16CH STEPPING MOTOR CONTROLLER

PM16C-04XDL

LOCAL CONTROL USER'S MANUAL

2735, 2736 (rev 6/2014.04.30)

TSUJICON

APPLICATION OF ELECTRONIC DEVICES

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PM16C-04XDL USER'S MANUAL IN LOCAL MODE

1. Abstract

PM16C-04XDL is the succession unit which is compatible with usage and communication commands of PM16C-02N, PM16C-02Z, PM16C-04, and PM16C-04S.

Local operability is superior than PM16C-04XD, that is remote operation and low-cost model.

The updated feature from PM16C-04 series are these.

① Count pulse step bit is expanded from 24bits to 32bits.
Numerical range is -2,147,483,647 ～ +2,147,483,647.
(PM16C-04 series: -8,388,607～ +8,388,607)

② Up to 5,000,000PPS pulse frequecncy output is available.
(PM16C-04 series:1 ～ 800,000PPS)

③ The range of acceleration and deceleration are expanded 1048.56 ～ 0.0125ms/1000PPS.
(PM16C-04 series: 1000 ～ 0.05ms/1000PPS)

④ Trapezoid and "S" character acceleration and deceleration activation is available.

⑤ Easy connection according to serial CH0 to CH15 connector allocation.

⑥ 4 output connectors which activates external devices are attached.
They output the trigger pulse or gate pulse at the arbitrary points and intervals.

⑦ Firmware ROM update via communication line is available.

⑧ IP address setting can be changed itself.

⑨ The unit size is shrinked 2U size (88mm height, Old one is 3U).

⑩ The output pulse type(pulse pulse or pulse direction) is selectable for each channel.
(PM16C-04 series were selectable for each window.)

⑪ Price down and simple parameter setting are archiveed with flat panel and wide LCD screen.

1.1 Features

These points are useful as before.

① Controls 16 pulse motors.
Each characteristics (HSPD, MSPD, LSPD, RATE, LMSW, DGLS) is available for each channel.

② Controls up to 4 motor units with one operation.

③ Absolute position drive, relative position drive, and continuous drive is available.
These drive have 3 acceleration and deceleration mode, constant, trapezoid, and "S" character.

④ There are the way of stop driving motor.
Detect the limit switch signal.
Detect the home position limit switch signal when detecting home position drive.
Detect the digital limit switch signal.
Push "STOP" button.
Deceleration stop or emergency stop is selectable for those situation.

⑤ Hand box operation (Optional unit)

Control four motors by wired remote control box.

Control speed change with high, Middle, and Low speed is available.

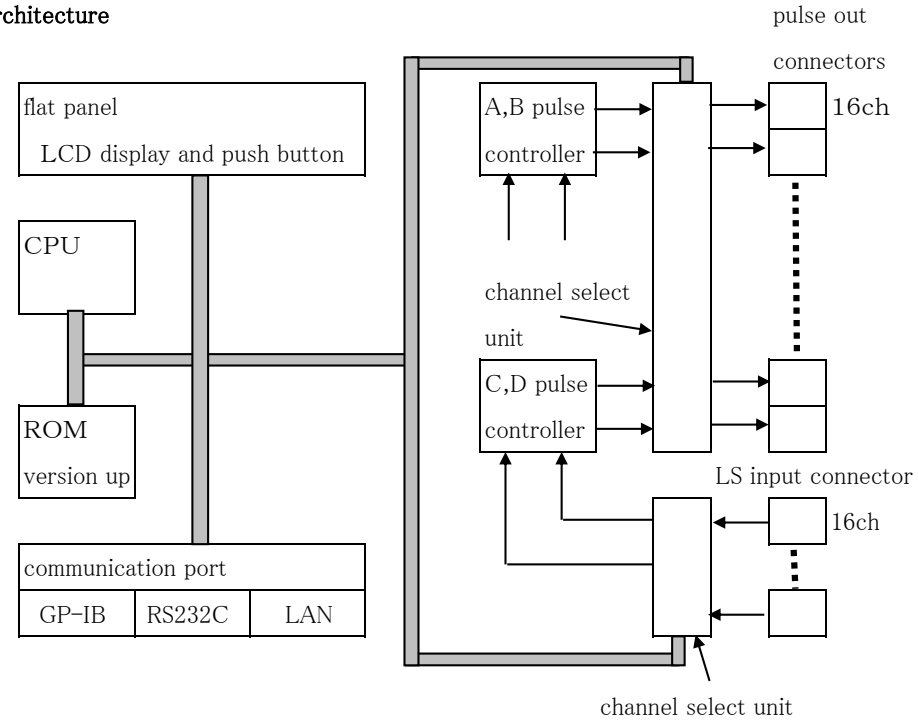
⑥ Operation mode is two, local and remote.

Local mode is front panel operation, and remote mode is communication line operation.

Communication line is as follows and selectable.

1. GP-IB communication
2. RS232C communication
3. LAN (Ethernet) communication

1.2 Architecture



1.3 The system of operation

Operation	Local operation	Control and enter initial motor data with switches on front panel. Hand box controller is available.
	Remote operation	Control with commands of external devices. GP-IB, RS-232C, and Ethernet communication is available.

The detail of remote control is by another manual,

"REMOTE CONTROL USER'S MANUAL".

2. Switches on front panel

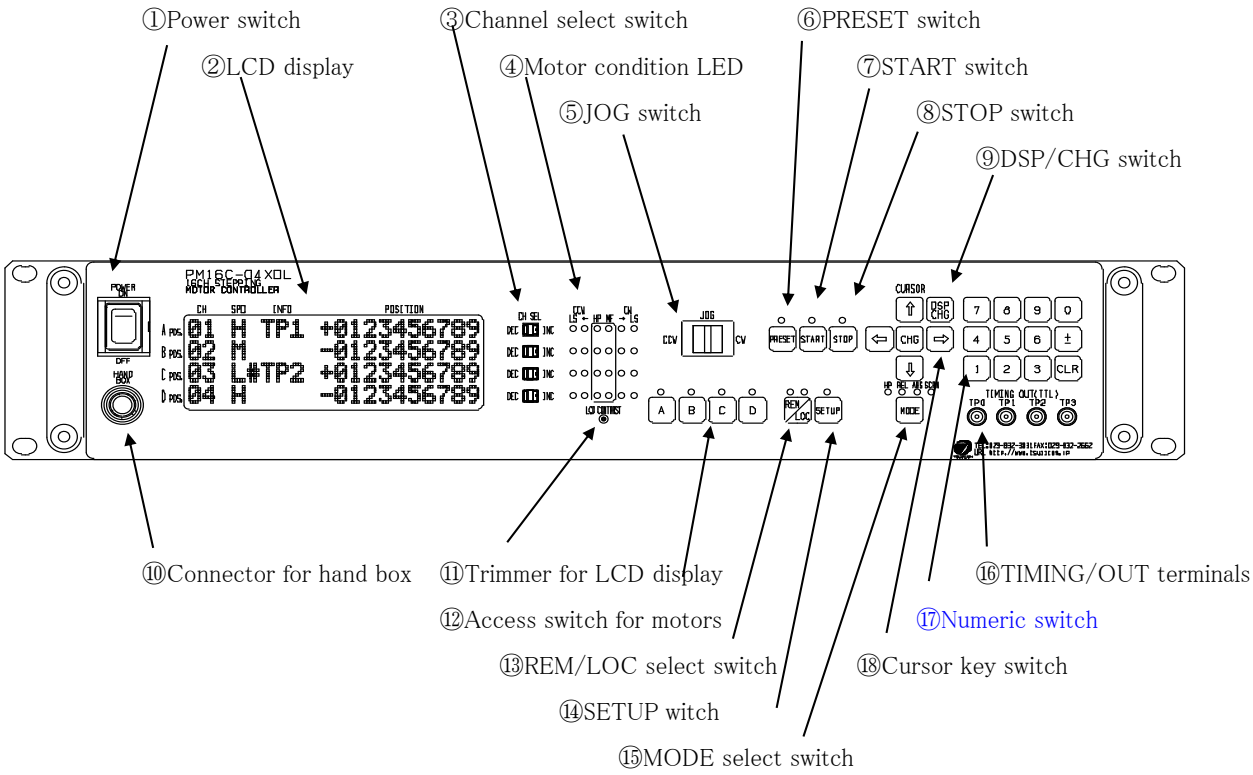


Fig1 Front panel

No.	Parts name	Functions
①	Power switch	The power switch of PM16C-04XDL.
②	LCD display	Wide range high brightness LCD display. 20 characters and 4 lines. Brightness is adjustable with ⑪Trimmer for LCD display. It shows motor drive data, mode data, and motor data entry data.
③	Channel select switch	Any 16 motor channel is allocated to A, B, C, D position. Selected motor position is incremental format such as CH0, CH1, CH2..., and decrement format such as CH0, CHF, CHE..., by this switch. When in setup mode, setup channel No. is changeable by A pos channel select switch.
④	Motor condition LED	These LED appear the state of A, B, C, D positions. Details are in Fig 2.
⑤	JOG switch	Starts JOG operation. CW and CCW operation is done. Motor moves just JOG set pulse with one push. If it pushes and hold over 0.4 seconds, motor acts continuous moving mode. In SETUP mode, the page of setup function is changed.

