INSTRUCTION MANUAL
使用說明書

TECO
INVERTER

220V Class 1Ø 0.5~3HP
0.4~2.2KW

220V Class 3Ø 0.5~40HP
0.4~30 KW

440V Class 3Ø 1~75HP
0.75~55 KW

TECO CVP
恆壓泵浦專用機
For constant-pressure pump

Table of Content

Preface

0.1 Preface

To extend the performance of the product and ensure your safety, please read this manual thoroughly before using the inverter. Should there be any problem in using the product and can not be solved with the information provided in the manual, contact your nearest Teco's distributor or our sales representatives who will be willing to help you. Please keep using Teco's products in the future.

※ Precautions

The inverter is an electrical electronic product. For your safety, there are symbols such as "Danger", "Caution" in this manual to remind you to pay attention to safety instructions on handling, installing, operating, and checking the inverter. Be sure to follow the instructions for highest safety.

🛇 Danger	Indicates a potential hazard could cause death or serious personal injury if misused.

⚠ Caution	Indicates that the inverter or the mechanical system might be damaged if misused.

🛇 Danger
● Do not touch any circuit boards or components if the charging indicator is still lit after turned the power off.
● Do not wire when the inverter is electrified. Do not check parts and signals on circuit boards during the inverter operation.
● Do not disassemble the inverter and modify internal wires, circuits and parts.
Ground the ground terminal of the inverter properly. As for 200V class ground to 100 Ω or below, 400v class ground to 10Ω or below.

⚠ Caution
● Do not perform a voltage test on parts inside the inverter. High voltage will easily destroy these semiconductor parts.
● Do not connect T1 (U), T2 (V), and T3 (W) terminals of the inverter to AC power supply.
● CMOS ICs on the inverter's main board are susceptible to static electricity. Do not touch the main circuit board

※Products Inspection

TECO's inverters are all passed the function test before delivery. Please check the followings when you received and unpacked the inverter:
- The model and capacity of the inverter are the same as those specified in your purchase order.
- Check where there are any damages caused by transportation. Please do not apply the power, and do contact Teco's sales representatives if any of the above problems happened.

Chapter 1   Definition of Model

```
MODEL        : JNTHBCBA0001BEAU-
Motor Rating : 1HP/0.75kW


INPUT        : AC 3 phases 50/60Hz
VOLTAGE      : 380~480V (+10%, -15%)
Amps         : 4.2A
OUTPUT       : AC 3 phases 0~400Hz
VOLTAGE      : 0~480V
Amps         : 2.3A


TECO Electric & Machinery Co., Ltd.
```

Inverter model→

Input voltage→

Output specifications→

| JNTH | BC | BA | 0001 | AC | A | U | F |

Series:

Keypad Panel
BC : LED
BG : LCD
BL : BLIND

Horsepower :
R500 : 0.5 HP
0001 : 1.0 HP
0002 : 2.0 HP
0003 : 3.0 HP
0005 : 5.0 HP
7R50 : 7.5 HP
0010 : 10 HP
0015 : 15 HP
0020 : 20 HP
0025 : 25 HP
0030 : 30 HP
0040 : 40 HP
0050 : 50 HP
0060 : 60 HP
0075 : 75 HP

Enclosure :
BA : IP00 or IP20
BB : NEMA1

Power supply
AC: Single phase 220V
BC: Three phase 220V
BE: Three phase 440V

UL Approval :
U : YES

Noise Filter :
- : None
F : Built-in

A: CVP Series
Constant-pressure
pump type inverter

Chapter 2   Safety Precautions

2.1 Operation Precaution

2.1.1 Before Power ON

⚠ **Caution**
The line voltage applied must comply with the inverter's specified input voltage.

⚠ **Danger**
Make sure the main circuit connections are correct. L1(L), L2 and L3(N) are power-input terminals and must not be mistaken for T1, T2 and T3. Otherwise, the inverter might be damaged.

⚠ **Caution**
● To avoid the front cover from disengaging, do not pull the cover during handling for the heat sink should be fallen off. Accident falling down will damage the inverter or injure to person, which should be avoided.   ● To avoid the risk of fire, do not install the inverter on a flammable object. Install it on nonflammable object such as metal.   ● If several inverters are placed in the same control panel, add extra heat sink to keep the temperature below 40 degree C to avoid overheat or fire.   ● When removing or installing the operator, turn OFF the power first, and manipulate the operator following the instruction of the diagram to avoid operator error or no display caused by bad contact.

Warning
This is a product of the restricted sales distribution class according to IEC 61800-3. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

⚠ **Caution**
To ensure the safety of peripheral devices, it is strongly command to install a fast acting fuse in the input side especially for higher output system. Regarding the specification of fast acting fuse, please refer to P7.

2.1.2 During Power ON

⚠ Danger
Do not plug or unplug the connectors on the inverter when electrified to avoid the control panel damage resulting from erratic transition voltage surge due to contact bounce.

2.1.3 Before Operation

⚠ Caution
The inverter will flash the power voltage 5 seconds when applying power.

2.1.4 During Operation

⚠ Danger
Do not engage or disengage the motor during operation. Otherwise, the over-current will cause the inverter to disconnect or the main circuit to burn.

⚠ Danger
• To avoid electric shock, do not take the front cover off during electrifying • The motor will restart automatically after stop when auto-restart function is on. In this case, do not get close to the machine. • Note: The stop switch is different from the usage of the emergency stop switch. It must be set first to be effective.

⚠ Caution
• Do not touch heat-generating components such as heat sink and braking resistor. • The inverter can drive the motor running from low speed to high speed. Verify the allowable capacities range of the motor and the mechanism. • Note the settings related to the braking reactor. • Do not check signals on circuit boards while the inverter is running.

⚠ Caution
It is after 5 minutes that disassembling or checking the components could be performed as power supply OFF and the indicator turned off.

2.1.5 During Maintenance

| ⚠ **Caution** |
| --- |
| The inverter should be used in a non-condensed environment with temperature from –10 degree C to +40 degree C and relative humidity of 95% non-condense. |

⚠ **Caution**
When the inverter top cover has removed, it can be used in a non-condensed environment with temperature from –10 degree C to +50 degree C and relative humidity of 95%, but the environment should be free from water and metal dust.

Chapter 3   Notice for wiring

3.1 Precautions for Peripheral Applications

Power

Molded-case circuit breaker

Magnetic contactor

AC reactor for power improvement

Install fast action fuse (If necessary)

Input noise filter

CVP inverter

Ground

Three-phase cage motor

Ground
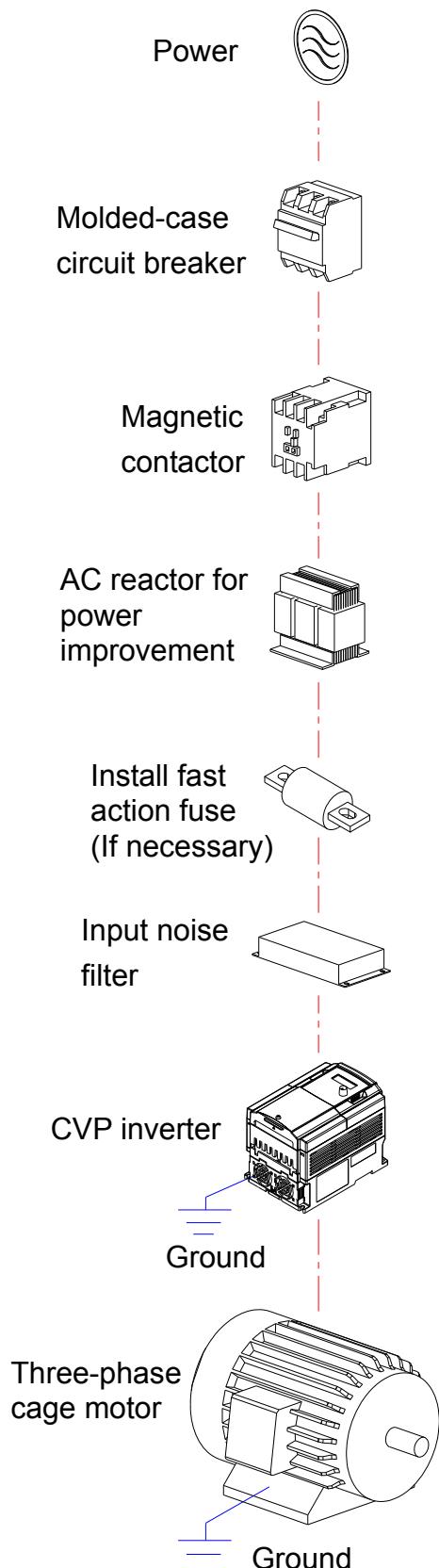
Power supply:
- Make sure the voltage applied is correct to avoid damaging the inverter.
- A molded-case circuit breaker must be installed between the AC source and the inverter

Molded-case circuit breaker:
- Use a molded-case circuit breaker that conforms to the rated voltage and current of the inverter to control the power ON/OFF and protect the inverter.
- Do not use the inverter as the switch for run/stop switch.

Leakage breaker:
- Install a leakage breaker to prevent error operation caused by electric leakage and to protect operators
- Setting current should be 200mA or above and the operating time at 0.1 second or longer to prevent malfunction.

Magnetic contactor:
- Normal operations do not need a magnetic contactor. But a contactor has to be installed in primary side when performing functions such as external control and auto restart after power failure, or when using brake controller.
- Do not use the magnetic contactor as the run/stop switch of the inverter.

AC reactor for power improvement:
- When inverters below 200V/400V 15KW are supplied with high capacity (above 600KVA) power source or an AC reactor can be connected to improve the power performance.

Install fast action fuse (If necessary):
- To ensure the safety of peripheral devices, please install the fast action fuse. Regarding the specification, please refer to P7.

Input noise filter:
- A filter must be installed when there are inductive load around the inverter

Inverter:
- Input power terminals L1, L2, and L3 can be used in any sequence regardless of phases.
- Output terminals T1, T2, and T3 are connected to U, V, and W terminals of the motor. If the motor is reversed while the inverter is forward, just swap any two terminals of T1, T2, and T3.
- To avoid damaging the inverter, do not connect the input terminals T1, T2, and T3 to AC power.
- Connect the ground terminal properly. 200 V series: class 3 grounding, <100Ω; 400 V series : <10Ω.

3.2 Fuse types:

Drive input fuses are required to disconnect the drive from power in the event of a component failure in the drive's power circuitry. The drive's electronic protection circuitry is designed to clear drive output short circuits and ground faults without blowing the drive input fuses. Table below shows the recommended input fuse ratings for CVP inverter. For effective protection use fuses with current-limit function, non delay type, also consider the applicable national and international regulations for short circuit and over current protection.

For UL type approval consider the following fuse types RK5, CC or T.

For non UL type approval consider gG and aR type fuses.

gG:-   (Overload and Short circuit protection)

aR ultra rapid   (Short circuit protection only), suitable for protection of Power semiconductors.

TECO Molded case circuit breakers can be used in Place of the input fuse, consider the necessity of back up fuse to provide correct protection according to the applicable national and international regulations. Consult with your fuse suppliers if in doubt.

