MN-2091U Series User's Manual

(Version 1.0)

Distributed Motionnet Single-axis Universal Motion Control Module

ICP DAS CO., LTD.

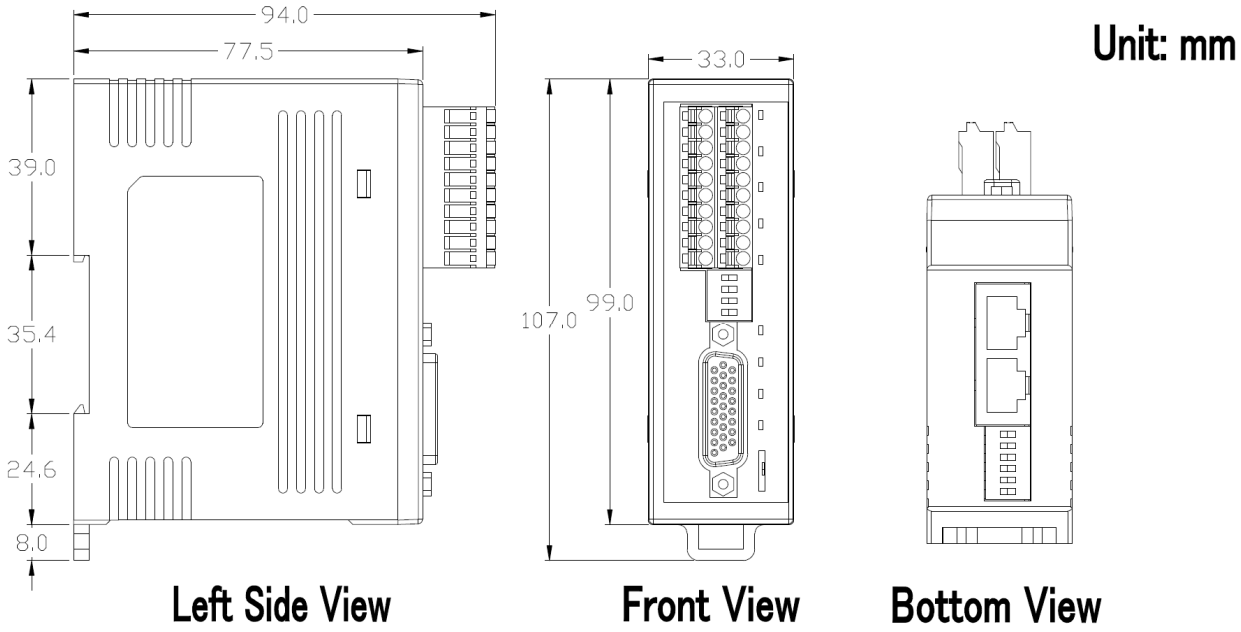
泓格科技股份有限公司

MN-2091U Series Motion Control Module

The **MN-2091U** and **MN-2091U-T** are used to expand the number of axes for distributed motion control on a Motionnet field bus. These extension slave modules are serially connected to the controller using a simple and affordable Cat.5 LAN cable, and one serial line can support up to 64 single-axis modules. The 26-pin HD D-Sub connector can be used to easily connect with various servo drivers and stepper drivers. ICP DAS also provides a variety of cables suitable for a range of brands of servo drivers, which further reduces the amount of wiring required between the drivers and the controller, making this an ideal solution for highly integrated machine automation applications.

This manual mainly describes the signal definition and instruction of operation. The content is divided into 6 parts: 1. Dimensions, 2. Internal circuit, 3. I/O Signal connectors, 4. Switch setting, 6. LED function description.

