SPECIFICATIONS: ANALOG I/O MODULES



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Analog I/O Modules Overview

There are 19 analog I/O modules that can be used in local and remote I/O bases. The specifications and wiring diagrams for these modules are found in this chapter. Each analog I/O module is identified as an "Input", "Output", or "Input/Output" module using the color coding scheme shown below. A blue bar on the front panel signifies an Input I/O module, a red bar signifies an Output I/O module and a white bar signifies a combination Input/Output module.

Analog Input Modules



Analog Input Modules			
Part Number	Number of Channels	Description	See Page
F2-04AD-1	4	Analog Current Input	6-6
F2-04AD-2	4	Analog Voltage Input	6-9
F2-08AD-1	8	Analog Current Input	6-12
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F2-04RTD	4	RTD	6-18
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Analog I/O Modules Overview - continued

Analog Output Modules



Analog Output Modules			
Part Number	Number of Channels	Description	See Page
F2-02DA-1(L)	2	Analog Current Output	6-28
F2-02DA-2(L)	2	Analog Voltage Output	6-30
F2-02DAS-1	2	Isolated Analog Current Output	6-34
F2-02DAS-2	2	Isolated Analog Voltage Output	6-36
F2-08DA-1	8	Analog Current Output	6-39
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Analog Input/Output Module



Analog I/O Modules Overview- continued

How to Access the Analog I/O Modules

With the Do-more PLC, the WX and WY memory addresses are assigned to exchange analog data with the analog I/O modules. (WX = Analog input data, WY = Analog output data and setup data) X addresses are also assigned to some analog I/O modules to indicate the status of those analog I/O modules.

The following table shows how many X, WX and WY addresses are assigned to each analog I/O module type.

Analog Input/Output Module Addressing				
Part Number	Module ID	Х	WX	WY
F2-04AD-1	0x3E	8	4	-
F2-04AD-2	0x3E	8	4	-
F2-08AD-1	0x3B	8	8	-
F2-08AD-2	0x3B	8	8	-
F2-04RTD	0x3C	8	4	-
F2-04THM	0x3C	8	4	-
F2-02DA-1(L)	0x3F	-	-	2
F2-02DA-2(L)	0x3F	-	-	2
F2-02DAS-1	0x4E	-	-	2
F2-02DAS-2	0x4E	-	-	2
F2-08DA-1	0x4F	-	-	8
F2-08DA-2	0x4F	-	-	8
F2-4AD2DA	0x3D	8	4	2
F2-8AD4DA-1	0x37	8	8	7
F2-8AD4DA-2	0x37	8	8	7

Analog I/O Modules Overview- continued

You can check which X, WX and WY addresses are assigned to each analog I/O module in the I/O Mapping tab of the System Configuration window, as shown below.

Select the pull-down menu PLC > System Configuration to open the System Configuration window and click the I/O Mapping tab.



onfiguration Entries	I/O Map Module ID	
- CPU Configuration	Slot Mod ID Slot I/O	X Map Y Map WX Map WY Map
I/O Configuration DI 205 Local I/O Master	DL205 Local I/O Master	
DL205 Base	- DL205 Base	
Module Configuration(s)	0 3E 4X/4WX	X0-7 WX0-3
 Device Configuration I/O Mappings 	1 3F 2WY	WY0-:
Memory Configuration	2 *Empty*	L//
	3 *Empty*	
	4 *Empty*	
	5 *Empty*	Assigned X, WX and WY
I/O Slot Number	6 *Empty*	Addresses
	7 *Empty*	
	Mapping Mode Manual Mode Instruct	bons
	In "Auto" mode, the PLC automatically assigns Automatically assig image register addresses to each slot. shown in gray.	shown in bold red.
	In "Auto" mode, the PLC automatically assigns image register addresses to each slot. Shown in gray. In "Manual" mode, you may enter the desired Manually assigned.	addresses are shown in
	In "Auto" mode, the PLC automatically assigns image register addresses to each slot. Shown in gray. In "Nanual" mode, you may enter the desired image register address for one or more slots. Black.	addresses are shown in Clear manual entry to return it to auto.
	In "Auto" mode, the PLC automatically assigns image register addresses to each slot. In "Manual" mode, you may enter the desired image register address for one or more slots. C Auto C Manual Clear Manual Entries Automatically assign shown in gray. Manually assigned black. Map range overlap shown in red.	addresses are may value access interiory compare shown in bidd red. addresses are shown in Clear manual entry to return it to auto.

F2-04AD-1(L) Analog Input

F2-04AD-1(L) 4-Cha	annel Analog Current In
Number of Channels	4, single ended (1 common)
Input Ranges	4–20mA current
Resolution	12-bit (1 in 4096)
Active Low-pass Filtering	-3dB at 120Hz, 2 poles (-12dB per octave)
Input Impedance	250q ±0.1%, 1/2W current input
Absolute Maximum Ratings	-40mA to +40mA, current input
Converter Type	Successive approximation
Conversion Time (PLC Update Rate)	4 channels per scan maximum
Linearity Error (End to End)	±1 count (0.025% of full scale) maximum
Input Stability	±1 count
Full Scale Calibration Error (not incl. offset error)	±12 counts max., @ 20mA current input
Offset Calibration Error	±7 counts max.,@ 4mA current input
Step Response	F2-04AD-1: 4.9 ms to 95% of F.S. change F2-04AD-1L: 4ms to 95% of F.S. change
Maximum Inaccuracy	±0.5% @ 77°F (25°C) ±0.65% 32° to 140°F (0° to 60°C)
Accuracy vs Temperature	±50ppm /ºC maximum full scale (Including max, offset change)

Recommended Fuse	0.032 A, Series 217 fast-acting, current inputs	
Base Power Required 5 VDC	F2-04AD-1: 100mA F2-04AD-1L: 50mA	
External Power Supply	F2-04AD-1: 5 mA maximum, +10 to +30VDC F2-04AD-1L: 90mA maximum, +10 to +15VDC	
Operating Temperature	32° to 140°F (0° to 60°C)	
Storage Temperature	-4º to 158°F (-20º to 70ºC)	
Relative Humidity	5 to 95% (non-condensing)	
Environmental Air	No corrosive gases permitted	
Vibration	MIL STD 810C 514.2	
Shock	MIL STD 810C 516.2	
Noise Immunity	NEMA ICS3-304	
Terminal Type (included)	Removable; D2-8IOCON	
ZIPLink Module	ZL-RTB20 (Feedthrough)	
ZIPLink Cable	ZL-D2-CBL10 (0.5 m) ZL-D2-CBL10-1 (1.0 m) ZL-D2-CBL10-2 (2.0 m)	

One count in the specification table is equal to one least significant bit of the analog data value (1 in 4096).

Note 1: Shields should be grounded at the signal source.





More than one external power supply can be used provided all the power supply commons are connected. A Series 217, 0.032A, fast-acting fuse is recommended for 4-20 mA current loops. If the power supply common of an external power supply is not connected to 0 VDC on the module, then the output of the external transmitter must be isolated. To avoid "ground loop" errors, recommended 4-20 mA transmitter types are: 2 or 3 wire - Isolation between input signal and power supply or 4 wire - Isolation between input signal and power supply or 4 wire - Isolation between input signal.

F2-04AD-1(L), Analog Input - continued

Setting the Module Jumpers

There are two channel selection jumpers, labeled +1 and +2, that are used to select the number of channels that will be used. See the figure below to find the jumpers on your module. The module is set from the factory for four channel operation. Any unused channels are not processed, so if you only select channels 1 thru 3, channel 4 will not be active. The following table shows how to use the jumpers to select the number of channels. Unused jumpers can be stored on a single post to prevent losing them.

F2-04AD-1(L) Module Jumper Table				
Number of Channels	Active Channels	+1	+2	
One	Channel 1	No	No	
Тwo	Channels 1 and 2	Yes	No	
Three	Channels 1, 2 and 3	No	Yes	
Four	Channels 1, 2, 3 and 4	Yes	Yes	

Yes = Jumper Installed	No = Jumper	Removed
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Jumper Location on Modules Having Date Code 0609F3 and Previous (Two Circuit Board Design)



Jumper Location on Modules Having Date Code 0709G and Above (Single Circuit Board Design)

F2-04AD-1(L), Analog Input - continued

F2-04AD-1(L) Addressing

The Do-more CPU module assigns the following memory addresses to this module.

F2-04AD	-1(L) X Addressing
Address	Description
Xn	On when the external 24VDC input power is missing or terminal block is removed.
Xn+1	On when the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 2 input is not used)
Xn+2	On when the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 3 input is not used)
Xn+3	On when the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 4 input is not used)
Xn+4	Not used
Xn+5	Not used
Xn+6	Not used
Xn+7	Not used

Xn: Starting X address assigned to this module

F2-04AD	-1(L) WX Addressing
Address	Description
WXn	Channel 1 Input Data (0 to 4095)
WXn+1	Channel 2 Input Data (0 to 4095)
WXn+2	Channel 3 Input Data (0 to 4095)
WXn+3	Channel 4 Input Data (0 to 4095)

WXn: Starting WX address assigned to this module



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F2-04AD-2(L), Analog Input

F2-04AD-2(L) 4-Channel Analog Voltage In		Maximum Inaccuracy	±0.1% @ 77°F (25°C) ±0.3% 32° to 140°F (0° to 60°C)
Number of Channels	4, single ended (1 common)		±50ppm/ °C full scale calibration
Input Ranges	0 to 5 V, 0 to 10 V, ±5V, ±10VDC	Accuracy vs. remperature	(Including maximum offset change)
Resolution	12 bit (1 in 4096) uni-polar 13 bit (1 in 8191) bi-polar	Base Power Required 5VDC	F2-04AD-2: 110mA F2-04AD-2L: 60mA
Active Low-pass Filtering	-3 dB at 80 Hz, 2 poles (-12 dB per octave)	External Power Supply	F2-04AD-2: 5mA maximum, +10 to +30 VDC F2-04AD-2L: 90mA maximum,
Input Impedance	>20Mq		+10 to +15 VDC
Absolute Maximum Ratings	-75 to +75 VDC	Operating Temperature	32° to 140°F (0 to 60°C)
		Storage Temperature	-4° to 158°F (-20° to 70°C)
Converter Type	Successive approximation	Relative Humidity	5 to 95% (Non-condensing)
Conversion Time	4 channels per scan maximum	Environmental Air	No corrosive gases permitted
(PLC Update Rate)		Vibration	MIL STD 810C 514.2
Lincarity Error (End	±1 count (0.025% of full scale)	Shock	MIL STD 810C 516.2
to End)	maximum	Noise Immunity	NEMA ICS3-304
Input Stability	+1 count	Terminal Type (included)	Removable; D2-8IOCON
		ZIPLink Module	ZL-RTB20 (Feedthrough)
Full Scale Calibration Error (not incl. offset error)	±3 counts maximum	ZIPLink Cable	ZL-D2-CBL10 (0.5 m) ZL-D2-CBL10-1 (1.0 m) ZL-D2-CBL10-2 (2.0 m)
Offset Calibration Error	±1 count maximum (0V input)	One count in the specification tal	ble is equal to one least significant bit of
Step Response	F2-04AD-2: 8.2 ms to 95% of F.S change F2-04AD-2L: 10ms to 95% of F.S change	The analog data value (1 in 4096). Note 1: Shields should be grounded at the signal source. Note 2: Unused inputs should be jumpered together (i.e. CH4- to CH4+).	

