# POWER MOLLER®24!

## Brushless DC Motor Driver
## 【CBK-109F〔N〕〔P〕】User Manual

Thank you for purchasing a Itoh Denki CBK-109 series motor driver.
Please read this manual before operating the product, and keep this manual readily accessible for reference.


Applicable MDR models

FH series
KT series

＊This product is compatible with CB-030 [P] [N].

Motor driver model

CBK-109F□

N : For standard motor,
NPN signal input and output

P : For standard motor,
PNP signal input and output

About description of the product

In this manual, CBK-109FN and CBK-109FP are described as CBK-109.
Also, CBK-109FN and CBK-109FP are described separately, when needed.

ITOH DENKI CO.,LTD.

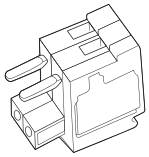
No.513

## INDEX

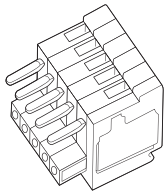


## Standard Accessories

- Power connector（CN1:EAHB05） —— 1pce
- Control connector（CN2:PACB16） —— 1pce
- Mounting screws and nuts
  Cross-ressed head SW screw M4 x 15 — 2pcs
  Nut M4 ——— 2pcs



Power connector
(CN 1)



Control connector
(CN 2)

## Warning & Caution

Shown below are the caution items for using the product safely and avoiding danger and damage to the user.
Caution items can be classified into danger, warning and caution as described below.

| | |
|---|---|
| ⚠ Warning | Incorrect handling may lead to death or serious injury, indicating potential danger. |
| ⚠ Caution | Possible danger of light or medium injury, or only a material damage. |

## 1. Safety Instructions

- Do not use the product in an explosive, flammable or corrosive atmosphere, or near flammable material. It may cause explosion, fire, electrical shock or injury.
- Do not disassemble, repair, or modify this product to avoid the risk of electrical shock or injury, damage to the product, and voiding the warranty.
- Do not forcibly bend or pull the wire. Do not put a heavy item on the wire or pinch the wire. The power cord may break and cause fire or electrical shock.
- Make sure the conveyor frame where the CBK-109 driver card and the DC power supply are mounted is grounded. Otherwise, it may cause of electrical shock or failure.
- Do not splash water or oil on CBK-109 driver card, which may cause electrical shock or failure.
- Be careful not to drop the product or expose it to impact or pressure as damage may result. Make sure to use the product within specification. Otherwise, it may cause failure, fire, or injury.
- Switch off the power when carrying, wiring, or performing maintenance. Otherwise there are risks of electrical shock or injury.
- Follow the safety rules for the place and the equipment, which the product is installed.
- The signal may stay ON or OFF in case of CBK-109 driver card failure. In order to avoid serius accidents, build the circuit separately to monitor the important input and output signal status. Otherwise, unexpected accident may be caused.
- Be sure to shut off the power before inserting or removing any connector. Do not wire while connector is plugged to CBK-109 driver card, which may cause electrical shock or damages to driver card.
- Make sure all the connecters are properly engaged with wiring cables. Otherwise, it may cause of electrical shock or failure.
- Do not change the DIP switches with great force (Recommended force is 9.8N or less). Do not use a pointy object to operate them. They may cause a failure of CBK-109 driver card.
- Be careful not to have switching devices (relays, contactors, etc.), which may generate or induce noise, within close proximity of this product, its power line, or its signal lines.
- In case of external controller has LED line or pull-up or pull-down register at output line, unexpected behavior may be occurred.
- When shutting the power off, turn the driver off first. Turning the external controller off first may cause a malfunction of this product.
- The electric brake function is only operational while the product is powered.
- Make sure to use the product within specification. Otherwise, it may cause failure, fire, or injury.
- Do not pull out a cable by force during operation and start and stop on power line, which may cause the malfuncation on CBK-109 driver card.
- Do not physically force the MDR to rotate. This may damage the product or shorten its lifetime.
- Do not shut off power while the motor is in operation. This may damage the product or shorten its lifetime.
- Do not apply power while riding on the conveyor or while a tray is under unstable conditions. MDR may rotate immediately after powered, and it may cause injury, accident, or damage.
- Switch off the power before wiring, performing maintenance, or removing the unit from the conveyor, to avoid the risk of electrical shock or injury.
- When disposing of this product, make consigning contracts with an industrial waste disposer to have the company dispose of it.

