

ControlWave Micro Digital Input / Output Modules

The Digital Input (DI), Digital Output (DO), and Digital Input/Output (DI/O) modules provide the ControlWave Micro with the ability to monitor and control various digital input and digital output field signals. The following DI, DO, and DI/O modules are available for the ControlWave Micro:

- Isolated Mixed DI/DO module – 12 digital inputs and 4 digital outputs.
- Mixed DI/DO module – 12 digital inputs and 4 digital outputs.
- Isolated 16 DI module – 16 isolated digital inputs.
- Isolated 16 DO module – 16 isolated digital outputs.
- Isolated Vac DI module – 8 digital inputs with 0 to 240 Vac input voltage range.
- Relay Isolated Vac/Vdc DO module – 8 digital output relays with 30 Vdc, 120 Vac, or 240 Vac output voltage.

All I/O modules have surge suppression that meets ANSI/IEE C37.90-1978 and IEEE 472-1978 specifications.

Isolated Mixed DI/O Module

The Isolated Mixed DI/O module provides the ControlWave Micro with 12 DIs and 4 DOs. DIs are individually selectable for either internally or externally powered operation. Dry contact DI operations utilize the internal +21 Vdc power supply. Each DI is protected with a surge suppressor. DI filtering is 30 ms.

Each DO contains an optically isolated open-source MOSFET with surge suppressor that is capable of sourcing 500 mA at 30 Vdc. An external power source from 10 Vdc to 30 Vdc powers the MOSFETs.

The Isolated Mixed DI/O module provides status indication with one LED per I/O point. The Isolated Mixed DI/O Module is available with local terminations.

Non-Isolated Mixed DI/O Module

The Non-Isolated Mixed DI/O module provides the ControlWave Micro with 12 DIs and 4 DOs. DIs support dry contact inputs internally sourced from the 3.3 Vdc supply, and a jumper selectable input current range of either 60 μ A (for low-power applications) or 2 mA (for in-plant noise immunity). Surge suppression and signal conditioning is

provided for each DI. 15 ms input filtering protects against contact bounce. DOs have a 30 Vdc operating range and are driven by open drain FETs that provide 100 mA (max) at 30 Vdc. DO circuits consist of an open drain MOSFETs and surge suppression. Surge suppression between each signal and ground is achieved with 31 Vdc transorbs.

The Non-Isolated Mixed DI/O module provides status indication with one LED per I/O point. The module is available with local terminations, remote terminations with fuses, or remote terminations without fuses.

Isolated 16 DI Module

The Isolated 16 DI module provides the ControlWave Micro with 16 isolated DIs factory configured for 12 Vdc or 24 Vdc input range. For the 24 Vdc range, each DI is individually field-configurable for internally or externally powered operation. For the 12 Vdc range, each DI is configured for externally powered operation. The module contains field interface circuitry for DIs with a nominal input voltage of 12 Vdc or 24 Vdc, a nominal input current of 5 mA, and 30 ms input filtering.



Isolated Mixed Digital Input/Output Module

DI field circuitry is electrically isolated from the module's bus interface circuitry by surge suppressors and optocouplers. The Isolated 16 DI module configured for use in dry contact applications contains an isolated 21 Vdc power supply that is powered by the +VIN output on the power supply/sequencer module (PSSM). 31 Vdc transorbs provide surge suppression between each signal and ground.

The Isolated 16 DI module provides status indication with one LED per I/O point. The module is available with local terminations, remote terminations with fuses, and remote terminations without fuses.

Isolated 16 DO Module

The Isolated 16 DO module provides the ControlWave Micro with 16 DOs for control of signaling functions. Each output contains an optically isolated open-source MOSFET with surge suppressor that is capable of handling 500 mA at 30 Vdc. An external power source from 10 Vdc to 30 Vdc powers the MOSFETs.

DO field circuitry MOSFETs are electrically isolated from the module's bus interface circuitry by surge suppressors and optocouplers. MOV to chassis and a 31 Vdc transorbs (across output) are provided to protect each DO. The maximum operating frequency is 20 Hz.