Note 3: More than one external power supply can be used provided the commons are connected together.

Note 4: F2-04AD-2L requires 10-15 VDC input supply.





F2-04AD-2(L), Analog Input - continued

Setting the Module Jumpers

There are two channel selection jumpers, labeled +1 and +2, that are used to select the number of channels that will be used. See the figure below to find the jumpers on your module. The module is set from the factory for four channel operation. Any unused channels are not processed, so if you only select channels 1 thru 3, channel 4 will not be active. The following table shows how to use the jumpers to select the number of channels. Unused jumpers can be stored on a single post to prevent losing them.

F2-04AD-2(L) Module Jumper Table				
Number of Channels	Active Channels	+1	+2	
One	Channel 1	No	No	
Two	Channels 1 and 2	Yes	No	
Three	Channels 1, 2 and 3	No	Yes	
Four	Channels 1, 2, 3 and 4	Yes	Yes	

	Yes = Jumper	Installed	No = J	umper	Removed
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As seen above, there is also one input signal range jumper, labeled J2 or J3, that is used to select between the 5V and 10V signal ranges. The module is set from the factory for 10V operation (jumper not installed).



Jumper Location on Modules Having Date Code 0609F3 and Previous (Two Circuit Board Design)

Install J3 for 0-5V or \pm 5V operation. Remove or store on single pin for 0-10V or \pm 10V operation.



Jumper Location on Modules Having Date Code 0709G and Above (Single Circuit Board Design)

F2-04AD-2(L), Analog Input - continued

F2-04AD-2(L) Addressing

The Do-more CPU module assigns the following memory addresses to this module.

F2-04AD-2(L) X Addressing			
Address	Description		
Xn	On when the external 24VDC input power is missing or terminal block is removed.		
Xn+1	On when the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 2 input is not used)		
Xn+2	On when the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 3 input is not used)		
Xn+3	On when the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 4 input is not used)		
Xn+4	Not used		
Xn+5	Not used		
Xn+6	Not used		
Xn+7	Not used		

Xn: Starting X address assigned to this module

F2-04AD-2(L) WX Addressing		
Address	Description	
WXn	Channel 1 Input Data (0 to 4095 or -4095 to 4095)	
WXn+1	Channel 2 Input Data (0 to 4095 or -4095 to 4095)	
WXn+2	Channel 3 Input Data (0 to 4095 or -4095 to 4095)	
WXn+3	Channel 4 Input Data (0 to 4095 or -4095 to 4095)	

WXn: Starting WX address assigned to this module

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F2-08AD-1, Analog Input

F2-08AD-1 8-Channel Analog Current In		Recommended Fuse	0.032 A, Series 217 fast-acting, current inputs	
Number of Channels	8, single ended (1 common)	Base Power Required 5VDC	100mA	
Input Ranges	4 to 20mA current	External Power Supply	5mA maximum, +10 to +30VDC	
Resolution	12 bit (1 in 4096)		,	
Low-pass Filtering	-3 dB at 200 Hz, (-6 dB per octave)	Operating Temperature	32° to 140°F (0° to 60°C)	
Input Impedance	250q ±0.1%, 1/2W current input	Storage Temperature	-4º to 158ºF (-20º to 70ºC)	
Absolute Maximum Ratings	-45mA to +45mA	Relative Humidity	5 to 95% (non-condensing)	
Converter Type	Successive approximation	Environmental Air	No corrosive gases permitted	
Conversion Time	8 channels per scan maximum	Vibration	MIL STD 810C 514.2	
(PLC Update Rate)		Shock	MIL STD 810C 516.2	
Linearity Error (End to End)	±1 count (0.025% of full scale) maximum	Noise Immunity	NEMA ICS3-304	
Input Stability	±1 count	Terminal Type (included)	Removable; D2-8IOCON	
Full Scale Calibration Error (Offset error not included)	±5 counts max., @ 20mA current input	ZIPLink Module	ZL-RTB20 (Feedthrough)	
Offset Calibration Error	±2 counts max., @ 4mA current input	ZIPLink Cable	ZL-D2-CBL10 (0.5 m) ZL-D2-CBL10-1 (1.0 m) ZL-D2-CBL10-2 (2.0 m)	
Step Response	1 ms to 95% of F.S. change	One count in the specification table is equal to one least significant bit of		
Maximum Inaccuracy	±0.1% @ 77°F (25°C) ±0.25% 32° to 140°F (0° to 60°C)	the analog data value (1 in 4096). Note 1: Shields should be grounded at the signal source.		
Accuracy vs Temperature	±50ppm/°C maximum full scale (Including max. offset change of two counts)			

Internal Module Wiring See NOTE 1 ≼ +5V 0 VDC +15V Ð +24 VDC 0V đ ⊕ -15V CH1+ Ð 4-wire 4-20mA CH2+ 250Ω Ð CH3+ ⊕ CH4+ Analog CH4 A to D Converte 3-wire 4-20mA ⊕ CH5 3 Switch 250Ω Ð CH6+ CH6 2-wire 4-20mA Transmitte ⊕ CHI7+ 250Ω CH8+ ⊕ CH8 2-wire 4-20mA 250Ω Optional External P/S ov 24VDC



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More than one external power supply can be used provided all the power supply commons are connected. A Series 217, 0.032A, fast-acting fuse is recommended for 4-20 mA current loops. If the power supply common of an external power supply is not connected to 0 VDC on the module, then the output of the external transmitter must be isolated. To avoid "ground loop" errors, recommended 4-20 mA transmitter types are: 2 or 3 wire - Isolation between input signal and power supply or 4 wire - Isolation between input signal and power supply or 4 wire - Isolation between input signal.

F2-08AD-1, Analog Input - continued

Setting the Module Jumpers

There are three channel selection jumpers, labeled +1, +2, and +4, that are used to select the number of channels that will be used. See the figure below to find the jumpers on your module. The module is set from the factory for eight channel operation (all three jumpers installed). Any unused channels are not processed, so if you only select channels 1 thru 3, channels 4 thru eight will not be active. The following table shows how to use the jumpers to select the number of channels. Unused jumpers can be stored on a single post to prevent losing them.

F2-08AD-1 Module Jumper Table					
Number of Channels	Active Channels	+1	+2	+4	
One	Channel 1	No	No	No	
Two	Channels 1 - 2	Yes	No	No	
Three	Channels 1 - 3	No	Yes	No	
Four	Channels 1 - 4	Yes	Yes	No	
Five	Channels 1 - 5	No	No	Yes	
Six	Channels 1 - 6	Yes	No	Yes	
Seven	Channels 1 - 7	No	Yes	Yes	
Eight	Channels 1 - 8	Yes	Yes	Yes	



Jumper Location on Modules Having Date Code 0609B5 and Previous (Two Circuit Board Design)



Channel enable/disable jumpers

Jumper Location on Modules Having Date Code 0709C1 and Above (Single Circuit Board Design)

F2-08AD-1, Analog Input - continued

F2-08AD-1 Addressing

The Do-more CPU module assigns the following memory addresses to this module.

F2-08AD-1 X Addressing			
Address	Description		
Xn	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed.		
Xn+1	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 2 input is not used)		
Xn+2	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 3 input is not used)		
Xn+3	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 4 input is not used)		
Xn+4	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 5 input is not used)		
Xn+5	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 6 input is not used)		
Xn+6	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 7 input is not used)		
Xn+7	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 8 input is not used)		

Xn: Starting X address assigned to this module

F2-08AD-1 WX Addressing		
Address	Description	
WXn	Channel 1 Input Data (0 to 4095)	
WXn+1	Channel 2 Input Data (0 to 4095)	
WXn+2	Channel 3 Input Data (0 to 4095)	
WXn+3	Channel 4 Input Data (0 to 4095)	
WXn+4	Channel 5 Input Data (0 to 4095)	
WXn+5	Channel 6 Input Data (0 to 4095)	
WXn+6	Channel 7 Input Data (0 to 4095)	
WXn+7	Channel 8 Input Data (0 to 4095)	

WXn: Starting WX address assigned to this module





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F2-08AD-2, Analog Input

F2-08AD-2 8-Channel Analog Voltage In			
Number of Channels	8, single ended (1 common)		
Input Ranges	0 to 5 V, 0 to 10V, ±5V, ±10VDC		
Resolution	12 bit (1 in 4096) uni-polar 13 bit (1 in 8191) bi-polar		
Active Low-pass Filtering	-3 dB at 200 Hz, (-6 dB per octave)		
Input Impedance	>20MΩ		
Absolute Maximum Ratings	-75 to +75VDC		
Converter Type	Successive approximation		
Conversion Time (PLC Update Rate)	8 channels per scan maximum		
Linearity Error (End to End)	±1 count (0.025% of full scale) maximum		
Input Stability	±1 count		
Full Scale Calibration Error (not incl. offset error)	±3 counts maximum		
Offset Calibration Error	±1 count maximum (0V input)		
Step Response	1 ms to 95% of F.S. change		
Maximum Inaccuracy	±0.1% @ 77°F (25°C) ±0.3% 32° to 140°F (0° to 60°C)		
Accuracy vs.Temperature	±50ppm/°C maximum full scale (Including max. offset change of 2 counts)		

Base Power Required 5VDC	100mA	
External Power Supply	5mA maximum, +10 to +30 VDC	
Operating Temperature	32° to 140°F (0° to 60°C)	
Storage Temperature	-4° to 158°F (-20° to 70°C)	
Relative Humidity	5 to 95% (non-condensing)	
Environmental Air	No corrosive gases permitted	
Vibration	MIL STD 810C 514.2	
Shock	MIL STD 810C 516.2	
Noise Immunity	NEMA ICS3-304	
Terminal Type (included)	Removable; D2-8IOCON	
ZIPLink Module	ZL-RTB20 (Feedthrough)	
ZIPLink Cable	ZL-D2-CBL10 (0.5 m) ZL-D2-CBL10-1 (1.0 m) ZL-D2-CBL10-2 (2.0 m)	

One count in the specification table is equal to one least significant bit of the analog data value (1 in 4096). Includes circuitry to automatically detect broken or open transmitters.

Note 1: Shields should be grounded at the signal source. Note 2: Connect all external power supply commons. Note 3: Connect unused channels (CH5+, CH6+, CH7+, CH8+ in this example) to OVDC.





F2-08AD-2, Analog Input - continued

Setting the Module Jumpers

There are three channel selection jumpers, labeled +1, +2, and +4, that are used to select the number of channels that will be used. See the figure below to find the jumpers on your module. The module is set from the factory for eight channel operation (all three jumpers installed). Any unused channels are not processed, so if you only select channels 1 thru 3, channels 4 thru eight will not be active. The following table shows how to use the jumpers to select the number of channels. Unused jumpers can be stored on a single post to prevent losing them.

