

Discrete Input Modules

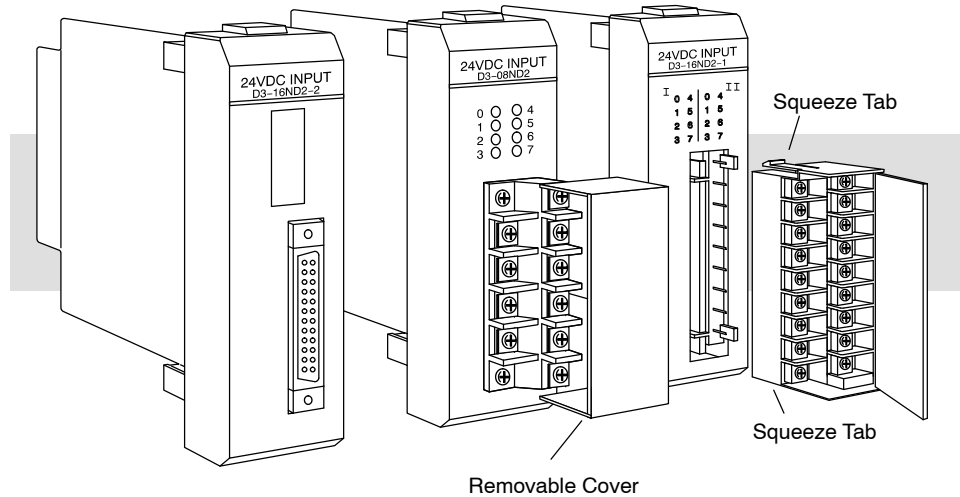
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Discrete Input Module Identification and Terminology

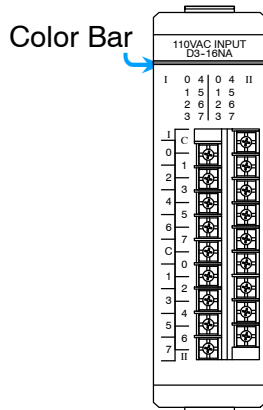
This chapter contains I/O specification sheets for the discrete input modules. The diagram below shows the status indicator location for some of the most common discrete input modules.

Discrete Input Module Status Indicators



Color Coding of I/O Modules

The DL305 family of I/O modules has a color coding scheme to help you identify whether the module is an input module, an output module or a special module. This is done through a color bar indicator located on the front of each module below the part number. The following color scheme is used.



Module Type	Color Code
Discrete/Analog Output	Red
Discrete/Analog Input	Blue
Other	White