1. Dimensions of MN-2091U



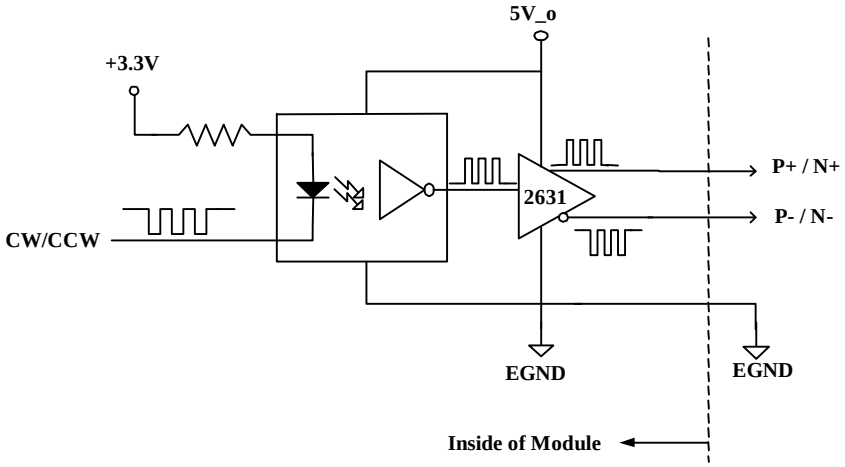
Dimension of MN-2091U

2. Internal Circuit of MN-2091U Series

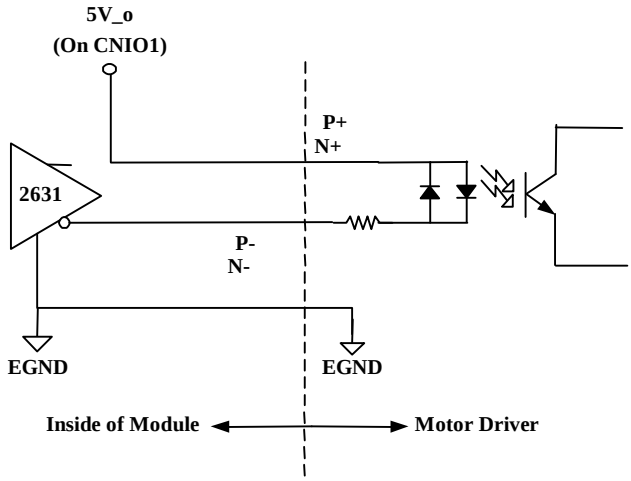
n Pulse Output

The pulse output signals are located at pin #5, #6, #23 and #24 of CNM1. Thes signals are differential line Driver output and the maximum output current of each pin is 20mA. The connection can be Differential Line Driver or Single Ended Current Sinking depending on external device.

1. Differential Line Driver connection:

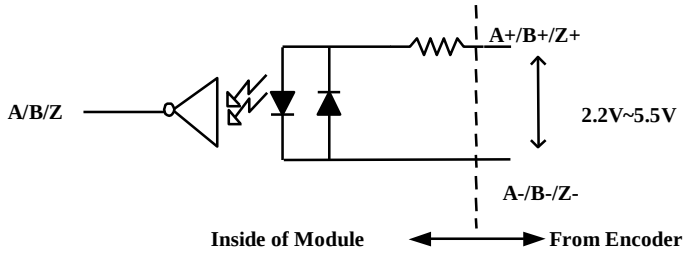


2. Single Ended Current Sinking connection:



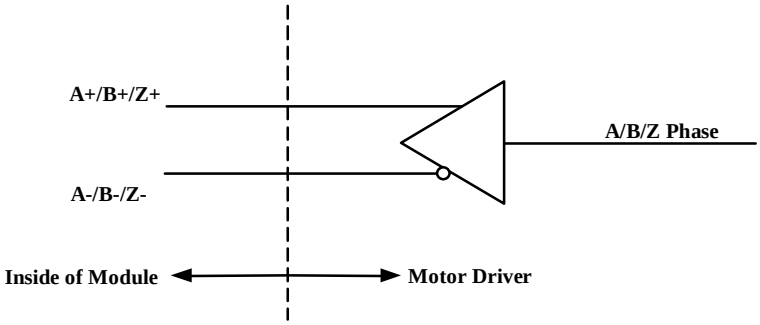
n Encoder Pulse Input

The encoder pulse input signals are located at pin #7, #8, #16, #17, #25 and #26 of CNM1. These signals are high speed photo-coupler input with internal resistor of about 550 Ohms and the suggested input operating current is about 1.6~8mA. As a result, the suggested input voltage should be within 2.2V~5.5V.