F2-08AD-2 Module Jumper Table					
Number of Channels	Active Channels	+1	+2	+4	
One	Channel 1	No	No	No	
Тwo	Channels 1 - 2	Yes	No	No	
Three	Channels 1 - 3	No	Yes	No	
Four	Channels 1 - 4	Yes	Yes	No	
Five	Channels 1 - 5	No	No	Yes	
Six	Channels 1 - 6	Yes	No	Yes	
Seven	Channels 1 - 7	No	Yes	Yes	
Eight	Channels 1 - 8	Yes	Yes	Yes	

Install J3 for 0-5V or \pm 5V operation. Remove or store on single pin for 0-10V or \pm 10V operation.



Install J3 for 0-5V or \pm 5V operation. Remove or store on single pin for 0-10V or \pm 10V operation.



Jumper Location on Modules Having Date Code 0609D4 and Previous

(Two Circuit Board Design)

Jumper Location on Modules Having Date Code 0709E1 and Above (Single Circuit Board Design)

As seen above, there is another jumper labeled J3 that is used to select between the 5V and 10V signal ranges. The module is set from the factory for 10V operation (jumper not installed).

F2-08AD-2, Analog Input - continued

F2-08AD-2 Addressing

The Do-more CPU module assigns the following memory addresses to this module.

F2-08AD	-2 X Addressing
Address	Description
Xn	On when the external 24VDC input power is missing or terminal block is removed.
Xn+1	On when the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 2 input is not used)
Xn+2	On when the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 3 input is not used)
Xn+3	On when the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 4 input is not used)
Xn+4	On when the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 5 input is not used)
Xn+5	On when the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 6 input is not used)
Xn+6	On when the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 7 input is not used)
Xn+7	On when the external 24VDC input power is missing or terminal block is removed. (This address stays off if Channel 8 input is not used)

Xn: Starting X address assigned to this module

F2-08AD-2 WX Addressing		
Address	Description	
WXn	Channel 1 Input Data (0 to 4095 or -4095 to 4095)	
WXn+1	Channel 2 Input Data (0 to 4095 or -4095 to 4095)	
WXn+2	Channel 3 Input Data (0 to 4095 or -4095 to 4095)	
WXn+3	Channel 4 Input Data (0 to 4095 or -4095 to 4095)	
WXn+4	Channel 5 Input Data (0 to 4095 or -4095 to 4095)	
WXn+5	Channel 6 Input Data (0 to 4095 or -4095 to 4095)	
WXn+6	Channel 7 Input Data (0 to 4095 or -4095 to 4095)	
WXn+7	Channel 8 Input Data (0 to 4095 or -4095 to 4095)	

WXn: Starting WX address assigned to this module

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F2-04RTD

Sampling Rate

F2-04RTD 4-Channel RTD		Converter Type	Charge Balancing
Number of Channels	4	Linearity Error	±.05 °C maximum, ±.01 °C typical
	Type Pt100:	Maximum Inaccuracy	±1°C
Input Ranges	-200.0 to 850.0 °C, -328.0 to 1562.0 °F Type Pt1000: -200.0 to 595.0 °C, -328.0 to 1103.0 °F Type jPt100: -38.0 to 450.0 °C, -36.0 to 842.0 °F Type CU-10/25q: -200.0 to 260.0 °C, -328.0 to 500.0 °F	PLC Update Rate	4 channels per scan maximum
		Base Power Required 5VDC	90mA
		Operating Temperature	32° to 140°F (0° to 60°C)
		Storage Temperature	-4° to 158°F (-20° to 70°C)
		Temperature Drift	None (self-calibrating)
Resolution	16 bit (1 in 65535)	Relative Humidity	5 to 95% (non-condensing)
Display Resolution	±0.1 °C, ±0.1 °F (±3276.7)	Environmental Air	No corrosive gases permitted
RTD Excitation Current	200µA	Vibration	MIL STD 810C 514.2
		Shock	MIL STD 810C 516.2
Input Type	Differential	Noise Immunity	NEMA ICS3-304
Notch Filter	>100 db notches at 50/60Hz -3db =13.1 Hz	Terminal Type (included)	Removable; D2-8IOCON
Maximum Setting Time	100ms (full-scale step input)	Note 1. The three wires connecting same type and length. Do not use connection.	g the RTD to the module must be the the shield or drain wire for the third
Common Mode Range	0–5 VDC	Note 2. If an RTD sensor has four left unconnected as shown. Note 3. This module is not compat	wires, the plus sense wire should be ible with the ZIPLink wiring systems.
Absolute Maximum Ratings	Fault protected inputs to ±50VDC		



160ms per channel



F2-04RTD - continued

Setting the Module Jumpers

There are seven jumpers (J8) located on the PC board of this module. The description of each jumper's function is also located on the PC board. These jumpers configure the module for the following options:

- Number of channels: 1 thru 4.
- The input type: 10q or 25q copper RTDs; jPt 100q, Pt 100q or Pt 1000 q RTDs.
- Temperature conversion: 2's complement or magnitude + sign format in Fahrenheit or Celsius.

There are two channel selection jumpers, labeled CH+1 and CH+2, that are used to select the number of channels that will be used. The module is set from the factory for four channel operation. Any unused channels are not processed, so if you only select channels 1 thru 3, channel 4 will not be active.



The following table shows how to use the jumpers to select the number of channels. Unused jumpers can be stored on a single post to prevent losing them.

F2-04RTD Module Jumper Table (Channel)				
Number of Channels	Active Channels	CH+1	CH+2	
One	Channel 1	No	No	
Тwo	Channels 1 and 2	Yes	No	
Three	Channels 1, 2 and 3	No	Yes	
Four	Channels 1, 2, 3 and 4	Yes	Yes	

Yes = Jumper Installed No = Jumper Removed

F2-04RTD - continued

The jumpers labeled RTD-0, RTD-1, and RTD-2 are used to select the type of RTD.The module can be used with many types of RTDs. All channels of the module must be the same RTD type.

The default setting from the factory is Pt100q (RTD-2 comes with the jumper removed). This selects the DIN43760 European type RTD. European curve type RTDs are calibrated to DIN43760, BS1905, or IEC751 specifications which is $0.00385 \text{ q/q/}^{\circ}\text{C}(100^{\circ}\text{C} = 138.5 \text{ q})$.

The jPt100q type is used for the American curve (0.00392 q/q/ $^{\circ}$ C), platinum 100q RTDs. The 10q and 25q RTD settings are used with copper RTDs.

The following table shows how to arrange the jumpers to set the different input types.

F2-04RTD Module Jumper Table (Input Type)			
RTD Inputs	RTD-0	RTD-1	RTD-2
CU 10Ω	No	No	No
CU 25Ω	Yes	No	No
jPt 100Ω	No	Yes	No
Pt 100Ω	Yes	Yes	No
Pt 1000Ω	No	No	Yes

Yes = Jumper Installed No = Jumper Removed

The last two jumpers, Units-0 and Units-1, are used to set the conversion unit. The 2's complement options are Fahrenheit or Celsius. The module comes from the factory with both jumpers installed. For Fahrenheit, remove Units-1 jumper. For Celsius remove both Units-0 and Units-1 jumpers.

All RTD types are converted into a direct temperature reading in either Fahrenheit or Celsius. The data contains one implied decimal place. For example, a value in WX memory of 1002 would be 100.2°C or °F.

Negative temperatures are represented in 2's complement form.

To view this data format in the Do-more Designer software, select Native.

The following table shows how to arrange the jumpers to set the different conversion units.

F2-04RTD Module Jumper Table (Temperature Conversion Unit)				
Temperature Conversion Units	Units-0	Units-1		
2's Complement (°F)	Yes	No		
2's Complement (°C)	No	No		

Yes = Jumper Installed No = Jumper Removed

F2-04RTD - continued

F2-04RTD Addressing

The Do-more CPU module assigns the following memory addresses to this module.

F2-04RT	D X Addressing
Address	Description
Xn	On when the RTD is open or terminal block is removed.
Xn+1	On when the RTD is open or terminal block is removed. (This address stays off if Channel 2 input is not used)
Xn+2	On when the RTD is open or terminal block is removed. (This address stays off if Channel 3 input is not used)
Xn+3	On when the RTD is open or terminal block is removed. (This address stays off if Channel 4 input is not used)
Xn+4	Not used
Xn+5	Not used
Xn+6	Not used
Xn+7	Not used

Xn: Starting X address assigned to this module

F2-04RTD WX Addressing		
Address	Description	
WXn	Channel 1 Input Data (Temperature [Unit: 0.1 degree])	
WXn+1	Channel 2 Input Data (Temperature [Unit: 0.1 degree])	
WXn+2	Channel 3 Input Data (Temperature [Unit: 0.1 degree])	
WXn+3	Channel 4 Input Data (Temperature [Unit: 0.1 degree])	

WXn: Starting WX address assigned to this module

F2-04THM

F2-04THM 4-Chan	nel Thermocouple	Thermocouple Specifications		
General Specifications			Type J -190 to 760°C -310 to 1400°F	
Number of Channels	4, differential		Type K -150 to 1372°C -238 to 2502°F Type R 65 to 1768°C 149 to 3214°F Type S 65 to 1768°C 149 to 3214°F Type T -230 to 400°C -382 to 752°F Type B 529 to 1820°C 984 to 3308°F Type C 65 to 2320°C 149 to 4208°F	
Common Mode Range	±5VDC	Input Ranges		
Common Mode Rejection	90dB min. @ DC, 150dB min. @ 50/60Hz.			
Input Impedance	1Mq			
Absolute Maximum Ratings	Fault-protected inputs to ±50VDC	Display Resolution	±0.1 °C or ±0.1 °F	
Accuracy vs. Temperature	±5ppm/°C maximum full scale calibration	Cold Junction Compensation	Automatic	
	change)	Conversion Time	100ms per channel	
PLC Update Rate	4 channels per scan maximum	Warm-Up Time	30 minutes typically ±1°C repeatability	
External Power Supply	60mA maximum 18 to 26 4 \/DC	Linearity Error (End	±0.05 °C maximum, ±0.01 °C typical	
		Maximum Inaccuracy	+3°C (excluding thermocouple error)	
Base Power Required 5VDC	110mA	Voltage Input Specifications		
Operating Temperature	32° to 140°F (0° to 60°C)	Voltage Ranges	0–5V, ±5V, 0–156.25 mV, ±156.25	
Storage Temperature	-4° to 158°F (-20° to 70°C)		mVDC	
Relative Humidity	5 to 95% (non-condensing)	Resolution	16 bit (1 in 65535)	
Environmental Air	No corrosive gases permitted	Full Scale Calibration Error	±13 counts typical ±33 maximum	
Vibration	MIL STD 810C 514.2	(not incl. offset error)		
Shock	MIL STD 810C 516.2	Offset Calibration Error	±1 count maximum, @ 0V input	
Noise Immunity	NEMA ICS3-304			
Terminal Type (included) Non-removable		Linearity Error (End to End)	±1 count maximum	
		Maximum Inaccuracy	±0.02% @ 25°C (77°F)	

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Thermocouple input wiring diagram

Voltage input wiring diagram



Note 1: Terminate shields at the respective signal source.

Note 2: Connect unused channels to a common terminal (0V, CH4+, CH4).

Note 3: When using 0–156 mV and 5V ranges, connect (-) or (0) volts terminal to 0V to ensure common mode range acceptance.

Note 4. This module is not compatible with the ZIPLink wiring system.