No.	Parts name	Functions
⑥	PRESET switch	When in ⑮MODE select switches in SCAN mode, preset value is set to pulse current position data.
⑦	START switch	Start driving the motors with selected.
⑧	STOP switch	Stop driving the motors with selected.
⑨	DSP/CHG switch	It changes motor control screen and mode set screen. When in mode set screen, there is no operation duling some seconds, the screen is changed to motor access screen type.
⑩	Connector for hand box	Connector for hand box controller.
⑪	Trimmer for LCD display	The brightness of LCD is controlled by this trimmer with + screw driver.
⑫	Access switch for motors	Set active or non-active for each A,B,C,D position. Brighting LED position is active.
⑬	REM/LOC select switch	Change Remote or Local mode. When push this switch, mode is changed alternately.
⑭	SETUP switch	Goes SETUP mode when in local mode. In this mode, motor access parameters are determined for each channel.
⑮	MODE select switch	It changes the active mode for select motor channels. The confirmation of active mode is done by ④Motor condition LED. It changes H.P>>REL>>ABS>>SCAN>>H.P ····· in sequential.
⑯	TIMING/OUT terminals	Pulse signal goes on according to pulse position data for each channel. Signal of TTL level goes from this LEMO type connectors. Each A,B,C,D channel is to terminal TP1,TP2, TP3,TP4.(Ver1.10) About details of timing out, see chap.5.1 Timing Out timing set chart.
⑰	Numeric switches	number entry switch [0] ～ [9] sign change switch [±] data clear switch [CLR] When in change channel No. , [±] Decrement channel No. [CLR] Increment channel No.
⑱	Cursor switches	[→] [←] [↑] [↓] Cursor position is determined by these keys. [CHG] Changes set data with this key.

Details of ④Motor condition LED

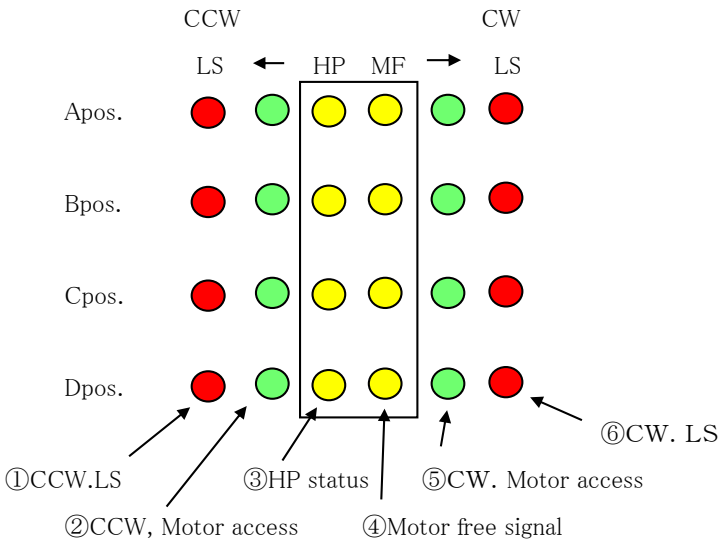


Fig 2. Motor condition display LED

No.	Parts name	Functions
①	CCW. LS(limit switch) :red	When CCW direction limit switch is on, this LED brights. When CCW direction digital limit switch is on, this LED blinks with 0.4 seconds cycle.
②	CCW. Motor access:green	When CCW direction pulse output is on, this LED brights.
③	H.P(Home position) limit switch:yellow	When H.P limit switch is on, this LED brights.
④	Motor free display:yellow	When motor hold off signal is on, this LED brights.
⑤	CW. Motor access:green	When CW direction pulse output is on, this LED brights.
⑥	CW. LS(limit switch) :red	When CW direction limit switch is on, this LED brights. When CW direction digital limit switch is on, this LED blinks with 0.4 seconds cycle.

3. control screen

3.1 Initial screen

*	*	*	*	P	M	1	6	C	-	0	4	X	D	L	*	*	*	*	*
S	T	E	P	P	I	N	G		M	O	T	O	R						
C	O	N	T	R	O	L	L	E	R		V	e	r	<	1	.	4	8	>
T	S	U	J	I	-	D	E	N	S	H	I		C	o	.	L	T	D	,

Initial screen when power on.

Current software version is displayed.

3.2 Motor control screen

This is usual screen when motor control mode.

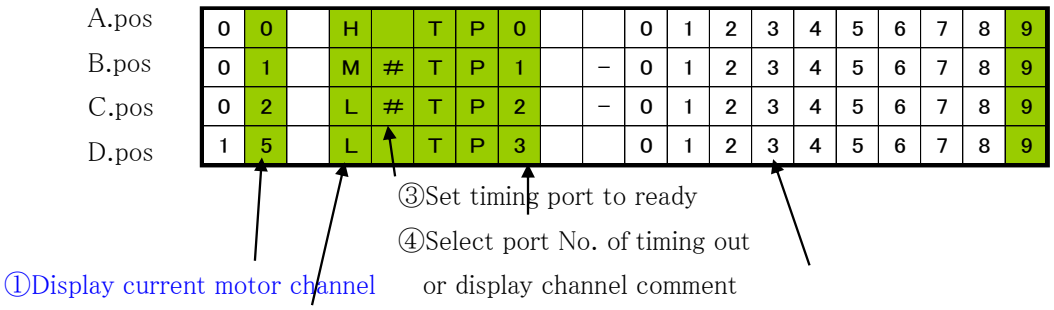
Pulse out position A, B, C, D is allocated from top to bottom.

Any CH0 - CH15 channel is allocated for each A, B, C, D position.

Each position is set to activate or non-activate mode. Only activated motor start driving by JOG and START switch.

Each parameter set is done by cursor position.

Cursor position is marked .



ITEMS	DISPLAY	OPERATION
①Set the motor channel No.	00 - 15	Enter with numeric keys. Or ± Increment the channnel No. CLR Decrement the channnel No. or set the channel No. directry with channel select switch. Channel No. is not allowed to same before No. . When you set the same No. twice, the number is blinking. When you set it by channel select switch, the same number is skipped.
②Select the motor speed	H:High range of speed M:Middle range of speed L:Low range of speed	Change the motor speed with CHG switch. Each step of speed H,M,L is entered by SETUP mode for each channel.

Continues to next page.

ITEMS	DISPLAY	OPERATION
③Select Motor Out mode of motor channel ＃:Timing Out Ready (sp) : space	00 Ha TP0 00 H#TP0	″a″ is change as (sp)>>#>>(sp)>>・・・・by CHG switch. When in mark ＃, timing out port is ready. When in mark (sp), timing out port is not ready. Only in timing out ready mode, timing out signal goes on depend on the pulse position. (Details are in chap5.2 Timing out mode)
④Timing signal output port for each channel Input the channel comment to each channel, available form software version 1.39.	TP0 or CH0 TP1 or CH1 TP2 or CH2 TP3 or CH3	Change the mode shown below with CHG . ・Output port mode Timing out port 0, 1, 2, 3 is allocated to each motor access channel A, B, C, D. (It's rigid to software version 1.1) ・Channel comment All channel are able to include 3 letter channel comment. (Details are in chap5.5 channel comment)
⑤Appears the pulse position	MAX ±2,147,483,647	It appears the pulse position.

3.3 Mode set screen

Push DSP CHG, you can select ″Motor control screen″ or ″Mode set screen″.

Mode set screen is to check and entry the parameter, which uses relative move step pulse, absolute move position data, preset position value, and home position value data.

A. pos	0	0		H		R	E	L			0	1	2	3	4	5	6	7	8	9
B. pos	0	1		M		R	E	L		−	0	1	2	3	4	5	6	7	8	9
C. pos	0	2		L	#	R	E	L		−	0	1	2	3	4	5	6	7	8	9
D. pos	1	5		L		R	E	L			0	1	2	3	4	5	6	7	8	9

There are 4 active mode in PM16C-04XDL. Each mode is selected by MODE.

This active mode is as common for selected active channels.

(1)H.P Mode — Drive detecting origin point of pulse count for each channel.
Details are in chap5.3 Setting the origin of home position.

(2)REL Mode — Drive relative step pulse mode.
Push START, and motor drives by the amount of preset pulse value.

(3)ABS Mode — Drive absolute point pulse mode.
Push START, motor drives for preset pulse position.

(4)SCAN Mode — Continuous drive mode to CW, CCW direction.
Push START and click ″CW or CCW″ jog switch, motor drives to dedicated direction continuously.

These drive will be stopped by STOP button or limit switch signal.

3.4 Data set in mode set screen

In mode set screen, related pulse count value is entered with numeric switchs for each mode.

If you change these value, set cursor where you enter the channel position and as these procedures.

- ·If you change the sign of number and enter the minus value, push [±].
- ·If you clear the number, push [CLR].
- ·If you enter the number, enter numeric switches from top of it.
- ·There is no positive sign on LCD.
- ·While you enter key switch, the number display is zero suppress display mode, but the cursor move to another point, previous number is decided so display of it is with zero.
- ·In home position mode, when there is no memorized home position data for channel, display in mode set screen is "NO_HOME POS".
  In this case you couldn't enter home position data by key switch.
  Only in case of memorized home position data exist, this number is changeable.

* When in SETUP mode, incase of there is no memorized data, you could set the home position by entering numerical position data.

This way of entering numerical number is adapted to chap 4 SETUP SCREEN.

4.SETUP mode Operation

This mode is for setting all channel motor initial data and communication line setting.

When you push [SETUP] in local mode, mode is changed to SETUP mode.

If you push it again in SETUP mode, exit this mode and go back to Motor drive screen.

It contains 11 pages. Use "JOG" switch to change tha page.

[CW]	Page Up	Increment the page of SETUP mode
[CCW]	Page Down	Decrement the page of SETUP mode

P1～P7: These pages are set-up data associated 16 channels.

P8～P11: These pages are communication set-up data and others.