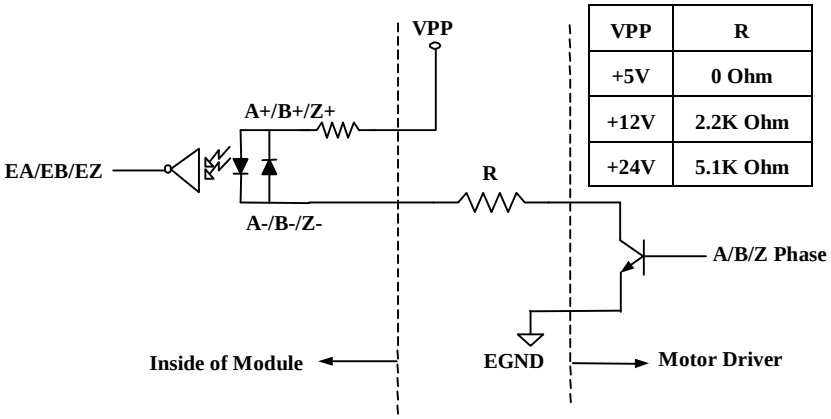


The connection can be Differential Line Driver or Open Collector depending on external device.

1. Differential Line Driver connection: Direct connection is possible



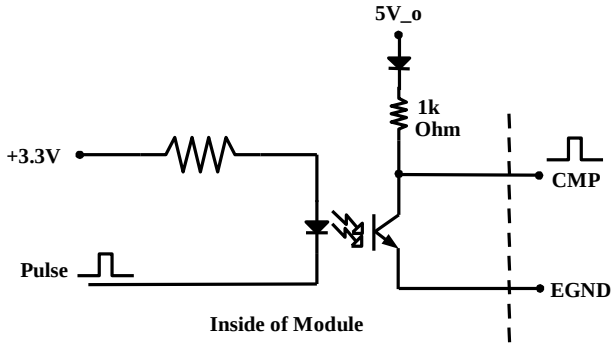
2. Open Collector: External resistor is required



VPP	R
+5V	0 Ohm
+12V	2.2K Ohm
+24V	5.1K Ohm

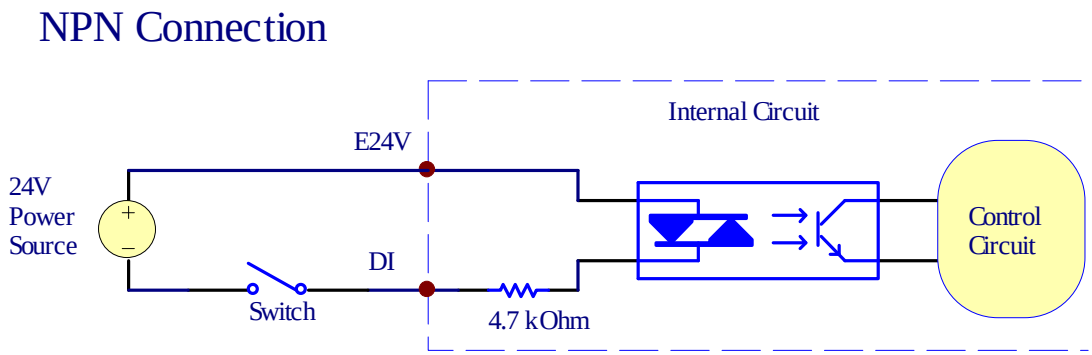
n Position Compare Trigger Output

The position compare trigger output signal is located at pin #4 of CNIO1. This signal is high speed photo-coupler output and the maximum output current is 40mA. This signal equipped with a protection diode and a internal pull high resistor of about 1k Ohms to 5V. It can be used to directly drive either a TTL input or a 24V NPN input.