	JNTHBCBA-	HP	KW	KVA	100% CONT Output AMPS (A)	Max.RK5 FUSE Rating(A)	Max.CC or T FUSE Rating(A)
220V class(1φ)	R500AC	0.5	0.4	1.2	3.1	10	20
	0001AC	1	0.75	1.7	4.5	15	30
	0002AC	2	1.5	2.9	7.5	20	40
	0003AC	3	2.2	4.0	10.5	25	50
220V class(3φ)	R500BC	0.5	0.4	1.2	3.1	8	10
	0001BC	1	0.75	1.7	4.5	12	15
	0002BC	2	1.5	2.9	7.5	15	20
	0003BC	3	2.2	4.0	10.5	20	30
	0005BC	5	3.7	6.7	17.5	30	50
	7R50BC	7.5	5.5	9.9	26	50	60
	0010BC	10	7.5	13.3	35	60	70
	0015BC	15	11.0	20.6	48	80	100
	0020BC	20	15.0	27.4	64	100	125
	0025BC	25	18.5	34.0	80	125	150
	0030BC	30	22.0	41.0	96	160	200
	0040BC	40	30.0	54.0	130	200	250
440V class(3φ)	0001BE	1	0.75	1.7	2.3	6	10
	0002BE	2	1.5	2.9	3.8	10	15
	0003BE	3	2.2	4.0	5.2	10	20
	0005BE	5	3.7	6.7	8.8	20	30
	7R50BE	7.5	5.5	9.9	13	25	35
	0010BE	10	7.5	13.3	17.5	30	50
	0015BE	15	11.0	20.6	25	50	60
	0020BE	20	15.0	27.4	32	60	70
	0025BE	25	18.5	34.0	40	70	80
	0030BE	30	22.0	41.0	48	80	100
	0040BE	40	30.0	54.0	64	100	125
	0050BE	50	37.0	68.0	80	125	150
	0060BE	60	45.0	82.0	96	150	200
	0075BE	75	55.0	110.0	128	200	250

*Fuse ratings are based upon 300V fuses for 230V inverter, and 500V for 460V inverters

※Notice
- To avoid shock hazards, do not touch any electrical component when the power is applied or just after five minutes the power plug is unplugged. The other action should be performed after the charge indicator went off.
- Do not perform wiring on the inverter while it is still electrified. Disregard of this notice could cause serious injure or death to persons.

※This product is designed to use in Pollution Degree 2 environment or equivalent environments.

3.3 Inflammable materials

A. Screwdriver torque:

Wiring with a screwdriver or other tools and follow the torque listed below:

Securing torque			
Horsepower	Power source	Nominal torque for TM1 terminal	
0.5/1/2(3φ)	200-240V	0.59/0.08 (LBS-FT / KG-M)	7.10/8.20 (LBS-IN/KG-CM)
1/ 2	380-480V		
2(1φ)/3/5/7.5/10	200-240V	1.5/0.21 (LBS-FT/KG-M)	18.00/20.28 (LBS-IN/KG-CM)
3/ 5/ 7.5/ 10/15	380-480V		
15/20/25	200-240V	1.84/0.3 (LBS-FT / KG-M)	22.1/30 (LBS-IN/KG-CM)
20/25/30	380-480V		
30/40	200-240V	4.42/0.66 (LBS-FT/KG-M)	53.1/66 (LBS-IN/KG-CM)
40/50/60/75	380-480V		

B. Power wires:

Power wires are connecting to L1, L2, L3, T1, T2, T3, P, BR and P1. Choose wires in accordance with the following criteria:

(1) Use copper wires only. Deciding diameters of wires should be based on rating working at 105 degree C.
(2) For rating voltage of wires, the minimum voltage of 230VAC type is 300V, and 460VAC type is 600V.
(3) For safety reason, the power wires should be fixed by type terminal.

C. Control wires:

Control wires are wires connecting to TM2 control terminal. Choose the wire in accordance with the following criteria:

(1) Use copper wires only. Deciding diameters of wires should be based on rating working at 105 degree C.
(2) For rating voltage of wires, the minimum voltage of 230VAC type is 300V, and 460VAC type is 600V.
(3) To avoid noise interference, do not route the control wires in the same conduit with power wires and motor wires.

D. Nominal electrical specifications of the terminals Block:

The following list is nominal values of TM1:

Horsepower	Power source	Volts	Amps
0.5/1/ 2(3φ)	200-240V		15A
1/ 2	380-480V		
2(1φ)/3/5/ 7.5/ 10	200-240V		40A
3/ 5/ 7.5/ 10/15	380-480V		
15/20/25	200-240V	600	80A
20/25/30	380-480V		60A
30	200-240V		100A
40/50	380-480V		
40	200-240V		150A
60/75	380-480V		

Note: Nominal values of input and output signals (TM2) – follow the specifications of class 2 wiring.

3.4 Specifications

Single phase, 200-240V model

JNTHBCBA□□□□ACAU(F)	R500	0001	0002	0003
Horsepower(HP)	0.5	1	2	3
Suitable Motor Capacity(KW)	0.4	0.75	1.5	2.2
Rated Output Current(A)	3.1	4.5	7.5	10.5
Rated Capacity(KVA)	1.2	1.7	2.9	4.0
Max. Input Voltage	Single Phase: 200~240V +10% -15%，50/60H$_Z$±5%			
Max. Output Voltage	Three Phases: 0~240V			
Input Current(A)	8.5	12	16	23.9
Net Weight(KG)	1.2(1.3)	1.2(1.3)	1.5(1.8)	1.9(2.3)
Allowable momentary power loss time (second)	1.0	1.0	2.0	2.0

Three phases, 200 – 240V model

JNTHBCBA□□□□BCAU	R500	0001	0002	0003	0005	7R50	0010	0015	0020	0025	0030	0040
Horsepower(HP)	0.5	1	2	3	5	7.5	10	15	20	25	30	40
Suitable Motor Capacity(KW)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30
Rated Output Current(A)	3.1	4.5	7.5	10.5	17.5	26	35	48	64	80	96	130
Rated Capacity(KVA)	1.2	1.7	2.9	4.0	6.7	9.9	13.3	20.6	27.4	34	41	54
Max. Input Voltage	Three Voltage: 200~240V +10% -15%，50/60H$_Z$±5%											
Max. Output Voltage	Three Voltage: 0~240V											
Input Current(A)	4.5	6.5	11	12.5	20.5	33	42	57	70	85	108	138
Net Weight(KG)	1.2	1.2	1.2	1.75	1.9	5.6	5.6	15	15	15	33	34
Allowable momentary power loss time (second)	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

Three phases, 380 – 480V model

JNTHBCBA□□□□BEAU(F)	0001	0002	0003	0005	7R50	0010	0015	0020	0025	0030	0040	0050	0060	0075
Horsepower(HP)	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75
Suitable Motor Capacity(KW)	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55
Rated Output Current(A)	2.3	3.8	5.2	8.8	13.0	17.5	25	32	40	48	64	80	96	128
Rated Capacity(KVA)	1.7	2.9	4.0	6.7	9.9	13.3	19.1	27.4	34	41	54	68	82	110
Max. Input Voltage	Three Voltage:380~480V +10% -15%， 50/60H$_Z$±5%													
Max. Output Voltage	Three Voltage: 0~480V													
Input Current(A)	4.2	5.6	7.3	11.6	17	23	31	38	48	56	75	92	112	142
Net Weight(KG)	1.2 (1.3)	1.2 (1.3)	1.8 (2.2)	1.8 (2.2)	5.6 (6.6)	5.6 (6.6)	5.6 (6.6)	15	15	15	33	33	50	50
Allowable momentary power loss time (second)	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

NOTE1: DC Reactor is built-in for 30hp above in 200V class series.

NOTE2: DC Reactor is built-in for 40hp above in 400V class series.

3.5 Wiring Diagram CVP Series Inverter

Wiring diagram I:
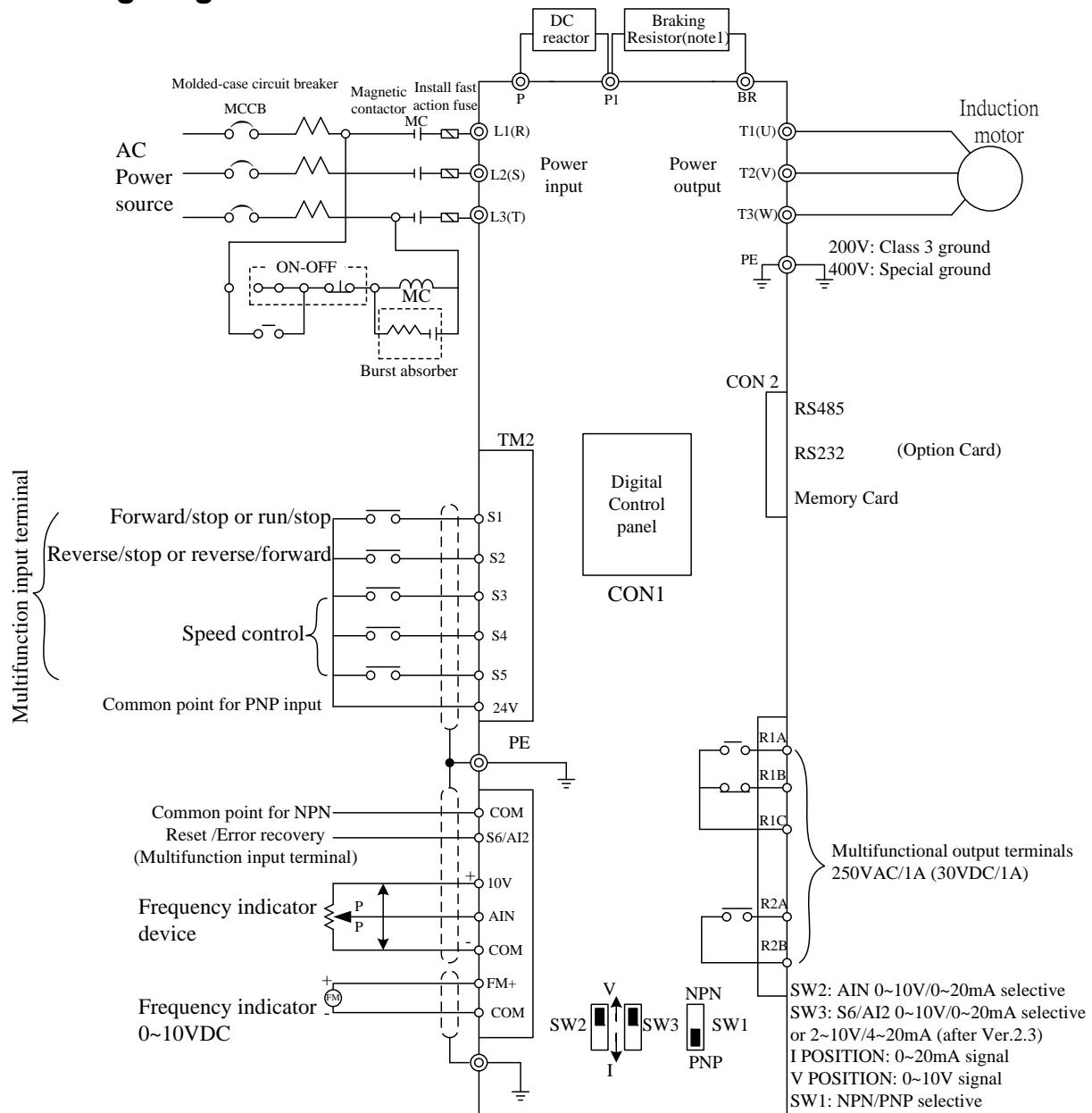
Note 1: Please refer to description of main circuit terminals (P1, BR) and specification of braking resistor for value selection.