These are not associated 16 channels.

4.1 P1 :Motor activation, limit switch setting

①Display and change SETUP channel 0-15

②Motor control

③Pulse output mode

The change is common for P1-P15

	C	H	:	0	0			M	O	T	O	R	:	E	N	A		P	1
④	H	.	O	F	F		:	E	N	A		P	.	M	O	D	:	P	_	P
⑤	C	W		.	L	S	:	E	N	A		N	.	C		_				
⑥	C	C	W	.	L	S	:	E	N	A		N	.	O		□				

④Motor hold off function

⑤CW limit switch action. Contact setting and present state.

⑥CCW limit switch action. Contact setting and present state.

ITEMS	DISPLAY	OPERATION
①Display and change SETUP channel 0-15	00～15	・Enter numeric switches [0] ～ [9] or [±] Increment channel No. [CLR] Decrement channel No. or Click A pos. channel select switch.
②Motor control If you set "DIS" this term, motor does not drive.	ENA/DIS	Select with [CHG].

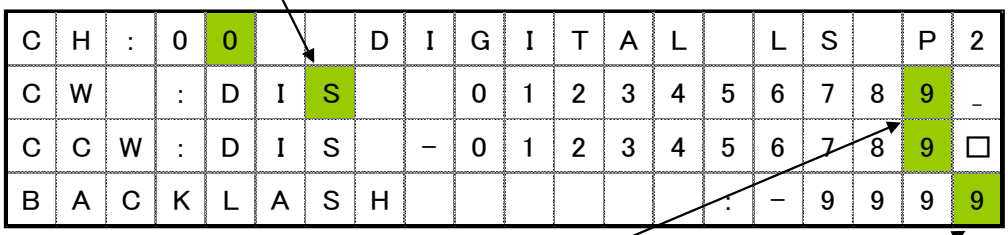
ITEMS	DISPLAY	OPERATION
③Pulse output mode		Select with CHG.
	P-P: PULSE-PULSE motor access	
	P-D: PULSE-DIRECTION motor access	
	PDR: PULSE-DIRECTION motor access with inverted direction logic (applied from Jan. 2009 shipped model)	
④Motor hold off function See Note 1.	ENA/DIS	Select with CHG.
⑤CW limit switch action	ENA/DIS	Select with CHG.
Set CW limit function and logic.	N.O(Normally Open)	Select with CHG.
If you set "DIS", limit switch	N.C(Normally Close)	
signal is ignored.	"_"	state: non-active
	"□"	state: active
⑥CCW limit switch action	ENA/DIS	Select with CHG.
Set CCW limit function and	N.O(Normaly Open)	Select with CHG.
logic.	N.C(Normaly Close)	
	"_"	state: non-active
	"□"	state: active

Note 1: Motor hold off function is cut off the power line when motor stopped.
If this function is "ENA", the power line is cut off when motor stopped.

4.2 P2 :Digital limit switch setting

①Display and change SETUP channel 0-15

②digital limit switch action

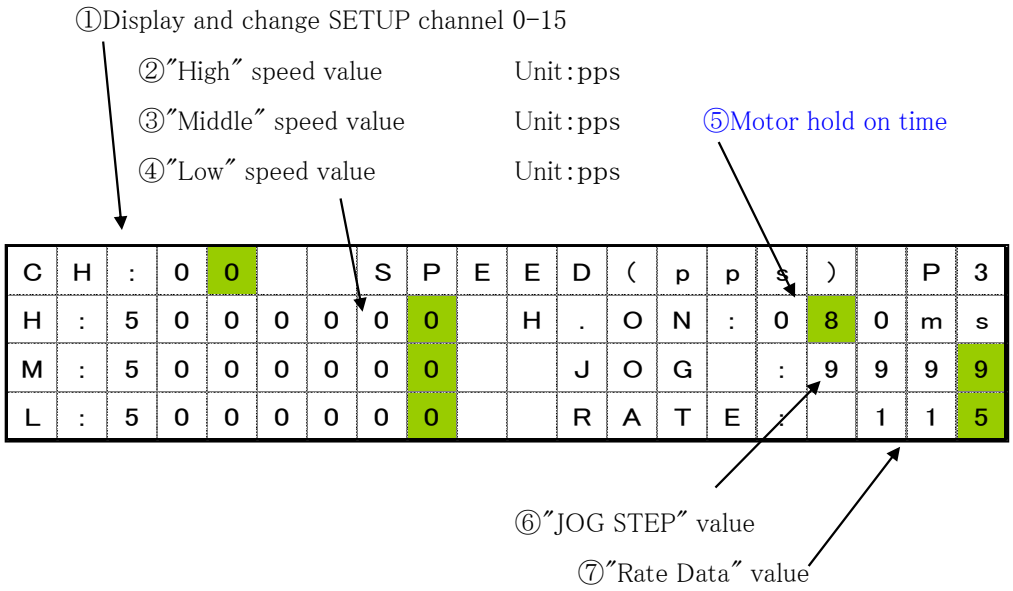


③Display and set the digital limit switch value for CW、CCW direction, and present state.

④Display and set backlash data by numerical key.

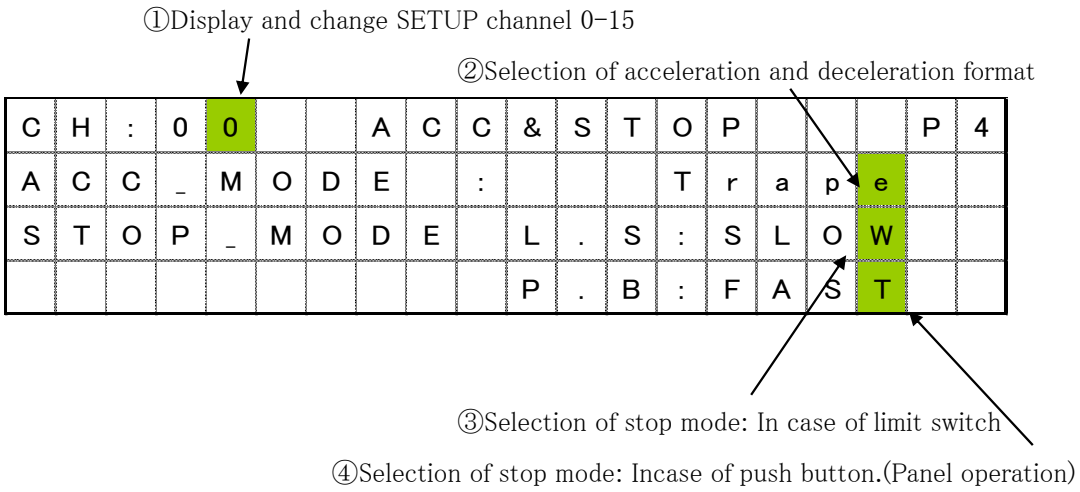
ITEMS	DISPLAY	OPERATION
①Display and change SETUP channel 0-15	00～15	See 4.1 .
②digital limit switch action	ENA/DIS	Select with CHG. This function is same for CW,CCW.
③Display and set the digital limit switch value for CW、CCW direction, and present state.	MAX ±2,147,483,647	See 3.4 Enter with numeric switches.
④Backlash data	±9999	Enter with numeric switches.

4.3 P3 :Speed setting



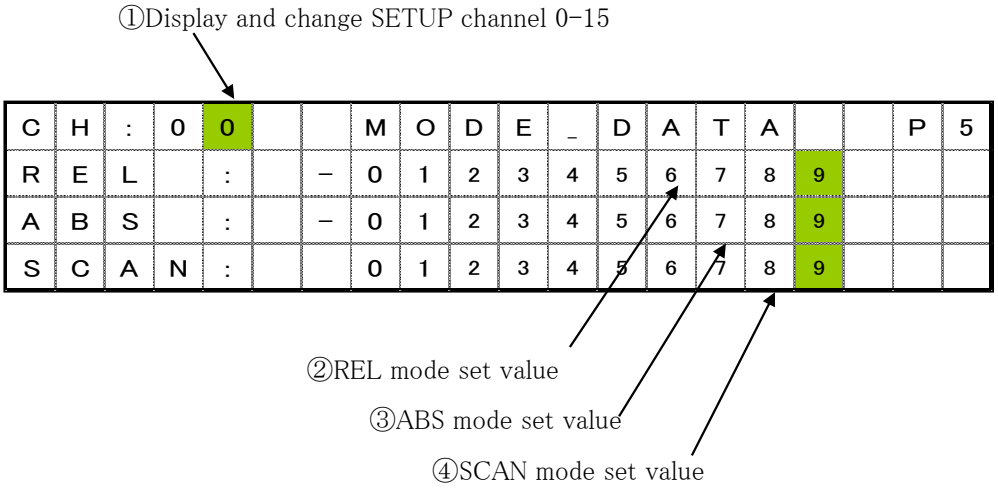
ITEMS	DISPLAY	OPERATION
①Display and change SETUP channel 0-15	00～15	See 4.1
②"HIGH" speed value Unit:pps	0 - 5,000,000	Enter with numeric switches.
③"MIDDLE" speed value	0 - 5,000,000	Enter with numeric switches.
④"LOW" speed value	0 - 5,000,000	Enter with numeric switches.
⑤Motor hold on time (available from V1.48)	50 - 500ms by 10ms	When hold off signal is enable, releases this signal for setting value before motor activation.
⑥"JOG STEP" value	0～ 9,999	Set pulse steps in JOG one step operation.
⑦"Rate Data" value	0～ (MAX) 115	Enter with numeric switches.

