



**PDA(N) Series - Sensor-Less Vector
PDH Series - High Frequency
PDE Serie - Wide Application
Inverter Instruction Manual**





WARNING!



Attention to these warning signs on the inverter or in this instruction book, they indicate **danger to human body or damage to the inverter**.

Before installing and putting the inverter into operation, please read the safety precautions and warnings following this page.

Safety precautions & warnings

Read carefully all the safety precautions included in these operating instructions and all the warning signs attached to the inverter. Make sure that the warning signs are kept in a legible condition and replace missing or damaged signs.

Before starting, familiarize yourself with the operation of the inverter. It may be too late if you start working with the inverter before read this instruction manual.

Never permit unqualified personnel to operate the inverter.



WARNING

This inverter produces dangerous electrical voltages and controls rotating mechanical parts. Death, severe injury or substantial damage to property can occur if the instructions in this operating manual are not completed with.

Only personnel with appropriate qualifications should work with this inverter. These personnel must be familiar with all the warning signs and precautions laid out in these operating instructions for the transport, installation and operation of this inverter.

The successful and safe use of this inverter depends on the correct installation, commissioning, operation and maintenance of the inverter.

This inverter operates at high voltages.

- The DC-link capacitors remain charged to dangerous voltages even the power is removed. For this reason it is not permissible to open the inverter cover until five (5) minutes after the power has been turned off. When handling the open inverter it should be noted that live parts are exposed. Do not touch these live parts.
- The terminals R, S, T, U, V, W, P, N, B, PR, BR can carry dangerous voltages even if the motor is inoperative:
- Only qualified personnel may connect, start the system up and repair faults. These personnel must be thoroughly acquainted with all the warnings and operating procedures contained with this manual.
- Certain parameter settings may cause the inverter to start up automatically after power on or power recover.

DEFINITIONS

Qualified Person

For the purposes of this manual and product labels, a qualified person is one who is familiar with the installation, construction, operation and maintenance of this inverter and with hazards involved. In addition, the person must be:

- **Trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.**
- **Trained in the proper care and use of protective equipment in accordance with established safety practices.**
- **Trained in rendering first aid.**

Danger

For the purposes of this manual and product labels, DANGER indicates that loss of life, severe personal injury or substantial property damage WILL result if proper precautions are not taken.

Warning

For the purposes of this manual and product labels, WARNING indicates that loss of life, severe personal injury or substantial property damage CAN result if proper precautions are not taken.

Caution

For the purpose of this manual and product labels, CAUTION indicates that minor personal injury or property damage CAN result if proper precautions are not taken.

Note

For the purpose of this manual and product labels, NOTES merely call attention to information that is especially significant in understanding and operating the drive.



DANGER and WARNING

Make sure that the location selected for installation is safe, protected from moisture and splash and drip-proof!

Children and the general public must be prevented from accessing or approaching the equipment!

The equipment may only be used for the purpose specified by the manufacturer.

Unauthorized modifications and the use of spare parts and accessories that are not sold or recommended by the manufacturer of the equipment can cause fires, electric shocks and injuries.

Keep these operating instructions within easy reach and give them to all users!



WARNING

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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1 Description of PDAN/PDA/PDH/PDE Series inverter

1.1 General description and Design philosophy

The **PDAN** Series inverter is a POWER CONVERTER for variable-speed AC drives. It applies the Sensor-less Vector concept to control the output voltage and frequency to the motor. Use current sensor detects three phase AC current signals and phase angle, and using the Sensor less Vector algorithm to compensate motor speed variation. The PDAN series will provide more torque at low speed and automatic compensate the motor slip when under heavy loading.

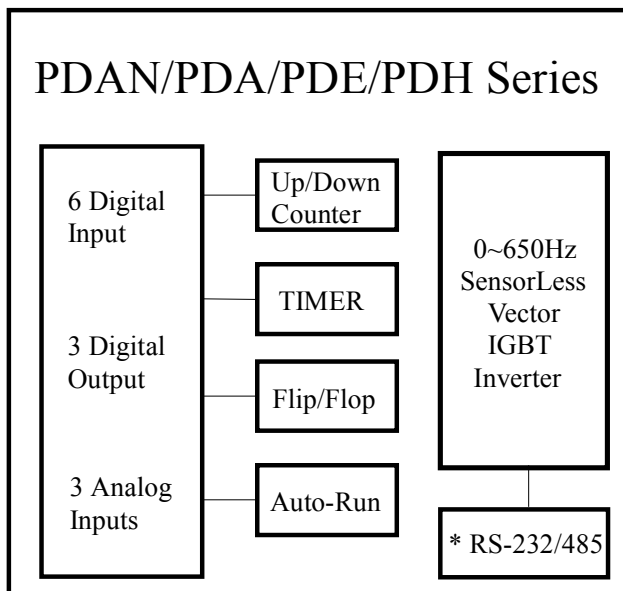
The **PDA** Series inverter is a POWER CONVERTER for variable-speed AC drives. It applies the Sensor-less Vector concept to control the output voltage and frequency to the motor. Use only one current sensor at DC bus, the advanced microprocessor detects the DC current and recovers the signal into three phase AC current signals. Phase angle of the output current is measured in order to compensate motor speed variation using the Sensor less Vector algorithm.

Superior than traditional V/F inverter, the PDA series will provide more torque at low speed and auto compensate the motor slip when under heavy loading.

PDE series inverter is similar to PDA series. However, for economic reason, a simple shunt resistor replaces the Hall-effect current sensor. Therefore, the PDE does not include all the functions involving current measurement and calculation.

The **PDAN**, **PDA** and **PDE** inverters can generate output frequency up to 650Hz.

PDH series inverter can generate output frequency up to 3,000Hz used for driving very high-speed motors. In order to decrease sub-harmonic when running the motor at high frequency, it employs Synchronous Symmetric Sine Pulse Width Modulation method for waveform generation.



Built in standard **UP/DOWN Counter** Module, **Timer/Counter** Module and **Flip/Flop** Module that are very often used in actual application system.

Six digital inputs and **three digital outputs** are all programmable to meet all kinds of applications.

Three analog inputs AI1, AI2 and AI3 is provided for various control applications. Moreover, many combinations of these three AIx signals are provided; allow your system design flexible.

Serial communication control software is embedded in the CPU; it can easily achieve computer direct control through RS485 serial port. It is very useful when inverter or many inverters would like to be dynamical controlled by master computer. With repeater one serial port can address up to 99 inverters. (Standard RS485 driver can drive up to 31 inverters only.)

* The PDAN series inverter has built-in RS-485 interface; the RS-485/RS-232 option card is available for PDA/PDE /PDH series inverter.

1.2 Control input & output configuration

The control terminal on the CPU board can be separate into three groups.

Terminal for Analog signals:

AM	AI1	AI2	AI3	5V	ACOM
----	-----	-----	-----	----	------

*AI3 does not exist in PDA/H-4015, PDE-2007/2015.

Terminal for Digital signals:

DI1	DI2	DI3	DI4	RUN	REV	RST	DO1	DO2	24V	DCOM
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------

*RUN=DI5, REV=DI6

Terminal for 1a contact Relay output:

RY1	RY2
-----	-----



CAUTION

All the input/output control signal lines, or remote panel lines and communication lines must be laid separately from the high current power/motor/brake lines.

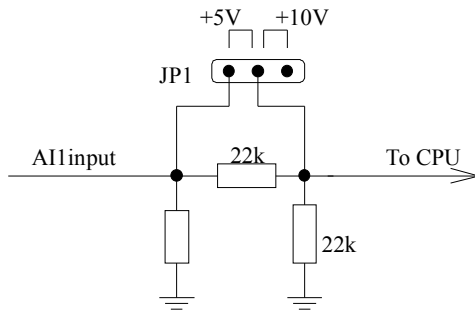
They must not be fed through the same cable conduit/trucking.

1.2.1 Analog input blocks (Refer to Sec. 7)

- AI1, AI2 and AI3 are analog input terminals.
- AM terminal is used for analog signal output.
- ACOM is the common terminal for analog circuit.
- The 5V terminal supply analog +5V.
- Inside the control board, there are three jumpers JP1, JP2 and JP3. They are used for selecting the hardware configuration of AI1, AI2 and AI3 respectively.

Note: there are only two jumpers JP1 and JP2 in PDA/H-4015, PDE-2007/2015.

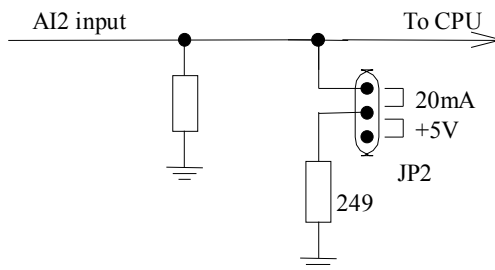
1.2.1.a Analog input AI1 module



JP1 is used to define the characteristic of the input terminals **AI1**.

- If you are using external analog voltage 0 ~ +10V input, please use **AI1** and select **JP1** to **+10V** position.
- If you are using external analog voltage 0 ~ +5V input to **AI1**, select **JP1** to **+5V** position.

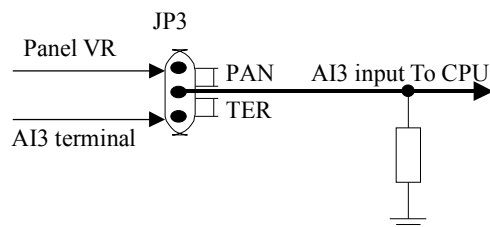
1.2.1.b Analog input AI2 module



JP2 is used to define the characteristic of the input terminal **AI2**.

- If you are using 0 ~ +5V input (external or internal voltage reference) to **AI2**, select **JP2** to **+5V** position.
- If you are using external 20mA current input to **AI2**, must select **JP2** to **20mA** position.

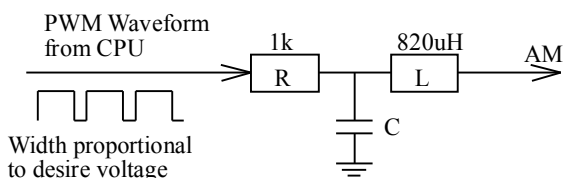
1.2.1.c Analog input AI3 module



The LOCAL panel has built in a small potential meter VR. Through jumper **JP3**, user can select the input source of **AI3** either from terminal or from panel.

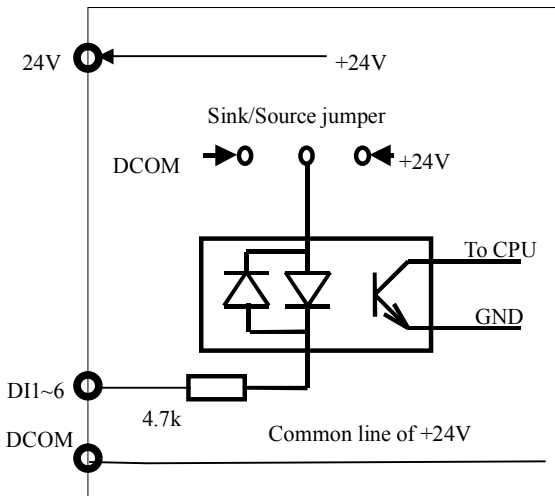
For models PDA/H-4015, PDE-2007/2015, because there is no **AI3** input terminal, the CPU always connects to panel VR.

1.2.2 AM the Analog output module (Refer to Sec.10)



The output voltage of AM terminal comes from CPU in PWM waveform. Its duty cycle is proportional to the desired analog amplitude. And the signal is filtered by internal resistor R and capacitor C.

1.2.3 Digital Input terminals (DI1 ~ DI4 and RUN / REV)

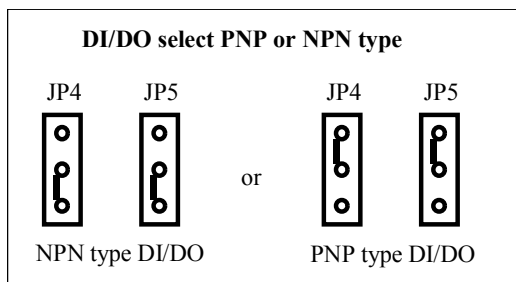
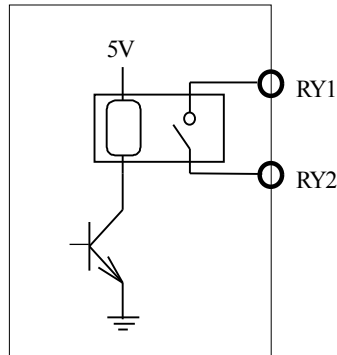
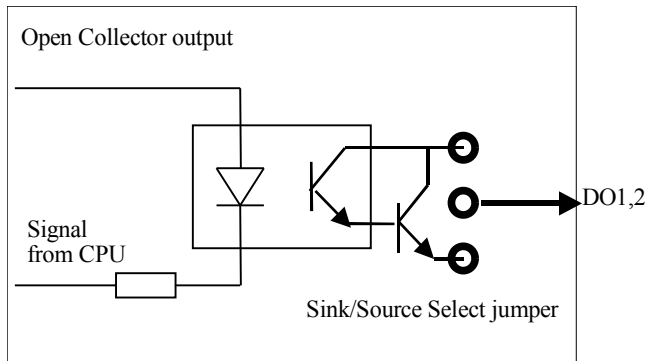


- DI1~DI4, RUN, REV are all identical Bi-directional digital inputs.
RUN terminal is equal to DI5.
REV terminal is equal to DI6.
 - +24V is common power supply for all DIx.
 - DCOM is the command reference for these digital circuits.
 - Each Digital Input can be configured individually by corresponding parameter. Refer to section 6, 8.
 - User can select Sink (NPN) type or Source (PNP) type by jumper JP4 and JP5.
- Note: The minimum input signal width is 5ms.**

1.2.4 Digital Output terminals (Refer to Sec. 9)

There are three digital output signals available to the user. Two of them are designed as **open collector** output; another is voltage isolated "1a" contact of relay output.

- **Open collector outputs** are named as **DO1** and **DO2**, **DCOM** is the common point.
- The relay output is terminals **RY1**, **RY2** (Note RY1, RY2 should drive 24V relay only.)
- Each Digital output can be configured individually by corresponding parameter. Refer to section 9.



- JP4 upper position selects Source (PNP) input
- JP5 upper position selects Source (PNP) output
- JP4 lower position selects Sink (NPN) input
- JP5 lower position selects Sink (NPN) output

Note: The digital input terminals and digital output terminals of PDA/H-4015, PDE-2007/2015 are "NPN" type only, there are no JP4 and JP5 on CPU board.

1.2.5 Hardware RESET terminal (RST)

The input hardware structure is similar to digital inputs described in Sec.1.2.3.

Terminal **RST** is used for reset the inverter.

- If Sink (NPN) type selected, under any circumstances, **RST** and **DCOM** shorted together will force the inverter execute **RESET**, as if **Power On** again.
- If Source (PNP) type selected, under any circumstances, **RST** and **24V** shorted together will force the inverter execute **RESET**, as if **Power On** again.

1.3 Electrical Specifications

Model	2007	2015	2022	2037	2055	2075	2110	2150	2225	2300
PDAN/PDA/PDE/PDH -	-	4015	4022	4037	4055	4075	4110	4150	4225	4300
HP	1	2	3	5	7.5	10	15	20	30	40
KW	0.75	1.5	2.2	3.7	5.5	7.5	11	15	22.5	30
KVA	2.0	3.0	4.0	6.5	9.5	13	19	25	34	46
Amp rms.	-2xxx	5	7	11	17	24	33	46	61	90
	-4xxx	-	4.0	5.5	8.5	12	17	23	31	45

2 INSTALLATION



WARNING

- To guarantee the safe operation of the equipment it must be installed and commissioned properly by qualified personnel in compliance with warnings laid down in these operating instructions.
- Take particular note of the general and regional installation and safety regulations regarding work on high voltage regulations, as well as the relevant regulations regarding the correct use of tools and personal protective gear.
- Make sure that the unobstructed clearance for each of the cooling inlets and outlets above and below the inverter is at least 100mm.
- Make sure that a space of 40mm is kept free at the sides of the inverter to permit the cooling air to escape from the side slits.
- Ensure that the temperature does not exceed the specified level when the inverter is installed in cubicle.
- Avoid excessive vibration and shaking of the equipment.
- Do not obstruct the cooling fan that installed on the inverter, it is used to build proper airflow for heat sink thermo dissipation. And do not touch the fan hole when it is running.

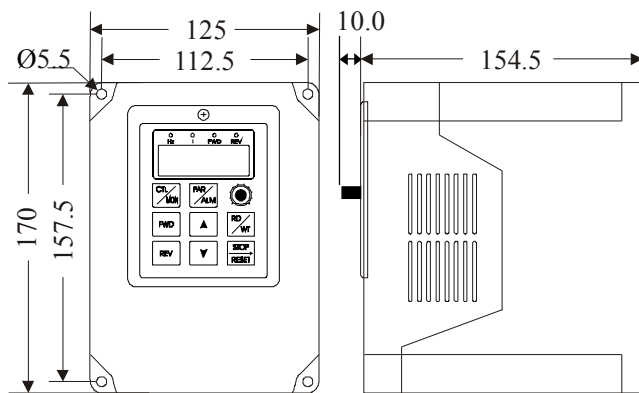
NOTE: Please consider the possible use of options, such as RFI suppression filters at the planning stage.



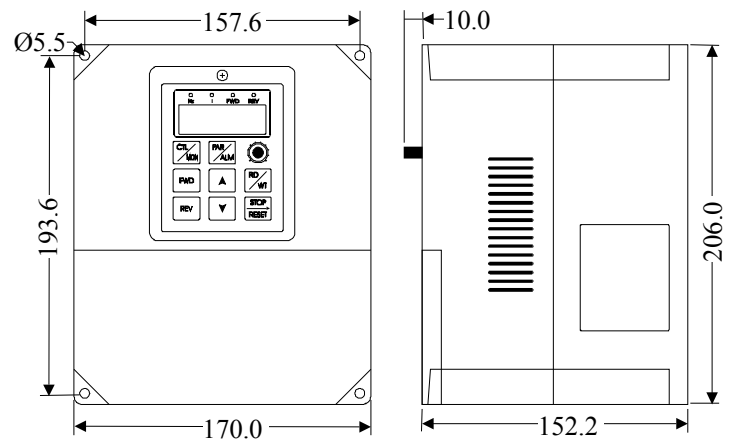
CAUTION

- 1) To open the upper cover of the inverter, follow these rules :
- 2) Cut off the input supply power
- 3) Wait 5 minutes until internal capacitor completely discharged
- 4) Use small \ominus minus screw driver, plug into the lock holes located at the lower edge of the cover. Then the cover is free to open.

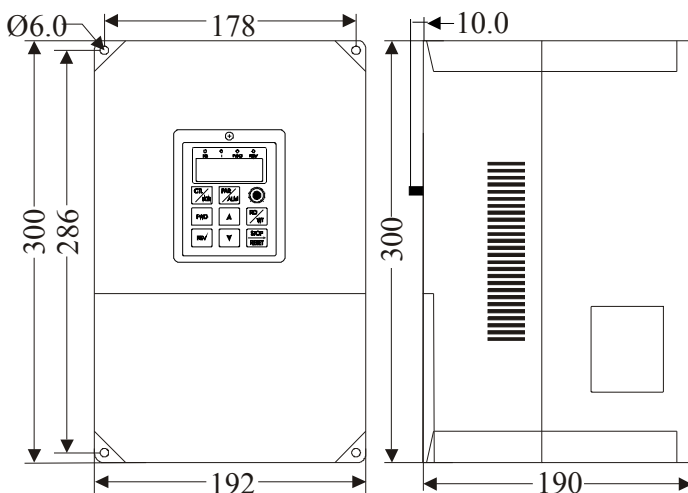
2.1 Outline Dimensions



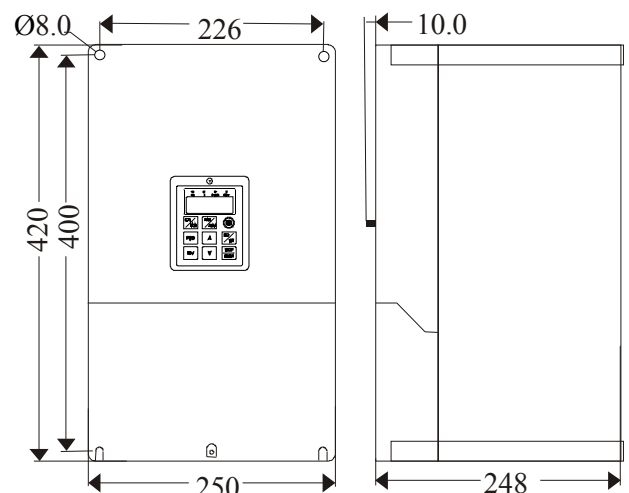
PDx - 2007、2015、4015



PDx - 2022、2037、4022、4037



PDx - 2055、2075、4055、4075



PDx - 2110、2150、2225、4110、4150、4225

2.2 Power Terminal

The upper cover must be removed in order to connect the electrical leads.

Basically, the Power terminals are divided into three portions:

- The Power line input, (R, S, T) receives power for the operation of the inverter.
- The Motor line output, (U, V, W) delivers Variable Frequency output to motor leads.
- Brake resistor connect to B, P, terminal. (The inscription of terminals may be PR or PB.)

Note: Must connect Earth properly.



WARNING: Never connect power line to U, V, W, P, N, B, PR, BR.

2.3 Connect Power line input to Inverter



WARNING and CAUTION

- Between the power line and the inverter, add NFB for system protection.
- There are static sensitive components inside the Printed Circuit Board. Avoid touching the boards or components with your hands or metal objects.
- Only the terminal screws may be touched with the insulated screwdrivers when connecting the leads.
- Make sure to connect the power terminals tight and correctly.
- Make sure that the power source supplies the correct voltage and is designed for the necessary current.
- Make sure the motor is configured to match the input voltage.
- Protective EARTH terminal marked with \oplus must be connected properly.
- Take care that the appropriate circuit breakers with the specified current rating are connected between the power supply and the inverter.

2.4 Connect inverter output to Motor



WARNING

Do not insert contactors between inverter output and motor.

For every model, "U, V, W " are the three phase output terminals, they should be connected to motor leads directly.

2.5 Control terminal connection



CAUTION

All the input/output control signal lines, or remote panel lines and communication lines must be laid separately from the high current power/motor/brake lines. They must not be fed through the same cable conduit/trucking.

2.6 DC bus terminal (P, N) or Brake terminal (B, P)

CAUTION

Some models with power terminal marked P and N, these models does not include Brake transistor inside the inverter. Customer may use extra Brake Transistor Module for discharge brake function.

For models that include braking transistor, the power terminal will mark P and B. User can connect suitable resistor to the P & B terminals directly.

Here is the recommended table for discharge resistors:

Model	Resistance (Ohm)	Rating (Watt)
2007	200	80
2015	100	150
2022	60	250
2037	40	300
2055	30	500
2075	20	600
2110	15	1000
2150	10	1500
4007	750	80
4015	400	150
4022	250	250
4037	150	300
4055	100	500
4075	75	750
4110	50	1000
4150	40	1500
Discharge duty 10%		

Warning : Never connect resistor to P & N terminal

If the terminals are P & N, must add external braking unit.

2.7 A.C.L.

When power supply capacity is larger than 500KVA and/or using thyristor, phase advance capacitor etc. from same power supply, must fitting A.C.L. at R.S.T. power input side to curb instantaneous current and to improve power ratio.

Here is the recommended table for A.C.L.:

Voltage (V)	Model	Current (Arms)	Induction Value
220	2007	6	1.8mH
	2015	10	1.1mH
	2022	15	0.71mH
	2037	20	0.53mH
	2055	30	0.35mH
	2075	40	0.26mH
	2110	60	0.18mH
	2150	80	0.13mH
	2225	120	0.09mH
380/440	4015	5	4.2mH
	4022	7.5	3.6mH
	4037	10	2.2mH
	4055	15	1.42mH
	4075	20	1.0mH
	4110	30	0.7mH
	4150	40	0.53mH
	4225	60	0.36mH
	4300	80	0.26mH

Note: The A.C.L. for 220V and 380V/440V have different induction values, please does not mix up.

3 CONTROL PANEL

The control panel involves 4 digits 7-segment display and 4 Led-lamps, 8 keys and a potential meter (VR). It has four possible operation modes: "CTL", "MON", "PAR" and "ALM modes, described below.

3.1 CTL mode



VR input is equivalent to AI3 input.

Push the "CTL/MON" key, will change the keypad operation between "CTL" and "MON" Mode.

If both "HZ" and "I" Led are blank, it is under "CTL" Mode.

Under "CTL" Mode, user can control the inverter running in either direction and may modify the desired running speed.

For normal run/stop control, use only the three keys:

FWD key is used for running the inverter in forward direction.

REV key is used for running the inverter in reverse direction.

STOP key is used to stop the inverter.

If Pr.40=3 or 8, the running frequency shall be modified by keypad, then these keys are enabled:

RD/WT key is used to read out the data in Pr.00 (minimum value is Pr.16)

▲ key is used to increase the set frequency or the data read from Pr.00.

▼ key is used to decrease the set frequency or the data read from Pr.00.

STOP key is used for cursor shift

Procedure:

- Under normal CTL mode, push RD/WT will enter **Set Frequency mode**, the display will show the value stored in Pr.00 and blinking the data.
- Push ▲ or ▼, the display starts to show the cursor position.
- Push ▲ or ▼, in order to modify the Panel set frequency.
- Push CTL/MON key will go back to normal CTL mode.

Note: If Pr.40=8, the newly modified Set Frequency will write into Pr.00 automatically.

3.2 MON mode

Push the "CTL/MON" key, will change the keypad operation between "CTL" and "MON" Mode.

Under "MON" Mode, user can control the inverter running in either direction and may monitor any two internal status easily. (Refer to Sec.13)

If "HZ" Led is on, it is under "MON" Mode and 7-segment shows the "HZ" data. **(Or the desired parameter assigned by Pr.99)**

If "I" Led is on, it is under "MON" Mode and 7-segment shows the "I" data. **(Or the desired parameter assigned by Pr.98)**

FWD key is used for running the inverter in forward direction.

REV key is used for running the inverter in reverse direction.

STOP key is used to STOP the inverter.

▲ key is used to select "HZ" or "I" data shown on the 7-segment display.

▼ key is used to select "HZ" or "I" data shown on the 7-segment display.

3.3 PAR mode

Push the "PAR/ALM" key, will change the keypad operation between "PAR" or "ALM" mode.

If push PAR/ALM key, 7-segment shows "Pr.xx", it is under "PAR" Mode.

If push PAR/ALM key, 7-segment shows "0.-xx", it is under "ALM" Mode.