Note 2: Above wiring diagram refers for 0.4~1.5KW at 220V and 0.75~1.5KW at 440V.

Wiring diagram II:
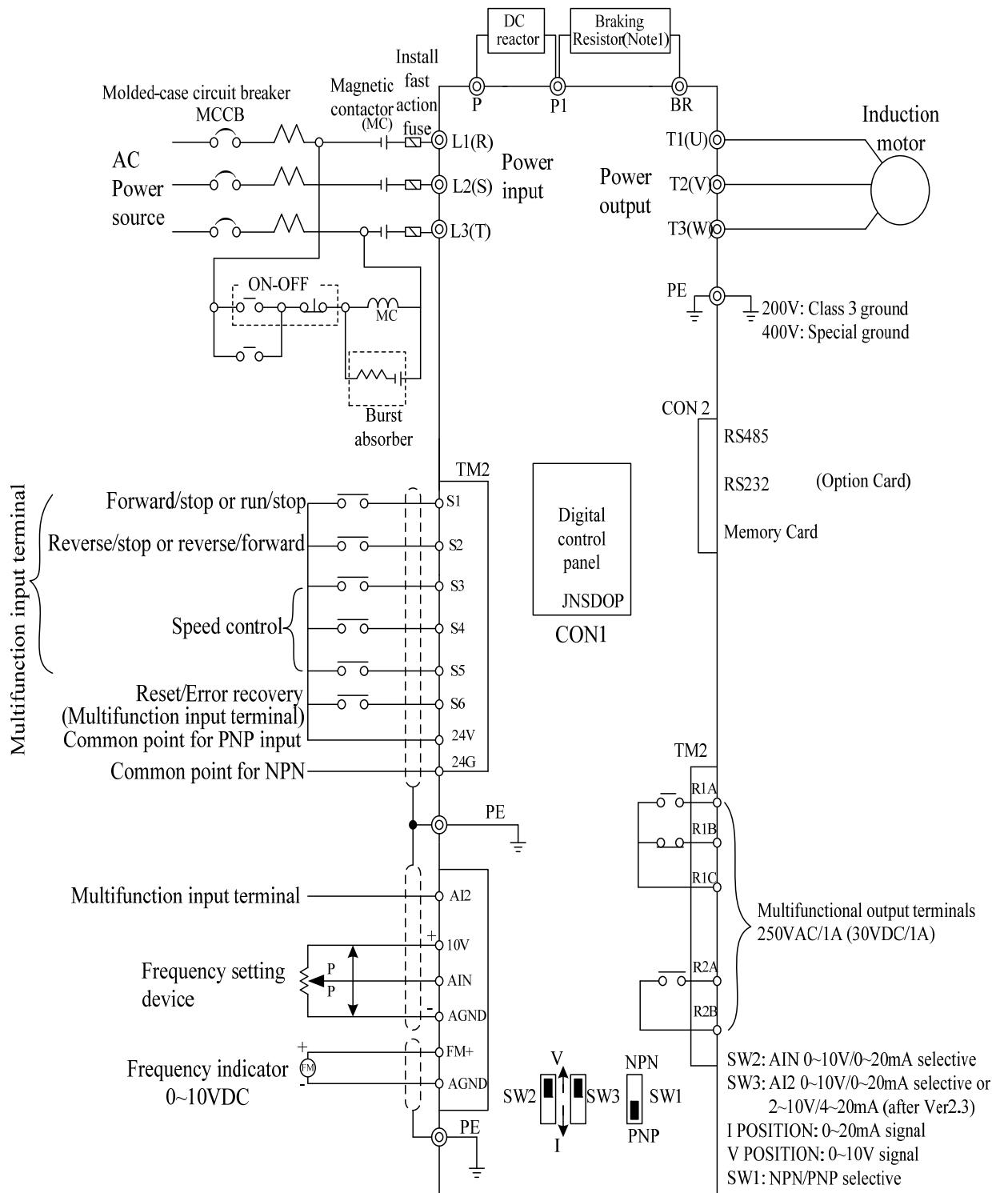
Note 1: Please refer to description of main circuit terminals (P1, BR) and specification of braking resistor for value selection.

Note 2: Above wiring diagram refers for 2.2~30KW at 220V and 2.2~55KW at 440V.

3.6 Pump Wiring Diagram of Control Board

1. Single pump wiring diagram. (I)

Single pump parameter setting:19-0=0

Pressure Transmitter − +

Switch

20-0 = 1 (External Control)

R2B	R2A	S6	S5	S4	S3	S2	S1

R1B	R1C	R1A	10V	AIN	COM	24V	FM+

V / I — SW3

NPN / PNP — SW1
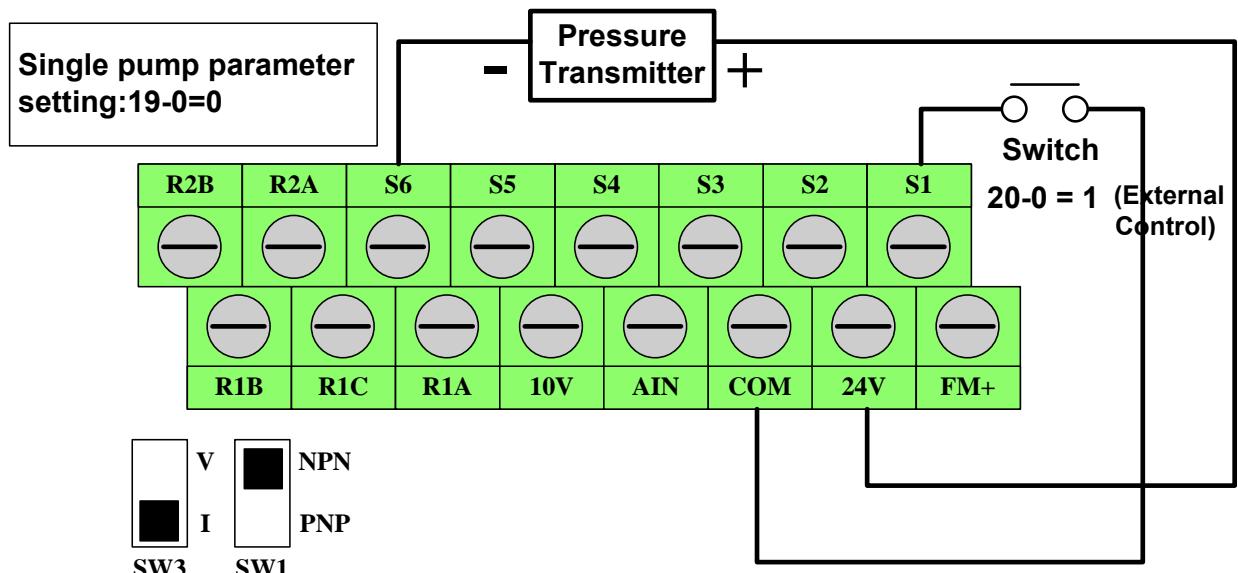
Single pump wiring diagram

2. Dual pump wiring diagram. (I)

Master

Dual pump parameter setting :
19-0 = 1(Dual pump : Master)

V / I — SW3

NPN / PNP — SW1

RS485

R2B	R2A	S6	S5	S4	S3	S2	S1

R1B	R1C	R1A	10V	AIN	COM	24V	FM+

BLACK COM

RED 24V

Pressure Transmitter − +

Switch

20-0 = 1
21-1 = 0

Slave

Dual pump parameter setting:
19-0 = 2~4(Dual pump : Slave)

V / I — SW3

NPN / PNP — SW1

RS485

R2B	R2A	S6	S5	S4	S3	S2	S1

R1B	R1C	R1A	10V	AIN	COM	24V	FM+

BLACK COM

RED 24V
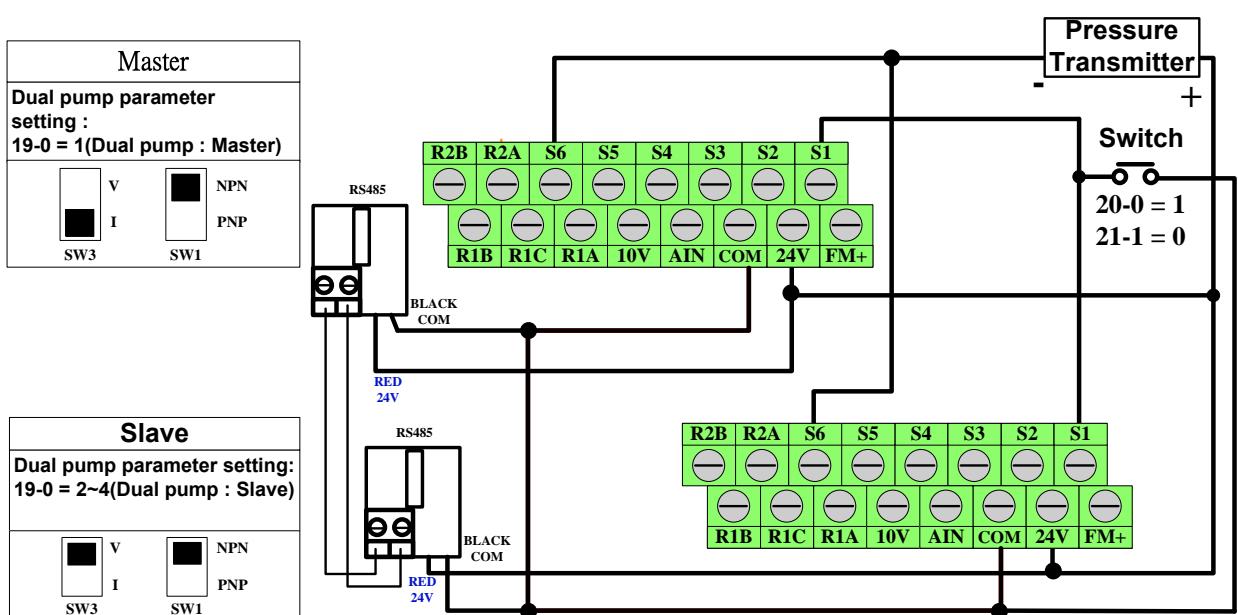
Dual pump wiring diagram (Up to 4 drives)

3. Single pump wiring diagram. (II)

Single pump parameter setting : 19-0=0

20-0 = 1(External Control)