## 2. Power

24VDC battery or switching power (24VDC 10A and 240W≦)
smoothed and rectified power (≦10% ripple)

- A switching power supply is recommended as the DC power supply (24VDC ±10%) for drivers.
- Use a stabilized power supply that has an adequate capacity of 24VDC and 10A or higher and does not fluctuate due to load variation. ＊1)
- A transformer type power supply cannot be used.
- Secure a voltage of 24VDC ±10% at the power source terminal of a driver.
- Be sure to use a power supply with a capacity equal to the total of the connected MDRs' rated powers or more. If the capacity of the power supply is less than the total of the connected MDRs' rated powers, it may cause the supply voltae drop and failure or damages in MDRs and drivers. ＊2)
- The power supply should not activate protection with peak current 30A, 1ms or below.
- DC power supply must be an insulation type switching power supply certified by the safety standard ( IEC60950-1 or UL90950-1 )for ensuring safety. Do not use non-insulation type series power supply for safety as well as conforming to radiation noise restriction.

＊1) The necessary capacity is for when an MDR is used.

＊2) In case of driving multiple MDRs simultaneously, use a power supply with a capacity larger than the total of the connected MDRs' starting current.

# 3. Before Operating the Product

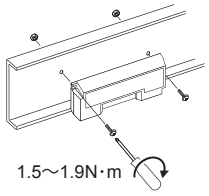
## 3－1. Mounting

① Drill mounting holes in the conveyor frame to fit the fixing holes in the product (see 10 Dimensions )

＊The product's back place should be affixed to metallic plate face to ensure the heat dissipation. Care must be paid to prevent the metallic dust entry to the product.

＊Make sure the conveyor is adequately grounded.

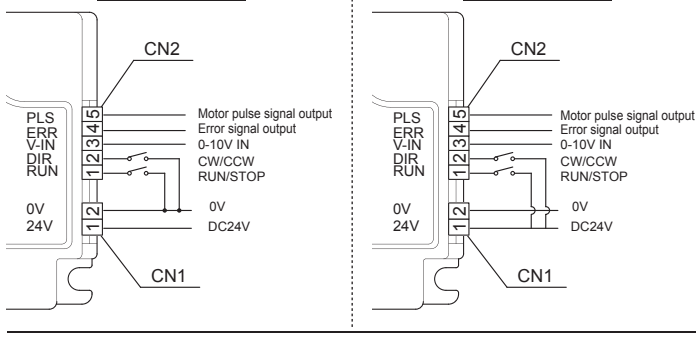
② Fix the product tightly to the conveyor frame with the supplied mounting screws and nuts with the recommended fastening torque between 1.5～1.9N･m




## 3－2. Wiring

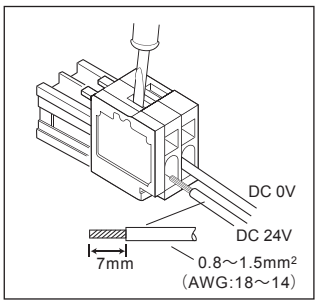
・Wiring should be made while the product is not powered.
・Switch for Run/stop or CW/CCW is an option and is not supplied.
・Relay contact or PLC output can be used instead of the above switch.
・Wiring to the supplied connectors should be made before inserting into the driver card.

【Wiring diagram】



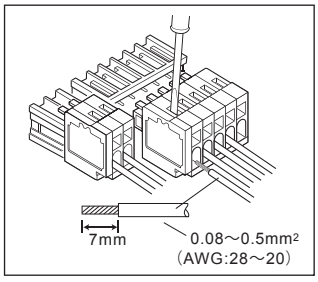

CN2
#1 MDR run and stop (mandatory) See section 5
#2 MDR direction (CW/CCW)* See section 5-2
#3 External speed variation by analog voltage change See section 5-1
#4 Discharge of error signal See section 6
#5 Discharge of MDR pulse See section 7
＊ Motor turning direction setting and speed variation can also be done by dip switch on the driver card.

① Wire 24VDC and 0V to the Power Connector CN 1(2P)



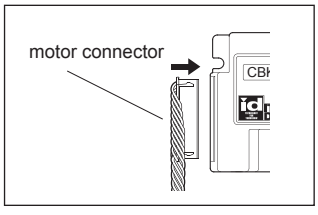

＊Connector current capacity is 10A. Avoid wiring causing excessive current.
＊Make sure the +/- wiring is correct.
＊Wiring should be made before inserting into the driver card.

② Wire to the Control Connector CN 2 (5P) per the diagram in section 3




＊0V to CN2-1 and CN2-2 should be common to the power voltage. (connector current capacity is 4A)
＊Analog voltage input to CN2-3 should not exceed 10V. 0V should be common to the power voltage.
＊Error signal from CN2-4 is NPN open collector.
＊Motor pulse signal from CN2-5 is NPN open collector.

③ Insert the pre-wired Power Connector CN 1, Control Connector CN 2 and motor connector respectively to the counter connectors in the driver card (motor connector to CN 3) while the power is shut off.

