Quick Start Guide
HMC7-MIO-06

Description:
HMC7-MIO-06 I/O expansion module with eight digital bidirectional inputs (including four high-speed inputs), six normally open (Form A) relay outputs and two sinking (NPN) digital outputs

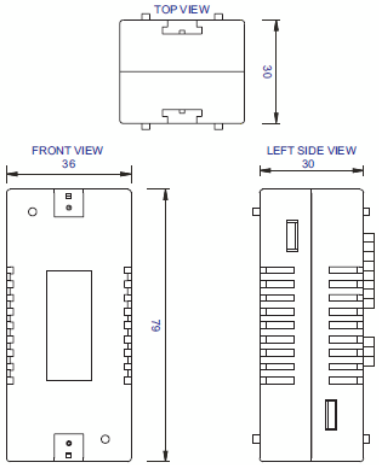
Contents:
- One HMC7-MIO-06 (in plastic bag)
- Quick Start Guide

Programming software (MAPware-7000), cables, and power supply purchased separately.

Specifications:

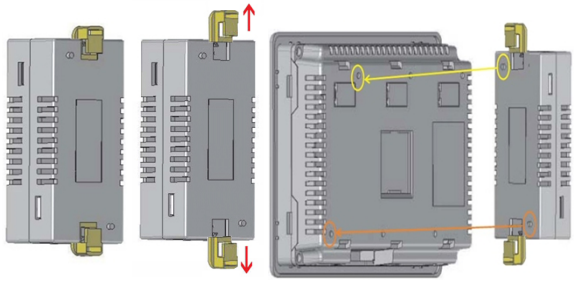
Power:	3.9VDC from HMC7000 base 24 VDC 4A max (user supplied)
Digital Inputs:	Eight bidirectional inputs (Four high speed – 25KHz)
Rated Input Current:	up to 5mA (per contact)
Input Impedance:	4.7KΩ
Minimum ON voltage:	15 VDC
Maximum OFF voltage:	5 VDC
Turn ON/OFF time:	10 msec
Isolation:	Optically isolated from internal circuit
Special Input Functions:	
High Speed Channels:	Four inputs, X0, X5, X2 and X7
Maximum Input Frequency:	25KHz
Maximum Input Count:	4,294,967,295 (32-bit)
Digital Outputs:	Six NO relay, two sinking (NPN-type) outputs
Output Capacity (NPN):	500mA max per output
Output Capacity (relay):	2A per contact, 6A per common
Rated Load:	500mA @ 24VDC (300 mA PWM)
Total Output Capacity:	4A @ 24VDC
PWM Outputs:	2 Channels (Y2 and Y4)
Connection Method:	Removable terminals (3.81 mm pitch)
Operating Temp:	0 to 55° C
Humidity:	10% to 90% (non-condensing)
Dimensions:	3.11 x 1.18 x 1.42 inches [79x30x36mm]

Dimensional Details:



Mounting Module to HMC7000:
The HMC7 I/O module must be mounted onto the back of a HMC7000 Series unit using one of the HMC expansion ports. When locating equipment behind the HMC7000 ensure that AC power wiring, PLC output modules, contactors, starters, relay and any other source of electrical interference are located away from the HMC7000. Make sure that variable speed drives and switching power supplies are located away from the unit.

Step 1 Step 2 Step 3

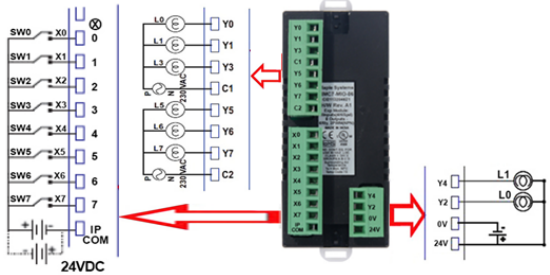


Step 1: Pull the two white lock connectors out from the center of the module.

Step 2: Place the module onto the HMC7000 expansion port so that the I/O module interconnect plug can attach to the HMC7000 socket. *Note: remove the protective tab on the HMC7000 expansion port to expose the socket.*

Step 3: Push down the lock connectors to safely secure the I/O Expansion module.

Wiring I/O Expansion Modules:
The HMC7 I/O module has green block terminals that are used to wire the module to the digital input devices (i.e. switches, contacts, etc.). The block terminals can be physically removed from the module to facilitate connection (18-gauge wire recommended). *Note: A 3/32" flat blade screwdriver should be used to tighten the screws of the terminal block.*



Note: 24VDC must be supplied to the power connector as shown for the module to operate.