For PDA/E series, under PAR mode, the HZ and I lamps all ON.

Under "PAR" Mode, user can modify or monitor all the internal PARAMETERS.

To modify a parameter, follow the steps described below:

STEP 1: push "PAR/ALM" key, the 7-segment will show "Pr.nn". (nn is parameter number)

STEP 2: push ▲ or ▼ key to select desired parameter number, **and "STOP" key used as cursor shift.**

STEP 3: push "RD/WT" key to READ the content of the specified parameter.

The 7-segment now shows the value of this parameter.

STEP 4: push ▲ or ▼ key to modify the displayed value, **and "STOP" key used as cursor shift.**

STEP 5: push "RD/WT" key to WRITE the new value into parameter memory.

STEP 6: push "PAR/ALM" repeat STEP 1 to modify next parameter.

3.4 ALM mode

Push the "PAR/ALM" key, will change the keypad operation between "PAR" or "ALM" mode.

If push PAR/ALM key, 7-segment shows "0.-xx", it is under "ALM" Mode.

Under "ALM" Mode, the user can execute RESET function or monitor ALARM STATUS.

STOP/RESET key, the inverter will execute RESET function.

▲ and ▼ key are used to check ALARM History.

4 SYSTEM START-UP

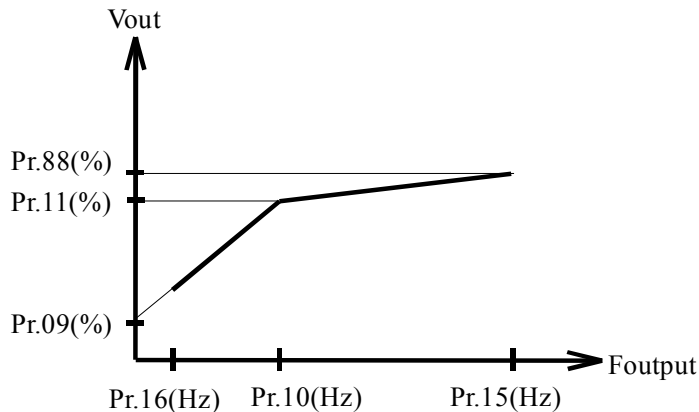
Many operation methods were designed into the PDA/E/H Series inverter. Here in this section, teaching you how to start running the inverter by simplest operation method.

4.1 Reset & Initialize the inverter

When you first receiving the inverter, and not sure of the parameter value inside the inverter, please execute **Memory Initialization**. The initialization sequence is first set **Pr.94=1**(refer to section 3 and 5.3), then change to **ALM** mode until display show **0. xx**. Then push **STOP/RESET** key to start executing **software reset** and **memory initialization**. Or, after Pr.94=1, then connect **RST** terminal to **DCOM**, and then Inverter will execute hardware RESET immediately. After memory initialized, most parameters (marked with TYPE: R/W in Table 5.1) will be preload to the default values.

4.2 Setup Basic Motor Parameter

Firstly, before starting, basic V/F curve parameters must setup first. Refer to section 5.4, the description of Pr.09, Pr.10, Pr.11, Pr.15, Pr.16 and Pr.88.



Note: If Auto-Tuning had been executed, Pr.09 may be altered automatically.

Secondly, set motor rating is calculated from:
$$\text{Pr.78} = \left(\frac{\text{MotorRatingCurrent}}{\text{InverterRatingCurrent}} \right) * 100\%$$

4.3 PDA series Operation Mode Selection

For PDA series only, through Pr.67 selection, the inverter can operate under the following 5 different modes:

Operation Mode	Description	Series
Model 0	Standard V/F (I)	PDA/PDE/PDH
Model 1	Standard V/F (II)	PDAN/PDA/PDH
Model 2	Sensor-Less (I)	PDA
Model 3	Sensor-Less (II)	PDAN/PDA
Model 4	Power-Control Mode	PDAN/PDA

4.3.0 Standard V/F (I) (For PDA/PDE/PDH)

Pr.67=0: The inverter delivers Sine PWM voltage waveforms to the motor winding. The current signal is used for protection only. Output current waveform is not compensated by the feedback current signal.

Note: PDE series also operate under this mode.

4.3.1 Standard V/F (II) (For PDAN/PDA/PDH)

Pr.67=1: The inverter delivers Sine PWM waveform to motor, and check AC side output current. The distortion of AC side current waveform due to IGBT dead time effect will be compensated in order to minimize torque ripple.

4.3.2 Sensor-Less (I) (For PDA)

Pr.67=2: When the inverter is running, it checks the output voltage, output current and the phase angle continuously. If the motor speed changes because of loading effect, the inverter can modify its output frequency automatically.

4.3.3 Sensor-Less (II) (For PDAN/PDA)

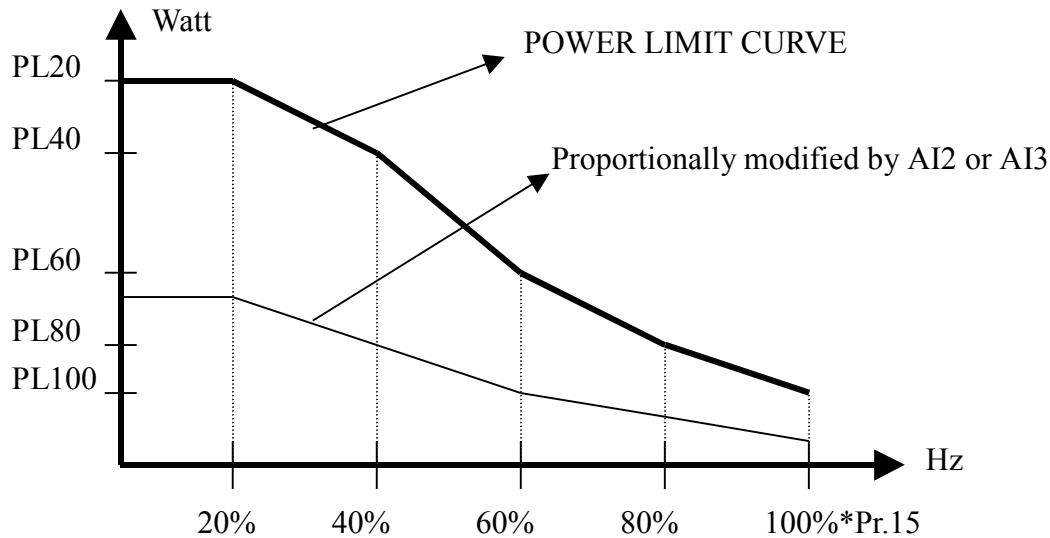
Pr.67=3: Similar to Sensor-Less (I), the inverter operates under Sensor-less control algorithm.

Moreover, extra boost voltage is added in order to decrease the motor slip when running at low speed.

4.3.4 Power (Torque) control (For PDAN/PDA)

Pr.67=4: Basically its operation characteristics is similar to Pr.67=1. Moreover, the user can pre-assign the POWER-LIMIT curve. Whenever the inverter output power exceeds the pre-defined limit curve, the output frequency will decrease automatically. In addition, by using AI2 (or AI3), it is easy to modify the POWER-LIMIT curve proportionally.

Note: In this mode, Pr.73~Pr.77 is used to define POWER LIMIT CURVE



The POWER LIMIT CURVE can be modified by AI2 or AI3, refer to section 8.75.

Pr.72 should set to 0, because AUTO RUN function is not allowed.

PL20 (Pr.73): the POWER LIMIT value when Hzout=20% * Upper limit (Pr.15)

PL40 (Pr.74): the POWER LIMIT value when Hzout=40% * Upper limit (Pr.15)

PL60 (Pr.75): the POWER LIMIT value when Hzout=60% * Upper limit (Pr.15)

PL80 (Pr.76): the POWER LIMIT value when Hzout=80% * Upper limit (Pr.15)

PL100 (Pr.77): the POWER LIMIT value when Hzout=100% * Upper limit (Pr.15)

All PL20~PL100 parameters are expressed as “W.n”, which stands for $PL = W \cdot 10^n$

For example, if Pr.15=60Hz, PL20 (Pr.73)=15.2, it means the power limit at 12Hz(60Hz*20%) is:

$$PL20 = 15 \cdot 10^2 = 1500Watt$$

The actual output power: PDA series is calculated from $P(watt) = V_{cap} \cdot I_{dc}$

$$PDAN \text{ series is calculated from } P(watt) = \sqrt{3} \cdot V_{out} \cdot I_{out} \cdot \cos \theta$$

Refer to detail explanation of Pr.54 for monitoring the output current or power.

4.4 Auto Tuning

4.4.1 Auto Tuning for PDA series

For PDA series, the embedded Auto-Tuning program can search the internal characteristics of motor. For convenience Both **Dynamic Tuning** and **Static Tuning** programs are installed.

Before start auto-tuning process, these parameters should be assigned first:

Pr.01: Main Acceleration rate

Pr.02: Main Deceleration rate

Pr.10: Base frequency (Hz) of the motor

Pr.11: Voltage (%) when the inverter output frequency reaches Base Frequency

Pr.12: Maximum Switching carrier

Pr.13: ≤ 2.0 (KHz)

Pr.14: $\geq (\text{Pr.10}) \div 2$

Pr.15: Maximum frequency $\geq \text{Pr.10}$

Pr.68: Sensor-Less Boost=0.0

Pr.88: Voltage (%) when the inverter output frequency reaches Upper Frequency

Pr.78: Current Rating (%) of the motor = (Motor Full Load current / Inverter Full Load current)*100%

4.4.1.1 PDA Dynamic Tuning

Set **Pr.94=155**, and reset the inverter, then the inverter will show “**Auto**” on the keypad, waiting to accept “**FWD**”, “**REV**” or “**STOP**” command.

If push “**FWD**”(or **REV**), the inverter will start tuning process and motor running in forward (or reverse) direction. Wait about 2minutes, when the motor characteristics obtained, the inverter will stop the motor and then initialize itself automatically.

If push “**STOP**” key while tuning is in progress, the inverter will stop the motor immediately and show “**Er.tu**”.

4.4.1.2 PDA Static Tuning

Set **Pr.94=55**, then reset the inverter, then the inverter will show “**Auto**” on the keypad, waiting to accept “**FWD**”, “**REV**” or “**STOP**” command.

In push “**FWD**” or “**REV**”, the inverter will start tuning process by injecting direct current into the motor windings. And while tuning, the motor should remain standstill throughout the entire tuning process.

If push “**STOP**” key while tuning is in progress, the inverter will stop the motor immediately and show “**Er.tu**”.

4.4.1.3 PDA Sensor-less related parameters

After tuning, these parameters are subject to change according the tuning results:

Pr.09 is general voltage boost value.

Pr.67 is RUN mode selection parameter

If tuning complete, Pr.67 will be set to 3, select Sensor-Less (II) compensation mode.

If tuning failed, Pr.67 will be set to 1, select standard V/F (II) mode.

Pr.68 is special voltage compensation factor

If tuning complete, Pr.68 will be used for Sensor-less voltage compensation.

If tuning failed, Pr.68 will be default to 5.0

Pr.69 is special frequency compensation factor

If tuning complete, Pr.69 will be used for Sensor-less compensation

If tuning failed, Pr.69 will be default to 50.50

4.4.1.4 PDA Tuning Fail process

When tuning process initiated, the display will show “**Auto**” and flashing. If push “**STOP**” key during this period, the tuning process will be terminated immediately, and display will show “**Er.tu**” means **Tuning Error**.

If Error Tuning occurs, contents of these parameters will be default value.

Pr.09 = 3

Pr.67 = 1

Pr.68 = 5.0

Pr.69 = 50.50

4.4.2 Auto Tuning for PDAN series

For PDAN series, the embedded Auto-Tuning program can search the internal characteristics of motor.

Before start auto-tuning process, these parameters should be assigned first:

Pr.01: Main Acceleration rate

Pr.02: Main Deceleration rate

Pr.10: Base frequency (Hz) of the motor

Pr.11: Voltage (%) when the inverter output frequency reaches Base Frequency

Pr.15: Maximum frequency \geq Pr.10

Pr.68: Sensor-Less Boost=0

Pr.78: Current Rating (%) of the motor = (Motor Full Load current / Inverter Full Load current)*100%

Pr.88: Voltage (%) when the inverter output frequency reaches Upper Frequency

4.4.2.1 PDAN Tuning

- Set **Pr.94=155**

- Reset the inverter, the inverter will start tuning process

4.4.2.2 PDAN Sensor-less related parameters

After tuning, these parameters are subject to change according the tuning results:

Pr.09 is general voltage boost value.

Pr.67 is RUN mode selection parameter

If tuning complete, Pr.67 will be set to 3, select Sensor-Less (II) compensation mode.

Pr.68 is special voltage compensation factor

If tuning complete, Pr.68 will be used for Sensor-less voltage compensation.

Pr.69 is special frequency compensation factor

If tuning complete, Pr.69 will be used for Sensor-less compensation

4.4.3 Gain Adjustment

Under conditions when **Tuning Error** occurs, or when fine adjustment is preferred for compensation accuracy, customer can modify Pr.69 manually by the procedures described follows:

Note: Pr.69 is composed of two factors: **Pr.69 = F1. F2**, separated by decimal point.

F1: Low speed Phase compensation factor

Set Pr.67=1 and Pr.54=3 (refer to section 13.1), run the inverter at 5% low frequency (e.g. if Pr.10=60Hz, 5%=3Hz),

Read the POWER ANGLE ϕ at this frequency,

Then calculate F1 according the following equation: $F1 = 50 / \tan(\phi)$

F2: High-Speed Load regulation factor

Run the motor to desired high frequency (e.g. 60Hz), using tachometer to check the speed variation between no load and full load, then adjust the gain constant F2 in order to minimize the load regulation.

4.5 Monitor Selection

Use Pr.98 and Pr.99 to select desired variables that you wish to monitor.

Enter MONITOR mode using LOCAL Panel:

Select MON mode by push CTL/MON key.

Pushing the CTL/MON key will change the mode between CTL and MON mode.

It is easy to distinguish that when **any one of Hz or I lamp is ON**, the inverter is under MON mode; if **Hz or I lamp all OFF**, the inverter is under CTL mode.

The ▲ & ▼ keys are used to select the desired variable shown on 7-segment display for monitoring.

4.6 Simple application example

4.6.1 Input Motor Parameters

If the Input Line voltage is 220V, and the motor in use is

Rated Voltage 200V

Rated Frequency 50Hz

Rated Current 9Amp.

Maximum output frequency 80Hz is desired

Choose inverter model PDA-2037 (220V, 11Amp).

Then, set the following parameters according to above conditions:

Pr.95=0 and Pr.96=1, allow parameter change

Pr.10=50.00Hz, set motor Rated frequency

Pr.11=91%, set motor Rated voltage 91%=(200V/220V)*100%

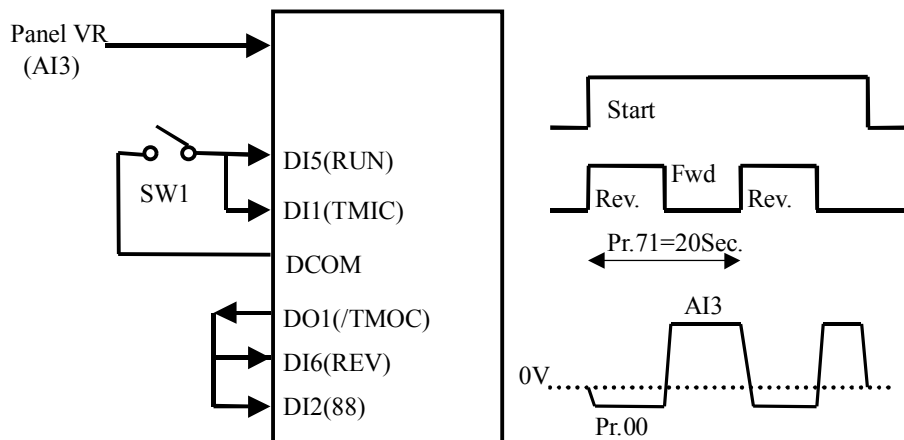
Pr.15=80.00Hz, set maximum output frequency

Pr.88=100%, set maximum output voltage at maximum frequency

Pr.78=82%, set the percentage of motor rating to inverter rating 82%=(9Amp / 11Amp)*100%

Refer to Sec.4.2

4.6.2 Application example



Set up procedure for above application:

- Pr.39=1.1 Determines the control command input from terminals
- Pr.40=25.00 Determines the set frequency may come from Panel-VR (AI3) or Pr.00
- Pr.00=60.00Hz Set predefined output frequency in Pr.00
- Pr.01=2.0Sec. Set desired acceleration time from stop to maximum speed
- Pr.02=2.0Sec. Set desired deceleration time from maximum speed to stop
- Pr.03=73 Select DI5 as RUN function
- Pr.04=74 Select DI6 as REV function
- Pr.41=36 Select DI1 as timer input
- Pr.42=88 Select DI2 as Frequency source switch (the function should combine with Pr.40). If DI2=OFF, frequency source come from Panel-VR, else if DI2=ON, frequency source come from Pr.00
- Pr.45=43 Select DO1 as timer output
- Pr.71=20.0 Select timer ON/OFF period is 20seconds

Explanation:

- Define an auto ON/OFF timer with period equal 20seconds, using DI1, DO1 and Pr.41, 45, 71.
- When switch SW1 ON, starts inverter and enables the timer.
- The timer output will control motor forward or reverse and repeat every 20seconds.
- For the first 10seconds period, the inverter runs at 60Hz(Pr.00) reverse;
- For the second 10 seconds period, the inverter runs in forward direction with frequency determined by Panel-VR.
- When switch SW1 OFF, inverter stops.

5 PARAMETERS

5.1 Parameter List

There are total 100 parameters in PDAN/PDA/PDE/PDH series inverter.

Pr.xx	Parameter Name	Default	Min.	Max.	Type	Remark
Pr.00	MAIN SPEED SET	0.00 Hz	0.00	650.00	R/W	PDAN/PDA/PDE
		0.0 Hz	0.0	3000.0	R/W	PDH
Pr.01	MAIN ACC TIME	10.0 Sec.	0.1	6553.0	R/W	
Pr.02	MAIN DEC TIME	10.0 Sec.	0.1	6553.0	R/W	
Pr.03	DI5 FUNCTION SELECT	73	0	99	FR/W	
Pr.04	DI6 FUNCTION SELECT	74	0	99	FR/W	
Pr.05	BRAKE FREQUENCY	5.00 Hz	0.50	650.00	R/W	PDAN/PDA/PDE
		50.0 Hz	5.0	3000.0	R/W	PDH
Pr.06	BRAKE VOLTAGE	5 %	0	30	R/W	
Pr.07	BRAKE TIME	1.0 Sec.	0.0	25.0	R/W	
Pr.08	BRAKE DELAY TIME	0.5 Sec.	0.1	1.0	R/W	PDA/PDE/PDH
		0.5 Sec.	0.0	1.0	R/W	PDAN
Pr.09	BOOST VOLTAGE	3 %	0	30	FR/W	PDAN
		5 %	0	30	FR/W	PDA/PDE
		0 %	0	30	FR/W	PDH
Pr.10	BASE FREQUENCY	60.00 Hz	0.50	650.00	FR/W	PDAN/PDA/PDE
		600.0 Hz	5.0	3000.0	FR/W	PDH
Pr.11	BASE VOLTAGE	100%	30	100	FR/W	
Pr.12	PWM Carrier/Carrier Transfer Point	16.0 KHz	2.0	16.9	FR/W	PDAN
	PWM_CARRIER	16.0 KHz	2.0	16.0	FR/W	PDA/PDE
		18.0 KHz	2.0	18.0	FR/W	PDH
Pr.13	MODBUS ELAPSE TIME	3ms	3	250	FR/W	PDAN
	MINIMUM_CARRIER	2.0 KHz	0.5	16.0	FR/W	PDA
		0.5 KHz	0.5	16.0	FR/W	PDE
		2.0 KHz	2.0	18.0	FR/W	PDH
Pr.14	THERMISTOR TYPE	440.8	0.0	999.9	FR/W	PDAN
	CARRIER_TRANSFER_POINT	30.00 Hz	0.00	650.00	FR/W	PDA/PDE
		300.0 Hz	0.0	3000.0	FR/W	PDH
Pr.15	UPPER FREQUENCY LIMIT	60.00 Hz	0.50	650.00	FR/W	PDAN/PDA/PDE
		600.0 Hz	5.0	3000.0	FR/W	PDH
Pr.16	LOWER FREQUENCY LIMIT	3.00 Hz	0.00	650.00	FR/W	PDAN
		3.00 Hz	0.50	650.00	FR/W	PDA/PDE
		30.0 Hz	2.0	3000.0	FR/W	PDH
Pr.17	SKIP FREQUENCY	0.00 Hz	0.00	650.00	R/W	PDAN/PDA/PDE
		0.0 Hz	0.0	3000.0	R/W	PDH
Pr.18	SKIP WIDTH	0.00 Hz	0.00	5.00	R/W	PDAN/PDA/PDE
		0.0 Hz	0.0	50.0	R/W	PDH
Pr.19	JOG SPEED	10.00 Hz	0.00	650.00	R/W	PDAN/PDA
		10.00 Hz	0.50	650.00	R/W	PDE
		100.0 Hz	0.0	3000.0	R/W	PDH
Pr.20	JOG ACC/DEC	10.0 Sec.	0.1	25.0	R/W	
Pr.21	SPD1 SPEED SET	0.00 Hz	0.00	650.00	R/W	PDAN/PDA/PDE
		0.0 Hz	0.0	3000.0	R/W	PDH
Pr.22	SPD1 ACC TIME	10.0 Sec.	0.1	6553.0	R/W	
Pr.23	SPD1 DEC TIME	10.0 Sec.	0.1	6553.0	R/W	
Pr.24	SPD2 SPEED SET	0.00 Hz	0.00	650.00	R/W	PDAN/PDA/PDE
		0.0 Hz	0.0	3000.0	R/W	PDH
Pr.25	SPD2 ACC TIME	10.0 Sec.	0.1	6553.0	R/W	
Pr.26	SPD2 DEC TIME	10.0 Sec.	0.1	6553.0	R/W	
Pr.27	SPD3 SPEED SET	0.00 Hz	0.00	650.00	R/W	PDAN/PDA/PDE
		0.0 Hz	0.0	3000.0	R/W	PDH
Pr.28	SPD3 ACC TIME	10.0 Sec.	0.1	6553.0	R/W	
Pr.29	SPD3 DEC TIME	10.0 Sec.	0.1	6553.0	R/W	
Pr.30	FREE RUN STOP	0	0	1	R/W	
Pr.31	REVERSE INHIBIT	0	0	1	R/W	
Pr.32	POWER FACTOR & FILTER	85.20	50.00	99.99	FR/W	PDAN

Pr.xx	Parameter Name	Default	Min.	Max.	Type	Remark
Pr.33	DISCHARGE ENABLE	0	0	2	R/W	PDAN/PDA/PDH
	Reserve					PDE
Pr.34	UP/OP RESTART ENABLE	0	0	1	R/W	
Pr.35	STALL LEVEL	200%	10	200	R/W	PDAN/PDA/PDH
	Reserve					PDE
Pr.36	BASE BLOCK TIME	0.5 Sec.	0.1	5.0	R/W	
Pr.37	AM SELECT	0	0	17	R/W	PDAN
		0	0	16	R/W	PDA/PDE/PDH
Pr.38	AM GAIN	255	0	255	R/W	
Pr.39	CONTROL COMMAND SELECT	0.0	0.0	9.9	R/W	
Pr.40	SPEED INPUT SELECT	8.08	0.00	99.99	R/W	
Pr.41	DI1 FUNCTION SELECT	0	0	99	R/W	
Pr.42	DI2 FUNCTION SELECT	0	0	99	R/W	
Pr.43	DI3 FUNCTION SELECT	0	0	99	R/W	
Pr.44	DI4 FUNCTION SELECT	0	0	99	R/W	
Pr.45	DO1 FUNCTION SELECT	0	0	99	R/W	
Pr.46	DO2 FUNCTION SELECT	0	0	99	R/W	
Pr.47	RELAY FUNCTION SELECT	4	0	99	R/W	
Pr.48	Irms/Idc DETECT LEVEL	100%	0	150	R/W	PDAN/PDA/PDH
	Reserve					PDE
Pr.49	HZ DETECT LEVEL	30.00 Hz	0.00	650.00	R/W	PDAN/PDA/PDE
		300.0 Hz	0.0	3000.0	R/W	PDH
Pr.50	HZ DETECT TOLERANCE	5.0 Hz	0.0	25.0	R/W	PDAN/PDA/PDE
		50 Hz	0	250	R/W	PDH
Pr.51	THERMAL TRIP TIME	60 Sec.	0	120	R/W	PDAN/PDA/PDH
	Reserve					PDE
Pr.52	POLE	4	2	12	FR/W	PDAN
		4	2	12	R/W	PDA/PDE/PDH
Pr.53	GEAR RATIO	100 %	0	100	R/W	
Pr.54	MONITOR SELECT	0	0	250	R/W	PDAN
		0	0	27	R/W	PDA/PDH
	Reserve					PDE
Pr.55	A/D CHANNEL SELECT	0	0	250	R/W	PDAN
		0	0	7	R/W	PDA/PDE/PDH
Pr.56	A/D DATA		0	1023	M	
Pr.57	HZ	Hz	0.00	650.0	M	PDAN/PDA/PDE
		Hz	0.0	3000	M	PDH
Pr.58	RPM	rpm/Krpm	0.00		M	PDAN
		Krpm	0.00		M	PDA/PDE
		Krpm	0.00		M	PDH
Pr.59	Vdc (Capacitor)	Vdc			M	
Pr.60	Vout (r.m.s. output)	Vrms			M	
Pr.61	Irms, Idc and others				M	PDAN/PDA/PDH
	Reserve					PDE
Pr.62	TEMPERATURE	°C	0	100	M	
Pr.63	Digital Input Terminal Status	0.0.0.0.	0.0.0.0.	1.1.1.1.	M	
Pr.64	RUN/REV INPUT STATUS	0.0.	0.0.	1.1.	M	
Pr.65	Digital Output Terminal Status	0.0.0.	0.0.0.	1.1.1.	M	
Pr.66	Reserve					
Pr.67	OPERATION MODE SELECT	1	0	4	FR/W	PDAN/PDA
	Reserve					PDE/PDH
Pr.68	Sensor-Less Boost	10	0	30	FR/W	PDAN
		5.0	0.0	20.9	FR/W	PDA
	Reserve					PDE/PDH
Pr.69	SLIP constant F1/F2	50.50%	0.0	99.99	FR/W	PDAN/PDA
	Reserve					PDE/PDH
Pr.70	ANALOG INPUT GAIN	50%	0	100	R/W	
Pr.71	TIMER TIME	5.0 Sec.	0.2	6553.0	R/W	
Pr.72	AUTO RUN MODE SELECT	0	0	6	R/W	

Pr.xx	Parameter Name	Default	Min.	Max.	Type	Remark
Pr.73	AUTO STEP1 (or 6) PERIOD	15.0 Sec.	0.1	6553.0	R/W	Refer to Sec.4.3.4 for PDAN/PDA torque mode, and Appendix A for PID function
Pr.74	AUTO STEP2 (or 7) PERIOD	15.0 Sec.	0.1	6553.0	R/W	
Pr.75	AUTO STEP3 (or 8) PERIOD	15.0 Sec.	0.1	6553.0	R/W	
Pr.76	AUTO STEP4 (or 9) PERIOD	15.0 Sec.	0.1	6553.0	R/W	
Pr.77	AUTO STEP5 (or 10) PERIOD	15.0 Sec.	0.1	6553.0	R/W	
Pr.78	MOTOR RATING	100%	10	100	FR/W	PDAN/PDA/PDH
	Reserve					PDE
Pr.79	RESTART TYPE SELECT	0	0	3	R/W	
Pr.80	RESTART STALL LEVEL	150%	10	200	R/W	PDAN/PDA/PDH
	Reserve					PDE
Pr.81	SPEED SEARCH DEC TIME	2.0 Sec.	0.1	25.0	R/W	
Pr.82	VOLTAGE RECOVER TIME	0.5 Sec.	0.1	5.0	R/W	
Pr.83	IGBT GUARD TIME	3.0 usec	2.0	25.0	FR/W	PDAN
		3.0 usec	2.0	25.5	FR/W	PDA/PDE/PDH
Pr.84	LINE VOLTAGE		40	1000	FR/W	
Pr.85	RATED CURRENT		0.5	3000.0	FR/W	
Pr.86	IRMS ADJUST	100	70	140		PDAN/PDA/PDH
	Reserve					PDE
Pr.87	VDC ADJUST		70	140	FR/W	
Pr.88	MAX. OUTPUT VOLTAGE	100%	30	100	FR/W	
Pr.89	AI1 LOW	12	0	1023	FR/W	
Pr.90	AI1 HIGH	1012	0	1023	FR/W	
Pr.91	AI2 LOW	12	0	1023	FR/W	
Pr.92	AI2 HIGH	1012	0	1023	FR/W	
Pr.93	UNIT/PROTOCOL SELECT	0.01	0.01	99.99	FR/W	PDAN
		0.01	0.01	7.99	FR/W	PDA/PDE/PDH
Pr.94	RELOAD PARAMETER	0	0	250	R/W	PDAN
		0	0	255	R/W	PDA
		0	0	1	R/W	PDH/PDE
Pr.95	MEMORY PROTECT	0	0	2	R/W	
Pr.96	FACTORY WRITE ENABLE	0	0	1	R/W	
Pr.97	VERSION				R	
Pr.98	MONITOR (I)	61	0	99	R/W	
Pr.99	MONITOR (HZ)	57	0	99	R/W	

Note:

- Type **R/W** parameters are stored in EAROM memory. They can be read/write and store in the memory permanently. Type **FR/W** parameters are also stored in EAROM memory. Generally, they are used for factory adjustment. Only authorized engineers should modify them. Type **M** is read only parameters for monitoring. Type **R** is constant parameters.
- Remark column shows the difference for specific parameter between each model. If it is blank, means this specific parameter is same for all PDAN/PDA/PDE/PDH models.

