

HB-510 series Hybrid Board Handling Instructions



Thank you for purchasing ITOH DENKI Power Moller or Motorised drum.

Please read this handling instructions first to understand the product, safety information and cautions before operating the product.

Keep this handling instructions readily accessible for reference.

Caution

HB 510 series hybrid board can not be used in conjunction with HB 508 series card.

All the cards connected though communication cable should be the same and identical.

If different HB cards are used, they should form separate line, and control between different HB card lines should be made with PLC or other equivalent equipment.

Applicable Power Moller models

【HB-510N】【HB-510P】

PM486FE , PM486FP , PM486FS , PM500FE , PM500FP , PM500FS , PM570FE , PM605FE , PMT42FE

【HB-510BN】【HB-510BP】

Above models with built-in brake option(-BR)

【HB-510N/LT】【HB-510P/LT】

Above Power Moller models with LT(Low temperature)option(-LT)※

※ High speed Power Moller with a speed of higher than 70m/min. is NOT applicable.

Note) Build-in brake option is NOT available.

Make sure the following accessories are enclosed upon opening the package

[Standard accessories]

● HB card × 1
(HB-510□/LT)

N : NPN signal input]

P : PNP signal input]

BN : NPN signal input for built-in brake Power Moller unit

BP : PNP signal input for built-in brake Power Moller unit

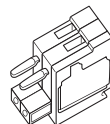
LT : Low temperature applications

● Mounting screws and nuts

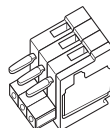
Screw (M4×15)×4

Nut (M4)×4

● Power connector × 1
(EAHB05:CN 1)

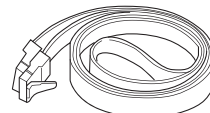


● Sensor connector × 1
(SAHB05:CN3)

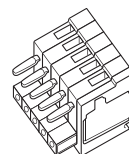


[Option]

● Communication cable
(CAHB05-□□□□)
□ stands for length(mm)



● Control connector
(PAHB08:CN2)



[Safety Instructions]

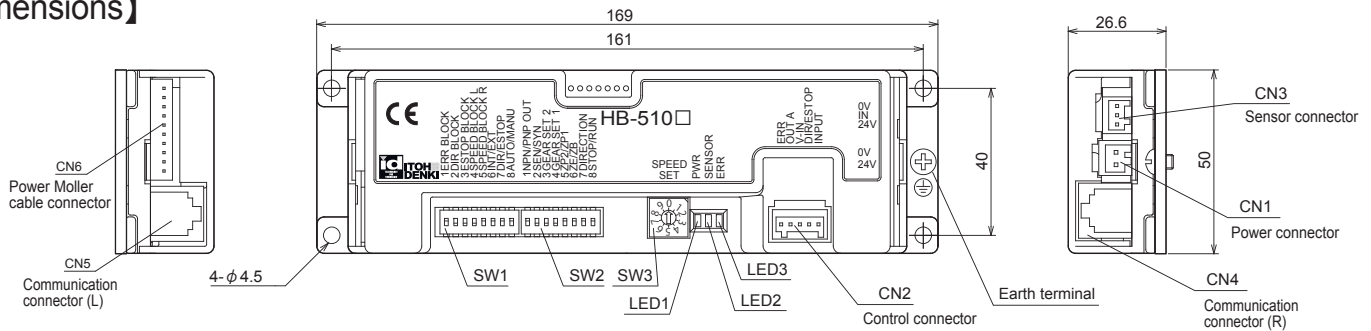
- Switch off the power, when removing from conveyor, wiring or maintenance is done, otherwise you have a risk of electrical shock or injury.
- Respect the electrical regulations of the site or the equipment, where the product is installed. (Labour safety and sanitary regulations, electrical equipment technical standard, etc)
- Operate the motor driver within its intended design and specifications to avoid electrical shock, injury, fire, or damage to the equipment.
- Do not disassemble, repair nor modify the product (for which we do not warrant) It might cause electrical shock, injury or fire.
- Separately set the circuitry to monitor the important input and/or output signal status, which might cause accident, because the signal may stay ON or OFF in case of the HB-510 driver card failure.
- Be sure to shut off the power before inserting or removing any connector. Do not wire connector left in the HB-510 driver card.
- Do not drop, give external impact nor pressure to the HB-510 driver card. If that happens, do not reuse it.
- Make sure all the connectors are properly engaged with wiring cables.
- Make sure the conveyor frame and control box where the HB-510 driver card is mounted are grounded.
- Dispose this product in industrial waste.
- Do not switch on or off the relay or contactor in close proximity to power or signal lines, or the HB-510 driver card as the generated noise could cause malfunction.
- Be sure to inject power or input signal for 15 milli-seconds or over to ensure the proper reaction.
- Use the Power Moller with brake option (BR) if holding effect is needed. (Except LT option)