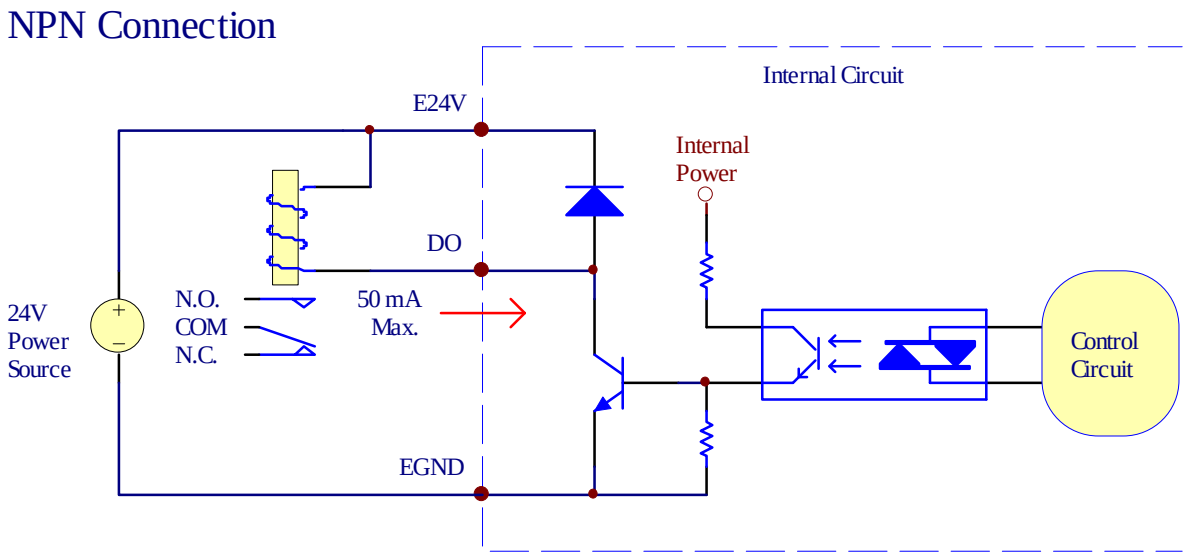
n Digital Input

The digital input signals including INP, RDY, ALARM on CNM1 and LMT+/-, HOME, SD, EMG on CNIO1. These signals are low speed 24V NPN photo-coupler input. Please refer to figure below for detailed connection information.



n Digital Output

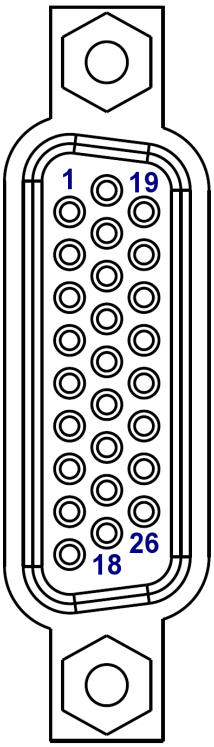
The digital output signals including SRV_ON, RESET and ERC on CNM1. These signals are open collector output of low speed photo-coupler with internal flywheel diode and the maximum output current of each is 50mA. Please refer to figure below for detailed connection information.



3. I/O Signal connectors of MN-2091U series

n CNM1 (Female HD D-Sub 26 pin)

This connector contain the commonly used control singals and I/O signals to the servo driver. ICP DAS provide various cables for easily snap-on connection between different servo drivers and the MN-2091U series.



No	Name	I/O	No	Name	I/O	No	Name	I/O
1	SRV_ON	Out	10	RESET	Out	19	EMG	Out
2	INP	In	11	ALARM	In	20	RSV	-
3	ERC	Out	12	E-PWR	PWR	21	E-GND	Out
4	RDY	In	13	E-GND	PWR	22	E-GND	Out
5	P-	Out	14	N.C.	N.C.	23	N-	Out
6	P+	Out	15	AGND	GND	24	N+	Out
7	A-	In	16	B-	In	25	Z-	In
8	A+	In	17	B+	In	26	Z+	In
9	N.C.	N.C.	18	N.C.	N.C.			

Note: Do not use signals marked as “N.C”

Table below shows the internal I/O connection when using different cable to connect with respective servo driver:

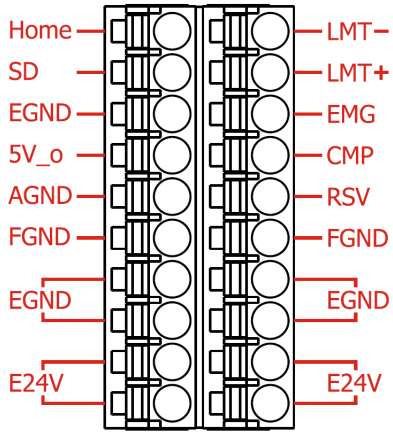
CNM1			Mitsubishi MELSERVO-J3/J4		Yaskawa Sigma-II/III/V	
			CA26-MJ3-xx 50pin		CA26-YSV-xx 50pin	
Pin No.	Signal Name	Connected to	Pin No.	Signal Name	Pin No.	Signal Name
11	ALARM	Motion ASIC	48	ALM	31	ALM+
2	INPOS	Motion ASIC	24	INP	25	/COIN+
4	RDY	Motion ASIC	49	RD	29	/S-RDY+
10	RESET	Motion ASIC	19	RES	44	/ALMRST
3	ERC	Motion ASIC	41	CR / SP1	14	/CLR
20	RSV	CNIO1	--	Reserved	--	Reserved
1	SRV_ON	Motion ASIC	15	SON	40	/S-ON
21	E-GND	EGND	43	LSP	42	P-OT
22	E-GND	EGND	44	LSN	43	N-OT
19	EMG	CNIO1 and Motion ASIC	42	EMG	x	N.C.
12	E-PWR	CNIO1	20	DICOM	47	+ 24VIN
13	E-GND	CNIO1	47	DOCOM	26	/COIN-
13	E-GND		--	--	30	/S-RDY-
13	E-GND		--	--	32	ALM-
15	AGND	CNIO1	3	LG	6	SG
			28	LG	10	SG
Note			--		To use the CLR (clear) function, SG signal on the servo driver should be connected to E-GND externally.	