Switch

R2B	R2A	24G	S6	S5	S4	S3	S2	S1

R1B	R1C	R1A	24V	10V	AIN	AI2	AGND	FM+

V
I
SW3

NPN
PNP
SW1

Pressure Transmitter
+   −

Single pump wiring diagram

4. Dual pump wiring diagram. (II)

Master

Dual pump parameter setting :
19-0 = 1(Dual pump : Master)

V
I
SW3

NPN
PNP
SW1

Pressure Transmitter
−   +

Switch

20-0 = 1
20-1 = 0

RS485

R2B	R2A	24G	S6	S5	S4	S3	S2	S1

R1B	R1C	R1A	24V	10V	AIN	AI2	AGND	FM+

BLACK COM

RED 24V

Slave

Dual pump parameter setting:
19-0 = 2~4(Dual pump : Slave)

V
I
SW3

NPN
PNP
SW1

RS485

R2B	R2A	24G	S6	S5	S4	S3	S2	S1

R1B	R1C	R1A	24V	10V	AIN	AI2	AGND	FM+

BLACK COM

RED 24V

Dual pump wiring diagram (Up to 4 drives)

3.7 Description of Terminals Troubleshooting Inverter

Descriptions of main circuit terminals

Symbol	Description	
R / L1 (L) S / L2 T / L3 (N)	Main power input Single-phase: L/N Three-phase: L1/L2/L3	
P1 BR	Braking resistor or connecting terminal: Used in cases where the inverter frequently disconnects due to large load inertia or short deceleration time (refer to specifications of braking resistor)	For 220V:0.5~10HP, 440V:1~15HP
P1/ P	DC reactor connecting terminals	
B1/P B2 Ө	●B1/P- Ө: DC power supply input B1/P-B2: External braking resistor For 220V: 15~20HP and 440V: 20HP	-
⊕	-	●⊕- Ө: DC power supply input or External braking unit. For 220V: 25~40HP and 440V: 25~75HP
U / T1 V / T2 W / T3	Inverter outputs	

● Do not remove the P-P1 jumper if there is no DC reactor connected.

Descriptions of CVP control circuit terminals

Symbol	Description		
R2A R2B	Multifunctional terminal – Normal open		Contact rated capacity: (250VAC/1A or 30VDC/1A)
R1C	Common contact	Multifunctional output terminals	
R1B	Normal close contact		
R1A	Normal open contact		
10V	Frequency knob (VR) power source terminal (pin 3)		
AIN	Analog frequency signal input terminal or multifunction input terminals S7 (H level:>8V, L level:<2V, PNP only)		
24V	Common contact for S1~S5 (S6, S7) in PNP (Source) input. Shift to PNP position (refer to wiring diagram) of SW1 when used PNP input		
COM 24G AGND	1. Common contact and analog input /output signal for S1~S5 in NPN (Sink) input. Shift to NPN position (refer to wiring diagram I) of SW1 when used NPN input. 2. AGND for AIN, AI2 and FM+ (analog input /output signal) & 24G for S1~S6 (digital input /output signal in NPN (Sink) input). Shift to NPN position (refer to wiring diagram II) of SW1 when used NPN input.		
FM+	The positive analog output for multifunction, the signal for output terminal is 0-10VDC (below 2mA).		
S1 S2 S3 S4 S5	Multifunctional input terminals		
S6	1. Multifunction input terminals (Digital terminal H level:>8V, L level:<2V, PNP only) or analog input terminal AI2(0~10Vdc/4~20mA) 2．The V2.9 version (contains) above the edition, S6 only is the Multi-function input terminal use, AI2 have replaced S6 to take analog input use. (Above wiring diagram refers for 2.2~30KW at 220V and 2.2~55KW at 440V only.)		

Descriptions of SW function

SW2/SW3	Type of external signal	Remarks	SW1	Type of external signal	Remarks
V / I (top filled)	0~10VDC analog signal	Factory setting is voltage input	(top filled)	NPN (SINK) input	
V / I (bottom filled)	0~20mA analog signal		(bottom filled)	PNP (SOURCE) input	Factory default

3.8 Outline Dimensions

(1) Frame1: Single phase JNTHBCBA __ AC: R500, 0001

Three phase JNTHBCBA __ BC/BE: R500, 0001, 0002

(2) Frame2: Single phase JNTHBCBA __ AC: 0002, 0003

Three phase JNTHBCBA __ BC/BE: 0003, 0005
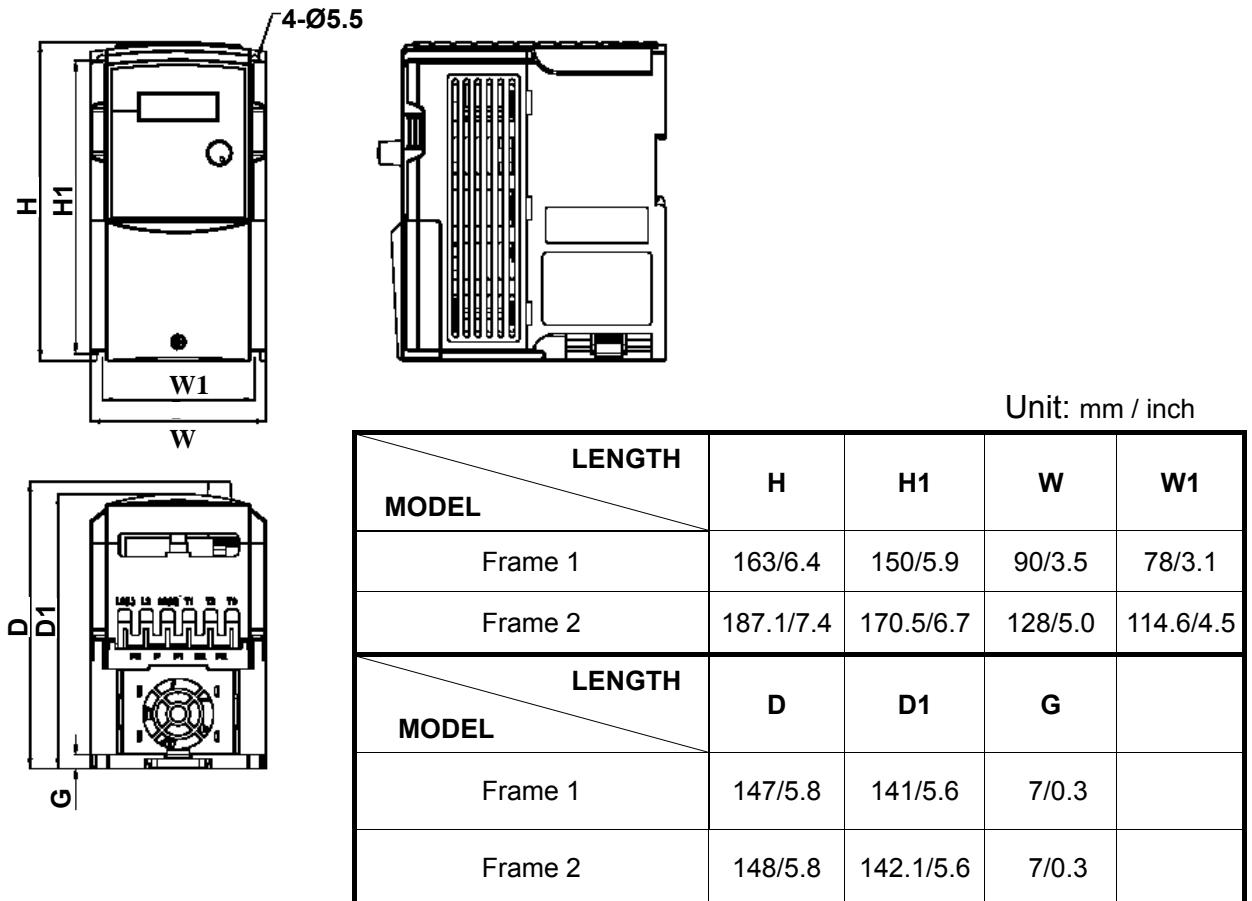
Unit: mm / inch

MODEL \ LENGTH	H	H1	W	W1
Frame 1	163/6.4	150/5.9	90/3.5	78/3.1
Frame 2	187.1/7.4	170.5/6.7	128/5.0	114.6/4.5

| MODEL \ LENGTH	D	D1	G	
Frame 1	147/5.8	141/5.6	7/0.3	
Frame 2	148/5.8	142.1/5.6	7/0.3	

(3) Frame3:

Three phase JNTHBCBA __ BC: 7R50, 0010

JNTHBCBA __ BE: 7R50, 0010, 0015
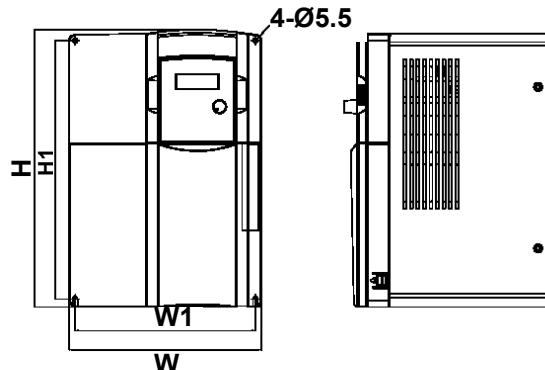
(4) Frame4:

Three phase JNTHBCBB __ BC: 0015, 0020, 0025

JNTHBCBB __ BE: 0020, 0025, 0030
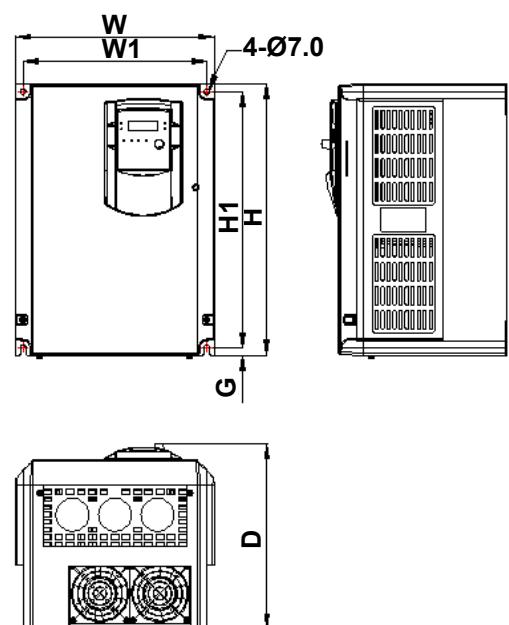
(5) Frame5:

Three phase JNTHBCBA __ BC: 0030, 0040

JNTHBCBA __ BE: 0040, 0050

(6) Frame6:

Three phase JNTHBCBA __ BE: 0060, 0075

Unit: mm / inch

LENGTH MODEL	H	H1	W	W1	D	D1	G
Frame3	260/ 10.2	244/ 9.6	186/ 7.3	173/ 6.8	195/ 7.7	188/ 7.4	
Frame4	360/ 14.2	340/ 13.4	265/ 10.4	245/ 9.6	248/ 9.8		10/ 0.4
Frame5	553/ 21.8	530/ 20.9	269/ 10.6	210/ 8.3	304/ 12		10/ 0.4
Frame6	653/ 25.7	630/ 24.8	308/ 12.1	250/ 9.8	309/ 12.1		10/ 0.4

(Open Chassis Type－IP00)

Chapter 4   Software Index

4.1 Operation Instruction of the Keypad

● :LED Light Lit

⊙ :LED Light Flash

Power Voltage

5 second later or Press DSP to modify pressure value

● HZ/RPM

Pressure (Bar) *1

2.02.0

Target (stop)   Feedback (flash)

∧ ∨ <

● HZ/RPM   Target Pressure Value (Setting)

RUN/STOP

● HZ/RPM

Pressure (Bar) *1

2.02.0

Target   Feedback (Operating)

READ/ ENTER

DSP

● FUN   Selecting the parameter group 15-0

READ/ ENTER

DSP

⊙ FUN   Setting Parameter

∧ ∨

● FUN   Selecting the parameter group 19-0

END

READ/ ENTER

DSP

DSP

Output Freq.   ● Frequency

DSP

Motor Current   ● AMP

*1 ： Dual pressure display is changed in software version b1.18 or later.