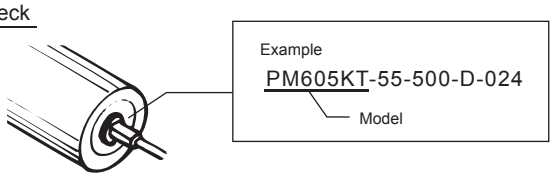




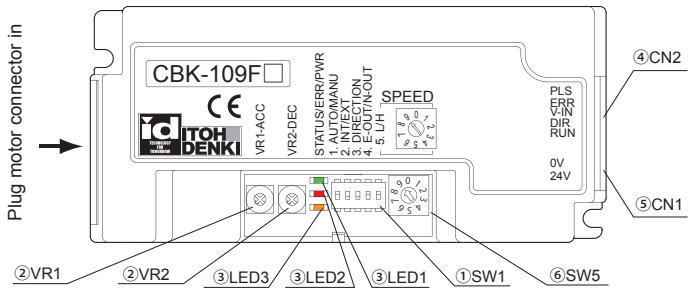

## 3－3. Direction setting

Dip switch 1-3 is to select the motor turning direction viewed from the MDR's power cable side. The setting differs according to the MDR model. Check the model from the circular label put on the MDR end housing.

Model check




# 4. Functions




①Dip Switch (SW1)

| No | Function | ON | OFF | Default | Remarks |
|---|---|---|---|---|---|
| SW1-1 | Thermister/Under voltage / Back EMF error reset | Manual | Automatic | ON | See section 8 |
| SW1-2 | Speed variation | External | Internal | OFF | See section 5-1 |
| SW1-3 | Turning direction | See 5-2 | | OFF | See section 5-2 |
| SW1-4 | Error signal | Discharges in normal status | Discharges when error arises | ON | See section 6 |
| SW1-5 | Speed range | High range | Low range | ON | See section 5-1 |

②Potentiometer (VR)

| | | Min (To the CCW end.) | Max (To the CW end.) | Default | Remarks |
|---|---|---|---|---|---|
| 1 | Acceleration from RUN signal | 0 sec | 2.5 sec | Min | See section 5-3 |
| 2 | Deceleration from STOP signal | 0 sec | 2.5 sec | Min | |

③LEDs

| | Color | Status | Remarks |
|---|---|---|---|
| 1 | Green | Powered and functions normally | See section 8 |
| 2 | Red | Indicates type of error | |
| 3 | Orange | Indicates number of error occurrence form thermister reaction, motor stall, back EMF or under voltage | See section 9 |

④Control Connector (CN 2)

| | Function | Remarks |
|---|---|---|
| 5 | Motor pulse signal ooutput | See section 7 |
| 4 | Error signal output | See section 6 |
| 3 | External speed variation | See section 5-1 |
| 2 | Motor turning direction | See section 5-2 |
| 1 | Motor Run/Stop | See section 5 |

⑤Power Connector (CN 1)

| | |
|---|---|
| 2 | 0V |
| 1 | 24VDC |

⑥Rotary Switch (SW 5)
10 index speed setting

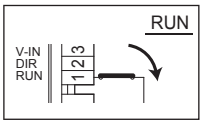
# 5. Operation Instructions

Ensure the following before operating the product

- MDR is adequately installed in compliance with the manual.
- MDR shafts are adequately secured with the supplied brackets or accessories.
- Each connector on the driver card is adequately wired and inserted.
- Operating and environmental conditions are respected.
- Power supply has sufficient capacity (stable 24VDC, 10A or over) so as not to be affected by varying load.
  The protector for the power supply should not react with peak current 30A 1 milli-second or less.
  ＊ It is within normal limits that under voltage error sometimes occurs when power is turned ON or OFF. Consider it and control CBK-109.

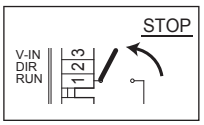
① Supply 24VDC to the driver card, and the LED 1 (green) illuminates.

② Close the contact of CN2-1 , and the MDR starts running.




＊ 0V should be common to the power voltage.
＊ 3mA current is drawn to CN2-1.
＊ Wait 1 second after the driver card is powered before running MDR.

③ Open the contact of CN2-1 , and the MDR stops.




＊ MDR run/stop should be manipulated only by CN2-1 and 0V, not by the 24VDC power to the driver card.

④ To vary the motor speed, follow the section 5-1.

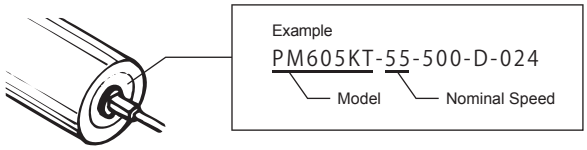
⑤ To reverse the motor, follow the section 5-2.

⑥ To accelerate or decelerate the motor, follow the section 5-3.

## 5－1. Speed Variation

Speed of the MDR can be varied either internally by integral dip switch or externally by analog voltage input.

- Range of speed variation differs according to the MDR model. Check the nominal speed of the model from the circular label put on its end housing.




