I/O Module Guide

For the HMC2000, HMC3000 and HMC4000 Series

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For use with the following:

- HMC2000 Series
- HMC3000 Series
- HMC4000 Series
- HMC3 I/O Modules

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TECHNICAL SUPPORT

This manual is designed to provide the necessary information for trouble-free installation and operation of your I/O module(s). However, if you need assistance, please contact Maple Systems:

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Introduction

The HMC3000, HMC2000, and HMC4000 HMI + PLC Series supports the following I/O expansion modules. These modules are not compatible with the HMC7000 Series. These modules provide digital and/or analog I/O (inputs and outputs) for an electrical control system. All of the I/O Modules are CE and UL Certified.

I/O Module Part No.	Description
HMC3-M0808P0401T	8 Digital Inputs (2 high-speed pairs, up to 200kHz) 8 Digital Outputs (2 PWM, up to 200kHz) 4 Analog Inputs (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA, Thermocouple, RTD) 1 Analog Output (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA)
HMC3-M0808Y0401T V2	8 Digital Inputs (2 high speed pairs, up to 200kHz) 8 Digital Outputs (6 Relay, 2 PWM up to 200kHz) 4 Analog Inputs (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA, Thermocouple, RTD) 1 Analog Output (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA)
HMC3-M0808Y0401T	8 Digital Inputs (2 high-speed pairs, up to 200kHz) 8 Digital Outputs (6 Relay, 2 PWM up to 200kHz) 4 Analog Inputs (Voltage: 0-5V, 0-10V, Current: 0-20mA, 4-20mA, Thermocouple, RTD) 1 Analog Output (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA)
HMC3-M1212P0200 V2	12 Digital Inputs (2 high-speed pairs, up to 200kHz) 12 Digital Outputs (1 PWM, up to 1kHz) 2 Analog Inputs (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA)
HMC3-M1212P0200	12 Digital Inputs (2 high-speed pairs, up to 200kHz) 12 Digital Outputs (2 PWM, up to 1kHz) 2 Analog Inputs (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA)
HMC3-M1212Y0200 V2	12 Digital Inputs (2 high-speed pairs, up to 200kHz) 12 Digital Outputs (10 Relay, 2 PNP w/ 1 PWM up to 1kHz) 2 Analog Inputs (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA)
HMC3-M1212Y0200	12 Digital Inputs (2 high-speed pairs, up to 200kHz) 12 Digital Outputs (10 Relay, 2 PNP w/ 2 PWM, up to 1kHz) 2 Analog Inputs (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA)
HMC3-M1210P0201 V2	12 Digital Inputs (2 high-speed pairs, up to 200kHz) 10 Digital Outputs (1 PWM up to 1kHz) 2 Analog Inputs (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA) 1 Analog Output (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA)
HMC3-M1210P0201	12 Digital Inputs (2 high-speed pairs, up to 200kHz) 10 Digital Outputs (2 PWM up to 1kHz) 2 Analog Inputs (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA) 1 Analog Output (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA)
HMC3-M1210Y0201 V2	12 Digital Inputs (2 high-speed pairs, up to 200kHz) 10 Digital Outputs (8 Relay, 2 PNP w/ 1 PWM, up to 1kHz) 2 Analog Inputs (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA) 1 Analog Output (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA)
HMC3-M1210Y0201	12 Digital Inputs (2 high-speed pairs, up to 200kHz) 10 Digital Outputs (8 Relay, 2 PNP w/ 2 PWM, up to 1kHz) 2 Analog Inputs (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA) 1 Analog Output (Voltage: 0-5V, 0-10V Current: 0-20mA, 4-20mA)

HMC3-M1614Y V2	16 Digital Inputs (2 high-speed pairs, up to 200kHz) 14 Digital Outputs (12 Relay, 1 PWM, up to 1kHz))
HMC3-M1614Y	16 Digital Inputs (2 high-speed pairs, up to 200kHz) 14 Digital Outputs (12 Relay, 1 PWM, up to 1kHz)
HMC3-M1616P V2	16 Digital Inputs (2 high-speed pairs, up to 200kHz) 16 Digital Outputs (1 PWM, up to 1kHz)
HMC3-M1616P	16 Digital Inputs (2 high-speed pairs, up to 200kHz) 16 Digital Outputs (2 PWM, up to 1kHz)

I/O Expansion Module Overview

Each I/O terminal is labeled for easy identification on the modules. 'COM' is the common ground terminal. A terminal with an 'X' followed by a number is an input terminal and a terminal with a 'Y' followed by a number is an output terminal. The number refers to the position associated with each terminal on the I/O module.

When a project is created in MAPware-7000, bit/register memory addresses are assigned for each terminal on the expansion module. MAPware-7000 provides the option to allow the software to do this automatically. In this case, it will assign memory addresses according to the position and expansion slot in which the I/O module is located.

In addition, many of the I/O modules have a two-pin connector that is used to connect a voltage source (usually +24VDC). This voltage source drives the output terminals of the I/O modules.

Installing I/O Modules

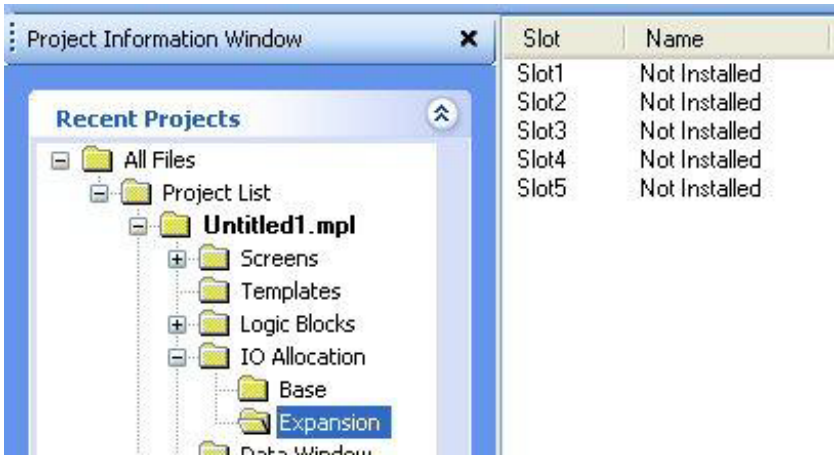
The expansion modules for the HMC3000, HMC2000 and HMC4000 base units attach onto the back of the unit via expansion slots and are secured with a Phillips screw on the top-right and bottom-left corners of the module. The 4.3" screen supports one expansion module. The 7" screen supports up to three modules, while the 10.1" unit supports up to five modules. Modules connected to the 4.3" unit are attached horizontally to the rear housing, while the 7" and 10.1" units allow for vertical mounting of the modules to the rear housing.

Configuring the I/O Modules

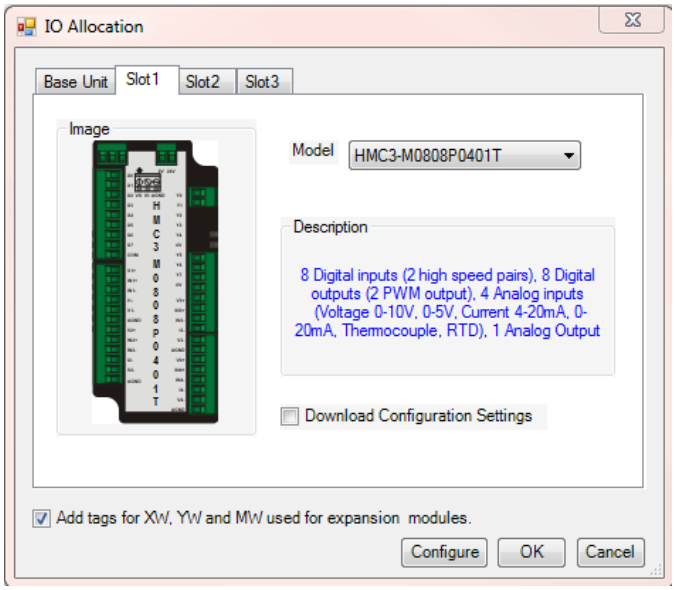
The I/O expansion modules for the HMC3000, HMC2000 and HMC4000 Series are assigned to the proper slot using MAPware-7000. Note that any project downloaded into a HMC base unit with modules that do not match the physical configuration of the unit will not run. Therefore, it is important to correctly identify the I/O modules in the MAPware-7000 project.

Regardless of the particular HMC model used, the steps to configure the I/O modules are very similar:

1. Open a new project and select the appropriate HMC3000, HMC2000 or HMC4000 model. Click **OK**.
2. In the **Project Information Window**, click the **IO Allocation** folder, then click the **Expansion** folder.



3. Double-click **Slot 1** to display the **IO Allocation** dialog:



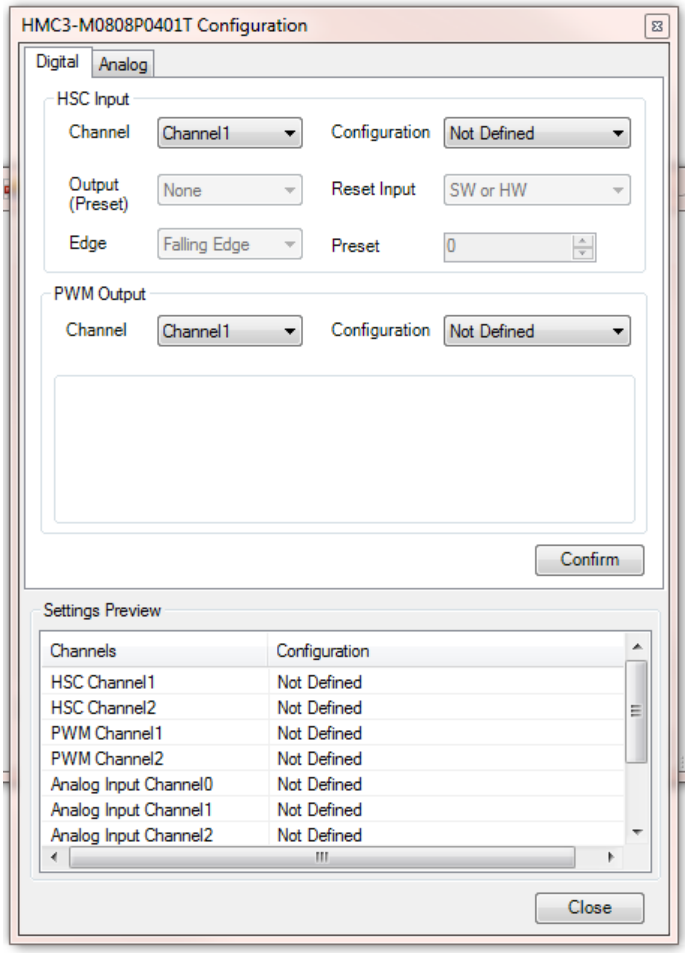
4. Select the particular I/O expansion module installed in Slot 1 of the HMC base unit from the drop-down **Model** selection menu. When the checkbox to '*Add tags for XW, YW, and MW*' option is checked, MAPware-7000 automatically assigns tags to the Tag Database for the I/O module. The tags configured are based upon the module and the slot location. Click **OK** to close the **IO Allocation** window, or click the **Configure** button to pre-configure the module's input and output channels.

5. In this example, Slot 1 is identified with an I/O module, along with a description and memory address allocation. The tags are available in the **Tag Database** as seen below. These tags can be used in the project to address the I/O, or they can be preconfigured.

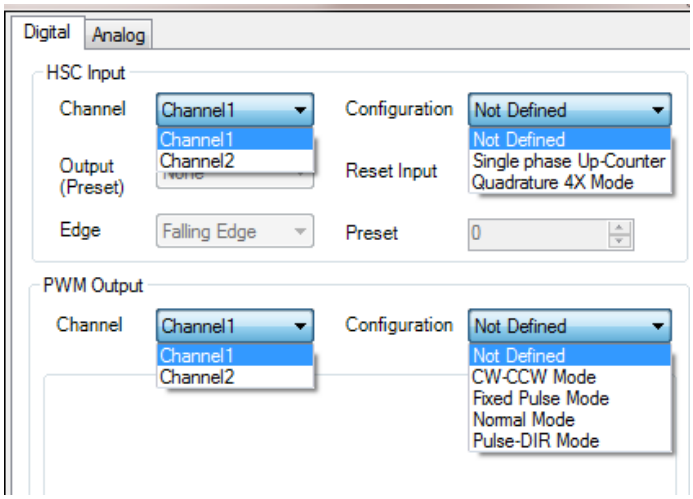
Tag No	Tag Name	Tag	Attribute	Tag Address	Po
185	Slot01-CH1_Rate_Reg	4	Read Only	XW0101	
186	Slot01-CH3_Rate_Reg	4	Read Only	XW0103	
187	Slot01-CH1_Pulses_Per_Scan_Reg	4	Read Only	XW0105	
188	Slot01-CH3_Pulses_Per_Scan_Reg	4	Read Only	XW0107	
189	Slot01-CH0_AnalogIPReg	4	Read Only	XW0111	
190	Slot01-CH1_AnalogIPReg	4	Read Only	XW0113	
191	Slot01-CH2_AnalogIPReg	4	Read Only	XW0115	
192	Slot01-CH3_AnalogIPReg	4	Read Only	XW0117	
193	Slot01-CH1_HSC_ConfigReg	2	Read Write	MW0100	
194	Slot01-CH1_HSC_Register	4	Read Write	MW0101	
195	Slot01-CH1_Preset_Register	4	Read Write	MW0103	
196	Slot01-CH3_HSC_ConfigReg	2	Read Write	MW0106	
197	Slot01-CH3_HSC_Register	4	Read Write	MW0107	
198	Slot01-CH3_Preset_Register	4	Read Write	MW0109	

6. If pre-configuring the I/O modules, simply choose the appropriate **Digital** or **Analog** tab and set the respective parameters of each input/output channel to your desired specifications. This will allow configuration of the I/O module automatically, without the need to configure the module elsewhere in the project, such as from a window or via a power-up task. The available options will depend on the

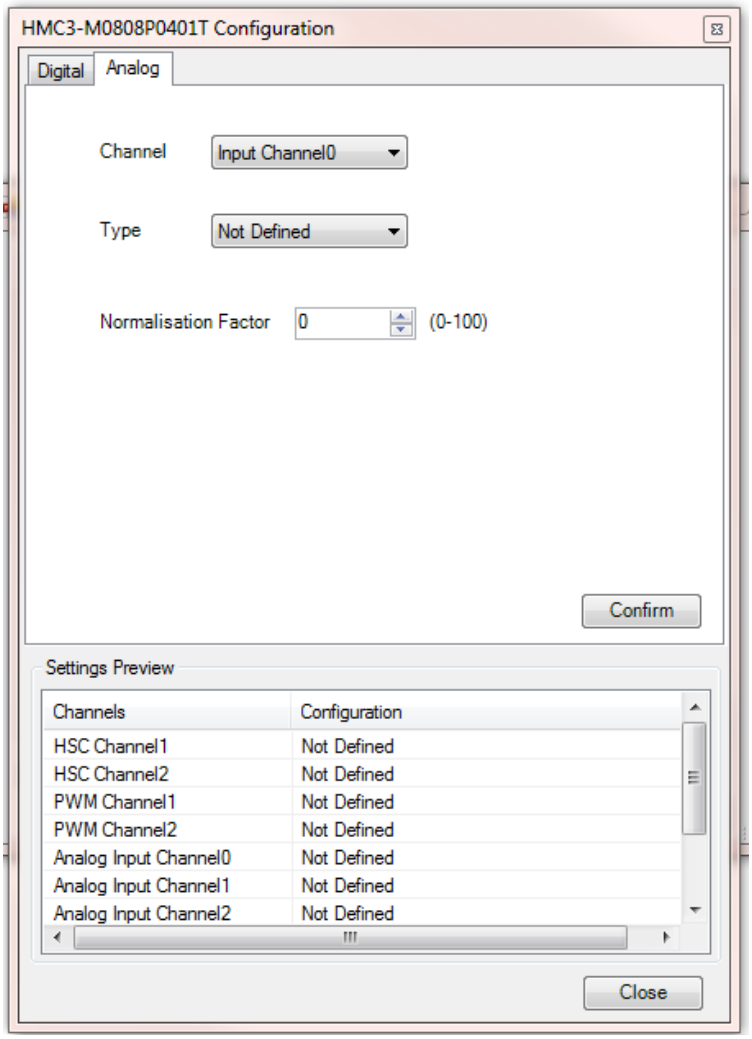
module being configured. Select the channel and desired configuration, then click the **Confirm** button to save the configuration.



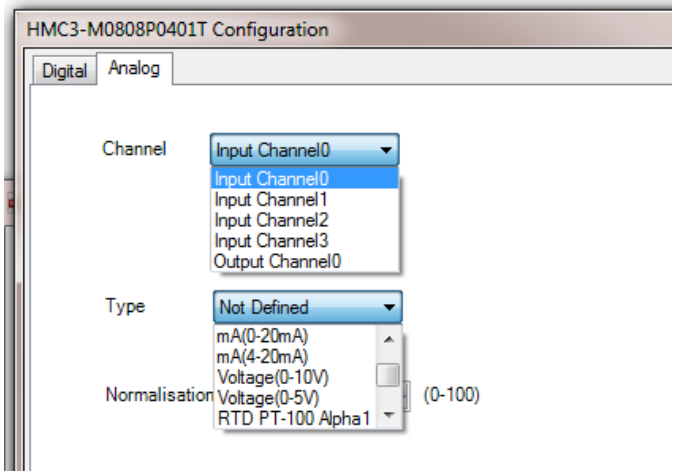
7. The image below lists the digital configuration options for this specific module:



8. For the Analog configuration of this module, the behavior is the same; choose the channel and the configuration, then click the **Confirm** button to complete the configuration.



9. Options for the Analog configuration of this specific module:



Common Terms and Definitions

This section defines some common terms used to describe various types of inputs and outputs. The terms explained below are generic descriptions. Be sure to consult the datasheet for the specific requirements when installing and wiring a module.

Digital Inputs and Outputs

Digital inputs provide physical connections and interpretations of input devices using discrete signals. The input is represented in the PLC input registers as a 1 for the on state and 0 for the off state. Each digital input terminal is associated with an internal Input Coil (X) in the tag database of the HMC. Similarly, each digital output terminal is associated with an Output Coil (Y).

Analog Inputs and Outputs

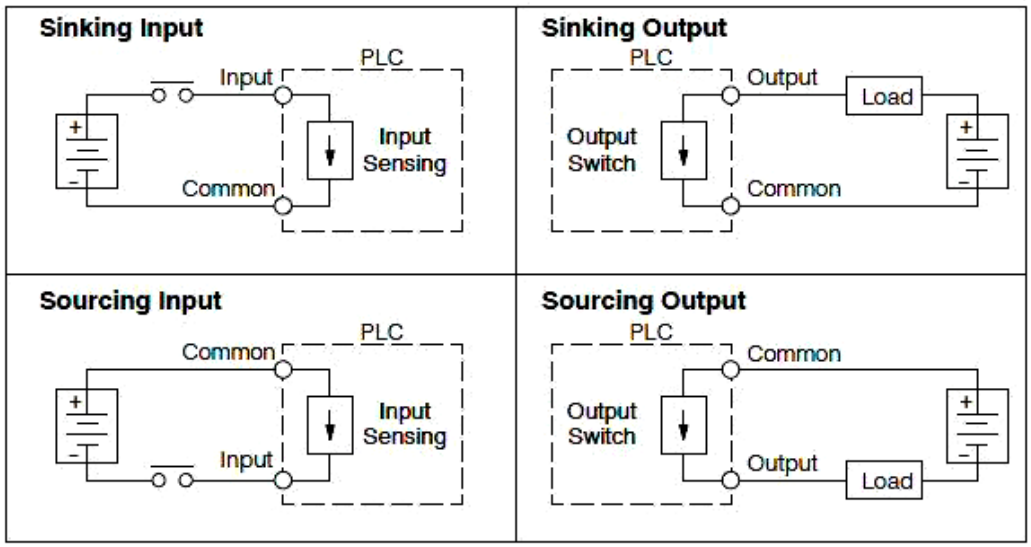
Analog inputs provide physical connections and interpretations of input devices using analog signals. The input range depends on the type of input device. Configure analog inputs to work with current or voltage sources. Each analog input terminal is associated with an internal Input Register (XW) in the tag database of the HMC3000. Similarly, each analog output terminal is associated with an Output Register (YW).

Sinking versus Sourcing

These terms refer to the type of digital inputs or outputs used. A sourcing I/O provides a voltage source, and a sinking I/O provides a ground. Any module that is not bidirectional (meaning current can go in either direction) requires that the circuit conduct current in a specific direction. In order to have current flow, each I/O terminal on the expansion module must have a return path or a signal ground connection. In most modules, multiple I/O terminals share the signal ground connection.

For a sourcing module, the current flows out of the expansion module terminal and into the common (signal ground) terminal. The term source indicates the terminal on the expansion module provides the current to the switch contact or load.

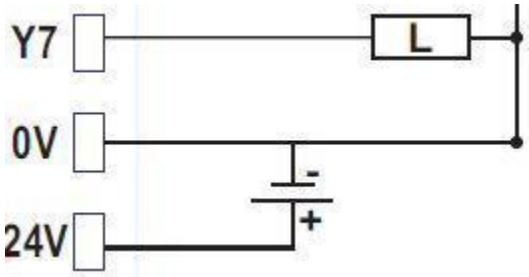
For a sinking module, the current flows into the expansion module terminal and out of the common terminal on the I/O module. The term sink indicates the terminal takes in the current from the switch contact or load.



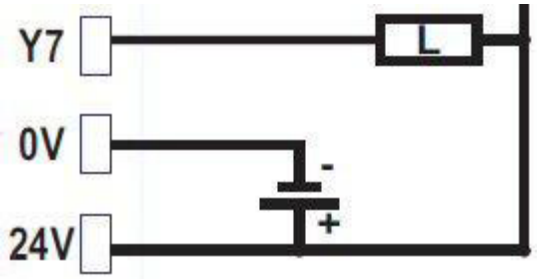
Note: Arrow indicates current flow direction

Digital Outputs (PNP or NPN type)

The output terminals of a digital I/O module use an optically isolated PNP or NPN transistor to energize the connected load. PNP/NPN outputs are faster than relay outputs but can only work with low current DC loads (typically 500mA max per terminal). PNP modules are sourcing modules, and NPN modules are sinking modules.



PNP-type connection (Source)

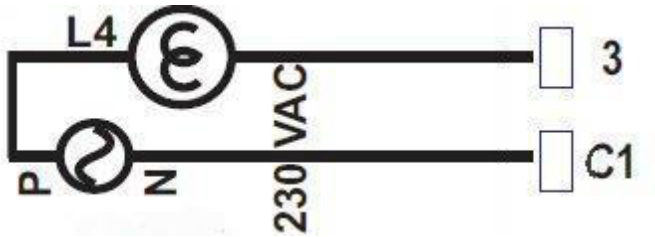


NPN-type connection (Sink)

Note: the above diagrams show that a PNP output is 'sourcing' current and the NPN output is 'sinking' current.

Digital Outputs (Relay type)

The output terminals of a relay-type digital module typically control loads that require an AC power source:



Use a Relay Output module to connect a DC load that requires more current than the maximum available when using a PNP or NPN output. For AC loads, each relay output contact can handle up to 230VAC with a 2A load per contact. For DC loads, each relay output contact can handle a 2A load per contact for up to 30VDC.

Analog Voltage

Analog voltage inputs can measure DC voltage ranges of 0-5 and 0 to 10 volts. With analog inputs, the analog module writes a data value to the assigned register (XW) based upon the measured DC voltage at the input. Analog outputs can provide 0 to 5VDC and 0 to 10 VDC with a minimum resistance of 1000 ohms depending upon the value in the assigned register (YW). Input resolution is 16-bits and Output resolution is 12-bits.

Analog Current

Analog current inputs can measure DC current ranges from 0 to 20mA and 4 to 20mA. With analog inputs, the analog module writes a data value to the assigned register (XW) based upon the measured DC current at the input. The analog outputs can provide 0 to 20mA and 4 to 20mA. Analog outputs can deliver a DC current of up to 20mA to a load with a maximum resistance of 500 ohms based upon the data value in the assigned register (YW). Input resolution is 16-bits and Output resolution is 12-bits.

Configuring High-speed Counters

Maple Systems' HMC modules have built-in High-Speed counters that link directly to specific inputs and outputs. Specific registers and bits are predefined for setup and control of these counters. No logic is required to run the counters, other than logic that may be used for configuration and control.

Two inputs on the module are used as the *Triggers* for the High-Speed counters, and two outputs are used as the *Done* bits. The inputs support a maximum speed of 200 KHz.

The following bits and registers are associated with a High-Speed counter:

Register/ Bit	Description
Configuration Register	The 16-bit register that controls how the High-Speed counter operates.
Current Count Register	The 32-bit register that counts the number of times that the Trigger has transitioned. The specified register is the Least Significant Word (LSW); the next consecutive register is the Most Significant Word (MSW).
Preset Register	The 32-bit register that defines the number of counts at which the Done bit will be set (see description of Done Bit below). The specified register is the Least Significant Word (LSW); the next consecutive register is the Most Significant Word (MSW).
Trigger Bit	The input bit that triggers the count. The counter will increment by one on each bit transition. The counter can operate on a falling (default) or rising edge.
Enable Bit	The counter will not run unless this bit is set. If this bit is reset while the counter is running, the current values will be maintained, but the Trigger bit will have no effect. The Done bit is reset if the Enable bit is reset. If the Current Count value is greater than or equal to the Preset value, the Done bit is set after the Enable bit is set again.
Reset Bit	When this bit goes from false to true, the current count will reset to 0 and the Done bit is reset. The reset occurs even when the Enable bit is reset. The reset is accomplished by an internal bit or a physical input.
Done Bit	The physical output that turns on when the Current Count is equal to or greater than the Preset value. The bit remains set until the Reset bit goes true, even if the counter counts beyond the preset. If the Enable bit is reset, the Done bit will reset. If the Enable bit is set while the Current Count is equal to or greater than the Preset, the Done bit is set.

Reference the tables below when configuring each HSC Configuration Register:

Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

HSC Configuration Register Bit table

Bits	Function
15-12	Not used
11-10	00: Reset counter if SW Reset bit or physical I/Preset bit goes from 0 to 1 01: Reset counter if the SW reset bit goes from 0 to 1 11: reserved for future use
9	Forced Output Configuration 0: Forced output ON for Preset 1 1: Forced output ON when enabled and OFF when Preset 1 reached
8	Forced Output Control 0: Forced Output Disabled 1: Forced Output Enabled
7-6	Quadrature mode 00: Reserved 01: Reserved 010: 4X Quadrature mode
4-5	HSC 00: Single Phase Up counter
3	0: Falling Edge 1: Rising Edge
2, 1, 0	Module Operating Mode 000: Normal Operation 010: Up Counter HSC 011: Quadrature

To Implement High-speed Counter Operation

1. Connect a device that will provide the high-speed pulses to one of the high-speed inputs on the expansion module.

2. Configure the HSC using the configuration register for that channel.
   Note: You can write to the configuration register value using the Power-Up logic block or in a Power-Up Task.

3. Write the HSC preset count value in that channel's Preset Register.

4. Enable the HSC by setting the HSC Enable Bit for that channel.

5. HSC increments the current value register for that channel until the preset value is reached.

6. Enable the HSC Reset Bit for that channel. This will cause the HSC current value to reset back to 0.

7. To start the process again, simply reset (clear) the HSC Reset Bit and set the HSC Enable Bit.
   Note: if the HSC Enable Bit is still ON, you must reset (clear) this bit, and then set it again.

Specific High-speed Counter Registers

The registers and I/O associated with the High-Speed Counter can be found below.

Function	Counter 1 (Channel 0)	Counter 2 (Channel 1)
Trigger Bit	X*nn*000	X*nn*002
Enable Bit	M*nn*080	M*nn*176
Reset Bit	M*nn*081	M*nn*177
Configuration Register	MW*nn*00	MW*nn*06
Current Count Register (LSW, MSW)	MW*nn*01, MW*nn*02	MW*nn*07, MW*nn*08
Preset Register (LSW, MSW)	MW*nn*03, MW*nn*04	MWn*n*09, MW*nn10*

Note: nn is the slot in which the module is installed (slot 1 is 01, slot 2 02, etc.)

For example, a module installed in Slot 3 has the following assignments:

Function	Counter 1 (Channel 0)	Counter 2 (Channel 1)
Trigger Bit	X03000	X03002
Enable Bit	M03080	M03176
Reset Bit	M03081	M03177
Configuration Register	MW0300	MW0306
Current Count Register (LSW, MSW)	MW0301, MW0302	MW0307, MW0308
Preset Register (LSW, MSW)	MW0303, MW0304	MW0309, MW0310

Configuring Pulse Width Modulation (PWM) Outputs

Maple Systems' HMC3000 I/O modules have built-in Pulse Width Modulation functionality. Specific registers and bits are predefined for setup and control of these functions. No logic is required to run the PWM, other than logic that may be used to configure and control them.

There are four modes of PWM: Normal, CW/CCW, Pulse/Direction and Fixed Pulse. Use the information below to configure the desired PWM output mode.

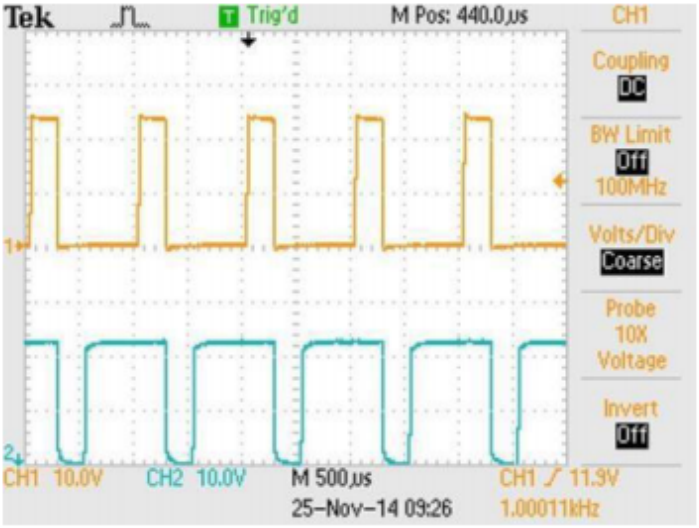
Note: For each table below, nn is the slot in which the module is installed (slot 1 is 01, slot 2 02, etc.)

Normal PWM

The frequency must be the same for channel 1 and channel 2, but the Duty Cycle is independently adjustable for each channel. Duty Cycle can be adjusted while the output is running. The valid range is 0 to 100%, but the effective range will vary depending on the device being controlled. The frequency can be adjusted while running (place a 2 in the Config register). The Channel 1 and Channel 2 outputs can be enabled and disabled independently.

Function	Register	Description

Output, PWM Pulse	Y0 (Channel 1)	Y1 (Channel 2)	Physical Output
Configuration Register	MWnn24	MWnn30	Value = 1 for this mode
Frequency Setting Register	MWnn25	MWnn31	Range = 1 to 200000
ON Duty Setting Register (Duty Cycle)	MWnn27	MWnn33	Range = 0 to 100
Pulse Enable Flag	Mnn576	Mnn577	Output enabled when ON
ON Duty Setting Error Flag	Mnn466	Mnn471	ON = error (resets automatically)
Frequency Setting Error Flag	Mnn467	Mnn472	ON = error (resets automatically)



Channel 1 Duty Cycle is 25%

Channel 2 Duty Cycle is 75%

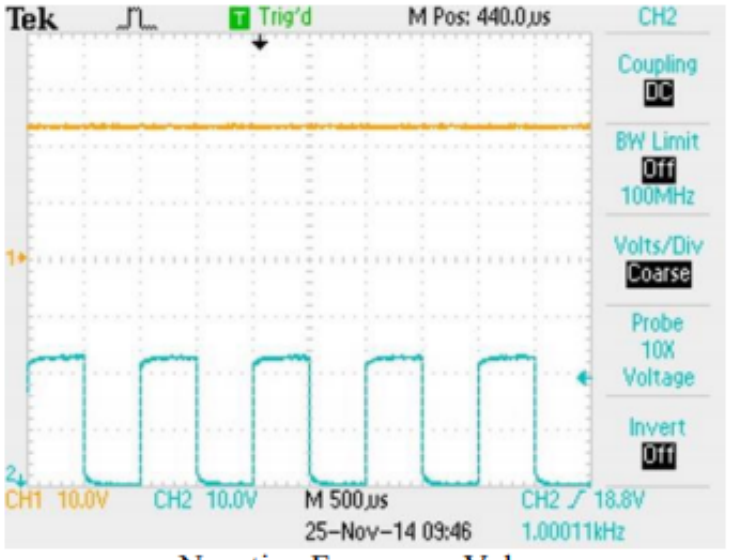
CW/CCW

When the frequency is positive, the output signal is generated on Channel 1, and Channel 2 is not used. When the frequency value is negative, the output signal is generated on Channel 2, and Channel 1 is not used. The frequency can be adjusted while running (place a 4 in the Config register instead of 3), and the Duty Cycle is fixed at 50%.

Function	Register		Description
Output, PWM Pulse	Y0 (Channel 1)	Y1 (Channel 2)	Physical Output
Configuration Register	MWnn24	MWnn30	Value = 3 for this mode
Frequency Setting Register	MWnn25	MWnn31	Range = -100000 to -1 and 1 to 100000
Pulse Enable Flag	Mnn576	Mnn577	Output enabled when ON
Frequency Setting Error Flag	Mnn467	Mnn472	ON = error (resets automatically)



Positive Frequency Value

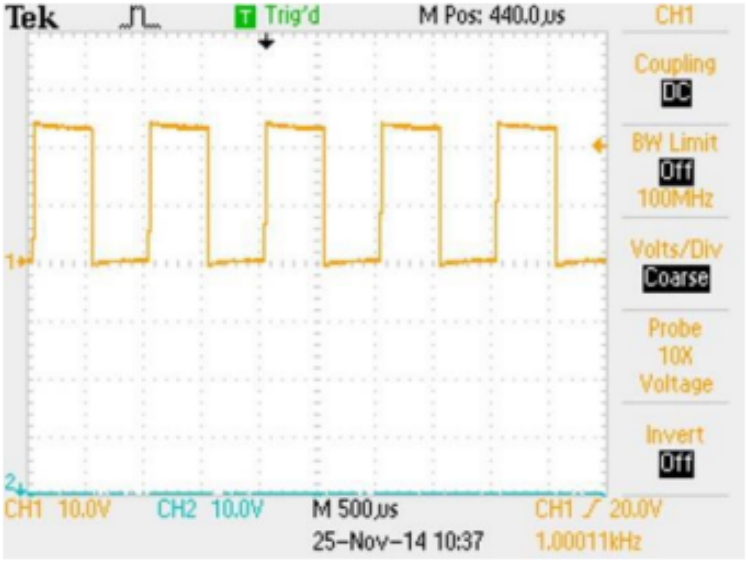


Negative Frequency Value

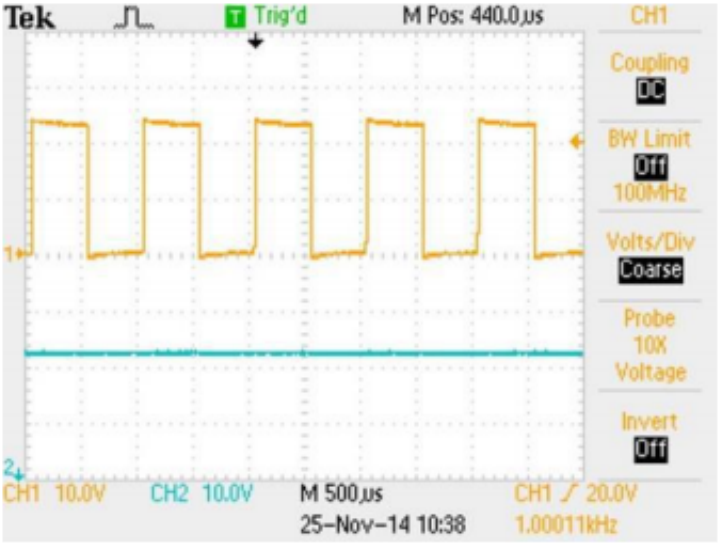
Pulse/Direction

The output signal is generated on Channel 1. If the frequency value is positive, Channel 2 is held low. If the frequency value is negative, Channel 2 is held high. The frequency can be adjusted while running (place an 8 in the configuration register), and the Duty Cycle is fixed at 50%.

Function	Register		Description
Output, PWM Pulse	Y0 (Channel 1)	Y1 (Channel 2)	Physical Output
Configuration Register	MWnn24	MWnn30	Value = 7 for this mode
Frequency Setting Register	MWnn25	MWnn31	Range = -100000 to -1 and 1 to 100000
Pulse Enable Flag	Mnn576	Mnn577	Output enabled when ON
Frequency Setting Error Flag	Mnn467	Mnn472	ON = error (resets automatically)



Positive Frequency Value

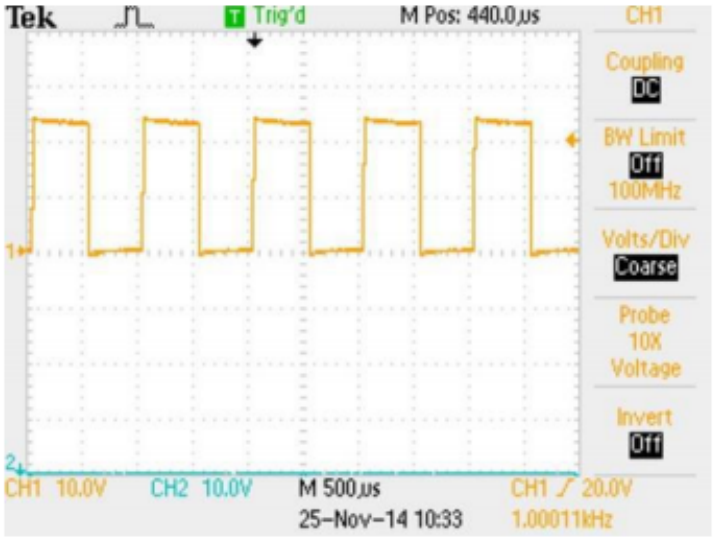


Negative Frequency Value

Fixed Pulse Mode

The output signal is generated on Channel 1. The frequency ramps up from the minimum frequency to the maximum frequency in the interval specified by acceleration time. The output signal is generated until the specified number of pulses has been sent. As the number of pulses approaches the specified count, the frequency ramps down from the maximum frequency to the minimum frequency in the interval specified by the deceleration time. When the specified number of pulses is reached, the output signal stops but remains enabled. The Duty Cycle is fixed at 50%.