4.2 Programmable Functions List

Parameter Group No.	Description
15-	Drive Status and Function Reset
16-	Operation Parameters
17-	PID Control Parameters
18-	System Protect Parameters
19-	Dual Pumps Parameters
20-	Multifunction Input/ Output Parameter Group

15-Group Drive Status and Function Reset

Function Code No.	Description	Range (unit) /Code	Factory Setting	Communication Address	Remarks
15-0	Drive Horsepower Code	---	---	134 or (0x86)	*3
15-1	Software Version	---	---	135 or(0x87)	*3
15-2	Fault Jog (Last 3 Faults)	---	---	136 or(0x88)	*3
15-3	Accumulated Operation Time(Hours)	0 - 9999	---	139 or(0x8B)	*3
15-4	Accumulated Operation Time(Hours X 10000)	0 - 27	---	140 or(0x8C)	*3
15-5	Accumulated Operation Time Mode	0: Time Under Power 1: Run Mode Time Only	0000	141 or (0x8D)	*3
15-6	Reset Parameter	1110: Reset for 50 Hz Motor Operation 1111: Reset for 60 Hz Motor Operation	0000	142 or (0x8E)	*1
15-7	Parameter locking password	0000 ~ 0999	0	228 or (0xE4)	*4
15-8	Copy Unit	0000: Disable 0001: Inverter to Copy Unit 0002: Copy Unit to Inverter 0003: Verify	0	42 or (0x2A)	*3
15-9	Display of Pressure Setting	0000: Setting and Feedback 0001: Only Setting 0002: Only Feedback	0	198 or (0xC6)	*4

16-Group Operation Parameters

Function Code No.	Description	Range (unit) /Code	Factory Setting	Communication Address	Remarks
16-0	Frequency Upper Limit (Hz)	0.01 – 400.00 (Hz)	60.00 (Hz)	24 or (0x18)	*1
16-1	Frequency Lower Limit (Hz)	0.00 – 400.00 (Hz)	00.00 (Hz)	25 or (0x19)	*1
16-2	Acceleration Time	0.1 – 3600.0 (sec)	5.00 (sec)	26 or (0x1A)	
16-3	Deceleration Time	0.1 – 3600.0 (sec)	5.00 (sec)	27 or (0x1B)	
16-4	Sleep Deceleration Time	0.1 – 3600.0 (sec)	3.00 (sec)	31 or (0x1F)	*3
16-5	Sleep Frequency	0.00 - 400.00 (Hz)	35.00 (Hz)	155 or (0x9B)	*3
16-6	Period of Water Used Detection	0.0 – 200.0 (sec)	20.0 (sec)	190 or (0xBE)	*3
16-7	Acceleration Time of Water Used Detection	0.1 - 3600.0 (sec)	12.0 (sec)	191 or (0xBF)	*3
16-8	Pressure Range of Water Used Detection	0.00 - 2.50 (Bar)	0.10 (Bar)	193 or (0xC1)	*3
16-9	HiP/LoP/1BrE Protection Auto Restart Time	0 - 200 (min)	20 (min)	192 or (0xC0)	*3
16-A	Direction of water usage	0 : Upward 1 : Downward	1	244 or (0xF4)	*1 *5
16-B	Deceleration time of water usage detection	0.1 – 3600.0 (sec)	40.0 (sec)	245 or (0xF5)	*5

17-Group   PID Control parameters

Function Code No.	Description	Range (unit) /Code	Factory Setting	Communication Address	Remarks
17-0	Proportional Gain (P)	0.0 – 10.0	1.0	111 or (0x6F)	
17-1	Integration Time (I)	0.0–100.0 (sec)	1.0 (sec)	112 or (0x70)	
17-2	Differentiation Time (D)	0.00 – 10.00 (sec)	0.00 (sec)	113 or (0x71)	
17-3	Output Filter Time (O)	0.0 – 2.5 (sec)	0.0 (sec)	116 or (0x74)	
17-4	Feedback Signal Offset(F)	0.00 – 10.00	1.00	110 or (0x6E)	
17-5	Feedback Signal Type(F)	0000 : 0~10V 0001 : 4~20mA	1	123 or (0x7B)	*1*2
17-6	Feedback Signal Scan Time(F)	1 – 100 (base on 4ms)	5 (20ms of 5*4ms)	75 or (0x4B)	
17-7	Liquid Leakage Detection Time	0.0 - 10.0 (sec)	0.0 (sec)	177 or (0xB1)	*3
17-8	Change Level within Detection Time	0.01 - 2.50 (Bar)	0.10 (Bar)	178 or (0xB2)	*3
17-9	Restart Level for Liquid Leakage Detection	0.01 - 2.50 (Bar)	0.50 (Bar)	179 or (0xB3)	*3

18-Group   System Protect parameters

Function Code No.	Description	Range (unit) /Code	Factory Setting	Communication Address	Remarks
18-0	Target Pressure Value	0.10 - 25.50 (Bar)	2.00 (Bar)	168 or (0xA8)	*3
18-1	Max. Pressure limit	0.10 - 25.50 (Bar)	5.00 (Bar)	166 or (0xA6)	*3
18-2	Min. Pressure limit	0.10 - 25.50 (Bar)	0.50 (Bar)	167 or (0xA5)	*3
18-3	High Pressure Alarm Time	0.0 - 600.0 (sec)	10.0 (sec)	169 or (0xA9)	
18-4	High Pressure Stop Time	0.0 - 600.0 (sec)	20.0 (sec)	170 or (0xAA)	
18-5	Low Pressure Alarm Time	0.0 - 600.0 (sec)	10.0 (sec)	171 or (0xAB)	
18-6	Low Pressure Stop Time	0.0 - 600.0 (sec)	20.0 (sec)	195 or (0xC3)	
18-7	Sleep Delay Time	0.0 - 120.0 (sec)	0.0 (sec)	162 or (0xA2)	*3
18-8	Sleep Tolerance Range	0.00 – 5.00 (Bar)	0.50 (Bar)	165 or (0xA5)	*3
18-9	HiP/LoP/1BrE Protection Auto Restart Times	0 ~ 999	999	199 or (0xC7)	*4
18-A	Pressure losing prevention level (%)	0 - 100 (rate)	0 (rate)	229 or (0xE5)	*5
18-B	Detection time of pressure losing	0.0 – 25.0 (sec)	0.0 (sec)	239 or (0xEF)	*5
18-C	Forced operating frequency	0.0 – 200.0 (Hz)	0.0 (Hz)	240 or (0xF0)	*5

19-Group　Dual Pumps Parameters

Function Code No.	Description	Range (unit) /Code	Factory Setting	Communication Address	Remarks
19-0	Single/Dual Pump and Master/Slave Selection	0 : Single 1 : Dual – Master 2 : Dual – Slave 1 3 : Dual – Slave 2 4 : Dual – Slave 3	0	172 or (0xAC)	*3
19-1	Max. Pressure of Pressure Transmitter	0.10 – 25.50 (Bar)	10.00 (Bar)	173 or (0xAD)	*3
19-2	Dual pump synchronal setting	0 : Disable 1 : Target Pressure Value & Run/Stop 2 : Only Target Pressure Value 3 : Only Run/Stop	0	243 or (0xF3)	*5
19-3	Auto Shift Time	0 – 240 (Hour)	1 (Hour)	175 or (0xAF)	
19-4	Launch Delay Time (Slave Unit)	0 – 30.0 (Sec)	10.0 (Sec)	176 or (0xB0)	
19-5	AI2 (S6)Gain(%)	0 – 200 (%)	100 (%)	76 or (0x4C)	
19-6	Start Frequency for Slave Pump Running (100% = 16-0)	0 - 100 (%)	0 (%)	196 or(0xC4)	*3
19-7	Start Frequency for Slave Pump Stopping (100% = 16-0)	0 - 100 (%)	0 (%)	197 or(0xC5)	*3

20-Group　多機能輸入輸出參數群

Function Code No.	Description	Range (unit) /Code	Factory Setting	Communication Address	Remarks
20-0	Run command source	0 : Keypad 1 : External Terminal	0	9 or (0x09)	
20-1	Terminal S1 Function	0 : Forward	0	53 or (0x35)	
20-2	Terminal S2 Function	1 : E.S. terminal A	6	54 or (0x36)	
20-3	Terminal S3 Function	2 : Base block (b.b.)	7	55 or (0x37)	
20-4	Terminal S4 Function	3 : RESET command 4 : Control signal switch	3	56 or (0x38)	
20-5	Terminal S5 Function	5 : Communication control 　　signal switch 6 : PID function disable 7 : Forced operating 　　frequency	1	57 or (0x39)	
20-6	RELAY1(R1C,R1B,R1A terminals in TM2)	0 : Run 1 : Fault terminal 2 : Auto restart 3 : Momentary power loss 4 : E.S.	0	79 or (0x4F)	
20-7	RELAY2(R2B,R2A terminals in TM2)	5 : Free run stop 6 : Motor overload 　　protection 7 : Inverter overload 　　protection 8 : High/Low pressure alarm 9 : Power On 10 : PID feedback signal 　　 offline 11 : Over torque detect 12 :Frequency output detect	8	80 or (0x50)	
20-8	Source of bias target pressure	0 : Disable 1 : AIN 2 : VR(15-6 password is a 　　 must)	0	241 or (0xF1)	
20-9	Range of bias target pressure	0.0 – 10.00	2.00	242 or (0xF2)	
20-A	Multifunction analog output selection	0 : Output Frequency 1 : Frequency command 2 : Output voltage 3 : DC voltage 4 : Output circuit 5 : PID feedback signal		77 or (0x4D)	*1

Function Code No.	Description	Range (unit) /Code	Factory Setting	Communication Address	Remarks
20-B	Gain control of multifunction analog output	0 - 200	100	78 or (0x4E)	*1
20-C	Reverse Function	0 :Reverse available 1 :Reverse unavailable	1	11 or (0x0B)	*6

Notes: *1 Modify parameter when inverter status is "STOP", can not change while inverter status is "Run".