【5-1-1 Internal Speed variation 】

①Set the SW1-2 OFF to effect the internal speed variation.

②With the combination of SW1-5 and Rotary Switch SW5, speed can be varied in 20 steps.

【5-1-2 External Speed Variation 】

① Set the SW1-2 ON to effect the external speed variation.

② Inject and vary the analog voltage between 0 and 10V to CN2-3 to vary the motor speed in 20 steps.

＊ Max 2mA current is consumed at CN2-3.

＊ The analog voltage input should not exceed 10V. Its 0V should be common to the Power voltage.



**PM486FH**

Speed deviation +/-3%

| Internal speed variation | | MDR Nominal Speed (m/min) | | Analog voltage input |
|---|---|---|---|---|
| SW1-5 | SW 5 | 255 | 55 | |
| ON | 9 | 243.7 | 53.5 | 9.6～9.9 |
| | 8 | 243.7 | 53.5 | 9.1～9.4 |
| | 7 | 243.7 | 53.5 | 8.6～8.9 |
| | 6 | 243.7 | 53.5 | 8.1～8.4 |
| | 5 | 235.1 | 51.6 | 7.6～7.9 |
| | 4 | 222.8 | 48.9 | 7.1～7.4 |
| | 3 | 197.7 | 43.4 | 6.6～6.9 |
| | 2 | 185.4 | 40.7 | 6.1～6.4 |
| | 1 | 173.1 | 38.0 | 5.6～5.9 |
| | 0 | 160.8 | 35.3 | 5.1～5.4 |
| OFF | 9 | 148.5 | 32.6 | 4.6～4.9 |
| | 8 | 136.2 | 29.9 | 4.1～4.4 |
| | 7 | 123.5 | 27.1 | 3.6～3.9 |
| | 6 | 111.2 | 24.4 | 3.1～3.4 |
| | 5 | 98.9 | 21.7 | 2.6～2.9 |
| | 4 | 86.6 | 19.0 | 2.1～2.4 |
| | 3 | 74.3 | 16.3 | 1.6～1.9 |
| | 2 | 62.0 | 13.6 | 1.1～1.4 |
| | 1 | 49.7 | 10.9 | 0.6～0.9 |
| | 0 | 36.9 | 8.1 | 0.1～0.4 |

**PM570KT**

Speed deviation +/-3%

| Internal speed variation | | MDR Nominal Speed (m/min) | | Analog voltage input |
|---|---|---|---|---|
| SW1-5 | SW 5 | 55 | 15 | |
| ON | 9 | 59.8 | 15.7 | 9.6～9.9 |
| | 8 | 56.4 | 14.9 | 9.1～9.4 |
| | 7 | 53.9 | 14.2 | 8.6～8.9 |
| | 6 | 51.3 | 13.5 | 8.1～8.4 |
| | 5 | 48.7 | 12.8 | 7.6～7.9 |
| | 4 | 46.2 | 12.1 | 7.1～7.4 |
| | 3 | 41.1 | 10.8 | 6.6～6.9 |
| | 2 | 38.4 | 10.1 | 6.1～6.4 |
| | 1 | 35.9 | 9.4 | 5.6～5.9 |
| | 0 | 33.4 | 8.8 | 5.1～5.4 |
| OFF | 9 | 30.8 | 8.1 | 4.6～4.9 |
| | 8 | 28.2 | 7.4 | 4.1～4.4 |
| | 7 | 25.6 | 6.7 | 3.6～3.9 |
| | 6 | 23.1 | 6.1 | 3.1～3.4 |
| | 5 | 20.5 | 5.4 | 2.6～2.9 |
| | 4 | 18.0 | 4.7 | 2.1～2.4 |
| | 3 | 15.5 | 4.1 | 1.6～1.9 |
| | 2 | 12.8 | 3.4 | 1.1～1.4 |
| | 1 | 10.3 | 2.7 | 0.6～0.9 |
| | 0 | 7.7 | 2.0 | 0.1～0.4 |