Function	Register		Description
Output, PWM Pulse	Y0 (Channel 1)	Y1 (Channel 2)	Physical Output
Configuration Register	MWnn24	MWnn30	Value = 9 for this mode
Minimum Frequency Register	MWnn25	MWnn31	Range = 1 to 100000
Maximum Frequency Register	MWnn27	MWnn33	Range = 1 to 100000
Acceleration Time Register	MWnn37	MWnn38	Range: 0 to 65535
Deceleration Time Register	MWnn39	MWnn40	Range: 0 to 35536
Total Pulses Register	MWnn41	MWnn43	0 to 4294967295
Elapsed Pulses Register	MWnn45	MWnn47	0 to 4294967295
Pulse Enable Flag	Mnn576	Mnn577	Output enabled when ON
Frequency Setting Error Flag	Mnn467	Mnn472	ON = error (resets automatically)
Acceleration Time Error Flag	Mnn468	Mnn473	ON = error
Deceleration Time Error Flag	Mnn469	Mnn474	ON = error
Total Pulses Setting Error Flag	Mnn470	Mnn475	ON = error
Total Pulses Reached	Mnn784	Mnn785	ON when Total Pulses have been sent

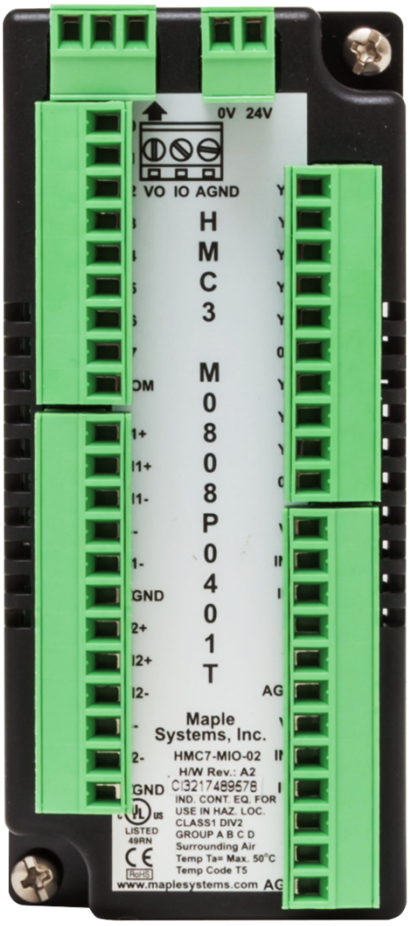


The output is on Channel 1
Channel 2 is unused

To Implement PWM Operation:

1. Configure the PWM output using the configuration register for that channel and mode.
2. Set the parameter values for the selected mode. Monitor the error flags for the parameters.
3. Enable the output by setting the Enable Output bit for that channel.

HMC3-M0808P0401T



8 Digital Inputs (2 high-speed pairs up to 200kHz)

8 Digital Outputs (2 PWM up to 200kHz)

4 Universal Analog Inputs

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**
- **Thermocouple**
- **RTD**

1 Analog Output

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**

This module is an input/output module for the HMC3000, HMC2000 and HMC4000 Series models. It has eight bidirectional inputs, two pairs of which are high-speed inputs. It also has eight digital sourcing (PNP) outputs, two of which can be configured for PWM operation.

This module also has 4 universal analog inputs (Voltage/Current/Thermocouple/RTD) as well as one analog output (Voltage/Current).

Specifications	
Power	12V and 3.3VDC from base
Certifications	CE, UL
Digital Inputs	8 bidirectional inputs (2 high-speed pairs)
Rated Input Voltage	24 VDC
Rated Input Current	Up to 5mA (per contact)
Input Impedance	3K ohms
Minimum ON voltage	15 VDC
Maximum OFF voltage	5 VDC
Turn ON Time	10 mSec
Turn OFF Time	10 mSec
Isolation	Optically isolated from internal circuit
Analog Inputs	4 Inputs, each configurable as: • 0 to 50mV, 0 to 100 mV; 0 to 10V, 0 to 5V; • 0 to 20mA, 4-20mA; • PT100 RTD, alpha1 [0.00385 Ω/Ω°C] (-200 to 850 C); • PT100 RTD, alpha2 [0.003926 Ω/Ω°C] (-100 to 457 C); • PT1000 RTD (-200 to 850 C); • Type J Thermocouple (-210 to 1200 C); • Type K Thermocouple (-200 to 1373 C)

Input Resolution	16 bit
Input Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)
Digital Outputs	8 sourcing outputs (PNP-type), 2 of which are PWM
Maximum PWM Output Frequency	200KHz
Minimum ON Output Voltage	22 VDC
Maximum ON Output Voltage	30 VDC
Minimum OFF Output Voltage	0.2 VDC
Maximum OFF Output Voltage	1 VDC
Rated Load	250mA @ 24VDC
Nominal load	96Ω 6W (resistive) @ 24VDC 6VA (inductive, UPF)
Analog Outputs	1, configurable as: • 0 to 5V, 0 to 10V; • 0 to 20mA, 4-20mA
Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)
Load	1 KΩ (Min) for V; 500Ω (Max) for mA
Output Resolution	12 bit
High-speed Channels	
No. of inputs	2 channel pairs (X0/X1 and X2/X3)
Maximum Input Frequency	200 KHz
Maximum Input Count	4,294,967,295 (32-bit)
General	
Connection method	Removable terminals (3.81 mm pitch)
Operating Temperature	0 to 55°C
Operating Humidity	10% to 90% (non-condensing)
Mechanical Dimension (W x H x D)	1.88 x 4.25 x 1.61 inches [48x108x41mm]

Configuration

Use MAPware-7000 to assign input (X and XW), output (Y and YW) and configuration (M and MW) memory addresses to the module. These addresses are created according to the slot location of the module, where **nn** refers to the slot number (ex. 01…05):

Function	Register		Access
X0-X7 Digital Inputs	Xnn000-007 (XWnn00)		Read Only
Y0-Y7 Digital Outputs	Ynn000-007 (YWnn00)		Read/Write
High-speed Counter Option	**HSC Channel 1**	**HSC Channel 2**	
HSC Input Pin	X0	X2	Read Only
Quadrature Inputs	**Pair 1**	**Pair 2**	
Counter Inputs	X0, X1	X2, X3	Read Only
HSC Configuration Register	MWnn00	MWnn06	Read/Write
HSC Counter Register (Current Value)	MWnn01	MWnn07	Read/Write
HSC Preset Register	MWnn03	MWnn09	Read/Write
HSC Enable Bit	Mnn080	Mnn176	Read/Write
HSC Reset Bit	Mnn081	Mnn177	Read/Write
Output Flag	Y2	Y3	
PWM Outputs	**Channel 1**	**Channel 2**	
Output	Y0	Y1	Read Only
PWM Configuration Register	MWnn24	MWnn30	Read/Write
Frequency Setting Register	MWnn25	MWnn31	Read/Write
ON Duty Setting Register (Duty Cycle)	MWnn27	MWnn33	Read/Write
Pulse Enable Flag	Mnn576	Mnn577	Read/Write
ON Duty Setting Error Flag	Mnn466	Mnn471	Read Only
Frequency Setting Error Flag	Mnn467	Mnn472	Read Only
Analog Inputs	**Register**		
Input Channel 0 Data	XWnn11		Read Only
Input Channel 1 Data	XWnn13		Read Only
Input Channel 2 Data	XWnn15		Read Only
Input Channel 3 Data	XWnn17		Read Only
Input Channel 0 Config Register	MWnn60		Read/Write
Input Channel 1 Config Register	MWnn61		Read/Write
Input Channel 2 Config Register	MWnn62		Read/Write
Input Channel 3 Config Register	MWnn63		Read/Write
Analog Outputs	**Register**		
Output Channel 0 Data (Voltage)	YWnn01		Read/Write
Output Channel 0 Data (Current)	YWnn02		Read/Write
Output Channel 0 Config Register	MWnn68		Read/Write

Reference the table below when configuring each HSC Configuration Register:

Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

Reference the table below when configuring the PWM Configuration Registers:

Output Mode	Register Value
Normal PWM (fixed frequency)	1
Normal PWM (variable frequency)	2
CW/CCW (fixed frequency)	3
CW/CCW (variable frequency)	4
Pulse/Direction (fixed frequency)	7
Pulse/Direction (variable frequency)	8
Trapezoidal (Fixed Pulse Mode)	9

Reference the table below when configuring each Analog Input Configuration Register (MWnn60-MWnn63):

Input Signal Type	Register Value	
Voltage, 0 to 10V	1	
Voltage, 0 to 5V	6	
Voltage, 0 to 50mV	5	
Voltage, 0 to 100mV	4	
Current, 4 to 20mA	2	
Current, 0 to 20mA	3	
RTC and Thermocouple	**For °C**	**For °F**
RTD, PT100, alpha1 [1]	7	19
RTD, PT100, alpha2 [1]	8	20
RTD, PT1000	9	21
Thermocouple, Type J [2]	14	26
Thermocouple, Type K [2]	15	27

Notes:

1. alpha1= 0.00385 Ω/Ω°C, alpha2=0.003926 Ω/Ω°C
2. 15-minute module warm-up time recommended

The values in the appropriate analog input register range from 0-65535.

Expansion Module Reg Value	Input Values					
	0 to 20mA	**4 to 20mA**	**0 to 10V**	**0 to 5V**	**0 to 100mV**	**0 to 50mV**
0	0mA	4mA	0V	0V	0mV	0mV
16384	5mA	8mA	2.5V	1.25V	25mV	12.5mV
32768	10mA	12mA	5V	2.5V	50mV	25mV
49152	15mA	16mA	7.5V	3.75V	75mV	37.5mV
65535	20mA	20mA	10V	5V	100mV	50mV

Reference the table below when configuring the Analog Output Configuration Register (MWnn68):

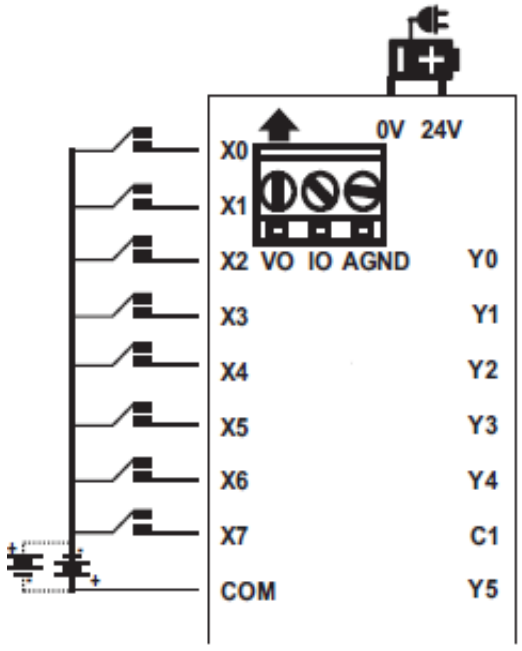
Output Signal Type	Register Value
Voltage, 0 to 10V	2
Voltage, 0 to 5V	1
Current, 4 to 20mA	5
Current, 0 to 20mA	6

Analog expansion modules have an analog output resolution of 12 bits with values ranging from 0-4095.

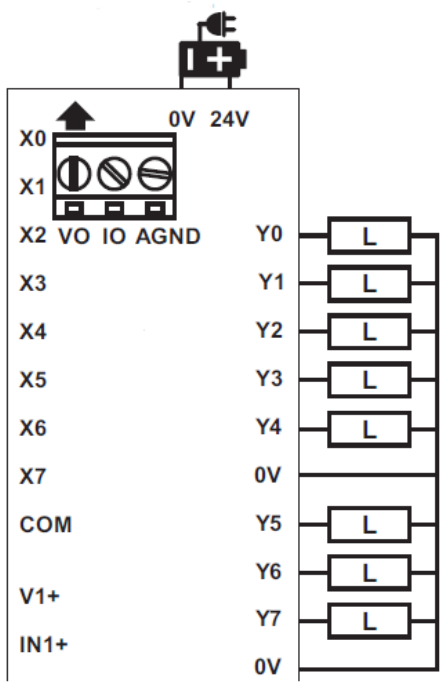
Expansion Module Reg Value	Output Values	
	0 to 10V	4 to 20mA
0	0	4mA
1024	2.5V	8mA
2048	5V	12mA
3072	7.5V	16mA
4095	10V	20mA

Wiring:

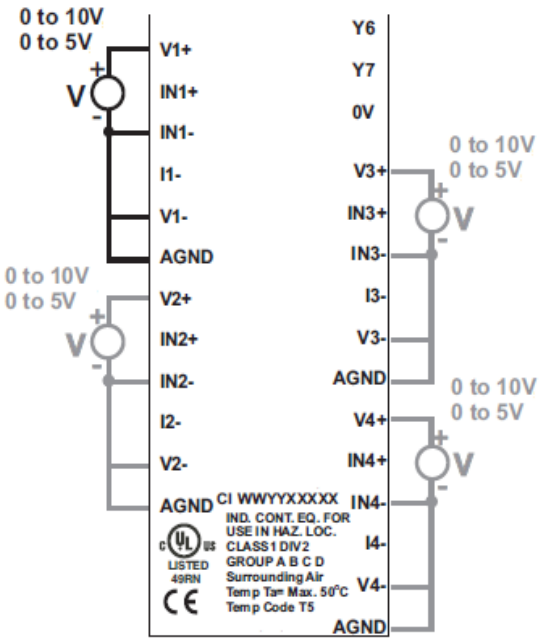
Digital Inputs



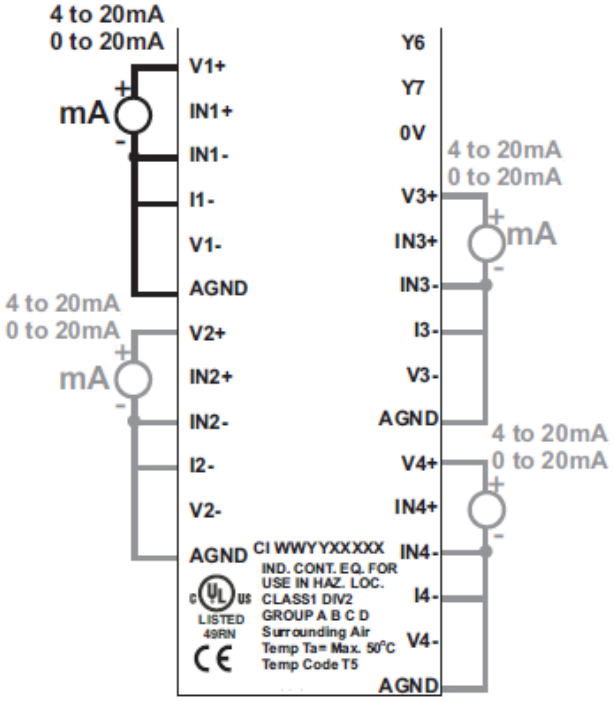
Digital Outputs



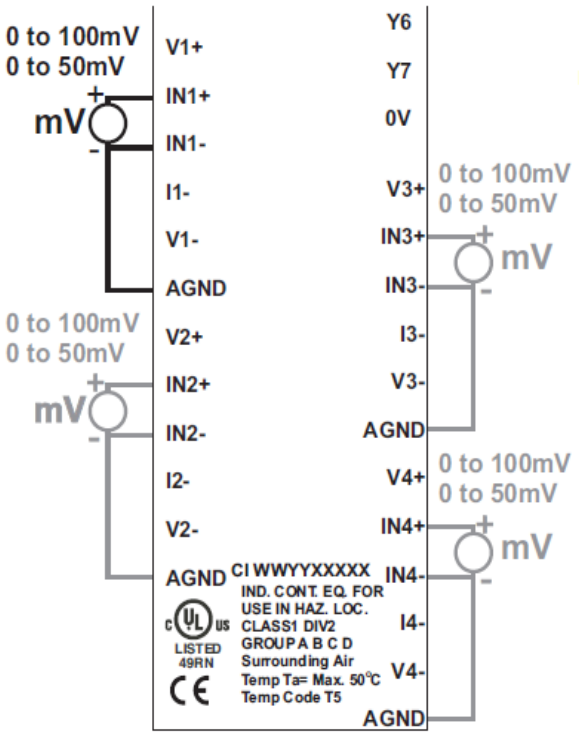
Analog Input (Voltage)



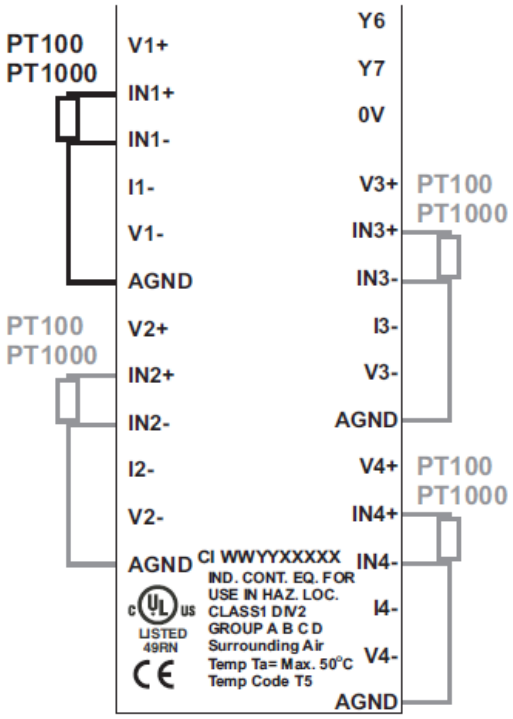
Analog Input (Current)



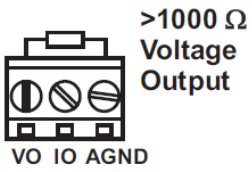
Analog Input (mV / Thermocouple)



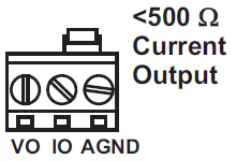
Analog Input (RTD)



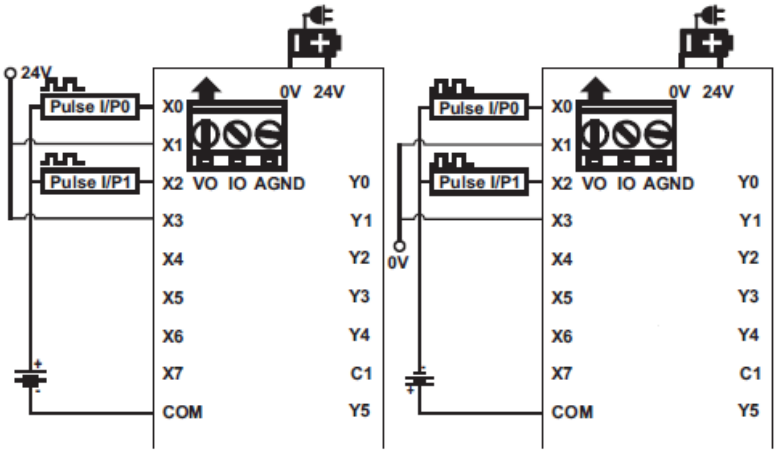
Analog Output (Voltage)



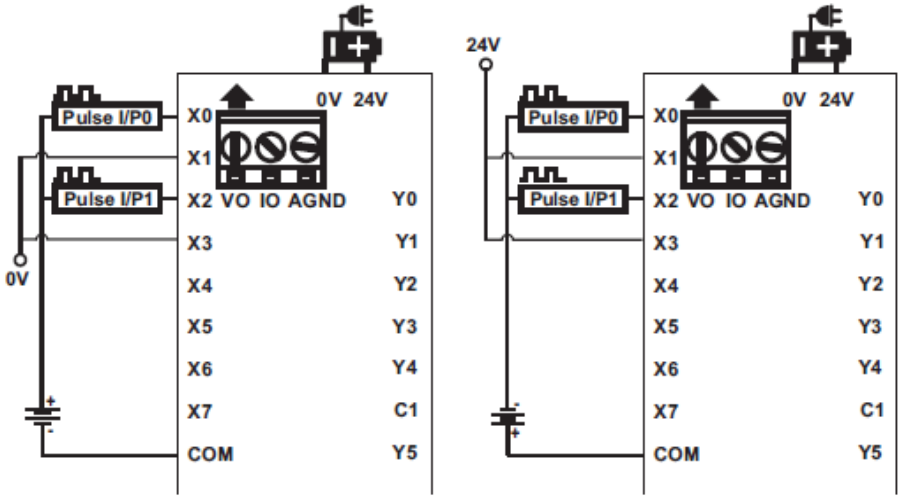
Analog Output (Current)



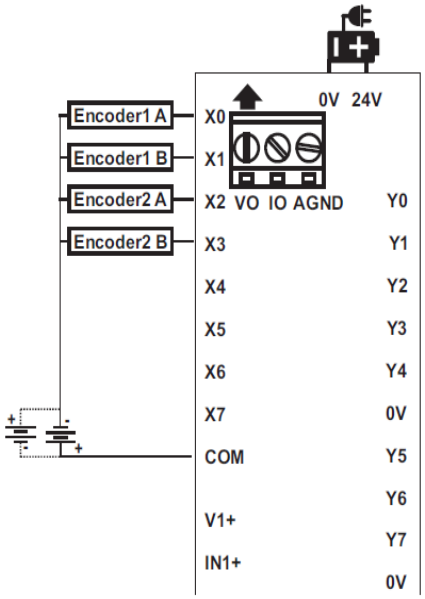
HSC Single Phase Up Counter



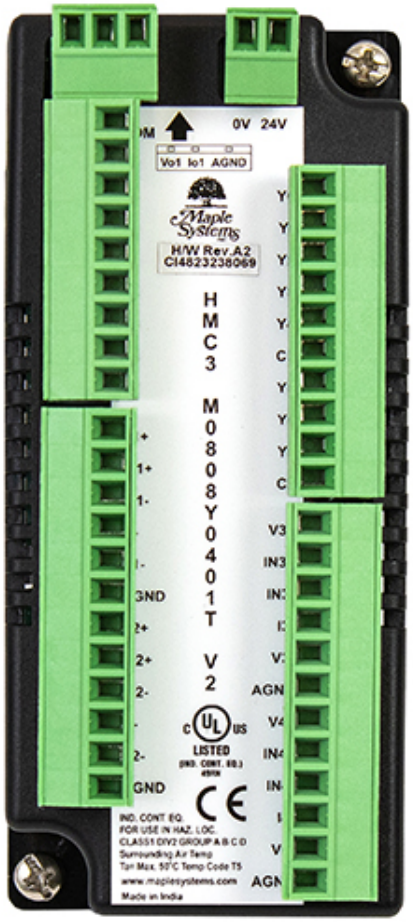
HSC Single Phase Down Counter



HSC Quadrature


Encoder1 A
Encoder1 B
Encoder2 A
Encoder2 B
0V 24V
X0
X1
X2 VO IO AGND
X3
X4
X5
X6
X7
COM
V1+
IN1+
Y0
Y1
Y2
Y3
Y4
0V
Y5
Y6
Y7
0V

HMC3-M0808Y0401T-V2



8 Digital Inputs (2 high-speed pairs up to 200kHz)

8 Digital Outputs (6 Relay, 2 PNP w/ 2 PWM up to 200kHz)

4 Universal Analog Inputs

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**
- **Thermocouple**
- **RTD**

1 Analog Output

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**

This module is an input/output module for ONLY the HMC2000 and HMC4000 Series models. It has eight bidirectional inputs, two pairs of which are high-speed inputs. It also has eight outputs, two sourcing (PNP) which can be configured for PWM operation and the other 6 are relay type.

This module also has 4 universal analog inputs (Voltage/Current/Thermocouple/RTD) as well as one analog output (Voltage/Current).

[Note: HMC3 I/O Module V2 Series are only compatible with HMC2000/ HMC4000 Series Base Model]

Specifications	
Power	12V and 3.3VDC from base
Certifications	CE, UL
Digital Inputs	8 bidirectional inputs (2 high-speed pairs)
Rated Input Voltage	24 VDC +/- 15%
Rated input current	Up to 5mA (per contact)
Input impedance	4.9K ohms
Minimum ON voltage	15 VDC
Maximum OFF voltage	5 VDC
Turn ON Time	10 mSec
Turn OFF Time	10 mSec
Isolation	Optically isolated from internal circuit

Analog Inputs	4 Inputs, each configurable as: • 0 to 50mV, 0 to 100 mV; 0 to 10V, 0 to 5V; • 0 to 20mA, 4-20mA; • PT100 RTD, alpha1 [0.00385 Ω/Ω°C] (-200 to 850 C); • PT100 RTD, alpha2 [0.003926 Ω/Ω°C] (-100 to 457 C); • PT1000 RTD (-200 to 850 C); • Type J Thermocouple (-210 to 1200 C); • Type K Thermocouple (-200 to 1373 C)
Input Resolution	16 bit
Input Impedance	3 KΩ
Input Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)
Digital Outputs	8 outputs: 6 Relay, 2 Sourcing (PNP-type) / 2 PWM
Maximum PWM Output Frequency	200KHz
Minimum ON Output Voltage	22 VDC
Maximum ON Output Voltage	30 VDC
Minimum OFF Output Voltage	0.2 VDC
Maximum OFF Output Voltage	1 VDC
Rated Load	250mA @ 24VDC 2A @230VAC
Nominal load	96Ω 6W (resistive) @ 24VDC 6VA (inductive, UPF)
Analog Outputs	1, configurable as: • 0 to 5V, 0 to 10V; • 0 to 20mA, 4-20mA
Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)
Load	1 KΩ (Min) for V; 500Ω (Max) for mA
Output Resolution	12 bit
High-speed Channels	
No. of inputs	2 channel pairs (X0/X1 and X2/X3)
Maximum Input Frequency	200 KHz
Maximum Input Count	4,294,967,295 (32-bit)
General	
Connection method	Removable terminals (3.81 mm pitch)
Operating Temperature	0 to 55°C
Operating Humidity	10% to 90% (non-condensing)
Mechanical Dimension (W x H x D)	1.88 x 4.25 x 1.61 inches [48x108x41mm]

Configuration

Use MAPware-7000 to assign input (X and XW), output (Y and YW) and configuration (M and MW) memory addresses to the module. These addresses are created according to the slot location of the module, where **nn** refers to the slot number (ex. 01…05):

Function	Register		Access
X0-X7 Digital Inputs	Xnn000-007 (XWnn00)		Read Only
Y0-Y7 Digital Outputs	Ynn000-007 (YWnn00)		Read/Write
High-speed Counter Option	**HSC Channel 1**	**HSC Channel 2**	
HSC Input Pin	X0	X2	Read Only
Quadrature Inputs	**Pair 1**	**Pair 2**	
Counter Inputs	X0, X1	X2, X3	Read Only
HSC Configuration Register	MWnn00	MWnn06	Read/Write
HSC Counter Register (Current Value)	MWnn01	MWnn07	Read/Write
HSC Preset Register	MWnn03	MWnn09	Read/Write
HSC Enable Bit	Mnn080	Mnn176	Read/Write
HSC Reset Bit	Mnn081	Mnn177	Read/Write
Output Flag	Y2	Y3	
PWM Outputs	**Channel 1**	**Channel 2**	
Output	Y0	Y1	Read Only
PWM Configuration Register	MWnn24	MWnn30	Read/Write
Frequency Setting Register	MWnn25	MWnn31	Read/Write
ON Duty Setting Register (Duty Cycle)	MWnn27	MWnn33	Read/Write
Pulse Enable Flag	Mnn576	Mnn577	Read/Write
ON Duty Setting Error Flag	Mnn466	Mnn471	Read Only
Frequency Setting Error Flag	Mnn467	Mnn472	Read Only
Analog Inputs	**Register**		
Input Channel 0 Data	XWnn11		Read Only
Input Channel 1 Data	XWnn13		Read Only
Input Channel 2 Data	XWnn15		Read Only
Input Channel 3 Data	XWnn17		Read Only
Input Channel 0 Config Register	MWnn60		Read/Write
Input Channel 1 Config Register	MWnn61		Read/Write
Input Channel 2 Config Register	MWnn62		Read/Write
Input Channel 3 Config Register	MWnn63		Read/Write
Analog Outputs	**Register**		
Output Channel 0 Data (Voltage)	YWnn01		Read/Write
Output Channel 0 Data (Current)	YWnn02		Read/Write
Output Channel 0 Config Register	MWnn68		Read/Write

Reference the table below when configuring each HSC Configuration Register:

Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

Reference the table below when configuring the PWM Configuration Registers:

Output Mode	Register Value
Normal PWM (fixed frequency)	1
Normal PWM (variable frequency)	2
CW/CCW (fixed frequency)	3
CW/CCW (variable frequency)	4
Pulse/Direction (fixed frequency)	7
Pulse/Direction (variable frequency)	8
Trapezoidal (Fixed Pulse Mode)	9

Reference the table below when configuring each Analog Input Configuration Register (MWnn60-MWnn63):

Input Signal Type	
Voltage, 0 to 10V	
Voltage, 0 to 5V	
Voltage, 0 to 50mV	
Voltage, 0 to 100mV	
Current, 4 to 20mA	
Current, 0 to 20mA	
RTC and Thermocouple	**For °C**
RTD, PT100, alpha1 [1]	7
RTD, PT100, alpha2 [1]	8
RTD, PT1000	9
Thermocouple, Type J [2]	14
Thermocouple, Type K [2]	15

Notes:

3. alpha1= 0.00385 Ω/Ω°C, alpha2=0.003926 Ω/Ω°C
4. 15-minute module warm-up time recommended

The values in the appropriate analog input register range from 0-65535.

Expansion Module Reg Value	Input Values					
	0 to 20mA	4 to 20mA	0 to 10V	0 to 5V	0 to 100mV	0 to 50mV
0	0mA	4mA	0V	0V	0mV	0mV
16384	5mA	8mA	2.5V	1.25V	25mV	12.5mV
32768	10mA	12mA	5V	2.5V	50mV	25mV
49152	15mA	16mA	7.5V	3.75V	75mV	37.5mV
65535	20mA	20mA	10V	5V	100mV	50mV

Reference the table below when configuring the Analog Output Configuration Register (MWnn68):

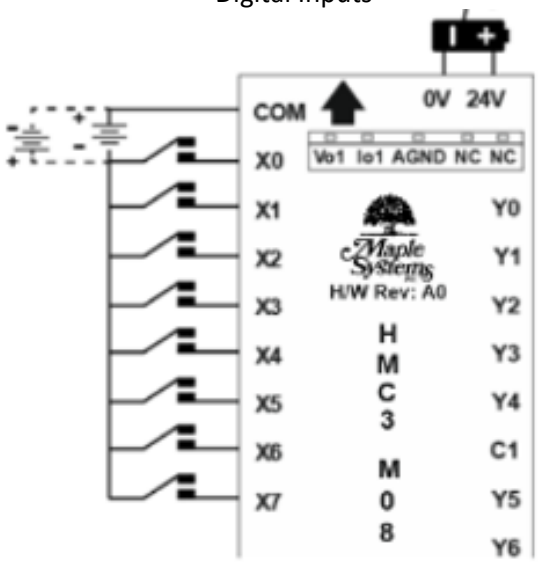
Output Signal Type	Register Value
Voltage, 0 to 10V	2
Voltage, 0 to 5V	1
Current, 4 to 20mA	5
Current, 0 to 20mA	6

Analog expansion modules have an analog output resolution of 12 bits with values ranging from 0-4095.

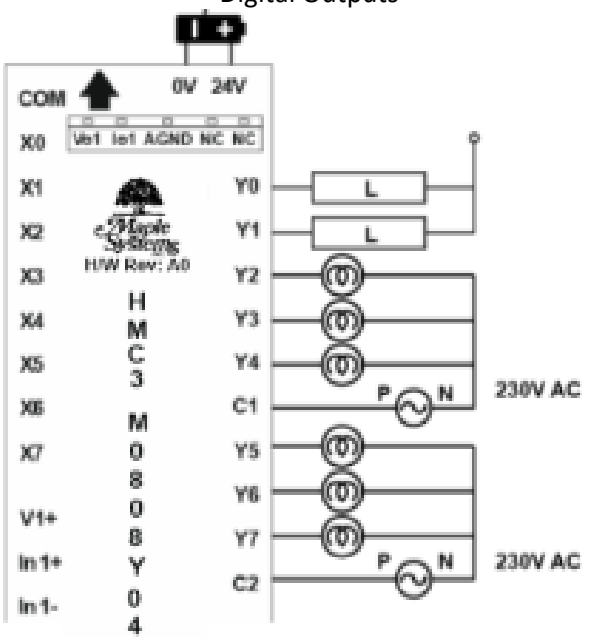
Expansion Module Reg Value	Output Values	
	0 to 10V	4 to 20mA
0	0	4mA
1024	2.5V	8mA
2048	5V	12mA
3072	7.5V	16mA
4095	10V	20mA

Wiring:

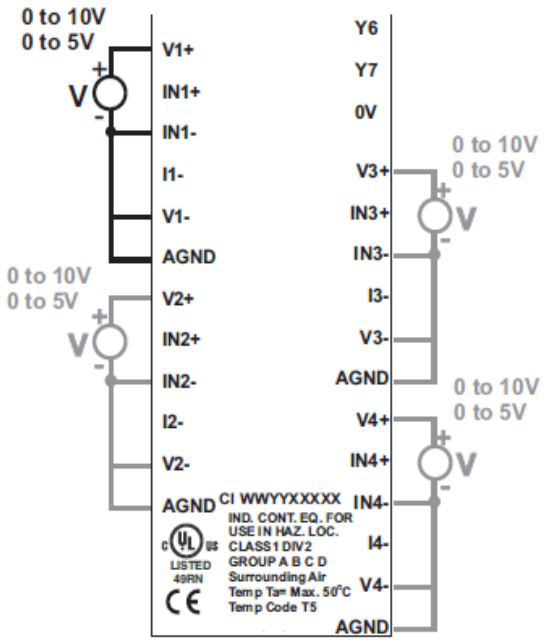
Digital Inputs



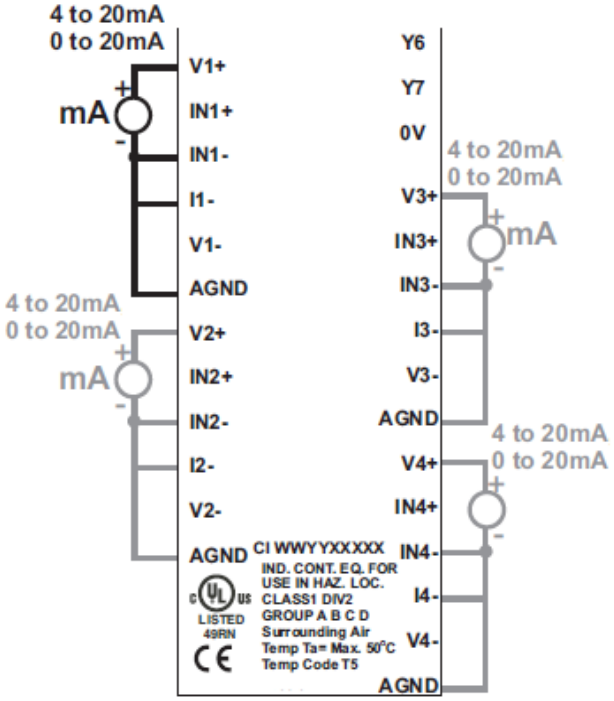
Digital Outputs



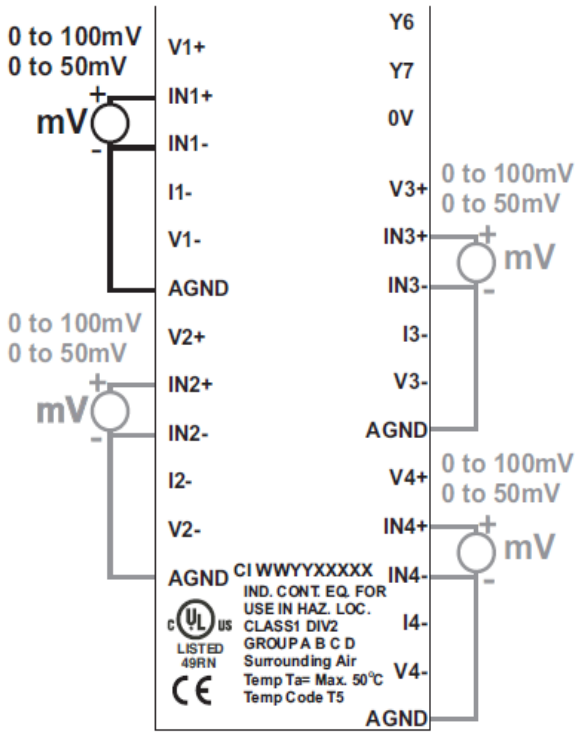
Analog Input (Voltage)



