CB-030S Circuit Board

- Designed for use with the high torque PM486FH (up to 7A)

- Adjustable acceleration and deceleration time (0 to 2.5s)

- Stable speed operation

- Switch for manual or automatic recovery of the thermal overload device

- One (1) DIP switch combined with one (1) rotary switch to select up to 20 different fixed speeds

- DIP switch to select the condition of error signal activity; during normal status or abnormal status

- Forcibly stops the motor if motor lock or thermal overload error lasts for 4 seconds or more.

- Three (3) LEDs (green, red, & orange) to identify the type of error and number of error occurrences

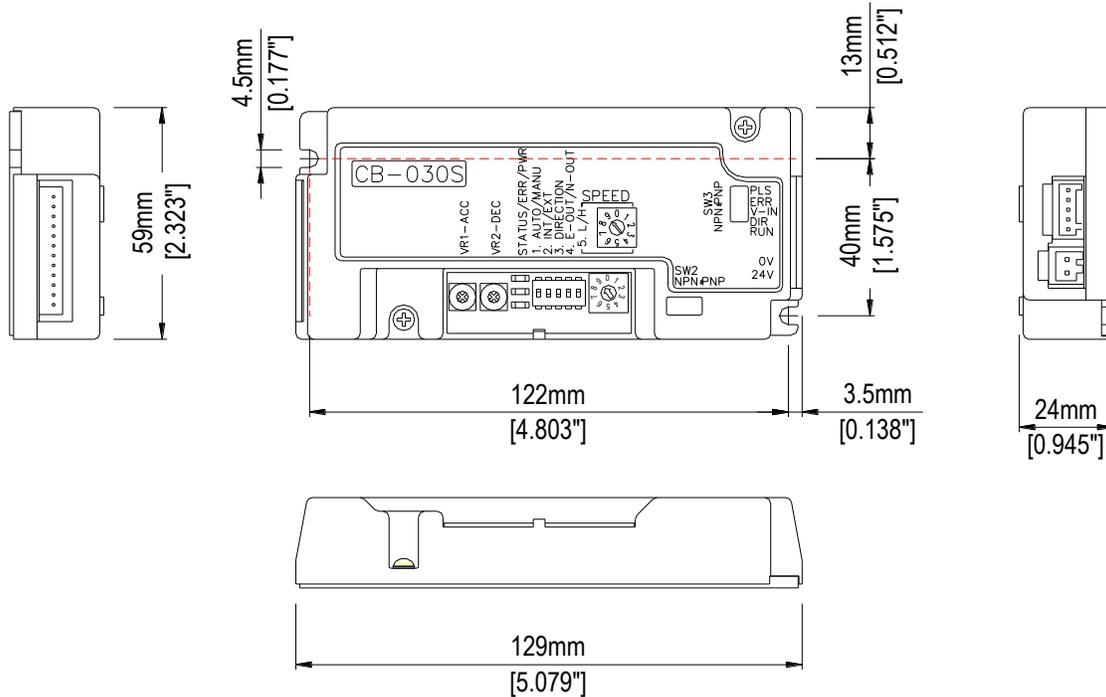- Pulse signal output to indicate motor revolution

- RoHS and EMC Conformity

SPECIFICATIONS

Electrical 24V DC ±10% input
- Battery
- Power Supply: full wave rectified with smoothed current and <10% Ripple

Power ON delay <1s

6.6~7.4A locking current

Input signal level for activation
- 0V (3V or less) for NPN
- 24V (18V or greater) for PNP

Output (Error and Motor Pulse) signals
- Open collector 24V, 25mA or less
- NPN
  - PNP (selectable for Error only)

Applicable PM Models PM486FH

Brake Dynamic (Electric)

SPECIFICATIONS

Protection	Thermal protection reaction - 85° C (185° F) on the PCB - 105° C (221° F) in the motor Built-in 10A fuse for power supply protection Built-in diode for incorrect wiring protection
Terminal	2-Pole WAGO (CN1) 5-Pole WAGO (CN2) - (M) 734-162 - (M) 733-365 - (F) 734-102 - (F) 733-105
Motor Connector	12-Pole JST - (M) S12B-XH-A - (F) XHP-12 (socket terminal SXH-001P-P0.6)
Applicable Environment	Temperature 0~40° C (32~104° F) <90% Relative Humidity (No condensation) No corrosive gas Vibration <0.5G

OPERATION

DIP Switches – User Settings

DIP-SW	Function	ON setting	OFF setting	Initial setting
1	Thermal device recovery	Manual	Automatic (Restarts 1min after cool down)	ON
2	Speed change selection	External (0~10V DC applied)	Internal (DIP & Rotary switches)	OFF
		See Speed Change Tables		
3	DIR (no external DIR signal; viewed from cable side)	FS/FP – CCW FE – CW	FS/FP – CW FE – CCW	OFF
4	Error signal activity	Active during normal status	Active during abnormal status	ON
5	Internal speed change	High speed	Low speed	ON
		Refer to table on page 7		
Rotary	Internal speed change	Refer to table on page 7		9

Potentiometers*

VR1 – Acceleration

       Adjust acceleration time from 0~2.5s after the RUN signal is applied

VR2 – Deceleration

       Adjust deceleration time from 0~2.5s after the RUN signal is removed

  * VRs turn 270°

Internal Switches*

Switch	Function	Position for Signal Type		Initial Setting
		NPN Setting	PNP Setting	
SW2	Inputs (RUN/DIR)	LEFT	RIGHT	LEFT
SW3	Output (ERR)	LEFT	RIGHT	LEFT

* These switches are not readily visible. They are under the cover, protected by rubber seals on the cover. Access them by removing the seals. Then, toggle the switches, and replace the seals.