The DO module provides status indication with one LED per I/O point. The Isolated 16 DO module is available with local terminations, remote terminations with fuses, and remote terminations without fuses, and remote terminations with 6 A relays.

Isolated Vac DI Module (0 to 240 Vac Input)

The Isolated 8 DI module (0 to 240 Vac Input) provides the ControlWave Micro with 8 isolated DIs that can interface

with 120/240 Vac field powered devices. DI field circuitry is electrically isolated from the module's bus interface by optocouplers. Individual DI circuitry provides 30 ms input filtering. The module is available with local terminations.

Relay Isolated Vac/Vdc DO Module

The Relay Isolated Vac/Vdc DO module provides the ControlWave Micro with eight isolated DOs for control of signal functions. Each output contains a pair of normally open relay contacts that are capable of handling a maximum load of 6 A at 120/240 Vac or 5 A at 30 Vdc. DO field circuitry components are electrically isolated from the module's bus interface circuitry by relays. The maximum operating frequency is 360 operations per hour (under rated load). The module is available with local terminations.

Note: The Relay Isolated Vac/Vdc DO module can be installed into any slot of a ControlWave MICRO I/O Expansion Chassis except slot 3 (I/O module slot 1).

Local or Remote Terminations

All digital I/O modules are factory configured for local terminations that consist of two 10-point terminal block assemblies. Some modules are available with remote terminations that consist of two 14-pin mass termination headers. Terminations are pluggable and accept a maximum wire size of 14 AWG (American Wire Gauge).

Remote terminations provide a convenient alternative to the standard direct connect termination. Remote terminations allow a concentration of electrical connections from one or more controllers to be located in a single area, such as the rear of a 19 inch cabinet. For more information on remote terminations, refer to *Product Data Sheet CWMICRO*.

Isolated Mixed Digital Input/Output Module

Field Wiring Terminals



Terminal Block 1	Definition
1	Digital Input 1 Positive
2	Digital Input 2 Positive
3	Digital Input 3 Positive
4	Digital Input 4 Positive
5	Digital Input 5 Positive
6	Digital Input 6 Positive
7	Digital Input 7 Positive
8	Digital Input 8 Positive
9	Digital Input 9 Positive
10	Isolated Ground

Terminal Block 2	Definition
1	Digital Input 10 Positive
2	Digital Input 11 Positive
3	Digital Input 12 Positive
4	Isolated Ground
5	Digital Output 1 Positive
6	Digital Output 2 Positive
7	Digital Output 3 Positive
8	Digital Output 4 Positive
9	DO External Power
10	Ground

Inputs

Quantity	12	
Type	Non-interrupting inputs	
Input Voltage	24 Vdc range selectable per point as internally or externally sourced dry contact 12 Vdc range externally sourced	
Input Current	5 mA nominal	
On-State Voltage	24 Vdc Range	> 19.2 V
	12 Vdc Range	> 10.8 V
Off-State Voltage	24 Vdc Range	< 2.4 V
	12 Vdc Range	< 1.2 V
Input Filtering	30 ms time constant (contact bounce)	
Loop Power	21 Vdc on-board isolated loop power supply for contacts or externally powered voltage inputs is available only on 24 Vdc range	
Isolation	1500 Vdc field to logic	
Surge Suppression	500 Vdc MOV to chassis 31 Vdc transorb between signal and isolated ground	

Outputs

Quantity	4	
Type	Solid-state open-source MOSFET	
Operating Voltage Range	10 to 31 Vdc, external power source	
Maximum Operating Frequency	20 Hz	
Current Sink Capability	500 mA at 31 Vdc	