5.2 Parameter Protection

Pr.95 -- MEMORY PROTECT

Pr.96 -- FACTORY WRITE ENABLE

If set Pr.95=1, all parameters (except Pr.00 and Pr.95 itself) are not allow to change.

If set Pr.95=0, parameters with R/W type are allowed to change.

If set Pr.95=0 and Pr.96=1, all parameters include FR/W type can be modified.

PDAN series: If set Pr.95=2, any further parameter change will write to RAM only, they will be changed to original value after RESET or power off.

5.3 Parameter Initialization

5.3.1 Initialize data into R/W type parameters

Note: parameters with FR/W type will not be initialized by this method.

Follow the process to execute memory initialization

Step 1: Write Pr.95 = 0, and Pr.94 = 1

Step 2: Execute "ALM" RESET

or Step 2: Execute Hardware RESET

or Step 2: Execute Power-On RESET

After initialization process, the data in EAROM memory (R/W type) will change to the DEFAULT values listed in the PARAMETERS LIST Table.

5.3.2 Initialize data into ALL parameters (for PDAN series only)

Follow the process to execute memory initialization

- Step 1: Write Pr.95 = 0, and Pr.94 = 249
- Step 2: Execute "ALM" RESET
- or Step 2: Execute Hardware RESET
- or Step 2: Execute Power-On RESET

After initialization process, all of data in EAROM memory will change to the DEFAULT values listed in the PARAMETERS LIST Table.

5.4 Description of All Parameters

Pr.00 MAIN_SPEED_SET

Pr.00 is the Main Speed memorized in EAROM. If SPEED_SELECT=0, this MAIN_SPEED_SET parameter will be used as the desired frequency source.

Pr.01 MAIN_ACC_TIME

Pr.02 MAIN_DEC_TIME

Pr.01 & Pr.02 are the preset ACC & DEC time while inverter running. The definition of the Pr.01 (ACC) is "the period of time from 0.0Hz ramp up to Pr.15". The definition of the Pr.02 (DEC) is "the period of time from Pr.15 ramp down to 0.0Hz".

Pr.03 DI5 FUNCTION SELECT (Refer to Section 8)

Defines the function for input terminal DI5 (or the terminal marked with "RUN").

Pr.04 DI6 FUNCTION SELECT (Refer to Section 8)

Defines the function for input terminal DI6 (or the terminal marked with "REV").

Pr.05 BRAKE FREQUENCY

While deceleration to stop, if the output frequency is lower than this parameter, then DC current injection braking start action.

Pr.06 BRAKE VOLTAGE

While braking starts, this parameter defines the Voltage level of DC injection. This parameter is defined as percent of the input voltage.

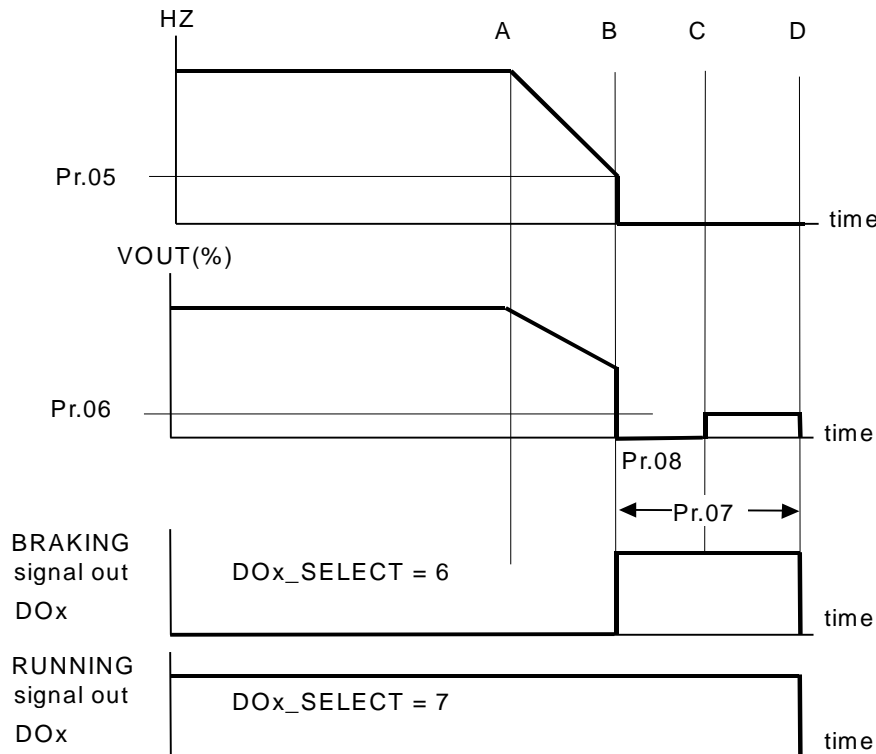
Pr.07 BRAKE TIME

This parameter defines the DC injection braking time.

Note: DC injection braking time = Pr.07 – Pr.08

Pr.08 BRAKE DELAY TIME

While deceleration, if output frequency is lower than braking frequency (Pr.05), the output frequency remains and output voltage will gradually drop down to the brake voltage (Pr.06) then start DC injection brake process.



TIMING RELATIONSHIP BETWEEN HZ & VOUT WHILE BRAKING STOP

Note:

Point-A is the time when STOP signal input.

Point-B is the time when output HZ = Pr.05, or when EMS is ON.

Point-C is the time when DC voltage (Pr.06) feed into the motor.

Point-D is the time when injection brake period of Pr.07 is complete.

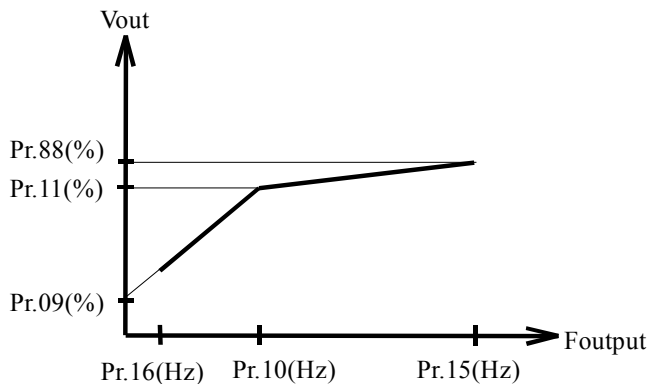
Pr.09 BOOST VOLTAGE

This parameter determines the minimum voltage while output frequency is low.

Pr.10 BASE_FREQUENCY (HZ)

Pr.11 BASE VOLTAGE (%)

These two parameters are determined by the motor's rated frequency and voltage.



Pr.12 PWM_CARRIER

PDA/PDE/PDH series:

series: Defines the maximum carrier frequency. When running frequency > Pr.14, the carrier frequency will be the value of Pr.12, otherwise it is the value of Pr.13.

PDAN series:

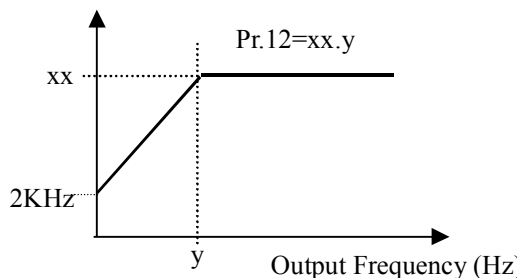
Pr.12 is composed of two parameters: **Pr.12 = xx.y**, separated by decimal point.

xx is used to define **PWM CARRIER**, y is used to defined **CARRIER TRANSFER POINT**.

MINIMUMCARRIER is fixed frequency 2KHz.

When running frequency > Transfer point , the carrier frequency will be the value xx (PWM Carrier), otherwise it is 2KHz (Minimum Carrier).

Carrier Frequency(KHz)



Pr.13 PDA/PDE/PDH series: MINIMUM_CARRIER

Defines the minimum carrier frequency.

PDAN series: MODBUS Elapse time

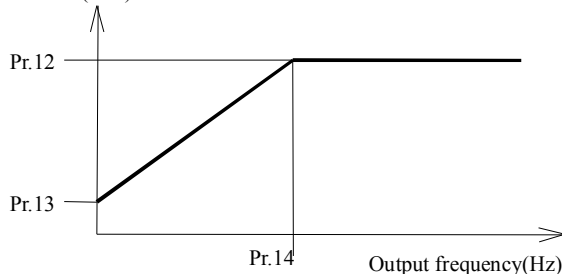
When RS485 port is defined as MODBUS protocol, this parameter defines the maximum elapse time between two receiving bytes.

Pr.14 PDA/PDE/PDH series: CARRIER_TRANSFER_POINT

Defines the transfer point of output frequency, when carrier frequency reaches Pr.12.

Note: Select lower carrier frequency while inverter is running at low output frequency (Hz) can decrease **vibration effect**.

PWM Carrier frequency
fc(kHz)



PDAN series: Thermistor type

Defines the Thermistor type, contact factory when board changed.

Pr.15 UPPER_FREQUENCY_LIMIT

Defines maximum possible output frequency (Hz) while running. Refer to Pr.10.

Pr.16 LOWER_FREQUENCY_LIMIT

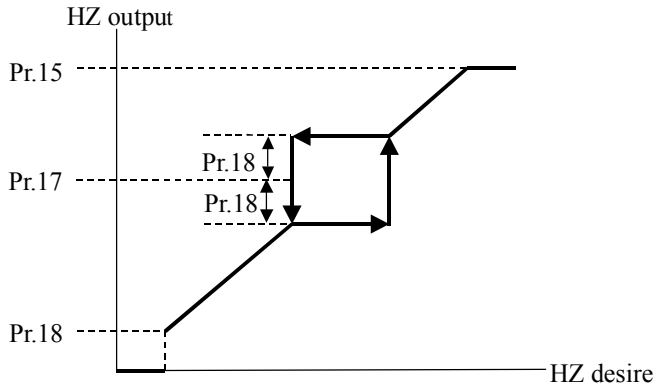
Defines minimum possible output frequency (Hz) while running. Refer to Pr.10.

Pr.17 SKIP_FREQUENCY

This parameter can prevent the inverter running at the resonant point of mechanical system.

Pr.18 SKIP_BAND

This parameter defines the skip range.



Pr.19 JOG SPEED (Refer to Section 8.2~8.5, 8.80~8.83 & 12)

This parameter determines the running frequency when JOG speed is required.

Pr.20 JOG ACC/DEC (Refer to 8.2~8.5, 8.84)

Defines the acceleration and deceleration rate when JOG command is in execution, or when DIx(84) is ON.

Pr.21 SPD1 SPEED SET (Refer to Section 8.2~8.5, 8.80~8.83 & 12)

This parameter determines the running frequency when SPD1 speed is required.

Pr.22 SPD1 ACC TIME (Refer to 8.2~8.5, 8.85)

Defines the acceleration rate when SPD1 command is in execution, or when DIx(85) is ON.

Pr.23 SPD1 DEC TIME (Refer to 8.2~8.5, 8.85)

Defines the deceleration rate when SPD1 command is in execution, or when DIx(85) is ON.

Pr.24 SPD2 SPEED SET (Refer to Section 8.2~8.5, 8.80~8.83 & 12)

This parameter determines the running frequency when SPD2 speed is required.

Pr.25 SPD2 ACC TIME (Refer to 8.2~8.5, 8.86)

Defines the acceleration rate when SPD2 command is in execution, or when DIx(86) is ON.

Pr.26 SPD2 DEC TIME (Refer to 8.2~8.5, 8.86)

Defines the deceleration rate when SPD2 command is in execution, or when DIx(86) is ON.

Pr.27 SPD3 SPEED SET (Refer to Section 8.2~8.5, 8.80~8.83 & 12)

This parameter determines the running frequency when SPD3 speed is required.

PDAN series: Refer to Appendix A for PID function.

Pr.28 SPD3 ACC TIME (Refer to 8.2~8.5, 8.87)

Defines the acceleration rate when SPD3 command is in execution, or when DIx(87) is ON.

PDAN series: Refer to Appendix A for PID function.

Pr.29 SPD3 DEC TIME (Refer to 8.2~8.5, 8.87)

Defines the deceleration rate when SPD3 command is in execution, or when DIx(87) is ON.

PDAN series: Refer to Appendix A for PID function.

Pr.30 FREE RUN STOP

If Pr.30 = 0, when stop, inverter gradually decreasing its output frequency and ramp down to stop. If Pr.30 = 1, when stop, inverter disables output immediately, the motor free run.

Pr.31 REVERSE INHIBIT

If Pr.31 = 0, Inverter may run in both direction.

If Pr.31 = 1, Reverse Run is inhibited.

Pr.32 POWER FACTOR & FILTER

This parameter composed of two factors: **Pr.32 = aa.bb**, separated by decimal point.

aa: Rated Power Factor value from motor nameplate

bb: Filter constant for Sensor-less compensation

Pr.33 DISCHARGE_ENABLE

If Pr.33 = 0, Discharge circuit is Disabled.

If Pr.33 = 1, Discharge circuit is Enabled.

The discharge transistor will ON if the following conditions are met:

- Inverter is Running, and
- Inverter has no alarm, and
- Inverter checks the $VDC > 117\%$, and
- Only when Inverter is Deceleration.

If Pr.33 = 2, Discharge circuit is Enabled.

The discharge transistor will ON if the following conditions are met:

- Inverter is Running, and
- Inverter has no alarm, and
- Inverter checks the $VDC > 117\%$

No matter the inverter is deceleration or not.

Pr.34 UP/OP RESTART_ENABLE (Refer to Section 11)

If Pr.34 = 1, when power come back normal, the Inverter will restart automatically.

Pr.35 STALL_LEVEL

This parameter defines the current limit level (%) while STALL process.

Pr.36 BASE BLOCK TIME (Refer to Section 11)

When UP/OP occurs or DIx(8 or 18) is ON, this parameter guarantees the minimum time to disable the inverter output.

Pr.37 AM SELECT (Refer to Section 10)

Select desired variables to appear at analog output terminal.

Pr.38 AM GAIN (Refer to Section 10)

Select desired gain ratio for analog output terminal.

Pr.39 CONTROL COMMAND SELECT (Refer to Section 6)

This parameter determines the type of FWD/REV, RUN/STOP control method.

Pr.40 SPEED INPUT SELECT (Refer to Section 7)

This parameter defines the source and type for determining the running frequency.

Pr.41 DI1 FUNCTION SELECT (Refer to Section 8)

Defines the function for input terminal DI1.

Pr.42 DI2 FUNCTION SELECT (Refer to Section 8)

Defines the function for input terminal DI2.

Pr.43 DI3 FUNCTION SELECT (Refer to Section 8)

Defines the function for input terminal DI3.

Pr.44 DI4 FUNCTION SELECT (Refer to Section 8)

Defines the function for input terminal DI4.

Pr.45 DO1 FUNCTION SELECT (Refer to Section 9)

Defines the function for output terminal DO1.

Pr.46 DO2 FUNCTION SELECT (Refer to Section 9)

Defines the function for output terminal DO2.

Pr.47 RELAY FUNCTION SELECT (Refer to Section 9)

Defines the function for output RELAY terminal RY1&RY2.

Pr.48 Irms/Idc DETECTOR THRESHOLD LEVEL (Refer to Section 9.13)

This parameter is used to define the threshold level for **Current Over Detector** module.

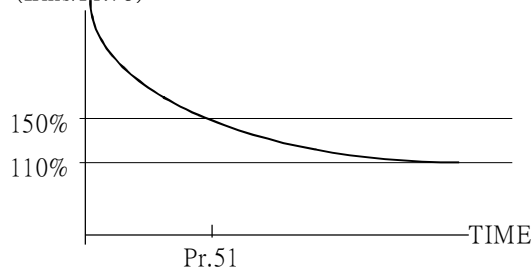
Pr.49 HZ DETECTOR THRESHOLD LEVEL (Refer to Section 9.2)

Pr.50 HZ DETECTOR TOLERANCE (Refer to Section 9.2)

Pr.49 and Pr.50 are used for **SPE, SPNE, SPO and SPNO** output functions.

Pr.51 THERMAL TRIP TIME

(Irms/Pr.78)



This parameter defines the OVER LOAD trip time of the INTERNAL THERMAL RELAY.

If Pr.51=0, the THERMAL RELAY function is disabled.

Pr.78 MOTOR RATING

If the inverter's rating capacity is larger than the motor in use, this parameter can be adjusted to protect the motor.

This parameter is defined as the percentage level of the inverter rating.

Pr.52 POLE (Refer to Section 13.1)

This parameter defines the POLE number of the motor in use.

Pr.53 GEAR_RATIO (Refer to Section 13.1)

Pole & Gear Ratio parameters will be used for RPM (Pr.58) calculation.

$$RPM = (120 * HZ / POLE) * GEAR_RATIO\%$$

Pr.54 MONITOR SELECTION

More internal status or value may be monitored.

Pr.54 selects the data shown in Pr.61.

Pr.54=0: Irms (ampere)

Pr.54=1: Irms (% of inverter rating)

Pr.54=2: Irms (% of motor rating)

Pr.54=3: Power Angle θ (Angle of Current Phase Lag)

Pr.54=4: Output VA = $\sqrt{3} * V_{rms} * I_{rms}$

Pr.54=5: Power Factor PF = $\cos(\theta)$

Pr.54=6: Watt (ac side) = $\sqrt{3} * V_{rms} * I_{rms} * \cos(\theta)$

Pr.54=7: Idc (ampere) (For PDA/PDH series only)

Pr.54=8: Idc (% of inverter rating) (For PDA/PDH series only)

Pr.54=9: Watt (dc side) = $V_{cap} * I_{dc}$ (For PDA/PDH series only)

Pr.54=10: Watt (limit)

Pr.54=11: OL accumulation level

Pr.54=32: Shows timer value when it is used. (For PDAN series only)

Pr.55 A/D CONVERTER CHANNEL SELECT (Refer to Section 13.3)

Pr.56 A/D CONVERSION DATA (Refer to Section 13.3)

Pr.57 HZ (Refer to Section 13.1)

Monitors the output frequency of the inverter.

Pr.58 RPM (Refer to Section 13.1)

Monitors the motor rotating speed, calculated by Pr.57 (HZ), Pr.52 (POLE), and Pr.53 (GEAR_RATIO).

$RPM = (120 * HZ / POLE) * GEAR_RATIO\%$

PDA/PDE/PDH series: Expressed in Krpm, the display shows “xx.xx” Krpm.

PDAN series: When $RPM \geq 10000$ rpm, Expressed in Krpm, the display shows “xx.xx” Krpm,

When $RPM \leq 9999$ rpm, Expressed in rpm, the display shows “xxxx” rpm .

Pr.59 VDC (Refer to Section 13.1)

Monitors the internal DC BUS voltage of the inverter, $VDC = 1.414 * Vac$ (line input)

Pr.60 VOUT (Refer to Section 13.1)

Monitors the output Vrms of the inverter.

Pr.61 Irms, Idc and others (Refer to Section 13.1)

Pr.62 HEAT SINK TEMPERATURE

Monitors the temperature of internal heat sink. When the temperature exceeds 80 degree, inverter will stop and show OH alarm.

Pr.63 Digital Input Terminal Status (Refer to Section 13.2)

Monitors the DI1~DI4 input terminal status.

Digit 3: DI1 Input Terminal Status

Digit 2: DI2 Input Terminal Status

Digit 1: DI3 Input Terminal Status

Digit 0: DI4 Input Terminal Status

Pr.64 Control Input Terminal status (Refer to Section 13.2)

Monitors the RUN & REV input terminal status.

Digit 1: RUN (or DI5) Input Terminal Status

Digit 0: REV (or DI6) Input Terminal Status

Pr.65 Digital Output Terminal status (Refer to Section 13.2)

Monitors the DO1, DO2 & RY(1,2) output terminal status.

Digit 2: DO1 Output Terminal Status

Digit 1: DO2 Output Terminal Status

Digit 0: RELAY Output Status

Pr.66 reserve

Pr.67 Operation Mode Selection

Select RUN mode as Standard V/F, Sensor-Less or Torque mode.

Refer to section4.3.

Pr.68 Sensor-Less Boost

This parameter is used under Sensor-Less mode. It will be set to suitable value during Auto-Tuning. User doesn't have to change it.

Refer to section4.4.

Pr.69 SLIP constant F1 / F2

Motor constant R1, R2 and L1, L2 are combined into this constant.

Refer to section4.4.

Pr.70 Analog Input Gain

Refer to Section 7.2.12, 7.2.13, 7.2.21, 7.2.22, 7.2.33, 7.2.35.

Pr.71 TIMER TIME (Refer to Section 8.7)

PDAN series: Refer to Appendix A for PID function.

Pr.72 AUTO RUN MODE SELECT (Refer to Section 12)

Pr.73 TIME PERIOD FOR AUTO RUN STEP1&6 (Refer to Section 12)

Pr.74 TIME PERIOD FOR AUTO RUN STEP2&7 (Refer to Section 12)

Pr.75 TIME PERIOD FOR AUTO RUN STEP3&8 (Refer to Section 12)

Pr.76 TIME PERIOD FOR AUTO RUN STEP4&9 (Refer to Section 12)

Pr.77 TIME PERIOD FOR AUTO RUN STEP5&10 (Refer to Section 12)

Pr.78 MOTOR RATING

Refer to the description of Pr.51.

Pr.79 RESTART TYPE SELECT (Refer to Section 11)

Pr.80 RESTART STALL LEVEL (refer to section 11)

Pr.81 SPEED SEARCH DEC TIME (Refer to Section 11)

Pr.82 VOLTAGE RECOVER TIME (Refer to Section 11)

Pr.83 IGBT GUARD TIME

This parameter defines the guard time for preventing IGBT short between upper and lower arm. **Only factory can modify this parameter. Consult factory if modification is necessary.**

Pr.84 INPUT SUPPLY LINE_VOLTAGE

This parameter defines the normal working voltage of the inverter.

According to this parameter, the inverter calculates all voltage dependent values.

- OP Trip Voltage (VDC) = $1.414 * Pr.84 * 130\%$
- UP trip Voltage (VDC) = $1.414 * Pr.84 * 70\%$
- OP Recover Voltage (VDC) = $1.414 * Pr.84 * 120\%$
- UP Recover Voltage (VDC) = $1.414 * Pr.84 * 80\%$
- Contactor On Voltage (VDC) = $1.414 * Pr.84 * 69\%$
- Contactor Off Voltage (VDC) = $1.414 * Pr.84 * 65\%$

Note: The "Contactor" means the device used to BY-PASS the Charging Resistor.

It may be a RELAY or a SCR instead.

There is no contactor in PDE-2007/2015

- Discharge Start Voltage (VDC) = $1.414 * Pr.84 * 117\%$

Note: there is no internal discharge transistor in PDE-2007/15

Pr.85 INVERTER RATED CURRENT

This parameter defines the rated output current of the inverter.

Pr.86 IRMS ADJUST

This parameter is used to adjust the IRMS data reading.

Pr.87 VDC ADJUST

This parameter is used to adjust the VDC data reading (Refer to Section 13.1).

Pr.88 MAXIMUM OUTPUT VOLTAGE (%)

The parameter determines maximum output voltage when running at maximum frequency. Refer to description of Pr.10, Pr.11 and Pr.15.