The following input/output settings are available from the factory, if necessary:

Alternate Model Designation

CB-030N – NPN input <u>and</u> output signals
CB-030P – PNP input <u>and</u> output signals

LED and ERROR Indications
LED 1 – Green (power)
LED 2 – Red (error condition)
LED 3 – Orange (error occurrence)

LED Error Indication

Status	LED 1 (Green)	LED 2 (Red)	ERR Output (DIP-SW4 setting) OFF	ON	Error Condition*	Result
Normal operation	●	○	○	●	–	–
No power	○	○	○	○	–	Supply power (24V DC)
Fuse blown	○	Blinks (6Hz) ●○●○○ ●○●○○	●	○	Current overload	Card must be replaced
Current limit (while running)	●	Blinks (6Hz) ●○●○○ ●○●○○	○	●	–	Normal during start-up; May indicate overload during operation
Low voltage (<15V)	●	Blinks (6Hz) ○○●○○ ●○●○○	●	○	≤15V DC	Motor does not operate
Thermal protection**	●	●	●	○	Motor or PCB overheated	Motor stops 4s after reaction
Motor lock	●	Blinks (1Hz) ● ○	●	○	Motor does not turn for 4s	Motor stops
Motor not plugged in	●	●	●	○	–	Motor does not operate

*To reset an error condition: Remove input signals; then reapply an input signal to either CN2-1 or CN2-2

**If thermal device recover is set for automatic, the error will reset 1min <u>after</u> the temperature has reached operating range.

Red LED Indication – Error condition

The red LED indicates the **current** error condition in conjunction with the green LED.

No Error	Motor Lock	Low Voltage (<15V)	Fuse Blown*	Current Limit*	Thermal Protection
○	Blinks (1Hz) ● ○	Blinks (6Hz) ●○●○○ ●○●○○	Blinks (6Hz) ●○●○○ ●○●○○	Blinks (6Hz) ●○●○○ ●○●○○	●

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Orange LED Indication – Error occurrence

The orange LED indicates the number of **consecutive** occurrences of the **current** error condition indicated by the red LED. If the previous error differs from the current error, a combination status will be displayed.

No Error	1	2	≥3	Combination
○	○	Blinks (1Hz) ● ○	●	Blinks (6Hz) ●○●○●○ ●○●○●○

* The occurrences of "fuse blown" and "current limit" errors are not recorded.

Motor pulse output signal
NPN (0V) output from CN2-5
Two (2) pulses per motor revolution

Speed Change Table

| Speed Adjustment Control Method Discreet Steps | | | Surface Speed* ft/min ±3% |
| Internal Control Switches | | External Control 0~10V DC | PM486FH-55 (2-stage) |
DIP SW5	Rotary		
ON	9	9.55~9.95	213.9
	8	9.05~9.45	195.9
	7	8.55~8.95	187.0
	6	8.05~8.45	178.2
	5	7.55~7.95	169.3
	4	7.05~7.45	160.4
	3	6.55~6.95	142.4
	2	6.05~6.45	133.5
	1	5.55~5.95	124.7
	0	5.05~5.45	115.8
OFF	9	4.55~4.95	107.0
	8	4.05~4.45	98.1
	7	3.55~3.95	88.9
	6	3.05~3.45	80.1
	5	2.55~2.95	71.2
	4	2.05~2.45	62.3
	3	1.55~1.95	53.8
	2	1.05~1.45	44.6
	1	0.55~0.95	35.8
	0	0.05~0.45	26.6

* The listed speed steps are based on our 1.9" (48.6mm) diameter roller tube, FH motors, and 2-stage gearing. Shaded speeds represent no-load speeds. Any speed settings (for the corresponding gear stage) above the model's maximum speed will have no effect.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

WIRING

WAGO connector wiring diagram
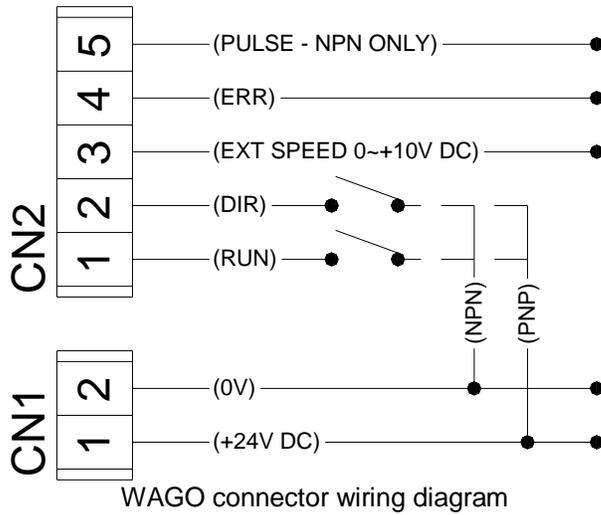
CN2 – Control Signals
External Speed Signal*
(0 ~ +10V DC)