Isolation	1500 Vdc field to logic		
Surge Suppression	500 Vdc MOV to chassis 31 Vdc transorb between signal and isolated ground		
Power			
Consumption	All Inputs ON	0.05 W	
	Additional Loading That May Apply	Powered Loop	Add 0.114 W per ON DI
		DI Loop Supply at 24 V	Add 0.432 W
	All Outputs ON:	0.04 W	
	All LEDs ON	Add 0.14 W	
Physical			
LEDs	16 status indicators, one per point		
Terminations	Local	Two 10-point terminal block assemblies	
Dimensions	152.4 mm H by 25.4 mm W by 88.9 mm L (6 in. H by 1 in. W by 3.5 in. L)		
Weight	128 g (4.5 oz)		
Wiring	Up to 14 AWG at the removable terminal block		
Environmental			
Same as the ControlWave Micro in which it is installed			
Approvals			
Same as the ControlWave Micro in which it is installed			

Non-Isolated Mixed DI/DO Module

Field Wiring Terminals



Terminal Block 1	Definition
1	Digital Input 1 Positive
2	Digital Input 2 Positive
3	Digital Input 3 Positive
4	Digital Input 4 Positive
5	Digital Input 5 Positive
6	Digital Input 6 Positive
7	Digital Input 7 Positive
8	Digital Input 8 Positive
9	Ground
10	Ground

Terminal Block 2	Definition
1	Digital Input 9 Positive
2	Digital Input 10 Positive
3	Digital Input 11 Positive
4	Digital Input 12 Positive
5	Digital Output 1 Positive
6	Digital Output 2 Positive
7	Digital Output 3 Positive
8	Digital Output 4 Positive
9	Ground
10	Ground

Inputs		
Quantity	12	
Type	Non-interrupting dry contact inputs	
Input Voltage Range	3.3 Vdc, internally sourced	
On-State Voltage	< 1.0 Vdc	
Off-State Voltage	> 2.0 Vdc	
Input Current	Selectable 66 μ A for low power applications or 2 mA for in-plant noise immunity	
Surge Suppression	31 Vdc transorb between signal and ground	
Input Filtering	15 ms time constant (contact bounce)	
Outputs		
Quantity	4	
Type	Open drain	
Current	100 mA max at 30 Vdc	
Surge Suppression	31 Vdc transorb between signal and ground	
Power		
Consumption	All Inputs ON at 66 μ A	0.0186 W
	All Inputs ON at 2 mA	0.123 W
	All LEDs ON	Add 0.144 W
Physical		
LEDs	16 status indicators, one per point	
Terminations	Local	Two 10-point terminal block assemblies
	Remote	Two 14-pin mass termination headers
Dimensions	152.4 mm H by 25.4 mm W by 88.9 mm L (6 in. H by 1 in. W by 3.5 in. L)	
Weight	128 g (4.5 oz)	
Wiring	Up to 14 AWG at the removable terminal block	
Environmental		
Same as the ControlWave Micro in which it is installed		
Approvals		
Same as the ControlWave Micro in which it is installed		

Isolated 16 Digital Inputs Module

Field Wiring Terminals



Terminal Block 1	Definition
1	Digital Input 1 Positive
2	Digital Input 2 Positive
3	Digital Input 3 Positive
4	Digital Input 4 Positive
5	Digital Input 5 Positive
6	Digital Input 6 Positive
7	Digital Input 7 Positive
8	Digital Input 8 Positive
9	Isolated Ground
10	Isolated Ground

Terminal Block 2	Definition
1	Digital Input 9 Positive
2	Digital Input 10 Positive
3	Digital Input 11 Positive
4	Digital Input 12 Positive
5	Digital Input 13 Positive
6	Digital Input 14 Positive
7	Digital Input 15 Positive
8	Digital Input 16 Positive
9	Isolated Ground
10	Isolated Ground