**PM605KT**

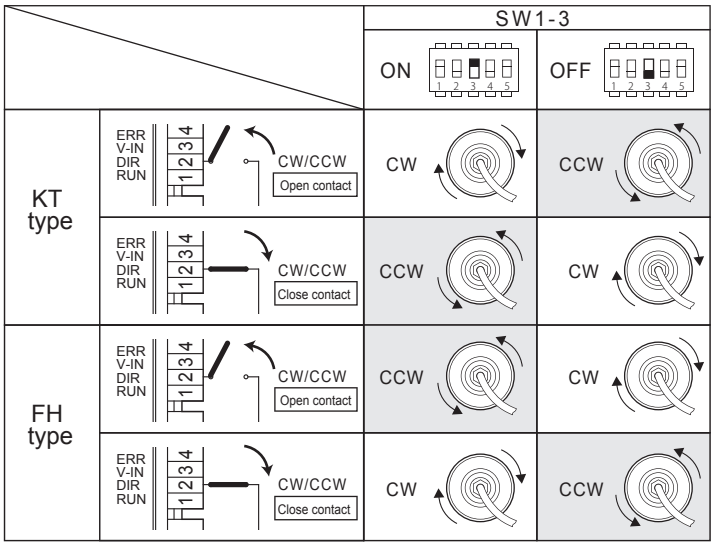
Speed deviation +/-3%

| Internal speed variation | | MDR Nominal Speed (m/min) | | Analog voltage input |
|---|---|---|---|---|
| SW1-5 | SW 5 | 55 | 15 | |
| ON | 9 | 63.5 | 16.7 | 9.6～9.9 |
| | 8 | 59.9 | 15.8 | 9.1～9.4 |
| | 7 | 57.2 | 15.1 | 8.6～8.9 |
| | 6 | 54.5 | 14.3 | 8.1～8.4 |
| | 5 | 51.7 | 13.6 | 7.6～7.9 |
| | 4 | 49.0 | 12.9 | 7.1～7.4 |
| | 3 | 43.6 | 11.5 | 6.6～6.9 |
| | 2 | 40.8 | 10.7 | 6.1～6.4 |
| | 1 | 38.1 | 10.0 | 5.6～5.9 |
| | 0 | 35.4 | 9.3 | 5.1～5.4 |
| OFF | 9 | 32.7 | 8.6 | 4.6～4.9 |
| | 8 | 29.9 | 7.9 | 4.1～4.4 |
| | 7 | 27.2 | 7.2 | 3.6～3.9 |
| | 6 | 24.5 | 6.4 | 3.1～3.4 |
| | 5 | 21.8 | 5.7 | 2.6～2.9 |
| | 4 | 19.1 | 5.0 | 2.1～2.4 |
| | 3 | 16.4 | 4.3 | 1.6～1.9 |
| | 2 | 13.6 | 3.6 | 1.1～1.4 |
| | 1 | 10.9 | 2.9 | 0.6～0.9 |
| | 0 | 8.2 | 2.2 | 0.1～0.4 |

## 5－2. Direction Setting

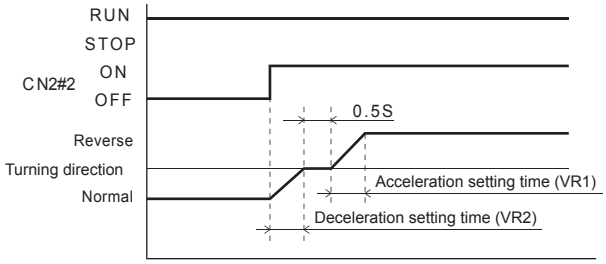
MDR turning direction can be set or changed either internally by integral dip switch or externally by optional switch.

Setting for Turning Direction




＊ Turning direction viewed from the MDR's power cable side.
＊ 0V should be common to power voltage.
＊ 3mA current is drawn at CN2-2

Reverse motor direction by external DIR signal.

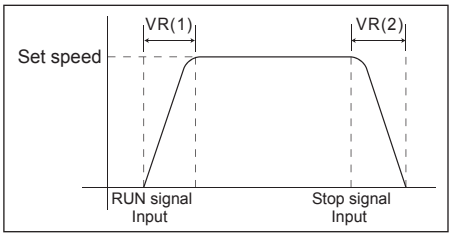



Reverse direction by DIP switch is prohibited while motor is running. Motor must be stopped first, and then reverse a direction by DIP switch.

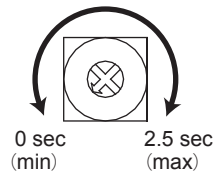
## 5－3. Acceleration and Deceleration

① Integral potentiometer VR 1 allows the acceleration adjustment from 0 to 2.5 seconds.
② Integral potentiometer VR 2 allows the deceleration adjustment from 0 to 2.5 seconds.

・The adjustable range of time is on the control basis, thus may differs on actual transfer speed.




VR1・VR2




## 6. Error Signal Output

**Caution**

- To monitor the error signal, a protective resistor should be mounted to suppress 24VDC to 25mA or less.
- The driver card has 100Ω protective resistor.

Error signal is discharged from CN2-4

・Disregard the error signal discharged when power is injected to the driver card (for 0.5 sec) and when power to the driver card is shut off (for 2 seconds)

① SW1-4 allows the selection of the error signal discharge timing: discharge on normal status or discharge when error arises. Error signal is NPN open collector in cace of CBK-109FN.
＊See section 8 for error status, reset and history.

| SW1-4 ON | SW1-4 OFF |
|---|---|
| Error signal discharges in normal status | Error signal discharges when error arises |
| Open on error | Open on normal |

## 7. Motor Pulse Signal Output

**Caution**

- Protective resistor should be mounted to suppress the output to be 25mA or less, otherwise the driver card's integral transistor may be damaged.
- 100Ω resistor is built-in the driver card's output section for motor pulse signal.

