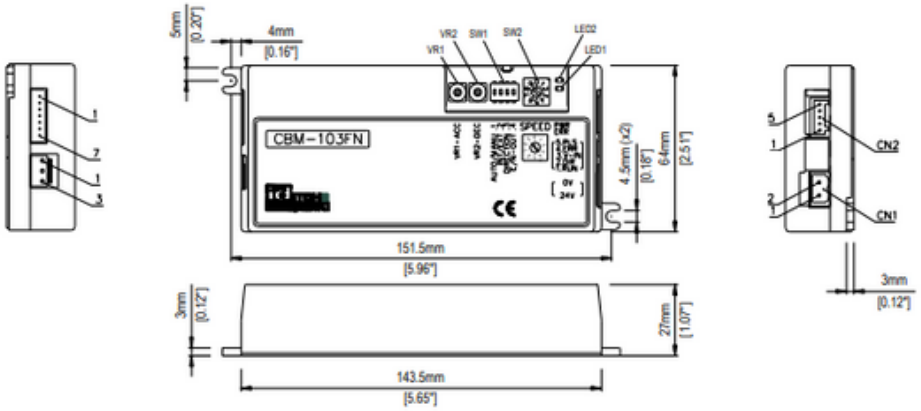
CBM-103FN/FP

Driver Card Manual

FEATURES:

- Specifically designed for the KE series Power Moller® family
- Adjustable acceleration and deceleration time (0 to 2.5s)
- Stable speed operation
- Manual or automatic recovery from thermal overload and low voltage
- One (1) rotary switch to select up to 10 different fixed speeds
- Two (2) LEDs (green & red) to identify error type
- Pulse signal output to indicate motor revolution (2 pulses/motor revolution)
- RoHS and EMC conformity
- Low Voltage Protection
- External Direction control



Specifications subject to change without notice

Revised 7/1/2024

2 Great Valley Blvd., Wilkes-Barre, PA 18706
Office Ph: 570-820-8811
Fax: 570-820-8838
www.itohdenki.com

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Itoh Denki USA Inc.
2 Great Valley Blvd., Wilkes-Barre, PA 18706
Office Ph: 570-820-8811
www.itohdenki.com

SPECIFICATIONS

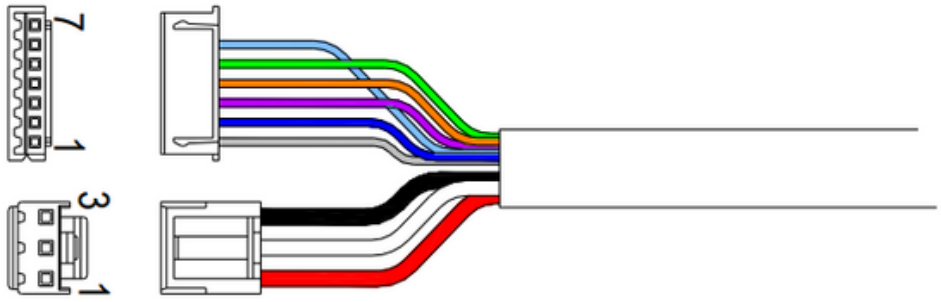
CONNECTIONS:

CN1	2 PIN Connector POWER	Connector on Card WAGO #231-432/001-000	Connector for Wiring WAGO ##231-102/026-000
Pin	Description		
1	+24V DC		Wire size 28~14 AWG
2	0V		

CN3	7 PIN Connector MOTOR	Connector on Card JST #S7B-XH-A	Connector for Wiring JST #XHP-7
Pin	Description		
1	GND – Grey		Wire size: 28~22 AWG Terminal Pins: JST #SXH-001T-P0.6
2	+12V DC – Blue		
3	Hall sensor U - Violet		
4	Hall sensor V – Orange		
5	Hall sensor W – Green		
6	Thermistor – Light Blue		
7	Not Used		