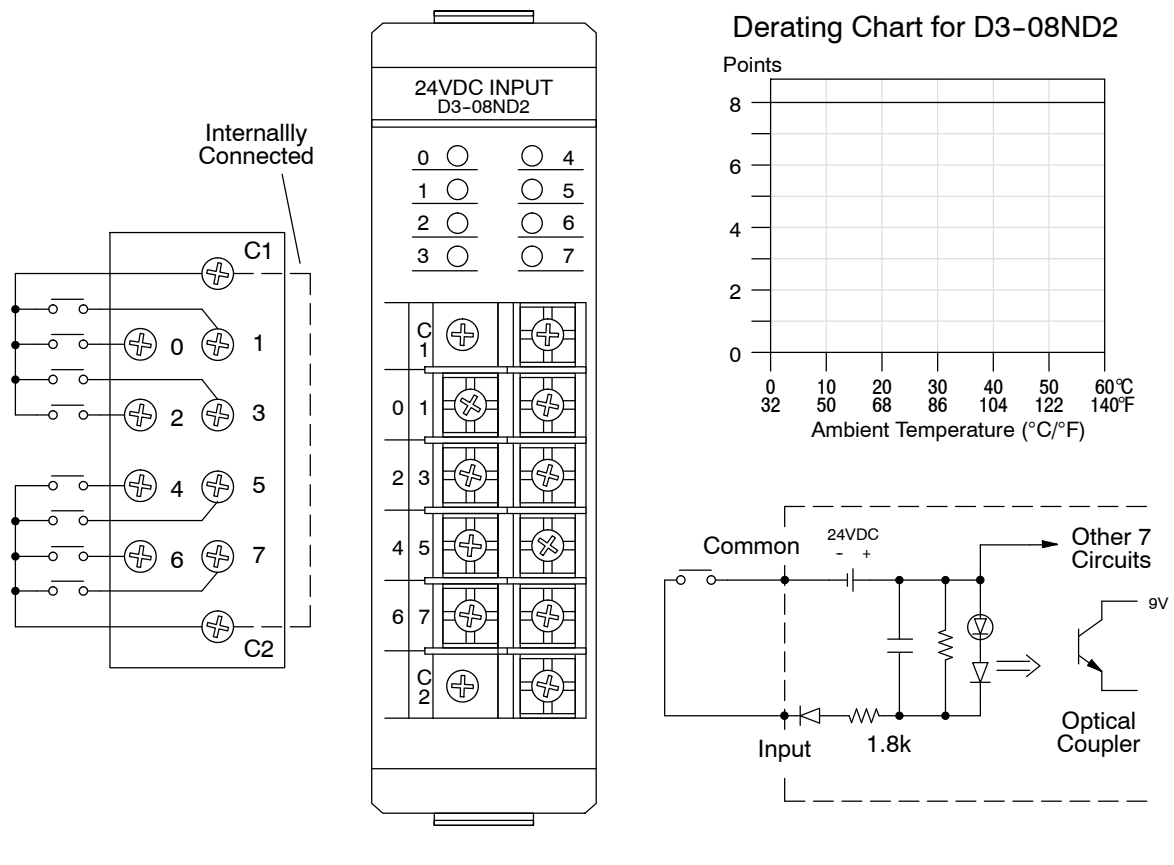
Input Module Selection

Your input module selection depends on the field devices used and system performance requirements. The input module specifications in this chapter list the information needed for choosing the correct module for a field device and to assure it meets the system requirements. The following list defines the specifications listed in this chapter.

Inputs Per Module	Indicates number of input points per module and designates current sinking, current sourcing, or either.
Commons Per Module	Number of commons per module and their electrical characteristics.
Input Voltage Range	The operating voltage range of the input circuit. DL305 input modules require either an internal or external power supply for the operating voltage. The base power supply will provide the internal voltage.
Peak Voltage	Maximum voltage allowed for the input circuit.
AC Frequency	AC modules are designed to operate within a specific frequency range. 60 Hz is the standard AC frequency in the U.S., 50 Hz is common in other countries.
ON Voltage Level	The voltage level at which the input point will turn ON.
OFF Voltage Level	The voltage level at which the input point will turn OFF.
Input Current	Typical operating current for an active (ON) input.
Input Impedance	Input impedance can be used to calculate input current for a particular operating voltage.
Minimum ON Current	The minimum current for the input circuit to operate reliably in the ON state.
Maximum OFF Current	The maximum current for the input circuit to operate reliably in the OFF state.
Base Power Required	Power from the base power supply is used by the DL305 input modules and varies between different modules. The guidelines for using module power is explained in the power budget configuration section in chapter 4.
OFF to ON Response	The time the module requires to process an OFF to ON state transition.
ON to OFF Response	The time the module requires to process an ON to OFF state transition.
Terminal Type	Indicates whether the terminal type is a removable or non-removable connector or terminal.
Status Indicators	LEDs indicate the ON/OFF status of an input point. These LEDs are electrically located on either the logic side or the field device side of the input circuit.
Weight	Indicates the weight of the module. (See Appendix D for a complete listing of DL305 component weights.)