・MDR's motor pulse signal is discharged from CN2-5.
・2 pulses/motor rotation, NPN open collector output.

Speed deviation +/-3%

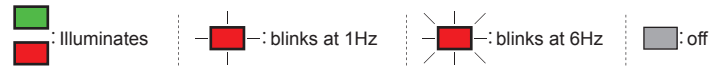
| Internal speed variation SW1-5 | SW5 | Frequency (Hz) | Motor speed (rpm) | Analog voltage input |
|---|---|---|---|---|
| ON | 9 | 155 | 4638 | 9.6～9.9 |
| | 8 | 152 | 4556 | 9.1～9.4 |
| | 7 | 145 | 4349 | 8.6～8.9 |
| | 6 | 138 | 4141 | 8.1～8.4 |
| | 5 | 131 | 3934 | 7.6～7.9 |
| | 4 | 124 | 3727 | 7.1～7.4 |
| | 3 | 110 | 3313 | 6.6～6.9 |
| | 2 | 104 | 3106 | 6.1～6.4 |
| | 1 | 97 | 2899 | 5.6～5.9 |
| | 0 | 90 | 2692 | 5.1～5.4 |
| OFF | 9 | 83 | 2485 | 4.6～4.9 |
| | 8 | 76 | 2278 | 4.1～4.4 |
| | 7 | 69 | 2071 | 3.6～3.9 |
| | 6 | 62 | 1864 | 3.1～3.4 |
| | 5 | 55 | 1657 | 2.6～2.9 |
| | 4 | 48 | 1450 | 2.1～2.4 |
| | 3 | 41 | 1242 | 1.6～1.9 |
| | 2 | 35 | 1035 | 1.1～1.4 |
| | 1 | 28 | 828 | 0.6～0.9 |
| | 0 | 21 | 621 | 0.1～0.4 |

# 8. Error Status, Reset and History

・When error arises, the error can be identified either by LED 1 (green) and LED 2 (red), or by the error signal discharged from CN2-4.

・To reset the error status, first remove the cause of error, and then switch the direction signal at CN2-2.
・To restart the MDR, first remove the cause of error, and then re-injection run signal at CN2-1.
・Please have 100ms or more intervals between each switch for ON→OFF→ON / OFF→ON→OFF / RUN→STOP→RUN to release error signal or restart MDR.

## LED indication




Manual recovery setting (SW1#1 ON <Factory setting>) / Automatic recovery setting (SW1#1 OFF)

| PWR (green) / ERR (red) | CN2-4 (Error signal) SW1-4 OFF | CN2-4 (Error signal) SW1-4 ON | MDR | Symptom/Causes | Reset the error signal | Restart the MDR |
|---|---|---|---|---|---|---|
| | Open | Discharge | n.a. | Normal operation | n.a. | |
| | Open | Open | Stop | No power | Supply 24VDC power | see 5 Operation Instructions |
| | Discharge | Open | Stop | PCB damaged | Shut off the power then replace the driver card | see 5 Operation Instructions |
| | Discharge | Open | Stop | Thermister reacted (Thermister error) | Automatic recovery setting | |
| | | | | | MDR restarts immediately 1 minute after thermister recovery from cooling off | |
| | | | | | After thermister recovery, inject signal RUN-STOP-RUN order to CN2-1 for error reset and restart. | |
| | | | | | After thermister recovery, inject signal ON-OFF-ON or OFF-ON-OFF order to CN2-2 | Inject signal RUN-STOP-RUN order to CN2-1 |
| | | | | | | Restarts automatically in a minute |
| | | | | | Manual recovery setting | |
| | | | | | MDR restarts by injecting RUN signal followed by STOP signal to CN2-1 to reset the error signal then inject RUN signal to CN2-1 to restart, 1 minute after thermister recovery | |
| | | | | | After thermister recovery, inject signal ON-OFF-ON or OFF-ON-OFF order to CN2-2 | Inject signal RUN-STOP-RUN order to CN2-1 |
| | Discharge | Open | Stop | Connector unplugged | Shut off the power and replug in the connector properly | see 5 Operation Instructions |
| | Discharge | Open | Stop | Motor cable disconnection | Shut off the power then replace the MDR | see 5 Operation Instructions |
| | Discharge | Open | Stop | Motor stall for 0.5 seconds (Stall error) | Inject signal RUN-STOP-RUN order to CN2#1 4 sec. after error occurred to reset the error and restart. | |
| | | | | | Inject signal ON-OFF-ON or OFF-ON-OFF order to CN2-2 | Inject signal RUN-STOP-RUN order to CN2-1 to restart |
| | Discharge | Open | Stop | Supply 15VDC or less for 1 sec, or supply 15V or less five times in 500ms. (under voltage error) | Automatic recovery setting | |
| | | | | | Secure the stable supply voltage 18V or over | Restarts immediately |
| | | | | | Manual recovery setting | |
| | | | | | First secure the stable supply voltage 18V or over, then inject signal RUN-STOP-RUN order to CN2-1 for error reset and restart | |
| | | | | | First secure the stable supply voltage 18V or over, then inject signal ON-OFF-ON or OFF-ON-OFF order to CN2-2 | Inject signal RUN-STOP-RUN order to CN2-1 to restart |
| Blinks twice ⇕ Off (1.5 sec.) | Discharge | Open | Stop | ＊ Supply MDR 40VDC or more for 2 sec. or 60VDC or over for 0.1 sec. (back EMF error) | Automatic recovery setting | |
| | | | | | Supply MDR 30VDC or less for 1 sec. | Restarts immediately |
| | | | | | Manual recovery setting | |
| | | | | | After supplying 30VDC or less for 1 sec., inject signal RUN - STOP - RUN order to CN2#1 to reset error and restart. | |
| | | | | | After supplying 30VDC or less for 1 sec., inject signal ON - OFF - ON or OFF - ON - OFF order to CN2#2 | Inject signal RUN-STOP-RUN order to CN2-1 to restart |
| | Open | Discharge | Run | 7A or more current flows to MDR | No error signal | |