Note 5. With grounded thermocouples, take precautions to prevent having a voltage potential between thermocouple tips. A voltage of 5V or greater between tips will skew measurements.



Setting the Module Jumpers

There are eight jumpers (J7) and one single jumper (J9) located on the PC board of this module. These jumpers configure the module for the following options:

- Number of channels
- Input type
- Thermocouple or Voltage conversion units
- Calibrate enable





Jumper Location on Modules Having Two Circuit Board Design

Jumper Location on Modules Having Single Circuit Board Design

There are two channel selection jumpers, labeled CH+1 and CH+2, that are used to select the number of channels that will be used. The module is set from the factory for four channel operation. Any unused channels are not processed. The following table shows how to use the jumpers to select the number of channels. Unused jumpers can be stored on a single post to prevent losing them.

F2-04THM Module Jumper Table (Channel)				
Number of Channels	Active Channels	CH+1	CH+2	
One	Channel 1	No	No	
Тwo	Channels 1 and 2	Yes	No	
Three	Channels 1, 2 and 3	No	Yes	
Four	Channels 1, 2, 3 and 4	Yes	Yes	

Yes = Jumper Installed No = Jumper Remov	/ed
--	-----

The jumpers labeled Tc Type 0, Tc Type 1, Tc Type 2, and Tc Type 3 must be set to match the type of thermocouple being used or the input voltage level. This module can be used with many types of thermocouples, so use the following table to determine your settings.

This module comes from the factory with all four jumpers installed for use with a J type thermocouple. For example, to use an S type thermocouple, remove the jumper labeled Tc Type 2. All channels of the module must be the same thermocouple type or input voltage level.

F2-04THM Module Jumper Table (Input Type)				
Thermocouple/ Voltage Level	ТС Туре О	ТС Туре 1	ТС Туре 2	ТС Туре З
J	Yes	Yes	Yes	Yes
К	No	Yes	Yes	Yes
E	Yes	No	Yes	Yes
R	No	No	Yes	Yes
R Wide*	No	Yes	No	No
S	Yes	Yes	No	Yes
Т	No	Yes	No	Yes
В	Yes	No	No	Yes
Ν	No	No	No	Yes
С	Yes	Yes	Yes	No
0–5V	No	Yes	Yes	No
±5V	Yes	No	Yes	No
0–156 mV	No	No	Yes	No
±156mV	Yes	Yes	No	No

* R Wide range is available only on modules with date code 0410E2 and later

Units-0 and Units-1 jumpers are used to set the conversion unit for either thermocouple or voltage inputs. The options are 2's complement in Fahrenheit or Celsius.

All thermocouple types are converted into a direct temperature reading in either Fahrenheit or Celsius. The data contains one implied decimal place. For example, a value in WX memory of 1002 would be 100.2°C or °F.

For thermocouple ranges which include negative temperatures (J,E,K,T,N), the display resolution is from -3276.7 to +3276.7. For positive-only thermocouple ranges (R,S,B,C), the display resolution is 0 to 6553.5. Negative temperatures are represented in 2's complement form.

The 2's complement data format may be required to correctly display bipolar data on some operator interfaces. This data format could also be used to simplify averaging a bipolar signal. To view this data format in the Do-more software, select Native.

For unipolar thermocouple ranges (R,S,B,C), 2's complement should be selected.

This module comes with both jumpers installed. For Fahrenheit remove Units-1 jumper. For Celsius remove both Units-0 and Units-1 jumpers. Use the following table to select temperature conversion unit.

F2-04THM Module Jumper Table (Temperature Conversion Unit)		
Temperature Conversion Units	Units-0	Units-1
2's Complement (°F)	Yes	No
2's Complement (°C)	No	No

The bipolar voltage input ranges, \pm 5V or \pm 156mV (see previous page for \pm 5V and \pm 156mV input settings), is converted to a 16-bit 2's complement value.

This module comes with both jumpers installed. Use the following table to select voltage conversion unit. For Example, remove the Units-1 jumper and leave the Units-0 jumper installed for 2's complement conversion. For Fahrenheit remove Units-1 jumper. For Celsius remove both Units-0 and Units-1 jumpers.

Yes = Jumper Installed	No = Jumper Removed
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F2-04THM Module Jumper Table (Voltage Conversion Unit)		
Voltage Conversion Units	Units-0	Units-1
2's Complement	Yes	No

The Calibrate Enable jumper J9 comes from the factory in the "jumper removed" setting (the jumper is installed over only one of the two pins). Installing this jumper disables the thermocouple active burn-out detection circuitry, which enables you to attach a thermocouple calibrator to the module. To make sure that the output of the thermocouple calibrator is within the 5V common mode voltage range of the module, connect the negative side of the differential voltage input channel to the 0V terminal, then connect the thermocouple calibrator to the differential inputs (for example, Ch 3+ and Ch 3).

For the voltage input ranges, this jumper is inactive and can be installed or removed with no effect on voltage input.

The Do-more CPU module assigns the following memory addresses to this module.

F2-04THM X Addressing		
Address	Description	
Xn	On when the thermocouple is open or the external 24VDC input power is missing.	
Xn+1	On when the thermocouple is open or the external 24VDC input power is missing. (This address stays off if Channel 2 input is not used)	
Xn+2	On when the thermocouple is open or the external 24VDC input power is missing. (This address stays off if Channel 3 input is not used)	
Xn+3	On when the thermocouple is open or the external 24VDC input power is missing. (This address stays off if Channel 4 input is not used)	
Xn+4	Not used	
Xn+5	Not used	
Xn+6	Not used	
Xn+7	Not used	

Xn: Starting X address assigned to this module

F2-04THM WX Addressing		
Address	Description	
WXn	Channel 1 Input Data (Temperature [Unit: 0.1 degree] or Voltage [0 to 655351])	
WXn+1	Channel 2 Input Data (Temperature [Unit: 0.1 degree] or Voltage [0 to 655351])	
WXn+2	Channel 3 Input Data (Temperature [Unit: 0.1 degree] or Voltage [0 to 655351])	
WXn+3	Channel 4 Input Data (Temperature [Unit: 0.1 degree] or Voltage [0 to 655351])	

WXn: Starting WX address assigned to this module



NOTE 1: The data format of the WX addresses is 'Signed Word'. They store -32768 to 32767 as default. To read and write 0 to 65535 into these memory addresses, use the casting ':U' (':U' is the casting for 'Unsigned' format). For instance, if you selected the voltage input for the first analog input channel and WX0 is assigned to the channel, use 'WX0:U' to access this memory address in the ladder program and other tools in Do-more Designer.

F2-02DA-1(L), Analog Output

F2-02DA-1(L) 2-Channel Analog Current Output		Base Power Required 5VDC	40mA
Number of Channels	2		F2-02DA-1:18 to 30VDC, 60mA F2-02DA-1L: 10 to 15VDC, 70mA
Output Ranges	4 to 20mA	External Power Supply	
Resolution	12 bit (1 in 4096)	(Add 20mA for e	
Output Type	Single ended, 1 common	Operating Temperature	32º to 140ºE (0º to 60ºC)
Maximum Loop Supply	30VDC		
Peak Output Voltage	40VDC	Storage Temperature	-4° to 158°F (-20° to 70°C)
suppressor)		Relative Humidity	5 to 95% (non-condensing)
Load Impedance	0q minimum	Environmental Air	No corrosive cases permitted
Maximum Load/Power Supply	620q/18V, 910q/24V, 1200q/30V	Vibration	MIL STD 810C 514.2
PLC Update Rate	2 channels per scan maximum	Shock	MIL STD 810C 516 2
Linearity Error (end to end)	±1 count (0.025% of full scale) maximum	Noise Immunity	NEMA ICS3-304
Conversion Settling Time	100µs maximum (full scale change)	Terminal Type (included)	Removable; D2-8IOCON
Full Scale Calibration Error (not incl. offset error)	tull Scale Calibration Error not incl. offset error) ±5 counts max., 20mA @ 77°F (25°C)		ZL-RTB20 (Feedthrough)
			ZL-D2-CBL10 (0.5 m)
Offset Calibration Error	±3 counts max., 4mA @ 77°F (25°C)	ZIPLink Cable	ZL-D2-CBL10-1 (1.0 m) ZL-D2-CBL10-2 (2.0 m)
Accuracy vs. Temperature	±50ppm/ °C full scale calibration change (including maximum offset change of 2 counts)	One count in the specification table is equal to one least significant bit of the analog data value (1 in 4096). Note 1: Shields should be connected to the 0V of the module or the	
Maximum Inaccuracy	+0.1% @ 77°F (25°C) ±0.3% @ 32 to 140°F (0 to 60°C)	OV of the P/S. Note 2: Unused voltage outputs should remain open (no connections) for minimum power consumption.	





ANALOG 2CH

F2-02DA-1(L), Analog Output - continued

The Do-more CPU module assigns the following memory addresses to this module.

F2-02DA-1(L) WY Addressing		
Address	Description	
WYn	Channel 1 Output Data (0 to 4095)	
WYn+1	Channel 2 Output Data (0 to 4095)	

WYn: Starting WY address assigned to this module



F2-02DA-2(L), Analog Output

F2-02DA-2(L) 2-Channel Analog Voltage Output		
Number of Channels	2	
Output Ranges	0 to 5V, 0 to 10V, ±5V, ±10V	
Resolution	12 bit (1 in 4096)	
Output Type	Single ended, 1 common	
Peak Output Voltage	15VDC (clamped by transient voltage sup- pressor)	
Load Impedance	2000q minimum	
Load Capacitance	0.01 μF maximum	
PLC Update Rate	2 channels per scan maximum	
Linearity Error (end to end)	±1 count (0.025% of full scale) max- imum	
Conversion Settling Time	5µs maximum (full scale change)	
Full Scale Calibration Error (not incl. offset error)	±12 counts max. unipolar @ 77°F (25°C) ±16 counts max. bipolar @ 77°F (25°C)	
Offset Calibration Error	±3 counts max., unipolar @ 77°F (25°C) ±8 counts max., bipolar @ 77°F (25°C)	
Accuracy vs. Temperature	±50 ppm/ °C full scale calibration change (including maximum offset change of 2 counts)	
Maximum Inaccuracy	+0.3% unipolar ranges @ 77°F (25°C) ±0.45% unipolar ranges >77°F (25°C) ±0.4% bipolar ranges @77°F (25°C) ±0.55% bipolar ranges >77°F (25°C)	

Base Power Required 5VDC	40mA
External Power Supply	F2-02DA-2: 18 to 30VDC, 60mA (outputs fully loaded) F2-02DA-2L: 10 to 15VDC, 70mA (outputs fully loaded)
Operating Temperature	32° to 140°F (0° to 60°C)
Storage Temperature	-4° to 158°F (-20° to 70°C)
Relative Humidity	5 to 95% (non-condensing)
Environmental Air	No corrosive gases permitted
Vibration	MIL STD 810C 514.2
Shock	MIL STD 810C 516.2
Noise Immunity	NEMA ICS3-304
Terminal Type (included)	Removable; D2-8IOCON
ZIPLink Module	ZL-RTB20 (Feedthrough)
ZIPLink Cable	ZL-D2-CBL10 (0.5 m) ZL-D2-CBL10-1 (1.0 m) ZL-D2-CBL10-2 (2.0 m)

One count in the specification table is equal to one least significant bit of the analog data value (1 in 4096).