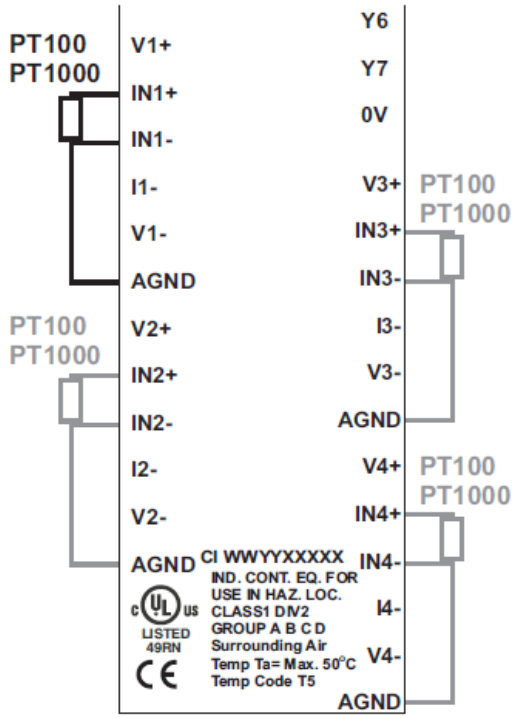
Analog Input (Current)



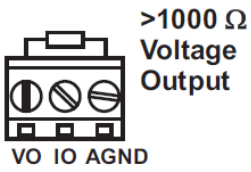
Analog Input (mV / Thermocouple)



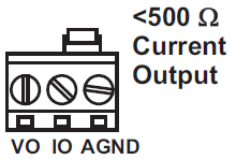
Analog Input (RTD)



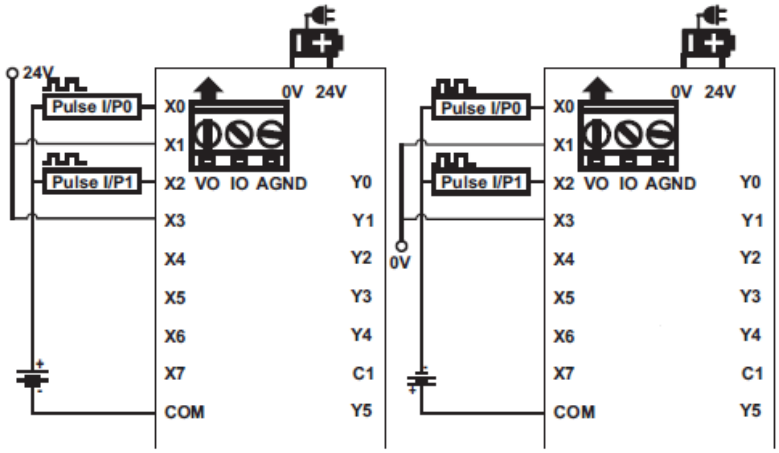
Analog Output (Voltage)



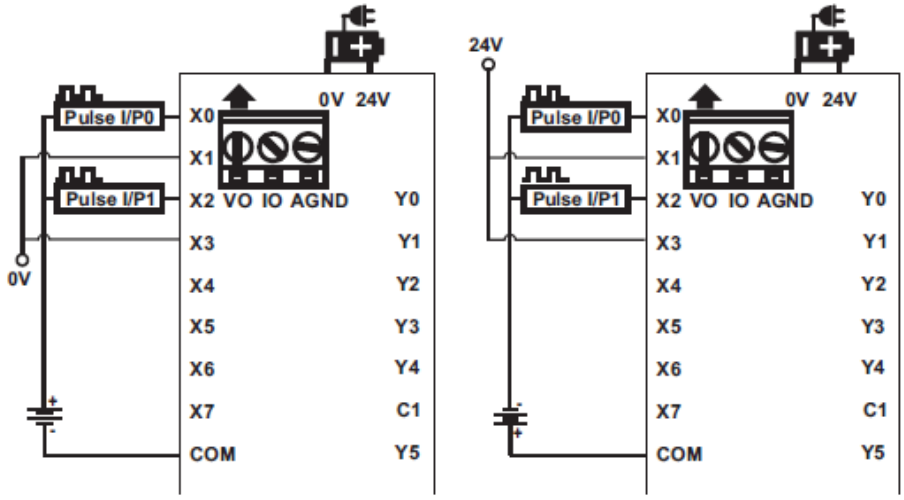
Analog Output (Current)



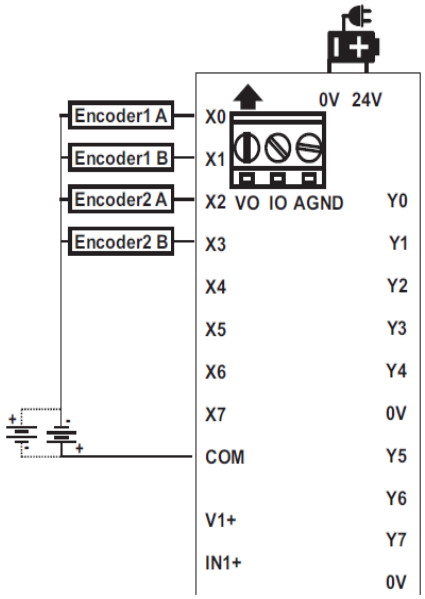
HSC Single Phase Up Counter



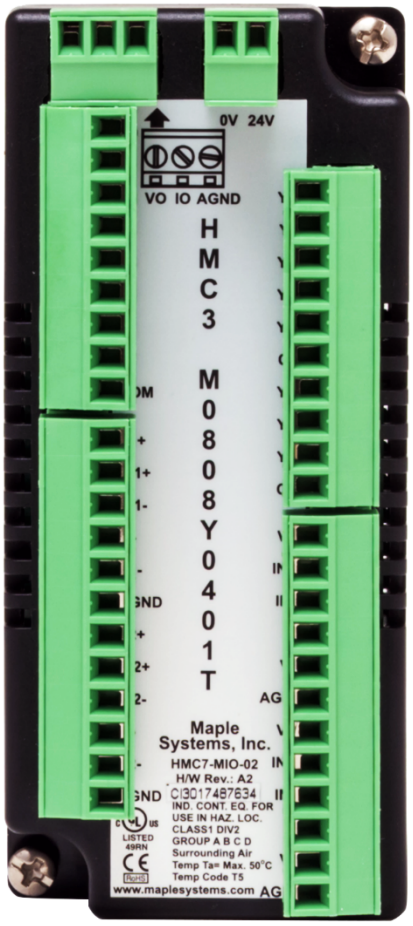
HSC Single Phase Down Counter



HSC Quadrature



HMC3-M0808Y0401T



8 Digital Inputs (2 high-speed pairs up to 200kHz)

8 Digital Outputs (6 Relay, 2 PNP w/ PWM up to 200kHz)

4 Universal Analog Inputs

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**
- **Thermocouple**
- **RTD**

1 Analog Output

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**

This module is an input/output module for the HMC3000, HMC2000 and HMC4000 Series models. It has eight bidirectional inputs, two pairs of which are high-speed inputs. It also has eight outputs, two sourcing (PNP) which can be configured for PWM operation and the other 6 are relay type.

This module also has 4 universal analog inputs (Voltage/Current/Thermocouple/RTD) as well as one analog output (Voltage/Current).

Specifications	
Power	12V and 3.3VDC from base
Certifications	CE, UL
Digital Inputs	8 bidirectional inputs (2 high-speed pairs)
Rated Input Voltage	24 VDC +/- 15%
Rated input current	Up to 5mA (per contact)
Input impedance	4.9K ohms
Minimum ON voltage	15 VDC
Maximum OFF voltage	5 VDC
Turn ON Time	10 mSec
Turn OFF Time	10 mSec
Isolation	Optically isolated from internal circuit

Analog Inputs	4 Inputs, each configurable as: • 0 to 50mV, 0 to 100 mV; 0 to 10V, 0 to 5V; • 0 to 20mA, 4-20mA; • PT100 RTD, alpha1 [0.00385 Ω/Ω°C] (-200 to 850 C); • PT100 RTD, alpha2 [0.003926 Ω/Ω°C] (-100 to 457 C); • PT1000 RTD (-200 to 850 C); • Type J Thermocouple (-210 to 1200 C); • Type K Thermocouple (-200 to 1373 C)
Input Resolution	16 bit
Input Impedance	3 KΩ
Input Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)
Digital Outputs	8 outputs: 6 Relay, 2 Sourcing (PNP-type) / PWM
Maximum PWM Output Frequency	200KHz
Minimum ON Output Voltage	22 VDC
Maximum ON Output Voltage	30 VDC
Minimum OFF Output Voltage	0.2 VDC
Maximum OFF Output Voltage	1 VDC
Rated Load	250mA @ 24VDC 2A @230VAC
Nominal load	96Ω 6W (resistive) @ 24VDC 6VA (inductive, UPF)
Analog Outputs	1, configurable as: • 0 to 5V, 0 to 10V; • 0 to 20mA, 4-20mA
Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)
Load	1 KΩ (Min) for V; 500Ω (Max) for mA
Output Resolution	12 bit
High-speed Channels	
No. of inputs	2 channel pairs (X0/X1 and X2/X3)
Maximum Input Frequency	200 KHz
Maximum Input Count	4,294,967,295 (32-bit)
General	
Connection method	Removable terminals (3.81 mm pitch)
Operating Temperature	0 to 55°C
Operating Humidity	10% to 90% (non-condensing)
Mechanical Dimension (W x H x D)	1.88 x 4.25 x 1.61 inches [48x108x41mm]

Configuration

Use MAPware-7000 to assign input (X and XW), output (Y and YW) and configuration (M and MW) memory addresses to the module. These addresses are created according to the slot location of the module, where **nn** refers to the slot number (ex. 01…05):

Function	Register		Access
X0-X7 Digital Inputs	Xnn000-007 (XWnn00)		Read Only
Y0-Y7 Digital Outputs	Ynn000-007 (YWnn00)		Read/Write
High-speed Counter Option	**HSC Channel 1**	**HSC Channel 2**	
HSC Input Pin	X0	X2	Read Only
Quadrature Inputs	**Pair 1**	**Pair 2**	
Counter Inputs	X0, X1	X2, X3	Read Only
HSC Configuration Register	MWnn00	MWnn06	Read/Write
HSC Counter Register (Current Value)	MWnn01	MWnn07	Read/Write
HSC Preset Register	MWnn03	MWnn09	Read/Write
HSC Enable Bit	Mnn080	Mnn176	Read/Write
HSC Reset Bit	Mnn081	Mnn177	Read/Write
Output Flag	Y2	Y3	
PWM Outputs	**Channel 1**	**Channel 2**	
Output	Y0	Y1	Read Only
PWM Configuration Register	MWnn24	MWnn30	Read/Write
Frequency Setting Register	MWnn25	MWnn31	Read/Write
ON Duty Setting Register (Duty Cycle)	MWnn27	MWnn33	Read/Write
Pulse Enable Flag	Mnn576	Mnn577	Read/Write
ON Duty Setting Error Flag	Mnn466	Mnn471	Read Only
Frequency Setting Error Flag	Mnn467	Mnn472	Read Only
Analog Inputs	**Register**		
Input Channel 0 Data	XWnn11		Read Only
Input Channel 1 Data	XWnn13		Read Only
Input Channel 2 Data	XWnn15		Read Only
Input Channel 3 Data	XWnn17		Read Only
Input Channel 0 Config Register	MWnn60		Read/Write
Input Channel 1 Config Register	MWnn61		Read/Write
Input Channel 2 Config Register	MWnn62		Read/Write
Input Channel 3 Config Register	MWnn63		Read/Write
Analog Outputs	**Register**		
Output Channel 0 Data (Voltage)	YWnn01		Read/Write
Output Channel 0 Data (Current)	YWnn02		Read/Write
Output Channel 0 Config Register	MWnn68		Read/Write

Reference the table below when configuring each HSC Configuration Register:

Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

Reference the table below when configuring the PWM Configuration Registers:

Output Mode	Register Value
Normal PWM (fixed frequency)	1
Normal PWM (variable frequency)	2
CW/CCW (fixed frequency)	3
CW/CCW (variable frequency)	4
Pulse/Direction (fixed frequency)	7
Pulse/Direction (variable frequency)	8
Trapezoidal (Fixed Pulse Mode)	9

Reference the table below when configuring each Analog Input Configuration Register (MWnn60-MWnn63):

Input Signal Type	Register Value	
Voltage, 0 to 10V	1	
Voltage, 0 to 5V	6	
Voltage, 0 to 50mV	5	
Voltage, 0 to 100mV	4	
Current, 4 to 20mA	2	
Current, 0 to 20mA	3	
RTC and Thermocouple	**For °C**	**For °F**
RTD, PT100, alpha1 [1]	7	19
RTD, PT100, alpha2 [1]	8	20
RTD, PT1000	9	21
Thermocouple, Type J [2]	14	26
Thermocouple, Type K [2]	15	27

Notes:

5. alpha1= 0.00385 Ω/Ω°C, alpha2=0.003926 Ω/Ω°C
6. 15-minute module warm-up time recommended

The values in the appropriate analog input register range from 0-65535.

Expansion Module Reg Value	Input Values					
	0 to 20mA	**4 to 20mA**	**0 to 10V**	**0 to 5V**	**0 to 100mV**	**0 to 50mV**
0	0mA	4mA	0V	0V	0mV	0mV
16384	5mA	8mA	2.5V	1.25V	25mV	12.5mV
32768	10mA	12mA	5V	2.5V	50mV	25mV
49152	15mA	16mA	7.5V	3.75V	75mV	37.5mV
65535	20mA	20mA	10V	5V	100mV	50mV

Reference the table below when configuring the Analog Output Configuration Register (MWnn68):

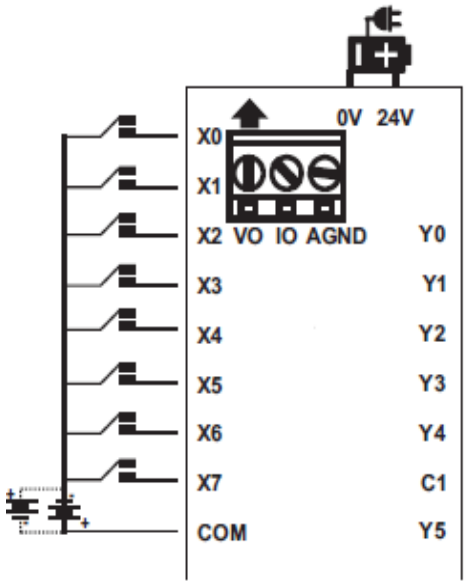
Output Signal Type	Register Value
Voltage, 0 to 10V	2
Voltage, 0 to 5V	1
Current, 4 to 20mA	5
Current, 0 to 20mA	6

Analog expansion modules have an analog output resolution of 12 bits with values ranging from 0-4095.

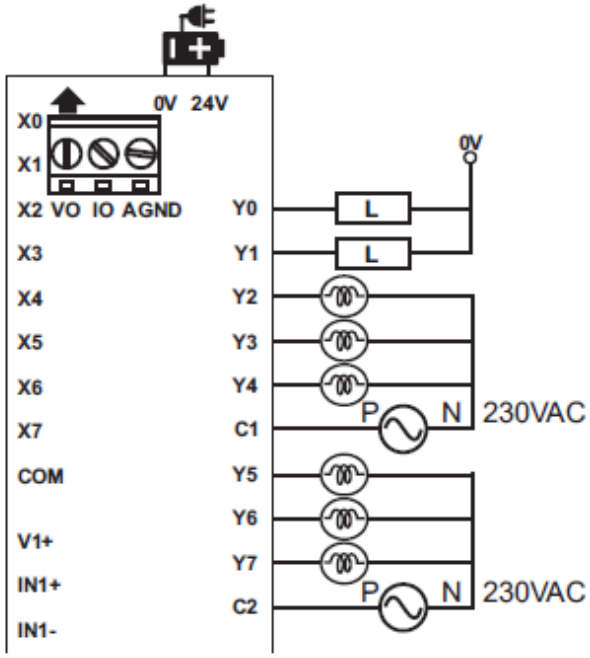
Expansion Module Reg Value	Output Values	
	0 to 10V	4 to 20mA
0	0	4mA
1024	2.5V	8mA
2048	5V	12mA
3072	7.5V	16mA
4095	10V	20mA

Wiring:

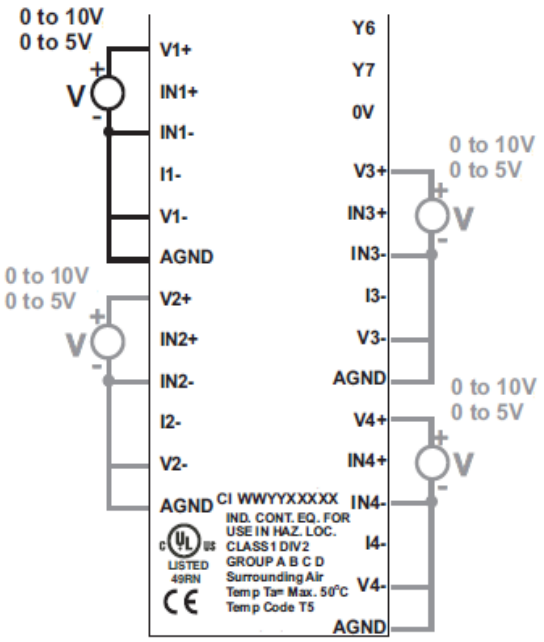
Digital Inputs



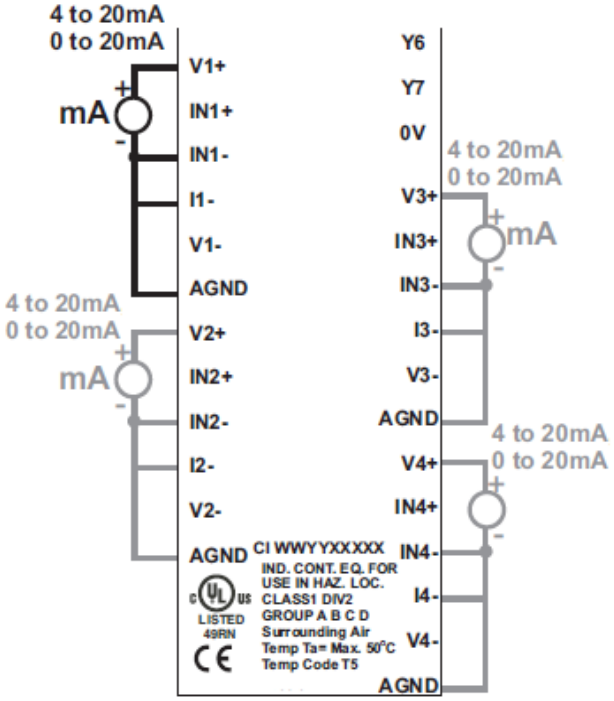
Digital Outputs



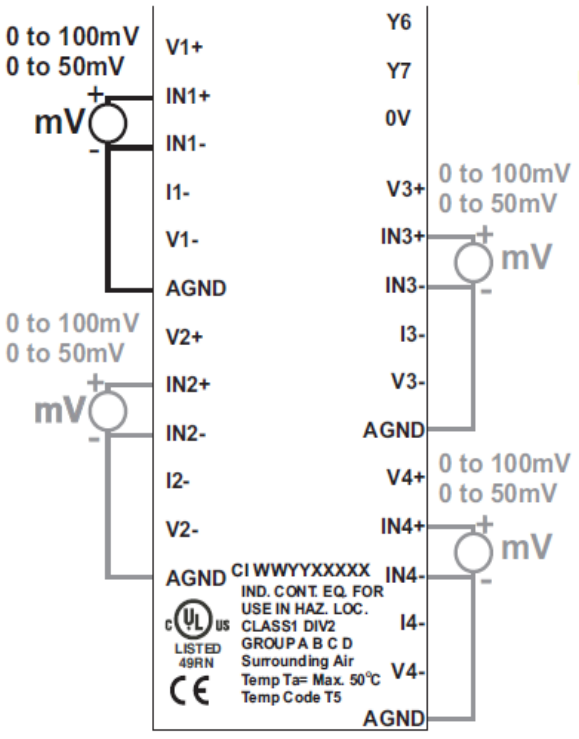
Analog Input (Voltage)



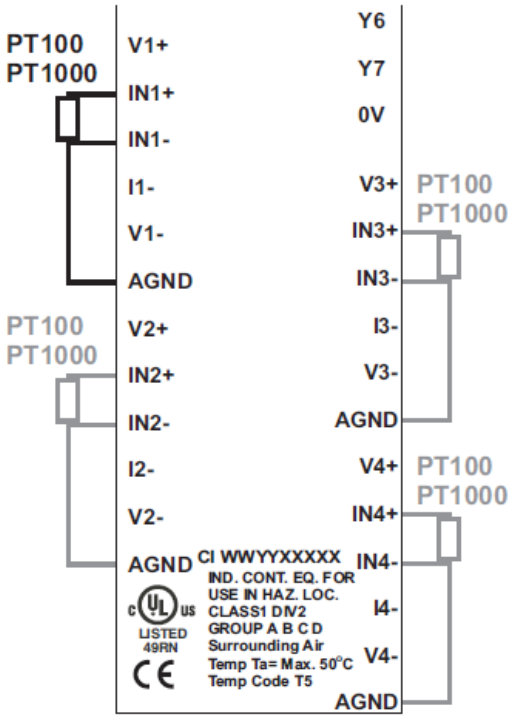
Analog Input (Current)



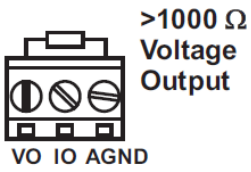
Analog Input (mV / Thermocouple)



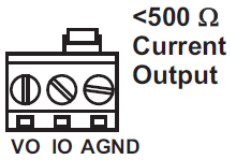
Analog Input (RTD)



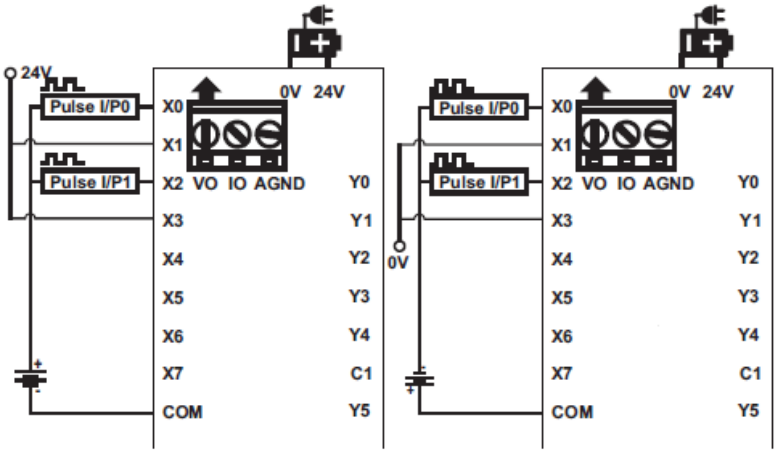
Analog Output (Voltage)



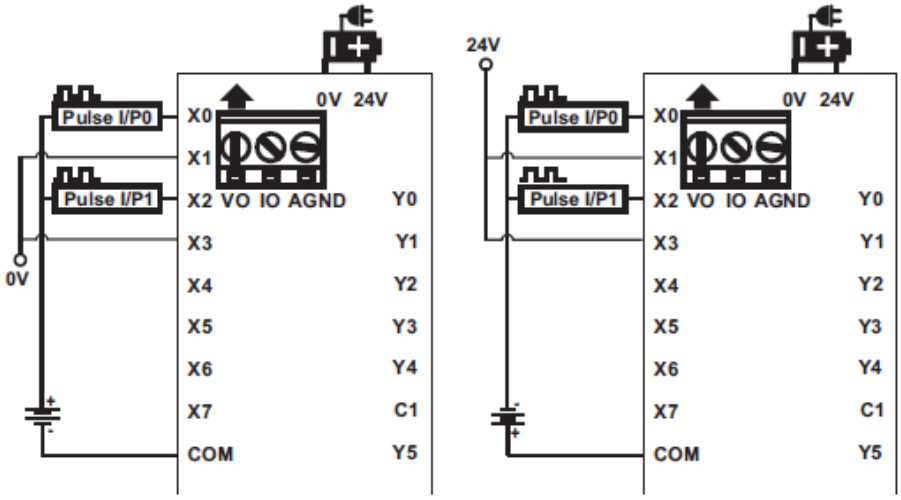
Analog Output (Current)



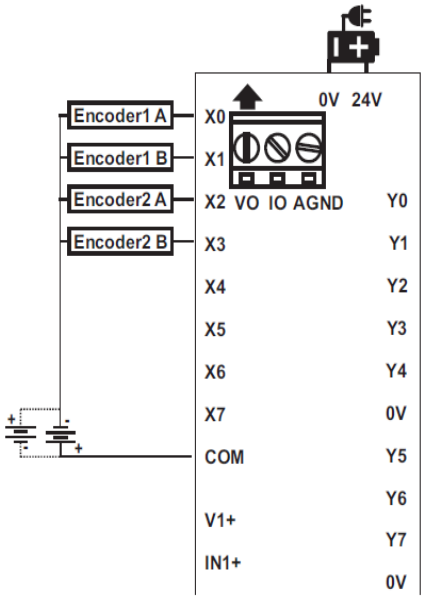
HSC Single Phase Up Counter



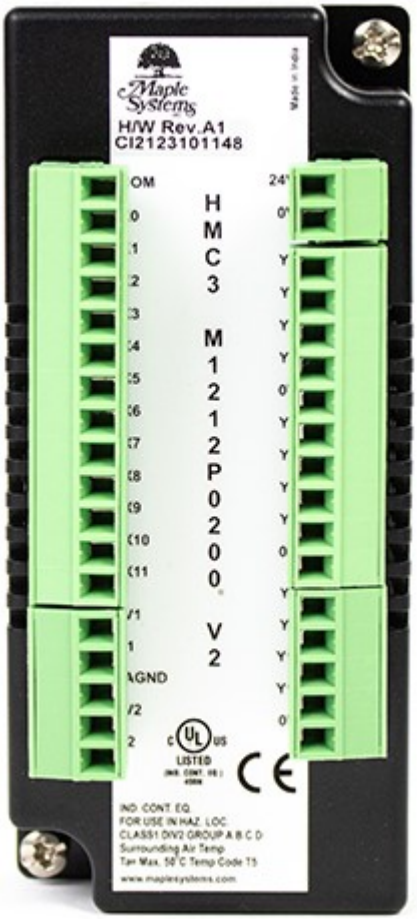
HSC Single Phase Down Counter



HSC Quadrature



HMC3-M1212P0200 V2



12 Digital Inputs (2 high-speed pairs up to 200kHz)

12 Digital Outputs (1 PWM up to 1kHz)

2 Analog Inputs

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**

This module is an input/output module for the HMC2000 and HMC4000 Series models. It has twelve digital inputs, two of which are high-speed pairs and 12 sourcing digital outputs. One of those digital outputs are configurable as PWM.

This module also has two analog inputs, each measuring Voltage or Current.

[Note: HMC3 I/O Module V2 Series are only compatible with HMC2000/ HMC4000 Series Base Model]

Specifications	
Power	12 VDC from base
Certifications	CE, UL
Digital Inputs	12 bidirectional inputs (2 high-speed pairs)
Rated Input Voltage	24 VDC +/- 15%
Rated input current	Up to 5mA (per contact)
Input impedance	4.9K ohms
Minimum ON voltage	15 VDC
Maximum OFF voltage	5 VDC
Turn ON Time	10 mSec
Turn OFF Time	10 mSec
Isolation	Optically isolated from internal circuit
Analog Inputs	2 Inputs, each configurable as: • 0 to 10V, 0 to 5V; • 0 to 20mA, 4-20mA
Input Resolution	16 bit
Input Impedance	3 KΩ
Input Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)

Digital Outputs	12 sourcing outputs (PNP-type), 1 PWM
Maximum PWM Output Frequency	1KHz
Minimum ON Output Voltage	22 VDC
Maximum ON Output Voltage	30 VDC
Minimum OFF Output Voltage	0.2 VDC
Maximum OFF Output Voltage	1 VDC
Rated Load	250mA @ 24VDC
Nominal load	96Ω 6W (resistive) @ 24VDC 6VA (inductive, UPF)
High-speed Channels	
No. of inputs	2 channel pairs (X0/X1 and X2/X3)
Maximum Input Frequency	200 KHz
Maximum Input Count	4,294,967,295 (32-bit)
General	
Connection method	Removable terminals (3.81 mm pitch)
Operating Temperature	0 to 55°C
Operating Humidity	10% to 90% (non-condensing)
Mechanical Dimension (W x H x D)	1.88 x 4.25 x 1.61 inches [48x108x41mm]

Configuration

Use MAPware-7000 to assign input (X and XW), output (Y and YW) and configuration (M and MW) memory addresses to the module. These addresses are created according to the slot location of the module, where **nn** refers to the slot number (ex. 01…05):

Function	Register		Access
X0-X11 Digital Inputs	Xnn000-011 (XWnn00)		Read Only
Y0-Y11 Digital Outputs	Ynn000-011 (YWnn00)		Read/Write
High-speed Counter Option	**HSC Channel 1**	**HSC Channel 2**	
HSC Input Pin	X0	X2	Read Only
Quadrature Inputs	**Pair 1**	**Pair 2**	
Counter Inputs	X0, X1	X2, X3	Read Only
HSC Configuration Register	MWnn00	MWnn06	Read/Write
HSC Counter Register (Current Value)	MWnn01	MWnn07	Read/Write
HSC Preset Register	MWnn03	MWnn09	Read/Write
HSC Enable Bit	Mnn080	Mnn176	Read/Write
HSC Reset Bit	Mnn081	Mnn177	Read/Write
Output Flag	Y2	Y3	
PWM Outputs	**Channel 1**		
Output	Y0		Read Only
PWM Configuration Register	MWnn24		Read/Write
Frequency Setting Register	MWnn25		Read/Write
ON Duty Setting Register (Duty Cycle)	MWnn27		Read/Write
Pulse Enable Flag	Mnn576		Read/Write
ON Duty Setting Error Flag	Mnn466		Read Only
Frequency Setting Error Flag	Mnn467		Read Only
Analog Inputs	**Register**		
Input Channel 0 Data	XWnn11		Read Only
Input Channel 1 Data	XWnn13		Read Only
Input Channel 0 Config Register	MWnn60		Read/Write
Input Channel 1 Config Register	MWnn61		Read/Write

Reference the table below when configuring each HSC Configuration Register:

Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

Reference the table below when configuring the PWM Configuration Registers:

Output Mode	Register Value
Normal PWM (fixed frequency)	1
Normal PWM (variable frequency)	2
CW/CCW (fixed frequency)	3
CW/CCW (variable frequency)	4
Pulse/Direction (fixed frequency)	7
Pulse/Direction (variable frequency)	8
Trapezoidal (Fixed Pulse Mode)	9

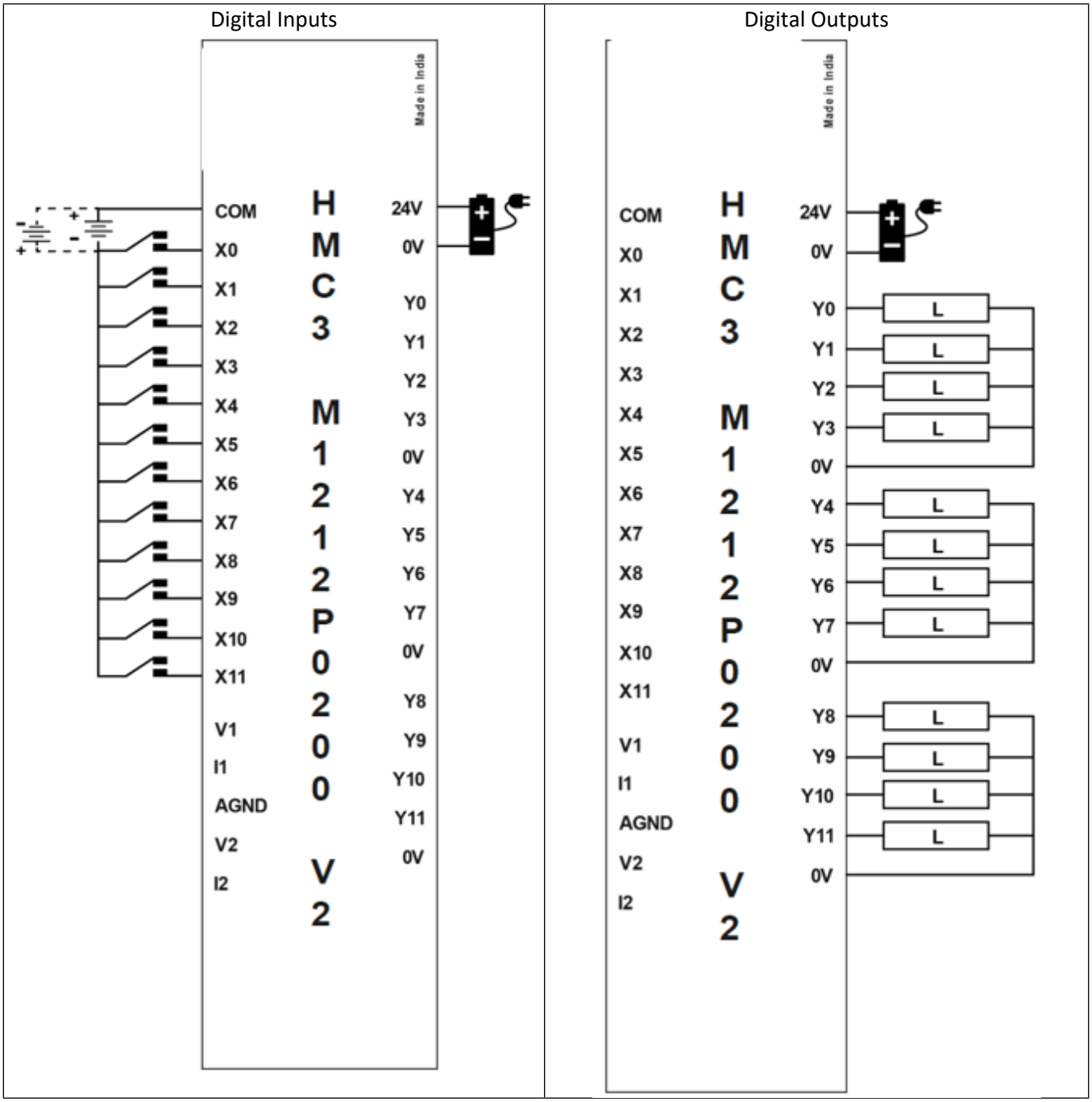
Reference the table below when configuring each Analog Input Configuration Register (MWnn60-MWnn61):

Input Signal Type	Register Value
Voltage, 0 to 10V	1
Voltage, 0 to 5V	6
Current, 4 to 20mA	2
Current, 0 to 20mA	3

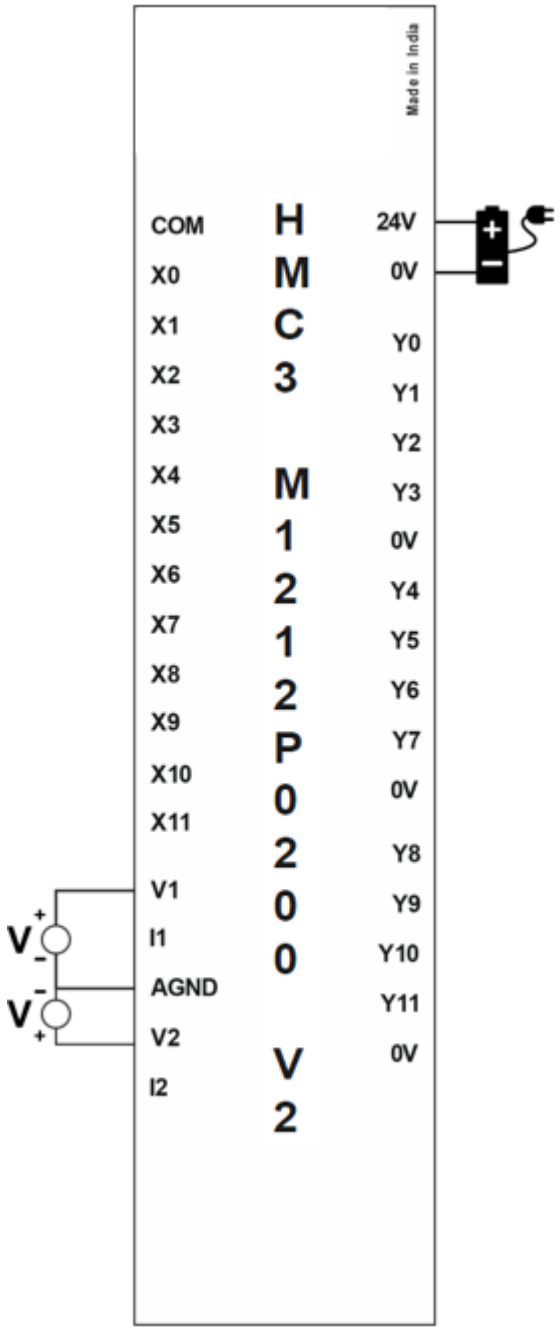
The values in the appropriate analog input register range from 0-65535.