- Do not pull by force during operation. It causes the HB-510 driver card to malfunction.
 - Do not force the Power Moller to turn. It may cause of damage to the driver card or shorten its life cycle.
 - Make sure the external controller is powered when HB-510 is controlled by it. If the external controller is not powered, unexpected behavior may occur on the HB-510, Power Moller or the external controller.
- Described below are the precautions for using this product at freezing temperature along with Power Moller having LT option —
- Connector and communication cable may harden with low temperature.
 - Do not insert and pull them by force.
 - Mount this product to the place where Power Moller can be properly connected without cable loose, extreme bend or pull, or move.
 - Power Moller speed may not reach immediately to the set speed if it is left long hours in 0 °C or below. In addition, the starting current may get larger to activate thermister, or under voltage error may be resulted. Therefore , warm up operation is recommended before formal use.
 - Be careful for condensation or freeze in case the product is used in varying temperature particularly between below and above 0°C. If condensation is generated, do not use the product until it is completely removed. Use of the product having condensation may result in malfunction or electrical accident.

[Power]

- 24VDC battery or switching power (24VDC 5A) or smoothed and rectified power ($\leq 10\%$ ripple)
 - ※ Use stable power supply with 24VDC, 5A or over. The Power supply should not be affected by peak current 20A for 1msec.
 - ※ Max 35mA current is drawn to CN3 for sensor.

[Dimensions]



● SW1 (from left to right)

No	Function	ON	OFF	Remarks	Default setting
1	Error signal transmission to the right adjacent zone	Valid	Invalid	(※1)OFF=	ON
2	Direction signal transmission to the right adjacent zone			- stops signal discharge to the right zone	ON
3	Emergency stop signal transmission to the right adjacent zone			- blocks signal input from the right zone	ON
4	Speed variation signal transmission to the left adjacent zone (external voltage change)			- accepts the signal input from the left zone	ON
5	Speed variation signal transmission to the right adjacent zone (external voltage change)			- discharges signal to the left zone	ON
6	Selection of internal or external speed variation	External (voltage input)	Internal (SW3 pot.)	(※1)OFF=	OFF
7	Selection of direction signal input or emergency stop signal input (CN2-4)	Emergency stop signal input	Direction signal input	- stops signal discharge to the specified direction	OFF
8	Selection of recovery for thermal or low voltage error	Manual	Automatic	- blocks signal input from the specified direction	ON
				External voltage is injected to the CN2-3 control connector (varied between 0 and 10V)	
				Input to the CN2-4 control connector	
				To reset, first switch on SW1-7 then CN2-4 ON, or power off then CN2-5 on.	ON

※1 The direction has nothing to do with the line upstream and downstream. Maximum 30 zones can be controlled from one HB card.

● SW2 (from left to right)