Note1: Shields should be connected to the 0V of the module or the OV of the P/S.

Note 2: Unused voltage outputs should remain open (no connections) for minimum power consumption.



F2-02DA-2(L), Analog Output - continued

The F2-02DA-2(L) Analog Output module uses jumpers for selecting the voltage ranges for each channel. The range of each channel can be independently set. Available operating ranges are 0–5 V, 0–10 V, \pm 5V, and \pm 10V. There are three jumpers for each channel. Two sets are on the top board, and the third set is along the edge of the bottom board with the black D-shell backplane connector. Install or remove these jumpers to select the desired range.

- Two of the top board jumpers are labeled "UNI/±5" and there is one for each channel. These jumpers are used in conjunction with the "BI-P 0-5" jumpers to determine output voltage polarity and range.
- The two bottom board • jumpers are labeled "UNI" and there is one for each channel. These jumpers determine the format of the channel output data, and the effect of their settings is independent from that of the other jumpers on the module. With a UNI jumper removed, the corresponding channel requires data values in the range of ±2047. With a UNI jumper installed, the channel requires data values in the range of 0 to 4095.
- The other two top board jumpers are labeled "BI-P 0-5" and there is one for each channel. These jumpers are used in conjunction with the "UNI/±5" jumpers to determine output voltage polarity and range.



NOTE: It is important to set the module jumpers correctly. The module will not operate correctly if the jumpers are not properly set for the desired voltage range.

F2-02DA-2(L), Analog Output - continued

The table below lists the eight possible combinations of voltage ranges and data formats along with their corresponding jumper settings. For most applications, use one of the four standard selections shown in the shaded blocks in the table. Standard unipolar voltage ranges accept a data format of 0 to 4095. Standard bipolar ranges accept a data format of -2047 to +2047. Unused jumpers can be stored on a single post to prevent losing them.

F2-02DA-2(L) Module Jumper Table					
Voltage	Output	UNI/±5V	UNI	BI-P 0-5V (Top board)	
Range	Data Format	(Top board) (Bottom board)		BI-P (Bipolar) Position	0-5V Position
0 to 5V	0 to 4095	Yes	Yes	No	Yes
0 to 10V	0 to 4095	Yes	Yes	No	No
0 to 5V	±2047	Yes	No	No	Yes
0 to 10V	±2047	Yes	No	No	No
±5V	±2047	Yes	No	Yes	No
±10V	±2047	No	No	Yes	No
±5V	0 to 4095	Yes	Yes	Yes	No
±10V	0 to 4095	No	Yes	Yes	No

Yes = Jumper Installed No = Jumper Removed

For example, to select settings of " \pm 5V" voltage range with a " \pm 2047" output data format for channel 1, refer to the table above and the figure on the previous page and arrange the jumpers as follows:

- Install the "CH1" "UNI/±5V" jumper.
- Remove the "CH1-UNI" jumper. Store the jumper so it does not get lost by placing it on one pin.
- Install the "CH1" "BI-P 0-5" jumper in the BI-P (bipolar) position on the left and center pins.

The non-standard selections in the table provide the opposite data format for both unipolar and bipolar voltage ranges. If you are using unipolar output (0–5 V or 0–10 V) on one channel and bipolar output (\pm 5V, \pm 10V) on the other channel, then one of the outputs will use a non-standard data format.

F2-02DA-2(L), Analog Output - continued

The Do-more CPU module assigns the following memory addresses to this module.

F2-02DA-2(L) WY Addressing	
Address Description	
WYn	Channel 1 Output Data (0 to 4095 or -2047 to 2047)
WYn+1	Channel 2 Output Data (0 to 4095 or -2047 to 2047)

WYn: Starting WY address assigned to this module

Unipolar Ranges



Bipolar Ranges



F2-02DAS-1, Analog Output

F2-02DAS-1 2-Cha	nnel Isolated Analog	Gain Calibration Error ±32 counts (±0.05%)		
Current Output		Offset Calibration Error	±13 counts (±0.02%)	
Number of Channels	2, isolated	Output Drift	50ppm/ °C	
Output Ranges	4–20mA	Maximum Inaccuracy	0.07% @ 25°C (77°F)	
Resolution	16 bit (1 in 65536)		0.18% 0 to 60°C (32° to 140°F)	
Output Type	Current sourcing	Operating Temperature	0° to 60°C (32° to 140°F)	
Isolation Voltage	±750V continuous, channel to channel.	Storage Temperature	-20° to 70°C (-4° to 158°F)	
	channel to logic	Relative Humidity	5 to 95% (non-condensing)	
Base Power Required 5VDC	100mA	Environmental air	No corrosive gases permitted	
	18–32 VDC	Vibration	MIL STD 810C 514.2	
External Power Supply	18–32 VDC @ 50mA per channel	Shock	MIL STD 810C 516.2	
Output Loop Compliance	Vin - 2.5 V	Noise Immunity	NEMA ICS3-304	
	0–1375 g (@ 32\/)	Terminal Type (included)	Removable; D2-8IOCON	
Maximum Land/ Davan	5 1010 q (@ 021)	ZIPLink Module	ZL-RTB20 (Feedthrough)	
Supply	375q /12V, 975q /24V, 1375q/32V	ZIPLink Cable	ZL-D2-CBL10 (0.5 m) ZL-D2-CBL10-1 (1.0 m) ZL-D2-CBL10-2 (2.0 m)	
PLC Update Rate	2 channels per scan maximum			
Conversion Settling Time	3ms to 0.1% of full scale	One count in the specification table is equal to one least significant bit of the analog data value (1 in 65536). Note 1: Shields should be connected to the 0V terminal of the module. Note 2: Load must be within compliance voltage. Note 3: For non-isolated outputs, connect all 0V's together (0V10V2) and connect all V/S together (V10V2) and connect all V/S together (V10V2).		
Linearity Error (end to end)	±10 count (±0.015% of full scale) maximum			
		Connect an +v 3 together (+v+v.	<u>-</u> /.	





F2-02DAS-1, Analog Output - continued

The Do-more CPU module assigns the following memory addresses to this module.

F2-02DAS-1 WY Addressing	
Address	Description
WYn	Channel 1 Output Data (0 to 655351)
WYn+1	Channel 2 Output Data (0 to 655351)

WYn: Starting WY address assigned to this module



NOTE 1: The data format of the WY addresses is 'Signed Word'. They store -32768 to 32767 as default. To read and write 0 to 65535 into these memory addresses, use the casting ':U' (':U' is the casting for 'Unsigned' format). For instance, if WY0 is assigned to the first analog output channel, use 'WY0:U' to access this memory address in the ladder program and other tools in Do-more Designer.



F2-02DAS-2, Analog Output

F2-02DAS-2 2-Channel Isolated Analog Voltage Output		
Number of Channels	2, isolated	
Output Ranges	0–5 V, 0–10 V	
Resolution	16 bit (1 in 65536)	
Output Type	Sourced through external loop supply	
Isolation Voltage	±750V continuous, channel to channel, channel to logic	
Base Power Required 5VDC	60mA	
External Power Supply	21.6–26.4 VDC @ 60mA per channel	
Load Impedance	2kq min	
PLC Update Rate	2 channels per scan maximum	
Conversion Settling Time	3ms to 0.1% of full scale	
Linearity Error (end to end)	±10 count (±0.015% of full scale) maximum	

Gain Calibration Error	±32 counts (±0.05%)
Offset Calibration Error	±13 counts (±0.02%)
Output Drift	50ppm/°C
Maximum Inaccuracy	0.07% @ 25°C (77°F) 0.18% 0 to 60°C (32° to 140°F)
Operating Temperature	0° to 60°C (32° to 140°F)
Storage Temperature	-20° to 70°C (-4° to 158°F)
Relative Humidity	5 to 95% (non-condensing)
Environmental air	No corrosive gases permitted
Vibration	MIL STD 810C 514.2
Shock	MIL STD 810C 516.2
Noise Immunity	NEMA ICS3-304
Terminal Type (included)	Removable; D2-8IOCON
ZIPLink Module	ZL-RTB20 (Feedthrough)
ZIPLink Cable	ZL-D2-CBL10 (0.5 m) ZL-D2-CBL10-1 (1.0 m) ZL-D2-CBL10-2 (2.0 m)

Note1: Shields should be connected to the 0V of the module or the OV of the P/S.





F2-02DAS-2, Analog Output - continued

Setting the Module Jumpers

The F2-02DAS-2 Analog Output module uses jumpers for selecting the voltage range for each channel. The range of each channel can be independently set. The available operating ranges are 0-5 V and 0-10 V.

There is one jumper for each channel. Install or remove these jumpers to select the desired range. See the figures below to find the jumpers on your module. The module is set from the factory for the 0–5 V range. Refer to the following table in order to configure module differently. Unused jumpers can be stored on a single post to prevent losing them.



NOTE: It is important to set the module jumpers correctly. The module will not operate correctly if the jumpers are not properly set for the desired voltage range.

F2-02DAS-2 Module Jumper Table		
Voltage Range	0-5V/0-10V Jumper	
0 to 5V	Yes	
0 to 10V	No	





F2-02DAS-2, Analog Output - continued

The Do-more CPU module assigns the following memory addresses to this module.

F2-02DAS-2 WY Addressing		
Address	ss Description	
WYn	Channel 1 Output Data (0 to 655351)	
WYn+1	Channel 2 Output Data (0 to 655351)	

WYn: Starting WY address assigned to this module



NOTE 1: The data format of the WY addresses is 'Signed Word'. They store -32768 to 32767 as default. To read and write 0 to 65535 into these memory addresses, use the casting ':U' (':U' is the casting for 'Unsigned' format). For instance, if WY0 is assigned to the first analog output channel, use 'WY0:U' to access this memory address in the ladder program and other tools in Do-more Designer.



F2–08DA–1, Analog Output

F2-08DA-1 8-Channel Analog Current Output			±9 counts max. sinking @ any load ±9 counts max. sourcing @ 125q load	
Number of Channels	8, single-ended	Offset Calibration Error	±11 counts max. sourcing @ 250q	
Output Ranges	4 to 20mA		toad ±13 counts max. sourcing @ 400q	
Resolution	12 bit (1 in 4096)		load	
Output Type	Current sinking or current sourcing	Maximum Full Scale	0.5% sinking (any load) sinking & sourcing @ 125q load	
Base Power Required 5VDC	30mA	Inaccuracy @ 60°C	0.64% sourcing @ 250q load 0.83% sourcing @ 400q load	
Maximum Loop Voltage	30VDC	Maximum Full Scale Inaccuracy @ 25°C	0.3% sinking (any load) sinking & sourcing @ 125q load	
External Power Supply	18 to 30VDC, 50mA., class 2 (Add 20mA for each current loop	(Incudes all errors and temp drift)	0.44% sourcing @ 250q load 0.63% sourcing @ 400q load	
	used)	Operating Temperature	32° to 140°F (0° to 60°C)	
Source Load	0–400 q @ 18–30 VDC	Storage Temperature	-4 to 158ºF(-20 to 70ºC)	
Sink Load	0–600q/18V, 0–900q/24V, 0–1200g/30V	Relative Humidity	5% to 95% (non-condensing)	
Total Load (sink + source)	600q/18V, 900q/24V, 1200q/30V	Environmental air	No corrosive gases permitted	
PLC Update Rate	8 channels per scan maximum	Vibration	MIL STD 810C 514.2	
Occurring Octiling Times		Shock	MIL STD 810C 516.2	
Conversion Settling Time 400µs maximum (tuli scale change)		Noise Immunity	NEMA ICS3-304	
Linearity Error	nearity Error ±2 count (±0.050% of full scale)		Removable; D2-16IOCON	
(end to end) maximum #12 counts max. sinking @ any load ±12 counts max. sourcing @ 125q load ±18 counts max. sourcing @ 250q load ±26 counts max. sourcing @ 400q		ZIPLink Module	ZL-RTB20 (Feedthrough)	
		ZIPLink Cable	ZL-D2-CBL19 (0.5 m) ZL-D2-CBL19-1 (1.0 m) ZL-D2-CBL19-2 (2.0 m) ZL-D2-CBL19-2 (2.0 m Pigtail) ZL-D2-CBL19-2P (2.0 m Pigtail)	

Note 1: Shields should be connected to the 0V of the module.