Expansion Module Reg Value	Input Values			
	0 to 20mA	4 to 20mA	0 to 10V	0 to 5V
0	0mA	4mA	0V	0V
16384	5mA	8mA	2.5V	1.25V
32768	10mA	12mA	5V	2.5V
49152	15mA	16mA	7.5V	3.75V
65535	20mA	20mA	10V	5V

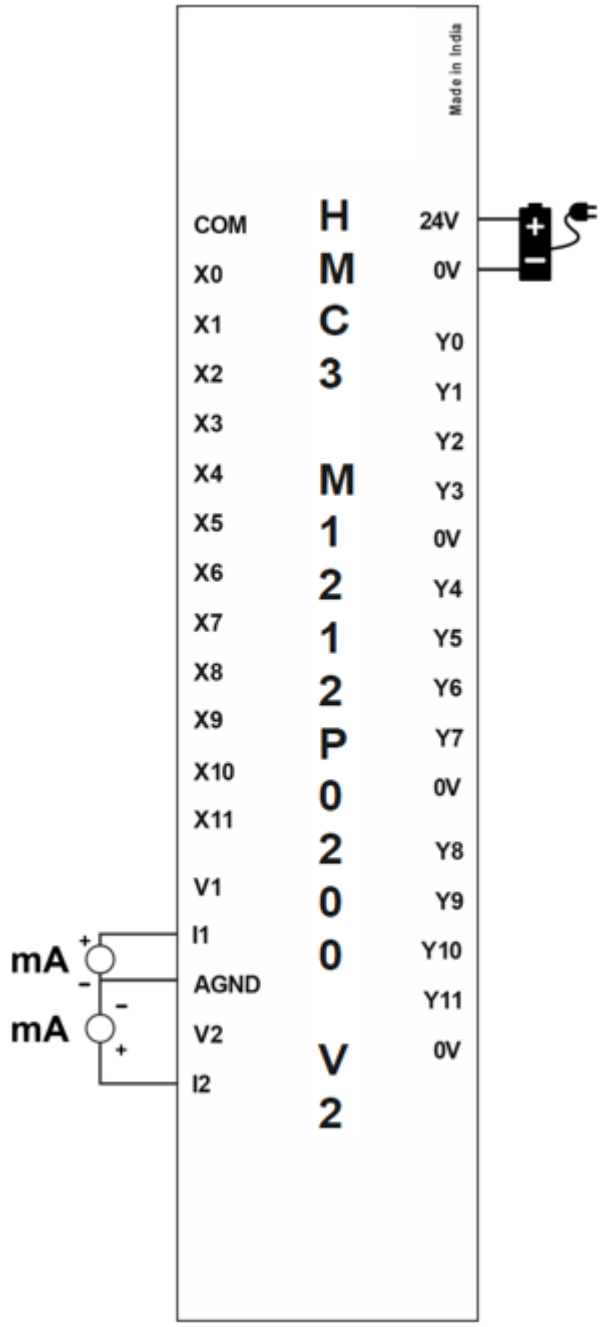
Wiring:


Digital Inputs
Digital Outputs
Made in India
HMC3 M1212P0200 V2
COM
X0
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
V1
I1
AGND
V2
I2
24V
0V
Y0
Y1
Y2
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0V
Y4
Y5
Y6
Y7
0V
Y8
Y9
Y10
Y11
0V
L

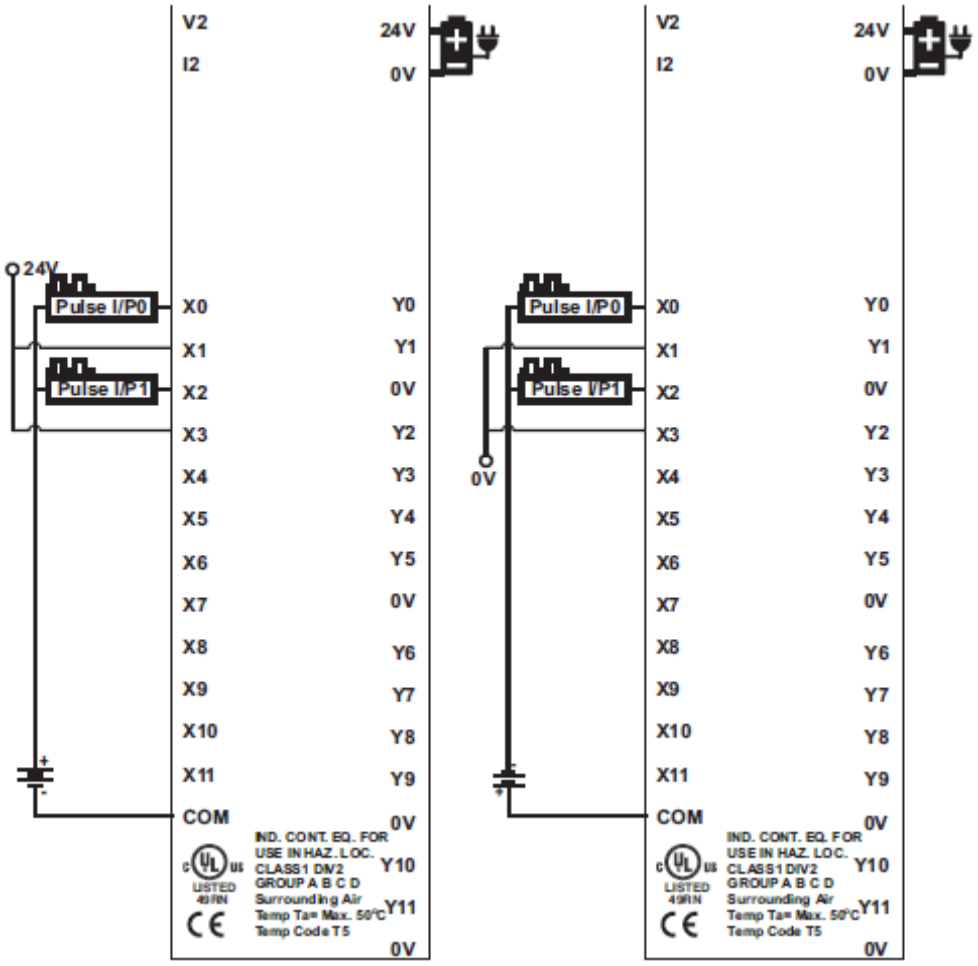
Analog Input (Voltage)



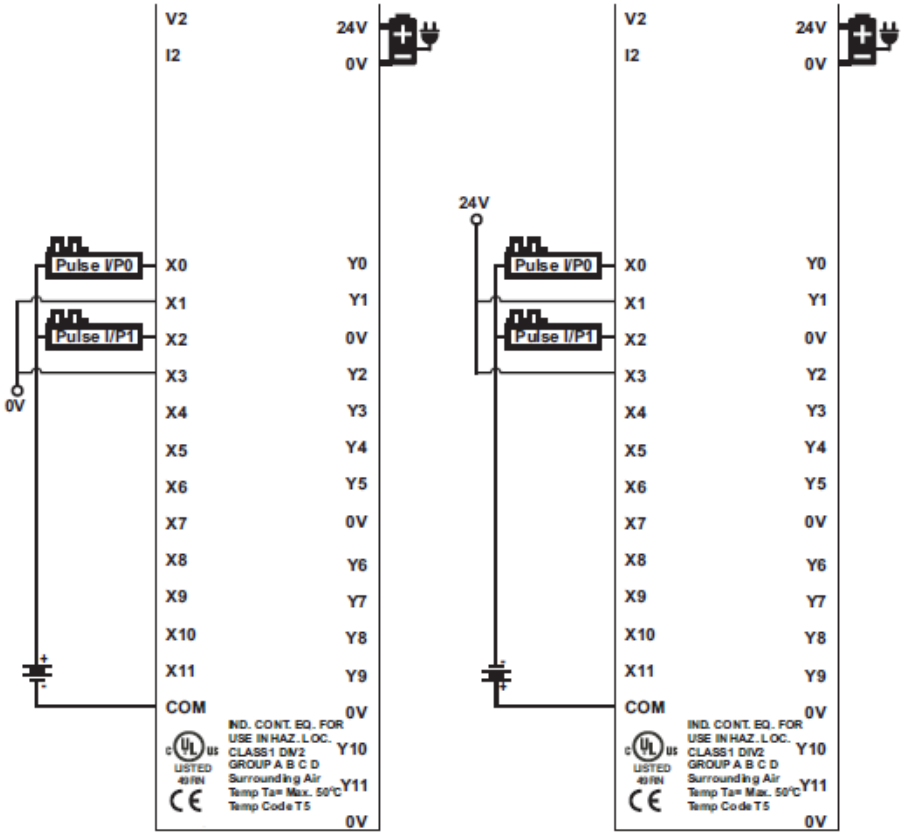
Analog Input (Current)



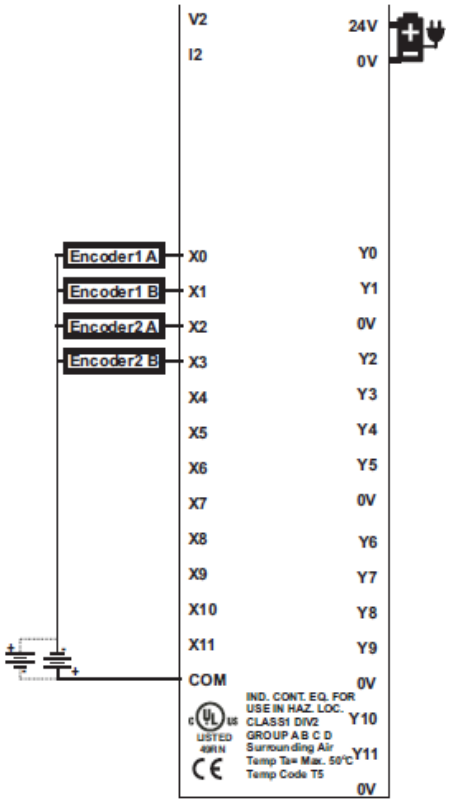
HSC Single Phase Up Counter



HSC Single Phase Down Counter



HSC Quadrature



HMC3-M1212P0200



12 Digital Inputs (2 high-speed pairs up to 200kHz)

12 Digital Outputs (2 PWM up to 1kHz)

2 Analog Inputs

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**

This module is an input/output module for the HMC3000, HMC2000 and HMC4000 Series models. It has twelve digital inputs, two of which are high-speed pairs and 12 sourcing digital outputs. Two of those digital outputs are configurable as PWM.

This module also has two analog inputs, each measuring Voltage or Current.

Specifications	
Power	12 VDC from base
Certifications	CE, UL
Digital Inputs	12 bidirectional inputs (2 high-speed pairs)
Rated Input Voltage	24 VDC +/- 15%
Rated input current	Up to 5mA (per contact)
Input impedance	4.9K ohms
Minimum ON voltage	15 VDC
Maximum OFF voltage	5 VDC
Turn ON Time	10 mSec
Turn OFF Time	10 mSec
Isolation	Optically isolated from internal circuit
Analog Inputs	2 Inputs, each configurable as: • 0 to 10V, 0 to 5V; • 0 to 20mA, 4-20mA
Input Resolution	16 bit
Input Impedance	3 KΩ
Input Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)

Digital Outputs	12 sourcing outputs (PNP-type), 2 PWM
Maximum PWM Output Frequency	1KHz
Minimum ON Output Voltage	22 VDC
Maximum ON Output Voltage	30 VDC
Minimum OFF Output Voltage	0.2 VDC
Maximum OFF Output Voltage	1 VDC
Rated Load	250mA @ 24VDC
Nominal load	96Ω 6W (resistive) @ 24VDC 6VA (inductive, UPF)
High-speed Channels	
No. of inputs	2 channel pairs (X0/X1 and X2/X3)
Maximum Input Frequency	200 KHz
Maximum Input Count	4,294,967,295 (32-bit)
General	
Connection method	Removable terminals (3.81 mm pitch)
Operating Temperature	0 to 55°C
Operating Humidity	10% to 90% (non-condensing)
Mechanical Dimension (W x H x D)	1.88 x 4.25 x 1.61 inches [48x108x41mm]

Configuration

Use MAPware-7000 to assign input (X and XW), output (Y and YW) and configuration (M and MW) memory addresses to the module. These addresses are created according to the slot location of the module, where **nn** refers to the slot number (ex. 01…05):

Function	Register		Access
X0-X11 Digital Inputs	Xnn000-011 (XWnn00)		Read Only
Y0-Y11 Digital Outputs	Ynn000-011 (YWnn00)		Read/Write
High-speed Counter Option	**HSC Channel 1**	**HSC Channel 2**	
HSC Input Pin	X0	X2	Read Only
Quadrature Inputs	**Pair 1**	**Pair 2**	
Counter Inputs	X0, X1	X2, X3	Read Only
HSC Configuration Register	MWnn00	MWnn06	Read/Write
HSC Counter Register (Current Value)	MWnn01	MWnn07	Read/Write
HSC Preset Register	MWnn03	MWnn09	Read/Write
HSC Enable Bit	Mnn080	Mnn176	Read/Write
HSC Reset Bit	Mnn081	Mnn177	Read/Write
Output Flag	Y2	Y3	
PWM Outputs	**Channel 1**	**Channel 2**	
Output	Y0	Y1	Read Only
PWM Configuration Register	MWnn24	MWnn30	Read/Write
Frequency Setting Register	MWnn25	MWnn31	Read/Write
ON Duty Setting Register (Duty Cycle)	MWnn27	MWnn33	Read/Write
Pulse Enable Flag	Mnn576	Mnn577	Read/Write
ON Duty Setting Error Flag	Mnn466	Mnn471	Read Only
Frequency Setting Error Flag	Mnn467	Mnn472	Read Only
Analog Inputs	**Register**		
Input Channel 0 Data	XWnn11		Read Only
Input Channel 1 Data	XWnn13		Read Only
Input Channel 0 Config Register	MWnn60		Read/Write
Input Channel 1 Config Register	MWnn61		Read/Write

Reference the table below when configuring each HSC Configuration Register:

Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

Reference the table below when configuring the PWM Configuration Registers:

Output Mode	Register Value
Normal PWM (fixed frequency)	1
Normal PWM (variable frequency)	2
CW/CCW (fixed frequency)	3
CW/CCW (variable frequency)	4
Pulse/Direction (fixed frequency)	7
Pulse/Direction (variable frequency)	8
Trapezoidal (Fixed Pulse Mode)	9

Reference the table below when configuring each Analog Input Configuration Register (MWnn60-MWnn61):

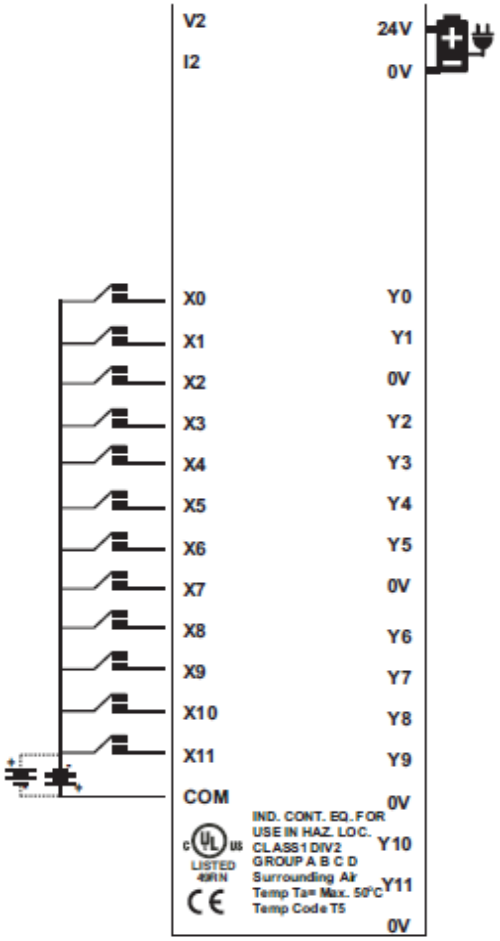
Input Signal Type	Register Value
Voltage, 0 to 10V	1
Voltage, 0 to 5V	6
Current, 4 to 20mA	2
Current, 0 to 20mA	3

The values in the appropriate analog input register range from 0-64000, with over and under indications at 65000 and 65001.

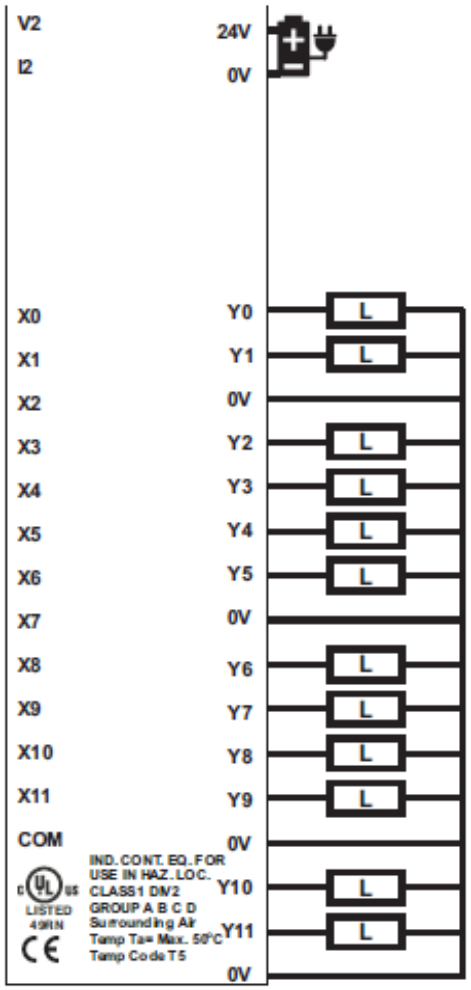
Expansion Module Reg Value	Input Values			
	0 to 20mA	4 to 20mA	0 to 10V	0 to 5V
0	0mA	4mA	0V	0V
16000	5mA	8mA	2.5V	1.25V
32000	10mA	12mA	5V	2.5V
48000	15mA	16mA	7.5V	3.75V
64000	20mA	20mA	10V	5V
65000	< 0mA	< 4mA	< 0V	< 0V
65001	> 20mA	> 20mA	> 10V	> 5V

Wiring:

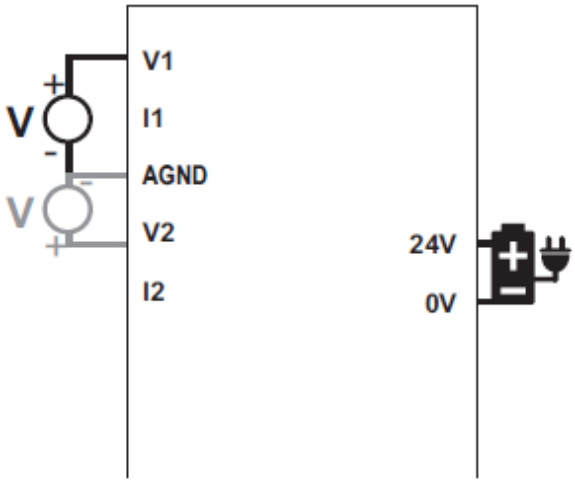
Digital Inputs



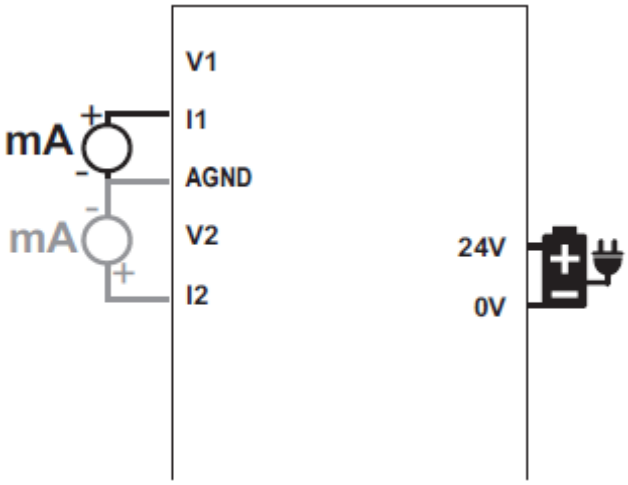
Digital Outputs



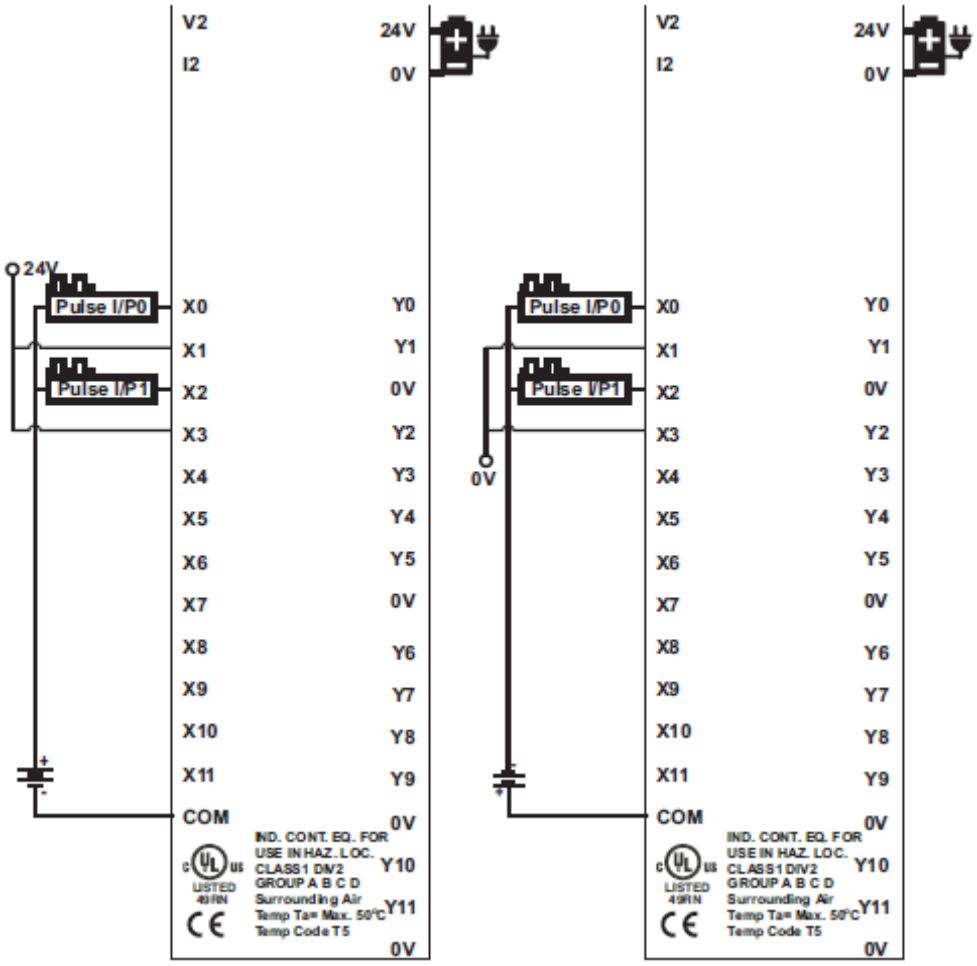
Analog Input (Voltage)



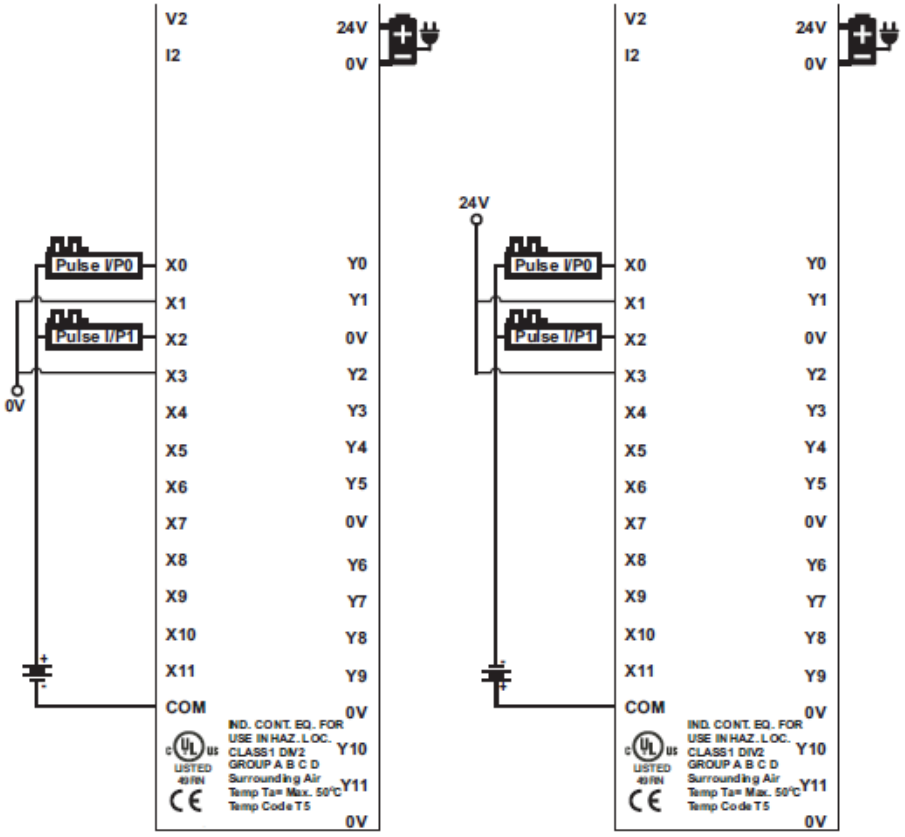
Analog Input (Current)



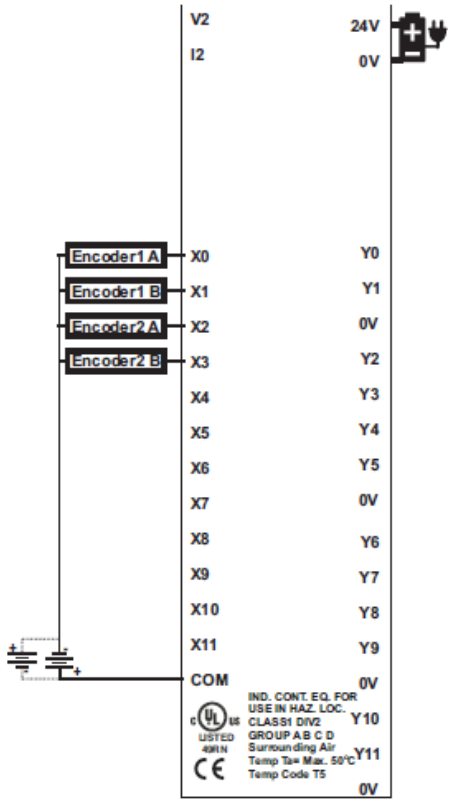
HSC Single Phase Up Counter



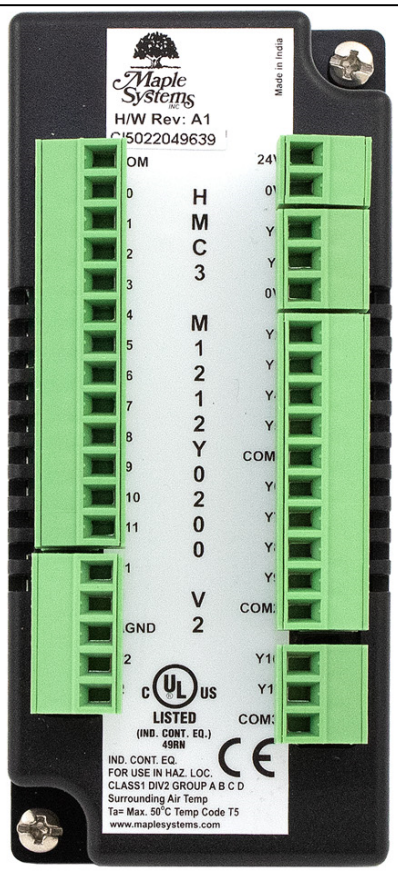
HSC Single Phase Down Counter



HSC Quadrature



HMC3-M1212Y0200 V2



12 Digital Inputs (2 high-speed pairs up to 200kHz)

12 Digital Outputs (10 Relay, and 2 PNP w/ 1 PWM up to 1kHz)

2 Analog Inputs

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**

This module is an input/output module for the HMC2000 and HMC4000 Series models. It has eight digital inputs, two of which are high speed pairs and 12 digital outputs. Two of those digital outputs are sourcing (PNP), and 1 can be configured for PWM, and the other 10 outputs are relay type.
This module also has two analog inputs, each measuring Voltage or Current.

[Note: HMC3 I/O Module V2 Series are only compatible with HMC2000/ HMC4000 Series Base Model]

Specifications	
Power	12 VDC from base
Certifications	CE, UL
Digital Inputs	12 bidirectional inputs (2 high-speed pairs)
Rated Input Voltage	24 VDC +/- 15%
Rated input current	Up to 5mA (per contact)
Input impedance	4.9K ohms
Minimum ON voltage	15 VDC
Maximum OFF voltage	5 VDC
Turn ON Time	10 mSec
Turn OFF Time	10 mSec
Isolation	Optically isolated from internal circuit
Analog Inputs	2 Inputs, each configurable as: • 0 to 10V, 0 to 5V; • 0 to 20mA, 4-20mA
Input Resolution	16 bit
Input Impedance	3 KΩ
Input Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)

Digital Outputs	12 outputs: 10 Relay, 2 Sourcing (PNP-type), 1 PWM
Maximum Output Frequency	1KHz
Minimum ON Output Voltage	22 VDC
Maximum ON Output Voltage	30 VDC
Minimum OFF Output Voltage	0.2 VDC
Maximum OFF Output Voltage	1 VDC
Rated Load	250mA @ 24VDC 2A @230VAC
Nominal load	96Ω 6W (resistive) @ 24VDC 6VA (inductive, UPF)
High-speed Channels	
No. of inputs	2 channel pairs (X0/X1 and X2/X3)
Maximum Input Frequency	200 KHz
Maximum Input Count	4,294,967,295 (32-bit)
General	
Connection method	Removable terminals (3.81 mm pitch)
Operating Temperature	0 to 55°C
Operating Humidity	10% to 90% (non-condensing)
Mechanical Dimension (W x H x D)	1.88 x 4.25 x 1.61 inches [48x108x41mm]

Configuration

Use MAPware-7000 to assign input (X and XW), output (Y and YW) and configuration (M and MW) memory addresses to the module. These addresses are created according to the slot location of the module, where **nn** refers to the slot number (ex. 01…05):

Function	**Register**		**Access**
X0-X11 Digital Inputs	Xnn000-011 (XWnn00)		Read Only
Y0-Y11 Digital Outputs	Ynn000-011 (YWnn00)		Read/Write
High-speed Counter Option	**HSC Channel 1**	**HSC Channel 2**	
HSC Input Pin	X0	X2	Read Only
Quadrature Inputs	**Pair 1**	**Pair 2**	
Counter Inputs	X0, X1	X2, X3	Read Only
HSC Configuration Register	MWnn00	MWnn06	Read/Write
HSC Counter Register (Current Value)	MWnn01	MWnn07	Read/Write
HSC Preset Register	MWnn03	MWnn09	Read/Write
HSC Enable Bit	Mnn080	Mnn176	Read/Write
HSC Reset Bit	Mnn081	Mnn177	Read/Write
Output Flag	Y2	Y3	
PWM Outputs	**Channel 1**		
Output	Y0		Read Only
PWM Configuration Register	MWnn24		Read/Write
Frequency Setting Register	MWnn25		Read/Write
ON Duty Setting Register (Duty Cycle)	MWnn27		Read/Write
Pulse Enable Flag	Mnn576		Read/Write
ON Duty Setting Error Flag	Mnn466		Read Only

Frequency Setting Error Flag	Mnn467		Read Only
Analog Inputs	**Register**		
Input Channel 0 Data	XWnn11		Read Only
Input Channel 1 Data	XWnn13		Read Only
Input Channel 0 Config Register	MWnn60		Read/Write
Input Channel 1 Config Register	MWnn61		Read/Write

Reference the table below when configuring each HSC Configuration Register:

Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

Reference the table below when configuring the PWM Configuration Registers:

Output Mode	Register Value
Normal PWM (fixed frequency)	1
Normal PWM (variable frequency)	2
CW/CCW (fixed frequency)	3
CW/CCW (variable frequency)	4
Pulse/Direction (fixed frequency)	7
Pulse/Direction (variable frequency)	8
Trapezoidal (Fixed Pulse Mode)	9

Reference the table below when configuring each Analog Input Configuration Register (MWnn60-MWnn61):

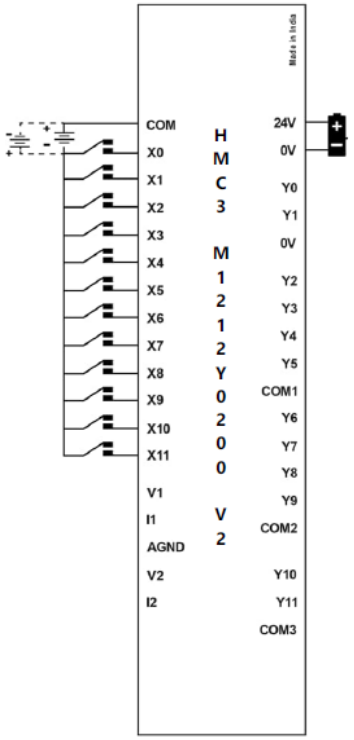
Input Signal Type	Register Value
Voltage, 0 to 10V	1
Voltage, 0 to 5V	6
Current, 4 to 20mA	2
Current, 0 to 20mA	3

The values in the appropriate analog input register range from 0-65535.

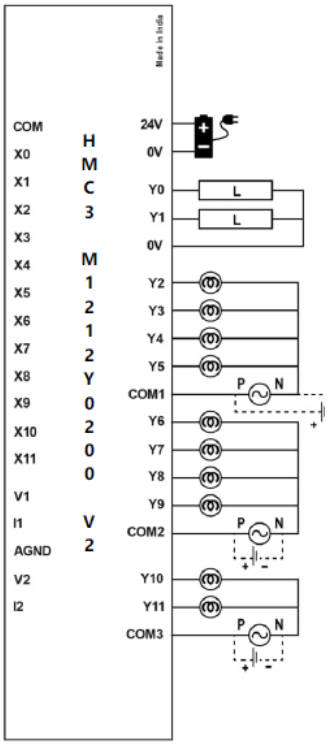
Expansion Module Reg Value	Input Values			
	0 to 20mA	4 to 20mA	0 to 10V	0 to 5V
0	0mA	4mA	0V	0V
16384	5mA	8mA	2.5V	1.25V
32768	10mA	12mA	5V	2.5V
49152	15mA	16mA	7.5V	3.75V
65535	20mA	20mA	10V	5V

Wiring

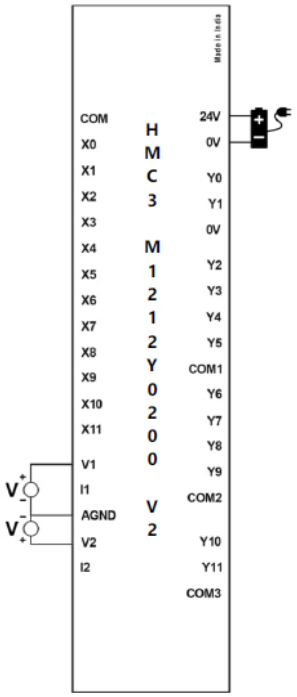
Digital Input



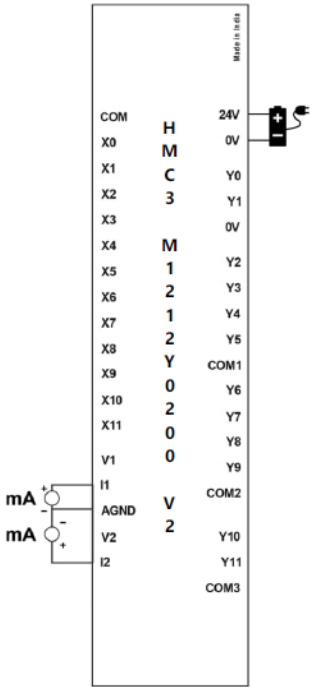
Digital Output



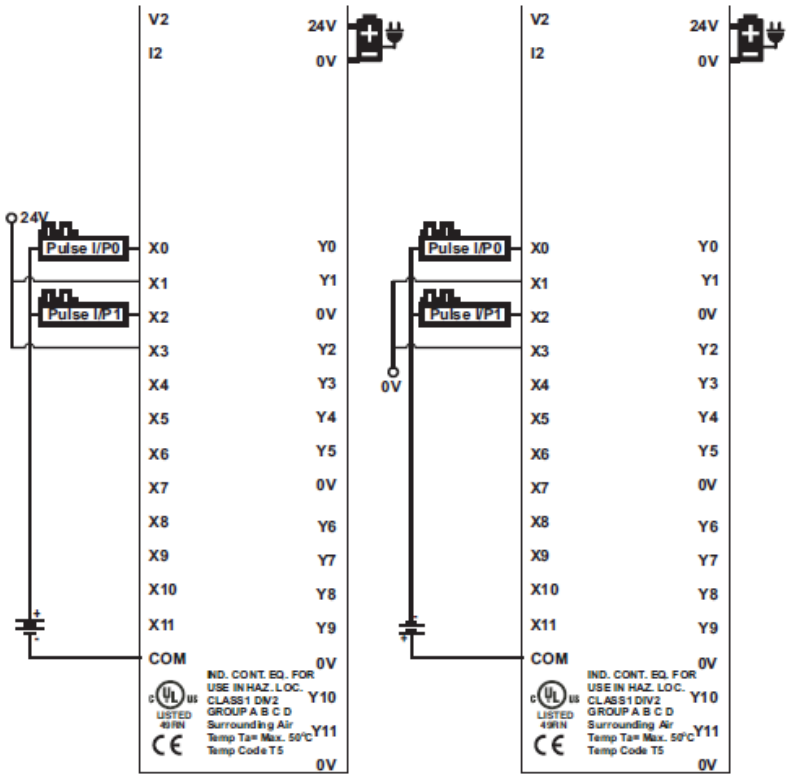
Analog Input Voltage



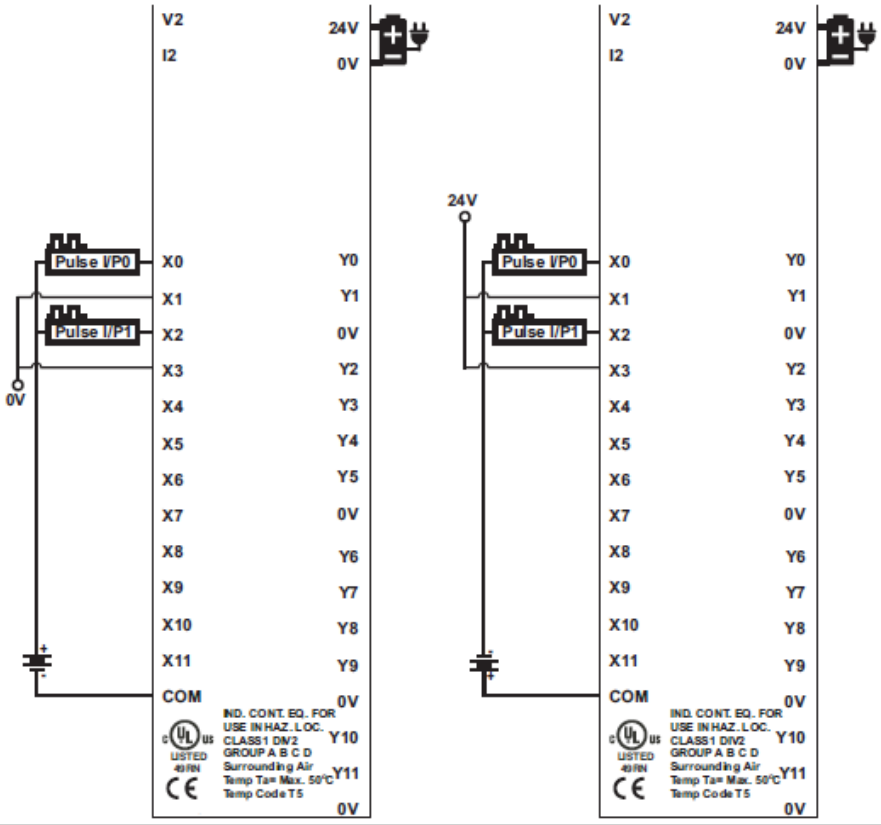
Analog Input Current



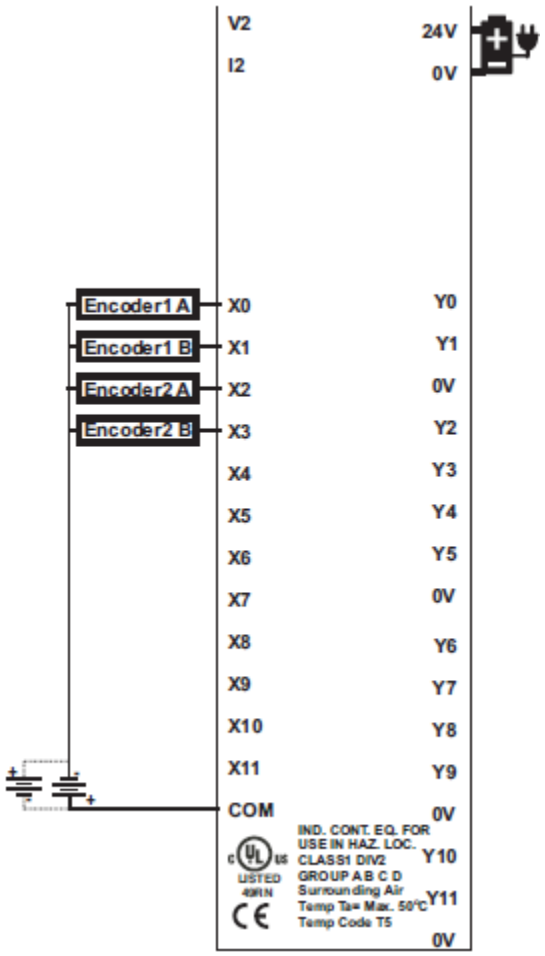
HSC Single Phase Up Counter



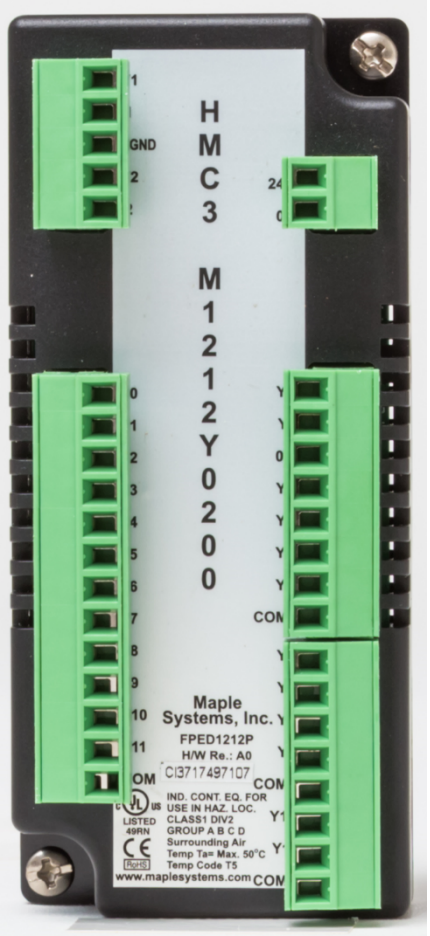
HSC Single Phase Down Counter



HSC Quadrature



HMC3-M1212Y0200



12 Digital Inputs (2 high-speed pairs up to 200kHz)

12 Digital Outputs (10 Relay, 2 PNP w/ PWM up to 1kHz)

2 Analog Inputs

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**

This module is an input/output module for the HMC3000, HMC2000 and HMC4000 Series models. It has eight digital inputs, two of which are high-speed pairs and 12 digital outputs. Two of those digital outputs are sourcing (PNP), and can be configured for PWM, and the other 10 outputs are relay type.