4.4 P4 :Acceleration and deceleration setting



ITEMS	DISPLAY	OPERATION
①Display and change SETUP channel 0-15	00～15	See 4.1 P1
②Selection of acceleration and deceleration format		Select with CHG.
	Const(constant acceleration drive)	
	Trape(trapezoidal form acceleration drive)	
	Schar("S" character form acceleration drive)	
③Selection of stop mode: In case of limit switch	SLOW(Slow stop)	Select with CHG.
	FAST(FASTstop)	
	Emergency stop	
④Selection of stop mode: Incase of push bottun. (Panel operation)	SLOW(Slow stop)	Select with CHG.
	FAST(FASTstop)	
	Emergency stop	

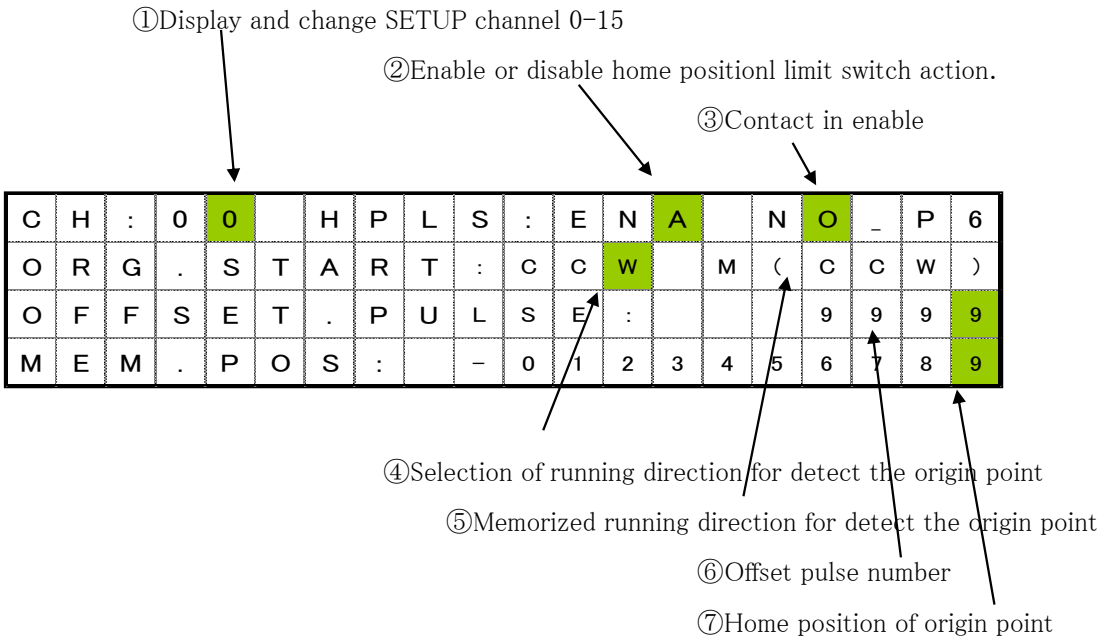
4.5 P5 :REL,ABS,SCAN data setting



ITEMS	DISPLAY	OPERATION
①Display and change SETUP channel 0-15	00～15	See 4.1 P1
②REL mode set value	0 - ±2,147,483,647	Set by numerical key switch.
Set pulse steps in relative mode.		
③ABS mode set value	0 - ±2,147,483,647	Set by numerical key switch.
Set pulse steps in absolute mode.		
④SCAN mode set value	0 - ±2,147,483,647	Set by numerical key switch.
Set pulse steps in scan mode. This data is for setting present motor position.		
PRESET By this key, this data is entered to position data.		

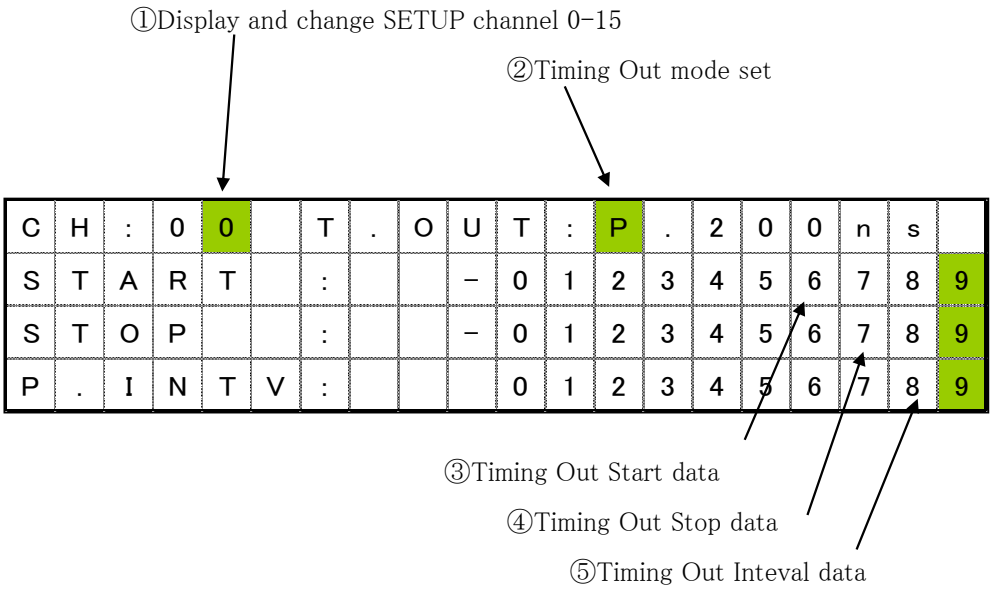
Each data is set by 3.3 Mode set screen.

4.6 P6 :Home position setting



ITEMS	DISPLAY	OPERATION
①Display and change SETUP channel 0-15	00 - 15	See 4.1 P1
②Enable or disable home positionl limit switch action.	ENA/DIS	Select with CHG.
③Contact in enable	N.O/N.C	Select with CHG. Normaly Open / Normaly Close
④Selection of running direction for detect the origin point	CW/CCW	Select with CHG.
⑤Memorized running direction for detect the origin point	CW/CCW	Only display the direction. Not impossible to set.
⑥Offset pulse number	9999	Set by numerical key switch.
⑦Home position of origin point	0 - ±2,147,483,647	When origin point had been set, this position data is displayed. When origin point hadn't been set, display is "NO H.P.". When display is "NO H.P.", enter CHG key,then enter numerical key you can set home position data . To cancel H.P data, enter CHG key, then "NO H.P." displayed.

4.7 P7 :Timing Out setting



ITEMS	DISPLAY	OPERATION
①Display and change SETUP channel 0-15	00～15	See 4.1 P1
②Timing Out mode set		Select with CHG.
	DIS	Disable: Timing Out
	GATE	GATE mode output. Signal out between START and STOP.
	PULSE 200ns PULSE 10us PULSE 100us PULSE 1ms	PULSE mode output Pulse Intervals are as these. Pulse width is 200ns>>10us >>100us>>1ms
		Select with CHG.
③Timing Out Start Position	0 - ±2,147,483,647	Set by numerical key switch.
④Timing Out Stop Position	0 - ±2,147,483,647	Set by numerical key switch. Related to GATE mode output.
⑤Timing Out Interval Pulse	0 - ±2,147,483,647 unsigned number	Set by numerical key switch. Pulse interval in pulse mode output

About the details of Timing Out, see chap5.1 Timing chart of Timing out port.

4.8 P8 :Timing Out channel setting

This set screen is not available in software version V1.10.

T	I	M	I	N	G				T	P	0	:	C	H	*	*	P	8
O	U	T							T	P	1	:	C	H	*	*		
S	E	T	T	I	N	G			T	P	2	:	C	H	*	*		
R	E	S	E	R	V	E	D		T	P	3	:	C	H	*	*		

In software version V1.10, channel number and timing ou port number is rigid.

TP0	Timing Out Port0	A.Pos set channel
TP1	Timing Out Port1	B.Pos set channel
TP2	Timing Out Port2	C.Pos set channel
TP3	Timing Out Port3	D.Pos set channel

4.9 P9 :Parameters of remote mode setting

R	E	M	O	T	E		C	O	N	T	R	O	L					P	9
R	S	-	2	3	2	C		B	.	R	A	T	E	:	3	8	4	0	0
G	P	I	B		A	D	D	R	E	S	S	:						3	1
H	A	N	D		B	O	X		C	O	N	T	:	0	4	T	Y	P	E

①RS-232C baud rate set

②GPIB address set

③Hand box type set

ITEMS	DISPLAY	OPERATION
①RS-232C baud rate set	1200 >> 2400 >>	Select with CHG.
	4800 >> 9600 >>	Baudrate data is 1200～38400(bps)
	19200 >> 38400 >>	
	1200‥‥	
②GPIB address set	It's available 2-31	Set by numerical key switch.
		Or
		± Address increment
		CLR Address decrement
③Hand box type set	Type02/	Select with CHG.
	Type04/	Type02:active A,B 2 channels
	Type16	Type04:active 4 channels
		Type16:active 16 channels

* About the details of hand box, see chap5.2 Hand Box Control.

4.10 P10:LAN setting

L	A	N		S	E	T	T	I	N	G							P	1	0
	M	A	C	:		<	1	A	2	B	3	C	4	D	5	E	6	F	>
	I	P		:	1	9	2	.	1	6	8	.	0	0	1	.	0	5	5
	P	O	R	T	.	N	O	:							1	0	0	0	1

①MAC address

②IP address

③PORT number

ITEMS	DISPLAY	OPERATION
①MAC address	12 characters	It's MAC address inside LAN module
②IP address	3 digit 4 data Maximum:255 (Hex(FF))	Set by numerical key switch.
③PORT number	Maximum:32767 (Hex(7FFF))	Set by numerical key switch.