＊The error may also occur when MDR runs faster than the set speed.

Error can also be reset by shutting off the power 2 seconds or over.

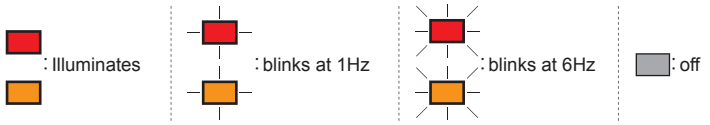


# 8－1. Error History

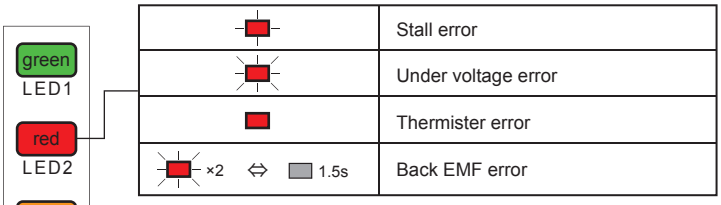
If thermister, motor stall or under voltage error arises while the MDR is running, the error status and frequency of error occurrence are identified by LED 2 and LED 3.

・LED of error history will not illuminate during normal operational condition, but when motor stops with next error.
・There is no error history for the other errors.
・When four errors or more occurred, the latest three error histories are displayed.
・The error history is reset by turning power off.

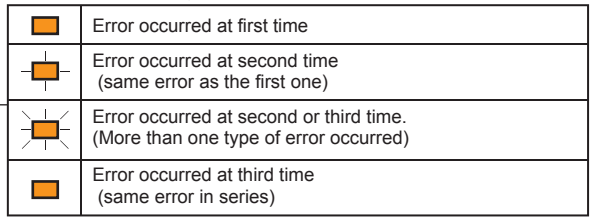
## LED indication




Motor stall error / under voltage error / thermister error /back EMF error




Shows the error history since the card is powered.



# 9. Troubleshooting

∗ Follow the procedures below without removing plastic cover or modifying the driver card, in case any problem happens.

| Symptom 1: MDR does not run | |
|---|---|
| Power | • Check if only PWR(green) illuminates.<br>• Check if 24VDC stable voltage is adequately supplied from the power supply.<br>• Check if the wiring to CN1 connector is made correctly.<br>• Check if 24VDC cable is adequately wired to the CN 1 connector. |
| RUN signal | • Check if 0V is injected to CN2-1.<br>• Check if the 0V injected to CN2-1 is common to 0V injected to CN1-2.<br>• Check if the wiring is adequately made to CN2-1 connector. |
| Error | • Check if ERR(red) is illuminating or blinking.<br>» If this is the case, see section 8 and remove the cause of error. |
| MDR | • Check if the MDR is adequately installed and its shafts are adequately fixed with the supplied mounting brackets or accessories.<br>• Check if the MDR end housing is NOT contacting conveyor frame.<br>• Check if the MDR's connector is properly inserted to the driver card.<br>• Check if the o-ring or belt tension is not too strong. Check if the number of slaved idler rollers is adequate. |

| Symptom 2 : Speed variation is not achieved, or speed is slower than expected | |
|---|---|
| MDR | • Check if the nominal speed of the MDR to see if the right model is used to achieve the speed variation or to reach expected speed. |
| SW1-2 setting | • Check if the SW1-2 is set properly: ON for external speed variation and OFF for internal speed variation. |
| Power (During external speed variation) | • Check if the external voltage 0V is common to the 0V input to CN1#2.<br>• Check if the stable 24VDC is supplied. |
| CN2-3 | • Check if the wiring is adequately made to CN2-3 connector.<br>• Check if the analog voltage input is made between 0 and 10V. |