NPN – 0V signal to operate
PNP – +24V DC signal to operate

CB-030**S** is set for **NPN** inputs and
PNP ERR output
CB-030**N** is set for **NPN** inputs and
NPN ERR output
CB-030**P** is set for **PNP** inputs and
PNP ERR output

*Terminal CN2-3 is used only when
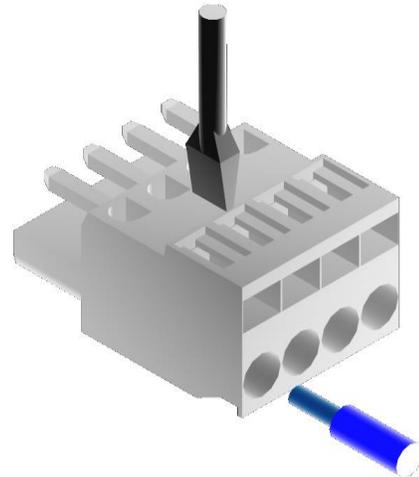PM speed is to be controlled by
an external DC voltage

CN1 – POWER CONNECTOR	CN2 – CONTROLS CONNECTOR
WAGO connector # 734-102	WAGO connector # 733-105
Minimum wire gauge – 28 AWG	Minimum wire gauge – 28 AWG
Maximum wire gauge – 16 AWG	Maximum wire gauge – 20 AWG

Press down spring clamp in connector with a small screwdriver.

Insert leads in proper order.

Lead should be stripped approx: 0.31~0.35"

WAGO connector (included) must be inserted and/or pulled out carefully, so as not to damage other parts.

⚠ Warning

Installation Precautions – **IMPORTANT, PLEASE READ BEFORE INSTALLATION**

Precaution	Action	Reason
Multiple power supplies	0V line of all power supplies on the same conveyor line (powering the card/rollers, & controls) need to be physically linked together.	This completes the signal path from one section of the conveyor (powered by a power supply) to the adjacent section of conveyor (powered by another power supply) and allows for proper communication through the cable and external interfaces.
Voltage drop across the power bus	Use suitable gauge wire in relation to distance and current draw to prevent voltage drop. Operating DC voltage is 24V ±10%	When running long distances from a DC power supply, the voltage drop during motor operation across the power bus may be significant (may drop below 15V!). If there is a large enough drop in voltage, the roller(s) may behave in a strange manner. In order to prevent this, a larger gauge wire must be used.
Grounding	Ensure the control card is securely grounded to the conveyor frame. The conveyor frame should also be at the same potential reference as earth ground. Standard grounding practices should be followed.	Static discharge may interfere and damage internal components.
Electrical	24V DC ±10% 4A maximum current limiter (motor lock is 4A) Diode protection for miswiring Sensor power short circuit protection 5A fuse for power supply protection	Improper power will damage the card. The motor/card should not be subject to locked conditions repeatedly. Internal fuse is not replaceable. If the fuse has blown, more serious damage has occurred within the card/motor.
Environment	Ambient temperature is 32~104°F Ambient humidity is < 90%RH Atmosphere has no corrosive gas Vibration is < 0.5G Indoor use only	Extreme environmental variables may cause poor or no performance and damage the card.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Over-speeding	Over-speeding of the roller's no-load speed by more than 50% may cause damage.	Back EMF will be generated.

www.itohdenki.com
info@itohdenki.com
Ph: 570.820.8811
Fx: 570.820.8838

ITOH DENKI, USA, INC.

2 Great Valley Boulevard
Wilkes Barre, PA 18706

rev19-0108

Warning

Additional Precautions to ensure best performance

- Use a stable power supply that won't be influenced by the load.
- When DC power supply gets heated, it normally tries to reduce the output current to avoid the further temperature rise. If this doesn't work adequately, it will then start reducing voltage, which could be lower than 15V. Low voltage error also might happen more frequently with a battery before it reaches down to it's discharging voltage.
- Capacity of the 24VDC power supply should be greater than 10A. The power supply should not activate its protection in 1msec or less for 30A peak current. This is important to ensure the service life of the power supply, driver card and to prevent malfunctions.
- Make sure the power is shut off before mounting or removing the CN3 motor connector. Otherwise, back EMF could damage the PCB or it may increase the risk of electrical shock.
- Do not start or stop the motor from the power line. This could shorten the service life of the product.
- The driver card requires 1 second to activate a motor when it is first powered.
- Do not use a relay or contactor near the power line, signal line or the driver card. The ON/OFF switching could generate noise that may cause malfunction of the driver card.
- Do not remove the motor cable while the motor is in operation. This could cause damage or malfunction.

Revision History

Revision Number	Change
08-0507	Initial document
09-0423	Added precautions
16-0107	Updated switch functions on p.4
19-0108	Updated company address