D3-08ND2, 24 VDC Input Module

Inputs per module	8 (current sourcing)	Base power required	9V 10 mA Max 24V 14mA/ON pt. (112 mA Max)
Commons per module	2 (internally connected)		
Input voltage range	18-36VDC	OFF to ON response	4-15 ms
Input voltage	Internally supplied	ON to OFF response	4-15 ms
Peak voltage	40 VDC	Terminal type	Non-removable
AC frequency	N/A	Status indicators	Field side
ON voltage level	< 3 V	Weight	4.2 oz. (120 g)
OFF voltage level	>18 V		
Input impedance	1.8 K ohm		
Input current	12 mA Max		
Minimum ON current	7 mA		
Maximum OFF current	3 mA		



D3-16ND2-1, 24 VDC Input Module

Inputs per module	16 (current sourcing)	Base power required	9V 25 mA Max	
Commons per module	2 (internally connected)		24V 14mA/ON pt. (224 mA Max)	
Input voltage range	18-36VDC		OFF to ON response	3-15 ms
Input voltage	Internally supplied		ON to OFF response	4-15 ms
Peak voltage	36VDC		Terminal type	Removable
AC frequency	N/A		Status indicators	Field side
ON voltage level	< 3V		Weight	6.3 oz. (180 g)
OFF voltage level	>19 V			
Input impedance	1.8 K ohm			
Input current	20 mA Max			
Minimum ON current	5 mA			
Maximum OFF current	1 mA			

Common

Common

CI

CH

Internally Connected

24VDC INPUT
D3-16ND2-1

I	0	4	0	4	II
	1	5	1	5	
	2	6	2	6	
	3	7	3	7	

I

C

II

Derating Chart for D3-16ND2-1

Ambient Temperature (°C/°F)	Points
0 / 32	16
10 / 50	16
20 / 68	16
30 / 86	16
40 / 104	16
45 / 113	16
50 / 122	12
60 / 140	0

24VDC

Common

Input

Other 15 Circuits

9V

Optical Coupler

D3-16ND2-2, 24 VDC Input Module Module

Inputs per module	16 (current sourcing)	Base power required	9V 3mA+1.3mA/ON pt (24 mA Max) 24V 1mA+13mA/ON pt (209 mA Max)		
Commons per module	8 internally connected				
Input voltage range	18-36 VDC				
Input voltage	Internally supplied				
Peak voltage	36 VDC			OFF to ON response	4-15 ms
AC frequency	N/A			ON to OFF response	4-15 ms
ON voltage level	< 3 V			Terminal type	24 Pin Removable connector
OFF voltage level	> 19 V			Status indicators	Field side
Input impedance	2.2 K ohm			Weight	5.3 oz. (150 g)
Input current	20 mA Max				
Minimum ON current	5 mA				
Maximum OFF current	2 mA				

Terminal block diagram showing 16 input channels (A, B, C) and DC GRND connections. Channels are labeled 0-7 for each group. A note indicates 'Internally Connected' for channels 0-7.

Physical module view showing '24VDC INPUT D3-16ND2-2' and terminal labels I, II, A, B, C. A derating chart shows 'Points' vs 'Ambient Temperature (°C/°F)'. The chart shows a constant 16 points up to 50°C (122°F), then a linear decrease to 12 points at 60°C (140°F).

Circuit diagram of the input module's internal circuit. It shows an 'Input' terminal connected to a 2.2K resistor, which is connected to the 'Internal Power Supply' (24VDC). The circuit also includes a 680 Ω resistor and an LED indicator. The output is connected to an 'Optical Coupler' which provides a 9V signal to the 'Common' terminal.

D3-16ND2F, 24 VDC Fast Response Input Module

Inputs per module	16 (current sourcing)	Base power required	9V 25 mA Max	
Commons per module	2 (internally connected)		24V 14 mA/ON pt. (224 mA Max)	
Input voltage range	18-36VDC		OFF to ON response	0.8 ms
Input voltage	Internally supplied		ON to OFF response	0.8 ms
Peak voltage	36VDC		Terminal type	Removable
AC frequency	N/A		Status indicators	Field side
ON voltage level	< 13V		Weight	6.3 oz. (180 g)
OFF voltage level	>19 V			
Input impedance	1.8 K ohm			
Input current	20 mA Max			
Minimum ON current	5 mA			
Maximum OFF current	1 mA			