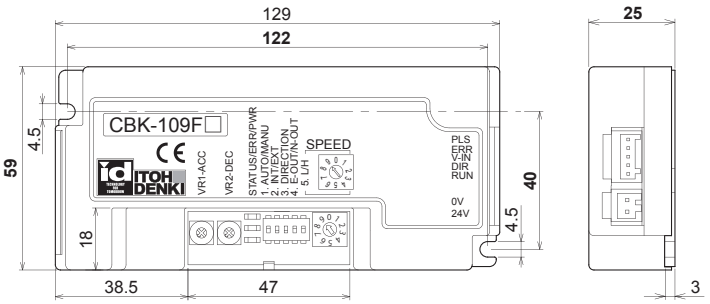
| Symptom 3 Reversing is not achieved | |
|---|---|
| CW/CCW | • Check if 0V is injected to CN2-2, and it is common to the 0V input to CN1-2.<br>• Check if the wiring is adequately made to CN2-1. |
| SW1#3 | • Check if DIP-SW1#3 is changed when MDR stops.<br>» The rotating direction cannot be changed during operation by DIP-SW1#3. Stop the operation and change the direction by DIP-SW1#3, or change the direction during operation by CN2#2 |

| Symptom 4 Error Signal Not Discharged | |
|---|---|
| SW1-4 | • Check if the setting is made properly for discharge on normal or discharge when error arises. |
| Voltage | • Check if the external voltage is 24VDC or less and its 0V is common to the 0V input to CN1-2.<br>• Check if the resistor larger than 1kΩ is mounted. |
| CN2-4 | • Check if the wiring is adequately done to CN2-4.<br>• Is wiring for NPN or PNP signal output correctly done. |

| Symptom 5 Error Signal is often Discharged | |
|---|---|
| ERR (red) | • Check if the ERR(red) is blinking.<br>» If this is the case, see section 8 in page 7 and remove the cause of error.<br>• Is an appropriate power supply with enough capacity used.<br>» See section 2, Power.<br>• Check if the wire diameter of the power supply is appropriate (0.8 to 1.5mm²). Also, check if there is no failure in wiring or no looseness at connectors.<br>» Check the wire diameter and wirings.<br>• Check if CBK-109 is too far from the power supply. (Check if the voltage is dropped.) |
| Environment | • Check if the product is used in the ambient temperature range between 0 and 40℃.<br>• Check if the driver card back plate is affixed to the metallic plate face for better heat dissipation.<br>• Check if motor stall occurs in case that a stopper is used to stop transferred products. |
| MDR | • Check if the MDR end housing is contacting the conveyor frame.<br>• Check if the MDR's connector is properly inserted to the driver card.<br>• Check if the power cable is damaged. |



# 10. Dimensions




# 11. Specifications

| | |
|---|---|
| Power voltage | 24VDC ±10% |
| Rated voltage | 24VDC |
| Static current | 0.06A |
| Peak current | 30A , 1msec or less |
| Starting current | 7.0A |
| Motor starts running from RUN signal | ≦15msec |
| Error signal discharge | NPN ∗1<br>Open collector output (should be set to 25mA to less max output current) |
| LED | Power (green)<br>Error (red)<br>Frequency (red/orange) |
| Protections | Integral 10A fuse (+ side)<br>Diode against miss-wiring |
| Thermister | 95℃ on PCB or<br>105℃ in motor |

| Type of brake | | Servo Lock Brake ∗2∗3 |
|---|---|---|
| Connector (wiring side) | Power | P/N 734-102 (10A max)<br>(Wire diameter : AWG18～14) |
| | Control | P/N 733-105 (4A max)<br>(Wire diameter : AWG28～20) |
| MDR connector | | JST P/N S12B-XH-A |
| Environment | Ambient temperature | 0 to +40℃ |
| | Relative humidity | ≦90%RH<br>(no condensation) |
| | Atmosphere | No corrosive gas |
| | Vibration | ≦0.5G |
| | Installation | Indoor |

∗1 CBK-109FP is for PNP in/output.

∗2 Tangential force and current while servo lock brake is activated.

| Max brake tangential force | Max current |
|---|---|
| 153N<br>(PM605KT-55 type) | 1A |

What is Servo Lock Brake?

・MDR is stopped and its position is kept when servo lock brake is activated.
・Even when MDR is rotated forcibly by external force, MDR moves back to the position where MDR was at activating servo lock brake.
・This option is especially for decline and incline conveyor where MDR may be rotated by external force when stopped.

∗3 MDR is stopped by dynamic brake in case an error occurs.

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