(NOTE) When you change IP ADDRESS or PORT NO, it's need to put on power switch.

4.11 P11:Program version change, return time from mode set screen, and LCD brightness adjustment

P	R	O	G	R	A	M		C	H	A	N	G	E				P	1	1
						N	E	W		V	e	r		<	1	.	2	9	>
D	S	P	/	C	H	G		R	E	T	U	R	N			:	9	9	s
L	C	D	.	B	R	I	G	H	T	N	E	S	S	:		1	0	0	%

①To change software version

②Return time from mode set screen

③LCD brightness adjustment

ITEMS	DISPLAY	OPERATION
①To change software version	NEW / OLD	It's changed by CHG switch. Details are in "PM16C-04XDL REMOTE CONTROL USER'S MANUAL".
②Return time from mode set screen	00 01 - 99 seconds	00: No return function. 01-99: When no key touch time continued, "Mode set screen" back to "Motor access screen" automatically.
③LCD brightness adjustment (available from Ver. 1.39 ～)	1 - 100	Set the brightness of LCD display by numeral key switch.

(NOTE 1) IN PM16C－04XDL, ″Motor access screen ″ is normal display.

When push DSP/CHG key, screen changed to ″Mode set screen″.

This screen is convenient to check and change channel parameters.

But when no key touch time continued for some seconds, ″Mode set screen″ back to ″Motor access screen″ automatically.

When you don't need this change, you set 00 time.

(NOTE 2) LCD brightness data is saved with battery back up.

On shipping, and turn on the power with pressing REM/LOC button,

LCD brightness data set to 100%.

LCD brightness control is available via communication line.

Here is command for LCD brightness adjustment.

function	command	response
LCD brightness data read	LCDB?(Cr)(Lf) (REM/LOC available)	LCD BRIGHT xx(Cr)(Lf) xx: 1 - 100
LCD brightness data set	LCDB xx(Cr)(Lf) xx: 1 - 100 (REM available)	No response data

5. Further Information

To use PM16C-04XDL correctly, following information help you to use one.

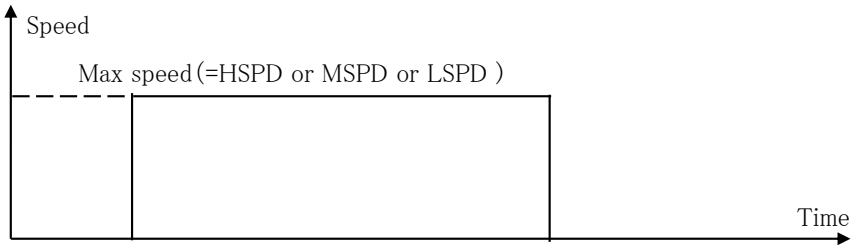
5.1 motor speed

The temporal characteristic of the setting speed "H, M, and L"
becomes a temporal characteristic shown in following figure in association
with the selection of the acceleration and deceleration setting mode.

(1) Acceleration and deceleration setting "Const (constant acceleration drive)"

Acceleration and deceleration is not set.

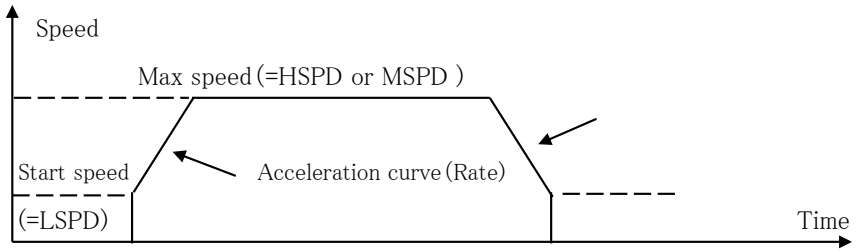
CAUTION: Too fast speed setting causes motor step out.



(2) Acceleration and deceleration setting "Trape (trapezoidal form acceleration drive)"

Motor starts at "LSPD".

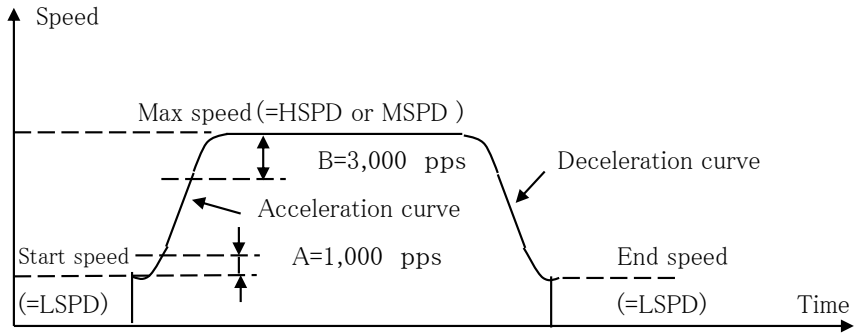
CAUTION: Large value of "LSPD" may not make smooth start of the motor.



(3) Acceleration and deceleration setting "Schar("S" shaped form acceleration drive)"

Motor starts at "LSPD".

CAUTION: Large value of "LSPD" may not make smooth start of the motor.



Increase speed A=1,000pps、Decrease speed B=3,000pps

Smooth curve is "HSPD <= LSPD + 4,000pps" a conversion.

5.2 Timing chart of Timing out port

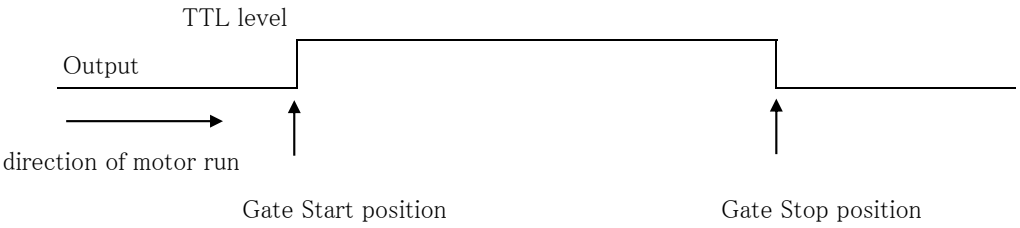
Pulse access channel output signals(TTL level) according to each channel pulse position.

This is called timing mode.

There are two ways of timing output. One is "Gate mode" another is "Pulse mode".

This mode is available in remote and local mode. The way of setting is see 4.7 Timing Out setting.

(1) Gate mode



When you change Timing ready to # by CHG key, signal output "High" level between Gate Start position and Gate Stop position.

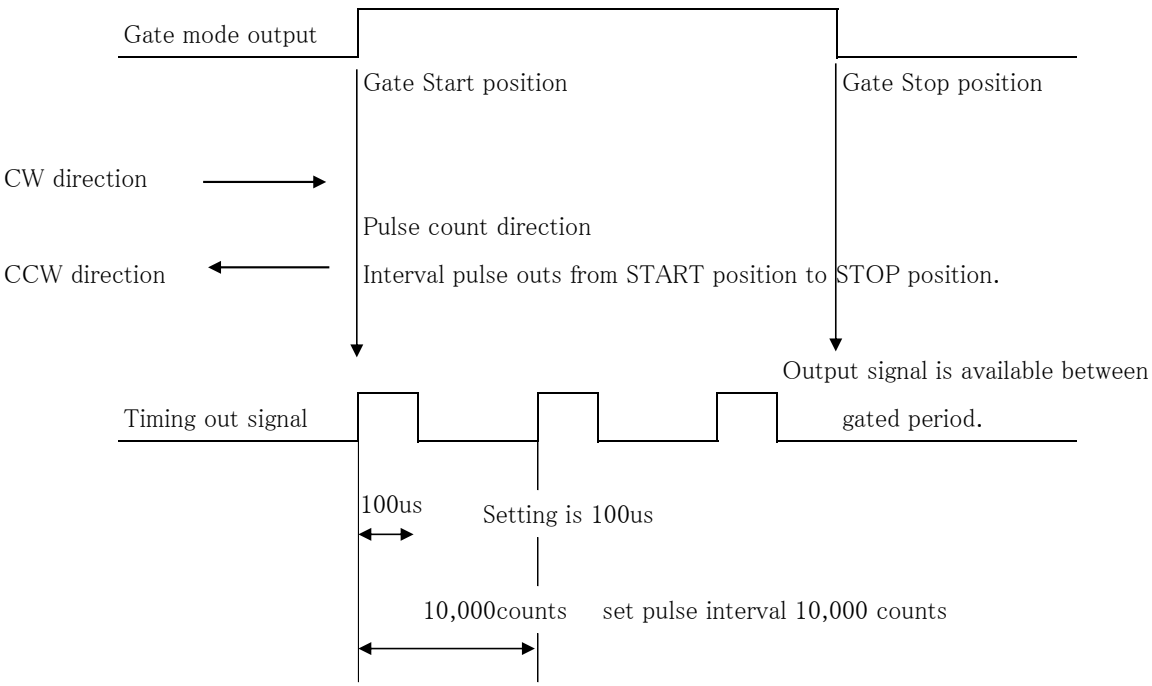
Mark # in motor access screen is standby state to pulse out.

It's useful to change Gate Start position and Gate Stop position.

This function is always available for preset start and stop position.

If you don't need this output, change mark # to (sp). (sp) means "space" by CHG key.

(2) Pulse mode



In pulse mode signal out only once to pulse direction.

To get this signal, it's need to set ready mark "#" by CHG key.