This module also has two analog inputs, each measuring Voltage or Current.

Specifications	
Power	12 VDC from base
Certifications	CE, UL
Digital Inputs	12 bidirectional inputs (2 high-speed pairs)
Rated Input Voltage	24 VDC +/- 15%
Rated input current	Up to 5mA (per contact)
Input impedance	4.9K ohms
Minimum ON voltage	15 VDC
Maximum OFF voltage	5 VDC
Turn ON Time	10 mSec
Turn OFF Time	10 mSec
Isolation	Optically isolated from internal circuit
Analog Inputs	2 Inputs, each configurable as: • 0 to 10V, 0 to 5V; • 0 to 20mA, 4-20mA
Input Resolution	16 bit
Input Impedance	3 KΩ
Input Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)

Digital Outputs	12 outputs: 10 Relay, 2 Sourcing (PNP-type) / PWM
Maximum PWM Output Frequency	1KHz
Minimum ON Output Voltage	22 VDC
Maximum ON Output Voltage	30 VDC
Minimum OFF Output Voltage	0.2 VDC
Maximum OFF Output Voltage	1 VDC
Rated Load	250mA @ 24VDC 2A @230VAC
Nominal load	96Ω 6W (resistive) @ 24VDC 6VA (inductive, UPF)
High-speed Channels	
No. of inputs	2 channel pairs (X0/X1 and X2/X3)
Maximum Input Frequency	200 KHz
Maximum Input Count	4,294,967,295 (32-bit)
General	
Connection method	Removable terminals (3.81 mm pitch)
Operating Temperature	0 to 55°C
Operating Humidity	10% to 90% (non-condensing)
Mechanical Dimension (W x H x D)	1.88 x 4.25 x 1.61 inches [48x108x41mm]

Configuration

Use MAPware-7000 to assign input (X and XW), output (Y and YW) and configuration (M and MW) memory addresses to the module. These addresses are created according to the slot location of the module, where **nn** refers to the slot number (ex. 01…05):

Function	Register		Access
X0-X11 Digital Inputs	Xnn000-011 (XWnn00)		Read Only
Y0-Y11 Digital Outputs	Ynn000-011 (YWnn00)		Read/Write
High-speed Counter Option	**HSC Channel 1**	**HSC Channel 2**	
HSC Input Pin	X0	X2	Read Only
Quadrature Inputs	**Pair 1**	**Pair 2**	
Counter Inputs	X0, X1	X2, X3	Read Only
HSC Configuration Register	MWnn00	MWnn06	Read/Write
HSC Counter Register (Current Value)	MWnn01	MWnn07	Read/Write
HSC Preset Register	MWnn03	MWnn09	Read/Write
HSC Enable Bit	Mnn080	Mnn176	Read/Write
HSC Reset Bit	Mnn081	Mnn177	Read/Write
Output Flag	Y2	Y3	
PWM Outputs	**Channel 1**	**Channel 2**	
Output	Y0	Y1	Read Only
PWM Configuration Register	MWnn24	MWnn30	Read/Write
Frequency Setting Register	MWnn25	MWnn31	Read/Write
ON Duty Setting Register (Duty Cycle)	MWnn27	MWnn33	Read/Write
Pulse Enable Flag	Mnn576	Mnn577	Read/Write
ON Duty Setting Error Flag	Mnn466	Mnn471	Read Only
Frequency Setting Error Flag	Mnn467	Mnn472	Read Only
Analog Inputs	**Register**		
Input Channel 0 Data	XWnn11		Read Only
Input Channel 1 Data	XWnn13		Read Only
Input Channel 0 Config Register	MWnn60		Read/Write
Input Channel 1 Config Register	MWnn61		Read/Write

Reference the table below when configuring each HSC Configuration Register:

Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

Reference the table below when configuring the PWM Configuration Registers:

Output Mode	Register Value
Normal PWM (fixed frequency)	1
Normal PWM (variable frequency)	2
CW/CCW (fixed frequency)	3
CW/CCW (variable frequency)	4
Pulse/Direction (fixed frequency)	7
Pulse/Direction (variable frequency)	8
Trapezoidal (Fixed Pulse Mode)	9

Reference the table below when configuring each Analog Input Configuration Register (MWnn60-MWnn61):

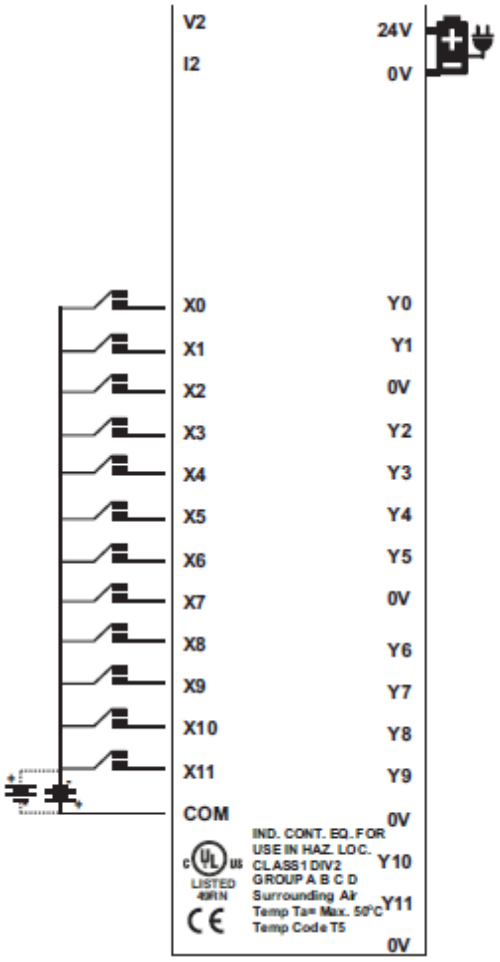
Input Signal Type	Register Value
Voltage, 0 to 10V	1
Voltage, 0 to 5V	6
Current, 4 to 20mA	2
Current, 0 to 20mA	3

The values in the appropriate analog input register range from 0-64000, with over and under indications at 65000 and 65001.

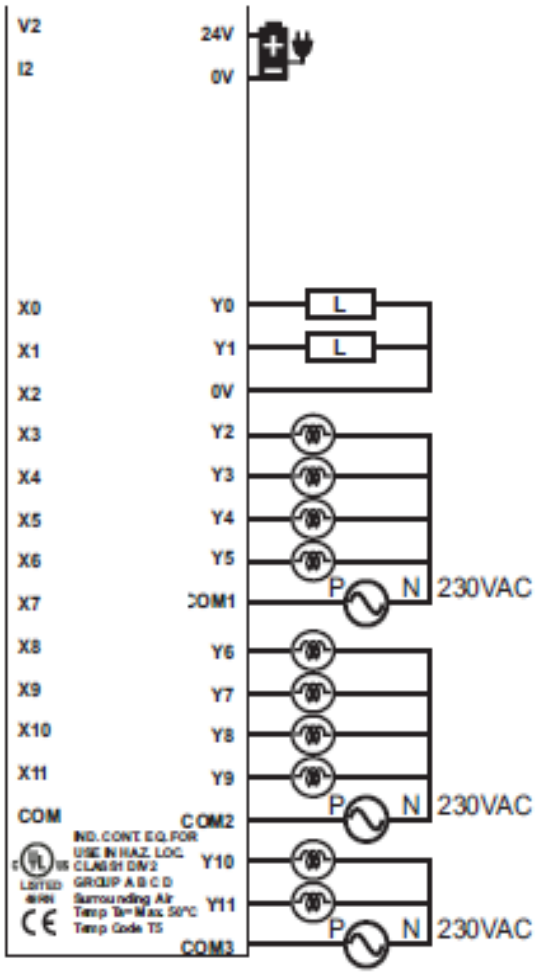
Expansion Module Reg Value	Input Values			
	0 to 20mA	4 to 20mA	0 to 10V	0 to 5V
0	0mA	4mA	0V	0V
16000	5mA	8mA	2.5V	1.25V
32000	10mA	12mA	5V	2.5V
48000	15mA	16mA	7.5V	3.75V
64000	20mA	20mA	10V	5V
65000	< 0mA	< 4mA	< 0V	< 0V
65001	> 20mA	> 20mA	> 10V	> 5V

Wiring:

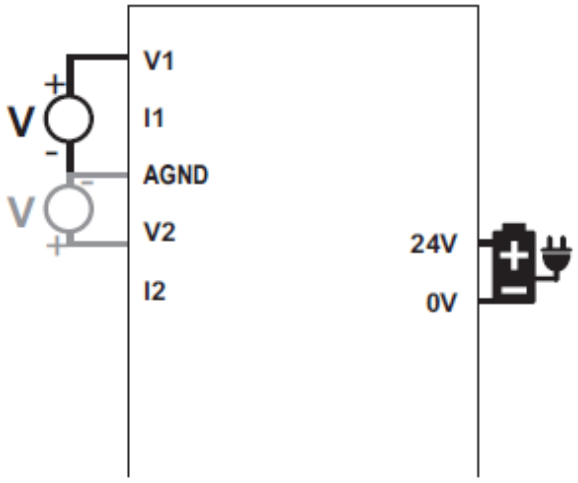
Digital Inputs



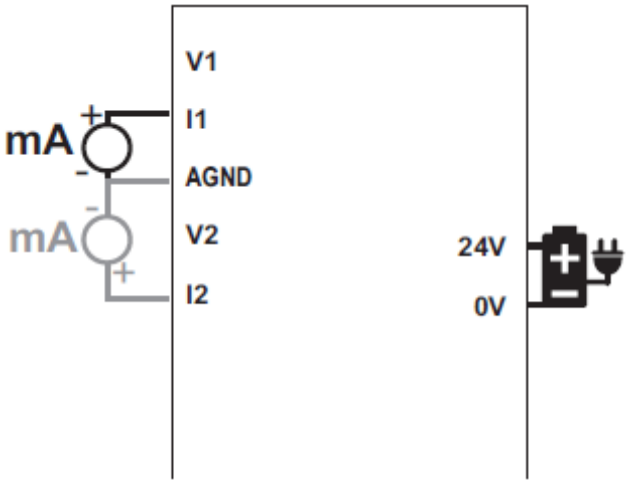
Digital Outputs



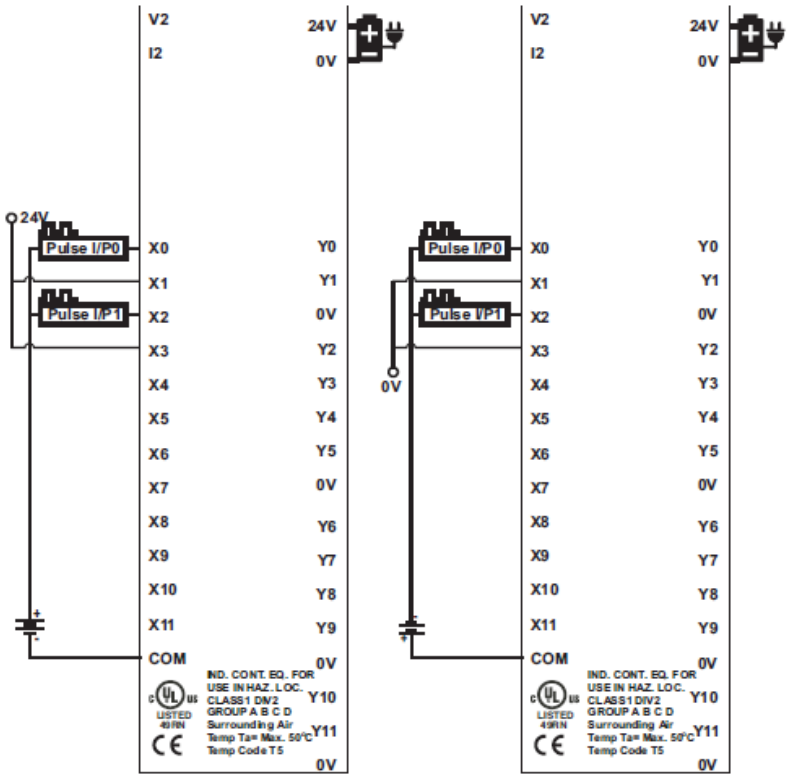
Analog Input (Voltage)



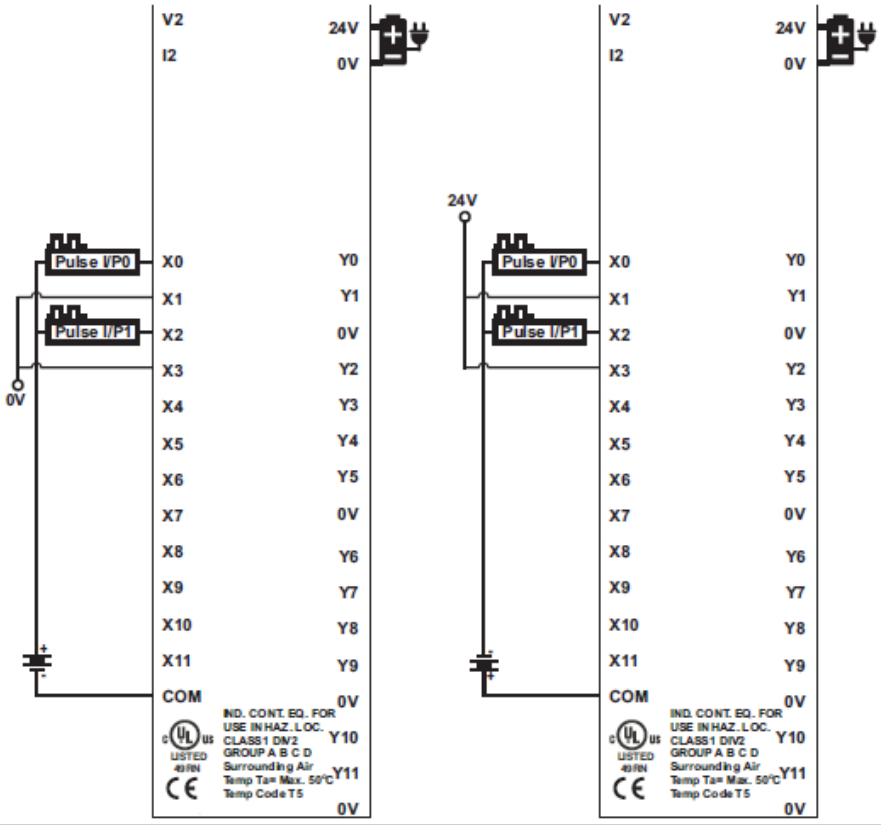
Analog Input (Current)



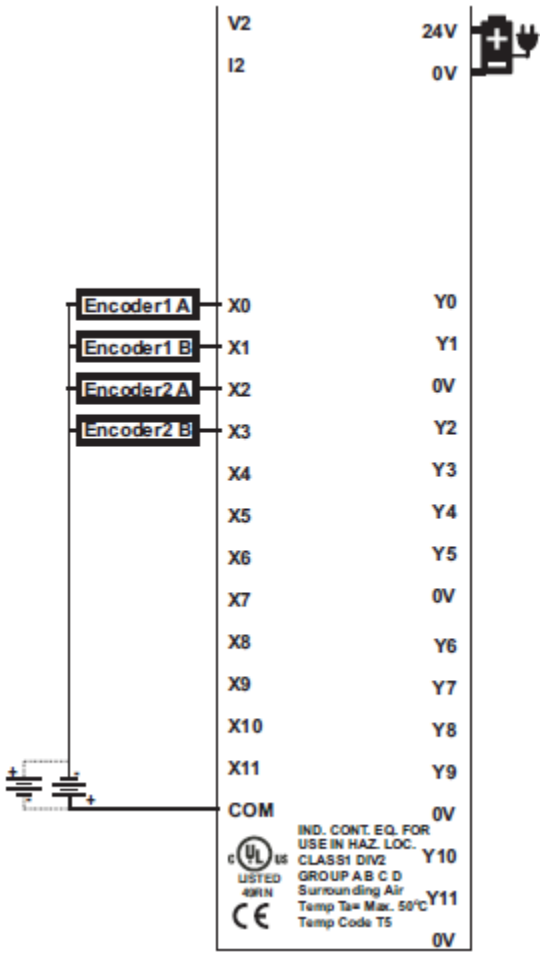
HSC Single Phase Up Counter



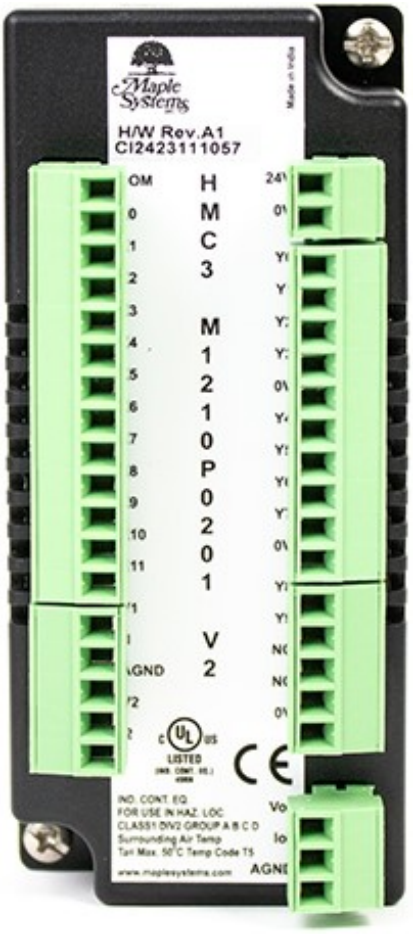
HSC Single Phase Down Counter



HSC Quadrature



HMC3-M1210P0201 V2



12 Digital Inputs (2 high-speed pairs up to 200kHz)

10 Digital Outputs (1 PWM up to 1kHz)

2 Analog Inputs

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**

1 Analog Output

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**

This module is an input/output module for the HMC2000 and HMC4000 Series models. It has twelve digital inputs, two of which are high-speed pairs and 10 sourcing (PNP) digital outputs. One of those digital outputs are PWM.

This module also has two analog inputs (Voltage/Current) and one analog output (Voltage/Current).

[Note: HMC3 I/O Module V2 Series are only compatible with HMC2000/ HMC4000 Series Base Model]

Specifications	
Power	12 VDC from base
Certifications	CE, UL
Digital Inputs	12 bidirectional inputs (2 high-speed pairs)
Rated Input Voltage	24 VDC +/- 15%
Rated input current	Up to 5mA (per contact)
Input impedance	4.9K ohms
Minimum ON voltage	15 VDC
Maximum OFF voltage	5 VDC
Turn ON Time	10 msec
Turn OFF Time	10 msec
Isolation	Optically isolated from internal circuit
Analog Inputs	2 Inputs, each configurable as: • 0 to 10V, 0 to 5V; • 0 to 20mA, 4-20mA
Input Resolution	16 bit
Input Impedance	3 KΩ
Input Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)

Digital Outputs	10 sourcing outputs (PNP-type), 2 PWM
Maximum PWM Output Frequency	1KHz
Minimum ON Output Voltage	22 VDC
Maximum ON Output Voltage	30 VDC
Minimum OFF Output Voltage	0.2 VDC
Maximum OFF Output Voltage	1 VDC
Rated Load	250mA @ 24VDC
Nominal load	96Ω 6W (resistive) @ 24VDC 6VA (inductive, UPF)
Analog Outputs	1, configurable as: • 0 to 5V, 0 to 10V; • 0 to 20mA, 4-20mA
Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)
Load	1 KΩ (Min) for V; 500Ω (Max) for mA
Output Resolution	12 bit
High-speed Channels	
No. of inputs	2 channel pairs (X0/X1 and X2/X3)
Maximum Input Frequency	200 KHz
Maximum Input Count	4,294,967,295 (32-bit)
General	
Connection method	Removable terminals (3.81 mm pitch)
Operating Temperature	0 to 55°C
Operating Humidity	10% to 90% (non-condensing)
Mechanical Dimension (W x H x D)	1.88 x 4.25 x 1.61 inches [48x108x41mm]

Configuration

Use MAPware-7000 to assign input (X and XW), output (Y and YW) and configuration (M and MW) memory addresses to the module. These addresses are created according to the slot location of the module, where **nn** refers to the slot number (ex. 01…05):
The values in the appropriate analog input register range from 0-65535, while analog output register values range from 0-4095.

Function	Register		Access
X0-X11 Digital Inputs	Xnn000-011 (XWnn00)		Read Only
Y0-Y9 Digital Outputs	Ynn000-009 (YWnn00)		Read/Write
High-speed Counter Option	**HSC Channel 1**	**HSC Channel 2**	
HSC Input Pin	X0	X2	Read Only
Quadrature Inputs	**Pair 1**	**Pair 2**	
Counter Inputs	X0, X1	X2, X3	Read Only
HSC Configuration Register	MWnn00	MWnn06	Read/Write
HSC Counter Register (Current Value)	MWnn01	MWnn07	Read/Write
HSC Preset Register	MWnn03	MWnn09	Read/Write
HSC Enable Bit	Mnn080	Mnn176	Read/Write
HSC Reset Bit	Mnn081	Mnn177	Read/Write
Output Flag	Y2	Y3	
PWM Outputs	**Channel 1**	**Channel 2**	
Output	Y0	Y1	Read Only
PWM Configuration Register	MWnn24	MWnn30	Read/Write
Frequency Setting Register	MWnn25	MWnn31	Read/Write
ON Duty Setting Register (Duty Cycle)	MWnn27	MWnn33	Read/Write
Pulse Enable Flag	Mnn576	Mnn577	Read/Write
ON Duty Setting Error Flag	Mnn466	Mnn471	Read Only
Frequency Setting Error Flag	Mnn467	Mnn472	Read Only
Analog Inputs	**Register**		
Input Channel 0 Data	XWnn11		Read Only
Input Channel 1 Data	XWnn13		Read Only
Input Channel 0 Config Register	MWnn60		Read/Write
Input Channel 1 Config Register	MWnn61		Read/Write
Analog Outputs	**Register**		
Output Channel 0 Data (Voltage)	YWnn01		Read/Write
Output Channel 0 Data (Current)	YWnn02		Read/Write
Output Channel 0 Config Register	MWnn68		Read/Write

Reference the table below when configuring each HSC Configuration Register:

Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131

	Output ON when counter is enabled, OFF when preset is reached	387

Reference the table below when configuring the PWM Configuration Registers:

Output Mode	Register Value
Normal PWM (fixed frequency)	1
Normal PWM (variable frequency)	2
CW/CCW (fixed frequency)	3
CW/CCW (variable frequency)	4
Pulse/Direction (fixed frequency)	7
Pulse/Direction (variable frequency)	8
Trapezoidal (Fixed Pulse Mode)	9

Reference the tables below when configuring each Analog Input and Output Configuration Register:

Input Signal Type	Register Value
Voltage, 0 to 10V	1
Voltage, 0 to 5V	6
Current, 4 to 20mA	2
Current, 0 to 20mA	3

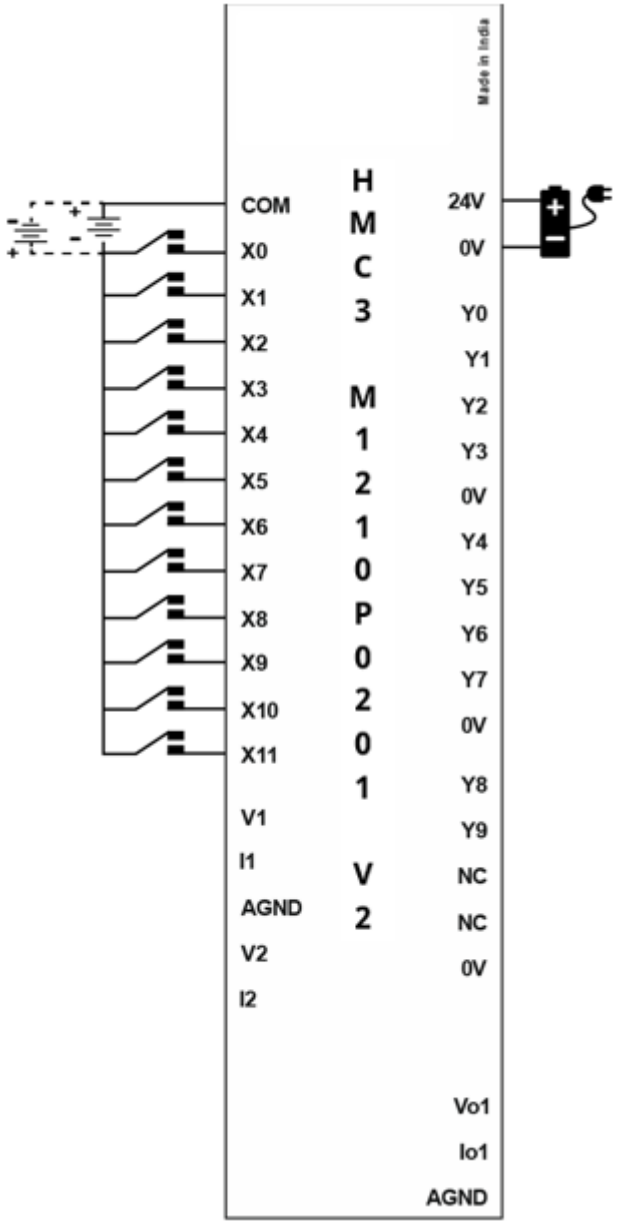
Output Signal Type	Register Value
Voltage, 0 to 10V	2
Voltage, 0 to 5V	1
Current, 4 to 20mA	5
Current, 0 to 20mA	6

Expansion Module Reg Value	Input Values			
	0 to 20mA	4 to 20mA	0 to 10V	0 to 5V
0	0mA	4mA	0V	0V
16384	5mA	8mA	2.5V	1.25V
32768	10mA	12mA	5V	2.5V
49152	15mA	16mA	7.5V	3.75V
65535	20mA	20mA	10V	5V

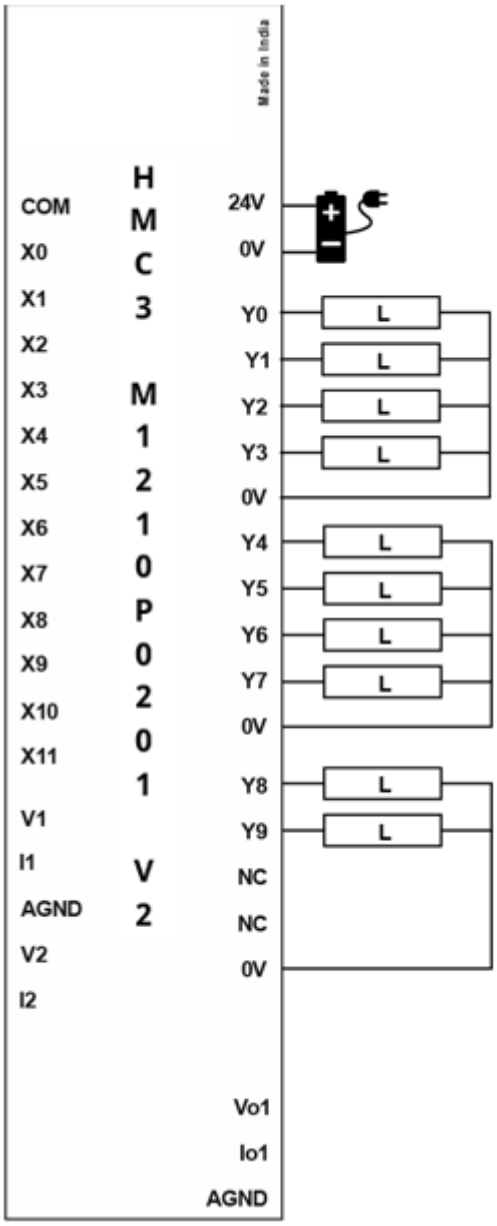
Expansion Module Reg Value	Output Values	
	0 to 10V	4 to 20mA
0	0	4mA
1024	2.5V	8mA
2048	5V	12mA
3072	7.5V	16mA
4095	10V	20mA

Wiring:

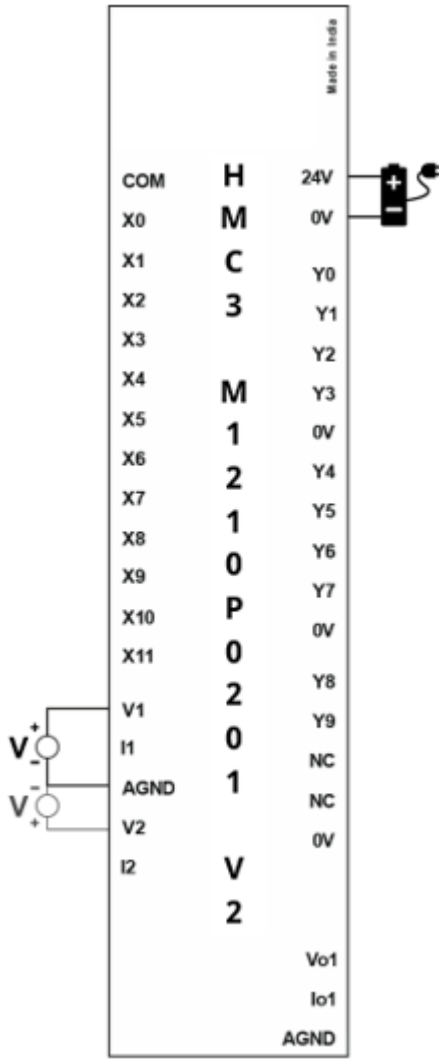
Digital Inputs



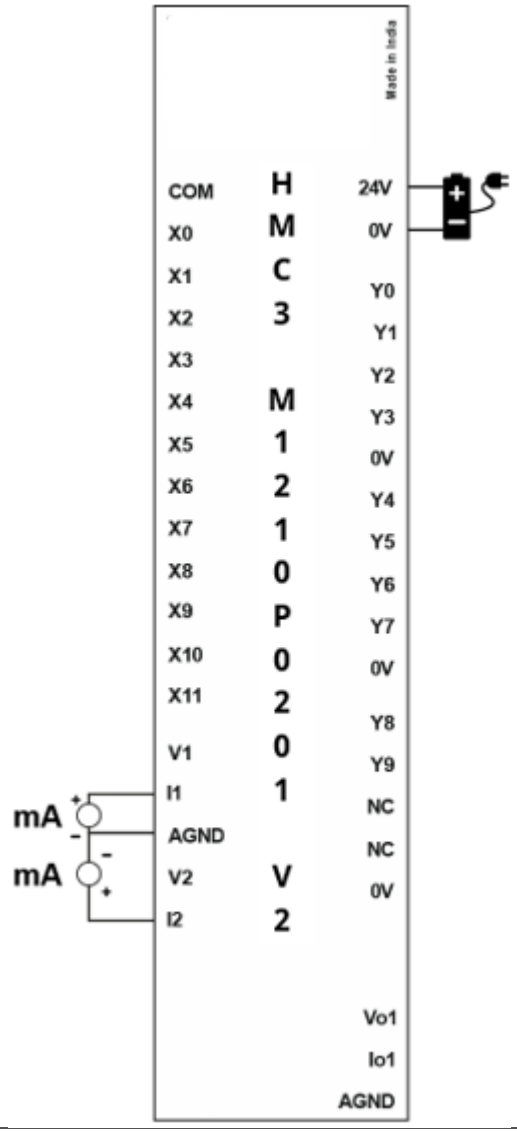
Digital Outputs



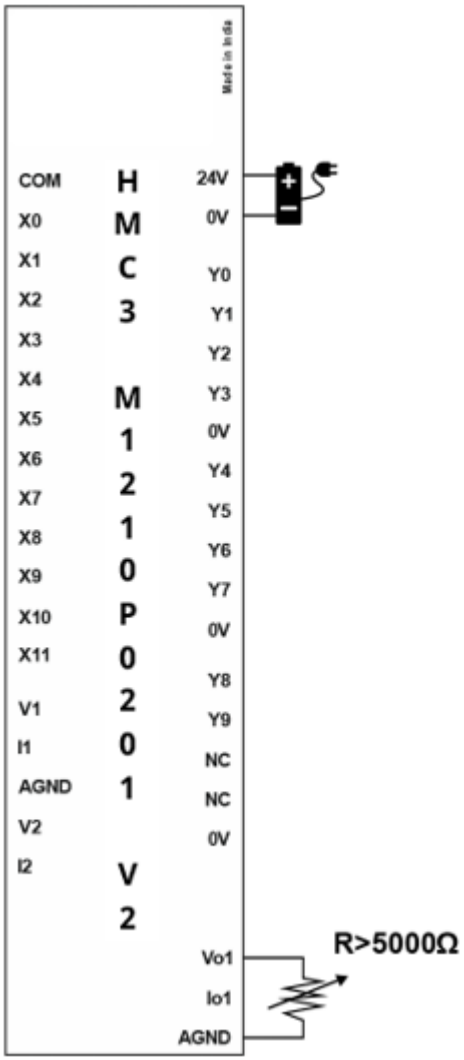
Analog Input (Voltage)



