

CBM-103FN/FP Circuit Board



Features

- New driver card specifically designed for the new 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

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SPECIFICATIONS

Electrical

24V DC $\pm 10\%$ 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 PM Models

PM635KE

Brake

Dynamic (electric)

Protection

Motor control thermal protection

- 95°C (203°F) on the PCB
- 105°C (221°F) in the motor

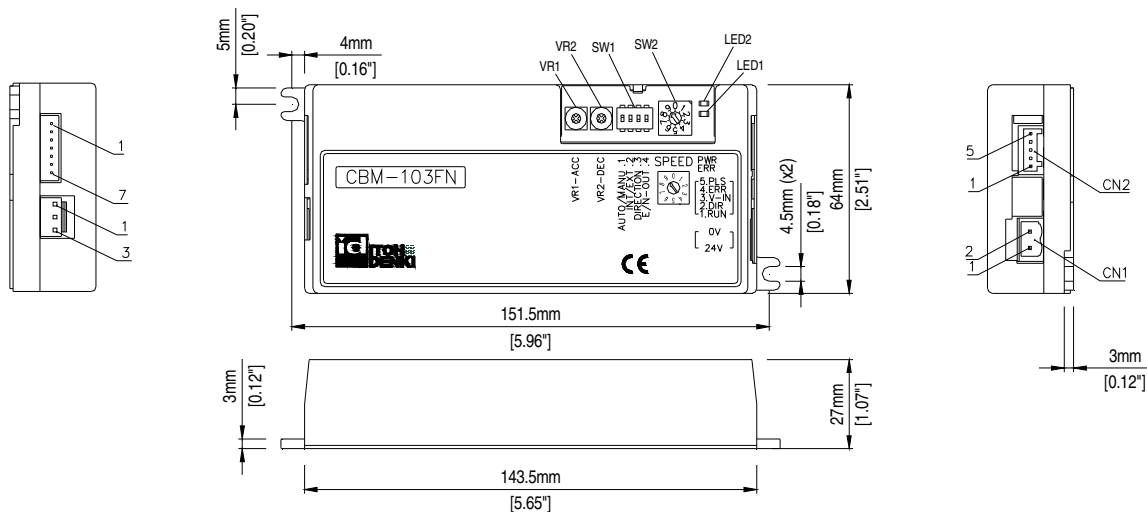
Built-in diode for incorrect wiring protection
 Built-in 18A in-line fuse for supply protection
 Built-in thermal fuse to prevent overheating

- 139°C (282°F)

Applicable Environment

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

Dimensions



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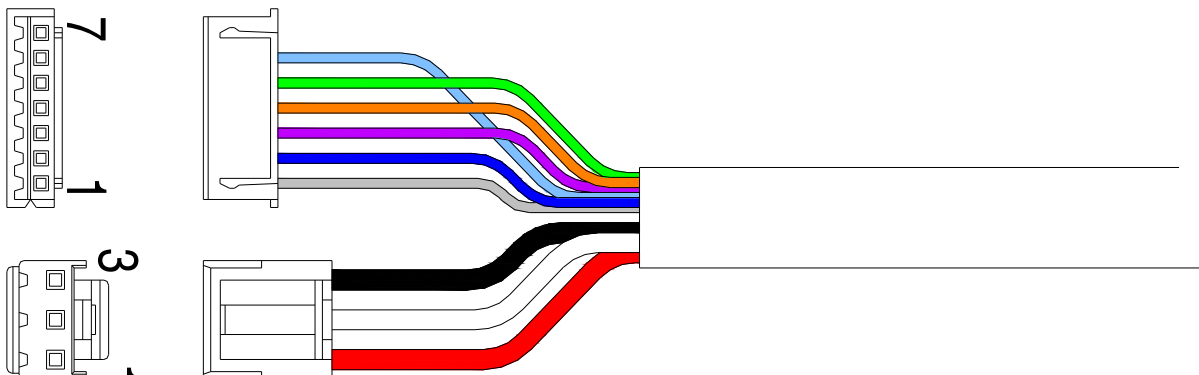
Connections

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



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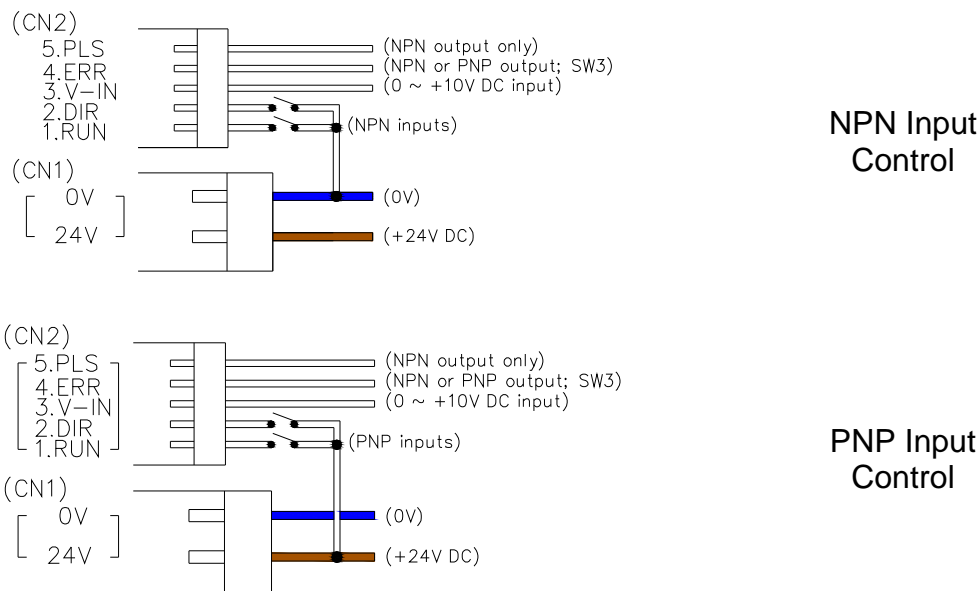
OPERATION