No	Function	ON	OFF	Remarks	Default setting																																									
1	Selection of PNP or NPN output signal	PNP output	NPN output	Output for error, synchronization and sensor signal	N / BN = OFF P / BP = ON																																									
2	Selection of sensor signal output or synchronization signal output	Synchronization signal output	Sensor signal output	Output from CN 2-2 control connector (24V, max 25mA)	ON																																									
3	※1 Power Moller nominal speed setting	<table><tr><td colspan="2">Nominal speed</td><td colspan="2">Switch setting</td><td colspan="2">Timer set time (S)</td></tr><tr><td>FE</td><td>FS/FP</td><td>#3</td><td>#4</td><td colspan="2">Sensor / Run hold</td><td>JAM</td></tr><tr><td>210</td><td>255</td><td>OFF</td><td>OFF</td><td colspan="2">0.3~1.2</td><td>0.6~2.2</td></tr><tr><td>60</td><td>55</td><td>OFF</td><td>ON</td><td colspan="2">1~4</td><td>2~8</td></tr><tr><td>17</td><td>15</td><td>ON</td><td>OFF</td><td colspan="2">4~14</td><td>7.5~27</td></tr><tr><td>—</td><td>—</td><td>ON</td><td>ON</td><td colspan="3">Forcible RUN ※</td></tr></table>		Nominal speed		Switch setting		Timer set time (S)		FE	FS/FP	#3	#4	Sensor / Run hold		JAM	210	255	OFF	OFF	0.3~1.2		0.6~2.2	60	55	OFF	ON	1~4		2~8	17	15	ON	OFF	4~14		7.5~27	—	—	ON	ON	Forcible RUN ※			Timer is effected for the time to move tote for 1 meter. The time differs by varied speed accordingly; faster the shorter and slower the longer. Individual timer setting is not feasible.	OFF
Nominal speed		Switch setting		Timer set time (S)																																										
FE	FS/FP	#3	#4	Sensor / Run hold		JAM																																								
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—	—	ON	ON	Forcible RUN ※																																										
4		※ Forcible RUN ceases when sensor in present and downstream zone is blocked.			ON																																									
5	Selection of ZPA release mode	Slug (train)		Singulated	ON																																									
6	Downstream end setting	Invalid		Valid	Zone stops after tote receipt and does not evacuate to further downstream zone even if it is empty. Evacuation is enabled only by inputting forcible RUN signal.	ON																																								
7	Motor direction	<table><tr><td>FE</td><td>FS / FP</td></tr><tr><td>CCW</td><td>CW</td></tr></table>		FE	FS / FP	CCW	CW	<table><tr><td>FE</td><td>FS / FP</td></tr><tr><td>CW</td><td>CCW</td></tr></table>	FE	FS / FP	CW	CCW	ON																																	
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CCW	CW																																													
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CW	CCW																																													
8	Selection of input terminal function	Forcible RUN	Forcible STOP	Input to CN2-5 control connector	ON																																									

※1 Speed variation in the table is achieved only by the correct combination of the Power Moller nominal speed and dip switch settings.

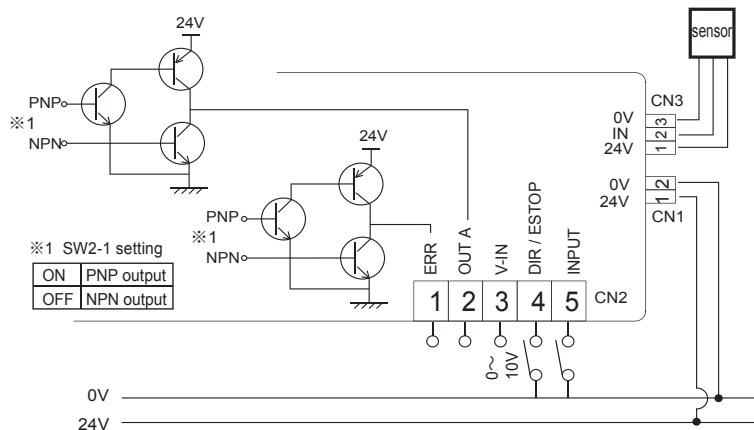
● SW3

Rotary switch for 10 index speed variation
(when SW1-6 is set to OFF)

● LED

LED 1	Green	Power status. Activates Power Moller
LED 2	Orange	Error on sensor or jam error
LED 3	Red	Error on thermister, motor block or current limiter, Low voltage

