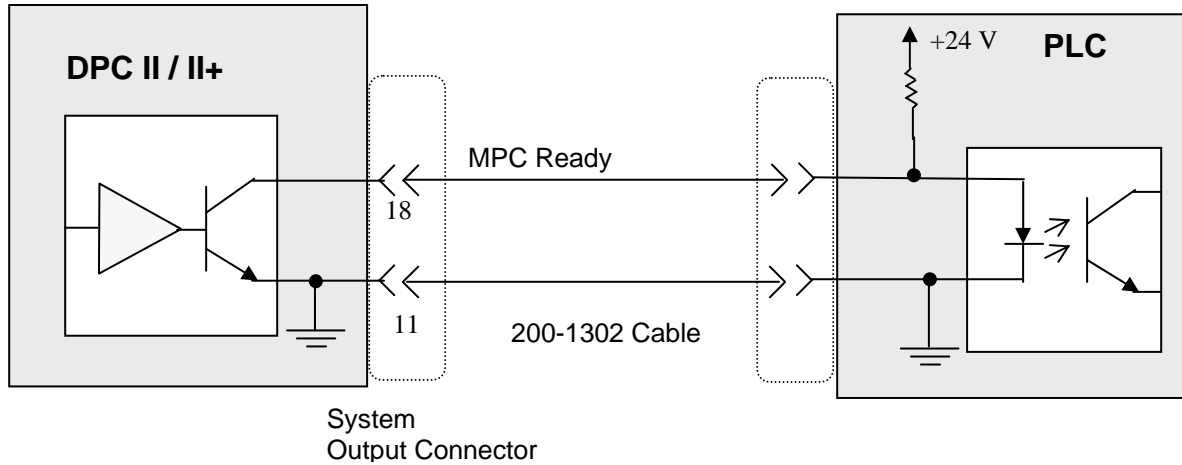
**Input Configured for Non-Isolated Sinking
(NPN type)**

Note: These diagrams provide a simplified representation of the DPC II / II+ input device for the purpose of demonstrating circuit functionality.

Status Output Interface Examples:

DPC status output device ratings:

Maximum Voltage = 24 VDC
Maximum Current Rating = 100mA
Type = NPN outputs



DPC II/II+ Output Pin	MPC Feature
Activated	Ready
Deactivated	Not Ready / Busy

Note: These diagrams provide a simplified representation of the DPC II / II+ output device for the purpose of demonstrating circuit functionality.

Revision History

<u>Revision Number</u>	<u>Revision History</u>	<u>Date</u>
-00	Original Release	28-October-2004