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F2–08DA–1, Analog Output - continued

The Do-more CPU module assigns the following memory addresses to this module.

F2-08DA-1 WY Addressing		
Address	Description	
WYn	Channel 1 Output Data (0 to 4095)	
WYn+1	Channel 2 Output Data (0 to 4095)	
WYn+2	Channel 3 Output Data (0 to 4095)	
WYn+3	Channel 4 Output Data (0 to 4095)	
WYn+4	Channel 5 Output Data (0 to 4095)	
WYn+5	Channel 6 Output Data (0 to 4095)	
WYn+6	Channel 7 Output Data (0 to 4095)	
WYn+7	Channel 8 Output Data (0 to 4095)	

WYn: Starting WY address assigned to this module



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F2-08DA-2, Analog Output

F2-08DA-2 8-Channel Analog Voltage Output			E
Number of Channels	8, single-ended, 1 common		
Output Ranges	0 to 5V, 0 to 10V		
Resolution	12 bit (1 in 4096)		
Output Type	Voltage sourcing		
Base Power Required 5VDC	60mA		
External Power Supply	21.6-26.4 VDC, 140mA (outputs fully loaded)		
Peak Output Voltage	15VDC (clamped by transient voltage suppressor)		ł
Load Impedance	1–10 kq		
Load Capacitance	0.01 µF maximum		
PLC Update Rate	8 channels per scan maximum		
Conversion Settling Time	400µs maximum (full scale change) 4.5 ms to 9ms for digital out to analog out		-
Linearity Error (end to end)	±1 count (±0.025% of full scale) maximum		2

Full Scale Calibration Error	±12 counts max. unipolar @ 25⁰C (77⁰F)
Offset Calibration Error	±3 counts max., unipolar @ 25ºC (77ºF)
Accuracy vs. Temperature	±57ppm/ °C full scale calibration change (including maximum offset change of 2 counts)
Maximum Inaccuracy	±0.3% @ 25°C (77°F) ±0.45% @ 0-60°C (32-140°F)
Operating Temperature	0° to 60°C (32° to 140°F)
Storage Temperature	-20° to 70°C (-4° to 158°F)
Relative Humidity	5 to 95% (non-condensing)
Environmental air	No corrosive gases permitted
Vibration	MIL STD 810C 514.2
Shock	MIL STD 810C 516.2
Noise Immunity	NEMA ICS3-304
Terminal Type (included)	Removable; D2-8IOCON
ZIPLink Module	ZL-RTB20 (Feedthrough)
ZIPLink Cable	ZL-D2-CBL10 (0.5 m) ZL-D2-CBL10-1 (1.0 m) ZL-D2-CBL10-2 (2.0 m)

One count in the specification table is equal to one least significant bit of the analog data value (1 in 4096).

Note 1: Shields should be connected to the 0V of the module.





F2-08DA-2, Analog Output- continued

Setting the Module Jumpers

The F2-08DA-2 module uses one jumper to select between the 0–5 V or 0–10 V operating ranges. Refer to the following figure and table for proper selection of voltage range. The output data format remains 0–4095 for either voltage range selected. Unused jumpers can be stored on a single post to prevent losing them.



Yes = Jumper Installed No = Jumper Removed

F2-08DA-2 Module Jumper Table			
Voltage Range	Output Data Format	0–5 V/0–10 V Jumper (top board)	
0 to 5V	0 to 4095	Yes	
0 to 10V	0 to 4095	No	

F2-08DA-2, Analog Output- continued

The Do-more CPU module assigns the following memory addresses to this module.

F2-08DA-2 WY Addressing				
Address	Description			
WYn	Channel 1 Output Data (0 to 4095)			
WYn+1	Channel 2 Output Data (0 to 4095)			
WYn+2	Channel 3 Output Data (0 to 4095)			
WYn+3	Channel 4 Output Data (0 to 4095)			
WYn+4	Channel 5 Output Data (0 to 4095)			
WYn+5	Channel 6 Output Data (0 to 4095)			
WYn+6	Channel 7 Output Data (0 to 4095)			
WYn+7	Channel 8 Output Data (0 to 4095)			

WYn: Starting WY address assigned to this module



F2–4AD2DA, Analog Input/Output

F2-4AD2DA 4-Channel Analog Current Input / 2-Channel Analog Current Output				
Number of Input Channels	4, single-ended (1 common)			
Number of Output Channels	2, single-ended (1 common)			
Ranges	4 to 20mA current (Current sinking)			
Resolution	12 bit (1 in 4096)			
Peak Withstanding Voltage	75VDC, current outputs			
Maximum Continuous Overload	-40 to +40mA, each current output			
Input Impedance	250q, ±0.1%, 1/2W, 25ppm/ °C current input resistance			
External Load Resistance	0q minimum, current outputs			
Maximum Loop Supply	30VDC			
Recommended Fuse	0.032 A, series 217 fast-acting, current inputs			
Maximum Load/Power Supply	910q/24V, current outputs 620q/18V, 1200 q/30 V			
Active Low-pass Filter	-3dB @ 20Hz, 2 poles (-12dB per octave)			
Linearity Error (best fit)	±1 count (±0.025% of full scale) maximum			
Output Settling Time	100µs maximum (full scale change)			

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A	±50ppm/ °C full scale calibration
Accuracy vs. Temperature	change
	(including maximum offset change)
Maximum Inaccuracy	±0.1% @ 77°F (25°C)
Maximum maccuracy	±0.3% @ 32 to 140°F (0 to 60°C)
	4 input channels per scan max-
PLC Lindata Pata	imum
FEC Opuale Nale	2 output channels per scan
	maximum
Base Power Required 5VDC	90mA
External Power Supply	18–26.4 VDC @ 80mA
Requirement	20mA per loop
Operating Temperature	32° to 140°F (0° to 60°C)
Storage Temperature	-4° to 158°F (-20° to 70°C)
Relative Humidity	5 to 95% (non-condensing)
Environmental Air	No corrosive gases permitted
Vibration	MIL STD 810C 514.2
Shock	MIL STD 810C 516.2
Noise Immunity	NEMA ICS3-304
Terminal Type (included)	Removable; D2-8IOCON
ZIPLink Module	ZL-RTB20 (Feedthrough)
	7L D2 CDI 10 (0.5 m)
ZIPI ink Cable	ZL-DZ-CBL 10 (0.5 III)
	ZL - DZ - CBL 10 - 1 (1.0 III)
	2L-D2-ODL 10-2 (2.0 111)

F2–4AD2DA, Analog Input/Output - continued



One count in the specification table is equal to one least significant bit of the analog data value (1 in 4096). Note 1: Shields should be connected at their respective signal source.

Note 2: Unused channel should remain open for minimum power consumption.

Note 3: More than one external power supply can be used provided the power supply commons are connected. Note 4: A Series 217, 0.032A fast-acting fuse is recommended for 4–20 mA current input loops.

Note 5: f the power supply common of an external power supply is not connected to 0 VDC on the module, then the output of the external transmitter must be isolated. To avoid "ground loop" errors, recommended 4–20 mA transmitter types are: 2 or 3 wire - Isolation between input signal and power supply or 4 wire - Isolation between input signal, power supply, and 4-20 mA output.

Note 6: If an analog channel is connected backwards, then erroneous data values will be returned for that channel. Note 7: To avoid small errors due to terminal block losses, connect 0 VDC, IN-, and OUT- on the terminal block as shown. The module's internal connection alone of these nodes is not sufficient to permit module performance up to the accuracy specifications.

Note 8: Choose an output transducer resistance according to the maximum load/power listed in the Output Specifications.

F2–4AD2DA, Analog Input/Output - continued

The Do-more CPU module assigns the following memory addresses to this module.

F2-4AD2DA X Addressing			
Address	Description		
Xn	On when the external 24VDC input power is missing or terminal block is removed.		
Xn+1	On when the external 24VDC input power is missing or terminal block is removed.		
Xn+2	On when the external 24VDC input power is missing or terminal block is removed.		
Xn+3	On when the external 24VDC input power is missing or terminal block is removed.		
Xn+4	Not used		
Xn+5	Not used		
Xn+6	Not used		
Xn+7	Not used		

Xn: Starting X address assigned to this module

F2-4AD2DA WX Addressing			
Address	Description		
WXn	Channel 1 Input Data (0 to 4095)		
WXn+1	Channel 2 Input Data (0 to 4095)		
WXn+2	Channel 3 Input Data (0 to 4095)		
WXn+3	Channel 4 Input Data (0 to 4095)		

WXn: Starting WX address assigned to this module

F2-4AD2DA WY Addressing		
Address	Description	
WYn	Channel 1 Output Data (0 to 4095)	
WYn+1	Channel 2 Output Data (0 to 4095)	

WYn: Starting WY address assigned to this module



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F2-8AD4DA-1 Analog Input/Output

F2-8AD4DA-1 8-0 Input / 4-Channel	Channel Analog Current Analog Current Output	Output Channels per Module	4	
Input Channels per	8, single ended (one common)	Output Range	4 to 20mA	
INIOQUIE		Resolution	16-bit, 0.244 mA/bit	
Input Range	0 to 20mA	Output Type	Current sourcing at 20mA max.	
Resolution	12, 14, 16-bit selectable	Load Impedance	0–750 h	
External DC Power Required	100mA @ 18–26.4 VDC	Max. Inaccuracy	0.25% of range	
Max. Continuous Overload	±45mA	Calibration Error (not incl. offset error)	±0.075% of range max.	
Input Impedance	100h 0.1% 1/4W	Max. Offset Calibration Error	±0.1% of range max.	
Filter Characteristics	Active low pass, -3dB @ 80 Hz 12-bit = 1.5 ms per channel 14-bit = 6ms per channel	Accuracy vs. Temperature	±25ppm/ °C max. full scale calibration change (± 0.0025% of range / °C)	
Conversion Mathed	16-bit = 25ms per channel Over sampling successive approx-	Max. Crosstalk at DC, 50/60Hz	-70dB, 1 LSB	
	imation	Linearity Error (End to End)	±1 count max. (±0.025% of full scale) Monotonic with no missing codes	
Maximum Inaccuracy	0.1% of range	Output Stability and Repeatability	±1 LSB after 10 min. warm-up typical	
	12-bit = ±2 count max. (±0.06% of	Output Ripple	0.005% of full scale	
Linearity Error	range) 14-bit = ±10 count max. (±0.06% of range) 16-bit = ±20 count max. (±0.06% of	Output Settling Time	0.5 ms max., 5µs min. (full scale change)	
(End to End)		Max. Continuous Overload	Outputs open circuit protected	
	Monotonic with no missing codes	Type of Output Protection	Electronically current limited to 20mA or less	
Full Scale Calibration Error (not incl. offset error)	±0.07% of range max.	Output Signal at Power-up and Power- down	4mA	
Offset Calibration Error	±0.03% of range max.	Terminal Type	Removable; D2-16IOCON	
Rec. Fuse (external)	0.032A, Littelfuse Series 217 fast-acting		7L PTP20 (Foodtbrough)	
Base Power Required 5VDC	35mA			
		ZIPLink Cable	ZL-D2-CBL19 (0.5 m) ZL-D2-CBL19-1 (1.0 m) ZL-D2-CBL19-2 (2.0 m) ZL-D2-CBL19-1P (1.0 m Pigtail) ZL-D2-CBL19-2P (2.0 m Pigtail)	



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NOTE: Module revision B1 or newer of the F2-8AD4DA-1 (found on the product label) must be used with the Do-more PLC.