24VDC INPUT
D3-16ND2F

I	0	4	0	4	II
	1	5	1	5	
	2	6	2	6	
	3	7	3	7	

I C II

0 1 2 3 4 5 6 7

Derating Chart for D3-16ND2F

Ambient Temperature (°C/°F)	Points
0 / 32	16
10 / 50	16
20 / 68	16
30 / 86	16
40 / 104	16
45 / 113	16
50 / 122	12
60 / 140	8

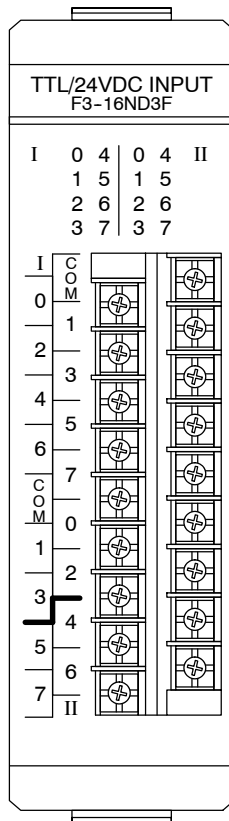
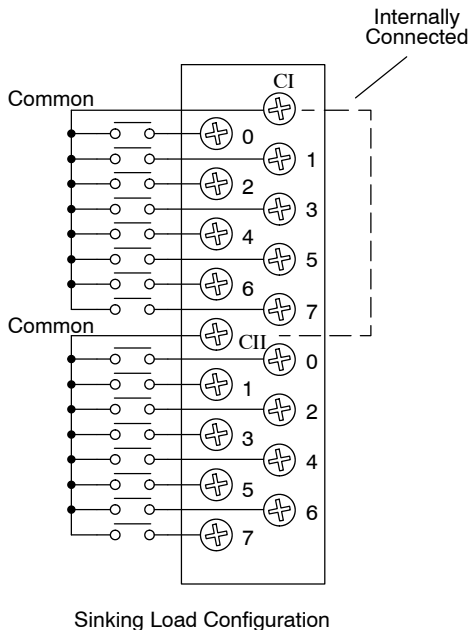
Common 24VDC Other 15 Circuits

Input 1.8k 0.1µF 1.5k 9V Optical Coupler

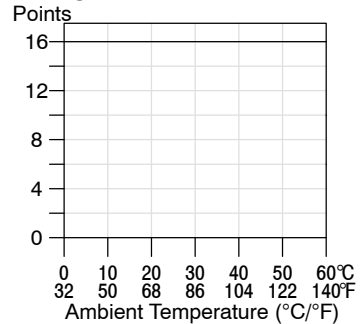
F3-16ND3F, TTL/24 VDC Fast Response Input Module

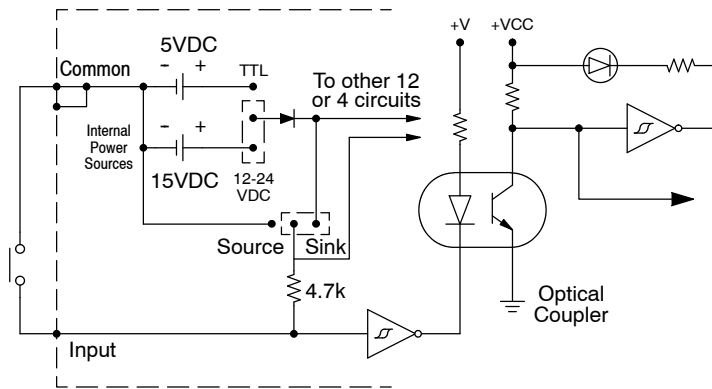
Inputs per module	16 sink/source (jumper selectable sink/source)*	Base power required	9V 148 mA Max 24V 68 mA Max
Commons per module	2 (non-isolated)	Input current	1 mA @ 5VDC 3 mA @ 12-24 DC
Input voltage range	5 VDC TTL & CMOS, 12-24 VDC (jumper selectable)*	Input impedance	4.7K
Input voltage supplied	Internal (used with sinking loads) External (used with sourcing loads)	OFF to ON response	1 ms
Peak voltage	100 VDC (35 VDC Continuous)	ON to OFF response	1 ms
AC frequency	N/A	Maximum input rate	500 Hz
ON voltage level	0-1.5VDC @ 5VDC 0-4VDC @ 12-24VDC	Minimum ON current	0.4 mA @ 5VDC 0.9 mA @ 12-24VDC
OFF voltage level	3.5-5VDC @ 5VDC 10-24VDC @12-24VDC	Maximum OFF current	0.8 mA @ 5VDC 2.2 mA @ 12-24VDC
		Terminal type	Removable
		Status indicators	Logic side
		Weight	5.4 oz. (153 g)