CNM1			Panasonic MINAS A4/A5		Fuji FALDIC-W, ALPHA5 Smart	
			CA26-PA4-xx 50pin		CA26-FFW-xx 26pin	
Pin No.	Signal Name	Connected to	Pin No.	Pin Name	Pin No.	Pin Name
11	ALARM	Motion ASIC	37	ALM+	17	OUT3 (ALMb)
2	INPOS	Motion ASIC	39	COIN+ / AT-SPEED+	16	OUT2 (PSET)
4	RDY	Motion ASIC	35	S-RDY+	15	OUT1 (RDY)
10	RESET	Motion ASIC	31	A-CLR	3	CONT2 (RST)
3	ERC	Motion ASIC	30	CL	5	CONT4 (CR)*
20	RSV	CNIO1	--	Reserved	--	Reserved
1	SRV_ON	Motion ASIC	29	SRV-ON	2	CONT1 (RUN)
21	E-GND	EGND	9	CCWL	x	N.C.
22	E-GND	EGND	8	CWL	x	N.C.
19	EMG	CNIO1 and Motion ASIC	33	INH	4	CONT3 (EMG)*
12	E-PWR	CNIO1	7	COM+	1	P24
13	E-GND	CNIO1	38	COIN- / AT-SPEED-	14	M24
13	E-GND		34	S-RDY-	--	--
13	E-GND		36	ALM-	--	--
13	E-GND		41	COM-	--	--
15	AGND	CNIO1	13	GND	26	M5
			15	GND	13	M5
			17	GND	--	--
Note			For A4 servo driver, PrNo.40 should be set to “1” (the default value is “0”) For A5 servo driver, Pr0.05 should be set to “1” (the default value is “0”)		Please refer to the user’s manual of servo driver to modify the setting below a. Set CONT4 as “7” (deviation clear) b. Set CONT3 as “5” (EMG)	

CNM1			Delta ASDA-A2		Delta ASDA-B2	
			CA26-DAA2-xx 50pin		CA26-DAB2-xx 44pin	
Pin No.	Signal Name	Connected to	Pin No.	Pin Name	Pin No.	Pin Name
11	ALARM	Motion ASIC	28	DO5+ (ALRM)	28	DO5+ (Alarm)
2	INPOS	Motion ASIC	1	DO4+ (TPOS) / (BRKR)	1	DO4+ (TPOS) / (BRKR)
4	RDY	Motion ASIC	7	DO1+ (SRDY)	7	DO1+ (SRDY)
10	RESET	Motion ASIC	33	DI5- (ARST)	33	DI5- (ARST)
3	ERC	Motion ASIC	10	DI2- (CCLR) / (TRQLM)	10	DI2- (CCLR) / (TRQLM)
20	RSV	CNIO1	--	Reserved	--	Reserved
1	SRV_ON	Motion ASIC	9	DI1- (SON)	9	DI1- (SON)
21	E-GND	EGND	31	DI7- (CCWL)	31	DI7- (CCWL)
22	E-GND	EGND	32	DI6- (CWL)	32	DI6- (CWL)
19	EMG	CNIO1 and Motion ASIC	30	DI8- (EMGS)	30	DI8- (EMGS)
12	E-PWR	CNIO1	11	COM+	11	COM+
13	E-GND	CNIO1	6	DO1-	6	DO1-
13	E-GND		26	DO4-	14	COM-
13	E-GND		27	DO5-	26	DO4-
13	E-GND		49	COM-	27	DO5-
15	AGND	CNIO1	44	GND	19	GND
			19	GND		
			12	GND		
Note			Digit D of P1-00 (source of pulse command) must be set as “1” (line driver)		Digit D of P1-00 (source of pulse command) must be set as “1” (line driver)	

n CNIO1 (Dual row 10 pin removable terminal block)

These connectors contain the input signal of mechanical switch (LMT+/-, HOME, Slow Down), Emergency Stop input and Position Compare Trigger output. The main power of this module is also connected via this connector. Table below shows the detailed description of these signal.