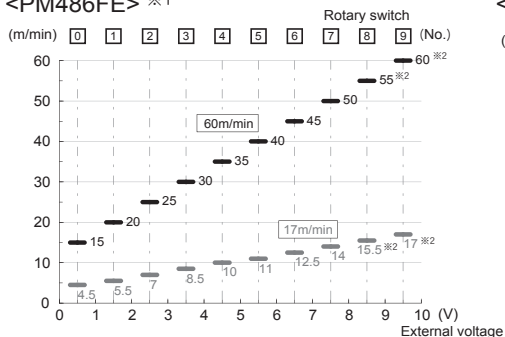
【Wiring diagram】



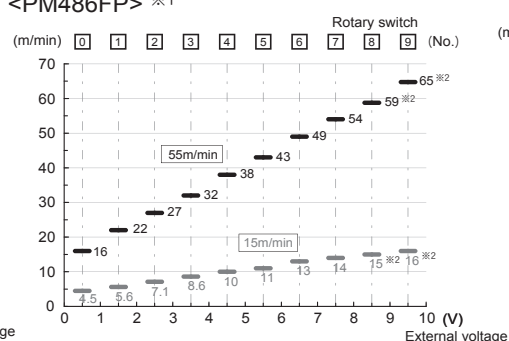
※Connecting with external device such as Relay Coil requires apply coil surge absorption type or add protective devices to protect from surge otherwise remote OUTPUT in HB-510 may be damaged by back EMF when output signal is changed.

【Speed Variation】

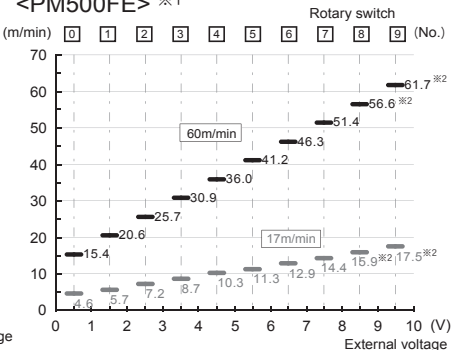
<PM486FE> ※1



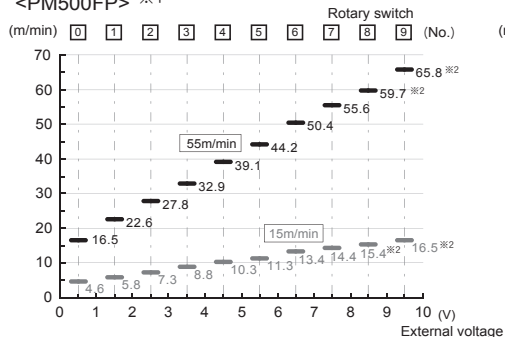
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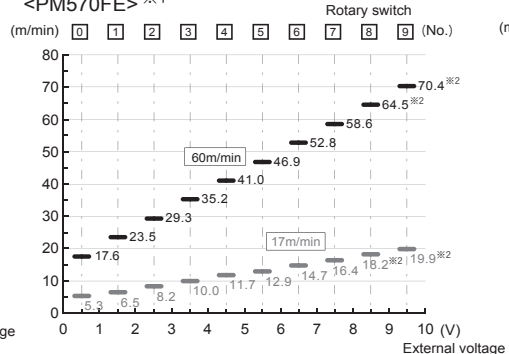
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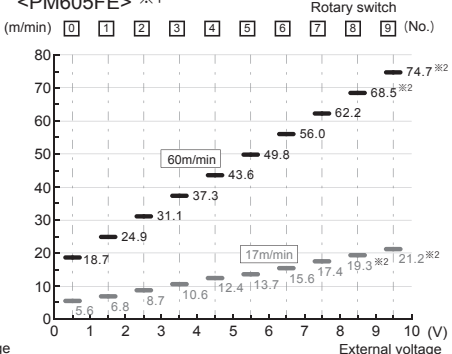
<PM500FP> ※1



<PM570FE> ※1



<PM605FE> ※1



• In case you use Power Moller with nominal speed not given above, please see our catalog or contact us.

※1 Nominal speed 210 (255 for FP series) is NOT available with LT option for low temperature applications.

※2 This product is not applicable for ambient temperature of 0 °C or less as it may take 10 minutes or so for motor to reach to the rated speed.

【to those who has used HB 508 series card:】

Please note the following differences between HB 508 and HB 510 series card.