Control Connection

CN2		Connector on Card	Connector for Wiring
5 PIN connector CONTROL		WAGO #733-365	WAGO #733-105
PIN	Description		
1	+24V DC (PNP) or 0V (NPN) input – RUN		
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)		
Wire size: 28~20 AWG			

Control Wiring

Power to CN1 (24V DC) remains ON, control motor Run/Stop through CN2

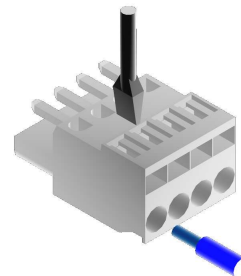


Press down spring clamp in connector with a small screwdriver.

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.



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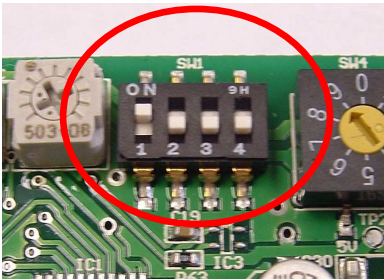
OPERATION

Switch



Switch	Function	Position		Initial Setting
		Up	Down	
SW3	ERR Output	NPN	PNP	NPN

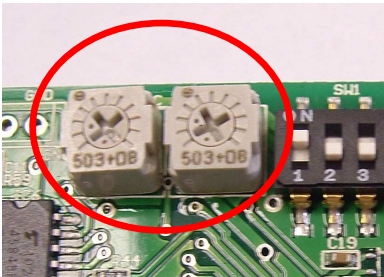
DIP Switches – User Settings



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

OPERATION

Potentiometers

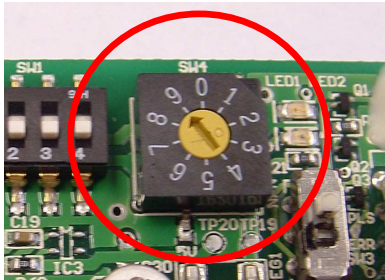


Potentiometer	Function	Description
VR1	Acceleration	RUN signal ON 0~2.5s until set speed
VR2	Deceleration	RUN signal OFF 0~2.5s until stop

VRs turn 270°

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Speed Change Table



10 speed steps available through on-board rotary switch

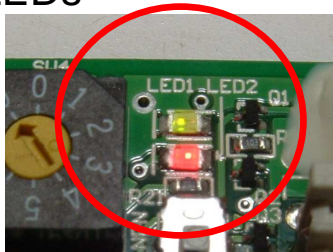
16 speed steps available through external voltage input (V-IN)

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

Motor Pulse Output Signal

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

LEDs



LED 1 – Green (power)

LED 2 – Red (error condition)

NPN / PNP inputs

The card(s) are ordered with the inputs preset from the factory – ALL NPN or ALL PNP. The model designation will show the factory preset.

- **CBM-103FN – NPN input type (Default)**
- **CBM-103FP – PNP input type**

Note – the output can be manually switched in the field by **DIP switch SW-3** – Output signal type for both CN2-4

OPERATION

LED and ERROR Indications

LED 1 (Green)	LED 2 (Red)	ERR Output (DIP-SW4 setting)		Condition	Result
		OFF	ON		
○	○	○	○	No power	Supply power (24V DC)
○	●● Flashes two times with a 1.5s pause	●	○	Fuse or temperature fuse, blown	Card must be replaced
●	○	○	●	Normal	-
●	●● Flashes Slowly	●	○	Stalled motor	Motor shuts off
●	●● Flashes Slowly	●	○	Motor is disconnected at CN4	Motor does not run
●	●●●● Flashes Quickly	○	●	Current limit, active	May indicate overload during operation
●	●	●	○	Thermal error in motor or on PCB	Motor stops after 4s
●	●	●	○	Motor is disconnected at CN3	Motor does not run
●	●● Flashes two times with a 1.5s pause	●	○	Low voltage	Motor shuts off
●	●●● Flashes three times with a 1.5s pause	●	○	Induced voltage	Motor shuts off

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OPERATION

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



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.	<ul style="list-style-type: none"> • 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 the power supply for the card must be common to the 0V line of the power supply for the controls (RUN, DIR, etc.).	This completes the signal path from the controller (PLC, etc.) to the motor driver card.
Voltage drop across the power bus	Use suitable gauge wire in relation to distance and current draw to prevent voltage drop. <u>Operating</u> 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% 10A maximum current limiter (motor lock is 10A) Diode protection for mis-wiring Sensor power short circuit protection 18A fuse for power supply protection Auto-sensing inputs for PNP or NPN	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. If inputs are subjected to a low potential the card may see this as a signal, use of a diode inline is recommended to prevent this.
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.

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Revision History

Revision Number	Change
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

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