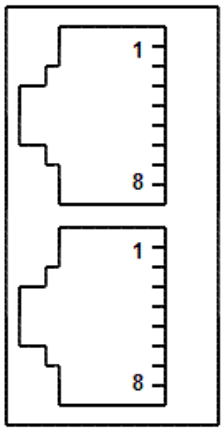


Left				Right			
No	**Name**	**I/O**	**Note**	**No**	**Name**	**I/O**	**Note**
11	HOME	In	NPN home input signal (N.C. or N.O. are software selectable)	1	LMT-	In	NPN negative limit input signal (N.C. or N.O. are selectable by SW2)
12	SD	In	NPN slow down input signal (N.C. or N.O. are software selectable)	2	LMT+	In	NPN positive limit input signal (N.C. or N.O. are selectable by SW2)
13	EGND	GND	GND of external power	3	EMG	In	NPN emergence stop input signal (N.C. only)
14	5V_o	PWR	5V power output (*see note)	4	CMP	Out	Position compare trigger output
15	AGND	--	Directly connected to the internal signal ground of servo driver. Not connected to any internal circuit of this module	5	RSV	--	Directly connected to pin#20 of CNM1. These signal is reserved and not connected to any internal circuit of this module
16	FGND	--	Frame ground	6	--	GND	Frame ground
17	EGND	GND	GND of external power	7	EGND	GND	GND of external power
18	EGND	GND	GND of external power	8	EGND	GND	GND of external power
19	E24V	PWR	24V external power input	9	E24V	PWR	24V external power input
20	E24V	PWR	24V external power input	10	E24V	PWR	24V external power input

*Note: The maximum outpu current of 5V_o is 200mA

n RJ1 (RJ45 phone jack, only available in MN-2091U)

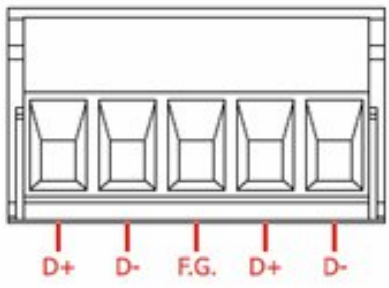
RJ1 is the snap in connector for Motionnet communication signals. Table below shows the detailed description of these signal.



No	Name	I/O	Note
1~2	N.C.	-	-
3	Data+	I/O	Positive line of the differential communicaiton signal pair
4~5	N.C.	-	-
6	Data−	I/O	Negative line of the differential communicaiton signal pair
7~8	N.C.	-	-

n CN1 (5-pin Removable Terminal block, Pitch 5.08 , only available in MN-2091U-T)

CN1 is the screw terminal for Motionnet communication signals. Table below shows the detailed description of these signal

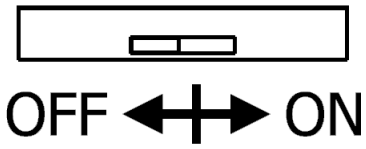


No	Name	I/O	Note
1	Data+	I/O	Positive line of the differential communicaiton signal pair
2	Data−	I/O	Negative line of the differential communicaiton signal pair
3	FGND	GND	Frame Ground
4	Data+	I/O	Positive line of the differential communicaiton signal pair
5	Data−	I/O	Negative line of the differential communicaiton signal pair

4. Switch Setting

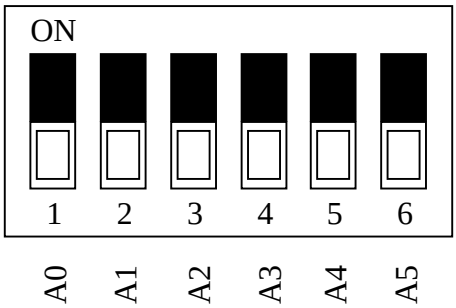
n SW3

This switch is used to set the on board termination resistor. The on board termination resistor is enabled when the switch is set to “ON”. Please be sure to enable the termination resistor only on the last slave module of each line.