* 12 Inputs are jumper selectable for 5VDC/12-24VDC and Sink Load/Source Load
4 Inputs are jumper selectable for 5VDC/12-24VDC and Sink Load/Source Load

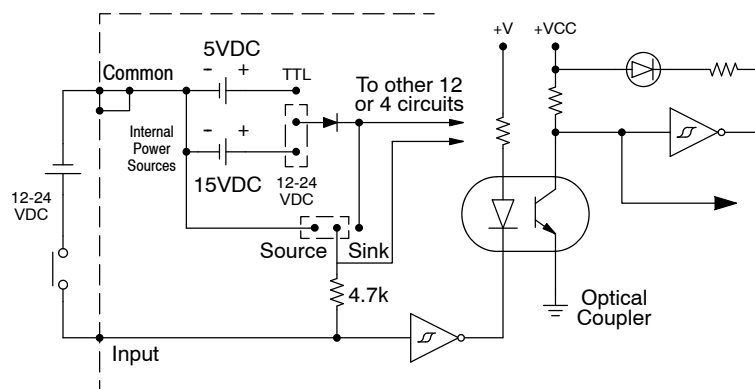


Derating Chart for F3-16ND3F





Jumper selected for 12-24VDC, sinking load configuration



Jumper selected for sourcing load configuration. An external power supply must be used in this configuration.

The DC power to sense the state of the inputs when jumpers are installed for sinking type signals is provided by the rack power supply. Sinking type inputs are turned ON by switching the input circuit to common. Source type input signals assume the ON state until the input device provides the voltage to turn the input OFF.

Selection of Operating Mode:

The mode of operation, either 5VDC or 12-24VDC sink or source, for each group of circuits is determined by the position of jumper plugs on pins located on the edge of the circuit board. There are four sets of pins (3 pins in each set), with two sets for each group of inputs. The first two sets of pins are used to configure the first 12 inputs (eg. 0 to 7 and 100 to 103) and are labeled 12 CIRCUITS. Above the first set of pins are the labels 12/24V and 5V. Above the second set of pins are the labels SINK and SRC (source). To select an operating mode for the first 12 circuits, place a jumper on the two pins nearest the appropriate labels. For example, to select 24VDC Sink input operation for the first 12 inputs, place a jumper on the two pins labeled 12/24V and on the two pins labeled SINK. The last two sets of pins are used to configure the last 4 inputs (eg. 104 to 107) and are labeled 4 CIRCUITS. The operating mode selected for the last group of 4 inputs can be different than the mode chosen for the first group of 12 inputs. Correct module operation requires each set of three pins have a jumper installed (four jumpers total).

NOTE: When a group of inputs are used with TTL logic, select the SINK operating mode for that group. "Standard" TTL can sink several milliamps but can source less than 1 mA.



D3-08NA-1, 110 VAC Input Module

Inputs per module	8	Minimum ON current	8 mA
Commons per module	2 (isolated)	Maximum OFF current	2 mA
Input voltage range	85-132VAC	Base power required	9V 10 mA Max 24V N/A
Input voltage supply	External	OFF to ON response	10-30 ms
Peak voltage	132VAC	ON to OFF response	10-60 ms
AC frequency	47-63 Hz	Terminal type	Non-removable
ON voltage level	>80 VAC	Status indicators	Field side
OFF voltage level	<20 VAC	Weight	5 oz. (140 g)
Input impedance	10 K ohm		
Input current	15 mA @ 50 Hz 18 mA @ 60 Hz		