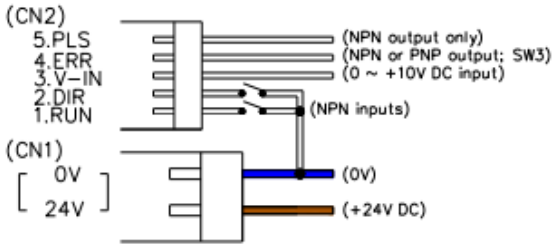
CN4	3 PIN Connector MOTOR	Connector on Card JST #S3P-VH	Connector for Wiring JST #VHR-3N
Pin	Description		
1	Motor phase U – Red		Wire size: 20~16 AWG Terminal pins: JST SVH-41T-P1.1
2	Motor phase V – White		
3	Motor phase W – Black		

KE Motor Cable:

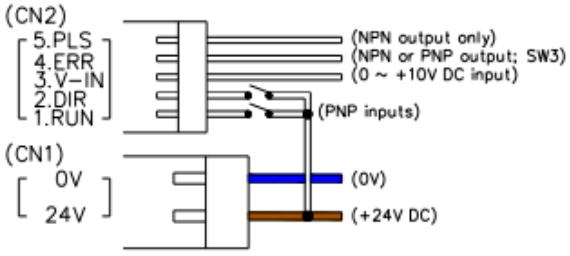


CONTROL CONNECTIONS:

CN2	5 PIN Connector CONTROL	Connector on Card WAGO #733-365	Connector for Wiring WAGO #733-105
Pin	Description		
1	+24V DC (PNP) or 0V (NPN) input – RUN		Wire Size: 28~20 AWG
2	+24V DC (PNP) or 0V (NPN) input – DIR		
3	0 ~ +10V DC input – V-IN (speed variation)		
4	+24V DC or 0V output – ERR		
5	0V (NPN) output – PLS (pulse)		

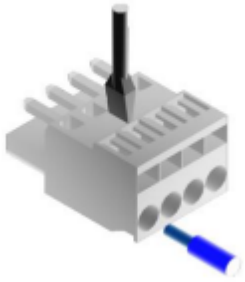


NPN Input Control



PNP Input Control

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



SPECIFICATIONS

ELECTRICAL:

24V DC ±10% input
- Battery
- Power Supply: fullwave rectified, smooth current <10% Ripple

Power ON delay < 1s
10A locking current
Input signals (minimum 2.2mA, maximum 7.3mA)
- NPN (0V)
- PNP (+24V DC)

Output signals (open collector 24V, 25mA or less)
- NPN (0V)
- PNP (+24V DC; selectable for Error only)

APPLICABLE MODELS:

PM635KE

BRAKE:

Dynamic (electric)

PROTECTION:

Motor control thermal protection
- 95°C (203°F) on the PCB
- 105°C (221°F) in the motor

Built-in diode for incorrect wiring protection
Built-in 18A in-line fuse for supply protection
Built-in thermal fuse to prevent overheating
- 139°C (282°F)

ENVIRONMENT:

Temperature 0~40°C (32~104°F)
<90% Relative Humidity (No condensation)
No corrosive gas
Vibration <0.5G

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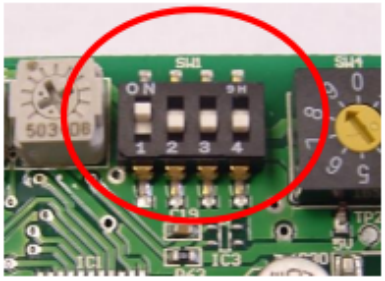
SWITCHES:

Switch	Function	Position		Initial Setting
		Up	Down	
SW3	Error Output	NPN	PNP	NPN: CBM-103FN PNP: CBM-103FP

Switch	Function	Position		Initial Setting
		Left	Right	
SW5	Input Type	NPN	PNP	NPN: CBM-103FN PNP: CBM-103FP

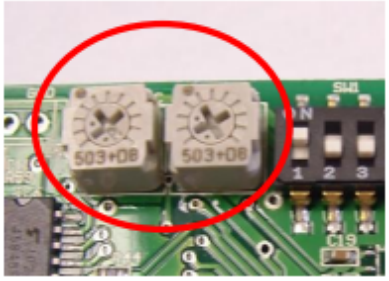
DIP SWITCHES – USER SETTINGS:

DIP-SW	Function	ON Setting	OFF Setting	Initial Setting
1	Error recovery: Thermal; Low voltage; Induced voltage	Manual Reset	Automatic Reset	ON
		See Page 8		
2	Speed change selection	External Voltage Input	Internal Rotary Switch	OFF
		See Page 9		
3	Motor Direction (no external DIR signal; viewed from cable side)	CW	CCW	OFF
4	ERR output	Normal, ON	Error, OFF	OFF



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°



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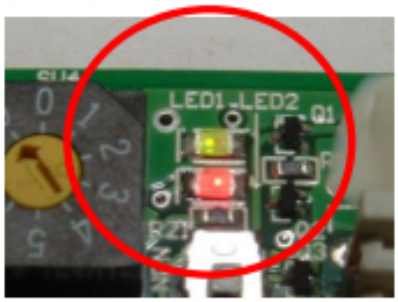
LED AND ERROR INDICATIONS

LED 1: Green (power)
LED 2: Red (error condition)



LED1 (Green)	LED2 (Red)	ERR Output (DIP-SW4 setting)		Condition	Solution*
		OFF	ON		
(OFF)	(OFF)	(OFF)	(OFF)	No power	Supply power (24V DC)
(OFF)	Flashes 2 times with a 1.5s pause	(ON)	(OFF)	Fuse or temperature fuse is blown	Card must be replaced
(ON)	(OFF)	(OFF)	(ON)	Normal	-
(ON)	Flashes slowly	(ON)	(OFF)	Stalled motor	Motor shuts off
(ON)	Flashes slowly	(ON)	(OFF)	Motor is disconnected at CN4	Motor does not run
(ON)	Flashes quickly	(OFF)	(ON)	Current limit, active	May indicate overload during operation
(ON)	(ON)	(ON)	(OFF)	Thermal error in motor or on PCB	Motor stops after 4s
(ON)	(ON)	(ON)	(OFF)	Motor is disconnected at CN3	Motor does not run
(ON)	Flashes 2 times with a 1.5s pause	(ON)	(OFF)	Induced voltage	Motor shuts off
(ON)	Flashes 3 times with a 1.5s pause	(ON)	(OFF)	Low voltage	Motor shuts off

MOTOR PULSE OUTPUT SIGNAL

- 0V (NPN) output from CN2-5
  Two (2) pulses per motor revolution
  Maximum speed pulse frequency approximately 147 Hz

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LED AND ERROR INDICATIONS

ERROR LIST:

Error	Description	Solution	
Fuse or temperature fuse, blown	> 18A through circuit or > 139°C (282°F)	Replace Card	
Motor disconnected (CN3 or CN4)	Motor connector(s) unplugged	Plug in appropriate connectors	
Stalled motor	RUN signal turns ON, but motor does not turn for 1s	After motor shuts off	Turn OFF RUN signal, then turn back ON
Thermal error (PCB or motor)	Motor control circuit has reached 95°C (203°F) on the PCB or 105°C (221°F) in the motor	After operating temperature is restored	
Low voltage	Supply voltage has dropped < 15V for at least 1s or dropped < 15V five times within 0.5s	After supply voltage rises > 18V	
Induced voltage (overspeeding)	Voltage from motor rises > 40V	After induced voltage drops < 30V	

AUTOMATIC RECOVERY:

- DIP switch 1 – OFF
  Toggling the run signal (OFF/ON) is not necessary
  Thermal error resets 60s AFTER operating temperature is restored
  Low voltage error resets as soon as the supply voltage rises above 18V
  Induced voltage error resets 1s AFTER induced voltage drops and stays below 30V

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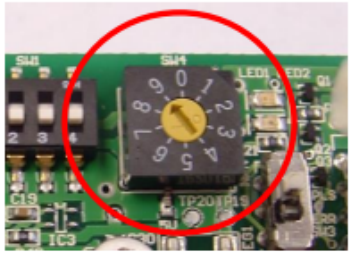
SPEED CHANGE TABLE