n SW1

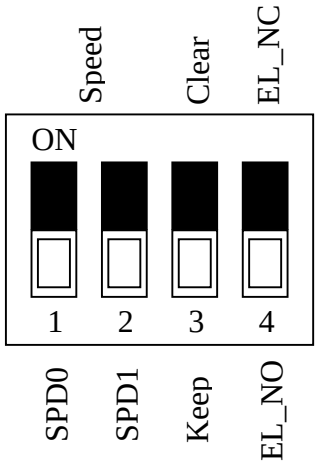
Users can set the slave address of this module. Please refer below for detailed description.



Position	Name	Function	Description
1	A0	Address Setting	Every slave module should be assigned a unique address in a Motionnet communication line and up to 64 slave modules can be connected in one line. A0 is the least significant (represent ‘1’ when it is set to ON) while A5 is the most significant (represent ‘32’ when it is set to ON)
2	A1		
3	A2		
4	A3		
5	A4		
6	A5		

n SW2

Users can set the communication speed, the action of watch dog timer and the polarity of limit switch of this module . Please refer below for detailed description.



<table>
<tr><th>Position</th><th>Name</th><th>Function</th><th>Description</th></tr>
<tr><td>1</td><td>SPD0</td><td rowspan="2">Speed Selection</td><td rowspan="2">Every slave module should use the same communicaiton speed as the one set in the master card in a Motionnet communication line for proper operation. Table below shows the setting of communicaiton speed.
<table>
<tr><th>SPD0</th><th>SPD1</th><th>Communication Speed</th></tr>
<tr><td>OFF</td><td>OFF</td><td>20 Mps (default)</td></tr>
<tr><td>ON</td><td>OFF</td><td>10 Mbps</td></tr>
<tr><td>OFF</td><td>ON</td><td>5 Mbps</td></tr>
<tr><td>ON</td><td>ON</td><td>2.5 Mbps</td></tr>
</table></td></tr>
<tr><td>2</td><td>SPD1</td></tr>
<tr><td>3</td><td>Clear / Keep</td><td>Watch Dog Timer Setting</td><td>This bit is used to set the action when the WDT expired (expire time is 20 ms).
Keep: All output will be holded (default)
Clear: All output will be cleared</td></tr>
<tr><td>4</td><td>EL_NC / EL_NO</td><td>Limit Switch Setting</td><td>This bit is used to set the polarity of LMT+ and LMT- on CNIO1
EL_NO: Normally open or Form A contact (default)
EL_NC: Normally closed or Form B contact</td></tr>
</table>

5. LED function description

The LEDs are used to indicate meaningful status. Please refer below for the detailed description of LEDs

- **LMT – (Red)**:
  It shows the minus end-limit signal of motion control on the machine. The minus end-limit signal of motion axis is to decide the end point of minus moving. If this signal is on, the LED will be turned on.
- **HOME (Yellow)**:
  It shows the home signal of motion control on the machine. The LED will be turned on when the motion control is moved to the home signal.
- **LMT + (Red)**:
  It shows the plus end-limit signal of motion control on the machine. The plus end-limit signal of motion axis is to decide the end point of plus moving. If this signal is on, the LED will be turned on.
- **SD (Slow Down, Yellow)**:
  It shows the slow down signal of motion control on the machine. The LED will be turned on when the motion control is moved to the slow down signal.
- **EMG (EMG OK, Green)**:
  It shows the state of EMG signal of motion module (on CNIO1). The motion module can driver the motors only when this LED is turned on.
- **PWR (Power OK, Yellow)**
  It shows the status of internal power of this module. This LED will be turned on when the power is good.
- **ERR (Communication Error, Red)**
  This LED will be turned on when the slave module receives an error frame such as a CRC error which means the the communication quality has been influenced by external noise.
- **LNK (Link, Green)**
  This LED will be turned on when the communication is successfully established.
- **TER (Terminator On, Yellow)**
  It shows the status of on board termination resistor. This LED will be turned on when the termination resistor is enabled.

6. Rivision History

Rev 1.0 2015/08/07 Initial version