110VAC INPUT
D3-08NA-1

0	1	4
1	2	5
2	3	6
3	4	7

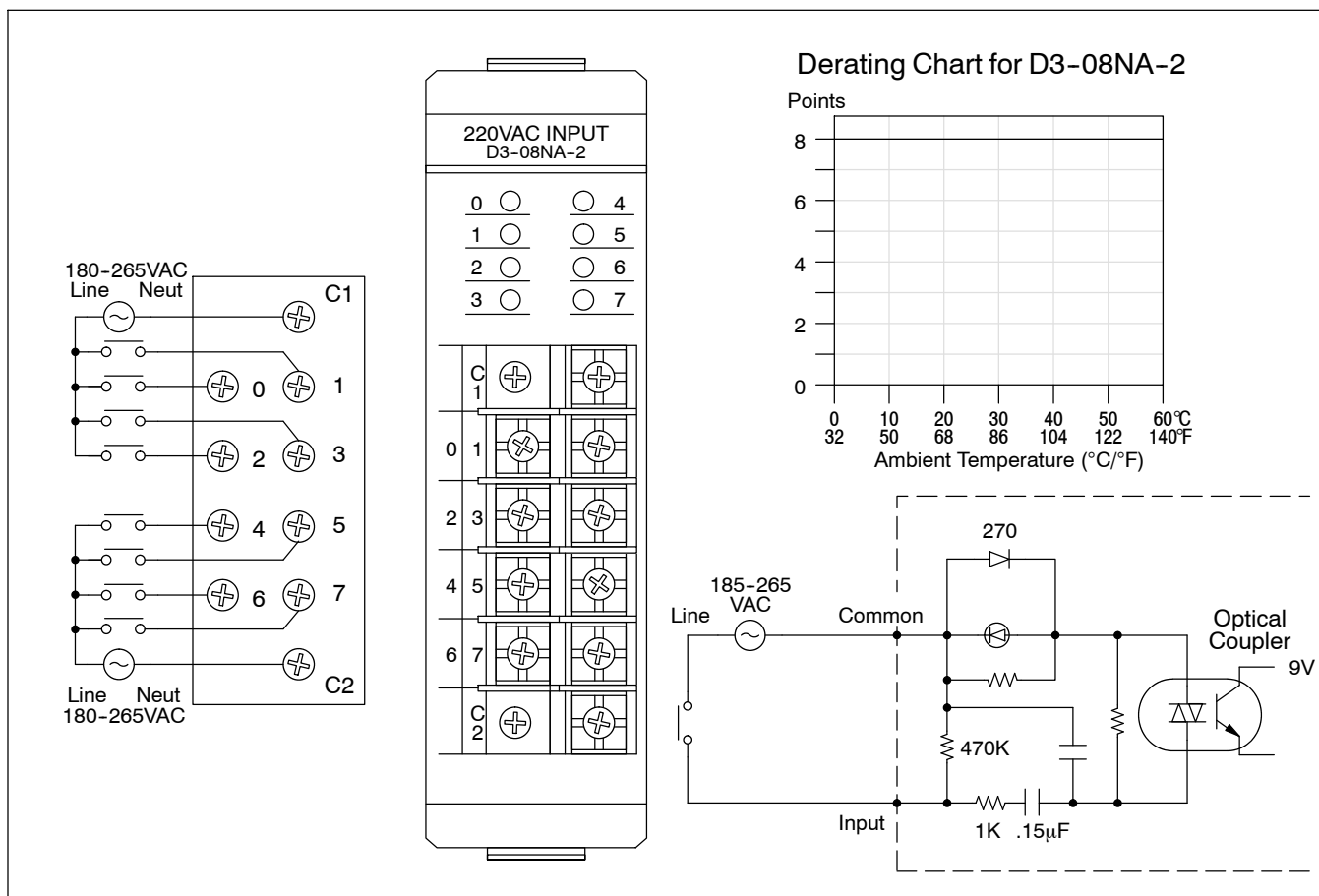
C1 C2

Derating Chart for D3-08NA-1

Ambient Temperature (°C/°F)	Points
0 / 32	8
10 / 50	8
20 / 68	8
30 / 86	8
40 / 104	8
50 / 122	8
60 / 140	6