		HB-508	HB-510
Wiring	CN2-2 terminal	Direction selection	Selection of direction or emergency stop (DIR/ESTOP)
	When powered	Power Moller no action (activated according to ZPA logic)	Power Moller activated when sensor in the present zone if off (for the period of sensor timer time)
Setting	External control	Global control (error output, direction, speed variation)	Selection of global or distributed control (error output, direction, speed variation, emergency stop)
	Timer time setting	RUN hold timer only	Adjustable for sensor timer, RUN hold timer, Jam timer (individual setting is not feasible)
	Speed variation	By integral pot. or by varying external analog voltage	By integral rotary switch or by varying external digital voltage (10 indexes)
	※1 Forcible RUN	OFF = immediate Power Moller stop	OFF = Power Moller stops after the time set by RUN holding timer
Error	Thermister	Automatic recovery	Selection of manual or automatic recovery
	Low voltage	Signal discharge from CN2-1 when normal	No signal discharge when normal

※1 Regardless of HB 508 or HB 510, motor in the present zone stops when the sensor in the zone becomes ON during forcible RUN mode, and is automatically follows the operation on ZPA logic.

【Specifications】

Power voltage		DC24V ±10%
Rated voltage		DC24V
Static current		0.06A
Peak current		20A ≤ 1msec
Starting current		4.0A
Input	Sensor	NPN/PNP
	Alarm	NPN/PNP
	Forcible run/stop	NPN/PNP
	Direction	NPN/PNP
	Emergency stop	NPN/PNP
External speed variation		DC 0 to 10V
Output	Sensor	NPN/PNP open collector (※1)
	Error	NPN/PNP open collector (※1)
	Synchronization	NPN/PNP open collector (※1)
LED indication		Error (red) Power status (green) Sensor status (orange)
Protection		Integral 7A fuse (+ side) Integral diode against miss wiring
Thermal protection		Reacts at 85 °C on circuit board, or 105°C on motor

Brake		Electric brake
HB card side	Power connector	wago734 -162(Max:10A)
	Sensor connector	wago733 -363(Max:4A)
	Control connector	wago733 -335(Max:4A)
Wiring side	Power connector	wago734 -102(Max:10A) Wire diameter 0.5~1.5mm ² (AWG:20~14)
	Sensor connector	wago733 -103(Max:4A) Wire diameter 0.08~0.5mm ² (AWG:28~20)
	Control connector	wago733 -105(Max:4A) Wire diameter 0.08~0.5mm ² (AWG:28~20)
Motor connector		JST S9B-XH-A
Environment	Ambient temp.	0~40°C (※3)
	Relative humidity	≤ 90%RH (no condensation)
	Atmosphere	No corrosive gas
	Vibration	≤ 0.5G
Mechanical Brake (※2)	From electrical stop to brake engagement	400msec
	Brake current	During brake activation: 0.2A

- ※1 PNP or NPN signal selectable by dip switch
 ※2 Applicable only for HB 510BN or HB 510BP for Power Moller with built-in brake
 ※3 It is not available at ambient temperature of 0 °C or less for LT.