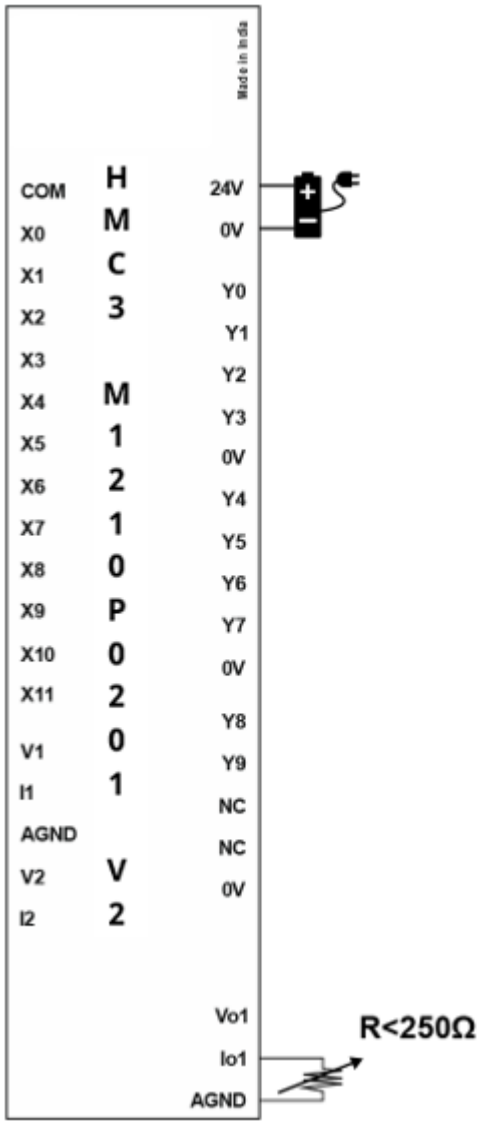
Analog Input (Current)



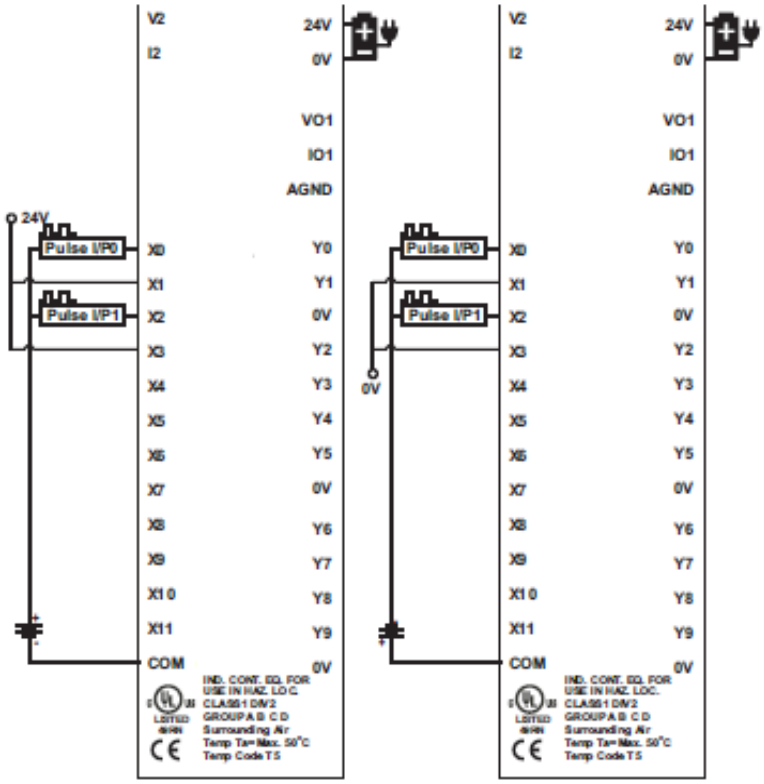
Analog Output (Voltage)



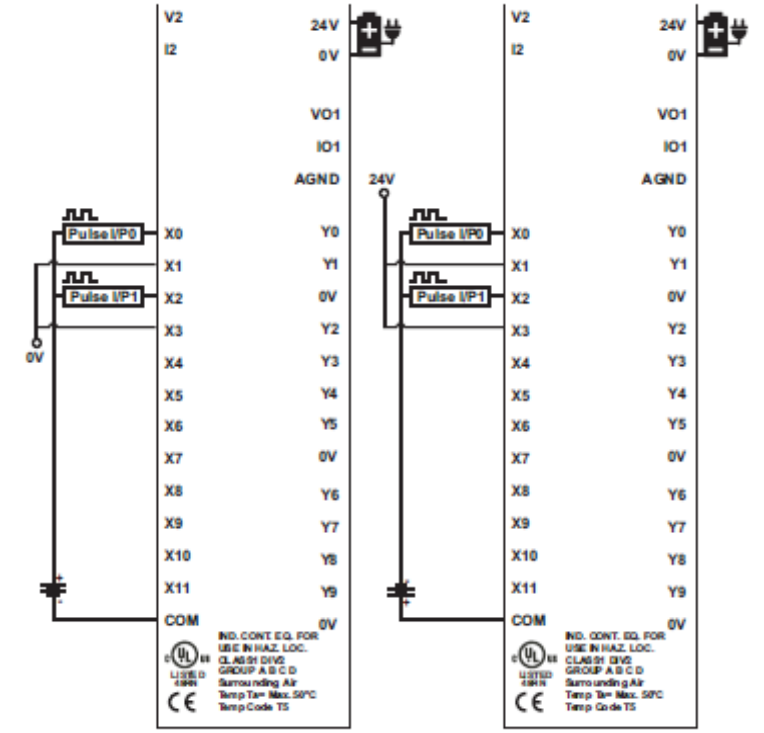
Analog Output (Current)



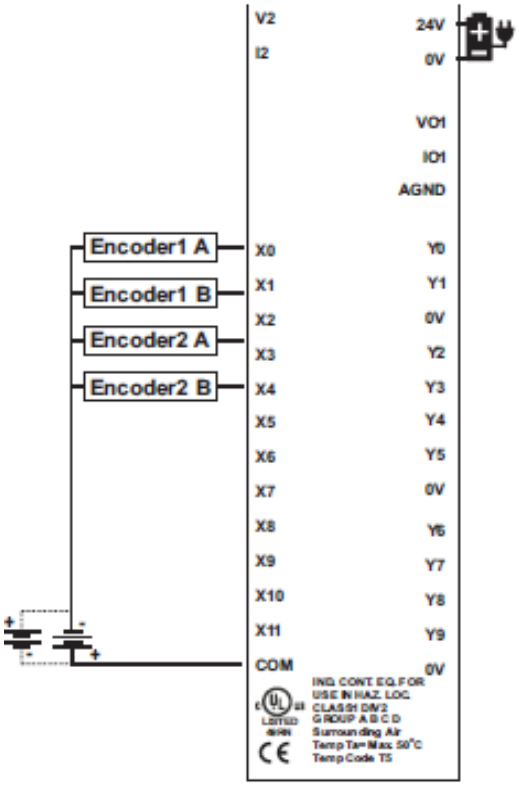
HSC Single Phase Up Counter



HSC Single Phase Down Counter



HSC Quadrature



HMC3-M1210P0201



12 Digital Inputs (2 high-speed pairs up to 200kHz)

10 Digital Outputs (2 PWM up to 1kHz)

2 Analog Inputs

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**

1 Analog Output

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**

This module is an input/output module for the HMC3000, HMC2000 and HMC4000 Series models. It has twelve digital inputs, two of which are high-speed pairs and 10 sourcing (PNP) digital outputs. Two of those digital outputs are PWM.

This module also has two analog inputs (Voltage/Current) and one analog output (Voltage/Current).

Specifications	
Power	12 VDC from base
Certifications	CE, UL
Digital Inputs	12 bidirectional inputs (2 high-speed pairs)
Rated Input Voltage	24 VDC +/- 15%
Rated input current	Up to 5mA (per contact)
Input impedance	4.9K ohms
Minimum ON voltage	15 VDC
Maximum OFF voltage	5 VDC
Turn ON Time	10 msec
Turn OFF Time	10 msec
Isolation	Optically isolated from internal circuit
Analog Inputs	2 Inputs, each configurable as: • 0 to 10V, 0 to 5V; • 0 to 20mA, 4-20mA
Input Resolution	16 bit
Input Impedance	3 KΩ
Input Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)

Digital Outputs	10 sourcing outputs (PNP-type), 2 PWM
Maximum PWM Output Frequency	1KHz
Minimum ON Output Voltage	22 VDC
Maximum ON Output Voltage	30 VDC
Minimum OFF Output Voltage	0.2 VDC
Maximum OFF Output Voltage	1 VDC
Rated Load	250mA @ 24VDC
Nominal load	96Ω 6W (resistive) @ 24VDC 6VA (inductive, UPF)
Analog Outputs	1, configurable as: • 0 to 5V, 0 to 10V; • 0 to 20mA, 4-20mA
Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)
Load	1 KΩ (Min) for V; 500Ω (Max) for mA
Output Resolution	12 bit
High-speed Channels	
No. of inputs	2 channel pairs (X0/X1 and X2/X3)
Maximum Input Frequency	200 KHz
Maximum Input Count	4,294,967,295 (32-bit)
General	
Connection method	Removable terminals (3.81 mm pitch)
Operating Temperature	0 to 55°C
Operating Humidity	10% to 90% (non-condensing)
Mechanical Dimension (W x H x D)	1.88 x 4.25 x 1.61 inches [48x108x41mm]

Configuration

Use MAPware-7000 to assign input (X and XW), output (Y and YW) and configuration (M and MW) memory addresses to the module. These addresses are created according to the slot location of the module, where **nn** refers to the slot number (ex. 01…05):

Function	Register		Access
X0-X11 Digital Inputs	Xnn000-011 (XWnn00)		Read Only
Y0-Y9 Digital Outputs	Ynn000-009 (YWnn00)		Read/Write
High-speed Counter Option	**HSC Channel 1**	**HSC Channel 2**	
HSC Input Pin	X0	X2	Read Only
Quadrature Inputs	**Pair 1**	**Pair 2**	
Counter Inputs	X0, X1	X2, X3	Read Only
HSC Configuration Register	MWnn00	MWnn06	Read/Write
HSC Counter Register (Current Value)	MWnn01	MWnn07	Read/Write
HSC Preset Register	MWnn03	MWnn09	Read/Write
HSC Enable Bit	Mnn080	Mnn176	Read/Write
HSC Reset Bit	Mnn081	Mnn177	Read/Write
Output Flag	Y2	Y3	
PWM Outputs	**Channel 1**	**Channel 2**	
Output	Y0	Y1	Read Only
PWM Configuration Register	MWnn24	MWnn30	Read/Write
Frequency Setting Register	MWnn25	MWnn31	Read/Write
ON Duty Setting Register (Duty Cycle)	MWnn27	MWnn33	Read/Write
Pulse Enable Flag	Mnn576	Mnn577	Read/Write
ON Duty Setting Error Flag	Mnn466	Mnn471	Read Only
Frequency Setting Error Flag	Mnn467	Mnn472	Read Only
Analog Inputs	**Register**		
Input Channel 0 Data	XWnn11		Read Only
Input Channel 1 Data	XWnn13		Read Only
Input Channel 0 Config Register	MWnn60		Read/Write
Input Channel 1 Config Register	MWnn61		Read/Write
Analog Outputs	**Register**		
Output Channel 0 Data (Voltage)	YWnn01		Read/Write
Output Channel 0 Data (Current)	YWnn02		Read/Write
Output Channel 0 Config Register	MWnn68		Read/Write

Reference the table below when configuring each HSC Configuration Register:

Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

Reference the table below when configuring the PWM Configuration Registers:

Output Mode	Register Value
Normal PWM (fixed frequency)	1
Normal PWM (variable frequency)	2
CW/CCW (fixed frequency)	3
CW/CCW (variable frequency)	4
Pulse/Direction (fixed frequency)	7
Pulse/Direction (variable frequency)	8
Trapezoidal (Fixed Pulse Mode)	9

Reference the tables below when configuring each Analog Input and Output Configuration Register:

Input Signal Type	Register Value
Voltage, 0 to 10V	1
Voltage, 0 to 5V	6
Current, 4 to 20mA	2
Current, 0 to 20mA	3

Output Signal Type	Register Value
Voltage, 0 to 10V	2
Voltage, 0 to 5V	1
Current, 4 to 20mA	5
Current, 0 to 20mA	6

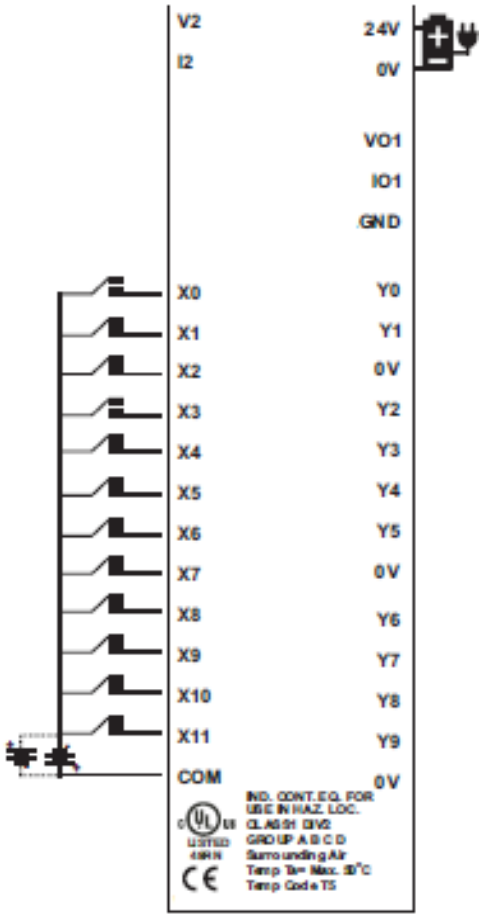
The values in the appropriate analog input register range from 0-64000, with over and under indications at 65000 and 65001, while analog output register values range from 0-4095.

Expansion Module Reg Value	Input Values			
	0 to 20mA	4 to 20mA	0 to 10V	0 to 5V
0	0mA	4mA	0V	0V
16384	5mA	8mA	2.5V	1.25V
32768	10mA	12mA	5V	2.5V
49152	15mA	16mA	7.5V	3.75V
64000	20mA	20mA	10V	5V
65000	< 0mA	< 4mA	< 0V	< 0V
65001	> 20mA	> 20mA	> 10V	> 5V

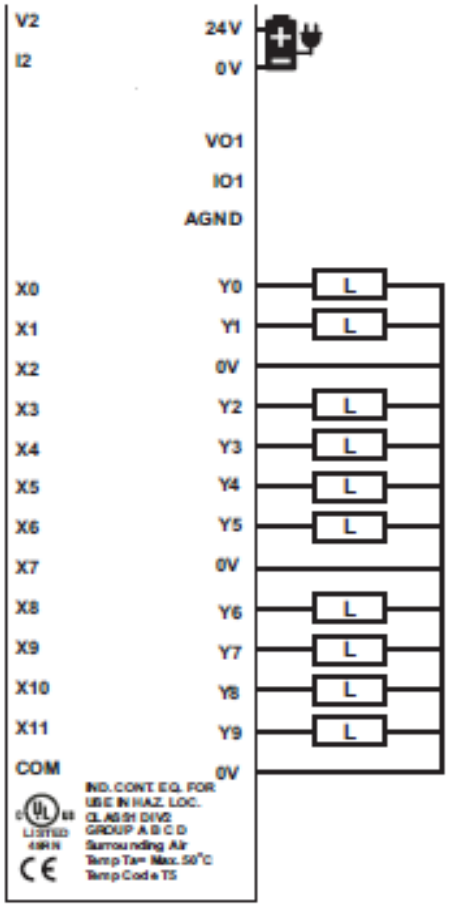
Expansion Module Reg Value	Output Values	
	0 to 10V	4 to 20mA
0	0	4mA
1024	2.5V	8mA
2048	5V	12mA
3072	7.5V	16mA
4095	10V	20mA

Wiring:

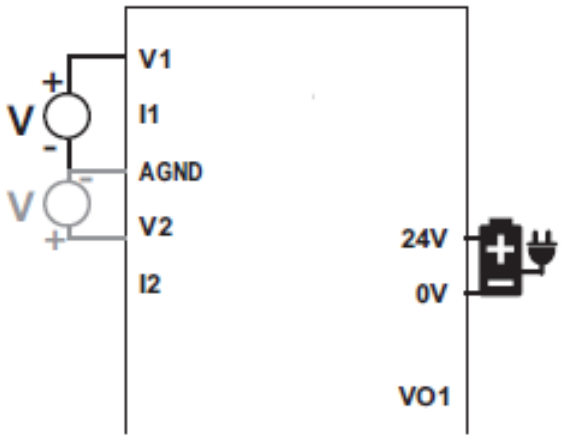
Digital Inputs



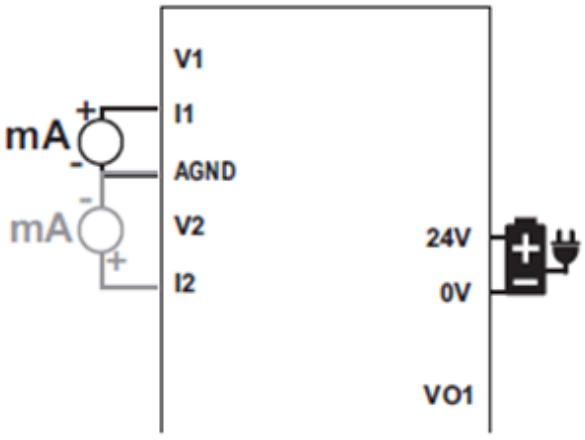
Digital Outputs



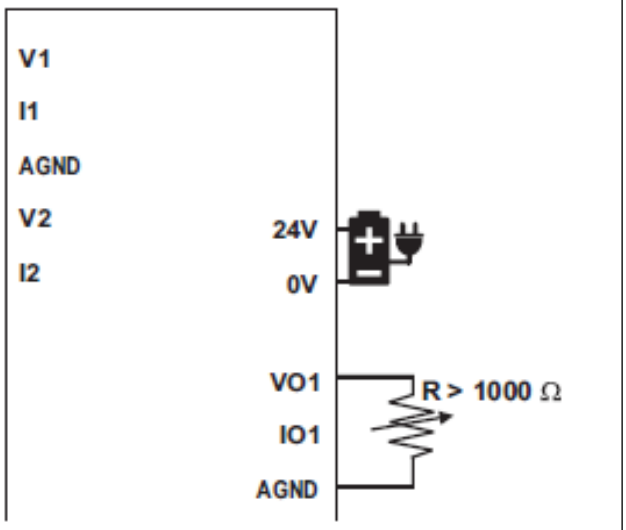
Analog Input (Voltage)



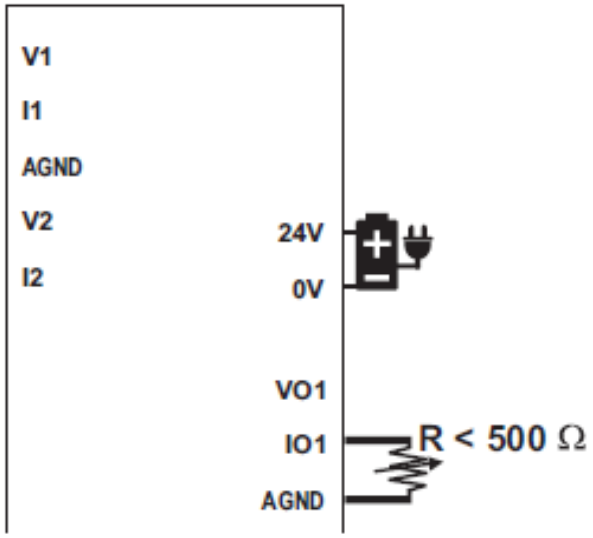
Analog Input (Current)



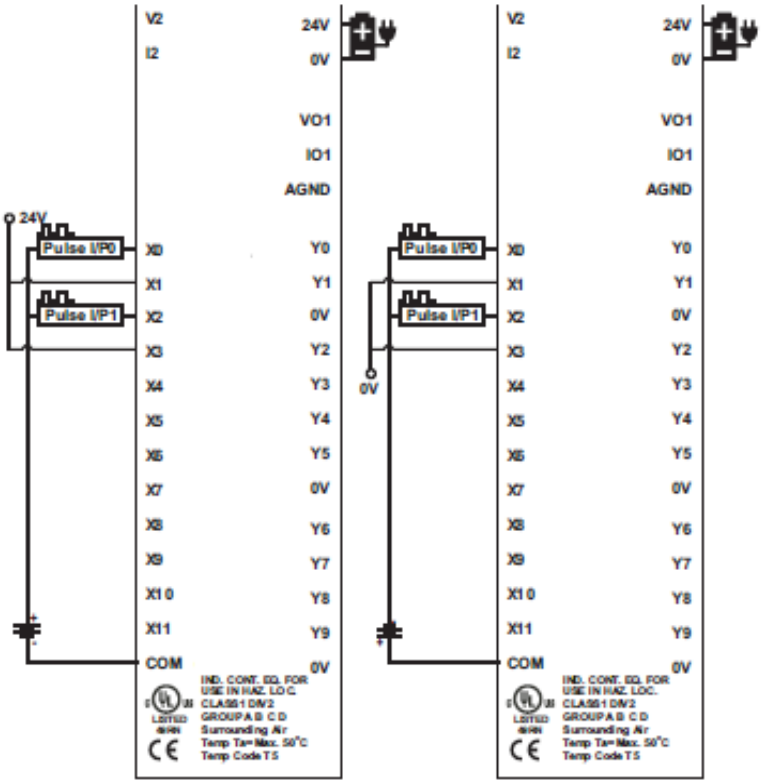
Analog Output (Voltage)



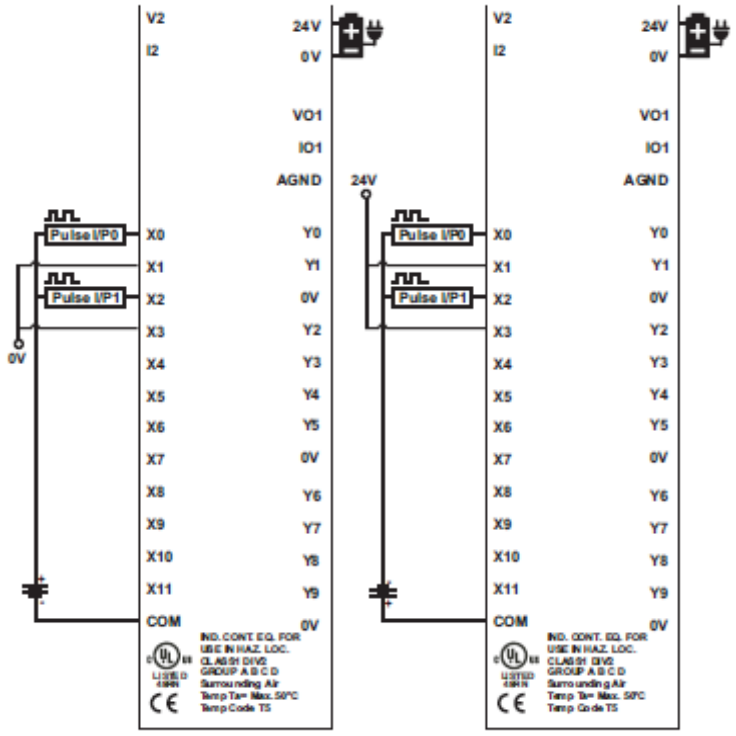
Analog Output (Current)



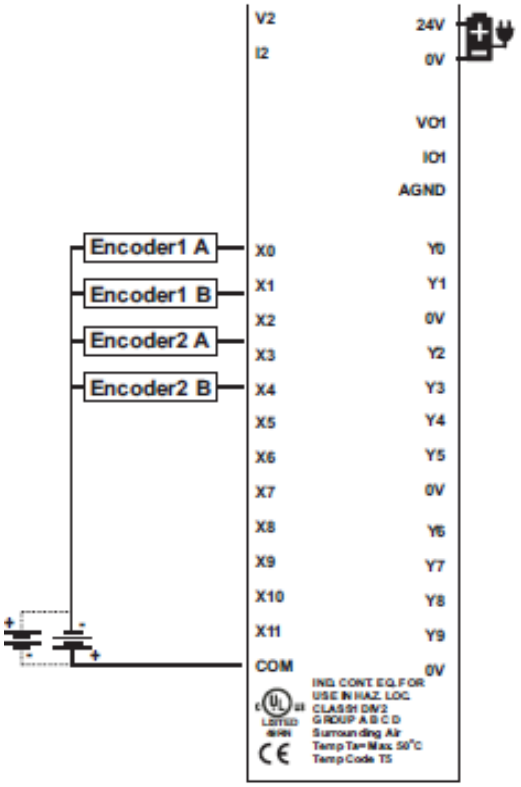
HSC Single Phase Up Counter



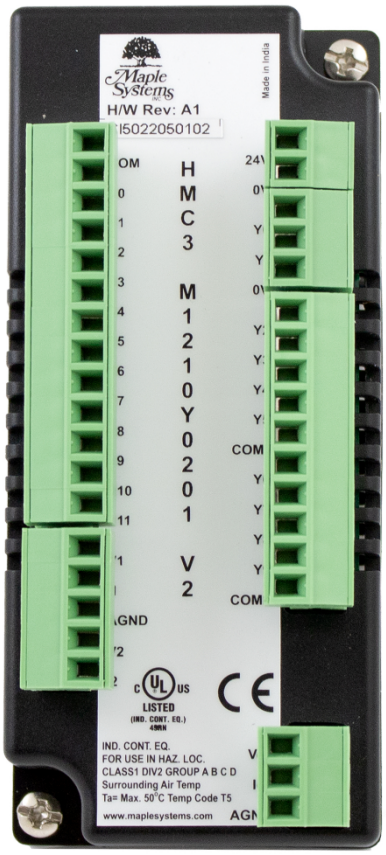
HSC Single Phase Down Counter



HSC Quadrature



HMC3-M1210Y0201 V2



12 Digital Inputs (2 high-speed pairs up to 200kHz)

10 Digital Outputs (8 Relay, 2 PNP w/ 1 PWM up to 1kHz)

2 Analog Inputs

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**

1 Analog Output

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**

This module is an input/output module for the HMC2000 and HMC4000 Series models. It has twelve digital inputs, two of which are high-speed pairs. There are 10 digital outputs, two are sourcing (PNP) with 1 PWM ability and 8 are relay type.

This module also has two analog inputs (Voltage/Current) and one analog output (Voltage/Current).

[Note: HMC3 I/O Module V2 Series are only compatible with HMC2000/ HMC4000 Series Base Model]

Specifications	
Power	12 VDC from base
Certifications	CE, UL
Digital Inputs	12 bidirectional inputs (2 high-speed pairs)
Rated Input Voltage	24 VDC +/- 15%
Rated input current	Up to 5mA (per contact)
Input impedance	4.9K ohms
Minimum ON voltage	15 VDC
Maximum OFF voltage	5 VDC
Turn ON Time	10 mSec
Turn OFF Time	10 mSec
Isolation	Optically isolated from internal circuit
Analog Inputs	2 Inputs, each configurable as: • 0 to 10V, 0 to 5V; • 0 to 20mA, 4-20mA
Input Resolution	16 bit
Input Impedance	3 KΩ
Input Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)

Digital Outputs	10 outputs: 8 Relay, 2 Sourcing (PNP-type)
Maximum Output Frequency	1KHz
Minimum ON Output Voltage	22 VDC
Maximum ON Output Voltage	30 VDC
Minimum OFF Output Voltage	0.2 VDC
Maximum OFF Output Voltage	1 VDC
Rated Load	250mA @ 24VDC 2A @230VAC
Nominal load	96Ω 6W (resistive) @ 24VDC 6VA (inductive, UPF)
Analog Outputs	1, configurable as: • 0 to 5V, 0 to 10V; • 0 to 20mA, 4-20mA
Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)
Load	1 KΩ (Min) for V; 500Ω (Max) for mA
Output Resolution	12 bit
High-speed Channels	
No. of inputs	2 channel pairs (X0/X1 and X2/X3)
Maximum Input Frequency	200 KHz
Maximum Input Count	4,294,967,295 (32-bit)
General	
Connection method	Removable terminals (3.81 mm pitch)
Operating Temperature	0 to 55°C
Operating Humidity	10% to 90% (non-condensing)
Mechanical Dimension (W x H x D)	1.88 x 4.25 x 1.61 inches [48x108x41mm]

Configuration

Use MAPware-7000 to assign input (X and XW), output (Y and YW) and configuration (M and MW) memory addresses to the module. These addresses are created according to the slot location of the module, where **nn** refers to the slot number (ex. 01…05):

Function	Register		Access
X0-X11 Digital Inputs	Xnn000-011 (XWnn00)		Read Only
Y0-Y9 Digital Outputs	Ynn000-009 (YWnn00)		Read/Write
High-speed Counter Option	**HSC Channel 1**	**HSC Channel 2**	
HSC Input Pin	X0	X2	Read Only
Quadrature Inputs	**Pair 1**	**Pair 2**	
Counter Inputs	X0, X1	X2, X3	Read Only
HSC Configuration Register	MWnn00	MWnn06	Read/Write
HSC Counter Register (Current Value)	MWnn01	MWnn07	Read/Write
HSC Preset Register	MWnn03	MWnn09	Read/Write
HSC Enable Bit	Mnn080	Mnn176	Read/Write
HSC Reset Bit	Mnn081	Mnn177	Read/Write
Output Flag	Y2	Y3	
PWM Outputs	**Channel 1**	**Channel 2**	
Output	Y0		Read Only
PWM Configuration Register	MWnn24		Read/Write
Frequency Setting Register	MWnn25		Read/Write
ON Duty Setting Register (Duty Cycle)	MWnn27		Read/Write
Pulse Enable Flag	Mnn576		Read/Write
ON Duty Setting Error Flag	Mnn466		Read Only
Frequency Setting Error Flag	Mnn467		Read Only
Analog Inputs	**Register**		
Input Channel 0 Data	XWnn11		Read Only
Input Channel 1 Data	XWnn13		Read Only
Input Channel 0 Config Register	MWnn60		Read/Write
Input Channel 1 Config Register	MWnn61		Read/Write
Analog Outputs	**Register**		
Output Channel 0 Data (Voltage)	YWnn01		Read/Write
Output Channel 0 Data (Current)	YWnn02		Read/Write
Output Channel 0 Config Register	MWnn68		Read/Write

Reference the table below when configuring each HSC Configuration Register:

Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

Reference the table below when configuring the PWM Configuration Registers:

Output Mode	Register Value
Normal PWM (fixed frequency)	1
Normal PWM (variable frequency)	2
CW/CCW (fixed frequency)	3
CW/CCW (variable frequency)	4
Pulse/Direction (fixed frequency)	7
Pulse/Direction (variable frequency)	8
Trapezoidal (Fixed Pulse Mode)	9

Reference the tables below when configuring each Analog Input and Output Configuration Register:

Input Signal Type	Register Value
Voltage, 0 to 10V	1
Voltage, 0 to 5V	6
Current, 4 to 20mA	2
Current, 0 to 20mA	3

Output Signal Type	Register Value
Voltage, 0 to 10V	2
Voltage, 0 to 5V	1
Current, 4 to 20mA	5
Current, 0 to 20mA	6

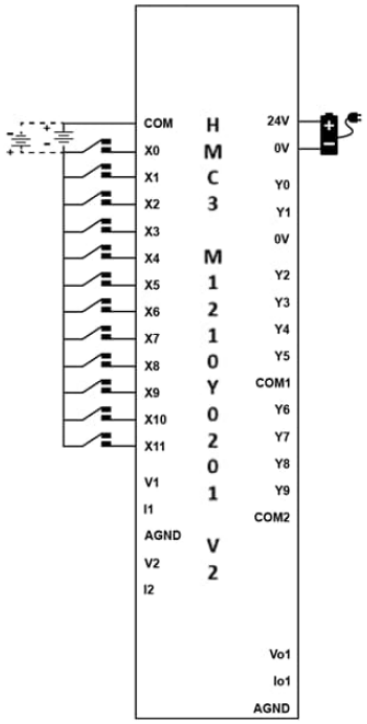
The values in the appropriate analog input register range from 0-65535, while analog output register values range from 0-4095.

Expansion Module Reg Value	Input Values			
	0 to 20mA	4 to 20mA	0 to 10V	0 to 5V
0	0mA	4mA	0V	0V
16384	5mA	8mA	2.5V	1.25V
32768	10mA	12mA	5V	2.5V
49152	15mA	16mA	7.5V	3.75V
65535	20mA	20mA	10V	5V

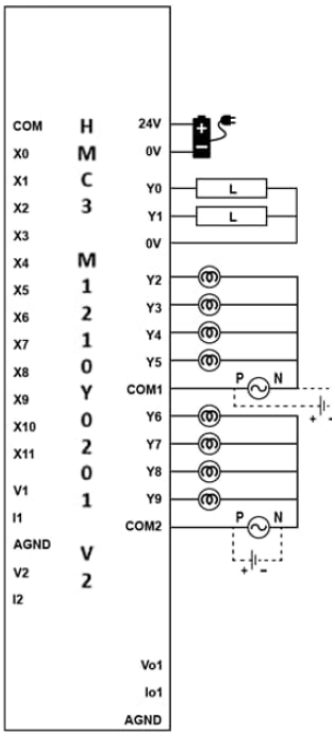
Expansion Module Reg Value	Output Values	
	0 to 10V	4 to 20mA
0	0	4mA
1024	2.5V	8mA
2048	5V	12mA
3072	7.5V	16mA
4095	10V	20mA

Wiring

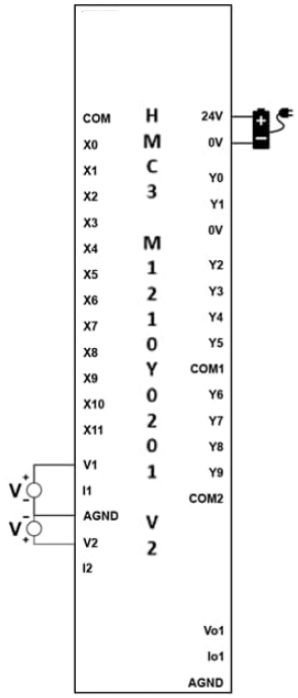
Digital Input



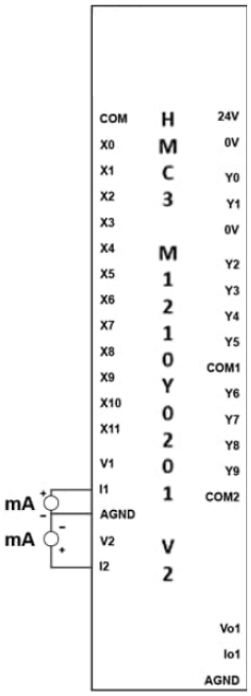
Digital Output

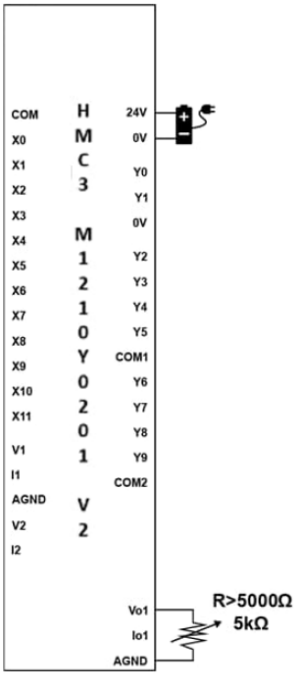
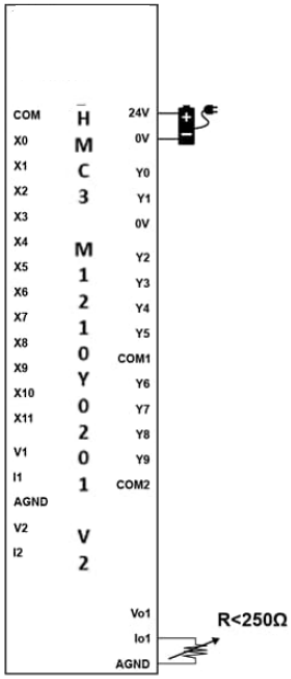


Analog Input Voltage

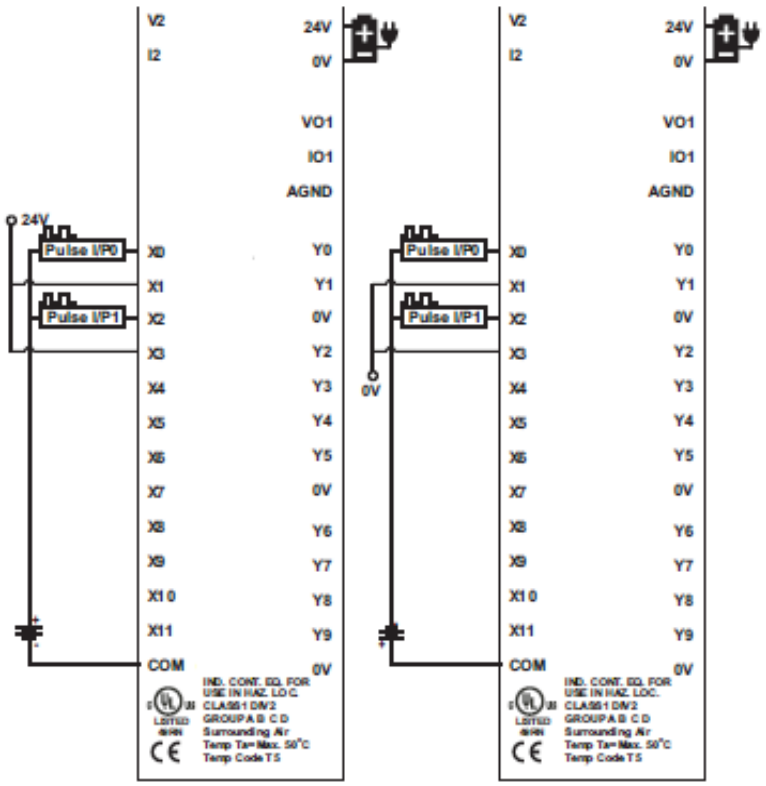


Analog Input Current

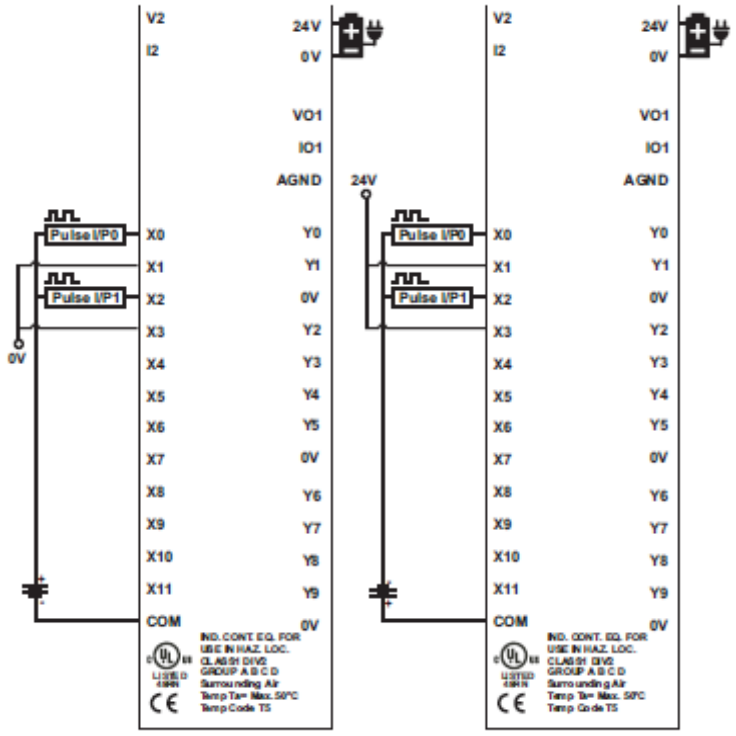


Analog Output Voltage	Analog Output Current
	

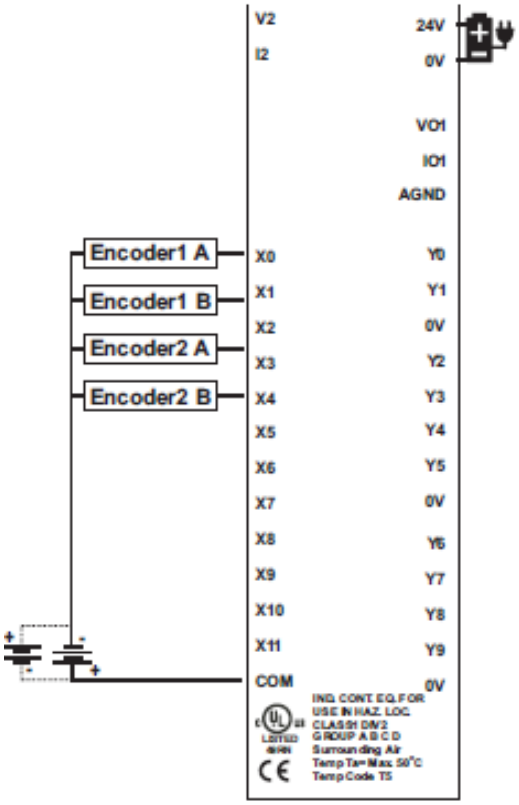
HSC Single Phase Up Counter



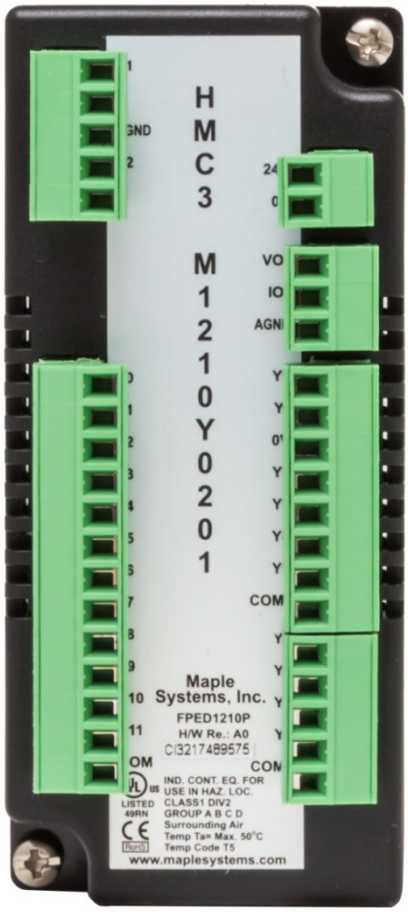
HSC Single Phase Down Counter



HSC Quadrature



HMC3-M1210Y0201



12 Digital Inputs (2 high-speed pairs up to 200kHz)

10 Digital Outputs (8 Relay, 2 PNP w/ PWM up to 1kHz)

2 Analog Inputs

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**

1 Analog Output

- **Voltage: 0-5V, 0-10V**
- **Current: 0-20mA, 4-20mA**

This module is an input/output module for the HMC3000, HMC2000 and HMC4000 Series models. It has twelve digital inputs, two of which are high-speed pairs. There are 10 digital outputs, two are sourcing (PNP) with PWM ability and 8 are relay type.