*2 Require to adjust position of SW3 of Control Board.

*3 The new parameter is added or modified in software version b1.2 or later.

*4 Available in Software version 1.4 or later.

*5 Available in Software version 1.5 or later.

*6 Available in Software version 1.6 or later.
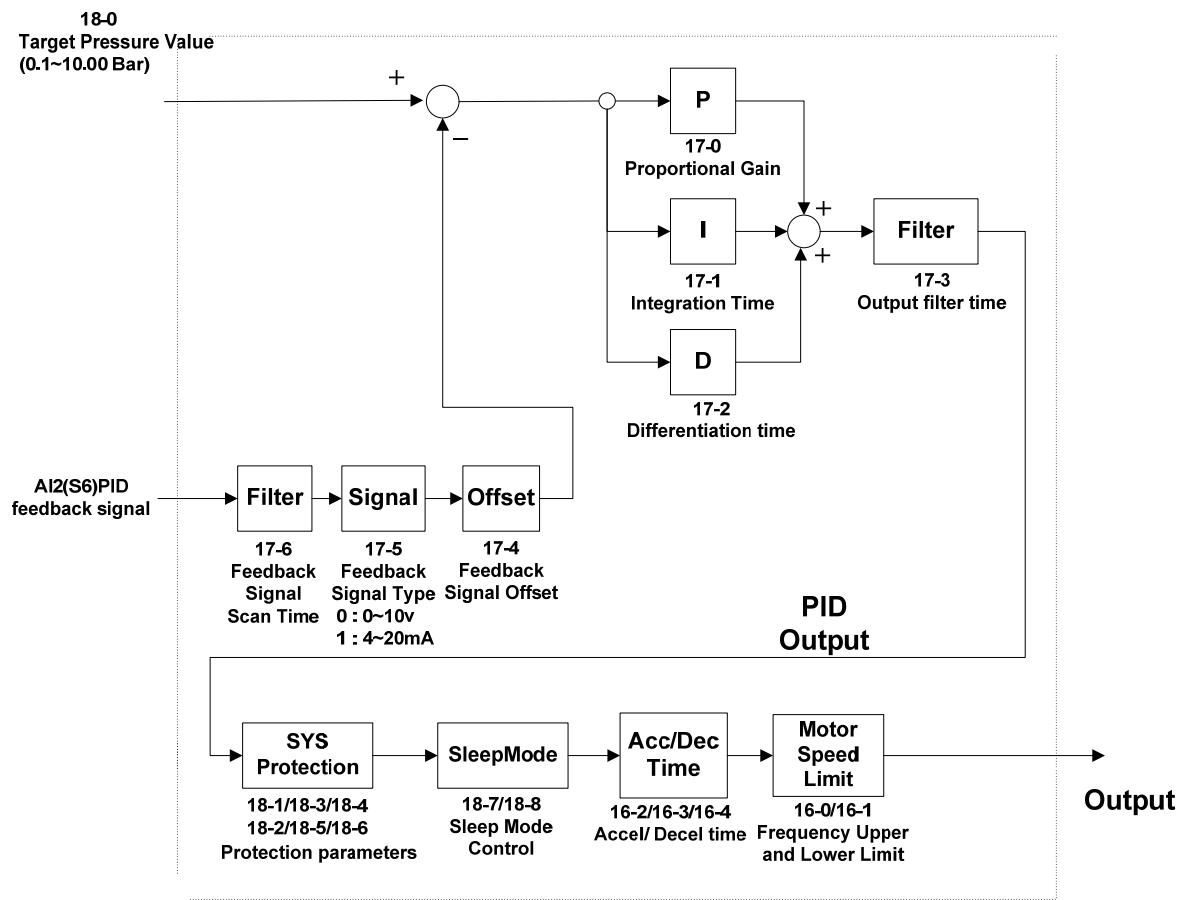
PID Process Diagram

(1):15-0 Drive Horsepower Code

15-0	Inverter Model		15-0	Inverter Model	
2P5	JNTHBCBA	R500AC / BC	401	JNTHBCBA	0001BE
201		0001AC / BC	402		0002BE
202		0002AC / BC	403		0003BE
203		0003AC / BC	405		0005BE
205		0005BC	408		7R50BE
208		7R50BC	410		0010BE
210		0010BC	415		0015BE
215		0015BC	420		0020BE
220		0020BC	425		0025BE
225		0025BC	430		0030BE
230		0030BC	440		0040BE
240		0040BC	450		0050BE
			460		0060BE
			475		0075BE

(2):15-1 Software Version

(3):15-2 Fault Jog (Latest 3 times)

1. When the inverter doesn't work normally, the former fault log stored in 2.xxx will be moved to 3.xxx, and the fault log in 1.xxx moved to 2.xxx. The present fault will be stored in 1.xxx. The fault stored in 3.xxx is the earliest one of the three, while the one 1.xxxx is the latest.

2. In 15-2, the fault 1.xxxx will be displayed at first, press▲, you can read 2.xxx→3.xxx→1.xxx, whereas▼, the order is 3.xxx→2.xxx→1.xxx→3.xxx.

3. In 15-2, the three fault log will be cleared when the reset key is pressed. The log content will changed to 1.---, 2.---, 3.---.

4. Ex. If the fault log content is '1.OCC' which indicates the latest fault is OC-C.

(4):15-3: Accumulated Operation Time 1 (Hours) 0 – 9999
    15-4: Accumulated Operation Time 2 (Hours X 10000) 0 - 27
    15-5: Accumulated Operation Time Mode 0000: Power on time
                                        0001: Operation time

1. When the operation time 1 is set to 9999, the operation time 2 will be add by 1 at next hour, meanwhile, the value of operation time 1 will be cleared to 0000.

2. Description of operation time selection:

Preset value	Description
0	Power on, count the accumulated time.
1	Inverter operation, count the accumulated operation time.

(5): 15-6 Reset the factory setting 1110: Reset the 50Hz factory setting
1111: Reset the 60Hz factory setting

(6):15-7 Parameter locking password 0000~0999

Establish the password procedure:

15-7 = 888 (establish the password command) →15-7 = establish the password (establish the password that the customer appoints) → Completion

Unlock the parameter:

When the parameter is locked, only 15-7 can be used, if want to unlock the parameter, input the primitive password of establishing on 15-7, other parameters can make an modification after unlocking.

Remove the password by force:

When forget the primitive password that establishes, remove the settlement of the primitive password with this procedure, when need to do the password to lock, please operate it in accordance with above-mentioned "Establish the password procedure".
15-7 = 123 (remove the password command 1) → 15-7 = 999 (remove the password command 2) → The original password has already been removed.

Note:
1. When inverter needs to establish a new password, please input the primitive password first to unlock parameter, can just use "Establish the password procedure" to establish the new password.
2. If the inverter has password of establishing, the inverter will lock the parameter automatically after power on.
3. Please avoid the value of 15-7 to use 123, 888, 999, 000.

(7):15-8 Copy Unit 0000: Disable
0001: Inverter to Copy Unit
0002: Copy Unit to Inverter
0003: Verify

1.) 15-8=0000**:** Disable.

2.) 15-8=0001**:** Copy the inverter parameters to module.

3.) 15-8=0002**:** Copy the module parameters to inverter.

4.) 15-8=0003**:** Copy the parameters to inverter or module to mutually verify the parameters.

Note: The copy function is available for the models with same capacity.

(8):15-9 Display of Pressure Setting 0000: Setting and Feedback
                                     0001: Only Setting
                                     0002: Only Feedback

1.) 15-9=0000: Display setting and feedback pressure value on keypad.

The 1st and 2nd segment is setting pressure value, and 3rd and 4th

segment is feedback pressure value.

2.) 15-9=0001: Only display setting pressure value.

3.) 15-9=0002: Only display feedback pressure value.

(9):16-0 Frequency Upper limit 0.01 – 400.00 Hz
     16-1 Frequency Lower limit 0.00 – 400.00 Hz
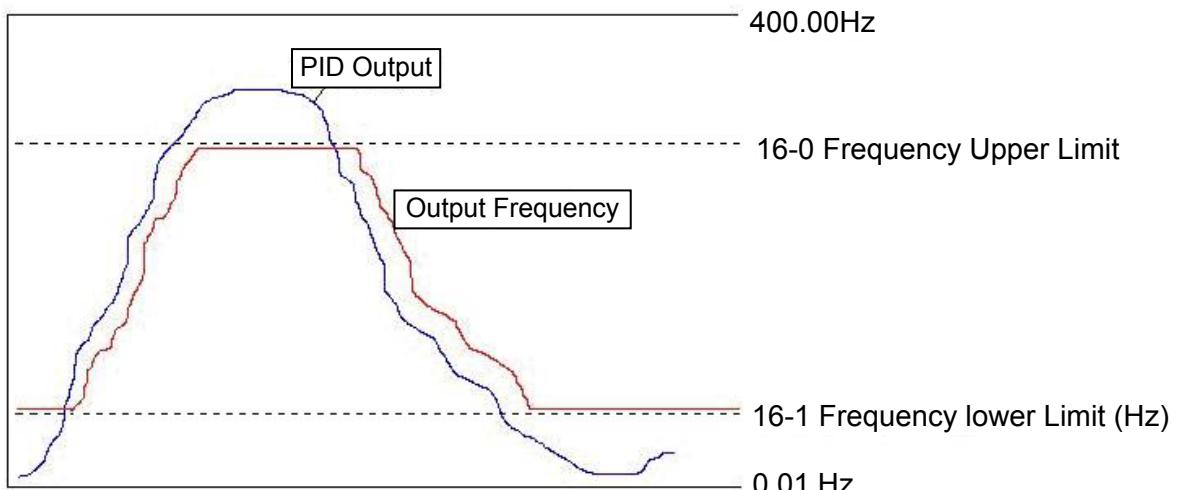
Operation example:

Confine output frequency in the certain range.

Set a frequency lower limit could increase response time and reduce vibration of pump.

Set a frequency upper limit could avoid motor operate above rate speed.