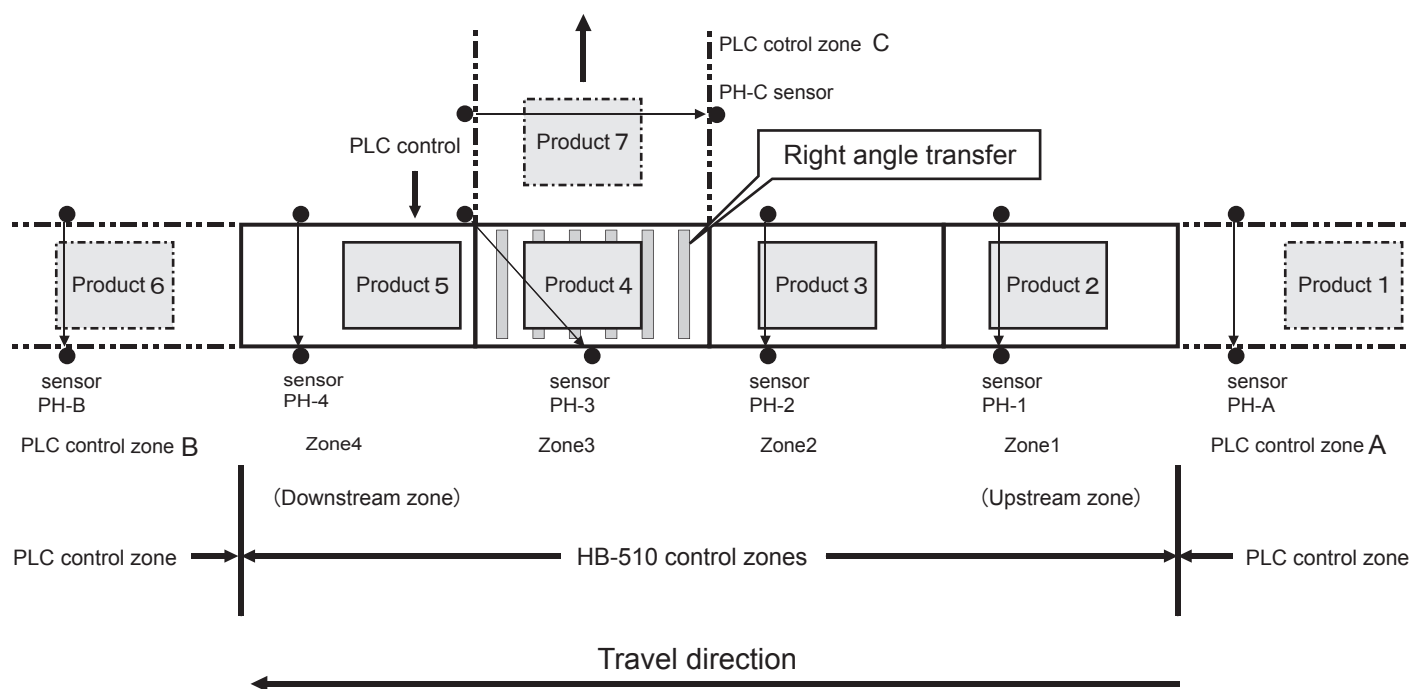
【LED error indications and solutions】

signal discharged from CN2-1

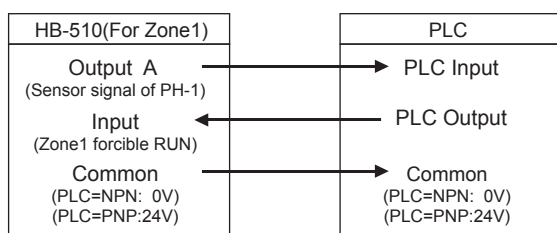
green LED1	orange LED2	red LED3	※1 Signal discharge	Cause of error	Symptom	Solutions
※2 Lights	Lights with sensor signal	Off	24V	N/A	N/A	N/A
Lights	Lights with sensor signal	Lights	open	Thermal error	Power Moller stops	※3 After the thermister recovery, stop then restart the motor, or switch off the power first then on the power.
※2 Lights	Lights with sensor signal	Blinks 1Hz	24V	Power Moller blocked for 4 seconds while powered	Lowers Power Moller output	Remove the cause of motor block
Lights	Lights with sensor signal	Lights	open	Power Moller connector is not plugged	Power Moller does not function	Switch off the power first then plug in the connector properly, then switch on the power
Lights	Blinks 1Hz	Off	open	Jam timer error	Power Moller stops	Remove the cause of the jam error, then block the adjacent downstream sensor
Off	Lights with sensor signal	Blinks 1Hz	24V	Low voltage or blown fuse	Power Moller stops	Supply correct voltage, or replace the card if fuse is blown
Blinks 1Hz	Lights with sensor signal	Blinks 6Hz	24V	Current limiter reaction	N/A	N/A

- ※1 Error signal is discharged on normal status, and is not discharged in abnormal status
 ※2 LED 1 blinks at 1Hz while Power Moller is running
 ※3 applicable when set to manual recovery mode