This module also has two analog inputs (Voltage/Current) and one analog output (Voltage/Current).

Specifications	
Power	12 VDC from base
Certifications	CE, UL
Digital Inputs	12 bidirectional inputs (2 high-speed pairs)
Rated Input Voltage	24 VDC +/- 15%
Rated input current	Up to 5mA (per contact)
Input impedance	4.9K ohms
Minimum ON voltage	15 VDC
Maximum OFF voltage	5 VDC
Turn ON Time	10 mSec
Turn OFF Time	10 mSec
Isolation	Optically isolated from internal circuit
Analog Inputs	2 Inputs, each configurable as: • 0 to 10V, 0 to 5V; • 0 to 20mA, 4-20mA
Input Resolution	16 bit
Input Impedance	3 KΩ
Input Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)

Digital Outputs	10 outputs: 8 Relay, 2 Sourcing (PNP-type) / PWM
Maximum PWM Output Frequency	1KHz
Minimum ON Output Voltage	22 VDC
Maximum ON Output Voltage	30 VDC
Minimum OFF Output Voltage	0.2 VDC
Maximum OFF Output Voltage	1 VDC
Rated Load	250mA @ 24VDC 2A @230VAC
Nominal load	96Ω 6W (resistive) @ 24VDC 6VA (inductive, UPF)
Analog Outputs	1, configurable as: • 0 to 5V, 0 to 10V; • 0 to 20mA, 4-20mA
Accuracy	Overall Accuracy 0.2% of full scale@25°C (max)
Load	1 KΩ (Min) for V; 500Ω (Max) for mA
Output Resolution	12 bit
High-speed Channels	
No. of inputs	2 channel pairs (X0/X1 and X2/X3)
Maximum Input Frequency	200 KHz
Maximum Input Count	4,294,967,295 (32-bit)
General	
Connection method	Removable terminals (3.81 mm pitch)
Operating Temperature	0 to 55°C
Operating Humidity	10% to 90% (non-condensing)
Mechanical Dimension (W x H x D)	1.88 x 4.25 x 1.61 inches [48x108x41mm]

Configuration

Use MAPware-7000 to assign input (X and XW), output (Y and YW) and configuration (M and MW) memory addresses to the module. These addresses are created according to the slot location of the module, where **nn** refers to the slot number (ex. 01…05):

Function	Register		Access
X0-X11 Digital Inputs	Xnn000-011 (XWnn00)		Read Only
Y0-Y9 Digital Outputs	Ynn000-009 (YWnn00)		Read/Write
High-speed Counter Option	**HSC Channel 1**	**HSC Channel 2**	
HSC Input Pin	X0	X2	Read Only
Quadrature Inputs	**Pair 1**	**Pair 2**	
Counter Inputs	X0, X1	X2, X3	Read Only
HSC Configuration Register	MWnn00	MWnn06	Read/Write
HSC Counter Register (Current Value)	MWnn01	MWnn07	Read/Write
HSC Preset Register	MWnn03	MWnn09	Read/Write
HSC Enable Bit	Mnn080	Mnn176	Read/Write
HSC Reset Bit	Mnn081	Mnn177	Read/Write
Output Flag	Y2	Y3	
PWM Outputs	**Channel 1**	**Channel 2**	
Output	Y0	Y1	Read Only
PWM Configuration Register	MWnn24	MWnn30	Read/Write
Frequency Setting Register	MWnn25	MWnn31	Read/Write
ON Duty Setting Register (Duty Cycle)	MWnn27	MWnn33	Read/Write
Pulse Enable Flag	Mnn576	Mnn577	Read/Write
ON Duty Setting Error Flag	Mnn466	Mnn471	Read Only
Frequency Setting Error Flag	Mnn467	Mnn472	Read Only
Analog Inputs	**Register**		
Input Channel 0 Data	XWnn11		Read Only
Input Channel 1 Data	XWnn13		Read Only
Input Channel 0 Config Register	MWnn60		Read/Write
Input Channel 1 Config Register	MWnn61		Read/Write
Analog Outputs	**Register**		
Output Channel 0 Data (Voltage)	YWnn01		Read/Write
Output Channel 0 Data (Current)	YWnn02		Read/Write
Output Channel 0 Config Register	MWnn68		Read/Write

Reference the table below when configuring each HSC Configuration Register:

Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

Reference the table below when configuring the PWM Configuration Registers:

Output Mode	Register Value
Normal PWM (fixed frequency)	1
Normal PWM (variable frequency)	2
CW/CCW (fixed frequency)	3
CW/CCW (variable frequency)	4
Pulse/Direction (fixed frequency)	7
Pulse/Direction (variable frequency)	8
Trapezoidal (Fixed Pulse Mode)	9

Reference the tables below when configuring each Analog Input and Output Configuration Register:

Input Signal Type	Register Value
Voltage, 0 to 10V	1
Voltage, 0 to 5V	6
Current, 4 to 20mA	2
Current, 0 to 20mA	3

Output Signal Type	Register Value
Voltage, 0 to 10V	2
Voltage, 0 to 5V	1
Current, 4 to 20mA	5
Current, 0 to 20mA	6

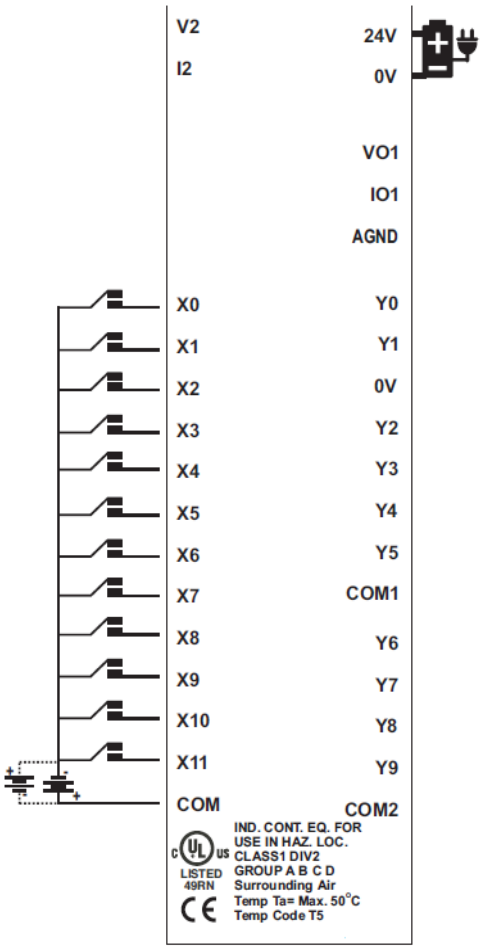
The values in the appropriate analog input register range from 0-64000, with over and under indications at 65000 and 65001, while analog output register values range from 0-4095.

Expansion Module Reg Value	Input Values			
	0 to 20mA	4 to 20mA	0 to 10V	0 to 5V
0	0mA	4mA	0V	0V
16384	5mA	8mA	2.5V	1.25V
32768	10mA	12mA	5V	2.5V
49152	15mA	16mA	7.5V	3.75V
64000	20mA	20mA	10V	5V
65000	< 0mA	< 4mA	< 0V	< 0V
65001	> 20mA	> 20mA	> 10V	> 5V

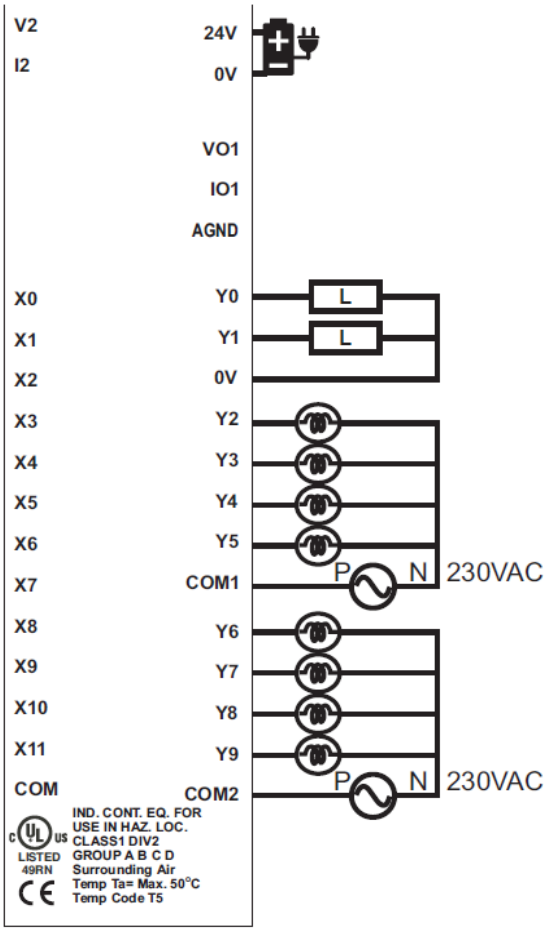
Expansion Module Reg Value	Output Values	
	0 to 10V	4 to 20mA
0	0	4mA
1024	2.5V	8mA
2048	5V	12mA
3072	7.5V	16mA
4095	10V	20mA

Wiring:

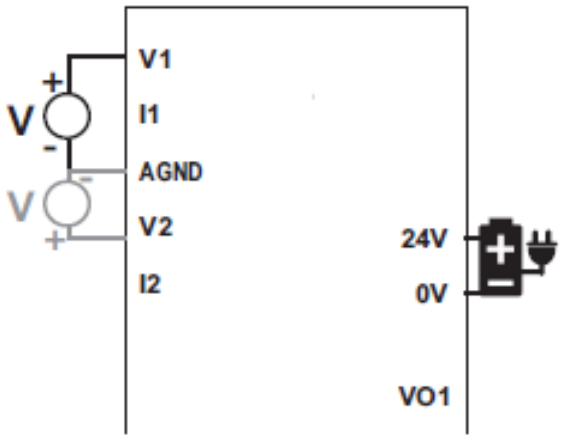
Digital Inputs



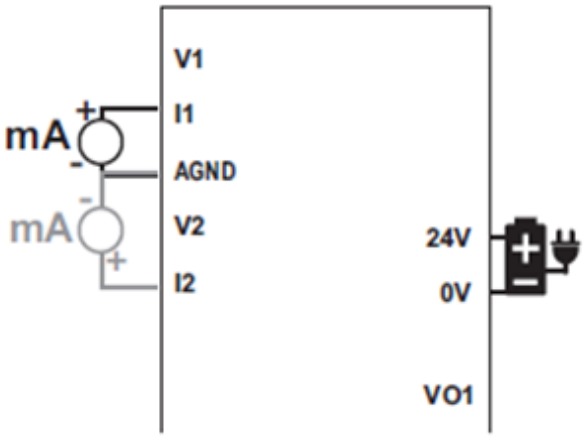
Digital Outputs



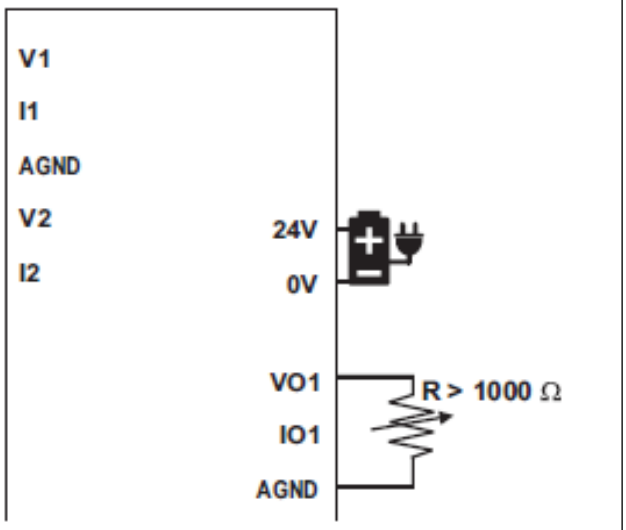
Analog Input (Voltage)



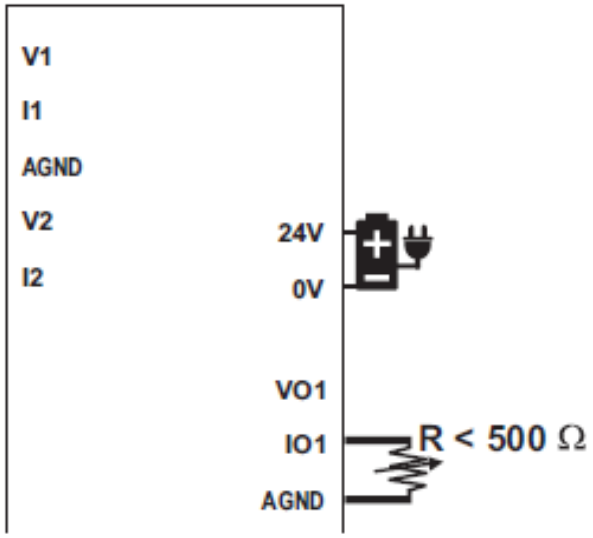
Analog Input (Current)



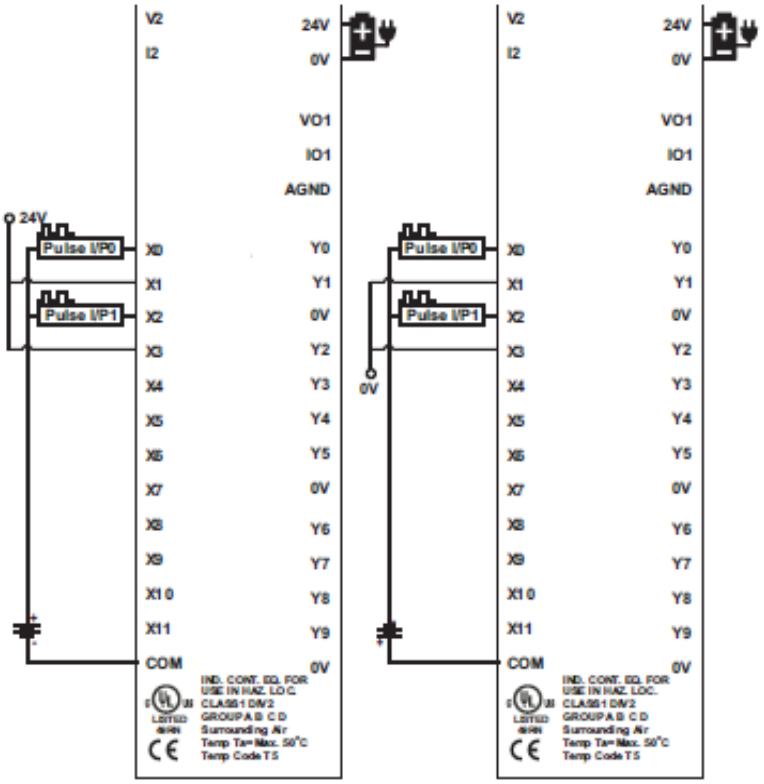
Analog Output (Voltage)



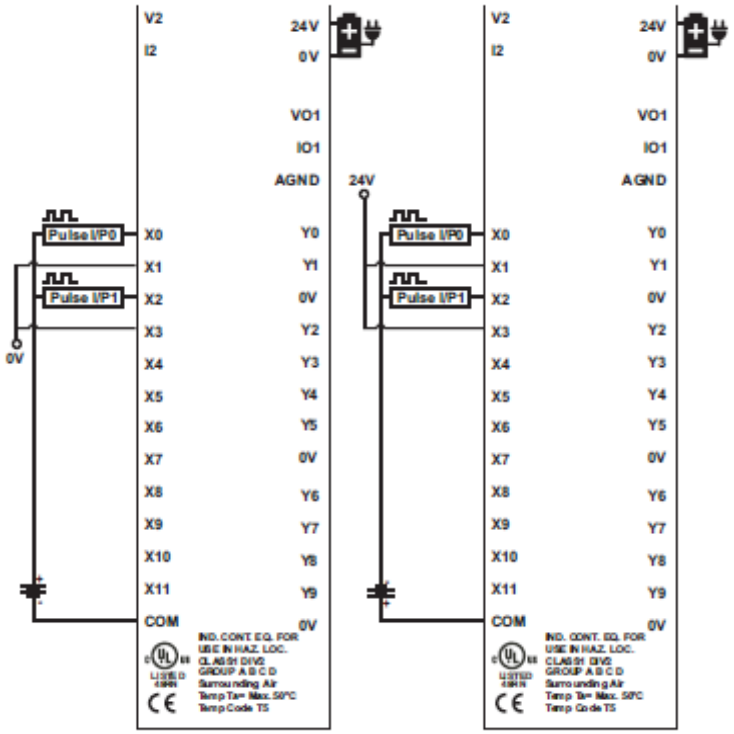
Analog Output (Current)



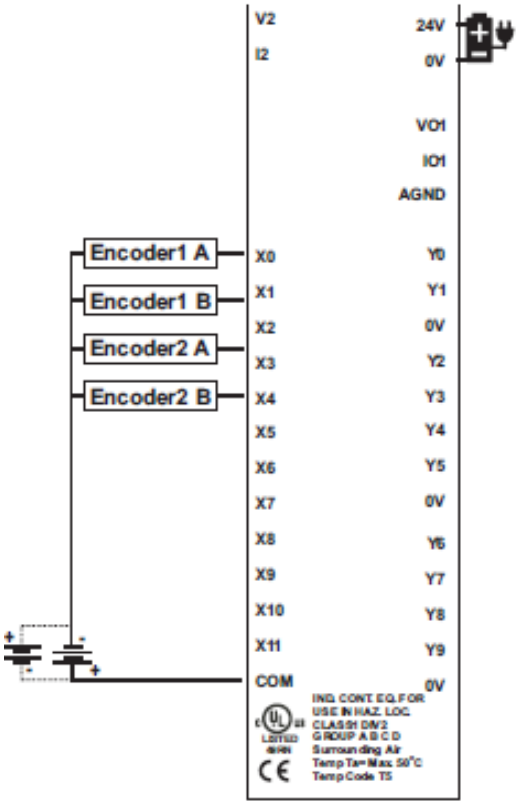
HSC Single Phase Up Counter



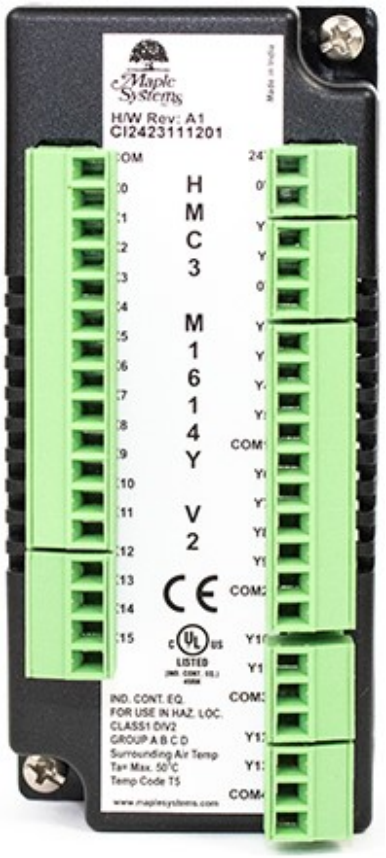
HSC Single Phase Down Counter



HSC Quadrature



HMC3-M1614Y V2



16 Digital Inputs (2 high-speed pairs up to 200kHz)

14 Digital Outputs (12 Relay, 2 PNP w/ 1 PWM up to 1kHz)

This module is a digital input/output module for the HMC2000 and HMC4000 Series models.

It has 16 digital inputs. The module also features 14 digital outputs, 2 sourcing (PNP) outputs with 1 capable of PWM operation and 12 relay type outputs.

[Note: HMC3 I/O Module V2 Series are only compatible with HMC2000/ HMC4000 Series Base Model]

Specifications	
Power	3.3 VDC from HMC3000 base
Certifications	CE, UL
Digital Inputs	16 bidirectional inputs (2 high-speed pairs)
Rated Input Voltage	24 VDC +/- 15%
Rated input current	Up to 5mA (per contact)
Input impedance	4.9K ohms
Minimum ON voltage	15 VDC
Maximum OFF voltage	5 VDC
Turn ON Time	10 mSec
Turn OFF Time	10 mSec
Isolation	Optically isolated from internal circuit
Digital Outputs	14 outputs: 12 Relay, 2 Sourcing (PNP-type) / 1 PWM
Maximum PWM Output Frequency	1KHz
Minimum ON Output Voltage	22 VDC
Maximum ON Output Voltage	30 VDC
Minimum OFF Output Voltage	0.2 VDC
Maximum OFF Output Voltage	1 VDC
Rated Load	250mA @ 24VDC 2A @230VAC
Nominal load	96Ω 6W (resistive) @ 24VDC 6VA (inductive, UPF)
High-speed Channels	
No. of inputs	2 channel pairs (X0/X1 and X2/X3)

Maximum Input Frequency	200 KHz
Maximum Input Count	4,294,967,295 (32-bit)
General	
Connection method	Removable terminals (3.81 mm pitch)
Operating Temperature	0 to 55°C
Operating Humidity	10% to 90% (non-condensing)
Mechanical Dimension (W x H x D)	1.88 x 4.25 x 1.61 inches [48x108x41mm]

Function	Register	Access
X0-X15 Digital Inputs	Xnn000-015 (XWnn00)	Read Only
Y0-Y13 Digital Outputs	Ynn000-013 (YWnn00)	Read/Write

Configuration

Use MAPware-7000 to assign input (X and XW), output (Y and YW) and configuration (M and MW) memory addresses to the module. These addresses are created according to the slot location of the module, where **nn** refers to the slot number (ex. 01…05):

Function	Register		Access
X0-X15 Digital Inputs	Xnn000-015 (XWnn00)		Read Only
Y0-Y13 Digital Outputs	Ynn000-013 (YWnn00)		Read/Write
High-speed Counter Option	**HSC Channel 1**	**HSC Channel 2**	
HSC Input Pin	X0	X2	Read Only
Quadrature Inputs	**Pair 1**	**Pair 2**	
Counter Inputs	X0, X1	X2, X3	Read Only
HSC Configuration Register	MWnn00	MWnn06	Read/Write
HSC Counter Register (Current Value)	MWnn01	MWnn07	Read/Write
HSC Preset Register	MWnn03	MWnn09	Read/Write
HSC Enable Bit	Mnn080	Mnn176	Read/Write
HSC Reset Bit	Mnn081	Mnn177	Read/Write
Output Flag	Y2	Y3	
PWM Outputs	**Channel 1**		
Output	Y0		Read Only
PWM Configuration Register	MWnn24		Read/Write
Frequency Setting Register	MWnn25		Read/Write
ON Duty Setting Register (Duty Cycle)	MWnn27		Read/Write
Pulse Enable Flag	Mnn576		Read/Write
ON Duty Setting Error Flag	Mnn466		Read Only
Frequency Setting Error Flag	Mnn467		Read Only

Reference the table below when configuring each HSC Configuration Register:

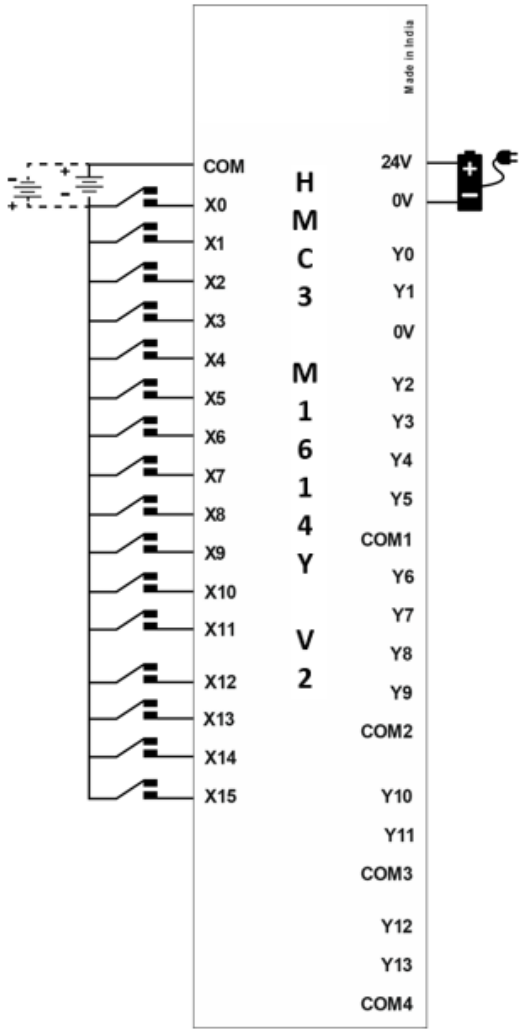
Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

Reference the table below when configuring the PWM Configuration Registers:

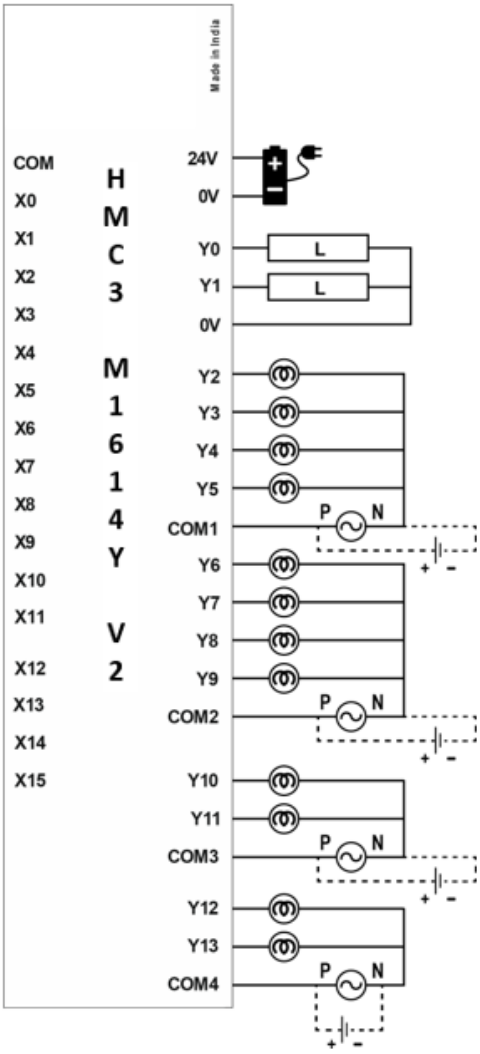
Output Mode	Register Value
Normal PWM (fixed frequency)	1
Normal PWM (variable frequency)	2
CW/CCW (fixed frequency)	3
CW/CCW (variable frequency)	4
Pulse/Direction (fixed frequency)	7
Pulse/Direction (variable frequency)	8
Trapezoidal (Fixed Pulse Mode)	9

Wiring:

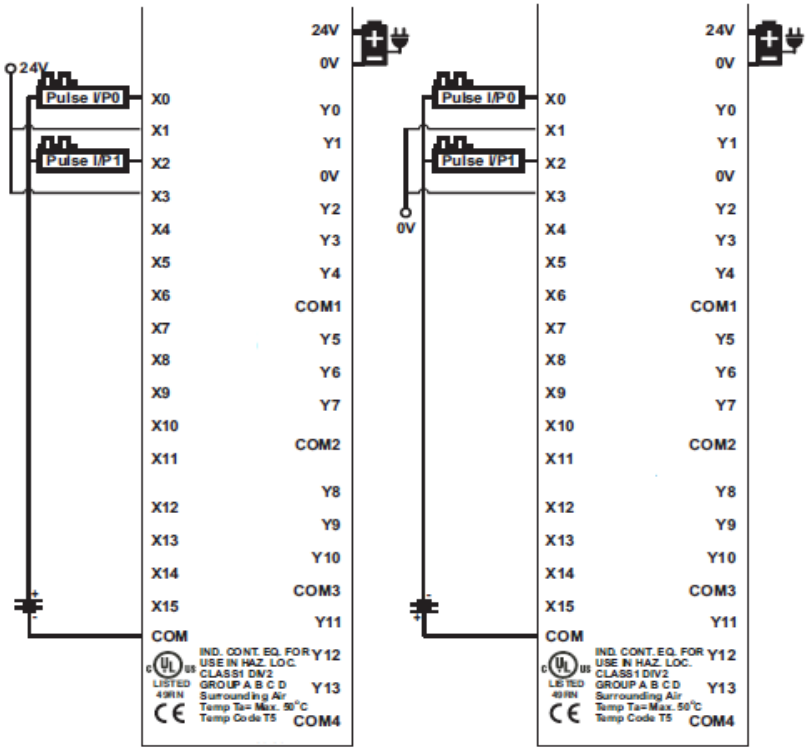
Digital Inputs



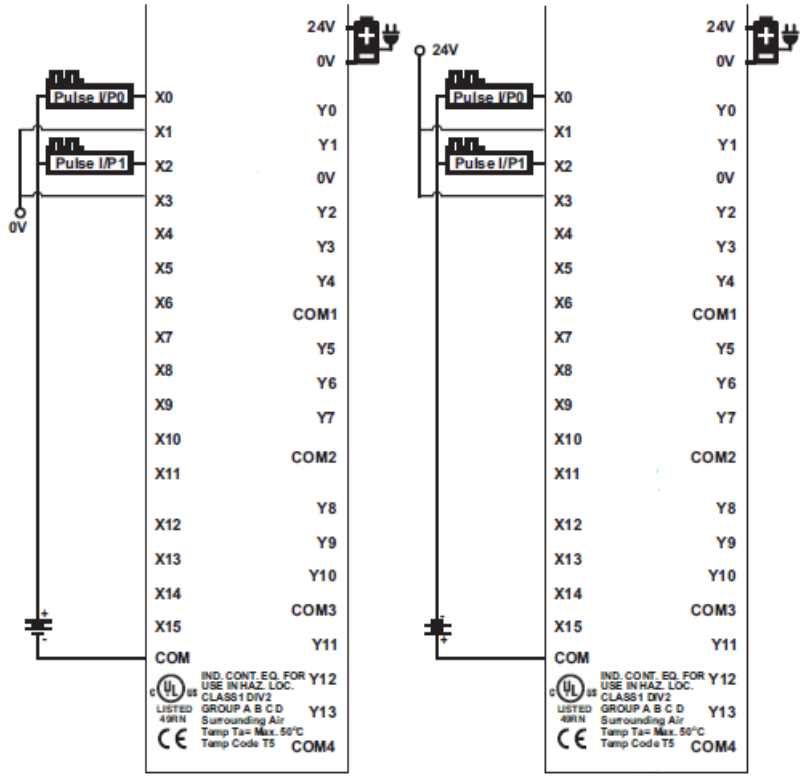
Digital Outputs



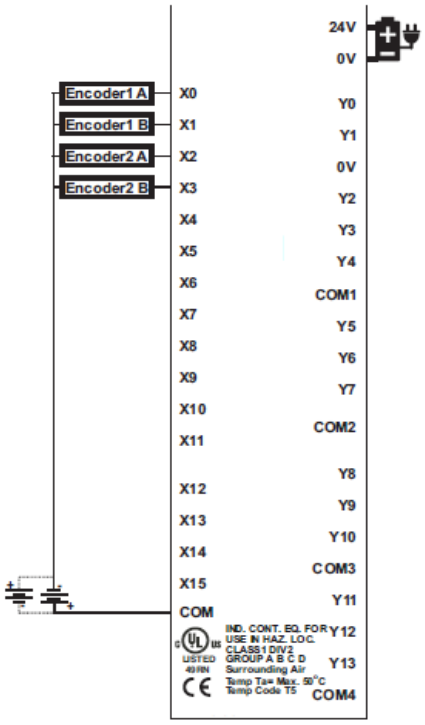
HSC Single Phase Up Counter



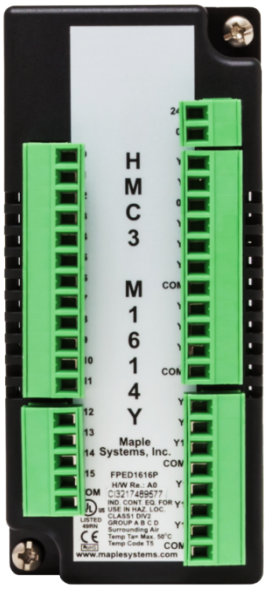
HSC Single Phase Down Counter



HSC Quadrature



HMC3-M1614Y



16 Digital Inputs (2 high-speed pairs up to 200kHz)

14 Digital Outputs (12 Relay, 2 PNP w/ PWM up to 1kHz)

This module is a digital input/output module for the HMC3000, HMC2000 and HMC4000 Series models. It has 16 digital inputs, 2 of which are high-speed pairs.

The module also features 14 digital outputs, 2 sourcing (PNP) outputs capable of PWM operation and 12 relay type outputs.