(10): 16-2 Acceleration time 0.1 – 3600.0 sec

16-3 Deceleration time 0.1 – 3600.0 sec

16-4 Sleep deceleration time 0.1 – 3600.0 sec
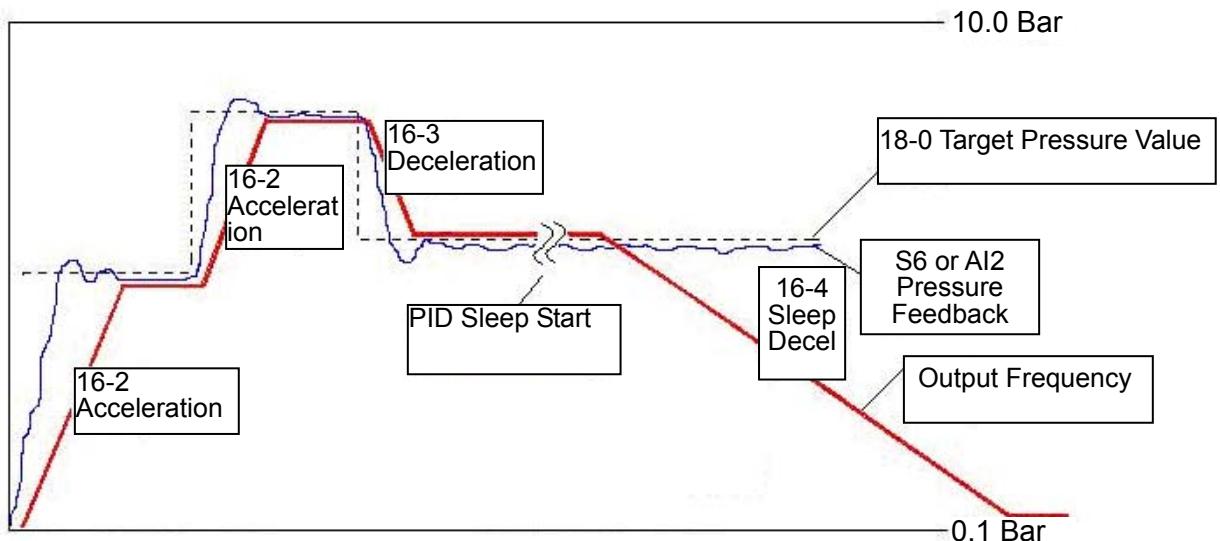
When │ (18-0 Target Pressure Value) – (S6 or AI2 Pressure Feedback) │ < 18-8 Sleep Tolerance Range, and Output Frequency is less than 16-5 Sleep Frequency, and the time is longer than 18-7 Sleep delay time, PID Sleep starts.

When inverter sleep mode starts, deceleration time depends on setting value of 16-4. Acceleration and deceleration is controlled by parameters 16-2 and 16-3 when using PID control.

(11):16-5 Sleep Frequency 0.00 – 400.00 Hz

16-6 Period of Water Used Detection 0.0 – 200.0 sec

16-7 Acceleration Time of Water Used Detection 0.1 – 3600.0 sec

16-8 Pressure Range of Water Used Detection 0.00 – 2.50 Bar

16-A Direction of water usage   0 : Upward   1 : Downward

16-B Deceleration time of water usage detection   0.1 – 3600.0 (sec)
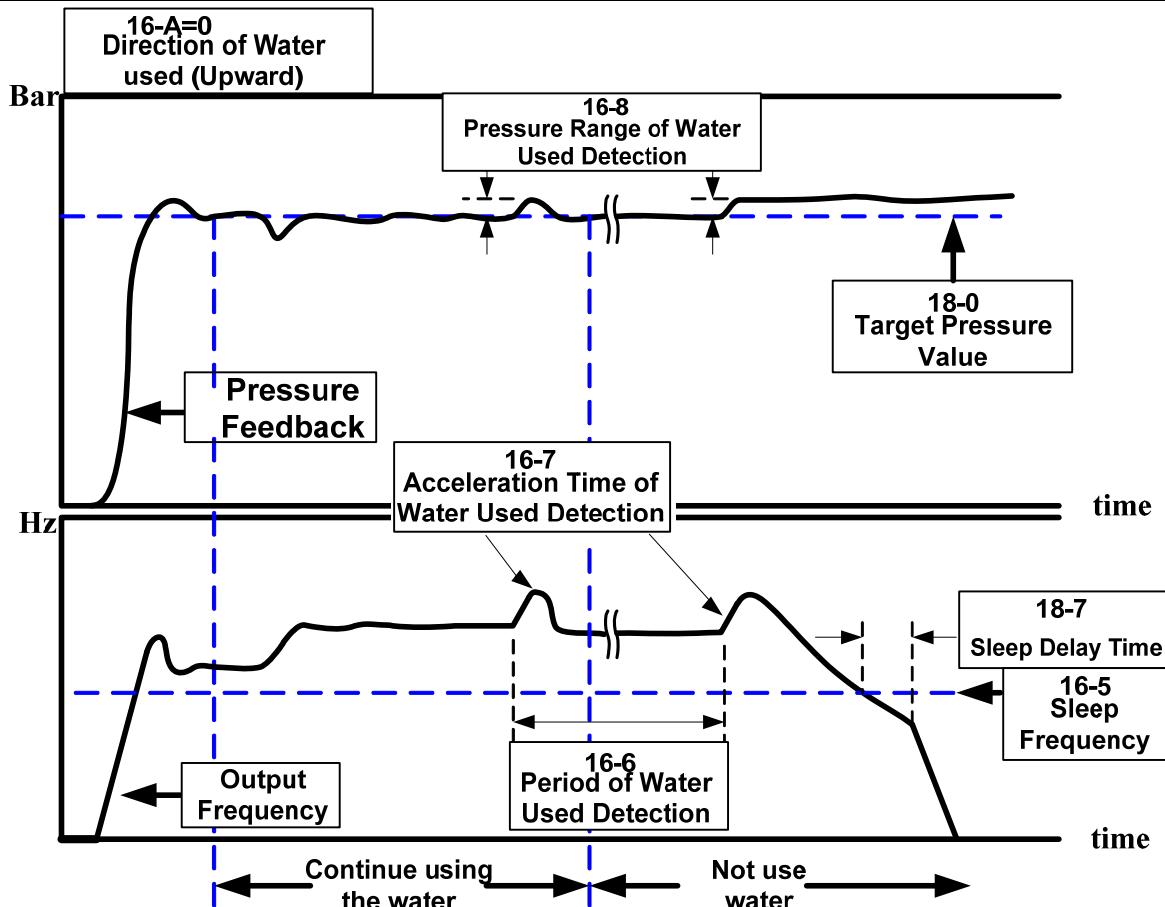
★16-6 = 0.0 (sec) : Disable water used detection.

★When this function is operated, it can reduce the time that pump get into sleep mode effectively.

★When using water frequently, we suggest that set 16-6 (Cycle of water usage detection) longer to reduce detection times, this would be helpful for lessening unstable pressure which cause by water usage detection function.

★When upward water usage detection is operating, the pressure will slightly increase, if users do care about the situation, we suggest you can adjust 16-8 (Pressure range of water usage detection) lower. In other hand, it will extend the time of getting to sleep when we are not using water or using small amount of water.
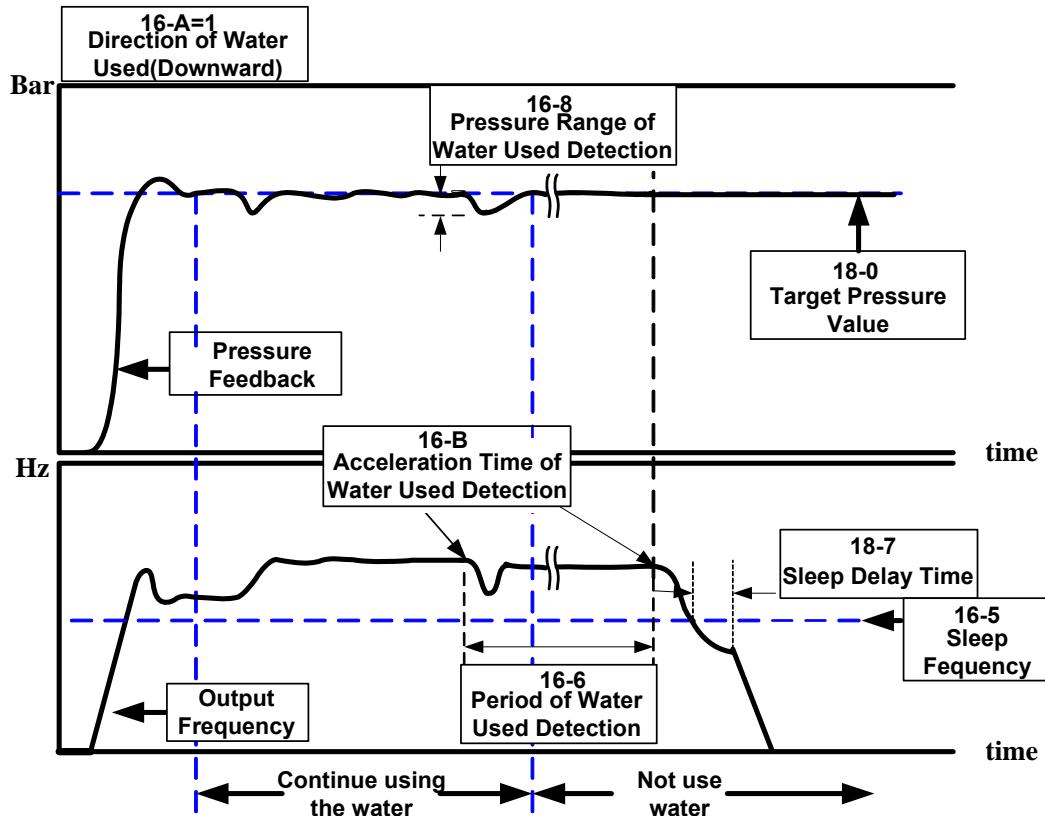
★16-6 = 0.0 (sec) : Disable water used detection.

★When this function is operated, it can reduce the time that pump get into sleep mode effectively.

★When using water frequently, we suggest that set 16-6 (Cycle of water usage detection) longer to reduce detection times, this would be helpful for reducing unstable pressure cause by water usage detection function.

★When downward water usage detection is operating; the frequency will decrease according to 16-B (Deceleration time of water usage detection). In the condition of using water, the pressure will decrease and then the frequency will rise to reach the original setting pressure, it is judge by pressure feedback is lower than 18-0 (working pressure) – 16-8(Pressure range of water usage detection). If the condition is small amount or not using water, the operating frequency will decrease continuously. The detecting process will cause the pressure slightly unstable in a very short time. So 16-8(Pressure range of water usage detection) must be adjusted appropriately. In the decreasing process, if small amount of leakage cause the pressure lower than 18-0 (working pressure) – 16-8(Pressure range of water usage detection) before it reach the sleeping frequency, the frequency will rise again.

	Advantage	**Disadvantage**
Direction of Water Used (Upward)	1. Keep the actual pressure always higher than command pressure in the operating process, especially for strict and precise applications.	1. If the lift is too high which cause the operating frequency higher than usual even if little water usage or not using water. The efficiency of upward water usage detection won't be as good as we expect. 2. When multi pump operate in parallel, the slave is hard to get into sleep.
Direction of Water Used (Downward)	1. Get into sleep more efficient in only small amount water usage or not using water situation. 2. When multi pumps operate in parallel, the drives have more efficient to control the operating drive quantity and output frequency in downward water usage detection. 3. The operating order is master, slave1, slave 2, slave 3, and the sleeping order is slave 3, slave 2 ,slave 3, the master and slave will exchange after Auto Shift Time ,it also helps the product life.	1. It could cause pressure shock wave if we didn't adjust (16-8) Pressure range of water usage detection and (16-B) Deceleration time of water usage detection appropriately.

(12):16-9 HiP/LoP/1BrE Protection Auto Restart Time 0 – 200 min

✸16-9 = 0(min): Disable auto restart function.

✸When Hi-p or Lo-p protection happens, the pump will stop. It will auto restart after 16-9 auto restart time.