【Signal passing between HB-510 and PLC】



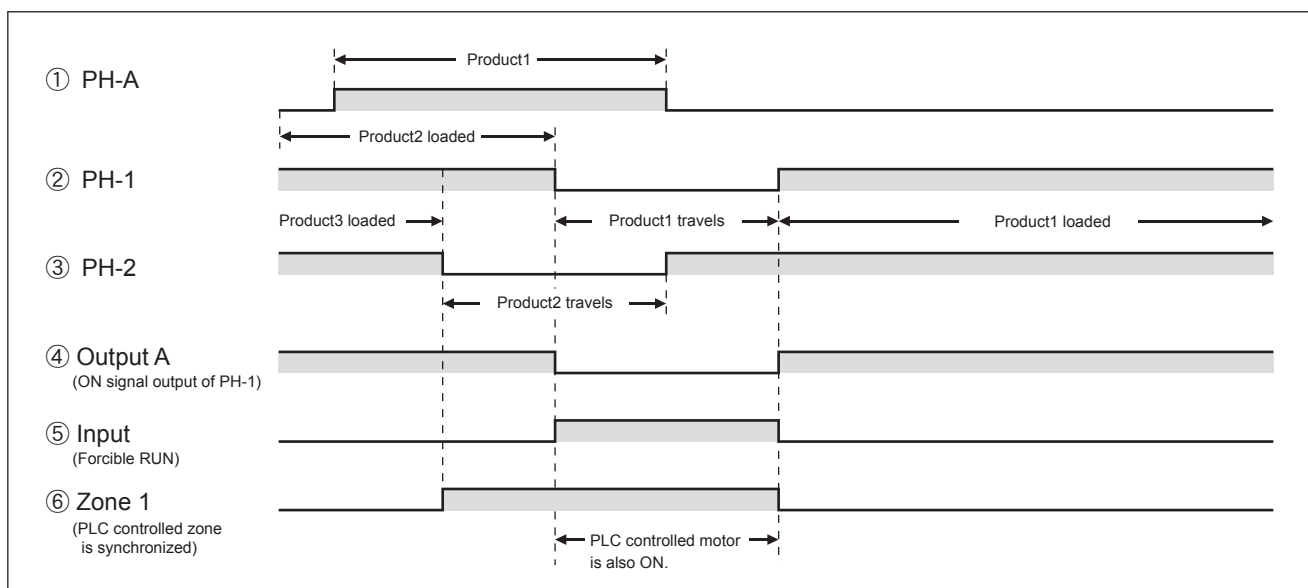
- Signal liaison between HB-510 in upstream end zone and PLC in the adjacent zone.



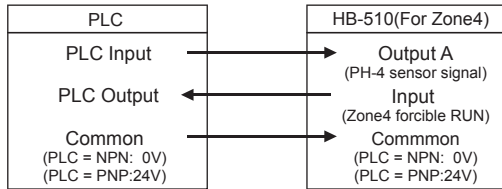
Setting conditions for SW2

- 2-1 : ON if PLC signal is PNP
OFF if PLC signal is NPN
- 2-2 : OFF (Sensor signal output)
- 2-6 : ON (Not to set downstream end)
- 2-8 : ON (Forcible Run)

Below is a diagram showing that Product1 moves to PH-A and then, Product2 starts moving and finally Product1 arrives at PH-1.



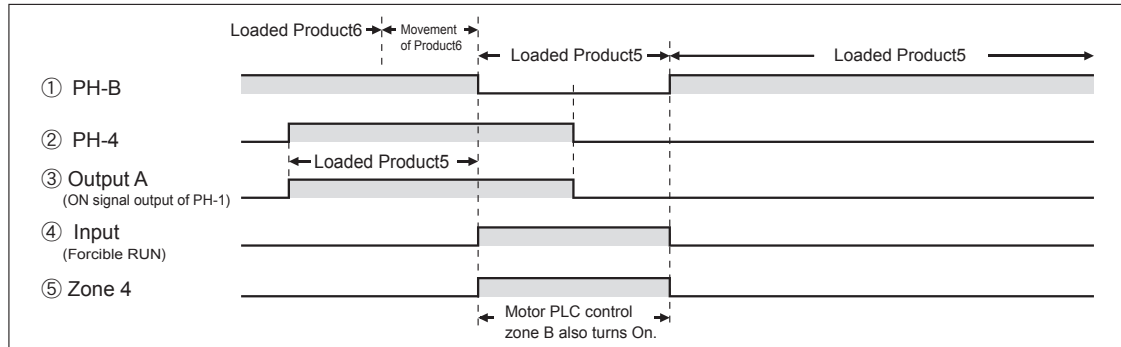
● Signal passing between zone4 of HB-510 and PLC control zone B