Pr.89 AI1_LOW

This parameter is used to record the A/D converter data when "AI1" input terminal is connected to "ACOM" terminal. (JP1 select +5V)

Pr.90 AI1_HIGH

This parameter is used to record the A/D converter data when "AI1" input terminal is connected to "+5V" voltage source. (JP1 select +5V)

Pr.91 AI2_LOW

This parameter is used to record the A/D converter data when "AI2" input terminal is connected to "ACOM" terminal. (JP2 select +5V) **Note: this parameter also used by AI3.**

Pr.92 AI2_HIGH

This parameter is used to record the A/D converter data when "AI2" input terminal is connected to "+5V" terminal. (JP2 select +5V) **Note: this parameter also used by AI3.**

Pr.93 UNIT_NUMBER & BAUD_RATE (only for communication option card)

While using serial communication control, this parameter is used to define the BAUD RATE, PROTOCOL and UNIT NUMBER (or station address).

Refer to section 15

Pr.94 PARAMETER RELOAD (Refer to Section 5.3)

Pr.95 MEMORY PROTECT (Refer to Section 5.2)

Pr.96 FACTORY WRITE ENABLE (Refer to Section 5.2)

Pr.97 VERSION

This parameter indicates the software revision of this inverter.

Pr.98 MONITOR (I) (Refer to Section 13)

Pr.99 MONITOR (HZ) (Refer to Section 13)

By changing Pr.98 and Pr.99, user can select any two variables for frequent monitoring.

Note: For PDE series, Pr.61 (Irms) always shows 0.0 ampere. User can monitor other important variable by changing this parameter.

6. Selection of RUN/STOP/FWD/REV control command

Before start running the inverter, the most important step is to select the **Control Command Source**. You can choose whether the control command will **come from panel or terminal**.

If the control command should come from terminal, then the two input terminals **RUN** and **REV** are used for controlling the inverter.

These two input terminals are **OFF** when left open and will be **ON** when connected to **DCOM** terminal.

Parameter Pr.39 is used to select the source of Control Command.

CMD_SELECT Pr.39 = a, b, is composed of two selections "a" and "b" in one parameter,

If DIx(89) or DIx(90) is ON, then CMD_SELECT="b", else CMD_SELECT="a".

Refer to DIx(89) and DIx(90).

If CMD_SELECT=0

The RUN and REV terminals are disabled.

Control Command will come from the **keypad panel**.

Push **FWD key**, the inverter will run forward direction.

Push **REV key**, the inverter will run forward direction.

If CMD_SELECT=1

The **RUN** terminal will start the inverter running, and **REV** terminal controls the running direction.

If CMD_SELECT=2

The **RUN** terminal is equivalent to **FORWARD-RUN**.

The **REV** terminal is equivalent to **REVERSE-RUN**.

If CMD_SELECT=3

Similar to mode-1, but will check **RUN terminal at OFF** position while power on.

If CMD_SELECT=4

Similar to mode-2, but will check **RUN & REV at OFF** position while power on.

If CMD_SELECT=5 (for PDAN series only)

When RS485 port is defined as JPS protocol, RUN/STOP command comes from RS485 Serial Port.

Note: Refer to Sec.7 concerning how to determine the running frequency.

Pr.39	"RUN" Terminal	"REV" Terminal	FUNCTION
0	Don't care	Don't care	Command from PANEL
1	OFF	Don't care	STOP
	OFF	Don't care	STOP
	ON	OFF	FORWARD RUN
	ON	ON	REVERSE RUN
2	OFF	OFF	STOP
	OFF	ON	REVERSE RUN
	ON	Don't care	FORWARD RUN
3	Similar to Mode-1, When after RESET, if RUN terminal is not in OFF position, the inverter will show "--on", warning the user to remove the control signal.		
4	Similar to Mode-2, When after RESET, if RUN and REV terminals are not in OFF position, the inverter will show "--on", warning the user to remove the control signals.		
5	When RS485 port is defined as JPS protocol, RUN/STOP command comes from RS485 Serial Port. (For PDAN series using JPS protocol only)		

7. Selection of Set Frequency

SPEED_SELECT parameter Pr.40 is used for speed input source selection. Through setting Pr.40, the speed input sources may come from **Panel, Memory, Analog input, Up/Down counter, or the combinations of the above sources.**

Note that, Pr.40 = cc. dd, is composed of two selections "cc" and "dd" in one parameter. If DIx(88) or DIx(90) is ON, then SPEED_SELECT="dd", else SPEED_SELECT="cc". Refer to DIx(88) and DIx(90).

7.1 Set Frequency Source Selection Table

Pr.40	SPEED source	DIRECTION Source
0	Set value in Pr.00	Refer to Sec.6
1	AI1	Refer to Sec.6
2	AI2	Refer to Sec.6
3	Set value from Panel	Refer to Sec.6
4	Both the output frequency and direction determined by AI1	
5	Both the output frequency and direction determined by AI2	
6	By internal U/D counter	Refer to Sec.6
7	Similar to Pr.40=6, but will preload U/D counter from Pr.00 after RESET.	
8	Similar to Pr.40=3, with PRELOAD from & AUTO WRITE to Pr.00	
9	Similar to Pr.40=4, but will not STOP while desired frequency is lower then Pr.16 (low limit)	
10	Similar to Pr.40=5, but will not STOP while desired frequency is low then Pr.16 (low limit)	
11	Same as Pr.40=6.	
12	Set Frequency = $AI1 * (100\% \pm (Pr.70 * AI2))$, With Minimum = Pr.16 (low limit)	
13	Set Frequency = $AI2 \pm (Pr.15 * (Pr.70 * AI1))$, With Minimum = Pr.16 (low limit)	
14	Reserve	
15	Reserve	
16	Reserve	
17	Similar to Pr.40=1, With Minimum = Pr.16 (low limit)	
18	Similar to Pr.40=2, With Minimum = Pr.16 (low limit)	
19	Similar to Pr.40=11, With Auto Reload from and Auto Write to Pr.00	
20	Reverse to Pr.40=18, +5V(or 20mA)--> Lower Limit, 0V--> Upper Limit Frequency	
21	Frequency Set = Panel(Computer) Set * (100%± (Pr.70*AI2))	
22	Set Frequency = Panel(Computer) Set ± (Pr.15 * (Pr.70*AI1)), With Minimum = Pr.16	
23~24	Reserve	
25	AI3 used as frequency source (similar to mode 2)	
26	AI3 used as bi-directional frequency source (similar to mode 5)	
27	AI3 as bi-directional frequency source with minimum speed (similar to mode 10)	
28	Set Frequency = $AI1 * (100\% \pm (Pr.70 * AI3))$, With Minimum = Pr.16 (similar to mode12)	
29	Set Frequency = $AI3 \pm (Pr.15 * (Pr.70 * AI1))$, With Minimum = Pr.16 (similar to mode13)	
30	AI3 as input, with minimum speed (Similar to Pr.40=18)	
31	AI3 as input with reverse slope (similar to mode 20)	
32	AI1 as input with reverse slope (similar to mode 20)	
33	Set Frequency = Panel(Computer) Set * (100%± (Pr.70*AI1))	
34	Set Frequency = Panel(Computer) Set * (100%± (Pr.70*AI3))	
35	Set Frequency = Panel(Computer) Set ± (Pr.15 * (Pr.70*AI2)), With Minimum = Pr.16	
36	Set Frequency = Panel(Computer) Set ± (Pr.15 * (Pr.70*AI3)), With Minimum = Pr.16	
37	AI1 FORWARD, AI2 REVERSE	
38	AI2 FORWARD, AI1 REVERSE	
39	Similar to Pr.00, but runs at Pr.16 when Pr.00 < Pr.16	
40	Output frequency determined by PID Output	
41~45	Reserve	
46	Speed Command come from RS485 Serial Port (for PDAN series using JPS protocol only)	
47	Reserve	
48	Set Frequency = PID Boost * (PID Output + PID Bias Input from AI1)	
49	Set Frequency = PID Boost * (PID Output + PID Bias Input from AI2)	
50	Set Frequency = PID Boost * (PID Output + PID Bias Input from AI3)	
51	Set Frequency = PID Boost * (PID Output + PID Bias Set by Pr.028)	

JP1 is used for changing the configuration of analog input AI1 (refer to Sec.1.2.1.a).

It may select 0~+5V(default) or 0~+10V.

JP2 is used for changing the configuration of analog input AI2 (refer to Sec.1.2.1.b).

It may select 0~+5V(default) or 0~20mA.

JP3 is used for changing the source of AI3 (refer to Sec.1.2.1.c)

7.2 Description of Frequency Input Sources

7.2.0 Pr.40 = 0, Speed input come from Pr.00

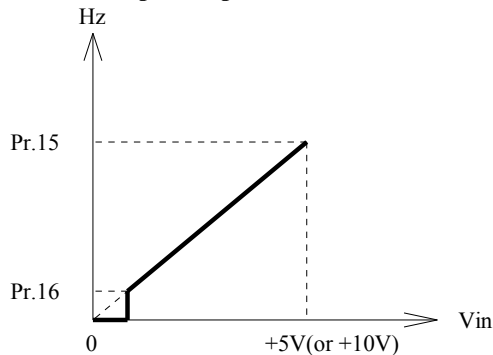
Parameter Pr.00 is the **MAIN_SPEED_SET** parameter stored in **EAROM memory**.

The value once written into Pr.00 will never be altered, unless you re-write a new value again.

In this mode, the Hz value stored in Pr.00 will be used to determine the output frequency of the inverter while running. The direction of the output phase sequence must be determined by control command.

Note: Changing the content in Pr.00 will immediately change the output frequency even if the inverter is running.

7.2.1 Pr.40 = 1, Speed input come from AI1



In this mode, the voltage signal fed into AI1 terminal will be used to determine the output frequency of the inverter while running.

The direction of the output phase sequence must be determined by control command.

If the input signal reaches maximum level, the set frequency is equal to Pr.15 (UPPER LIMIT).

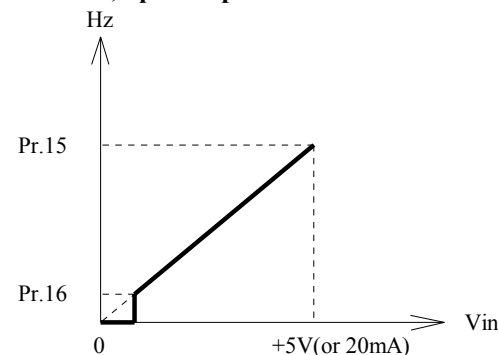
If the desired set frequency is lower than Pr.16 (LOWER LIMIT), the inverter will stop.

Note:

Set jumper JP1 to match the input voltage range.

If necessary, use Pr.89 & Pr.90 to modify the input range.

7.2.2 Pr.40 = 2, Speed input come from AI2



In this mode, the voltage signal fed into AI2 terminal will be used to determine the output frequency of the inverter while running.

The direction of the output phase sequence must be determined by control command.

If the input signal reaches maximum level, the set frequency is equal to Pr.15 (UPPER LIMIT).

If the desired set frequency is lower than Pr.16 (LOWER LIMIT), the inverter will stop.

Note:

Set jumper JP2 to match the input signal type and range. If

necessary, use Pr.91 & Pr.92 to modify the input range.

7.2.3 Pr.40 = 3, Speed input come from Key-pad setting

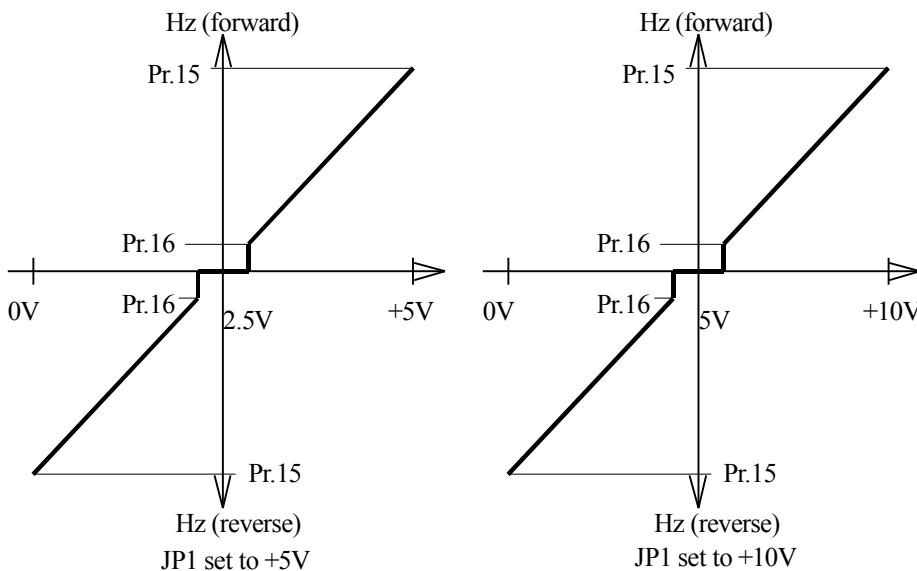
The set frequency comes from keypad directly.

Or if communication option is used, set frequency comes from communication command.

The direction of the output phase sequence must be determined by control command.

Note: When start running; the minimum running frequency shall be Pr.16.

7.2.4 Pr.40 = 4, Speed input come from AI1 with Bi-direction control



In this mode, the voltage signal fed into AI1 terminal will be used to determine the output frequency and direction of the inverter.

The input signal level determines the direction of the output phase sequence.

If the input signal is maximum level, the set frequency is equal to Pr.15 (UPPER LIMIT) in forward

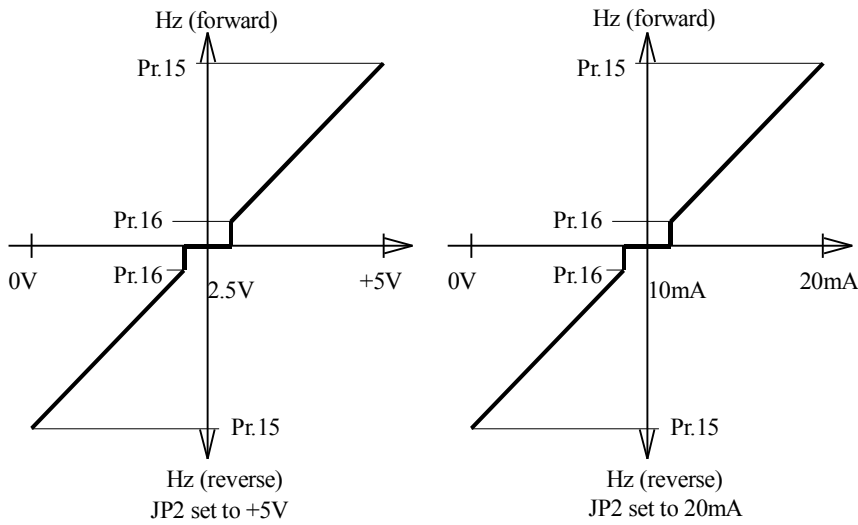
direction; and if the input signal is zero, the set frequency is equal to Pr.15 in reverse direction.

If the input is around half level, the inverter will stop.

Note: Set jumper JP1 to match the input voltage range. If necessary,

use Pr.89 and Pr.90 to modify the input range.

7.2.5 Pr.40 = 5, Speed input come from AI2 with Bi-direction control



In this mode, the voltage signal fed into AI2 terminal will be used to determine the output frequency and direction of the inverter.

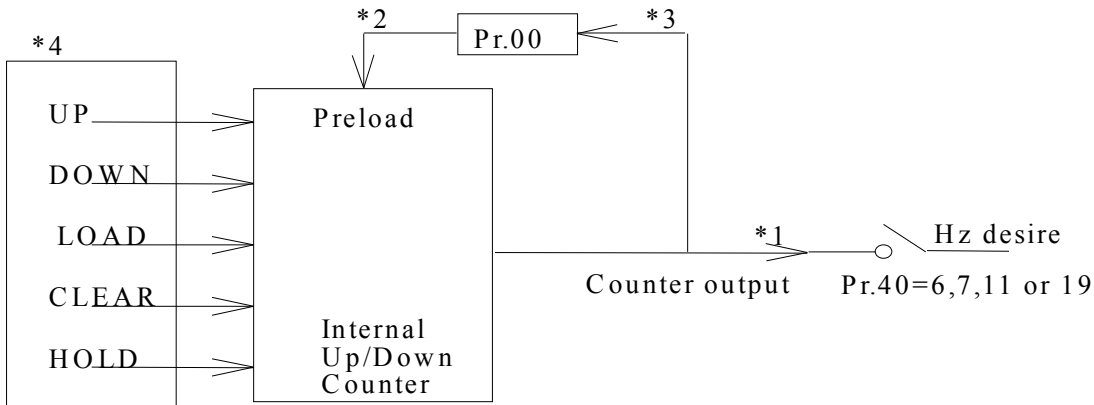
The input signal level determines the direction of the output phase sequence. If the input signal is positive maximum level, the set frequency is equal to Pr.15 (UPPER LIMIT) in forward direction; and if the input signal is zero, the set frequency is equal to Pr.15 in reverse direction. If the input is around half level, the inverter will stop.

Note: Set jumper JP2 to match with the input signal type and range. If necessary, use Pr.91 and Pr.92 to modify the input range.

7.2.6 Pr.40 = 6, Speed input come from Internal Up/Down Counter

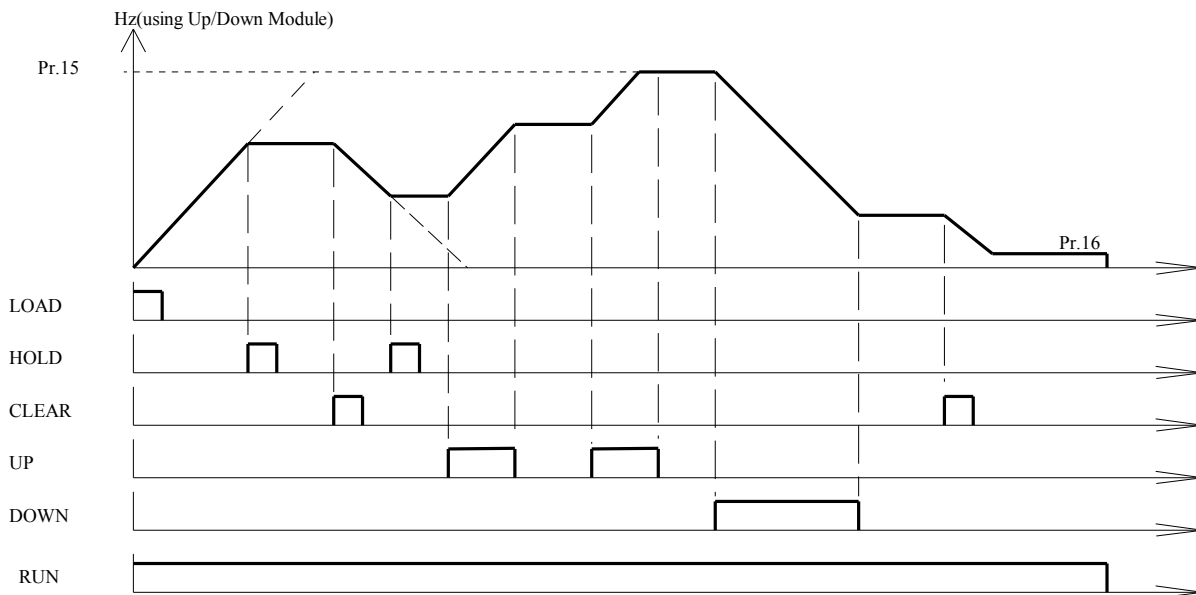
7.2.7 Pr.40 = 7, Speed input come from Internal Up/Down Counter with Preload from Pr.00

Note: When start running; the minimum running frequency shall be Pr.16.



Functional Block Diagram of the Internal UP/DOWN Counter

- *1. If Pr.40=6, 7, 11, or 19, the counter output is used to determine the output frequency.
- *2. If Pr.40=7 or 19, Data in Pr.00 will preload into the counter when Power On or after Reset.
- *3. If Pr.40=19, after Up/Down execution, the content of counter will write into Pr.00 automatically.
- *4. These signals come from Digital Input (DIx) terminal. Refer to Sec.8 for detail description.



UP/DOWN COUNTER OPERATION EXAMPLE

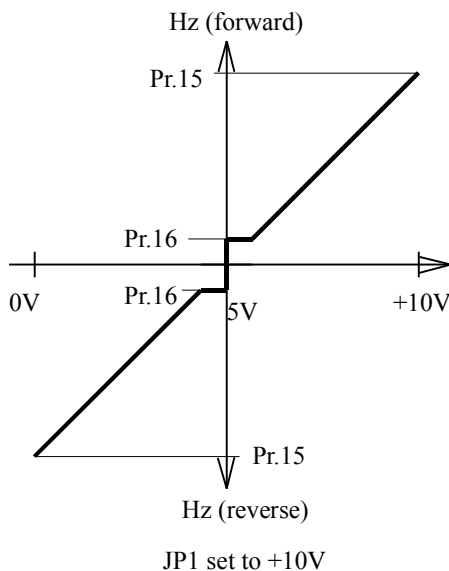
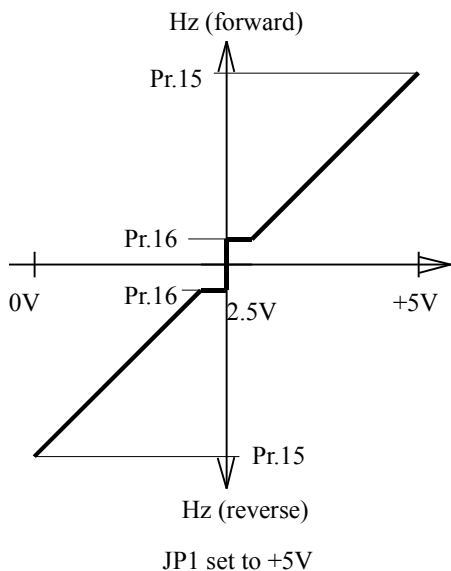
7.2.8 Pr.40 = 8, Similar to mode 3, with Preload from Pr.00 (and Auto Write to Pr.00)

This function is similar to Pr.40=3, with only two differences:

- When Power On or after Reset, the data in Pr.00 will preload into set frequency buffer.
- When using LOCAL panel, after changing ser frequency, the buffer value will write back into Pr.00 automatically.

Note: When start running; the minimum running frequency shall be Pr.16.

7.2.9 Pr.40 = 9, Similar to mode 4, with minimum running speed



In this mode, the voltage signal fed into AI1 terminal will be used to determine the output frequency and direction of the inverter.

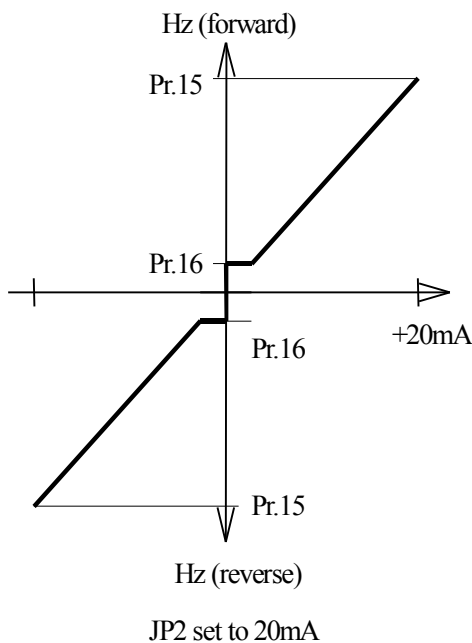
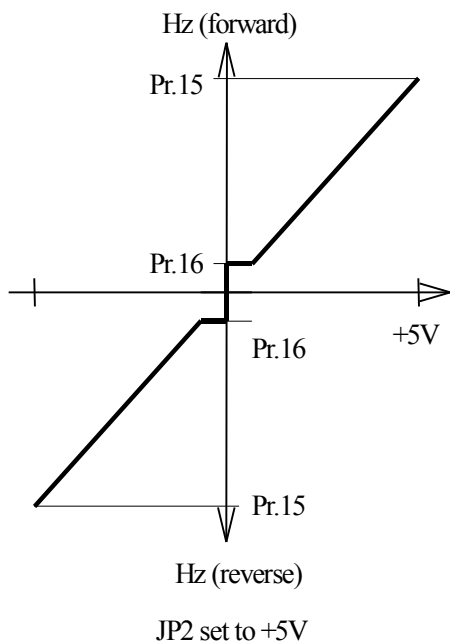
The input signal level determines the direction of the output phase sequence.

If the input signal is maximum level, the set frequency is equal to Pr.15 (UPPER LIMIT) in forward direction, and if the input signal is zero, the set frequency is equal to Pr.15 in reverse direction.

If the input is around half level, the inverter will run at Pr.16 (LOWER LIMIT).

Note: Set jumper JP1 to match with the input voltage range. If necessary, use Pr.89 and Pr.90 to modify the input range.

7.2.10 Pr.40 = 10, Similar to mode 5, with minimum running speed



In this mode, the voltage signal fed into AI2 terminal will be used to determine the output frequency and direction of the inverter.

The input signal level determines the direction of the output phase sequence.

If the input signal is positive maximum level, the set frequency is equal to Pr.15 (UPPER LIMIT) in forward direction; and if the input signal is zero, the set frequency is equal to Pr.15 in reverse direction.

If the input is around half level, the inverter will run at Pr.16 (LOWER LIMIT).

Note: Set jumper JP2 to match with the input signal type and range. If necessary, use Pr.91 and Pr.92 to modify the input range.

7.2.11 Pr.40 = 11, Same as mode 6

7.2.12 Pr.40 = 12, Speed input is the combination of AI1 * (100%± (Pr.70*AI2))

In this mode, the desired set frequency is the combination of AI1 and AI2.

Set Frequency = AI1 * (100%± (Pr.70*AI2))

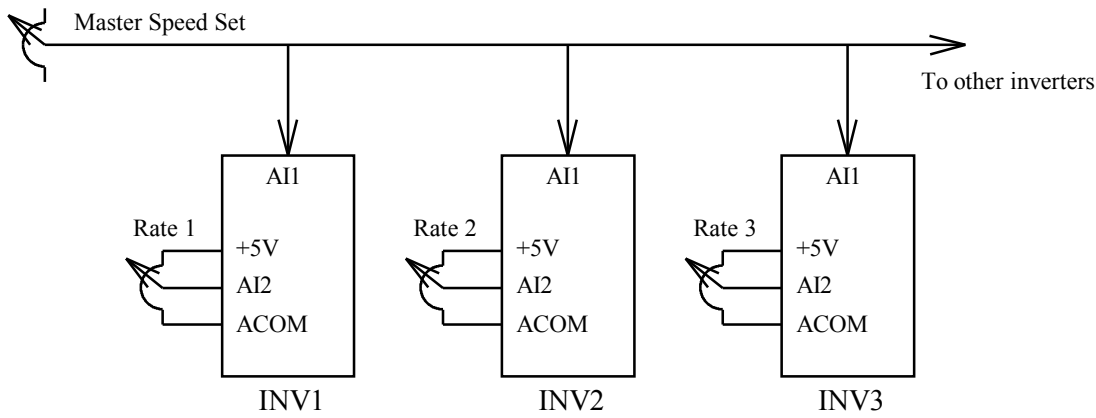
Analog signal from AI1 is selected to be the master set frequency; and signal from AI2 is the proportional rate input.