Note 1: A Littlefuse Series 217, 0.032A fast-acting fuse is recommended for all 4-20mA current loop inputs.

Note 2: Connect shields to the 0V of the module; do not connect both ends of shield.

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F2-8AD4DA-1 X Addressing			
Address	Description		
Xn	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed.		
Xn+1	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed.		
Xn+2	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed.		
Xn+3	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed.		
Xn+4	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed.		
Xn+5	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed.		
Xn+6	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed.		
Xn+7	On when the transmitter is broken, the external 24VDC input power is missing or terminal block is removed.		

Xn: Starting X address assigned to this module

F2-8AD4DA-1 WX Addressing			
Address	Description		
WXn	Channel 1 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)		
WXn+1	Channel 2 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)		
WXn+2	Channel 3 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)		
WXn+3	Channel 4 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)		
WXn+4	Channel 5 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)		
WXn+5	Channel 6 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)		
WXn+6	Channel 7 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)		
WXn+7	Channel 8 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)		

WXn: Starting WX address assigned to this module

The Do-more CPU module assigns the following memory addresses to this module.

The resolution of each analog input channel can be selected separately. Available resolutions are 12 bit (0 to 4095), 14 bit (0 to 16383) and 16 bit (0 to 65535). You need to use the memory address WYn+4 to select the resolutions. Please refer to the next page for details.



NOTE 1: The data format of the WX addresses is 'Signed Word'. They store -32768 to 32767 as default. To read and write 0 to 65535 into these memory addresses, use the casting ':U' (':U' is the casting for 'Unsigned' format). For instance, if you selected the 16 bit resolution for the first analog input channel and WX0 is assigned to the channel, use 'WX0:U' to access this memory address in the ladder program and other tools in Do-more Designer.

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F2-8AD4DA-1 WY Addressing				
Address	Description			
WYn	Channel 1 Output Data (0 to 655352)			
WYn+1	Channel 2 Output Data (0 to 655352)			
WYn+2	Channel 3 Output Data (0 to 655352)			
WYn+3	Channel 4 Output Data (0 to 655352)			
WYn+4	Input Resolution Selection			
WYn+5	Not used			
WYn+6	Input Track and Hold Selection			

WYn: Starting WY address assigned to this module



NOTE 2: The data format of the WY addresses is 'Signed Word'. They store -32768 to 32767 as default. To read and write 0 to 65535 into these memory addresses, use the casting '.U' (':U' is the casting for 'Unsigned' format). For instance, if WY0 is assigned to the first analog output channel, use 'WY0:U' to access this memory address in the ladder program and other tools in Do-more Designer.



Input Configuration Using Do-more Designer Version 1.1 or Newer

Using the Module Configurations section of the Do-more Designer System Configuration, each of the eight input channels can be individually configured for resolutions: 12, 14, or 16 bit, configured for track and hold options: None (no hold), Minimum, Maximum, or Reset held value, or each input can be individually disabled.

From the System Configurations page, select Module Configuration(s) in the tab on the left. The screen below will appear showing the modules that are pre-configurable. Select the Type F2-8AD4DA-x in the table and click the Edit Config button on the right hand side.

Once the Edit Config button is selected, the Module Settings page shown below will open.

System Configuration				X
Configuration Entries — CPU Configuration — 1/0 Configuration — DL205 Local I/0 Master — DL205 Base — Mod le Configuration(c)	Module Configurations Modules that are programmable by Do-more instructions require a Module Configuration. The Module Configuration provides a logical connection between the program and the module, eliminating the need for Base/Slot addressing in the program. Certain modules have additional setup information that is provided through the Module Configuration.			
- Device Configuration	Module Name	Туре	Location	New Config
I/O Mappings Memory Configuration	SERIO_000A CTRIO_001 SERIO_002	SERIO/SERIO4 CTRIO/CTRIO2 SERIO/SERIO4	DL205 Local I/O Master->DL205 Base->Slot 0 DL205 Local I/O Master->DL205 Base->Slot 1 DL205 Local I/O Master->DL205 Base->Slot 2	Edit Config
	F2_8AD4DA_002	F2-8AD4DA-x	DL205 Local I/O Master->DL205 Base->Slot 3	Delete Config
				Delete Disconnected
				Assign Config
		ОК	Cancel Help	

From this page each input channel can be configured with Resolution and/or Track and Hold options. Select the radial button next to the desired option for each input and select the OK button when done.

Name	F2_8AD4DA_002					
Info	Module Type: F2-8AD	4DA-x Assiç	ned to: DL205 Lo	cal I/O Master : DL205 Base	e : Slot 3	
Thannel	Res	olution		Track	and Hold	
1	🖲 12 bit 🔿 14 bit	C 16 bit	C Disabled	• None C Minimum	C Maximum	C Reset
2	🔍 12 bit 🔿 14 bit	🔿 16 bit	C Disabled		C Maximum	C Reset
3	● 12 bit ○ 14 bit	🔿 16 bit	C Disabled	None C Minimum	C Maximum	C Reset
4	🔎 12 bit 🔿 14 bit	🔘 16 bit	C Disabled	None C Minimum	C Maximum	C Reset
5		C 16 bit	C Disabled	None C Minimum	C Maximum	C Reset
6	● 12 bit ○ 14 bit	🔿 16 bit	C Disabled	🖲 None 🔿 Minimum	C Maximum	C Reset
7	🔍 12 bit 🔿 14 bit	🔿 16 bit	C Disabled	🕫 None 🤇 Minimum	C Maximum	C Reset
8		C 16 bit	C Disabled	None C Minimum	C Maximum	C Reset
	Input Range (F2-8AD	1DA-2 only)	Output Rang	je (F2-8AD4DA-2 only)		
All	@ 0 to 5V C	0 to 10V	O to 5	V C 0 to 10V		



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NOTE: The Input and Output Range selections are for the F2-8AD4DA-2 module only.

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Input Resolution Selection (WYn+4)

If not using Do-more Designer version 1.1 or newer, each of the eight input channels can be individually configured for 12, 14, or 16 bit resolution or disabled with memory address WYn+4 (WYn: Starting WY address assigned to this module). Two (2) bits in this memory address are assigned to each analog input channel.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
R-															
8H	8L	7H	7L	6H	6L	5H	5L	4H	4L	3H	3L	2H	2L	1H	1L

Channel Resolution Selection Table								
Input Resolution	RnH (Resolution channel n High bit)	RnL (Resolution channel n Low bit)						
12 bit	0	0						
14 bit	0	1						
16 bit	1	0						
Disabled	1	1						

The HEX data format is used to set up the input resolution as seen in the following example.

Example: An F2-8AD4DA-1 is installed in slot 0 and WY4 is used for the input resolution selection. Input channels 1-4 are 12 bit, channel 5 is 14 bit, channel 6 is 16 bit, and channels 7 and 8 are disabled. In this case, 0xF900 needs to be written into WY4.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
R-															
8H	8L	7H	7L	6H	6L	5H	5L	4H	4L	ЗH	3L	2H	2L	1H	1L
1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0
		F			9	9			(5			()	

Use the MOVE instruction to write the Hex value 0xF900 into WY4.



Input Track and Hold Selection (WYn+6)

The track and hold feature for each of the eight inputs can be individually configured for minimum, maximum, no hold, or reset held value with memory address WYn+6 (WYn: Starting WY address assigned to this module). This configuration can be changed "on the fly" while the program is running. Two (2) bits in this memory address are assigned to each analog input channel.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
T-	Т-														
8H	8L	7H	7L	6H	6L	5H	5L	4H	4L	ЗH	3L	2H	2L	1H	1L

Channel Track and Hold Selection Table									
Track and Hold Select	TnH (Track and Hold channel n High bit)	TnL (Track and Hold channel n Low bit)	Result						
No Track and Hold	0	0	Returns real time input value						
Track and Hold Minimum Value	0	1	Maintains lowest measured value						
Track and Hold Maximum Value	1	0	Maintains highest measured value						
Reset Track and Hold Value	1	1	Resets previously held input value						

The HEX data format is used to set up the track and hold option as seen in the following example.

Example: An F2-8AD4DA-1 is installed in slot 0 and WY6 is used for the track and hold selection. Input channel track and hold settings: ch 1-3 = none, ch 4-5 = minimum, ch 6-7 = maximum, ch 8 = reset. In this case, 0xE940 needs to be written into WY6.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
T-															
8H	8L	7H	7L	6H	6L	5H	5L	4H	4L	3H	3L	2H	2L	1H	1L
1	1	1	0	1	0	0	1	0	1	0	0	0	0	0	0
		E				9			4	1			()	

Use the MOVE instruction to write the Hex value 0xE940 into WY6.