Rotary Switch	V-IN (V)	Speed (ft/min) +/- 5%		
		1-stage	2-stage	3-stage
9	9.69 ± 0.25	758.0	199.5	52.5
8	9.06 ± 0.25	710.6	187.0	49.2
7	8.44 ± 0.25	663.3	174.5	45.9
n/a	7.81 ± 0.25	615.9	162.1	42.7
6	7.19 ± 0.25	568.5	149.6	39.4
n/a	6.56 ± 0.25	521.1	137.1	36.1
5	5.94 ± 0.25	473.8	124.7	32.8
n/a	5.31 ± 0.25	426.4	112.2	29.5
4	4.69 ± 0.25	379.0	99.7	26.2
n/a	4.06 ± 0.25	331.6	87.3	23.0
3	3.44 ± 0.25	284.3	74.8	19.7
n/a	2.81 ± 0.25	236.9	62.3	16.4
2	2.19 ± 0.25	189.5	49.9	13.1
1	1.56 ± 0.25	142.1	37.4	9.8
0	0.94 ± 0.25	94.8	24.9	6.6
n/a	0.31 ± 0.25	47.4	12.5	3.3

10 speed steps available through on-board rotary switch

16 speed steps available through external voltage input (V-IN)



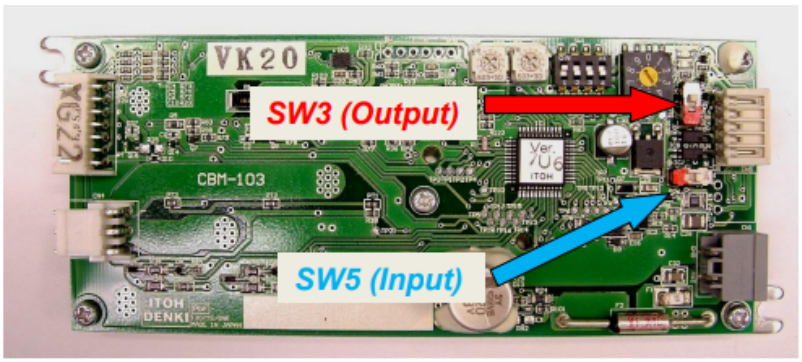
NPN OR PNP INPUTS/OUTPUTS:

- The card(s) are ordered with the inputs/outputs preset from the factory – ALL NPN or ALL PNP.
  The model designation will show the factory preset.
  - CBM-103FN – NPN input/output type
  - CBM-103FP – PNP input/output type

- If it is necessary to change the input or output type, the internal dip switch(es) will need to be changed as shown below:

1. Pry open the plastic cover at screwdriver slots on back of card

2. Change internal dip switch(es) to appropriate setting and replace cover



Position for Input Signal Type (SW5)		Initial Setting
NPN Setting	PNP Setting	
Right	Left	Right: CBM-103FN Left: CBM-103FP

Position for Output Signal Type (SW3)		Initial Setting
NPN Setting	PNP Setting	
Up	Down	Up: CBM-103FN Down: CBM-103FP

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INSTALLATION PRECAUTIONS

IMPORTANT: PLEASE READ BEFORE INSTALLATION

Precaution	Action	Reason
Power supply	If the power supply is not sized appropriately for the number of cards/rollers it provides power to, then a low voltage condition may occur.	• If the voltage drops below 15V DC and remains low for 1s, then the low voltage error will appear. • If the voltage drops below 15V DC five times in 0.5s, then the low voltage error will appear. • If the voltage drops below 15V DC less than five times in 0.5s or does not remain low for 1s, the roller may stutter – quickly turning off then on.
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.
Over-Speeding	Over-speeding of the roller's no-load speed by more than 50% may cause damage.	Back EMF will be generated.

REVISION HISTORY

Revision Number	Change	Changed by:
11-0914	Initial Document	
12-1226	Added autosensing inputs and precautions for electrical potential	
13-0314	Added diode recommendation and wiring diagram	
13-0514	Removed auto-sensing feature	
14-1219	Added internal input type switch	
15-0409	Added internal output type switch and mirrored induced and low voltage errors	JC and BB
19-0108	Updated company address	

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