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 Inputs	Xnn000-007 (XWnn00)				Rd Only
Y0 – Y7 Outputs	Ynn000 relay, Ynn001 relay, Ynn002 NPN, Ynn003 relay, Ynn004 NPN, Ynn005 relay, Ynn006 relay, Ynn007 relay				Rd/Write
High Speed Counter	**HSC Ch. 1**	**HSC Ch. 2**	**HSC Ch. 3**	**HSC Ch. 4**	
HSC Input	X0 (terminal) Xnn000 (reg)	X5 (terminal) Xnn005 (reg)	X2 (terminal) Xnn002 (reg)	X7 (terminal) Xnn007 (reg)	Rd Only
HSC Reset Input	X1 (terminal) Xnn001 (reg)	X6 (terminal) Xnn006 (reg)	X3 (terminal) Xnn003 (reg)	X4 (terminal) Xnn004 (reg)	Rd Only
HSC Output Flag	Y1 (terminal) Ynn001 (reg)	Y6 (terminal) Ynn006 (reg)	Y7 (terminal) Ynn007 (reg)	Y0 (terminal) Ynn000 (reg)	Rd Only
HSC Config. Register	MWnn00	MWnn06	MWnn12	MWnn18	Rd Only
HSC Counter Register (Current Value)	MWnn01 MWnn02	MWnn07 MWnn08	MWnn13 MWnn14	MWnn19 MWnn20	Rd/Write
HSC Preset Register	MWnn03 MWnn04	MWnn09 MWnn10	MWnn15 MWnn16	MWnn21 MWnn22	Rd/Write
HSC Enable Bit	Mnn080	Mnn176	Mnn272	Mnn368	Rd/Write
HSC Reset Bit	Mnn081	Mnn177	Mnn273	Mnn369	Rd/Write
Quadrature Inputs	**Pair 1**		**Pair 2**		
Counter Inputs	X0,X5		X2, X7		Rd Only
Counter Reset Input	X1		X3		Rd Only
Output Flag	Y1		Y7		
PWM Outputs	**PWM1**		**PWM2**		
Output	Y2		Y4		Rd Only

Refer to the table below when implementing HSC operation:

Input Mode	Output Mode	Register Value
Normal Input	N/A	0
High Speed, Single Phase, Up Counter	Output ON when preset is reached	2
	Output ON when counter is enabled, OFF when preset is reached	258
Quadrature 1X	Output ON when preset is reached	3
	Output ON when counter is enabled, OFF when preset is reached	259
Quadrature 2X	Output ON when preset is reached	67
	Output ON when counter is enabled, OFF when preset is reached	323
Quadrature 4X	Output ON when preset is reached	131
	Output ON when counter is enabled, OFF when preset is reached	387

To implement High Speed Counter Operation:

1. Connect a device that will provide the high speed pulses to one of the four High-Speed inputs on the expansion module.
2. Configure the HSC using the configuration register for that channel.
3. Write the HSC preset count value in the Preset register for that channel.
4. Enable the HSC by setting the HSC Enable Bit that channel.
5. HSC increments the current value register for that channel until the preset value is reached.
6. Enable the HSC Reset Bit by setting 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.

Refer to the tables below when configuring PWM operation:

Normal PWM:

Function	Register		Description
Output	Y2	Y4	Physical Output
Configuration Register	MWnn24	MWnn30	1 for this mode
Frequency Setting Register	MWnn25	MWnn26	Range=1 to 10000
ON Duty Setting Register	MWnn27 MWnn28	MWnn31 MWnn32	Range=0 to 100
Output Enable	MWnn36_0	MWnn36_1	Enabled when ON
ON Duty Set Error	MWnn29_2	MWnn29_7	ON=Error
Frequency Setting Error	MWnn29_3	MWnn29_3	ON = Error

CW/CCW:

Function	Register		Description
Output	Y2:CW	Y4:CCW	Physical Output
Configuration Reg.	MWnn24		3 for this mode
Freq. Setting Reg.	MWnn25	MWnn26	Range=-10000 to -1 / 1 to 10000
ON Duty Setting Register	MWnn27 MWnn28	MWnn31 MWnn32	Range=0 to 100
Output Enable	MWnn36_0		Enabled when ON
Freq. Setting Error	MWnn29_3		ON=Error

Pulse/Direction

Function	Register	Description
Output PWM Pulse	Y2	Physical Output
Output PWM Direction.	Y4	
Configuration Reg.	MWnn24	7 for this mode
Frequency Setting Reg.	MWnn25 MWnn26	Range=-10000 to -1 / 1 to 10000
Output Enable	MWnn36_0	Enabled when ON
Freq. Setting Error	MWnn29_3	ON=Error

Fixed Pulse Mode

Function	Register	Description
Output PWM Pulse	Y2	Physical Output
Configuration Reg.	MWnn24	9 for this mode
Minimum Freq. Reg.	MWnn25 MWnn26	Range=1 to 10000
Maximum Freq. Reg.	MWnn27 MWnn28	Range=1 to 10000
Acceleration Time	MWnn37	Range: 0 to 32767
Deceleration Time	MWnn39	Range: 0 to 32767
Total Pulses Register	MWnn41 MWnn42	0 to 2147483647
Elapsed Pulses Register	MWnn45 MWnn46	0 to 2147483647
Output Enable	MWnn36_0	Enabled when ON
Freq. Setting Error	MWnn29_3	ON=Error
Acc.. Setting Error	MWnn29_4	ON=Error
Dec. Setting Error	MWnn29_5	ON=Error
Total Pulses Setting Error	Mwnn29_6	ON=Error
Total Pulses Reached	Mwnn49_0	ON when Total Pulses have been sent

To implement PWM Operation:

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

Additional Resources:

Detailed instructions on the operation and installation of the HMC7000 Series are available in the HMC7000 Programming Manual that is included with the MAPware-7000 configuration software. MAPware-7000 also includes help files, which provide detailed information on using the configuration software.

⚠WARNING: DO NOT REMOVE OR REPLACE WHILE CIRCUIT IS LIVE UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITIBLE CONCENTRATIONS OF FLAMMABLE SUBSTANCES. This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or non-hazardous locations only.

⚠WARNING – EXPLOSION HAZARD – Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous.

⚠WARNING – EXPLOSION HAZARD - Substitution of components may impair suitability for Class I, Division 2.

It is recommended that the user periodically inspect the sealed devices used, check for any degradation of properties, and replace as necessary.

For Technical Support:

Please contact Maple Systems if you have any questions regarding this product. We ask that you provide us with the unit serial number and firmware revision number written on the product label of the unit.

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