If signal level of AI2 is maximum, the modification rate equal (100%+Pr.70);

and if AI2 is minimum, the modification rate is (100%-Pr.70).

Note: Minimum-running frequency is Pr.16.

Typical application is as follows:



7.2.13 Pr.40 = 13 , Speed input is the combination of AI2± (Pr.15 * (Pr.70*AI1))

In this mode, the desired set frequency is the combination of AI1 and AI2.

Set Frequency = $AI2 \pm (Pr.15 * (Pr.70 * AI1))$

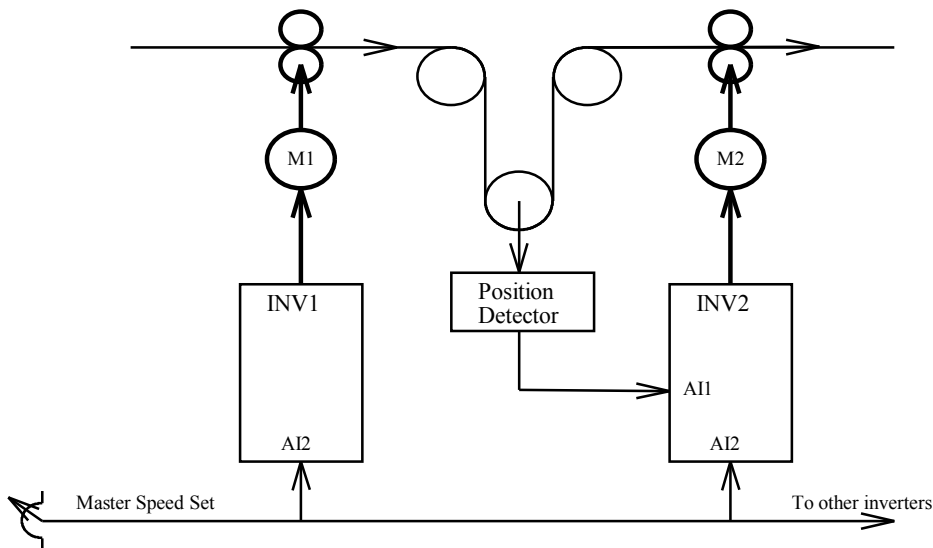
Analog signal from AI2 is selected to be the major set frequency; and signal from AI1 is the auxiliary input.

If signal level of AI1 is maximum, the modification quantity is $(Pr.15 * Pr.70)$;

and if AI1 is minimum, the modification quantity is $-(Pr.15 * Pr.70)$.

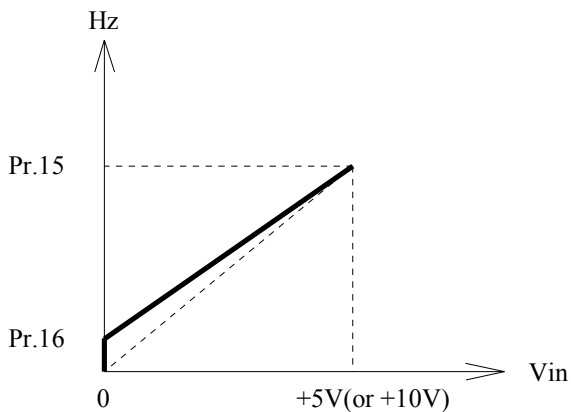
Note: Minimum-running frequency is Pr.16.

Typical application is as follows:



7.2.14 Pr.40 = 14 ~ 16, Reserved for factory use

7.2.17 Pr.40 = 17, Similar to mode 1, with minimum frequency = Pr.16

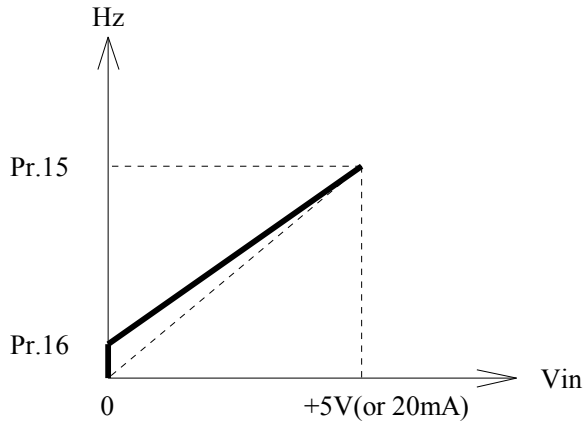


While the desired output frequency is lower than Pr.16 (LOWER LIMIT), the actual output frequency will maintain at the lower frequency limit.

Note:

Set jumper JP1 to match with the input voltage range. If necessary, use Pr.89 and Pr.90 to modify the input range.

7.2.18 Pr.40 = 18, Similar to mode 2, with minimum frequency = Pr.16



While the desired output frequency is lower than Pr.16 (LOWER LIMIT), the actual output frequency will maintain at the lower frequency limit.

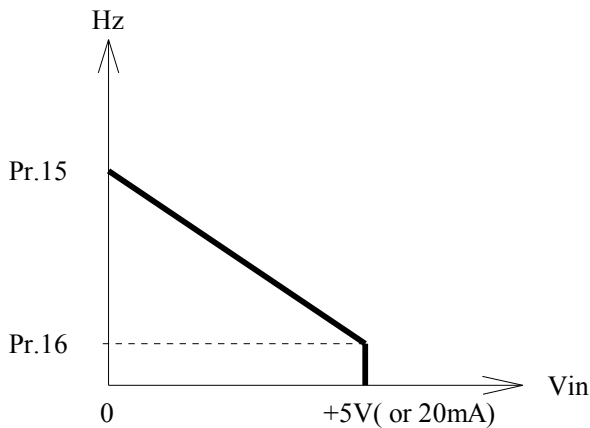
Note:

Set jumper JP2 to match with the input signal type and range. If necessary, use Pr.91 and Pr.92 to modify the input range.

7.2.19 Pr.40 = 19, Similar to mode 11, with Preload and Auto Write

Refer to Sec.7.2.6, Sec.7.2.7.

7.2.20 Pr.40 = 20, Similar to mode 18, with Reverse Slope



In this mode, the voltage signal fed into AI2 terminal will be used to determine the output frequency of the inverter while running.

The direction of the output phase sequence must be determined by control command.

If the input signal reaches maximum level, the set frequency is equal to Pr.16 (LOWER LIMIT).

On the contrary, if the input signal is zero, the set frequency is equal to Pr.15 (UPPER LIMIT).

Note:

Set jumper JP2 to match with the input signal type and range. If necessary, use Pr.91 and Pr.92 to modify the input range.

7.2.21 Pr.40=21, Set frequency = Panel set frequency * (100%± (Pr.70*AI2))

This mode is similar to mode-12; however, Panel-Set Frequency is used instead of AI1 input.

In this mode, the desired set frequency is the combination of Panel input and AI2.

Set Frequency = Panel-Set * (100%± (Pr.70*AI2))

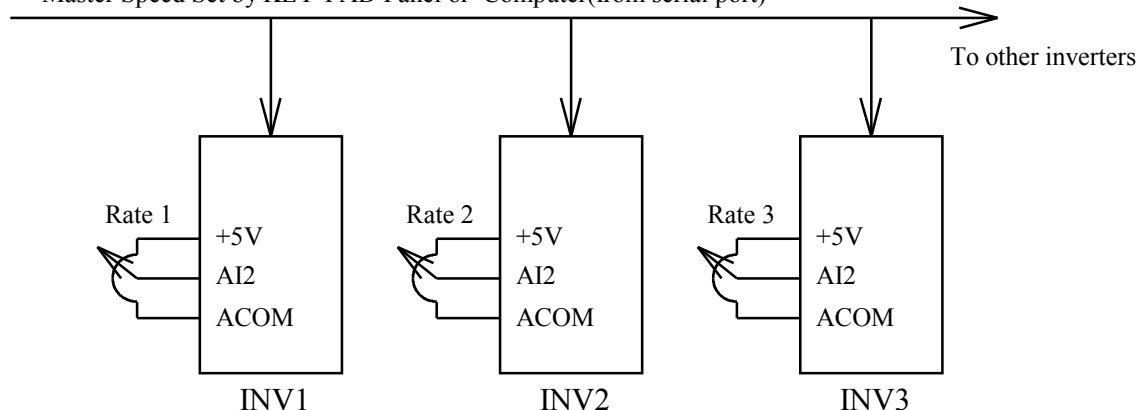
If signal level of AI2 is maximum, the modification rate equal (100%+Pr.70);

and if AI2 is minimum, the modification rate is (100%-Pr.70).

Note: Minimum-running frequency is Pr.16.

This function is useful when master computer controls multiple inverters.

Master Speed Set by KEY-PAD Panel or Computer(from serial port)



7.2.22 Pr.40=22, Set frequency = Panel set frequency ± (Pr.15 * (Pr.70*AI1))

This mode is similar to mode-13; however, Panel-Set Frequency is used instead of AI2 input.

In this mode, the desired set frequency is the combination of Panel input and AI1.

Set Frequency = Panel-Set ± (Pr.15 * (Pr.70*AI1))

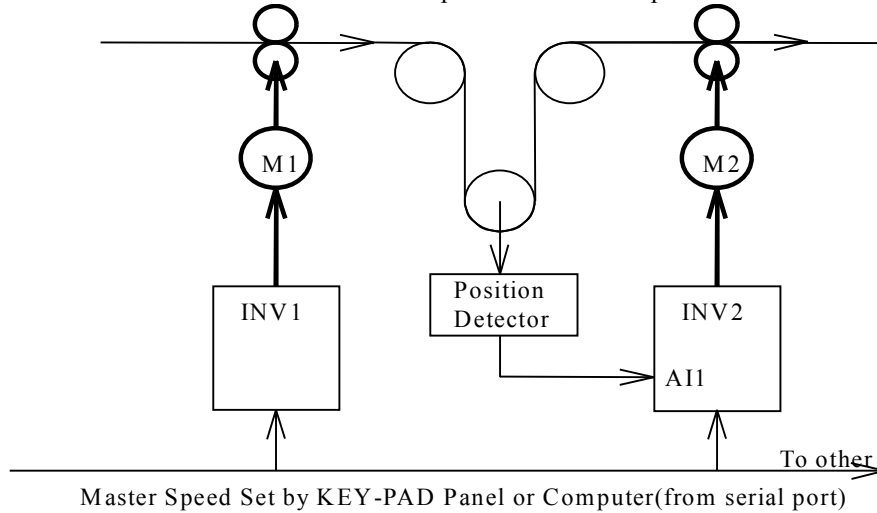
Frequency command for Panel (or computer) is selected to be the major set frequency; and signal from AI1 is the auxiliary input.

If signal level of AI1 is maximum, the modification quantity is (Pr.15 * Pr.70);

And if AI1 is minimum, the modification quantity is -(Pr.15 * Pr.70).

Note: Minimum-running frequency is Pr.16.

This function is useful when master computer controls multiple inverters.



7.2.23 Pr.40=23~24, reserve

7.2.25 Pr.40=25, AI3 use as frequency source (Similar to mode 2)

This mode is similar to mode2, but AI3 is used instead of AI2. Pr.91 and Pr.92 are used to define the high and low limit of AI3. Input range is 0~+5V.

7.2.26 Pr.40=26, AI3 used as bi-directional frequency source (Similar to mode 5)

This mode is similar to mode5, but AI3 is used instead of AI2. Pr.91 and Pr.92 are used to define the high and low limit of AI3. Input range is 0~+5V.

7.2.27 Pr.40=27, AI3 used as bi-directional frequency source with minimum speed

This mode is similar to mode10, but AI3 is used instead of AI2. Pr.91 and Pr.92 are used to define the high and low limit of AI3. Input range is 0~+5V.

7.2.28 Pr.40=28 , Speed input is the combination of AI1 * (100% ± (Pr.70*AI3))

This mode is similar to mode12, but AI3 is used instead of AI2. Pr.91 and Pr.92 are used to define the high and low limit of AI3. Input range is 0~+5V.

7.2.29 Pr.40=29 , Speed input is the combination of AI3 ± (Pr.15 * (Pr.70*AI1))

This mode is similar to mode13, but AI3 is used instead of AI2. Pr.91 and Pr.92 are used to define the high and low limit of AI3. Input range is 0~+5V.

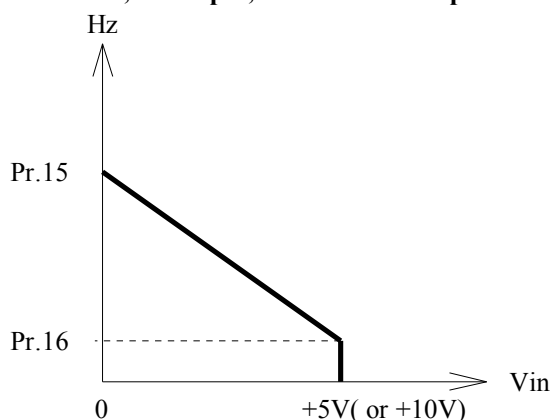
7.2.30 Pr.40=30, Use AI3 as speed source, with minimum frequency = Pr.16

This mode is similar to mode18, but AI3 is used instead of AI2. Pr.91 and Pr.92 are used to define the high and low limit of AI3. Input range is 0~+5V.

7.2.31 Pr.40=31, AI3 input, with Reverse Slope

This mode is similar to mode20, but AI3 is used instead of AI2. Pr.91 and Pr.92 are used to define the high and low limit of AI3. Input range is 0~+5V.

7.2.32 Pr.40=32, AI1 input, with Reverse Slope



This mode is similar to mode20, but AI1 is used instead of AI2. In this mode, the voltage signal fed into AI1 terminal will be used to determine the output frequency of the inverter while running.

The direction of the output phase sequence must be determined by control command.

If the input signal reaches maximum level, the set frequency is equal to Pr.16 (LOWER LIMIT).

On the contrary, if the input signal is zero, the set frequency is equal to Pr.15 (UPPER LIMIT).

Note: Set jumper JP1 to match with the input signal type and range. If necessary, use Pr.89 and Pr.90 to modify the input range.

7.2.33 Pr.40=33, Set frequency = Panel set frequency * (100% ± (Pr.70*AI1))

This function is similar to mode 21, but the modification input is AI1.

7.2.34 Pr.40=34, Set frequency = Panel set frequency * (100% ± (Pr.70*AI3))

This function is similar to mode 21, but the modification input is AI3.

7.2.35 Pr.40=35, Set frequency = Panel set frequency ± (Pr.15 * (Pr.70*AI2))

This function is similar to mode 22, but the modification input is AI2.

7.2.36 Pr.40=36, Set frequency = Panel set frequency ± (Pr.15 * (Pr.70*AI3))

This function is similar to mode 22, but the modification input is AI3.

7.2.37 Pr.40=37, AI1 FORWARD, AI2 REVERSE

While motor run in FORWARD direction, it is same as mode 17, use AI1 as input source.

If the motor run in REVERSE direction, it is same as mode 18, use AI2 as input source.

7.2.38 Pr.40=38, AI2 FORWARD, AI1 REVERSE

While motor run in FORWARD direction, it is same as mode 18, use AI2 as input source.

If the motor run in REVERSE direction, it is same as mode 17, use AI1 as input source.

7.2.39 Pr.40=39, When start running, the output frequency is determined by Pr.00.

If in the case when Pr.00<Pr.16, the inverter will output the frequency stored in Pr.16.

7.2.39 Pr.40=40, The output frequency is determined PID Output. (for PDAN series only)

Refer to Appendix A.

7.2.41 Pr.40=41~45, reserve

7.2.46 Pr.40=46, Speed Command come from RS485 Serial Port (for PDAN series only)

When RS485 port is defined as JPS protocol, Speed Command come from RS485 Serial Port.

7.2.47 Pr.40=47, reserve

7.2.48 Pr.40=48, Set Frequency = PID Boost * (PID Output + PID Bias Input from AI1) (for PDAN series only)

7.2.49 Pr.40=49, Set Frequency = PID Boost * (PID Output + PID Bias Input from AI2) (for PDAN series only)

7.2.50 Pr.40=50, Set Frequency = PID Boost * (PID Output + PID Bias Input from AI3) (for PDAN series only)

7.2.51 Pr.40=51, Set Frequency = PID Boost * (PID Output + PID Bias Set by Pr.28) (for PDAN series only)

Refer to Appendix A.

8. Selection of Digital input function

The terminals DI1, DI2, DI3, & DI4 are multi-functioned Digital Input terminals.

【Note】 All the DIx terminals are scanned once every 5.0 ms.

These four terminals are exactly identical in its hardware/software configurations.

When left open, they are **OFF**. And will become **ON** when connected to **DCOM**.

Each input terminal can be configured individually by corresponding DIx_SELECT parameters.

The four DIx_SELECT parameters are:

Pr.41 -- DI1_SELECT, used for DI1

Pr.42 -- DI2_SELECT, used for DI2

Pr.43 -- DI3_SELECT, used for DI3

Pr.44 -- DI4_SELECT, used for DI4

Pr.03 -- DI5_SELECT, used for DI5 (Sec. 1.2 RUN mark terminal)

Pr.04 -- DI6_SELECT, used for DI6 (Sec. 1.2 REV mark terminal)

Selection Table of Digital input function

Pr.41,42,43,44	FUNCTION	COMMENT
0	NULL	NO FUNCTION
1	EMS	EMERGENCY STOP
2	SPD3	SPEED SET
3	SPD2	SPEED SET
4	SPD1	SPEED SET
5	JOG	JOG SPEED SET
6	OH	OVER HEAT ERROR,
7	TMIA	TIMER INPUT for TYPE A
8	ON BB	BASE BLOCK if DIx is ON
9	FJR	FORWARD JOG RUN
10	RJR	REVERSE JOG RUN
11	TMIB	TIMER INPUT for TYPE B
12~14	Reserve	
15	U/D COUNTER CLEAR	SET UP/DOWN COUNTER to Pr.16
16	U/D COUNTER LOAD	SET UP/DOWN COUNTER to Pr.15
17	U/D COUNTER HOLD	HOLD "Output HZ" to UP/DOWN COUNTER
18	OFF BB	BASE BLOCK if DIx is OFF
19	U/D COUNTER UP	INCREASE UP/DOWN COUNTER
20	U/D COUNTER DOWN	DECREASE UP/DOWN COUNTER
21	ALARM CLEAR	CLEAR ALARM WHEN ALARM OCCUR
22	SET1 (FF1)	SET input of Flip/Flop-1
23	CLR1 (FF1)	CLEAR input of Flip/Flop-1
24	SET2 (FF2)	SET input of Flip/Flop-2
25	CLR2 (FF2)	CLEAR input of Flip/Flop-2
26	SET (FF1&FF2)	SET input to both FF1 & FF2
27	CLR (FF1&FF2)	CLEAR input to both FF1 & FF2
28	CLK Input	Input CLOCK to Timer/Counter Block
29	Reserve	
30	/OH	OVER HEAT ERROR, (input open)
31	Normal/Auto SW	Change Over Switch for Normal or Auto Run
32~35	Reserve	
36	TMIC	TIMER INPUT for TYPE C
37~47	Reserve	
48	Speed Hold	Hold Output Speed
49	Reserve	
50	PID Enable	PID Enable
51	PID Hold	PID Integrator Hold
52	PID Clear	PID Integrator Clear
53	PID Preset	Preset PID Integrator
54	PID Bias Enable	PID Bias Enable
55	PID Boost Enable	PID Boost Enable
56-68	Reserve	
69	DC-BRAKE1	DC injection brake use AI1 as brake level
70	DC-BRAKE2	DC injection brake use AI2 as brake level
71	DC-BRAKE3	DC injection brake use AI3 as brake level
72	Sensor-Less Mode Change	Select or non-select the SENSOR-LESS mode
73	RUN function	Select standard RUN function, Refer to Sec.6
74	REV function	Select standard REV function, Refer to Sec.6
75	POWER-CONTROL select	Select AI2 or AI3 for Power Control input
76	FORWARD INHIBIT	Forward run inhibit

Pr.41,42,43,44	FUNCTION	COMMENT
77	REVERSE INHIBIT	Reverse run inhibit
78	PANEL FREQUENCY UP	INCREASE PANEL FREQUENCY when Pr.40=8
79	PANEL FREQUENCY DOWN	DECREASE PANEL FREQUENCY when Pr.40=8
80	SPEED SW 1	16 SPEED SELECT
81	SPEED SW 2	
82	SPEED SW 3	
83	SPEED SW 4	
84	JOG ACC/DEC TIME	ACC/DEC TIME SELECT
85	SPD1 ACC/DEC TIME	
86	SPD2 ACC/DEC TIME	
87	SPD3 ACC/DEC TIME	
88	SPEED COMMAND SW	SPEED SELECT SWITCH
89	CONTROL COMMAND SW	CONTROL COMMAND SELECT SWITCH
90	SPEED & CONTROL CMD SW	SPEED AND CONTROL COMMAND SELECT
91	/TMIA	TIMER INPUT for TYPE A (complement)
92	/TMIB	TIMER INPUT for TYPE B (complement)
93	/TMIC	TIMER INPUT for TYPE C (complement)
94	TMIAX	TMIA With T=Pr.71*AI2
95	TMIBX	TMIB With T=Pr.71*AI2
96	TMICX	TMIC With T=Pr.71*AI2
97	/TMIAX	TMIA With T=Pr.71*AI2 (complement)
98	/TMIBX	TMIB With T=Pr.71*AI2 (complement)
99	/TMICX	TMIC With T=Pr.71*AI2 (complement)

8.0 DIx_Select = 0, NULL function

The input terminal is disabled into **OFF** state when select NULL function.

8.1 DIx_Select = 1, EMS Emergency Stop function (Refer to Section 5.4, Pr.05~Pr.08)

While inverter running, if the input terminal is ON, then inverter will start delivering DC voltage instead of AC voltage to motor. The DC voltage level is assigned by Pr.06, and will remain a period of time determined by Pr.07.

8.2 DIx_Select = 2, SPD3 (Also refer to Section 12)

8.3 DIx_Select = 3, SPD2

8.4 DIx_Select = 4, SPD1

8.5 DIx_Select = 5, JOG

In addition to Pr.00 Main_Speed_Set, there are other four pre-settable speeds: JOG Speed, SPD1, SPD2, and SPD3. The following table lists the corresponding parameters:

PARAMETER	FUNCTION	COMMENT
Pr.00	MAIN SPD SET	Main preset speed
Pr.01	MAIN ACC TIME	ACC rate for Main speed
Pr.02	MAIN DEC TIME	DEC rate for Main speed
Pr.19	JOG FREQUENCY	Desired JOG Frequency
Pr.20	JOG ACC/DEC TIME	ACC/DEC rate when select JOG, or DIx(84)
Pr.21	SPD1 FREQUENCY	Desire SPD1 Frequency
Pr.22	SPD1 ACC TIME	ACC rate when select SPD1, or DIx(85)
Pr.23	SPD1 DEC TIME	DEC rate when select SPD1, or DIx(85)
Pr.24	SPD2 FREQUENCY	Desire SPD2 Frequency
Pr.25	SPD2 ACC TIME	ACC rate when select SPD2, or DIx(86)
Pr.26	SPD2 DEC TIME	DEC rate when select SPD2, or DIx(86)
Pr.27	SPD3 FREQUENCY	Desire SPD3 Frequency
Pr.28	SPD3 ACC TIME	ACC rate when select SPD3, or DIx(87)
Pr.29	SPD3 DEC TIME	DEC rate when select SPD3, or DIx(87)

The priority level for multi-speed operation is:

JOG > SPD1 > SPD2 > SPD3 > (16STEP) > NORMAL_SPEED_REQUEST.

NORMAL_SPEED_REQUEST stands for the speed set from Pr.00, or Panel, or UP/DOWN counter, or AIx, according to the user's selection defined in Pr.40.

Normally the JOG, SPD1, SPD2, & SPD3 functions must be combined with RUN Command.

Refer to DIx mode 9 and 10, for JOG run without RUN command.

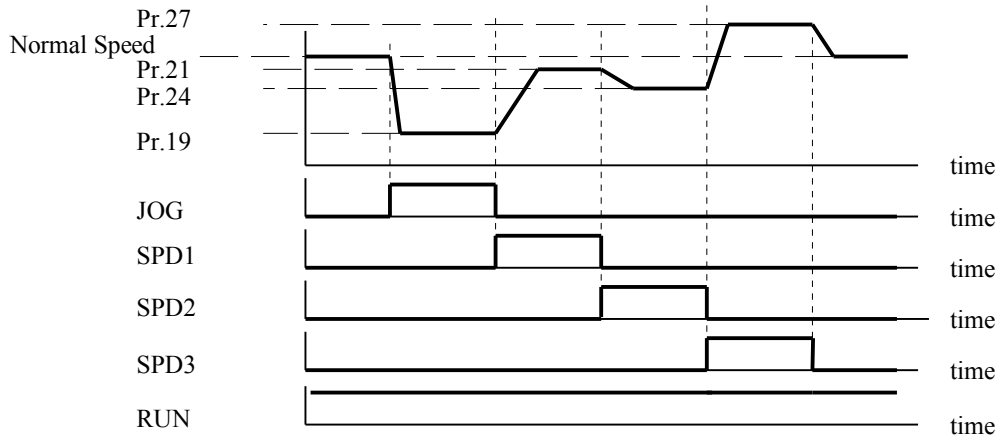
Refer to DIx(80)~DIx(83), to determine 16STEP speed.

When inverter selects JOG speed, Pr.20 determines the acceleration and deceleration rate.

When inverter selects SPD1 speed, Pr.22, 23, determines the acceleration and deceleration rate.

When inverter selects SPD2 speed, Pr.25, 26, determines the acceleration and deceleration rate.

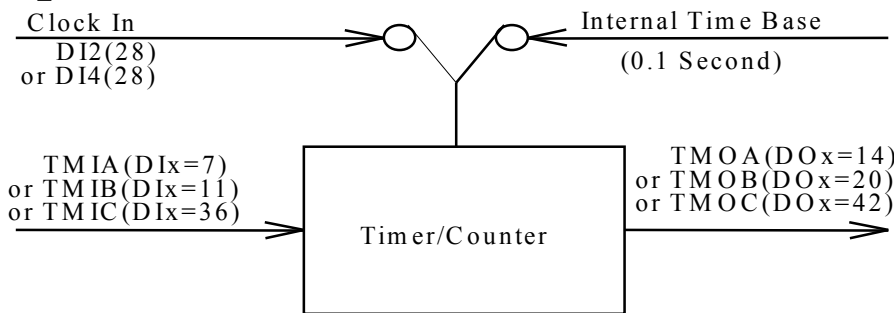
When inverter selects SPD3 speed, Pr.28, 29, determines the acceleration and deceleration rate.