Specifications	
Power	3.3 VDC from HMC3000 base
Certifications	CE, UL
Digital Inputs	16 bidirectional inputs (2 high-speed pairs)
Rated Input Voltage	24 VDC +/- 15%
Rated input current	Up to 5mA (per contact)
Input impedance	4.9K ohms
Minimum ON voltage	15 VDC
Maximum OFF voltage	5 VDC
Turn ON Time	10 mSec
Turn OFF Time	10 mSec
Isolation	Optically isolated from internal circuit
Digital Outputs	14 outputs: 12 Relay, 2 Sourcing (PNP-type) / PWM
Maximum PWM Output Frequency	1KHz
Minimum ON Output Voltage	22 VDC
Maximum ON Output Voltage	30 VDC
Minimum OFF Output Voltage	0.2 VDC
Maximum OFF Output Voltage	1 VDC
Rated Load	250mA @ 24VDC 2A @230VAC
Nominal load	96Ω 6W (resistive) @ 24VDC 6VA (inductive, UPF)
High-speed Channels	
No. of inputs	2 channel pairs (X0/X1 and X2/X3)
Maximum Input Frequency	200 KHz
Maximum Input Count	4,294,967,295 (32-bit)
General	
Connection method	Removable terminals (3.81 mm pitch)
Operating Temperature	0 to 55°C
Operating Humidity	10% to 90% (non-condensing)
Mechanical Dimension (W x H x D)	1.88 x 4.25 x 1.61 inches [48x108x41mm]

Configuration

Use MAPware-7000 to assign input (X and XW), output (Y and YW) and configuration (M and MW) memory addresses to the module. These addresses are created according to the slot location of the module, where **nn** refers to the slot number (ex. 01…05):

Function	Register		Access
X0-X15 Digital Inputs	Xnn000-015 (XWnn00)		Read Only
Y0-Y13 Digital Outputs	Ynn000-013 (YWnn00)		Read/Write
High-speed Counter Option	**HSC Channel 1**	**HSC Channel 2**	
HSC Input Pin	X0	X2	Read Only
Quadrature Inputs	**Pair 1**	**Pair 2**	
Counter Inputs	X0, X1	X2, X3	Read Only
HSC Configuration Register	MWnn00	MWnn06	Read/Write
HSC Counter Register (Current Value)	MWnn01	MWnn07	Read/Write
HSC Preset Register	MWnn03	MWnn09	Read/Write
HSC Enable Bit	Mnn080	Mnn176	Read/Write
HSC Reset Bit	Mnn081	Mnn177	Read/Write
Output Flag	Y2	Y3	
PWM Outputs	**Channel 1**	**Channel 2**	
Output	Y0	Y1	Read Only
PWM Configuration Register	MWnn24	MWnn30	Read/Write
Frequency Setting Register	MWnn25	MWnn31	Read/Write
ON Duty Setting Register (Duty Cycle)	MWnn27	MWnn33	Read/Write
Pulse Enable Flag	Mnn576	Mnn577	Read/Write
ON Duty Setting Error Flag	Mnn466	Mnn471	Read Only
Frequency Setting Error Flag	Mnn467	Mnn472	Read Only

Reference the table below when configuring each HSC Configuration Register:

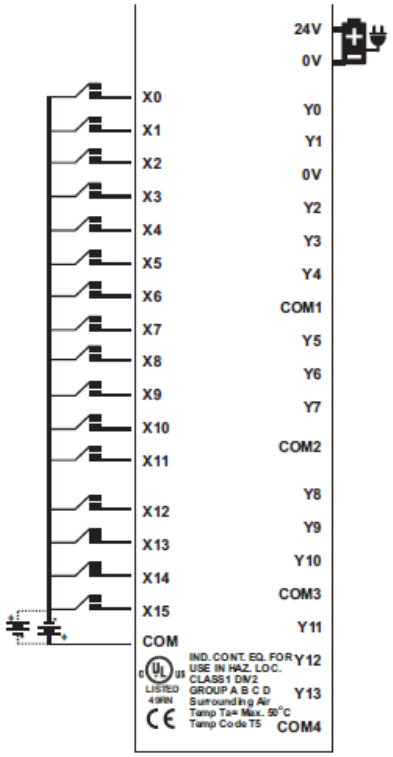
Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

Reference the table below when configuring the PWM Configuration Registers:

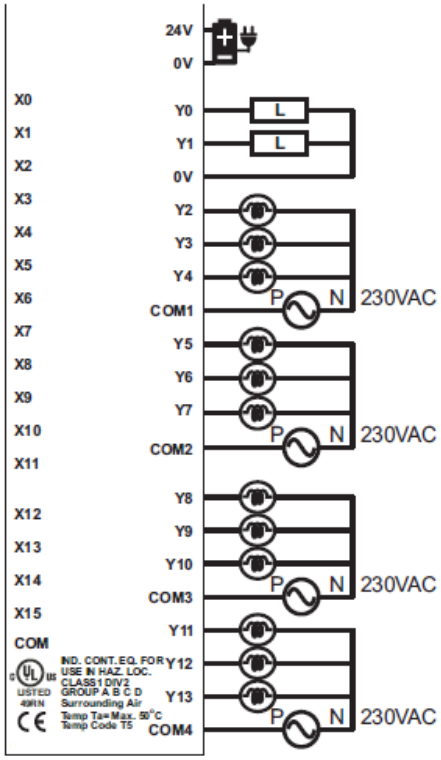
Output Mode	Register Value
Normal PWM (fixed frequency)	1
Normal PWM (variable frequency)	2
CW/CCW (fixed frequency)	3
CW/CCW (variable frequency)	4
Pulse/Direction (fixed frequency)	7
Pulse/Direction (variable frequency)	8
Trapezoidal (Fixed Pulse Mode)	9

Wiring:

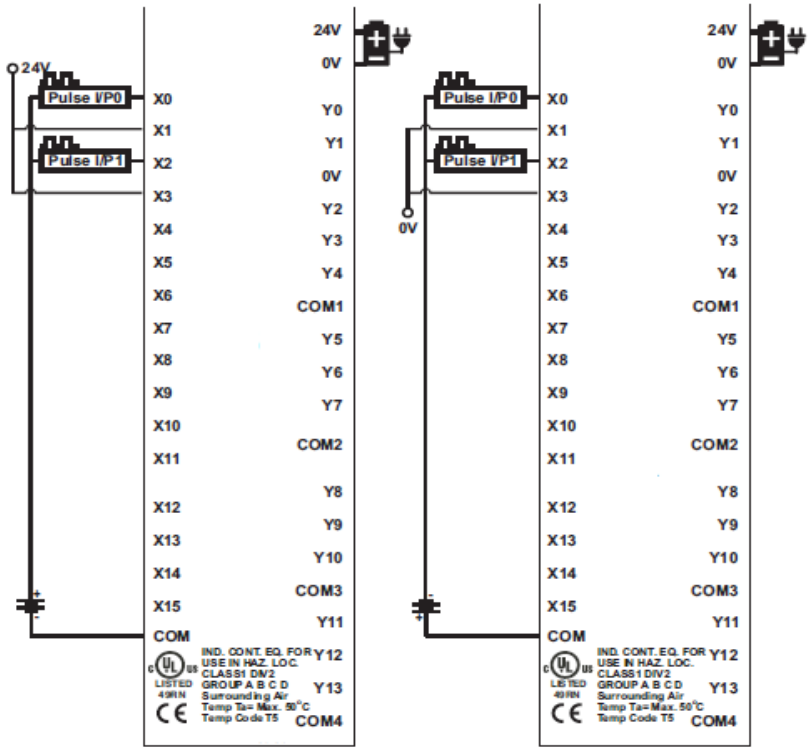
Digital Inputs



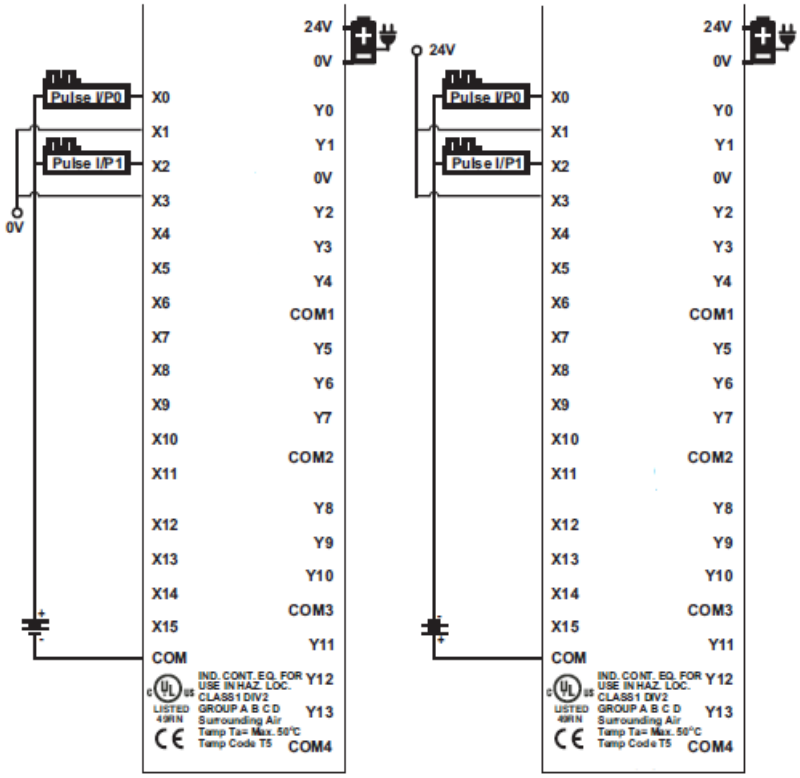
Digital Outputs



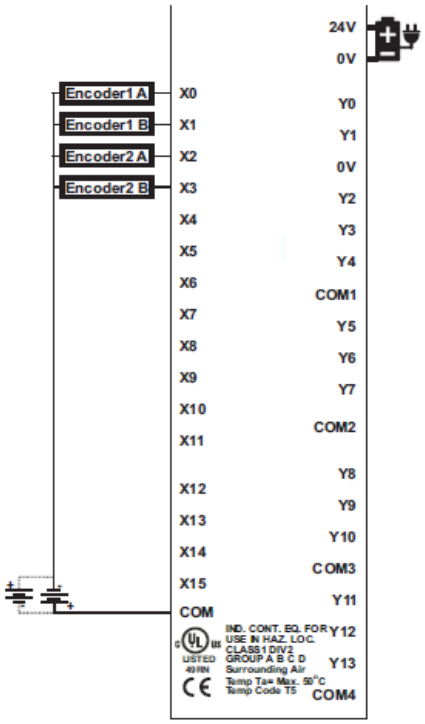
HSC Single Phase Up Counter



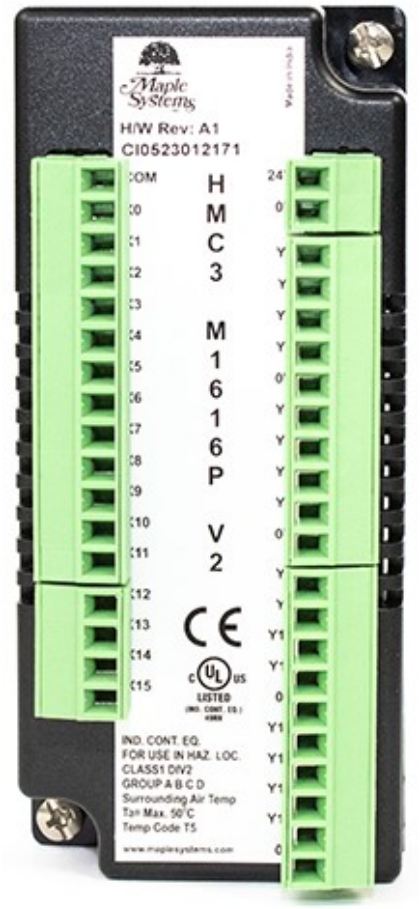
HSC Single Phase Down Counter



HSC Quadrature



HMC3-M1616P V2



16 Digital Inputs (2 high-speed pairs up to 200kHz)

16 Digital Outputs (1 PWM up to 1kHz)

This module is a digital input/output module for the HMC2000 and HMC4000 Series models. It has 16 digital inputs.

The module also features 16 digital sourcing (PNP) outputs, 1 of which can be used for PWM operation.

[Note: HMC3 I/O Module V2 Series are only compatible with HMC2000/ HMC4000 Series Base Model]

Specifications	
Power	12 VDC from base
Certifications	CE, UL
Digital Inputs	16 bidirectional inputs (2 high-speed pairs)
Rated Input Voltage	24 VDC +/- 15%
Rated input current	Up to 5mA (per contact)
Input impedance	4.9K ohms
Minimum ON voltage	15 VDC
Maximum OFF voltage	5 VDC
Turn ON Time	10 mSec
Turn OFF Time	10 mSec
Isolation	Optically isolated from internal circuit
Digital Outputs	16 sourcing outputs (PNP-type), 1 PWM
Maximum PWM Output Frequency	1KHz
Minimum ON Output Voltage	22 VDC
Maximum ON Output Voltage	30 VDC
Minimum OFF Output Voltage	0.2 VDC
Maximum OFF Output Voltage	1 VDC
Rated Load	250mA @ 24VDC
Nominal load	96Ω 6W (resistive) @ 24VDC 6VA (inductive, UPF)
High-speed Channels	

No. of inputs	2 channel pairs (X0/X1 and X2/X3)
Maximum Input Frequency	200 KHz
Maximum Input Count	4,294,967,295 (32-bit)
General	
Connection method	Removable terminals (3.81 mm pitch)
Operating Temperature	0 to 55°C
Operating Humidity	10% to 90% (non-condensing)
Mechanical Dimension (W x H x D)	1.88 x 4.25 x 1.61 inches [48x108x41mm]

Configuration

Use MAPware-7000 to assign input (X and XW), output (Y and YW) and configuration (M and MW) memory addresses to the module. These addresses are created according to the slot location of the module, where **nn** refers to the slot number (ex. 01…05):

Function	Register		Access
X0-X15 Digital Inputs	Xnn000-015 (XWnn00)		Read Only
Y0-Y15 Digital Outputs	Ynn000-015 (YWnn00)		Read/Write
High-speed Counter Option	**HSC Channel 1**	**HSC Channel 2**	
HSC Input Pin	X0	X2	Read Only
Quadrature Inputs	**Pair 1**	**Pair 2**	
Counter Inputs	X0, X1	X2, X3	Read Only
HSC Configuration Register	MWnn00	MWnn06	Read/Write
HSC Counter Register (Current Value)	MWnn01	MWnn07	Read/Write
HSC Preset Register	MWnn03	MWnn09	Read/Write
HSC Enable Bit	Mnn080	Mnn176	Read/Write
HSC Reset Bit	Mnn081	Mnn177	Read/Write
Output Flag	Y2	Y3	
PWM Outputs	**Channel 1**		
Output	Y0		Read Only
PWM Configuration Register	MWnn24		Read/Write
Frequency Setting Register	MWnn25		Read/Write
ON Duty Setting Register (Duty Cycle)	MWnn27		Read/Write
Pulse Enable Flag	Mnn576		Read/Write
ON Duty Setting Error Flag	Mnn466		Read Only
Frequency Setting Error Flag	Mnn467		Read Only

Reference the table below when configuring each HSC Configuration Register:

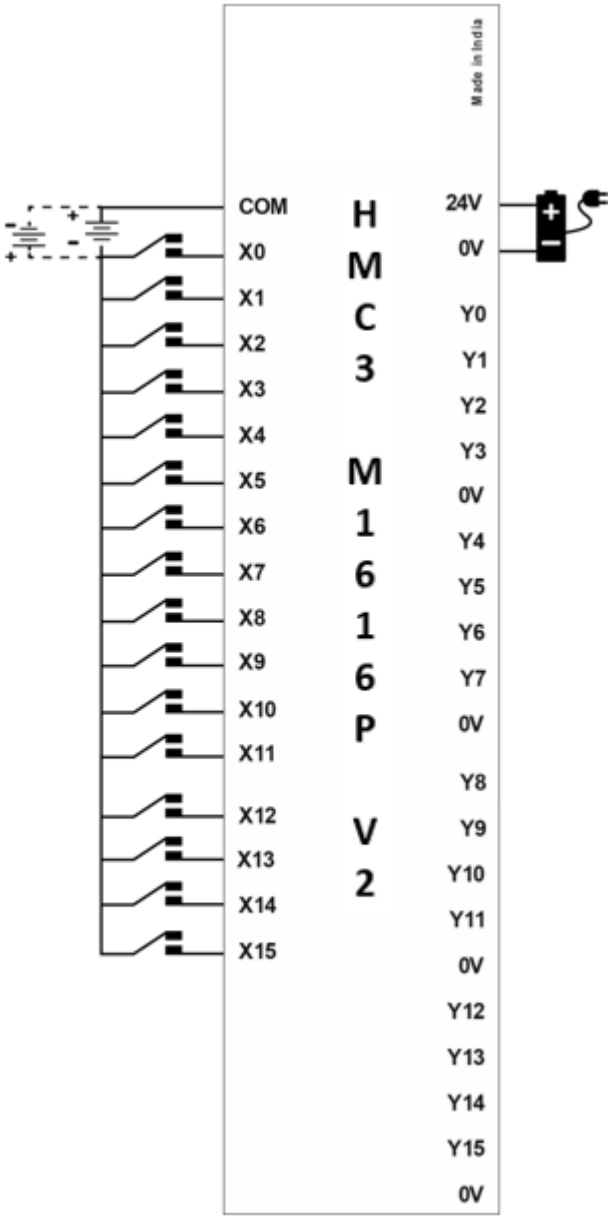
Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

Reference the table below when configuring the PWM Configuration Registers:

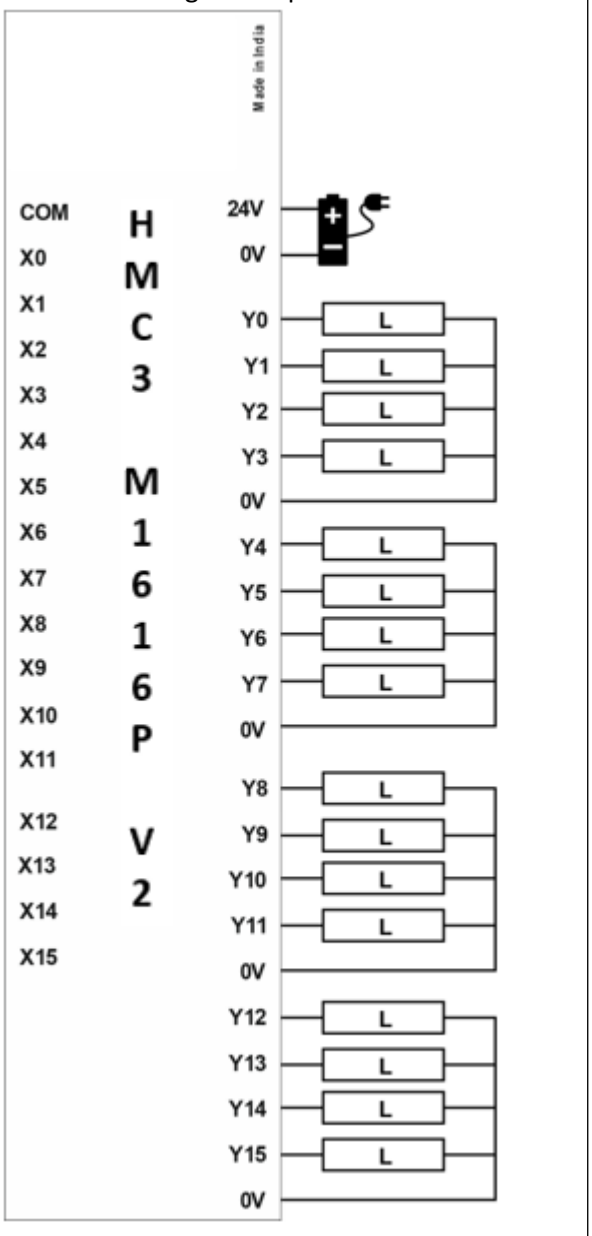
Output Mode	Register Value
Normal PWM (fixed frequency)	1
Normal PWM (variable frequency)	2
CW/CCW (fixed frequency)	3
CW/CCW (variable frequency)	4
Pulse/Direction (fixed frequency)	7
Pulse/Direction (variable frequency)	8
Trapezoidal (Fixed Pulse Mode)	9

Wiring:

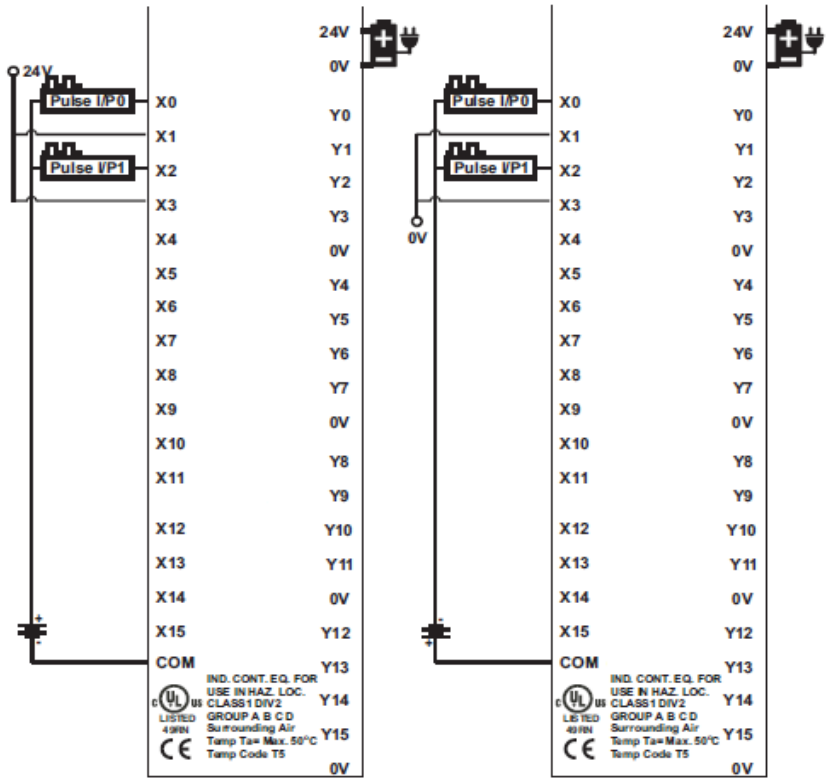
Digital Inputs



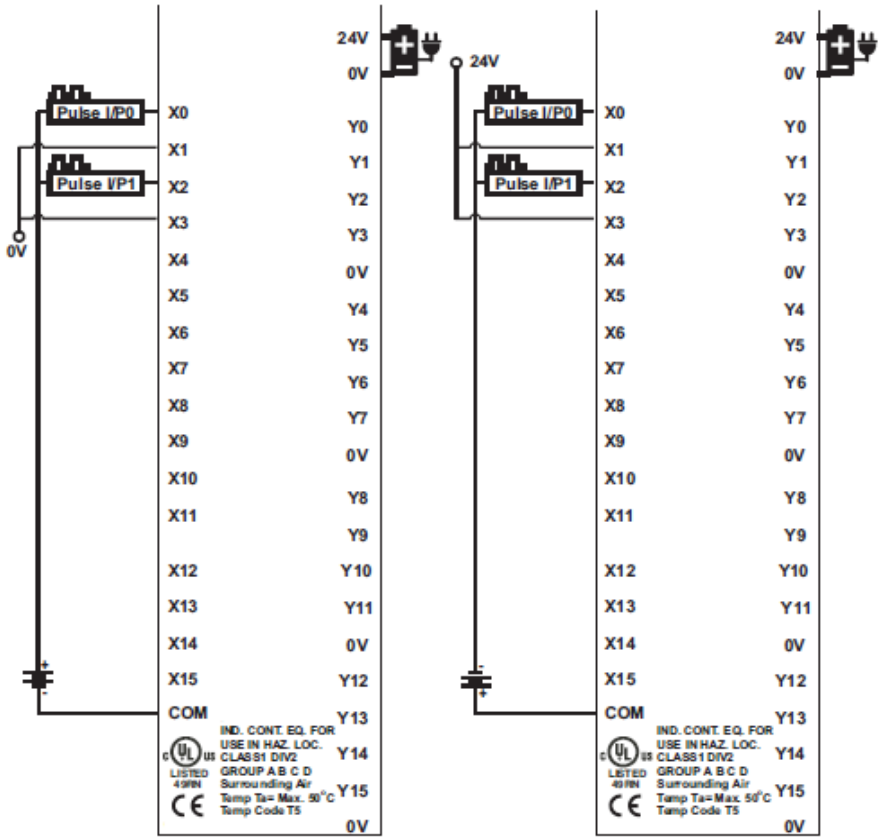
Digital Outputs



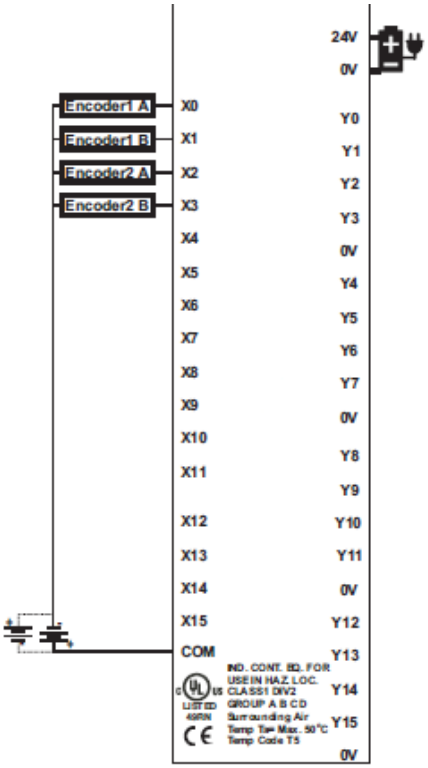
HSC Single Phase Up Counter



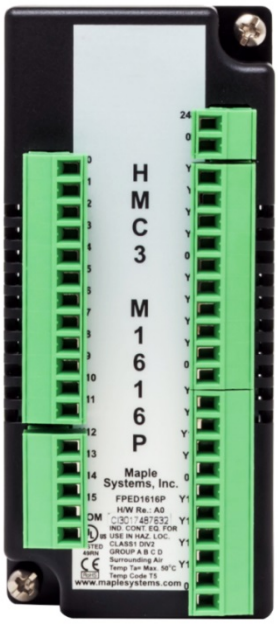
HSC Single Phase Down Counter



HSC Quadrature



HMC3-M1616P



16 Digital Inputs (2 high-speed pairs up to 200kHz)

16 Digital Outputs (2 PWM up to 1kHz)

This module is a digital input/output module for the HMC3000, HMC2000 and HMC4000 Series models. It has 16 digital inputs, 2 of which are high-speed pairs.

The module also features 16 digital sourcing (PNP) outputs, 2 of which can be used for PWM operation.

Specifications	
Power	12 VDC from base
Certifications	CE, UL
Digital Inputs	16 bidirectional inputs (2 high-speed pairs)
Rated Input Voltage	24 VDC +/- 15%
Rated input current	Up to 5mA (per contact)
Input impedance	4.9K ohms
Minimum ON voltage	15 VDC
Maximum OFF voltage	5 VDC
Turn ON Time	10 mSec
Turn OFF Time	10 mSec
Isolation	Optically isolated from internal circuit
Digital Outputs	16 sourcing outputs (PNP-type), 2 PWM
Maximum PWM Output Frequency	1KHz
Minimum ON Output Voltage	22 VDC
Maximum ON Output Voltage	30 VDC
Minimum OFF Output Voltage	0.2 VDC
Maximum OFF Output Voltage	1 VDC
Rated Load	250mA @ 24VDC
Nominal load	96Ω 6W (resistive) @ 24VDC 6VA (inductive, UPF)
High-speed Channels	
No. of inputs	2 channel pairs (X0/X1 and X2/X3)
Maximum Input Frequency	200 KHz
Maximum Input Count	4,294,967,295 (32-bit)
General	
Connection method	Removable terminals (3.81 mm pitch)
Operating Temperature	0 to 55°C
Operating Humidity	10% to 90% (non-condensing)
Mechanical Dimension (W x H x D)	1.88 x 4.25 x 1.61 inches [48x108x41mm]

Configuration

Use MAPware-7000 to assign input (X and XW), output (Y and YW) and configuration (M and MW) memory addresses to the module. These addresses are created according to the slot location of the module, where **nn** refers to the slot number (ex. 01…05):

Function	Register		Access
X0-X15 Digital Inputs	Xnn000-015 (XWnn00)		Read Only
Y0-Y15 Digital Outputs	Ynn000-015 (YWnn00)		Read/Write
High-speed Counter Option	**HSC Channel 1**	**HSC Channel 2**	
HSC Input Pin	X0	X2	Read Only
Quadrature Inputs	**Pair 1**	**Pair 2**	
Counter Inputs	X0, X1	X2, X3	Read Only
HSC Configuration Register	MWnn00	MWnn06	Read/Write
HSC Counter Register (Current Value)	MWnn01	MWnn07	Read/Write
HSC Preset Register	MWnn03	MWnn09	Read/Write
HSC Enable Bit	Mnn080	Mnn176	Read/Write
HSC Reset Bit	Mnn081	Mnn177	Read/Write
Output Flag	Y2	Y3	
PWM Outputs	**Channel 1**	**Channel 2**	
Output	Y0	Y1	Read Only
PWM Configuration Register	MWnn24	MWnn30	Read/Write
Frequency Setting Register	MWnn25	MWnn31	Read/Write
ON Duty Setting Register (Duty Cycle)	MWnn27	MWnn33	Read/Write
Pulse Enable Flag	Mnn576	Mnn577	Read/Write
ON Duty Setting Error Flag	Mnn466	Mnn471	Read Only
Frequency Setting Error Flag	Mnn467	Mnn472	Read Only

Reference the table below when configuring each HSC Configuration Register:

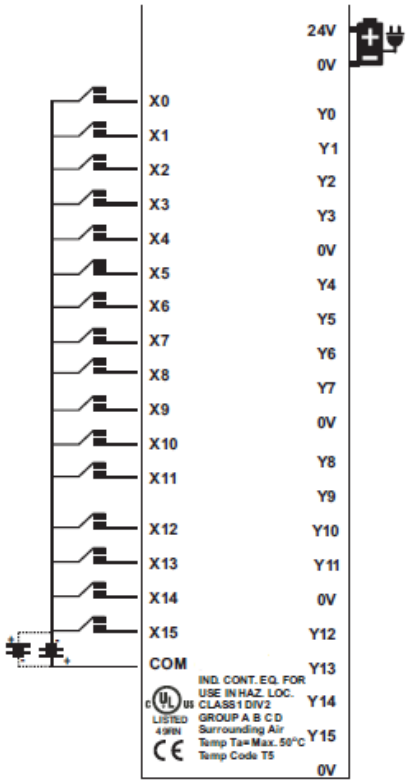
Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up/Down Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

Reference the table below when configuring the PWM Configuration Registers:

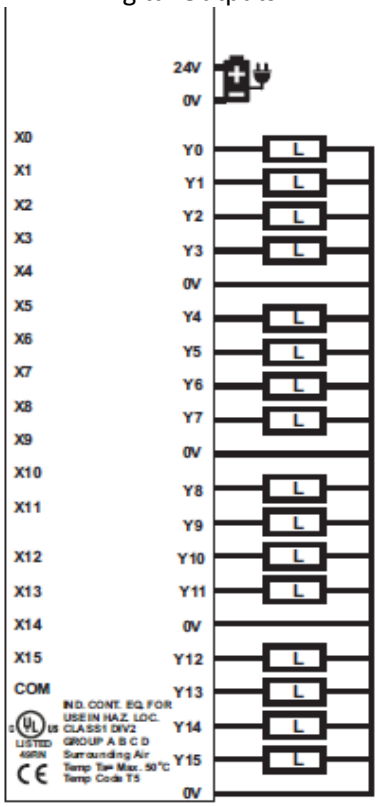
Output Mode	Register Value
Normal PWM (fixed frequency)	1
Normal PWM (variable frequency)	2
CW/CCW (fixed frequency)	3
CW/CCW (variable frequency)	4
Pulse/Direction (fixed frequency)	7
Pulse/Direction (variable frequency)	8
Trapezoidal (Fixed Pulse Mode)	9

Wiring:

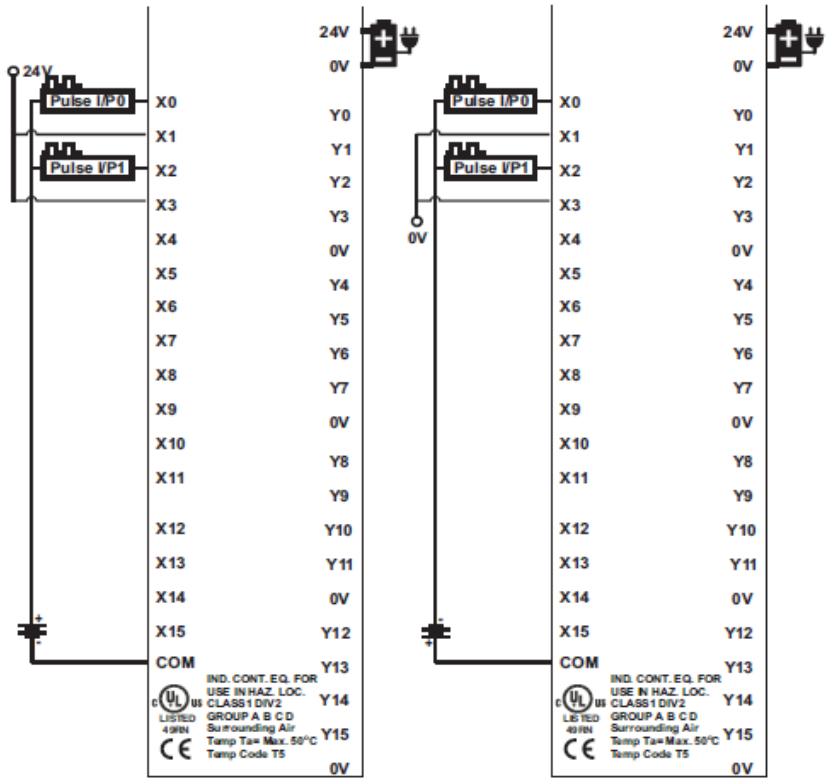
Digital Inputs



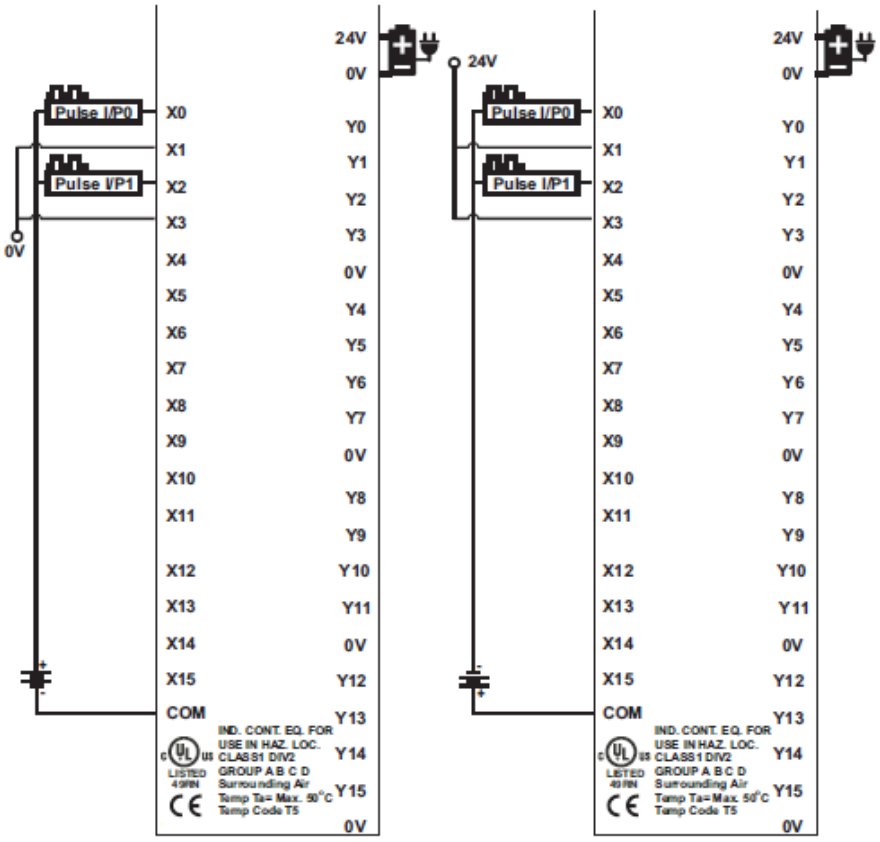
Digital Outputs



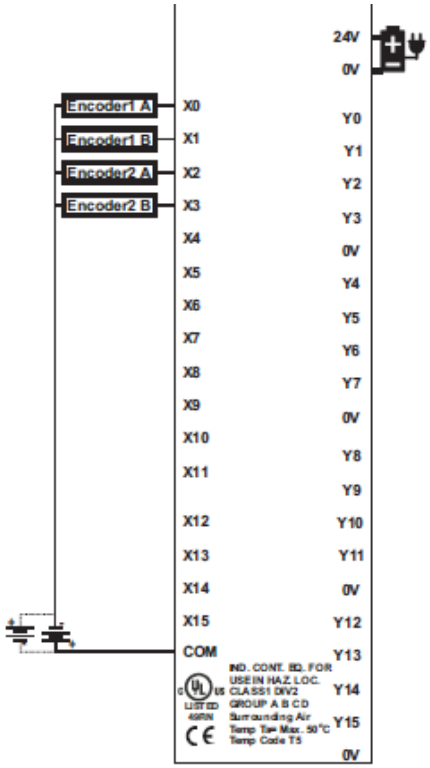
HSC Single Phase Up Counter



HSC Single Phase Down Counter



HSC Quadrature



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