To get this signal continuously, it's need to set read before start position each time.

To get this signal to CCW direction move, it's need to set "Gate stop position" < "Gate Start position". And initial position must be bigger than "Gate Start position" then timing out ready and start motor.

(In addition)

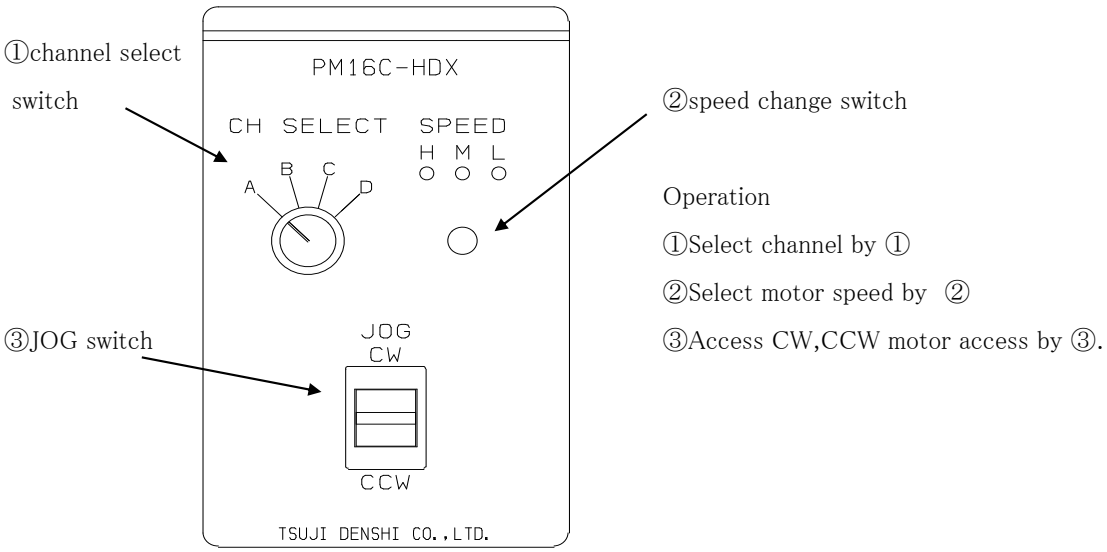
When in timing out mode, pulse position goes "Gate Start position" mark # turns (sp).

When motor stopped between gated area, and back to start position, then start from "Gate start position", signal outs continuously.

Once motor go through "Gate Stop position", pulse out ability had finished then no output signal.

5.3 Hand box control (Optional)

・04TYPE Hand box controller(PM16-HDX 4 axis control)

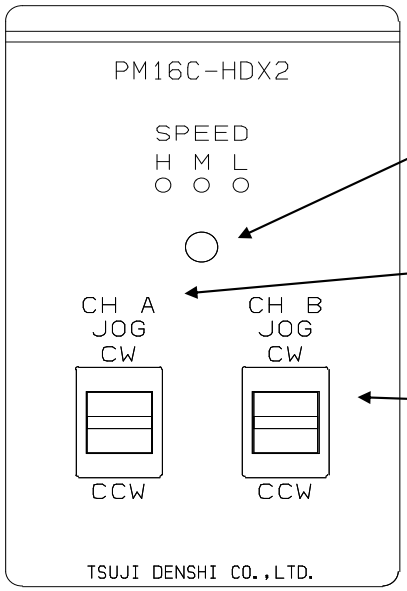


This controller is useful in local mode.

You can control A,B,C,D channels far from 3m of PM16C.

Preset speed is indicated by LED display.

・02TYPE Hand box controller(PM16-HDX 2 axis simultaneous control)



①speed change switch

It's possible to change speed

High, Middle, Low speed.

②CHA:JOG switch

It's possible to activate motor CHA

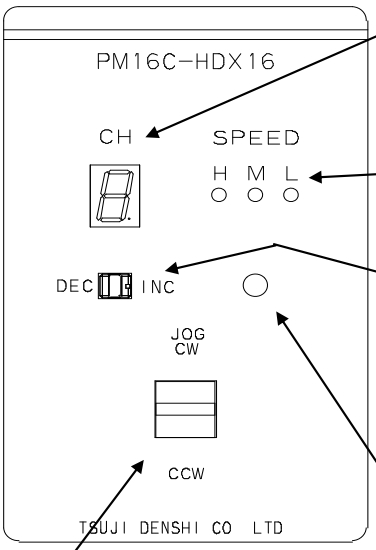
③CHB:JOG switch

It's possible to activate motor CHB

Incase of Type 02, 2 motors are activate simultaneously.

・16TYPE Hand box controller(PM16-HDX16 16 axis selected control)

0 to 15(F) channel control can be selected.



①channel indicate LED

Shows number of "0～F(15)" channel.

②speed indicate LED

The Lamp shows current speed.

③channel select switch(useful in local mode)

The "INC" side knocking increment channel.

0→1→2→・・・・

The "DEC" side knocking decrement channel.

F→E→D→・・・・

④speed change switch(useful in local mode) (※1)

It's possible to change speed

High, Middle, Low speed.

⑤JOG switch (useful in local mode)

It's possible to activate motor.

(※1) By over three second pressing of this button when it is remote, "H, M, and L" of the speed indicator lamp light, and then the speed change button will work as a motor STOP button. It is convenient to stop the motor at a place away from the unit by the Hand box. To change this mode to normal over three second pressing of this button.

5.4 Setting the origin of home position

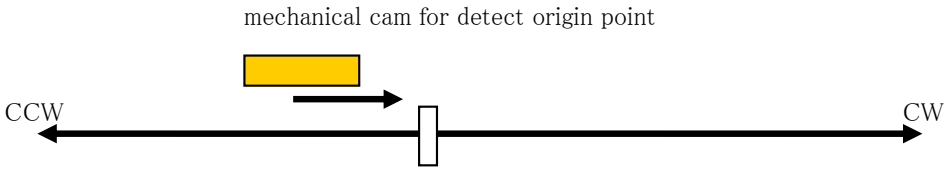
Sometimes to control pulse motor controller, It's need to set home position.

This unit has H.P mode. By this mode it's easy to get home position of mechanical origin point.

Once H.P had got into unit, these related data are memorized.

(1) At the beginning

To get H.P data it's convenient to use origin sensor and origin limit switch.



[Fig 1]

To set H.P, it's need to decide the direction of detecting origin point.

In this case, detect way is CW.

Once detect the origin point, motor stopped automatically and memorize the direction and H.P pulse data. In this case, motor speed must be low within response time of sensor.

It's need to check the set speed.

(2) Selection of detecting ways

There are three ways of detecting origin point.

Some are in case of memorized data had existed and another is incase of no memorized data.

WAY	ORIGINAL STATE	DETECT WAY	PROCEDURES	ACCURACY	TIME
A	NO MEMORIZED DATA	MANUAL	Manual operation JOG CW,CCW or START +JOG CW,CCW	△	SHORT
B		SEMI AUTOMATICAL	Hold "START" switch more than 1 sec.	◎	LONG
C	EXISTED MEMORIZED DATA	SEMI AUTOMATICAL	Push "START" switch	◎	SHORT

[WAY A]

1. Set target channel to active.

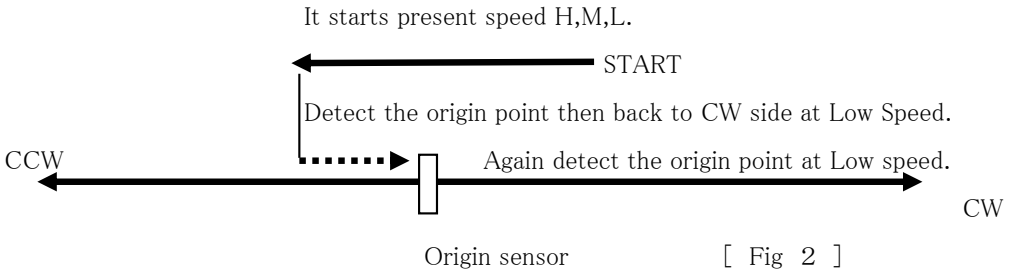
See fig1. When you set H.P to direction CW, you have to set motor position to CCW side against origin sensor, then move motor from CCW to CW side by operation switch JOG CW or START + JOG CW.

2. Once detect the origin point, motor stopped suddenly, origin point procedures finished.
Then the position of pulse data is memorized and displayed LCD screen.
And direction of it CW had memorized in ORG.MEM 4.6 SETUP screen H.P set.

[WAY B]

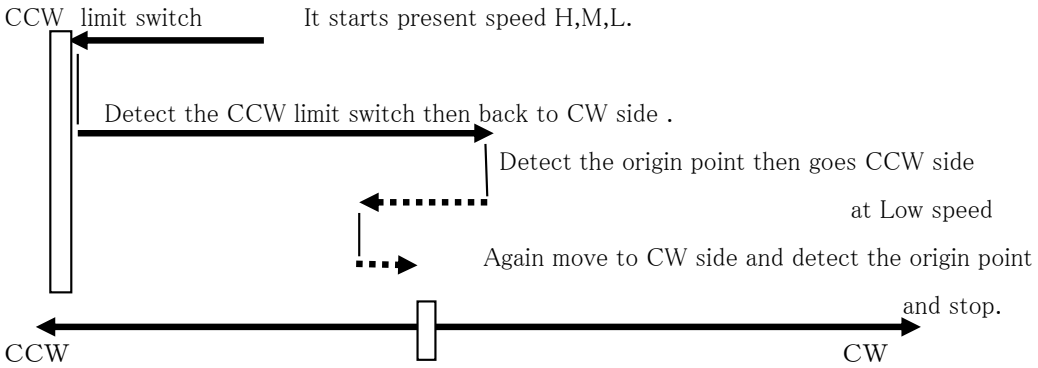
1. Set target channel to active.
See fig2. When you set H.P to direction CW, you have to set start direction to CCW.
In this case ORG. START (4. 4 P4 :Acceleration and deceleration setting) must be CCW.
Then push START button more than 1 sec, it starts H.P action.