8.6 DIx_Select = 6, OH (Over Heat) function (Also refer to Section 8.30)

When the input terminal is activated, the inverter will disable the output transistors, and show **OH** alarm message on the display. Refer to mode-30, for complementary function.

8.7 DIx_Select = 7, TMIA



Functional block diagram of Timer/Counter module

Note: Only when select DI2(28) or DI4(28), the Timer/Counter Module will be configured as Counter Module. Otherwise, it is configured as Timer Module.

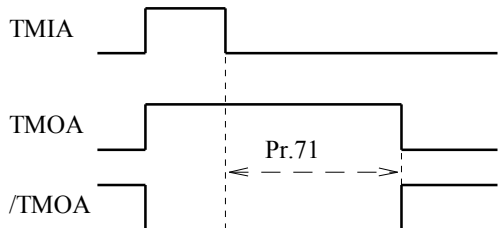
When configured as a Timer, the Internal 0.1 Second time base signal is selected to be the clock input of the Timer/Counter Module.

If configured as a Counter, the terminal of DI2 & DI4 that was assigned to mode-28 will become the clock input of the Timer/Counter Module.

When digital input DIx is assigned to **TMIA** function, it serves as **Input of the OFF-DELAY** timer. User must assign a digital output DOx , which select **TMOA** function to serve as the output of this timer. And the **timer time** will be defined in Pr.71. (Refer to Sec.8.94)

When the timer input TMIA is ON, the timer output TMOA will be ON immediately.

If the TMIA become OFF, the timer will start counting time. After waiting the specified time period of Pr.71, then the TMOA become OFF too.



Note:
When use as Counter mode, the maximum clock input rate is 1000Hz. There is only one internal Timer/Counter Block; you can use only one Timer/Counter, either TYPE A or TYPE B or TYPE C.

8.8 DIx_Select = 8, ON-BB

When any DIx selecting this function, activate the input DIx will **BLOCK the BASE** signal to all transistors immediately in order to disable the inverter output. When the input is OFF again, the inverter will execute **Speed Search process**.

Refer to Sec.11, the special function for **Speed Search process**.

Also Refer to Sec.8.18 for complement function.

8.9 DIx_Select = 9, FJR

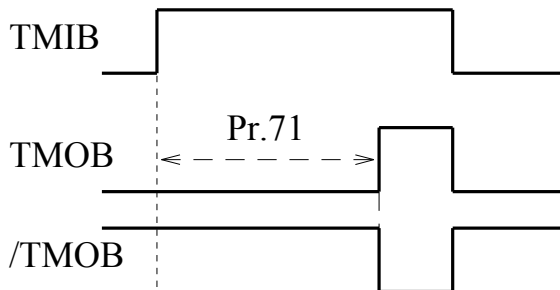
When selected DIx is ON, it will force the inverter execute **Forward-Jog-Run** without RUN Command.

8.10 DIx_Select = 10, RJR

When selected DIx is ON, it will force the inverter execute **Reverse-Jog-Run** without RUN Command.

8.11 DIx_Select = 11, TMIB

Refer to the functional block diagram of Timer/Counter module in Sec.8.7.



When digital input DIx is assigned to **TMIB** function, it serves as **Input of the ON-DELAY** timer. User must assign a digital output DOx, which select **TMOB** function to serve as the output of this timer. And the **timer time** will be defined in Pr.71. (Refer to Sec.8.94)

When the timer input TMIB is OFF, the timer output TMOB will be OFF too.

Until the input TMIB is ON and **continue ON for a specified time period of Pr.71**, then the TMOB will become ON.

8.12 DIx_Select = 12~14, reserve

8.15 DIx_Select = 15, CLEAR the content of UP/DOWN COUNTER to Pr.16

8.16 DIx_Select = 16, LOAD the content of UP/DOWN COUNTER to Pr.15

8.17 DIx_Select = 17, HOLD the UP/DOWN COUNTER

Refer to Sec.7.6 Functional Block Diagram of Internal UP/DOWN counter.

Note: These digital function may be selected as the input terminals when Pr.40=6, 7 and 19, using the content of the UP/DOWN counter as the NORMAL_SPEED_REQUEST.

If DIx(15) is ON, selects CLEAR function, the content of the internal UP/DOWN COUNTER will be set to Pr.16 (Lower Limit).

If DIx(16) is ON, selects LOAD function, the content of the internal UP/DOWN COUNTER will be set to Pr.15 (Upper Limit).

If DIx(17) is ON, selects HOLD function, the UP/DOWN COUNTER will hold its value.

8.18 DIx_Select = 18, OFF-BB

When any DIx selecting this function, the input terminal must remain in activate state for normal operation. If the input terminal is left open to OFF state, it will **BLOCK the BASE** signal to all transistors immediately in order to disable the inverter output.

When the input is ON again, the inverter will execute **Speed Search process**. Refer to Sec.11, the special function for **Speed Search process**.

Also Refer to Sec.8.8 for complement function.

8.19 DIx_Select = 19, UP

If DIx(19) is ON, the UP/COUNTER will increase its value, according to the acceleration rate specified in Pr.01.

8.20 DIx_Select = 20, DOWN

If DIx(20) is ON, the UP/COUNTER will decrease its value, according to the deceleration rate specified in Pr.02.

8.21 DIx_Select = 21, ALARM CLEAR

If user choose this function, then activate the DIx terminal will reset the inverter only when alarm had occurred.

Note: The **RST terminal** is used to **RESET** the whole inverter no matter alarm occurred or not.

8.22 DIx_Select = 22, SET Flip/Flop-1

8.23 DIx_Select = 23, CLEAR Flip/Flop-1

8.24 DIx_Select = 24, SET Flip/Flop-2

8.25 DIx_Select = 25, CLEAR Flip/Flop-2

8.26 DIx_Select = 26, SET both Flip/Flop-1 & Flip/Flop-2

8.27 DIx_Select = 27, CLEAR both Flip/Flop-1 & Flip/Flop-2

Two general purpose Flip/Flops were built in for many applications in order to minimize the necessary external components. Each Flip/Flop block has two SET inputs, two CLEAR inputs and two complementary outputs for free selection.

For example, Let

DI1_Select (Pr.41) = 22, select DI1 to be the SET input of FF1

DI2_Select (Pr.42) = 23, select DI2 to be the CLEAR input of FF1

DO1_Select (Pr.45)=32, select DO1 to be the output Q of FF1

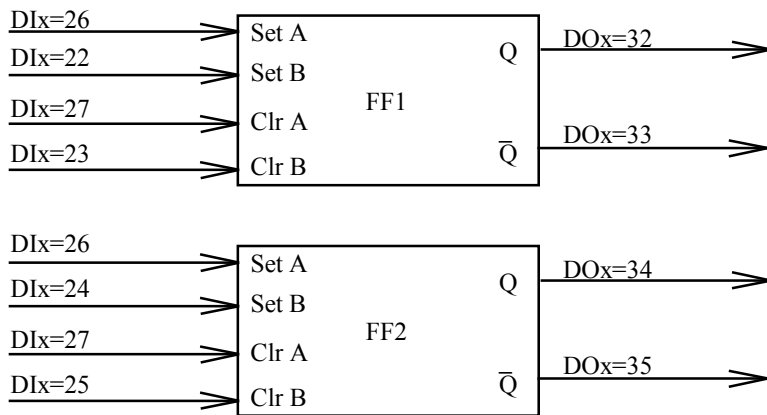
then, **the combination of inputs DI1, DI2 and output DO1 will serve as a Latch Relay.**

Momentary ON signal apply to DI1 will cause DO1 enter ON state. On the contrary, ON signal apply to DI2 will cause DO1 back to OFF state again.

If digital input function select is DIx_select=26, then ON input to DIx will SET both FF1 & FF2.

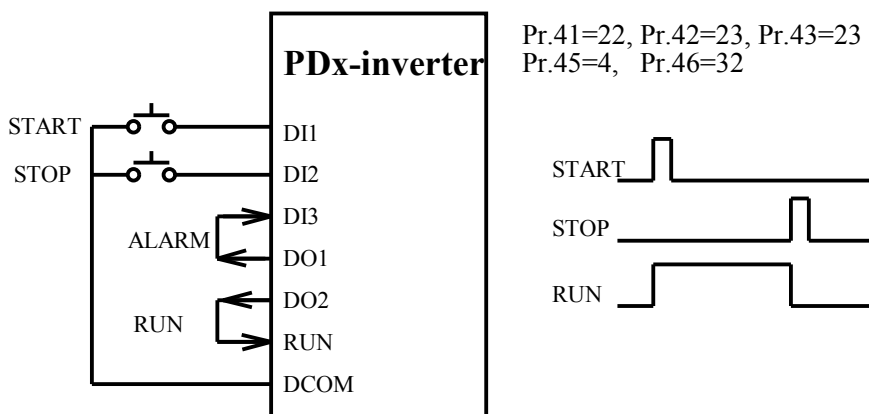
If digital input function select is DIx_select=27, then ON input to DIx will CLEAR both FF1 & FF2.

Note: Multiple assignment to the same input function is acceptable.



Functional Block diagram of Internal Flip/Flop Modules

Flip/Flop application example : Use DI1, DI2, DO1 as a LATCH RELAY.



8.28 DIx_Select = 28, CLOCK input of Timer/Counter

Refer to Sec.8.7, the Functional Block Diagram of the Internal Timer/Counter Module.

Note: Not every DIx input can select this function; only DI2(28) and DI4(28) are useful.

DI1(28): Used for AUTO-RUN mode, refer to Sec. 12 (for PDA/PDE/PDH series only)

DI2(28): Used for general purpose Timer/Counter, refer to Sec. 8.7, 8.11, 8.36.

DI3(28): No function

DI4(28): Used for AUTO-RUN mode, refer to Sec. 12 (for PDAN series only)

If this function is used, the Counter Module will advance one count when the input status of DIx changes from OFF to ON.

The maximum input clock rate is limited to 1,000 Transitions/Second.

8.29 DIx_Select = 29, reserve

8.30 DIx_Select = 30, /OH function

When any digital input terminal select this function, it must remain in **ON state for normal operation.**

Else if the input is **OFF**, the inverter will disable the output transistors, and show **OH** alarm message on the display.

Refer to mode-6, for complementary function.

8.31 DIx_Select = 31, Normal/Auto Switch

Refer to Sec.12, the description of AUTO RUN Function.

Parameter Pr.72 determines the Auto Run Mode of the inverter.

This Digital Input function provides an easy way to change between Normal or Auto Run mode.

When the selected DIx input is OFF, then Pr.72 determines the inverter running mode.

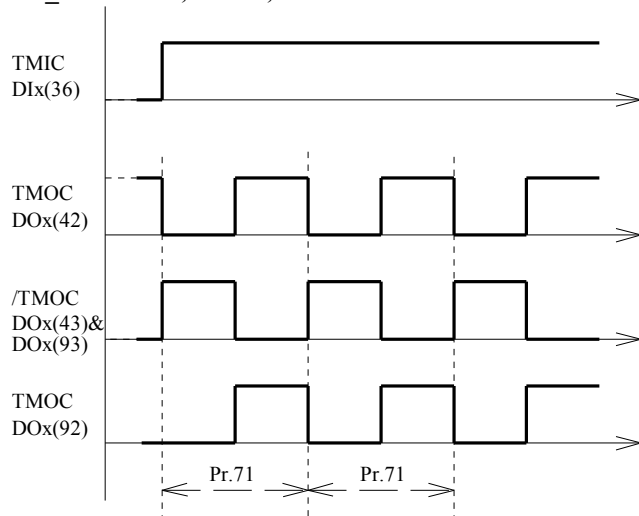
If the input is ON, then it will force the inverter to run under Normal mode (equal to Pr.72=0).

Note: a. If Pr.72=0, selects Normal Run Mode.

b. The status change of the DIx will be effective only when the inverter is stop.

8.32 DIx_Select = 32~35, reserve

8.36 DIx_Select = 36, TMIC, start Astable Timer/Counter



If the input TMIC is OFF, the output TMO is always under ON state.
When the TMIC is ON, then the TMO will start the Astable ON/OFF cycle.
The period of time for one ON/OFF cycle is determined by Pr.71. (Refer to Sec.8.94)
The duty cycle is 50%.
If TMO assigned by DOx(92), the TMO output will remain OFF, when TMIC is OFF.

8.37 DIx_Select = 37~47, reserve

8.48 DIx_Select = 48, Speed Hold

When DIx(48) is ON, the inverter will stop ramp up or ramp down, and hold on present running speed.
If DIx(48) change to OFF, the inverter will resume ramp up or ramp down.

8.49 DIx_Select = 49, reserve

8.50 DIx_Select = 50, PID Enable

8.51 DIx_Select = 51, PID Hold

8.52 DIx_Select = 52, PID Clear

8.53 DIx_Select = 53, PID Preset

8.54 DIx_Select = 54, PID Bias Enable

8.55 DIx_Select = 55, PID Boost Enable

Refer to Appendix A

8.56 DIx_Select = 56~68, reserve

8.69 DC-BRAKE1

8.70 DC-BRAKE2

8.71 DC-BRAKE3

When set DIx(69 or 70 or 71) ON, the inverter will start injecting a continuous DC current into the motor winding.
Under this application, AI1, AI2 or AI3 are used to define the level of the injection current respectively.
The actual DC output voltage level is defined by Pr.06*Aix.

8.72 SENSOR-LESS Mode Change (for PDAN/PDA series only)

DIx(72) is used to toggle the operating mode between SENSOR-LESS and NON-SENSOR-LESS externally.

If Pr.67=1, and DIx(72)=ON, mode will change from **Non-Sensor-Less** to **Sensor-Less**.

If Pr.67=3, and DIx(72)=ON, mode will change from **Sensor-Less** to **Non-Sensor-Less**.

8.73 RUN function

8.74 REV function

Any digital input terminal assigned as DIx(73) will function as RUN terminal input.

Any digital input terminal assigned as DIx(74) will function as REV terminal input.

Refer to section 6 for detail RUN and REV terminal function.

8.75 Power Control Input Selection (for PDAN/PDA series only)

This function is only available under Pr.67=4, the **Power Control** mode.

When DIx(75) is ON, AI2 is selected in order to modify the **POWER-LIMIT-CURVE**.

Otherwise, if DIx(75) is OFF, or not any DIx(75) is assigned, AI3 is selected.

Refer to section 4.3.4.

8.76 FORWARD INHIBIT (for PDAN series only)

8.77 REVERSE INHIBIT (for PDAN series only)

If DIx(76)=ON, Forward Run is inhibited.

If DIx(77)=ON, Reverse Run is inhibited.

8.78 DIx_Select = 79, Increase the Panel Set frequency

8.78 DIx_Select = 79, Decrease the Panel Set frequency

While using Panel Set frequency as speed command (Pr.40=8),

if DIx(78)=ON, can increase the Panel Set frequency, and

if DIx(79)=ON, can decrease the Panel Set frequency.

8.80 DIx_Select = 80~83, 16 STEP-Speed select

DIx(80)~DIx(83) are used to assign 16-step frequency.

If DIx(2)~DIx(5) are all OFF, (no JOG, SPD1, SPD2, SPD3 function)

and if any of DIx(80)~DIx(83) is ON, then the set speed is:

Set Frequency = DIx(83)*Pr.27 + DIx(82)*Pr.24 + DIx(81)*Pr.21 + DIx(80)*Pr.19

8.84 DIx_Select = 84~87, Select different ACC/DEC rate

If DIx(2)~DIx(5) are all OFF, then DIx(84)~DIx(87) can be used to select or change ACC/DEC rate.

DIx(84): select ACC=Pr.20, DEC=Pr.20

DIx(85): select ACC=Pr.22, DEC=Pr.23

DIx(86): select ACC=Pr.25, DEC=Pr.26

DIx(87): select ACC=Pr.28, DEC=Pr.29

8.88 DIx_Select = 88~90, Change COMMAND source

Refer to the definition of Pr.39 and Pr.40 in section 6 and section 7.

Pr.39 = a . b; contains selection a or b

Pr.40 = cc . dd; contains selection cc or dd

DIx(88) ON: Speed Command source = dd

DIx(88) OFF: Speed Command source = cc

DIx(89) ON: Control Command source = b

DIx(89) OFF: Control Command source = a

DIx(90) ON: Speed Command source = dd , and Control Command source = b

DIx(90) OFF: Speed Command source = cc , and Control Command source = a

Note: If any DIx(90) is selected, do not assign DIx(88) and DIx(89)

8.91 DIx_Select = 91, /TMIA

Complementary function of TMIA, refer to sec.8.7.

8.92 DIx_Select = 92, /TMIB

Complementary function of TMIB, refer to sec.8.11.

8.93 DIx_Select = 93, /TMIC

Complementary function of TMIC, refer to sec.8.36.

8.94 DIx_Select = 94~99, TIMER TIME MODIFICATION

DIx(94) = TMIAX

DIx(95) = TMIBX

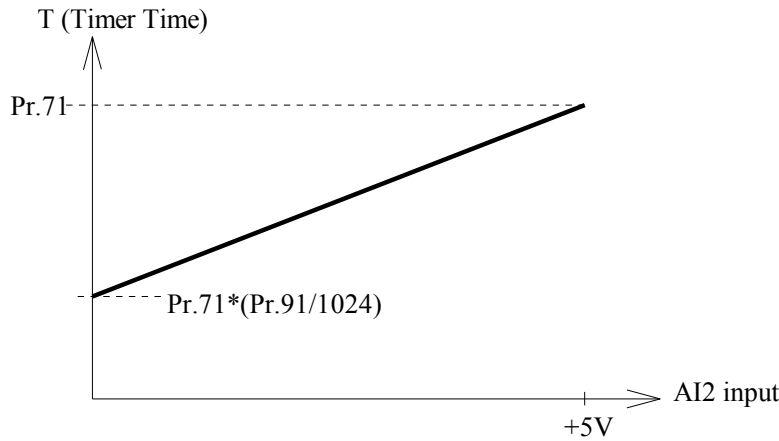
DIx(96) = TMICX

DIx(97) = /TMIAX

DIx(98) = /TMIBX

DIx(99) = /TMICX

Similar to TIMA~TMIC, but the time can be varied by AI2 input.



9. Selection of Digital output and Relay function

The **DO1, DO2, RY1 and RY2** terminals are defined as multi-functional **DIGITAL OUTPUTS**.

The output circuit structure of **DO1 & DO2** is Transistor **OPEN COLLECTOR** outputs.

The **RY1 and RY2** pair terminals are **NORMAL OPEN(1a)** contacts of the output **RELAY**.

The parameters for configuring the digital outputs are:

Pr.45 -- DO1_SELECT, used for DO1 output function select

Pr.46 -- DO2_SELECT, used for DO2 output function select

Pr.47 -- RELAY_SELECT, used for Relay output function select

Each of the three digital outputs may select any of the following output functions:

Pr.45,46,47	FUNCTION	COMMENT
0	OFF	ALWAYS OFF
1	NOT RUN	NOT RUNNING
2	SPE	SPEED EQUAL
3	SPNE	SPEED NOT EQUAL
4	ALM	ALARM
5	NALM	NO ALARM
6	BRAKING	UNDER BRAKING
7	RUNNING	UNDER RUNNING
8	SPO	SPEED OVER
9	SPNO	SPEED NOT OVER
10	SPA	SPEED ARRIVE
11	SPNA	SPEED NOT ARRIVE
12	DIR	OUTPUT DIRECTION
13	IRMS-LEVEL0	Irms>Pr.48
14	TMOA	TIMER OUTPUT TYPE A
15	SPZ	ZERO SPEED
16	SPNZ	NOT ZERO SPEED
17	STALLING	OUTPUT WHILE STALLING
18~19	Reserve	
20	TMOB	TIMER OUTPUT TYPE B
21	STEP1	AUTO RUNNING AT STEP 1
22	STEP2	AUTO RUNNING AT STEP 2
23	STEP3	AUTO RUNNING AT STEP 3
24	STEP4	AUTO RUNNING AT STEP 4
25	STEP5	AUTO RUNNING AT STEP 5
26	STEP6	AUTO RUNNING AT STEP 6
27	STEP7	AUTO RUNNING AT STEP 7
28	STEP8	AUTO RUNNING AT STEP 8
29	STEP9	AUTO RUNNING AT STEP 9
30	STEP10	AUTO RUNNING AT STEP 10
31	Reserve	
32	Q1(FF1)	Output of Flip/Flop-1
33	/Q1(FF1)	Complement Output of FF1
34	Q2(FF2)	Output of Flip/Flop-2
35	/Q2(FF2)	Complement Output of FF2
36~37	Reserve	
38	ALWAYS ON	The Output terminal always ON
39	Reserve	
40	/TMOA	Complement of TMOA
41	/TMOB	Complement of TMOB
42	TMOC	TIMER OUTPUT TYPE C
43	/TMOC	Complement of TMOC
44	X32CLK (only DO1)	Output clock rate = 32 * Pr.57 (HZ)
45	X16CLK (only DO1)	Output clock rate = 16 * Pr.57 (HZ)
46	X8CLK (only DO1)	Output clock rate = 8 * Pr.57 (HZ)
47	X4CLK (only DO1)	Output clock rate = 4 * Pr.57 (HZ)
48	X26CLK (only DO1)	Output clock rate = 2 * Pr.57 (HZ)
49	X1CLK (only DO1)	Output clock rate = 1 * Pr.57 (HZ)
50	IDC-LEVEL0	Idc>Pr.48 (PDA/PDH series only)
51	IDC-LEVEL1	Idc>A11 (PDA/PDH series only)
52	IDC-LEVEL2	Idc>A12 (PDA/PDH series only)

Pr.45,46,47	FUNCTION	COMMENT
53	IDC-LEVEL3	Idc>AI3 (PDA/PDH series only)
54	IRMS-LEVEL1	Irms>AI1
55	IRMS-LEVEL2	Irms>AI2
56	IRMS-LEVEL3	Irms>AI3
57	POWER-LIMIT	Under Power-Limit status (PDAN series only)
58~69	Reserve	
70	RUN & AI1-Compare-HIGH	RUNNING & AI1 > Pr.74
71	RUN & AI1-Compare-LOW	RUNNING & AI1 < Pr.74
72	RUN & AI2-Compare-HIGH	RUNNING & AI2 > Pr.75
73	RUN & AI2-Compare-LOW	RUNNING & AI2 < Pr.75
74	RUN & AI3-Compare-HIGH	RUNNING & AI3 > Pr.76
75	RUN & AI3-Compare-LOW	RUNNING & AI3 < Pr.76
76~77	Reserve	
78	OL-WARNING	OL level >50%
79	/OL-WARNING	OL level <50%
80	AI1-Compare-HIGH	AI1 > Pr.74
81	AI1-Compare-LOW	AI1 < Pr.74
82	AI2-Compare-HIGH	AI2 > Pr.75
83	AI2-Compare-LOW	AI2 < Pr.75
84	AI3-Compare-HIGH	AI3 > Pr.76
85	AI3-Compare-LOW	AI3 < Pr.76
86	ACCELERATING	Under acceleration status
87	DECELERATING	Under Deceleration status
88	DISCHARGING	Under Discharging status
89	Reserve	
90	FWD	FORWARD RUNNING
91	REV	REVERSE RUNNING
92	TMOC	TMOC ENABLE AFTER TMIC ON
93	/TMOC	Same as DOx(43)

Note: When power on, or the inverter will executing INITIALIZE function, all of the outputs will go OFF for a short period of reset.

9.0 NULL function

The output status of DOx will always under **OFF state** when selecting this mode.

This function is complement function of **Always ON** function. Refer to Sec.9.38.

This function is useful when a master computer controls the inverter. The master computer can control these digital outputs for other peripheral, independent to the inverter operation.

9.1 NOT RUNNING function (complement of Sec.9.7)

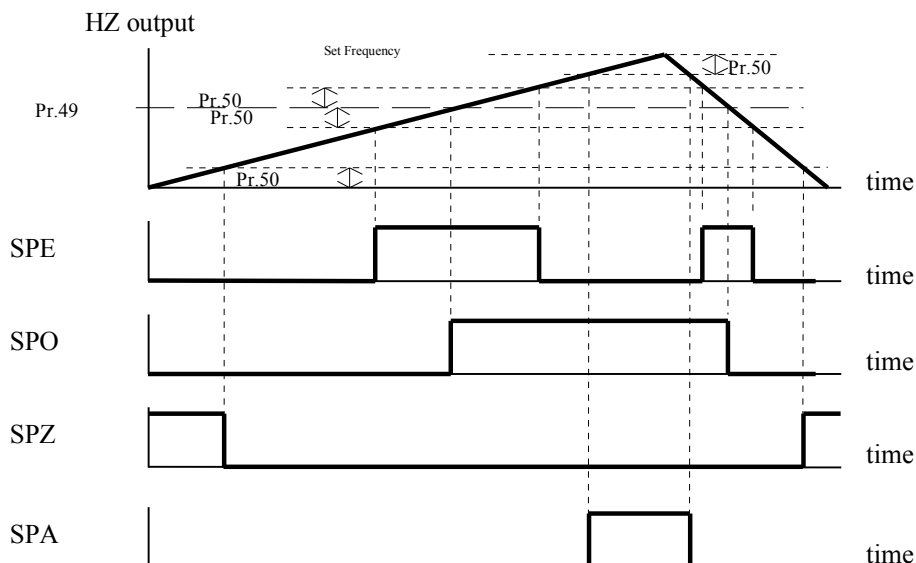
The output status of DOx will be **ON** when the inverter is under **standby** mode.

Inverter under standby mode means the output transistors are all OFF.

If the inverter starts **running or under DC injection braking** mode, the output status will become OFF.

9.2 SPE Speed Equal function

9.3 SPNE Speed Not Equal function (complement of Sec.9.2)



The output status of DOx(2) will ON, if the output frequency is **EQUAL** to the preset frequency defined in Pr.49.

Definition of EQUAL means: Difference is within the allowable tolerance defined in Pr.50.

* Relative functions are SPO, SPZ, and SPA.

9.4 ALARM output function (complement of Sec.9.5)

The output status of DOx(4) is normally OFF when the inverter detects **no error**.

If **error occurs**, the output DOx(4) will ON immediately.

9.5 NOT ALARM output function (complement of Sec.9.4)

$DOx(5) = /DOx(4)$

9.6 BRAKING function (Refer to Section 5.4, Pr.05~Pr.08)

The output DOx(6) will ON, when the inverter is under **DC injection braking mode**.