Inputs

Quantity	16	
Type	Non-interrupting inputs	
Input Voltage	24 Vdc selectable per point as internally sourced (24 Vdc input) for dry contacts or externally sourced inputs (12 Vdc and 24 Vdc input).	
Input Current	5 mA nominal	
On-State Voltage	24 Vdc Range	> 19.2 V
	12 Vdc Range	> 10.8 V
Off-State Voltage	24 Vdc Range	< 2.4 V
	12 Vdc Range	< 1.2 V
Input Filtering	30 ms time constant (contact bounce)	
Loop Power	21 Vdc on-board isolated loop power supply for internally sourced dry contacts (24 Vdc range) or externally powered (12Vdc and 24 Vdc range) voltage inputs.	
Isolation	1500 V field to logic	
Surge Suppression	500 Vdc MOV to chassis	
	30 Vdc transorb between signal and isolated ground	

Power

Consumption	All Inputs ON	0.081 W
	All LEDs ON	Add 0.144 W
	DI Loop Supply at 24 V	Add 0.432 W
	Powered Loop Per DI ON	Add 0.114 W

Physical	
LEDs	16 status indicators, one per point
Terminations	Local Two 10-point terminal block assemblies
	Remote Two 14-pin mass termination headers
Dimensions	152.4 mm H by 25.4 mm W by 88.9 mm L (6 in. H by 1 in. W by 3.5 in. L)
Weight	128 g (4.5 oz)
Wiring	Up to 14 AWG at the removable terminal block
Environmental	
Same as the ControlWave Micro in which it is installed	
Approvals	
Same as the ControlWave Micro in which it is installed	

Isolated 16 Digital Output Module

Field Wiring Terminals



Terminal Block 1	Definition
1	Digital Output 1 Positive
2	Digital Output 2 Positive
3	Digital Output 3 Positive
4	Digital Output 4 Positive
5	Digital Output 5 Positive
6	Digital Output 6 Positive
7	Digital Output 7 Positive
8	Digital Output 8 Positive
9	Isolated Field Voltage 1
10	Isolated Ground 1

Terminal Block 2	Definition
1	Digital Output 9 Positive
2	Digital Output 10 Positive
3	Digital Output 11 Positive
4	Digital Output 12 Positive
5	Digital Output 13 Positive
6	Digital Output 14 Positive
7	Digital Output 15 Positive
8	Digital Output 16 Positive
9	Isolated Field Voltage 2
10	Isolated Ground 2

Outputs	
Quantity	16
Type	Solid-state open-source MOSFET
Operating Voltage Range	10 to 31 Vdc
Maximum Operating Frequency	20 Hz
Current Source Capability	500 mA at 31 Vdc powered from 11 Vdc to 30 Vdc external power source (3 A max per 8-channel remote terminal block)
Isolation	1500 Vdc field to logic

Surge Suppression	500 MOV to chassis 31 Vdc transorb signal to isolated ground	
Power		
Consumption	All Outputs ON	0.152 W
	All LEDs ON	Add 0.141 W
Physical		
LEDs	16 status indicators, one per point	
Terminations	Local	Two 10-point terminal block assemblies
	Remote	Two 14-pin mass termination headers (3 A max per 8 channel terminal block)
Dimensions	152.4 mm H by 25.4 mm W by 88.9 mm L (6 in. H by 1 in. W by 3.5 in. L)	
Weight	128 g (4.5 oz)	
Wiring	Up to 14 AWG at the removable terminal block	
Environmental		
Same as the ControlWave Micro in which it is installed		
Approvals		
Same as the ControlWave Micro in which it is installed		

Isolated Vac Digital Input Module

Field Wiring Terminals



Terminal Block 1	Definition
1	AC Input 1 L1
2	AC Input 1 L2
3	AC Input 2 L1
4	AC Input 2 L2
5	No Connection
6	No Connection
7	AC Input 3 L1
8	AC Input 3 L2
9	AC Input 4 L1
10	AC Input 4 L2

Terminal Block 2	Definition
1	AC Input 5 L1
2	AC Input 5 L2
3	AC Input 6 L1
4	AC Input 6 L2
5	No Connection
6	No Connection
7	AC Input 7 L1
8	AC Input 7 L2
9	AC Input 8 L1
10	AC Input 8 L2