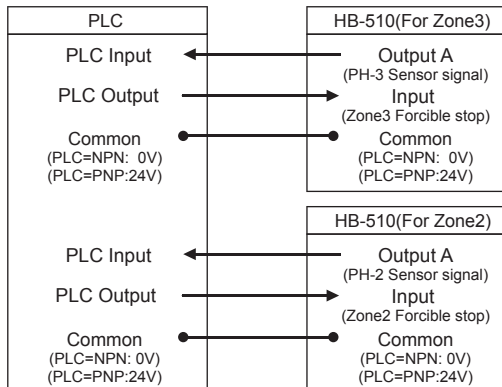
Setting conditions for SW2

- 2-1 : In case PLC is PNP, it turns ON
In case PLC is NPN, it turns OFF
- 2-2 : OFF (Sensor signal output)
- 2-6 : ON (No set downstream)
- 2-8 : ON (Forcible Stop)

Below is a diagram showing that Product5 moves to PH-4 and then, Product6 starts to move and finally Product5 arrives at PH-B.



● Signal Passing between zone3 and PLC controlled zone C .



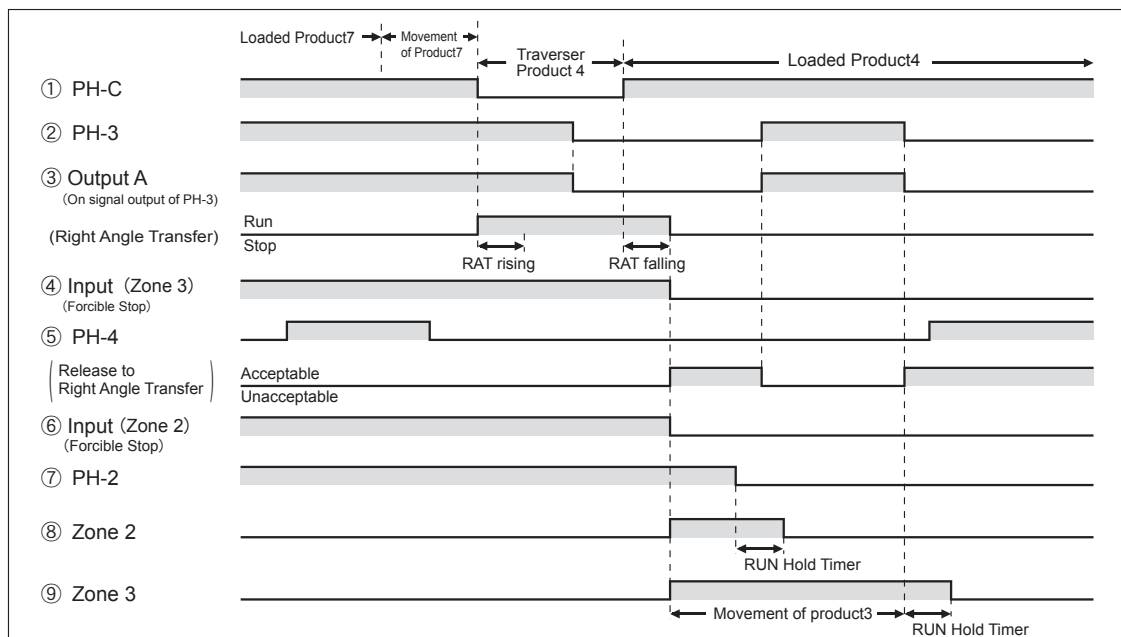
Setting condition for SW2

- 2-1 : When PLC is PNP, it must be ON.
When PLC is NPN it must be OFF.
- 2-2 : OFF (Sensor signal output)
- 2-6 : ON (Set-up at downstream)
- 2-8 : OFF (Forcible stop)

Setting condition for SW2

- 2-1 : When PLC is PNP, it must be ON.
When PLC is NPN, it must be OFF.
- 2-2 : OFF (Sensor signal output)
- 2-6 : ON (No set-up at downstream)
- 2-8 : OFF (Forcible stop)

Below is a diagram showing that Product4 moves to PH-3 and then, Product7 starts to move and finally Product3 goes through PH-3 and arrives at PH-4.



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