9.7 RUNNING function (Refer to Section 5.4, Pr.05~Pr.08)

The output DOx(7) is OFF when the inverter is under **standby mode** (not running).

If the inverter starts running or under DC injection braking mode, the output DOx(7) will ON.

9.8 SPO Speed Over function (Refer to Section 9.2)

The output status of DOx(8) will ON, if the absolute value of output frequency is **OVER** the preset frequency defined in Pr.49. (i.e. $Pr.57 > Pr.49$)

9.9 SPNO Speed Not Over function (complement of Sec.9.8)

$DOx(9) = /DOx(8)$

9.10 SPA Speed Arrive function (Refer to Section 9.2)

The output status of DOx will ON, if the output frequency is **EQUAL** to the Set frequency.

Definition of EQUAL means: Difference between output Hz and desired frequency is within the allowable tolerance defined in Pr.50.

Note: the SPA signal is always OFF if inverter is not running or is under DC injection braking.

9.11 SPNA Speed Not Arrive function (complement of Sec.9.10)

$DOx(11) = /DOx(10)$

9.12 DIRECTION output function

The output status of DOx(12) will ON, if the output frequency ≥ 0 .

The output status of DOx will be OFF, if the output frequency < 0 .

Refer to Sec.9.90 & 9.91

9.13 IRMS-LEVEL0

DOx(13) output will ON, if $I_{rms} > Pr.48$.

I_{rms} is root mean square current value of inverter output.

9.14 TMOA Timer Output A-type function (Refer to Section 8.7)

Refer to the Functional block diagram of Timer/Counter module in Sec.8.7 and the related descriptions.

9.15 SPZ Speed Zero function (Refer to Section 9.2)

The output status of DOx will ON, if the output frequency is **EQUAL to Zero**. ($Pr.57 < Pr.50$)

9.16 SPNZ Speed Not Zero function (complement of Sec.9.15)

$DOx(16) = /DOx(15)$

9.17 STALLING function

While inverter running, if the output current exceeds hardware limit (150%), the output frequency will decrease automatically to reduce the output current. Inverter running under such condition is called Stalling, and output status DOx(17) will become ON to indicate this situation.

9.18~19 reserve

9.20 TMOB Timer Output B-type function (Refer to Section 8.11)

Refer to the Functional block diagram of Timer/Counter module in Sec.8.7 and the related descriptions in Sec.8.11.

9.21 STEP1 output indicating Auto running at step1 (Refer to Section 12.2)

9.22 STEP2 output indicating Auto running at step2 (Refer to Section 12.2)

9.23 STEP3 output indicating Auto running at step3 (Refer to Section 12.2)

9.24 STEP4 output indicating Auto running at step4 (Refer to Section 12.2)

9.25 STEP5 output indicating Auto running at step5 (Refer to Section 12.2)

9.26 STEP6 output indicating Auto running at step6 (Refer to Section 12.2)

9.27 STEP7 output indicating Auto running at step7 (Refer to Section 12.2)

9.28 STEP8 output indicating Auto running at step8 (Refer to Section 12.2)

9.29 STEP9 output indicating Auto running at step9 (Refer to Section 12.2)

9.30 STEP10 output indicating Auto running at step10 (Refer to Section 12.2)

9.31 Reserve

9.32 Q1 output of Flip/Flop-1 (Refer to Section 8.22)

DOx(32) is Q output of Flip/Flop-1.

9.33 /Q1 output of Flip/Flop-1 (Refer to Section 8.22)

DOx(33) is /Q output of Flip/Flop-1.

9.34 Q2 output of Flip/Flop-2 (Refer to Section 8.22)

DOx(34) is Q output of Flip/Flop-2.

9.35 /Q2 output of Flip/Flop-2 (Refer to Section 8.22)

DOx(35) is /Q output of Flip/Flop-2.

9.36~37 Reserve

9.38 Always ON

The output status of DOx(38) is always under **ON state** when selecting this mode.

This function is complement function of **NULL** function. Refer to Sec.9.0.

This function is useful when the inverter is controlled by a master computer, or under TEST mode.

The master computer can control these digital outputs for other peripheral, independent to the inverter operation.

9.39 reserve

9.40 /TMOA Complement function of TMOA

DOx(40) = /DOx(14)

9.41 /TMOB Complement function of TMOB

DOx(41) = /DOx(20)

9.42 TMOC Timer Output C-type function (Refer to Section 8.36)

9.43 /TMOC Complement function of TMOC

DOx(43) = /DOx(42)

9.44 X32CLK output clock rate = 32 * Pr.57 (HZ)

9.45 X16CLK output clock rate = 16 * Pr.57 (HZ)

9.46 X8CLK output clock rate = 8 * Pr.57 (HZ)

9.47 X4CLK output clock rate = 4 * Pr.57 (HZ)

9.48 X2CLK output clock rate = 2 * Pr.57 (HZ)

9.49 X1CLK output clock rate = 1 * Pr.57 (HZ)

DOx(44)~DOx(49) are used for generating an output clock.

The maximum output clock rate should limit within 3KHz.

This clock output is only available for DO1.

After select one of these functions, user must execute RESET in order to change DO1 into XnCLK function. On the contrary, if change from XnCLK into other DOx function, also execute RESET after selection is changed.

9.50 IDC-LEVEL0

DOx(50) output will ON, if $I_{dc} > Pr.48$.

I_{dc} is current value in DC bus.

Note: this function is for PDA/PDH series only.

9.51 IDC-LEVEL1

DOx(51) is similar to DOx(50), but AI1 is used as the comparison level.

Actual comparison method is : $I_{dc}(\%) > 150\% * AI1$

Note: this function is for PDA/PDH series only.

9.52 IDC-LEVEL2

DOx(52) is similar to DOx(50), but AI2 is used as the comparison level.

Actual comparison method is: $I_{dc}(\%) > 150\% * AI2$

Note: this function is for PDA/PDH series only.

9.53 IDC-LEVEL3

DOx(53) is similar to DOx(50), but AI3 is used as the comparison level.

Actual comparison method is: $I_{dc}(\%) > 150\% * AI3$

Note: this function is for PDA/PDH series only.

9.54 IRMS-LEVEL1

DOx(54) is similar to DOx(13), but AI1 is used as the comparison level.
Actual comparison method is : $\text{Irms}(\%) > 150\% * \text{AI1}$

9.55 IRMS-LEVEL2

DOx(55) is similar to DOx(13), but AI2 is used as the comparison level.
Actual comparison method is: $\text{Irms}(\%) > 150\% * \text{AI2}$

9.56 IRMS-LEVEL3

DOx(56) is similar to DOx(13), but AI3 is used as the comparison level.
Actual comparison method is: $\text{Irms}(\%) > 150\% * \text{AI3}$

9.57 POWER-LIMIT

DOx(57) will ON, if under Power-Limit condition. (Refer to section 4.3.4)

9.58 ~ 9.69 reserve

9.70 RUN & AI1-COMPARE-HIGH

9.71 RUN & AI1-COMPARE-LOW

9.72 RUN & AI2-COMPARE-HIGH

9.73 RUN & AI2-COMPARE-LOW

9.74 RUN & AI3-COMPARE-HIGH

9.75 RUN & AI3-COMPARE-LOW

DOx(70)~DOx(75) are used to detect the input level of AIx and inverter running respectively.

Pr.74 is used as the comparison level for AI1.

Pr.75 is used as the comparison level for AI2.

Pr.76 is used as the comparison level for AI3.

Under this application, the value of Pr.74, Pr.75 and Pr.76 should set in the range 0.0~1023.0.

AI1 input level can be monitored by checking Pr.56 when Pr.55=3.

AI2 input level can be monitored by checking Pr.56 when Pr.55=4.

AI3 input level can be monitored by checking Pr.56 when Pr.55=5.

Example: DOx(80) will ON, if inverter running and AI1 input level > Pr.74.

DOx(81) will ON, if inverter running and AI1 input level < Pr.74.

9.78 OL-WARNING

9.79 /OL-WARNING

The OL level can be monitored at Pr.61 when Pr.54=11.

DOx(78) will ON, if OL level >50%.

DOx(79) is complement function of DOx(78).

Refer to Pr.54, for monitoring the OL accumulation level.

9.80 AI1-COMPARE-HIGH

9.81 AI1-COMPARE-LOW

9.82 AI2-COMPARE-HIGH

9.83 AI2-COMPARE-LOW

9.84 AI3-COMPARE-HIGH

9.85 AI3-COMPARE-LOW

DOx(80)~DOx(85) are used to detect the input level of AIx respectively.

Pr.74 is used as the comparison level for AI1.

Pr.75 is used as the comparison level for AI2.

Pr.76 is used as the comparison level for AI3.

Under this application, the value of Pr.74, Pr.75 and Pr.76 should set in the range 0.0~1023.0.

AI1 input level can be monitored by checking Pr.56 when Pr.55=3.

AI2 input level can be monitored by checking Pr.56 when Pr.55=4.

AI3 input level can be monitored by checking Pr.56 when Pr.55=5.

Example: DOx(80) will ON, if AI1 input level > Pr.74.

DOx(81) will ON, if AI1 input level < Pr.74.

9.86 ACCELERATING

DOx(86) will ON, if inverter is increasing its output frequency.

9.87 DECELERATING

DOx(87) will ON, if inverter is decreasing its output frequency.

9.88 DISCHARGING

DOx(88) will ON, if the voltage of internal capacitor goes too high.

9.89 reserve

9.90 RUNNING FORWARD

DOx(90) = ON, when the inverter is Running in FORWARD direction.

9.91 RUNNING REVERSE

DOx(91) = ON, when the inverter is Running in REVERSE direction.

9.92 TMOC with Disable

When DIx(36)=TMIC is ON, this output function is the same as DOx(42).

If DIx(36) is OFF, then DOx(92) will always OFF.

9.93 /TMOC

Same as DOx(43)

10. Selection of Analog output function

This section describes the definition of analog output voltage between "AM" & "ACOM".

Refer to Section-1.2.2 for the internal circuit structure.

Relative parameter

Pr.37 -- AM_SELECT

Pr.38 -- AM_GAIN

Auxiliary Analog Output Terminal "AM" is provided for analog meter display, or other applications

Requiring the analog output signal.

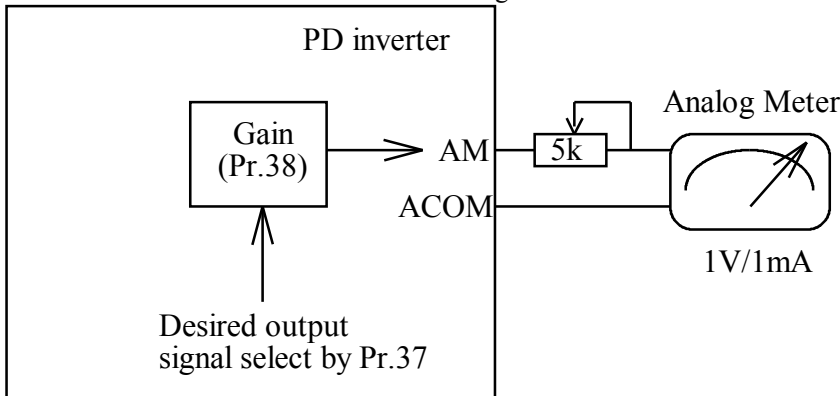
"AM_SELECT" is used to select desired signal, which will output to AM terminal.

"AM_GAIN" is used to fine tuning the output voltage level.

User may select any of the four signals in the Table for output to the "AM" terminal.

Pr.37	AM Terminal Function	Output Ratio	Remarks
0	HZ Signal	$+5V * ((Pr.57) / (Pr.15))$	
1	Reserve		
2	Vdc Signal	$+5V * ((Pr.59) / 1000)$	
3	Vout Signal	$+5V * ((Pr.60) / (2 * Pr.84))$	
4~6	Reserve		
7	PID Output	$+5V * (PID Output)$	
8	PID Output + Bias Input from AI1	If DIx(54)=ON, $+5V * (PID Boost * (PID Output + Bias Input from AI1))$ If DIx(54)=OFF, $+5V * (PID Boost * PID Output)$	Refer to Appendix A
9	PID Output + Bias Input from AI2	If DIx(54)=ON, $+5V * (PID Boost * (PID Output + Bias Input from AI2))$ If DIx(54)=OFF, $+5V * (PID Boost * PID Output)$	
10	PID Output + Bias Input from AI3	If DIx(54)=ON, $+5V * (PID Boost * (PID Output + Bias Input from AI3))$ If DIx(54)=OFF, $+5V * (PID Boost * PID Output)$	
11	PID Output + Bias Set by Pr.28	If DIx(54)=ON, $+5V * (PID Boost * (PID Output + Bias Set by Pr.28))$ If DIx(54)=OFF, $+5V * (PID Boost * PID Output)$	
12	Constant voltage	$+5V * ((Pr.38) / 255)$	
13~16	Reserve		
17	Heat Sink Temperature	$+5V * ((Pr.62) / 100)$	For PDAN series only

Recommend interface circuit to external analog meter:



First use Pr.37 to select desired output signal.

And let Pr.38=250.

Then adjust variable resistor for trimming to correct position.

If necessary, modify Pr.38 for fine-tuning.

Refer to Sec.1.2 for hardware structure.

11. Speed search and Base Block function

Pr.79 to Pr.82 are used to define the inverter's speed searching characteristics for restart process.

The Speed Search function may be initiated by two methods:

By Digital Input to initiate the speed search process

Let DIx(8), selects "Base Block" function to any Digital input. If DIx(8) is ON, then the inverter will disable IGBT output causing the motor **FREE RUN** to stop.

When DIx OFF again, the inverter will still remain in the BLOCK state for a period of time defined in the parameter **BASE BLOCK TIME (Pr.36)**. After the period of BASE BLOCK TIME, Then the restart process begins.

Power comes back normal after UP/OP alarm to initiate the speed search process

LET Pr.34 = 1, enables UP/OP restart function. If "UP" or "OP" alarm appear while inverter running, Then the inverter will disable IGBT output causing the motor FREE RUN.

When Power come back to normal again, the inverter will still remain in the BLOCK state for a period of time defined in the parameter **BASE BLOCK TIME (Pr.36)**. After the period of BASE BLOCK TIME, Then the restart process begins.

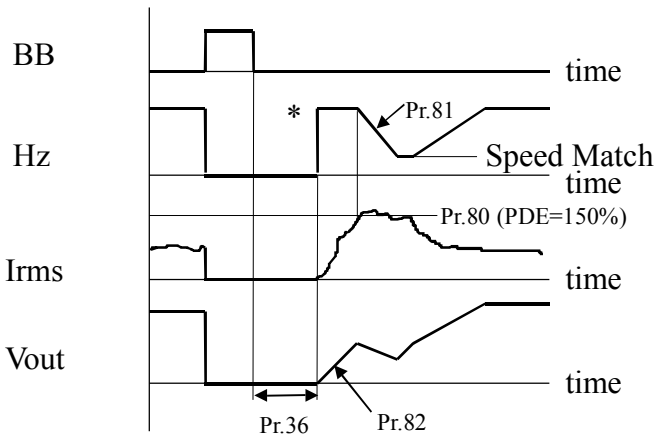
PARAMETER	FUNCTION	DESCRIPTION
Pr.79	RESTART TYPE	SELECT RESTART TYPE
Pr.80	RESTART STALL LEVEL	STALL LEVEL WHILE RESTARTING
Pr.81	RESTART DEC TIME	DEC TIME WHILE SPEED SEARCH
Pr.82	VOLTAGE RECOVER TIME	VOLTAGE INCREASING RATE WHILE RESTARTING

Pr.79=0: No restart speed search process. Inverter will start from Pr.04.

Pr.79=1: Speed search begins from previous running frequency.

Pr.79=2: Speed search begins from UPPER LIMIT frequency (Pr.15).

Pr.79=3: Speed search begins from SET SPEED.



*Note: Pr.79 selects the search start frequency.

After BASE BLOCK TIME, the following steps describe the speed search process:

- Send out a frequency Hz which is selected by Pr.79, and Let Vout =0.
- Maintain the initial frequency, and increase the output voltage Vout according to the rate defined by Pr.82. During this period, monitor the current until it reaches the level defined in Pr.80.
- Use Pr.81 as deceleration rate to decrease the output frequency Hz and output voltage Vout. Wait until Irms is less than Pr.80 that means now the inverter output frequency matches the motor speed.
- Now the inverter output frequency can start ramp to desired target frequency.

12. AUTO RUN Function

12.1 Auto Mode Selection & Running

TABLE OF PARAMETERS USED FOR AUTO MODE.

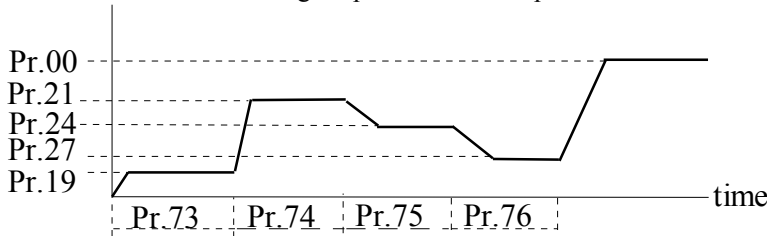
PARAMETER	FUNCTION
Pr.72	AUTO MODE SELECT
Pr.73	AUTO STEP 1(or 6) JOG SPD PERIOD
Pr.74	AUTO STEP 2(or 7) SPD1 SPD PERIOD
Pr.75	AUTO STEP 3(or 8) SPD2 SPD PERIOD
Pr.76	AUTO STEP 4(or 9) SPD3 SPD PERIOD
Pr.77	AUTO STEP 5(or 10) MANI SPD PERIOD

TABLE OF AUTO MODE FUNCTIONS

Pr.72	AUTO FUNCTION DESCRIPTION
0	NO AUTO FUNCTION
1	STEP RUN & MAINTAIN SPEED
2	STEP RUN, STOP & REPEAT
3	STEP RUN, STOP & CHANGE DIRECTION REPEAT
4	STEP RUN, & REPEAT
5	STEP RUN, & CHANGE DIRECTION REPEAT
6	SIMILAR TO MODE 4, BUT REPEAT FROM STEP2

Pr.72 = 1 STEP RUN & MAINTAIN

- STEP1 inverter running as if JOG command is applied.
Pr.73 (JOG_PERIOD) determines time.
- STEP2 inverter running as if SPD1 command is applied.
Pr.74 (SPD1_PERIOD) determines time.
- STEP3 inverter running as if SPD2 command is applied.
Pr.75 (SPD2_PERIOD) determines time.
- STEP4 inverter running as if SPD3 command is applied.
Pr.76 (SPD3_PERIOD) determines time.
- STEP5 inverter running at specified MAIN speed as if it is in normal mode.

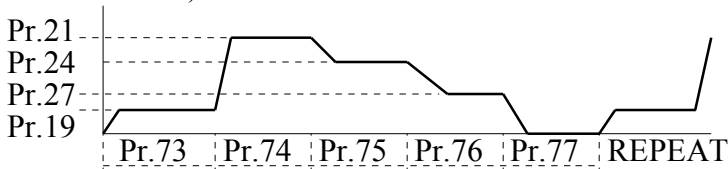


Example speed pattern of AUTO STEP RUN Type 1

Pr.72 = 2 STEP RUN, STOP & REPEAT

- STEP1 inverter running as if JOG command is applied.
Pr.73 (JOG_PERIOD) determines time.
- STEP2 inverter running as if SPD1 command is applied.
Pr.74 (SPD1_PERIOD) determines time.
- STEP3 inverter running as if SPD2 command is applied.
Pr.75 (SPD2_PERIOD) determines time.
- STEP4 inverter running as if SPD3 command is applied.
Pr.76 (SPD3_PERIOD) determines time.
- STEP5 inverter running as if STOP command is applied.
Pr.77 (HALT_PERIOD) determines time.

AFTER STEPS5, REPEAT FROM STEP1.



Example speed pattern of AUTO STEP RUN Type 2

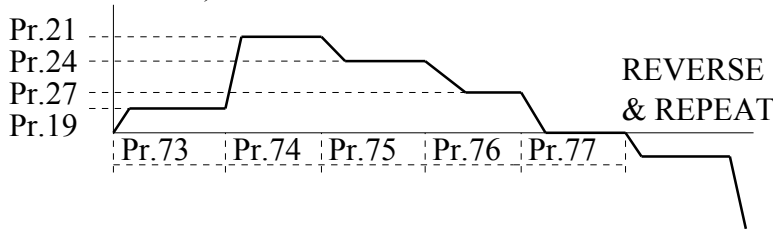
Pr.72 = 3 STEP RUN, STOP & CHANGE DIRECTION REPEAT

- STEP1 inverter running as if JOG command is applied.
Pr.73 (JOG_PERIOD) determines time.
- STEP2 inverter running as if SPD1 command is applied.
Pr.74 (SPD1_PERIOD) determines time.
- STEP3 inverter running as if SPD2 command is applied.
Pr.75 (SPD2_PERIOD) determines time.
- STEP4 inverter running as if SPD3 command is applied.
Pr.76 (SPD3_PERIOD) determines time.
- STEP5 inverter running as if STOP command is applied.
Pr.77 (HALT_PERIOD) determines time.

AFTER STEP5, CHANGE DIRECTION

- STEP6 inverter running as if JOG command is applied.
Pr.73 (JOG_PERIOD) determines time.
- STEP7 inverter running as if SPD1 command is applied.
Pr.74 (SPD1_PERIOD) determines time.
- STEP8 inverter running as if SPD2 command is applied.
Pr.75 (SPD2_PERIOD) determines time.
- STEP9 inverter running as if SPD3 command is applied.
Pr.76 (SPD3_PERIOD) determines time.
- STEP10 inverter running as if STOP command is applied.
Pr.77 (HALT_PERIOD) determines time.

AFTER STEP10, REPEAT FROM STEP1.



Example speed pattern of AUTO STEP RUN Type 3

Pr.72 = 4 STEP RUN & REPEAT

This mode is similar to mode2.

From STEP1 to STEP4, its operation is exactly the same as mode2.

Under STEP5 period, the inverter will run at MAIN speed instead of STOP command.

AFTER STEP5, REPEAT FROM STEP1.

Pr.72 = 5 STEP RUN & CHANGE DIRECTION REPEAT

This mode is similar to mode3.

From STEP1 to STEP4, its operation is exactly the same as mode3.

Under STEP5 period, the inverter will run at MAIN speed instead of STOP command.

From STEP6 to STEP9, its operation is exactly the same as mode3.

Under STEP10 period, the inverter will run at MAIN speed instead of STOP command.

AFTER STEP10, REPEAT FROM STEP1.

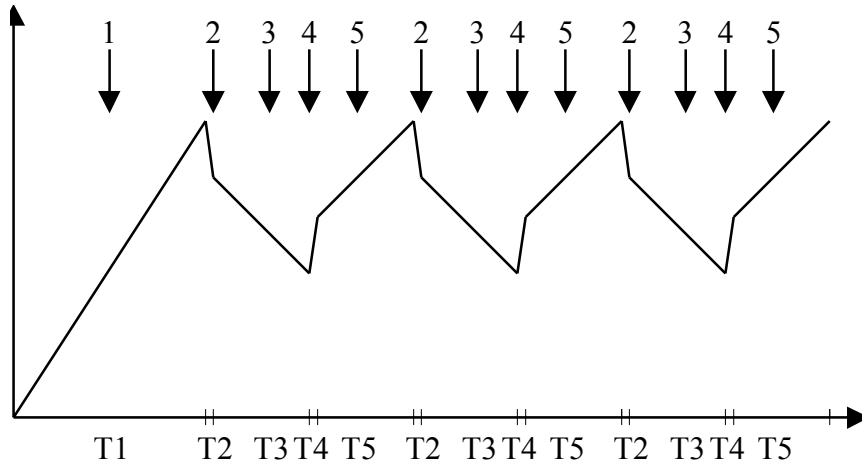
Pr.72 = 6 STEP RUN & REPEAT from STEP-2

This mode is similar to mode4.

From STEP1 to STEP5, its operation is exactly the same as mode4.

After STEP5, the procedure jumps to STEP2 and repeat.

START: SETP1-->STEP2 ~-->STEP5-->STEP2 ~-->STEP5-->STEP2 ~-->STEP5



12.2 Auto Run Status Output

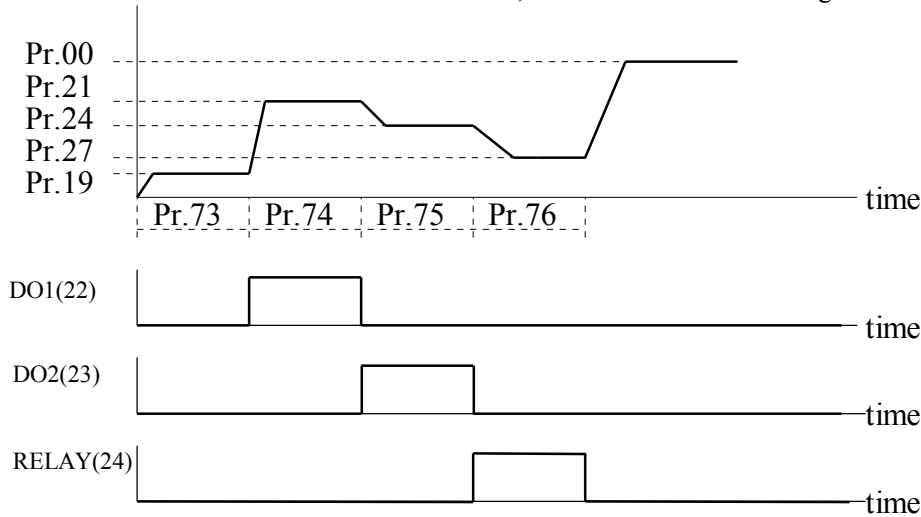
During AUTO RUNNING, there are special DOx functions reserved for AUTO STEP EQUAL application. (Refer to Section 9.21~9.30)

EXAMPLE:

If user wishes to activate the DOx outputs when inverter is auto running,

if LET DO1(22), select STEP2
 DO2(23), select STEP3
 DO3(24), select STEP4

THEN DO1 terminal will become ON, while the inverter is running at STEP2
 DO2 terminal will become ON, while the inverter is running at STEP3
 RELAY terminals will become ON, while the inverter is running at STEP4



EXAMPLE: Timing Relationship waveform of "STEP EQUAL OUTPUT " Function.

13. MONITOR function

While Panel is in MON mode, user can select which two statuses are to be monitored.

Pr.98 is used to assign the parameter to be monitored, when "I" LED is on.

Pr.99 is used to assign the parameter to be monitored, when "HZ" LED is on.

For example, the default value in Pr.99 is 57. That means, 7-segment will display the value of Pr.57 while "HZ" LED is on.

Note: For PDE series, Irms (Pr.61)=0. User can choose another important parameter for monitoring.