D3-08NA-2, 220 VAC Input Module

Inputs per module	8	Minimum ON current	10 mA
Commons per module	2 (isolated)	Maximum OFF current	2 mA
Input voltage range	180-265VAC	Base power required	9V 10 mA max 24V N/A
Input voltage supply	External	OFF to ON response	5-50 ms
Peak voltage	265 VAC	ON to OFF response	5-60 ms
AC frequency	50-60Hz	Terminal type	Non-removable
ON voltage level	>180 VAC	Status indicators	Field side
OFF voltage level	< 40 VAC	Weight	5 oz. (140 g)
Input impedance	18 K ohm		
Input current	13 mA @ 50 Hz 18 mA @ 60 Hz		



D3-16NA, 110 VAC Input Module

Inputs per module	16	Minimum ON current	8 mA
Commons per module	2 (isolated)	Maximum OFF current	1.5 mA
Input voltage range	80-132VAC	Base power required*	9V 6.25 mA Max/ON pt. 100mA max
Input voltage supply	External	OFF to ON response	5-50 ms
Peak voltage	132VAC	ON to OFF response	5-60 ms
AC frequency	50-60 Hz	Terminal type	Removable
ON voltage level	>80 VAC	Status indicators	Logic side
OFF voltage level	<15 VAC	Weight	6.4 oz. (180 g)
Input impedance	8 K ohm		
Input current	16 mA @ 50 Hz 25 mA @ 60 Hz		

* 9V typical values are 4 mA/ON pt., 64 mA total

Derating Chart for D3-16NA

D3-08NE3, 24 VAC/DC Input Module

Inputs per module	8 (sink/source)	Base power required	9V 10 mA max 24V N/A
Commons per module	2 (isolated)	OFF to ON response	AC: 5-50 ms DC: 6-30 ms
Input voltage range	20-28 VAC/VDC	ON to OFF response	AC/DC: 5-60 ms
Input voltage	External	Terminal type	Non-removable
Peak voltage	28 VAC/VDC	Status indicators	Field side
AC frequency	47-63 Hz	Weight	4.2 oz. (120 g)
ON voltage level	>20 V		
OFF voltage level	<6V		
Input impedance	1.5 K ohm		
Input current	19 mA Max		
Minimum ON current	10 mA		
Maximum OFF current	2 mA		

24VAC/DC INPUT
D3-08NE3

0	1	2	3	4	5	6	7
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Derating Chart for D3-08NE3

The chart shows a constant 8 points of operation across the entire temperature range from 0°C to 60°C (32°F to 140°F).

Sinking Module Configuration

NOTE: This module can be wired in a sourcing configuration and it will be operational except there will be no module LED indication for each input.

D3-16NE3, 24 VAC/DC Input Module

Inputs per module	16 (sink/source)	Base power required	9V 2.5 mA.+4.5mA/ ON pt.(130 mA max) 24V N/A
Commons per module	2 (isolated)		
Input voltage range	14-30VAC/VDC	OFF to ON response	AC 5-30 ms DC 5-25 ms
Input voltage supplied	External	ON to OFF response	AC 5-30 ms DC 5-25 ms
Peak voltage	30 VAC/VDC	Terminal type	Removable
AC frequency	47-63 Hz	Status indicators	Logic side
ON voltage level	>14 V	Weight	6 oz. (170 g)
OFF voltage level	<3 V		
Input impedance	1.8 K ohm		
Input current	16 mA Max		
Minimum ON current	7 mA		
Maximum OFF current	2 mA		

Derating Chart for D3-16NE3

Sinking Module Configuration

D3-08SIM, Input Simulator

Inputs per module	8		
Base Power required	10mA @ 9VDC 112mA max @ 24VDC		
OFF to ON response	4-15 ms		
ON to OFF response	4-15 ms		
Terminal type	None		
Status indicators	Switch side		
Weight	3.0 oz. (85 g)		