Inputs	
Quantity	Eight channels

Type	Non-interrupting inputs	
Input Voltage	0 to 240 Vac, externally sourced	
Input Current	12 mA nominal at 120 Vac, 60 Hz	
On-State Voltage	> 79 Vdc	
Off-State Voltage	< 20 Vdc	
Input Filtering	30 ms time constant	
Isolation	500 Vdc field to logic and channel to channel	
Power		
Consumption	All Inputs ON	0.13 W
Physical		
LEDs	8 status indicators, one per point	
Terminations	Local	Two 10-point terminal block assemblies
Dimensions	152.4 mm H by 25.4 mm W by 88.9 mm L (6 in. H by 1 in. W by 3.5 in. L)	
Weight	128 g (4.5 oz)	
Wiring	Up to 14 AWG at the removable terminal block	
Environmental		
Same as the ControlWave Micro in which it is installed		
Approvals		
Not approved for Class 1, Div. 2 hazardous locations		

Relay Isolated Vac/Vdc Digital Output Module

Field Wiring Terminals



Terminal Block 1	Definition
1	Normally Open 1 In
2	Normally Open 1 Out
3	Normally Open 2 In
4	Normally Open 2 Out
5	No Connection
6	No Connection
7	Normally Open 3 In
8	Normally Open 3 Out
9	Normally Open 4 In
10	Normally Open 4 Out

Terminal Block 2	Definition
1	Normally Open 5 In
2	Normally Open 5 Out
3	Normally Open 6 In
4	Normally Open 6 Out
5	No Connection
6	No Connection
7	Normally Open 7 In
8	Normally Open 7 Out
9	Normally Open 8 In
10	Normally Open 8 Out

Outputs		
Quantity	8	
Type	Normally-open relay	
Voltage	30 Vdc, 120 Vac, 240 Vac	
Maximum Operating Frequency	360 operations per hour under rated load	
Current Sink Capability	5 A at 30 Vdc, 6 A at 120/240 Vac	
Minimum Permissible Load	10 mA, 5 Vdc	
Contact Life Expectancy	100,000 operations with resistive load	
Isolation	1500 Vdc field to logic 500 Vdc channel-to-channel	
Power		
Consumption	All Outputs ON	0.25 W
Physical		
LEDs	8 status indicators, one per point	
Terminations	Local	Two 10-point terminal block assemblies
Dimensions	152.4 mm H by 25.4 mm W by 88.9 mm L (6 in. H by 1 in. W by 3.5 in. L)	
Weight	128 g (4.5 oz)	
Wiring	Up to 14 AWG at the removable terminal block	
Environmental		
Same as the ControlWave Micro in which it is installed		
Approvals		
Not approved for Class 1, Div. 2 hazardous locations		

Headquarters:

Emerson Process Management

Remote Automation Solutions
6005 Rogerdale Road
Houston, TX 77072 U.S.A.
T +1 281 879 2699 | F +1 281 988 4445
www.EmersonProcess.com/Remote

Europe:

Emerson Process Management

Remote Automation Solutions
Emerson House
Kirkhill Drive Kirkhill Industrial Estate
Aberdeen UK AB21 OEU
T +44 1224 215700 | F +44 1224 215799
www.EmersonProcess.com/Remote

North American/Latin America:

Emerson Process Management

Remote Automation Solutions
6005 Rogerdale Road
Houston TX USA 77072
T +1 281 879 2699 | F +1 281 988 4445
www.EmersonProcess.com/Remote

Middle East/Africa:

Emerson Process Management

Remote Automation Solutions
Emerson FZE
P.O. Box 17033
Jebel Ali Free Zone – South 2
Dubai U.A.E.
T +971 4 8118100 | F +971 4 8865465
www.EmersonProcess.com/Remote

Asia-Pacific:

Emerson Process Management

Remote Automation Solutions
1 Pandan Crescent
Singapore 128461
T +65 6777 8211 | F +65 6777 0947
www.EmersonProcess.com/Remote

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