13.1 Operating Status Check

Parameters from Pr.57 ~ Pr.61 are inverter running status for user monitoring purpose.

Pr.57 HZ HZ status shows the running frequency.

Pr.58 RPM RPM status is calculated by HZ status.

$$\text{RPM} = (120 * \text{HZ} / \text{POLE}) * \text{GEAR_RATIO}\%$$

Refer to Section 5.4, description of Pr.52 & Pr.53.

Pr.59 Vdc Vdc is the DC voltage measured from internal Smoothing Capacitor.

$$\text{Vdc} = \text{Pr.87}(\%) * \text{Pr.56 (when Pr.55=0)}$$

Pr.60 Vout Vout is the Root-Mean-Square value of inverter output voltage.

Pr.61 IRMS (or other status)

Through Pr.54, other status can be selected for display.

Pr.54=0: Irms (ampere)

Pr.54=1: Irms (% of inverter rating)

Pr.54=2: Irms (% of motor rating)

Pr.54=3: Power Angle θ (Angle of Current Phase Lag)

$$\text{Pr.54=4: Output VA} = \sqrt{3} * V_{rms} * I_{rms}$$

Pr.54=5: Power Factor PF=cos(θ)

$$\text{Pr.54=6: Watt (ac side)} = \sqrt{3} * V_{rms} * I_{rms} * \cos(\theta)$$

Pr.54=7: Idc (ampere) (For PDA/PDH series only)

Pr.54=8: Idc (% of inverter rating) (For PDA/PDH series only)

Pr.54=9: Watt (dc side) = Vcap*Idc (For PDA/PDH series only)

Pr.54=10: Watt (limit)

Pr.54=11: OL accumulation level

Pr.54=32: Shows timer value when it is used. (For PDAN series only)

Pr.62 TEMPERATURE of HEAT SINK in Centigrade.

13.2 Terminal Status Check

User can easily check the input or output terminal status from following parameters:

TERMINAL STATUS is easily verified by select the corresponding parameter number.

Pr.63 Digital Input Terminal Status

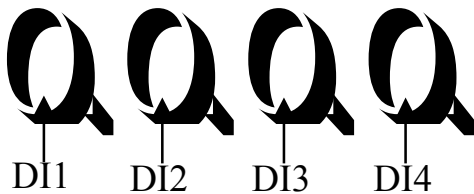
Monitors the DI1~DI4 input terminal status.

Digit 3: DI1 Input Terminal Status

Digit 2: DI2 Input Terminal Status

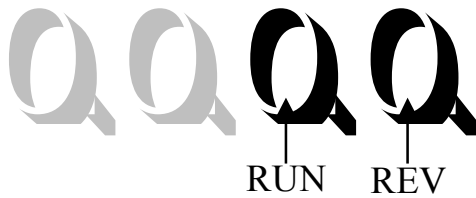
Digit 1: DI3 Input Terminal Status

Digit 0: DI4 Input Terminal Status



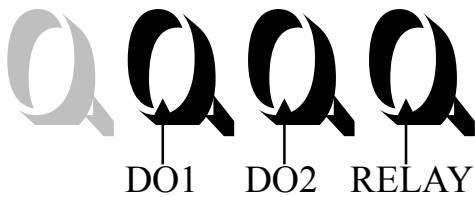
Input Terminal Status

Pr.64 Control Input Terminal status
 Monitors the RUN & REV input terminal status.
 Digit 1: RUN Input Terminal Status
 Digit 0: REV Input Terminal Status



Control Input Terminal status

Pr.65 Digital Output Terminal Status
 Monitors the DO1, DO2 & RY (1,2) output terminal status.
 Digit 2: DO1 Output Terminal Status
 Digit 1: DO2 Output Terminal Status
 Digit 0: RELAY Output Status



Digital Output Terminal Status

13.3 A/D Converter Check

Pr.55 A/D CHANNEL SELECT

Pr.56 A/D CONVERSION DATA

Use Pr.55 to select the desired channel for monitoring, then the 10-bits A/D converter of CPU will execute Analog to Digital conversion and put the conversion result in Pr.56.

The range of the converted data is from 0 to 1023 corresponding to full range input.

Pr.55	Pr.56 (A/D DATA)
0	VDC channel A/D value
1	Iv channel A/D value Note: For PDAN series only.
2	Iw channel A/D value Note: For PDAN series only.
3	AI1 channel A/D value
4	AI2 channel A/D value
5	AI3 channel A/D value
6	Thermistor A/D value
7	Reserve
8	Shows QUEUE content while using RS-485 communication port to write parameter Note: For PDAN series only.
9-31	Reserve
32	Shows COUNTER value when it is used. Note: For PDAN series only.

14. MAINTENANCE & ERROR MESSAGE

Monthly maintenance

a. Inverter running

Monitor and record the running status (ex. output current). Compare the data with the previous recorded.

b. Inverter power off

Check and Ensure all ventilation Fans are un-obstructed.

Examine the input and output power terminals for signs of overheating.

Three-Monthly maintenance

Perform monthly maintenance as described above.

Remove any accumulated dust from the equipment. Using a suction type cleaner with a non-conducting nozzle.

Error Messages:

ERROR CODE	MESSAGE DESCRIPTION
n. --	NO ALARM
n. OP	OVER VOLTAGE
n. UP	UNDER VOLTAGE
n. OL	OVER LOAD
n. OH	OVER HEAT
n. OC	OVER CURRENT when normal run
n. CA	OC when acceleration
n. CD	OC when deceleration
n. CB	OC when braking
n. CS	OC detect by Software

Note: n=0, present alarm type.

n=1, alarm type before.

n=2, alarm type twice before.

n=3, alarm type three times before.

Counter Measure

OP: Check input voltage or modify deceleration rate

UP: Check input voltage

OL: Check load current

OH: If external Digital Input causes the OH, check external input source.

Otherwise, check the working temperature of HEAT SINK, and check the load current, or decrease carrier frequency.

OC: Check motor wiring, or check inverter itself.

CA: Decrease acceleration rate.

CD: Decrease deceleration rate.

CB: Modify Pr.05, Pr.06, Pr.07, Pr.08.

CS: Check inverter by qualified engineer.

15. RS485 Communication

15.1 RS485 Communication port related parameter

While using serial communication control, this parameter is used to define the BAUD RATE, PROTOCOL and UNIT NUMBER (or station address).

15.1.1 PDAN series Communication Parameter

Pr.93=PB.ID (P: Protocol, B: Baud Rate , ID: Unit Number):

1. ID is used to assign the communication address while this inverter controlled by RS485 port. ID=01~99
2. P: Protocol

Setting	Protocol
P=0	JPS Protocol, parameter number format “nn”
P=1	JPS Protocol, parameter number format “nnn”
P=2	Modbus Protocol, no parity, 8bit binary
P=3	JPS Modbus Protocol, no parity, 8bit binary

3. B: Baud Rate

Setting	Baud Rate
B=0	4800bps , 2stopbits
B=1	9600bps , 2stopbits
B=2	19200bps , 2stopbits
B=3	Reserve
B=4	4800bps , 1stopbits
B=5	9600bps , 1stopbits
B=6	19200bps , 1stopbits
B=7	Reserve

15.1.2 PDA/PDE/PDH series Communication Parameter

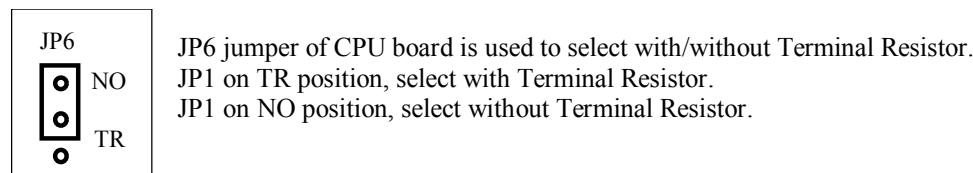
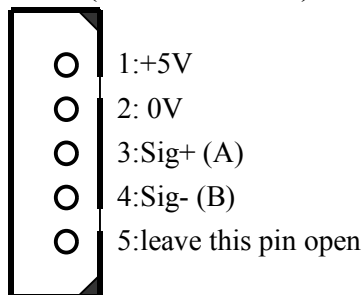
Pr.93= B.ID (B: Baud Rate, ID: Unit Number):

1. ID is used to assign the communication address while this inverter controlled by RS485 port. ID=01~99
2. B: Baud Rate

Setting	Baud Rate
B=0	4800bps , 7 bit data , Even Parity , 2 Stop Bit
B=1	9600bps , 7 bit data , Even Parity , 2 Stop Bit
B=2	19200bps , 7 bit data , Even Parity , 2 Stop Bit
B=3	Reserve
B=4	4800bps , 7 bit data , Even Parity , 1 Stop Bit
B=5	9600bps , 7 bit data , Even Parity , 1 Stop Bit
B=6	19200bps , 7 bit data , Even Parity , 1 Stop Bit
B=7	Reserve

15.2 RS485 Configuration

PDAN series build in RS485 communication port on CON6 of CPU board, the definition of CON6 is:
CON6 (JAM-SC25-05WS)



- RS485 port can use to control multiple inverter by connect the signal in parallel.
- The option of RS485/232 card is used to convert RS485 into RS232.
- The option of standard cable (CABLE_RS485) is used to transform JAM connector (CON6) into standard 9 pin D-sub Male connector. The definition the D-sub connector is:

9 pin D-sub Male Connector	Definition	JAM Connector (CON6)
PIN1~3	N.C.	
PIN4	A (SIG+)	PIN3
PIN5	B (SIG-)	PIN4
PIN6	0V	PIN2
PIN7~9	N.C.	

Note: PDA/PDE/PDH series must use RS485/232 option card when using serial communication control ◦

15.3 JPS Protocol & Format

All code transfer between Computer and Drive are ASCII code, and the “CR” code (0x0D) must add to the end of each command string.

Data Format: 7 Bit data ◦ Even Parity ◦

15.3.1 Computer to Inverter

Computer may send three types of message to drive.

15.3.1.1 Control Command (No response will send back from drive)

Format: “C,uu,cc,ffff”

C: Head of COMMAND String.

uu: ID of drive, from 00 to 99.

If the “uu” code in command string is “00”, all drives can be controlled at the same time.

cc: Control command code, from 00 to 15.

The “cc” number is actually converted from four bits binary data.

cc= 8 * Bit-3 (JOG) + 4 * Bit-2 (Reverse) + 2 * Bit-1 (RUN) + Bit-0 (Reset)

Control Code	Function
cc=00	Stop
cc=01	Reset
cc=02	Forward Run
cc=06	Reverse Run
cc=10	Forward JOG Run
cc=14	Reverse JOG Run

ffff: Set Frequency.

PDAN/PDA/PDE series: from 00000 to 65000, representing desired Hz = 0.00 to 650.00

PDH series: from 00000 to 30000, representing desired Hz = 0.0 to 3000.0

15.3.1.2 Write Command (No response will send back from drive)

format: “W,uu,nn,dddd” or “W,uu,nnn,dddd”

W: Head of WRITE String.

uu: ID of drive, from 00 to 99.

If the “uu” code in command string is “00”, all drives can be controlled at the same time.

nn(n): PDAN series: If Protocol P=0, Parameter format is “nn”, from 00 to 99

If Protocol P=1, Parameter format is “nnn”, from 000 to 999

PDA/PDE/PDH series: Parameter format is “nn”, from 00 to 99

dddd : data value, from 00000 to 65535.

If data exceed upper or lower limit (shown in parameter table) will be trimmed within boundary automatically.

15.3.1.3 Read Command (Drive will send back P-string after receive this string)

Format: “R,uu,nn” or “R,uu,nnn”

R: Head of READ String

uu: ID of drive, from 01 to 99.

Do not specify uu=00 for Read Command while multiple drives are under control.

nn(n): PDAN series: If Protocol P=0, Parameter format is “nn”, from 00 to 99

If Protocol P=1, Parameter format is “nnn”, from 000 to 999

PDA/PDE/PDH series: Parameter format is “nn”, from 00 to 99

15.3.2 Drive to Computer

Drive will send back Parameter data and its Status after receive Read Command from computer.

Format: “P,uu,nn,tt,dddd,s,aaa” or “P,uu,nnn,tt,dddd,s,aaa”

P: P stands for PARAMETER String

uu: ID of drive, from 00 to 99.

This number is defined in Pr.093 of each drive.

nn(n): PDAN series: If Protocol P=0, Parameter format is “nn”, from 00 to 99

If Protocol P=1, Parameter format is “nnn”, from 000 to 999

PDA/PDE/PDH series: Parameter format is “nn”, from 00 to 99

tt: **Data type of this parameter, from 00 to 22.**

tt	Data Type	Data Range	Format
0	Read/Write, store in EAROM	00000~65535	999.99
1	Read/Write, store in EAROM	00000~65535	9999.9
2	Read/Write, store in EAROM	00000~65535	99999
3	Read/Write, store in EAROM	00000~00255	999.99
4	Read/Write, store in EAROM	00000~00255	9999.9
5	Read/Write, store in EAROM	00000~00255	99999
6	Read/Write, store in EAROM	00000~00001	99999
7	Read/Write, store in RAM	00000~65535	99999
8	Read only, store in RAM	00000~65535	999.99, if data >32767 which is - (65536-ddddd)
9	Read only, store in RAM	00000~65535	999.99
10	Read only, store in RAM	00000~65535	9999.9
11	Read only, store in RAM	00000~65535	99999
12	Read only, store in RAM	00000~00255	999.99
13	Read only, store in RAM	00000~00255	9999.9
14	Read only, store in RAM	00000~00255	99999
15	Read only, store in RAM	00000~00001	99999
16	Read only, store in RAM	00000~00015	99999, (Binary)
17	Read only, store in RAM	00000~00007	99999, (Binary)
18	Read only, store in RAM	00000~00003	99999, (Binary)
19	Read only, store in RAM	00000~01023	99999
20	Read only, store in RAM	00000~00001	99999, (Hex)
22	Read only, store in RAM	00000~00001	99999, (Hex)

dddd: Data value, from 00000 to 65535.

s: Drive output status, from 0 to 9.

s = 1: Drive Reverse Running

s = 2: Drive Forward Running.

s = 3: Drive Stop

else, undefined.

aaa: Alarm history, from 0000 to 9999

The drive can record 4 Alarm messages.

Most significant digit stands for oldest Alarm message.

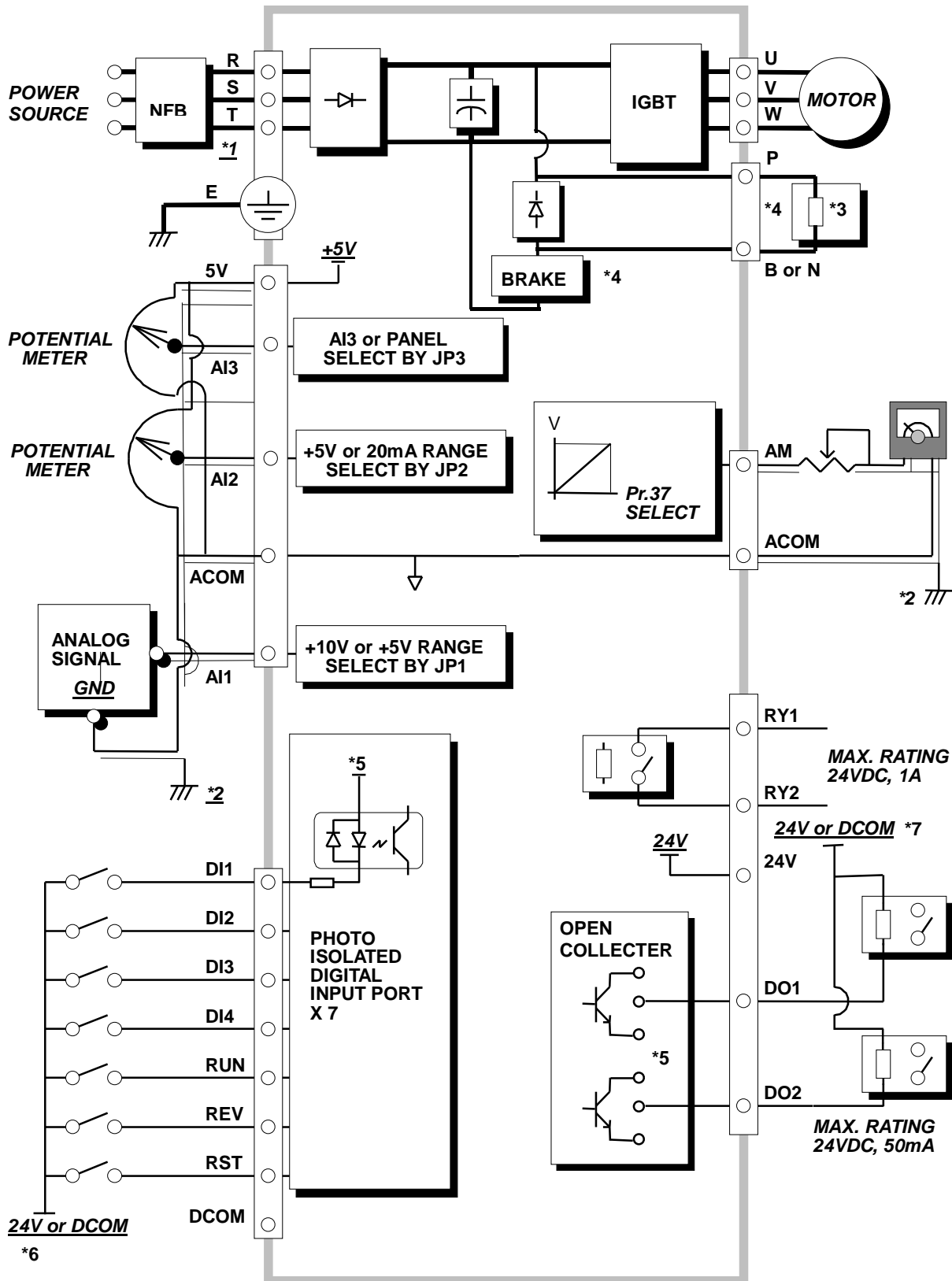
Least significant digit stands for present Alarm message.

Refer to section 14.2 for Alarm code.

15.4 Modbus Protocol

PDAN series: Standard Modbus protocol and JPS Modbus protocol are built in to the inverter as standard, please contact our application department for details.

16. BLOCK DIAGRAM OF PDA INVERTER



Note:

1. Apply NFB before power line input to inverter.
2. The analog signal wires should be shielded & connected to the Earth.
3. Refer to Sec.2.6, in order to select suitable discharging resistor.
4. For models with P & N, must use separate Brake Discharge Unit and do not connect resistor to the P, N terminals directly.
5. To select Sink (NPN) type or Source (PNP) type by Jumper JP4 & JP5. Refer to section 1.2.3 & 1.2.4.
6. Connect to DCOM if Sink (NPN) type selected; connect to 24V if Source (PNP) type selected.
7. Connect to 24V if Sink (NPN) type selected; connect to DCOM if Source (PNP) type selected

Appendix A : PID Function

The PID function is for PDAN series only.

A-1 PID Parameter

Pr.73 PID Input Select

This parameter composed by “X” & “Y” separated by decimal point, the X value is used to select the PID Set signal source for PID block, and the Y value is used to select the PID FB signal source for PID block.

The equivalent source for selection value “X” or “Y” is:

Pr.73	Description
0	Constant value defined by Pr.27 (0.00~100.00%)
1	From Analog Input AI1 , 0 ~ +5V → 0~0x7FFF
2	From Analog Input AI2 , 0 ~ +5V → 0~0x7FFF
3	From Analog Input AI3 , 0 ~ +5V → 0~0x7FFF
4	From Analog Input AI1 , +5V ~ 0 → 0~0x7FFF
5	From Analog Input AI2 , +5V ~ 0 → 0~0x7FFF
6	From Analog Input AI3 , +5V ~ 0 → 0~0x7FFF
10	DI2(28) Clock Input, the value calculate as: 0x7FFF * (Clocks Input from DI2(28) per 13.2ms / Pr.71)

Pr.28 PID Bias (0.1~100.0%)

Pr.29 PID Boost (0.0~500.0%)

Pr.74 PID Preset (0.1~100.0%)

Pr.75 PID P Gain

Pr.76 PID I Gain

Pr.77 PID D Gain

Note: when use PID block function, do not use other function of Pr.73~77

A-2 Digital Input Function

DIx	Function	Description
50	PID Enable	If DIx(50) = OFF, PID block disabled. If DIx(50) = ON, PID block enabled.
51	PID Hold	If DIx(51) = OFF, PID Integrator normal. If DIx(51) = ON, PID Integrator Hold.
52	PID Clear	If DIx(52) = ON, PID Integrator Clear.
53	PID Preset	If DIx(53) = ON, PID Integrator preset to the value defined by Pr.74
54	PID Bias Enable	If DIx(54) = ON, Bias = Bias Input Enable. If DIx(54)=OFF, Bias = 0
55	PID Boost Enable	If DIx(55) = ON, Boost = Pr.29 (0.0~500.0%) If DIx(55) = OFF, Boost = 100.0%. when DIx(55) = ON, PID output will hold on original value, it is similar to DIx(51)

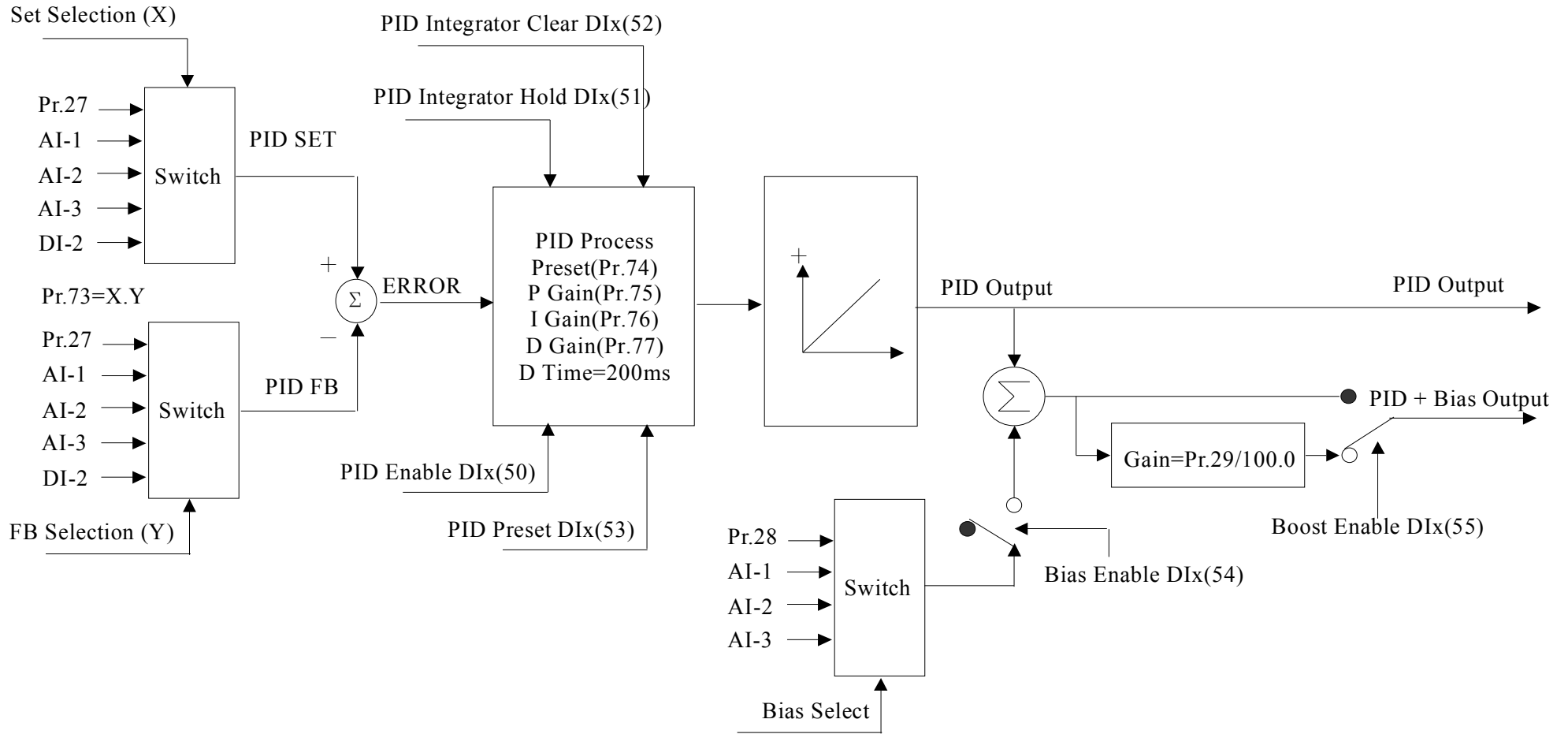
A-3 Speed Source

Pr.40	Speed Source
40	Set Frequency = PID Output
48	If DIx(54) = ON, Set Frequency = (PID Boost * (PID Output + Bias Input from AI1)) If DIx(54) = OFF, Set Frequency = (PID Boost * PID Output)
49	If DIx(54) = ON, Set Frequency = (PID Boost * (PID Output + Bias Input from AI2)) If DIx(54) = OFF, Set Frequency = (PID Boost * PID Output)
50	If DIx(54) = ON, Set Frequency = (PID Boost * (PID Output + Bias Input from AI3)) If DIx(54) = OFF, Set Frequency = (PID Boost * PID Output)
51	If DIx(54) = ON, Set Frequency = (PID Boost * (PID Output + Bias Set by Pr.28)) If DIx(54) = OFF, Set Frequency = (PID Boost * PID Output)

A-4 Analog Function

Pr.37	AM Output
7	PID Output
8	If DIx(54) = ON, AM = +5V * (PID Boost * (PID Output + Bias Input from AI1)) If DIx(54) = OFF, AM = +5V * (PID Boost * PID Output)
9	If DIx(54) = ON, AM = +5V * (PID Boost * (PID Output + Bias Input from AI2)) If DIx(54) = OFF, AM = +5V * (PID Boost * PID Output)
10	If DIx(54) = ON, AM = +5V * (PID Boost * (PID Output + Bias Input from AI3)) If DIx(54) = OFF, AM = +5V * (PID Boost * PID Output)
11	If DIx(54) = ON, AM = +5V * (PID Boost * (PID Output + Bias Set by Pr.28)) If DIx(54) = OFF, AM = +5V * (PID Boost * PID Output)

A-5 PID Function Block



Kemmerich Elektromotoren GmbH u. Co. KG

Hückeswagener Str. 120a
51647 Gummersbach/Windhagen
Telefon +49/ (0) 2261/50198-0
Telefax +49/ (0) 2261/50198-20
www.elektromotoren.de