F2-8AD4DA-2 Analog Input/Output

F2-8AD4DA-2 8-0	Channel Analog Voltage	Output Channels per Module	4
Input / 4-Channel	Analog voltage Output	Output Range	0 to 5V, 0 to 10V
Input Channels per	8, single ended (one common)	Resolution	16-bit
Module	, C , ,	Output Type	Voltage sourcing/sinking at 10mA max.
Input Range	0 to 5V, 0 to 10V	Load Impedance	>1000h
Resolution	12, 14, 16-bit selectable	Max. Inaccuracy	0.15% of range
External DC Power Required	80mA @ 18–26.4 VDC	Max. Full Scale Calibration Error (not incl. offset error)	±0.075% of range max.
Max. Continuous Overload	±100V	Max. Offset Calibration Error	±0.025% of range max.
Input Impedance	>10MΩ	Accuracy vs. Temperature	±50ppm/ °C max. full scale calibration change
Filter Characteristics	Active low pass, -3 dB @ 80 Hz	' 	(± 0.005% of range / °C)
Conversion Time	12-bit = 1.5 ms per channel 14-bit = 6ms per channel	Max. Crosstalk @ DC, 50/60Hz	-70dB, 1 LSB
	16-bit = 25ms per channel	Linearity Error	±1 count max. (±0.025% of full scale)
Conversion Method	mation		
Accuracy vs. Temperature	+50ppm / °C Max	Repeatability	typical
		Output Ripple	0.005% of full scale
Maximum Inaccuracy	0.1% of range	Output Settling Time	0.5 ms max., 5µs min. (full scale change)
Lincority From (End	12-bit = ± 1 count max. ($\pm 0.025\%$ of range) 14-bit = ± 4 count max. ($\pm 0.025\%$ of	Max. Continuous Overload	Outputs current limited to 15mA typical
to End)	range) 16-bit = ±16 count max. (±0.025% of range)	Type of Output Protection	1VDC peak output voltage (clamped by transient voltage sup- pressor)
Full Scale Calibration	the the test of the test of te	Output Signal at Power-up and Power- down	0V
(not incl. offset error)	10.01376 of range max.	Terminal Type (included)	Removable; D2-16IOCON
Offset Calibration Error	±0.025% of range max.	ZIPLink Module	ZL-RTB20 (Feedthrough)
Base Power Required 5VDC	35mA	ZIPLink Cable	ZL-D2-CBL19 (0.5 m) ZL-D2-CBL19-1 (1.0 m) ZL-D2-CBL19-2 (2.0 m) ZL-D2-CBL19-1P (1.0 m Pigtail)
			7L-D2-CBI 19-2P (2.0 m Pigtail)

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Note 1: Connect shields to the 0V of the module; do not connect both ends of shield.

The Do-more CPU module assigns the following memory addresses to this module.

F2-8AD4	F2-8AD4DA-2 X Addressing						
Address	Description						
Xn	Not Used						
Xn+1	Not Used						
Xn+2	Not Used						
Xn+3	Not Used						
Xn+4	Not Used						
Xn+5	Not Used						
Xn+6	Not Used						
Xn+7	Not Used						

Xn: Starting X address assigned to this module

F2-8AD4	DA-2 WX Addressing
Address	Description
WXn	Channel 1 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)
WXn+1	Channel 2 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)
WXn+2	Channel 3 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)
WXn+3	Channel 4 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)
WXn+4	Channel 5 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)
WXn+5	Channel 6 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)
WXn+6	Channel 7 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)
WXn+7	Channel 8 Input Data (0 to 4095, 0 to 16383 or 0 to 655351)

WXn: Starting WX address assigned to this module

The resolution of each analog input channel can be selected separately. Available resolutions are 12 bit (0 to 4095), 14 bit (0 to 16383) and 16 bit (0 to 65535). You need to use the memory address WYn+4 to select the resolutions. Please refer to the next page for details.



NOTE 1: The data format of the WX addresses is 'Signed Word'. They store -32768 to 32767 as default. To read and write 0 to 65535 into these memory addresses, use the casting ':U' (':U' is the casting for 'Unsigned' format). For instance, if you selected the 16 bit resolution for the first analog input channel and WX0 is assigned to the channel, use 'WX0:U' to access this memory address in the ladder program and other tools in Do-more Designer.

F2-8AD4	DA-2 WY Addressing
Address	Description
WYn	Channel 1 Output Data (0 to 655352)
WYn+1	Channel 2 Output Data (0 to 655352)
WYn+2	Channel 3 Output Data (0 to 655352)
WYn+3	Channel 4 Output Data (0 to 655352)
WYn+4	Input Resolution Selection
WYn+5	Input and Output Ranges Selection
WYn+6	Input Track and Hold Selection

WYn: Starting WY address assigned to this module



NOTE 2: The data format of the WY addresses is 'Signed Word'. They store -32768 to 32767 as default. To read and write 0 to 65535 into these memory addresses, use the casting ':U' (':U' is the casting for 'Unsigned' format). For instance, if WY0 is assigned to the first analog output channel, use 'WY0:U' to access this memory address in the ladder program and other tools in Do-more Designer.



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Input Configuration Using Do-more Designer Version 1.1 or Newer

Using the Module Configurations section of the Do-more Designer System Configuration, each of the eight input channels can be individually configured for resolutions: 12, 14, or 16 bit, configured for track and hold options: None (no hold), Minimum, Maximum, or Reset held value, or each input can be individually disabled. Input and output ranges can also be configured for 0 to 5V or 0 to 10V in this section.

From the System Configurations page, select Module Configuration(s) in the tab on the left. The screen below will appear showing the modules that are pre-configurable. Select the Type F2-8AD4DA-x in the table and click the Edit Config button on the right-hand side.

onfiguration Entries CPU Configuration I/O Configuration DL205 Local I/O Master DL205 Base	Module Configurations Modules that are programmable by Do-more instructions require a Module Configuration. The Module Configuration provides a logical connection between the program and the module, eliminating the need for Base/Siot addressing in the program. Certain modules have additional setup information that is provided through the Module Configuration.									
Module Configuration(s)	Module Name	Туре	Location	New Config						
- I/O Mappings - Memory Configuration	SERIO_000A CTRIO_001 SERIO_002	SERIO/SERIO4 CTRIO/CTRIO2 SERIO/SERIO4	DL205 Local I/O Master->DL205 Base->Slot 0 DL205 Local I/O Master->DL205 Base->Slot 1 DL205 Local I/O Master->DL205 Base->Slot 2	Edit Config						
-	F2_8AD4DA_002	F2-8AD4DA-x	DL205 Local I/O Master->DL205 Base->Slot 3	Delete Config						
				Delete Disconnected						
				Assign Config						

Once the Edit Config button is selected, the Module Settings page shown below will open. From this page each input channel can be configured with Resolution and/or Track and Hold options. Input/output range options are also available. Select the radial button next to the desired options and select the OK button when done.

Name	F2_8AD4DA_002					
Info	Module Type: F2-8AD	4DA-x Assiq	gned to: DL205 Lo	ical I/O Master : DL205 Basi	e : Slot 3	
Channel	Res	olution		Track	and Hold	
1	🔍 12 bit 🔿 14 bit	C 16 bit	C Disabled		C Maximum	C Reset
2		C 16 bit	$\ensuremath{\mathbb{C}}$ Disabled	📀 None 🔿 Minimum	C Maximum	C Reset
3	🔍 12 bit 🔿 14 bit	🔿 16 bit	C Disabled	🖲 None 🔿 Minimum	C Maximum	C Reset
4	🔍 12 bit 🔿 14 bit	C 16 bit	\bigcirc Disabled	🖲 None 🗢 Minimum	C Maximum	⊂ Reset
5	🔍 12 bit 🔿 14 bit	\odot 16 bit	$\ensuremath{\mathbb{C}}$ Disabled	🖲 None 🔿 Minimum	C Maximum	C Reset
6		\odot 16 bit	\bigcirc Disabled	📀 None 🔿 Minimum	C Maximum	C Reset
7	🖲 12 bit 🔿 14 bit	🔿 16 bit	\bigcirc Disabled	🖲 None 🔿 Minimum	C Maximum	C Reset
8		C 16 bit	C Disabled		C Maximum	C Reset
	Input Range (F2-8AD4	IDA-2 only)	Output Ran	ge (F2-8AD4DA-2 only)		
All	@ 0 to 5V C	0 to 10V	O to 5	V C 0 to 10V		

Input Resolution Selection (WYn+4)

If not using Do-more Designer version 1.1 or newer, each of the eight input channels can be individually configured for 12, 14, or 16 bit resolution or disabled with memory address WYn+4 (WYn: Starting WY address assigned to this module). Two (2) bits in this memory address are assigned to each analog input channel.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
R-															
8H	8L	7H	7L	6H	6L	5H	5L	4H	4L	ЗH	3L	2H	2L	1H	1L

Channel Reso	lution Selection T	able
Input Resolution	RnH (Resolution channel n High bit)	RnL (Resolution channel n Low bit)
12 bit	0	0
14 bit	0	1
16 bit	1	0
Disabled	1	1

The HEX data format is used to set up the input resolution as seen in the following example.

Example: An F2-8AD4DA-2 is installed in slot 0 and WY4 is used for the input resolution selection. Input channels 1-4 are 12 bit, channel 5 is 14 bit, channel 6 is 16 bit, and channels 7 and 8 are disabled. In this case, 0xF900 needs to be written into WY4.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
R-															
8H	8L	7H	7L	6H	6L	5H	5L	4H	4L	ЗH	3L	2H	2L	1H	1L
1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0
	F			9			0				0				

Use the MOVE instruction to write the Hex value 0xF900 into WY4.



Input and Output Range Selection (WYn+5)

The range of the eight input channels can be collectively set for 0 to 5V or for 0 to10V. The range of the four output channels can also be collectively set for either of the same two voltage ranges. The configuration is stored in memory address WYn+5 (WYn: Starting WY address assigned to this module). Only 2 bits in this memory address are used for the setup.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
-	-	-	-	-	-	-	OR	-	-	-	-	-	-	-	IR

Input/Output F	Input/Output Range Selection Table											
Input/Output Range	IR (Input Range)	OR (Output Range)										
0V to 5V	0	0										
0V to 10V	1	1										

The HEX data format is used to set up the input resolution as seen in the following example.

Example: An F2-8AD4DA-2 is installed in slot 0 and WY5 is used for the input and output resolution selection. Input channel range is set to 0 to 5V and output channel range is set to 0 to 10V. In this case, 0x100 needs to be written into WY5.

Use the MOVE instruction to write the Hex value 0x100 into WY5.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
-	-	-	-	-	-	-	OR	-	-	-	-	-	-	-	IR
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
0 1				1			()			()			

\$FirstScan ST0	MOVE	Move Value
	Source Destination	0x100 WY5

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Input Track and Hold Selection (WYn+6)

The track and hold feature for each of the eight inputs can be individually configured for minimum, maximum, no hold, or reset held value with memory address WYn+6 (WYn: Starting WY address assigned to this module). This configuration can be changed "on the fly" while the program is running. Two (2) bits in this memory address are assigned to each analog input channel.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
T-															
8H	8L	7H	7L	6H	6L	5H	5L	4H	4L	3H	3L	2H	2L	1H	1L

Channel Track	Channel Track and Hold Selection Table													
Track and Hold Select	TnH (Track and Hold channel n High bit)	Result												
No Track and Hold	0	0	Returns real time input value											
Track and Hold Minimum Value	0	1	Maintains lowest measured value											
Track and Hold Maximum Value	1	0	Maintains highest measured value											
Reset Track and Hold Value	1	1	Resets previously held input value											

The HEX data format is used to set up the track and hold option as seen in the following example.

Example: An F2-8AD4DA-2 is installed in slot 0 and WY6 is used for the track and hold selection. Input channel track and hold settings: ch 1-3 = none, ch 4-5 = minimum, ch 6-7 = maximum, ch 8 = reset. In this case, 0xE940 needs to be written into WY6.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
T-	T-	T-	T-	T-	T-	T-	T-	T-	T-	T-	T-	T-	T-	T-	T-
8H	8L	7H	7L	6H	6L	5H	5L	4H	4L	ЗH	3L	2H	2L	1H	1L
1	1	1	0	1	0	0	1	0	1	0	0	0	0	0	0
E 9						4	1		0						

Use the MOVE instruction to write the Hex value 0xE940 into WY6.