(a). In case of start position is in CW side against origin point



[Fig 2]

(b). In case of start position is in CCW side against origin point



[Fig 3]

2. Once detect the origin point, motor stopped suddenly, origin point procedures has finished.
Then the position of pulse data is memorized and displayed LCD screen.
And direction of it CW had memorized in ORG.MEM 4.4 SETUP screen H.P set.
While in this procedures, if you stop this operation by "STOP" switch, H.P hadn't been finished.
If in this procedures, CW or CCW limit switch or digital limit switch is activate, detecting procedures continue until STOP button on.

[WAY C]

1. Set target channel to active.

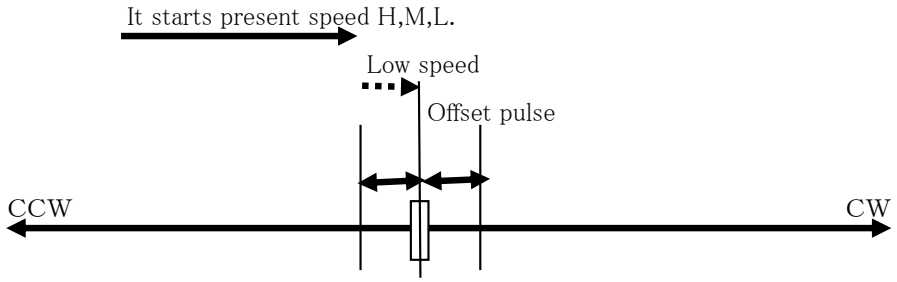
   In this case this set is resetting of H.P set.

   According to related data, this mode is done in high accuracy and in short time automatically.

2. If you push START button, motor goes to origin direction by preset speed

   to origin point ± Offset Pulse area. Offset pulse is set by 4.4 SETUP screen H.P set.

   Default value of it is 100.



[Fig 4]

3. When motor enter the offset area, then goes to origin point at Low speed then detect the

   origin point and stopped motor. Thus H.P procedures has finished.

   While in this procedures, CW, CCW limit switch activate or push STOP button,

   This procedures stopped, H.P state is ″ NO. H.P″.

   But even in this state, you set CHG key in MEM.POS (4.4 SETUP screen H.P set)

   you can bring back past data to display and set.

5.5 Including the channel comment for each channel (available from Ver. 1.39 ～)

0	0		H		T	P	0			0	1	2	3	4	5	6	7	8	9
0	1		M	#	T	P	1		–	0	1	2	3	4	5	6	7	8	9
0	2		L	#	T	P	2		–	0	1	2	3	4	5	6	7	8	9
1	5		L		T	P	3			0	1	2	3	4	5	6	7	8	9

Each channel can include 3 letters comment.

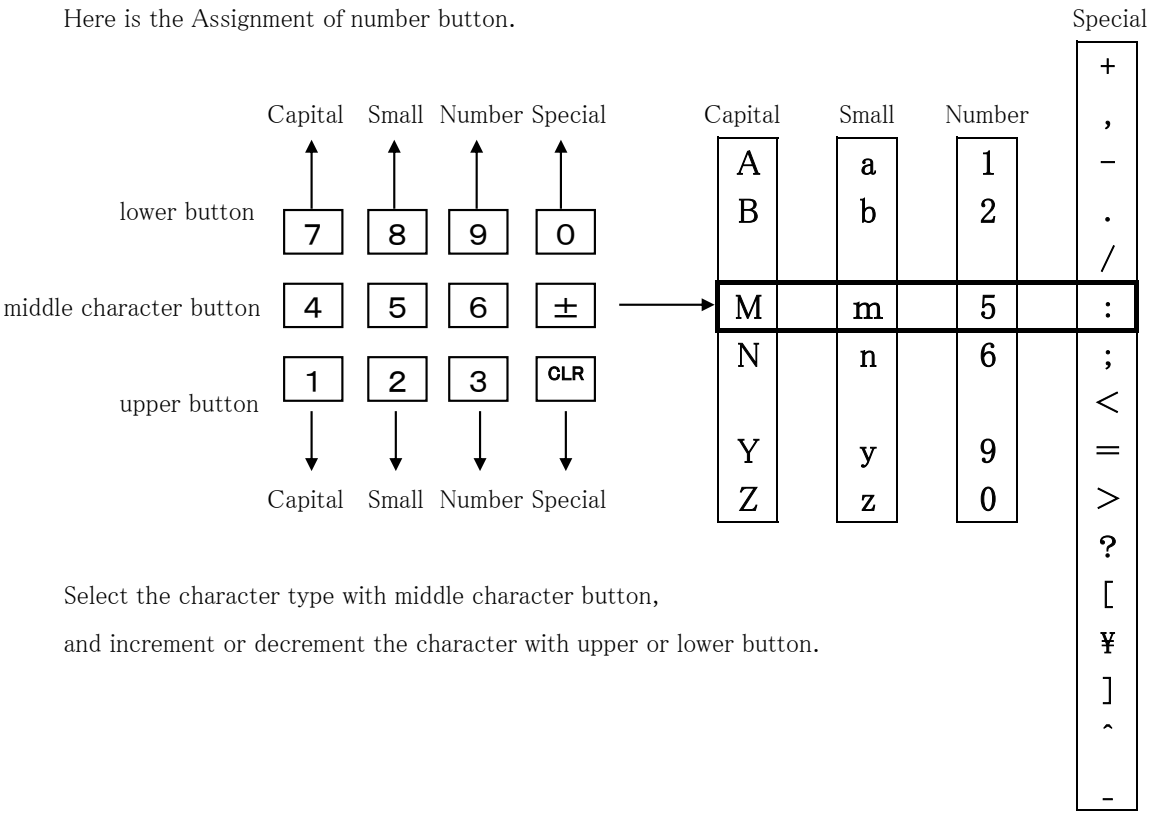
Channel comment input is available for remote and local mode.

(1) Setting via front panel

With these button ← ↑ ↓ → on front panel, move the cursor for letter input, and number button, decide the letter.

Capital letter, small letter, number, and special character are available for channel comment.

Here is the Assignment of number button.



Select the character type with middle character button,

and increment or decrement the character with upper or lower button.

Each channel comment data is saved with battery back up.

On shipping, and turn on the power with pressing REM/LOC button, channel comment data is set to the below initialized data. Be careful for the initialization of other data at the same time.

Initialized data

Channel	Channel comment
0	CH0
1	CH1
2	CH2
⋮	⋮
10	CHA
11	CHB
⋮	⋮
15	CHF

(2) Setting via communication line

Here is the command for channel comment input.

function	command	response
read the CHx comment x:0 – F	CHCMNT?x(Cr)(Lf) (REM/LOC available)	CHx (CHx comment returns)
read all CH comment	CHCMNT?a(Cr)(Lf) a= all (REM/LOC available)	CH0 CH1 CH2 ・・・ CHF
set the comment to CHx x:0 – F	CHCMNTx YYY(Cr)(Lf) YYY: comment (REM available)	No response data, but LCD change to channel comment mode.

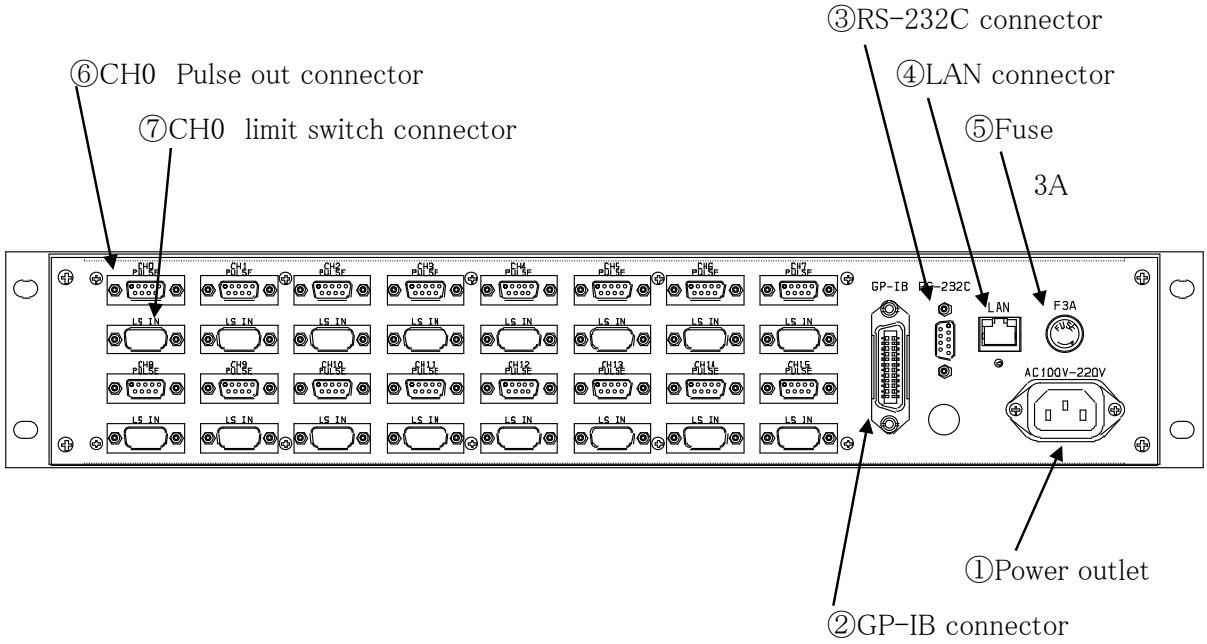
There is no command for all channel comment setting.

Here is the command for LCD display mode. (REM available)

function	command	response
change to timing output mode	LCD_DISP T(Cr)(Lf)	No response data
change to channel comment mode	LCD_DISP C(Cr)(Lf)	No response data

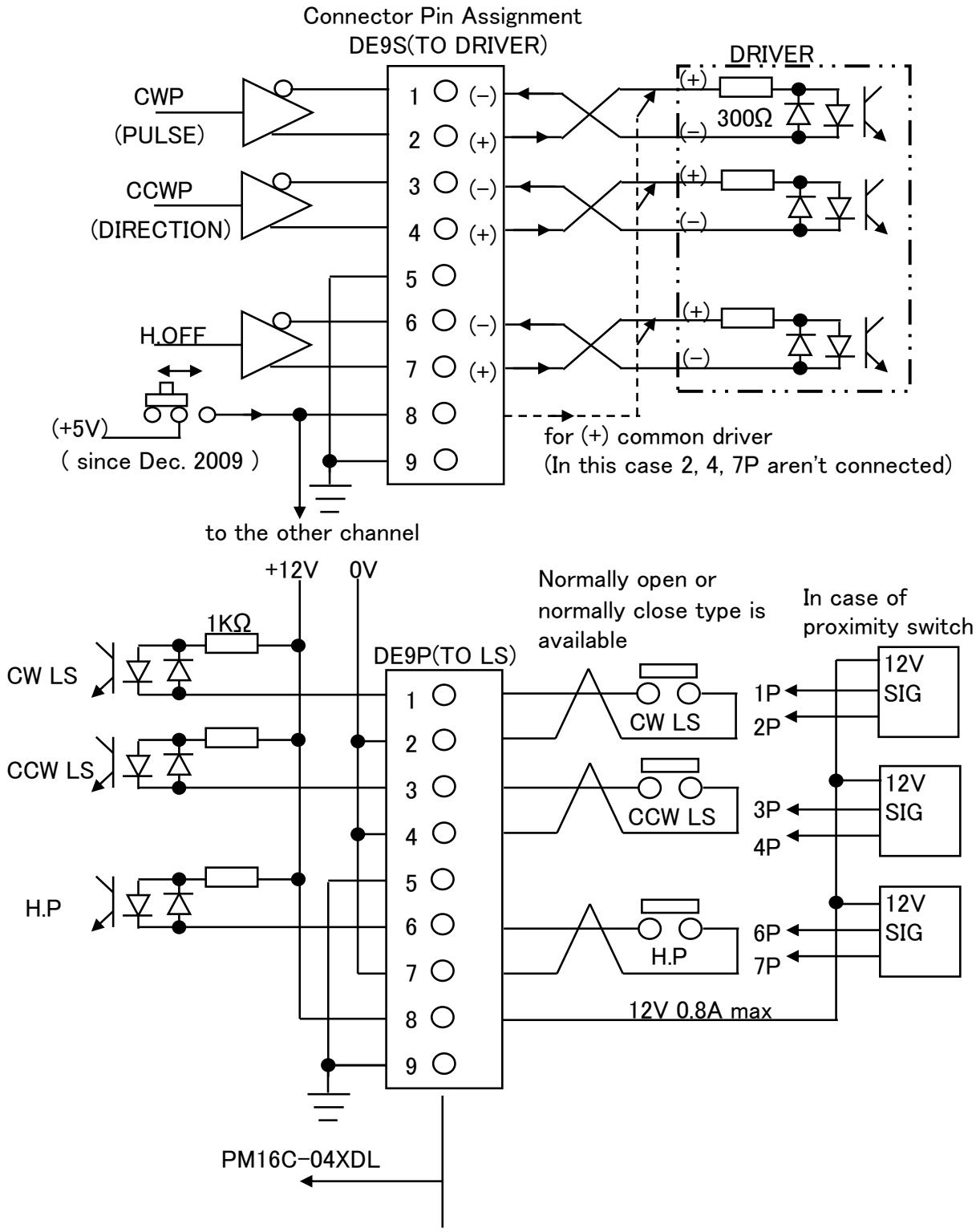
6. Rear panel

6.1 Appearance of rear panel is as follows



Connectors of CH0 to CH15 are located in order.

6.2 Connection of external devices



(NOTE)

- Shell size of connector is different from manufactures.
- Select the outside dimension of width of connector is under 35 mm.
- Our recommend one is DE-C1-J6(JAE), XM2S-0911(OMRON), HDE-CTF(HIROSE).

7. Acceleration and Deceleration Rate

Acceleration and Deceleration Rate are given by code number 0 – 115 those mean actual rate data below.

Rate Data Table （ unit: ms/1000pps ）

No.	RATE	No.	RATE	No.	RATE	No.	RATE	No.	RATE	No.	RATE
0	1000	20	150	40	22	60	3.3	80	0.47	100	0.068
1	910	21	130	41	20	61	3.0	81	0.43	101	0.062
2	820	22	120	42	18	62	2.7	82	0.39	102	0.056
3	750	23	110	43	16	63	2.4	83	0.36	103	0.051
4	680	24	100	44	15	64	2.2	84	0.33	104	0.047
5	620	25	91	45	13	65	2.0	85	0.30	105	0.043
6	560	26	82	46	12	66	1.8	86	0.27	106	0.039
7	510	27	75	47	11	67	1.6	87	0.24	107	0.036
8	470	28	68	48	10	68	1.5	88	0.22	108	0.033
9	430	29	62	49	9.1	69	1.3	89	0.20	109	0.030
10	390	30	56	50	8.2	70	1.2	90	0.18	110	0.027
11	360	31	51	51	7.5	71	1.1	91	0.16	111	0.024
12	330	32	47	52	6.8	72	1.0	92	0.15	112	0.022
13	300	33	43	53	6.2	73	0.91	93	0.13	113	0.020
14	270	34	39	54	5.6	74	0.82	94	0.12	114	0.018
15	240	35	36	55	5.1	75	0.75	95	0.11	115	0.016
16	220	36	33	56	4.7	76	0.68	96	0.10		
17	200	37	30	57	4.3	77	0.62	97	0.091		
18	180	38	27	58	3.9	78	0.56	98	0.082		
19	160	39	24	59	3.6	79	0.51	99	0.075		

8. Performance and specifications

Term	ITEM	REMARKS
Power	Voltage and frequency	85 ～ 264 V AC, 47 ～ 440Hz, 50VA
IN/OUT	Control motor	16 motors can be controlled
	Capability	4 motors can be controlled synchronously or simultaneously
	Out put	CW, CCW, HOLE OFF (5V, 8mA: line driven) for each 16 motor driver
	Pulse rate	1～5MPPS
	Pulse control number	0～±2,147,483,647
	Acceleration and deceleration rate	1048.56～0.0125 ms/KHz
	Acceleration and deceleration form	Constant speed, S-character form, trapezoidal form
	Output format	2 pulse / 1pulse and 1 direction
	Pulse out connector	DE9S(F)/PM16C-05XDL, RJ-4/PM-16C04XR
	Limit switch input	CW-LS, CCW-LS, HOME-LS 12V 5mA (minus common) and power supply +12V for censer for each motor (total 1A).
	Limit switch connector	DE9S(M)/PM16C-05XDL, RJ-4/PM-16C04XR
LCD display	Characters and lines of display device	PM16C-04XDL: 20charactors × 4 lines (Size : 9.2H ×4.8W)
	Display contents in control mode	channel number, current position of ±10 digit number, speed display, contents of limit switch, relative moving value, preset count value, home position information, panel operation ready/not ready
	Display contents in data set mode	limit switch setting information, pulse output mode, value of speed HSPD/MSPD/LSPD, acceleration and deceleration rate value, Push button stop mode, origin detect function, timing pulse generate function, RS232C settings, GP-IB settings, HAND BOX selection, FIRMWARE version selection
Panel push button and lamp	PM16C-04XDL	switch and button: CH-SEL, JOG CW/CCW, channel act, REM/LOC, SETUP, PRESET, START, STOP, CURSOR, CHG, MODE, ten-key lamp: limit switch, home position, hold off, motor select, PRESET, START, STOP, REM/LOC, SETUP, MODE
Numeric button and cursor button		channel selection by ten-key and cursor key. Selection of control ready/not ready for each channel, and change preset values. selectable speed of H, M, L for each channel. and preset speed value of H,M,L for each channel.
Control	PRESET	preset specified data to the selected display
	START	moving start for selected channel according to the mode
	STOP	stop moving for selected channel
	JOG	jog stepping for selected channel

Term	ITEM	REMARKS
Stepping mode	SCAN MODE	continuous stepping operation of ready channel. Stepping direction is according JOG switch.
	ABS IDX MODE	moving to specified position of ready channel
	REL IDX MODE	moving specified steps of ready channel
	HP STOP MODE	stop by Home Position Limit Switch
		total 3 moving style. 1 is for with HP detection memory, another is for no HP detection memory.
Remote control	communication way	LAN, GP-IB, RS232C port
Case	size and weight	EIA 2 UNIT rack mount type (88H×482W×325D)　4.5Kg

For the further information, feel free to ask us.

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