✸When 1BrE is occurred during dual pump operation and the message will disappear after 16-9 auto restart time. When 1BrE is reset, it is never occurred again, until Master and Slave unit change states. (Reference dual pump parameter)

(13):17-0 Proportional Gain (P) 0.0 – 10.0 rate
17-1 Integration Time (I) 0.0 – 100.0 sec
17-2 Differentiation Time (D) 0.00 – 10.00 sec
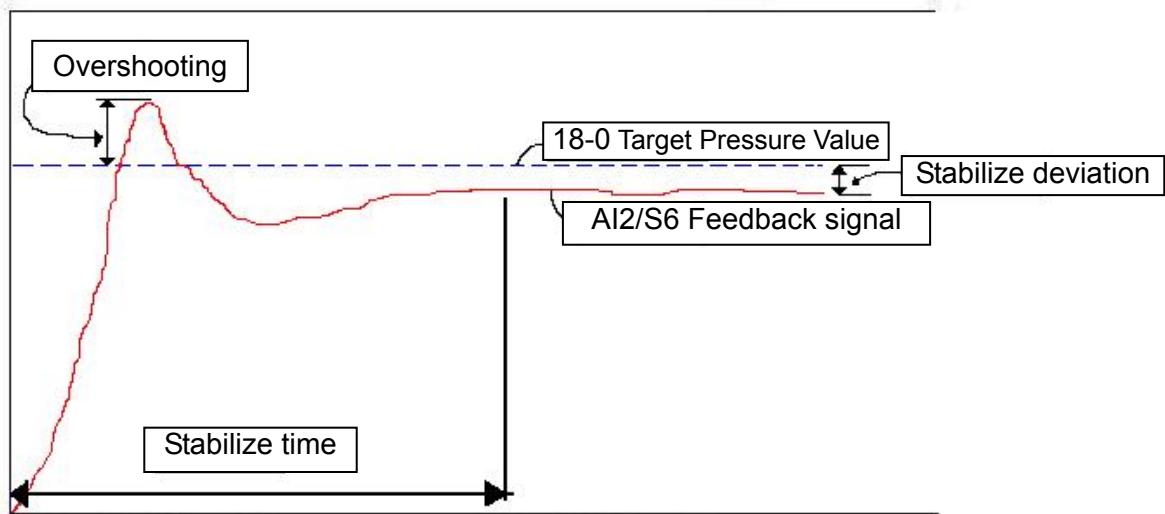
PID Parameter Adjustment Guide:

PID Parameters	Increase Setting Value	Decrease Setting Value	Main Feature
Proportional Gain (P)	(G) Increase response time (B) Might cause pump vibration	(G) Reduce vibration (B) Slow down response	Increase stabilize time
Integration Time (I)	(G) Smooth output frequency (B) Slow down response	(G) Fast response (B) Change rapidly of output frequency.	For smooth feedback variations
Differentiation Time (D)	(G) Avoid overshooting (B) System unstable or motor vibration	(G) System stable (B) Overshooting easily	Respond to system rapid variations

Notes: PID parameters can be changed during the inverter is running.
Notes: (G) means good, (B) means bad.

(14):17-3 Output Filter Time (O) 0.0 – 2.5 sec

After adjust filter

Before adjust filter
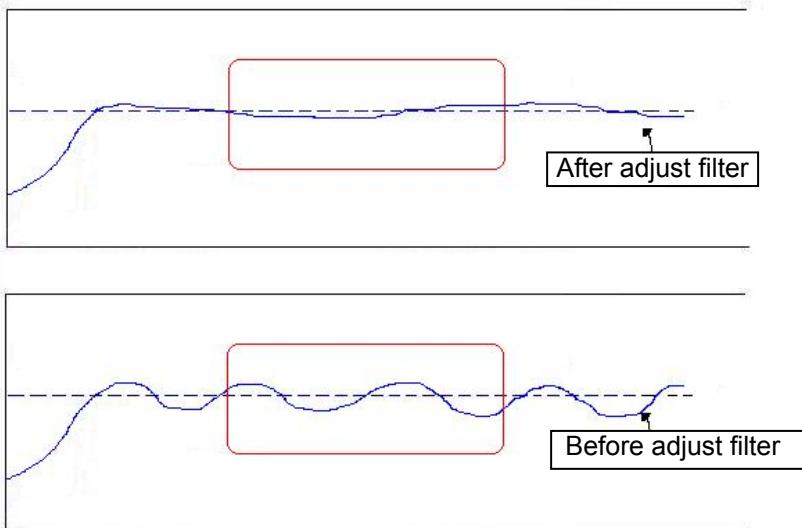
Smooth the PWM output by increase filter time setting.

Setting a bigger filter time will get a slower system response time.


(15):17-4 Feedback Signal (F) Offset 0.00 – 10.00 rate
    17-5 Signal Type 0000 : 0 ~10V   0001 : 4 ~ 20mA
    17-6 Feedback Signal Scan Time 1 – 100 (base on 4ms)

17-4 Feedback Signal Offset(F): Gradual adjust to specific value

Example: When the feedback signal were not the same as keypad display, adjust this parameter to reduce the bias.

Keypad Display

Adjustable Range

Adjustable Range
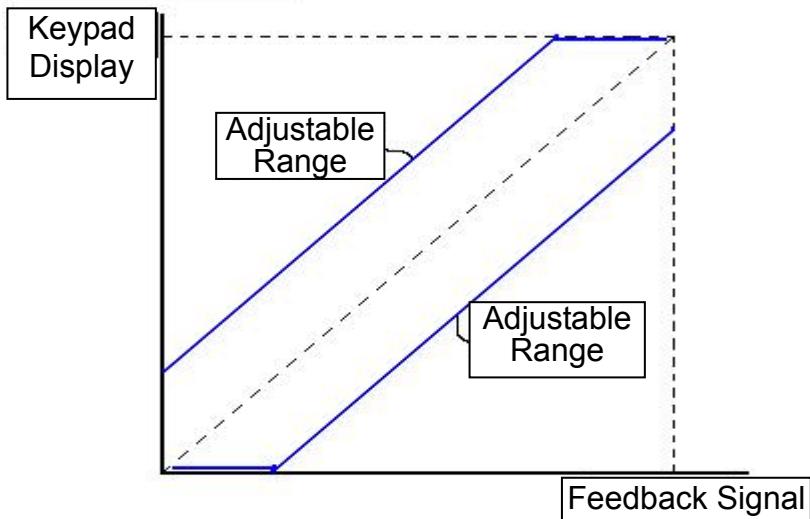
Feedback Signal

17-5 Feedback Signal Type(F): select a signal type depends on the pressure sensor specification for the voltage type 0 ~ 10V and current type 4 ~ 20mA.

17-6 Feedback Signal Scan Time(F) setting range 1 ~100 : To set a Scan Time for feedback signal, increasing the setting will get slower response.

Example: Set 17-6 to 5, it will automatically multiply 4ms derive a 20ms scan time. Every 20ms, inverter detect feedback signal once.

(16) 17-7 Liquid Leakage Detection Time 0.0 – 10.0 sec

17-8 Change Level within Detection Time 0.01 - 2.50 Bar

17-9 Restart Level for Liquid Leakage Detection 0.01 - 2.50 Bar

Liquid Leakage Detection Case 1：Change of pressure value is over than 17-8
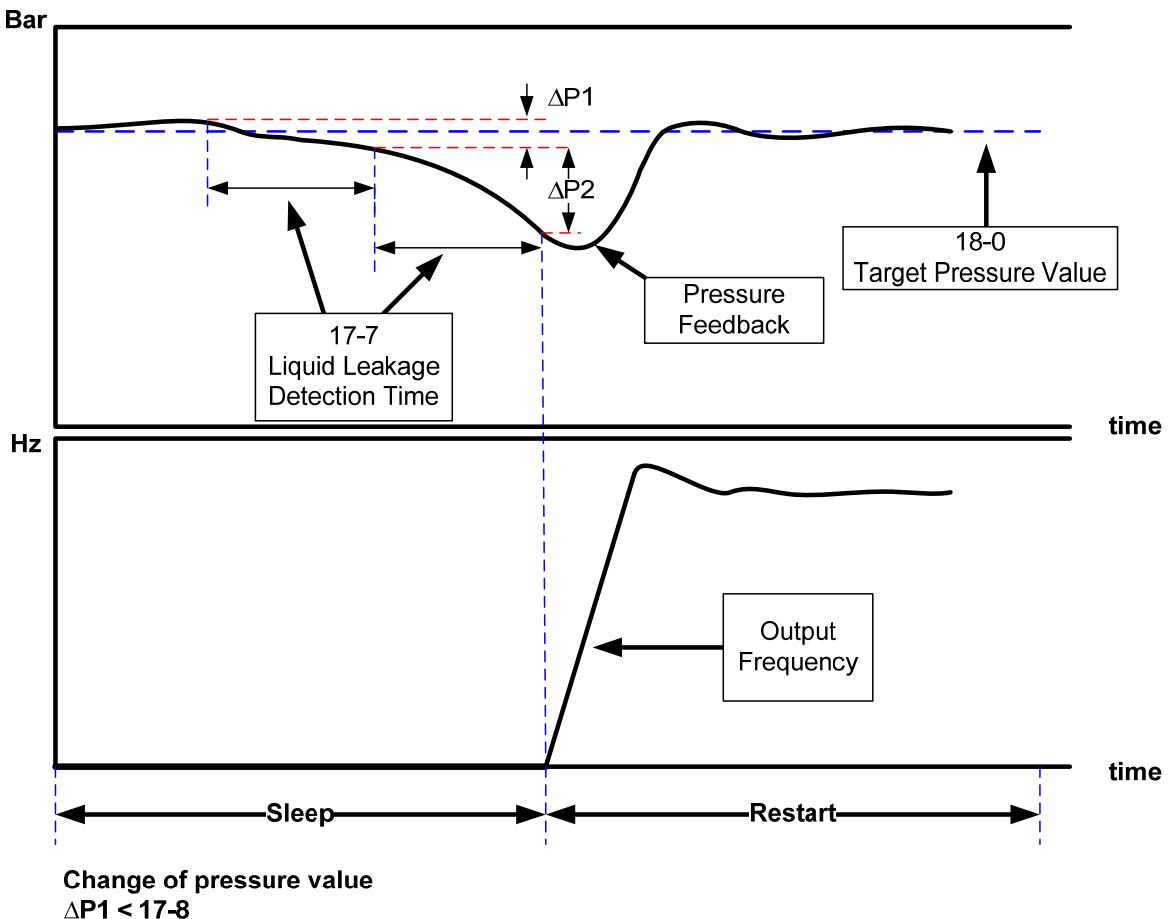
Change of pressure value
△P1 < 17-8
△P2 > 17-8

✷17-7 = 0.0(sec) : Disable Liquid Leakage Detection.

✷When pump is sleeping, the pressure value maybe decrease due to the liquid leakage, if the change of pressure value is higher than 17-8, the pump will start again.

**Liquid Leakage Detection Case 2 : Change of pressure value is less than 17-8**
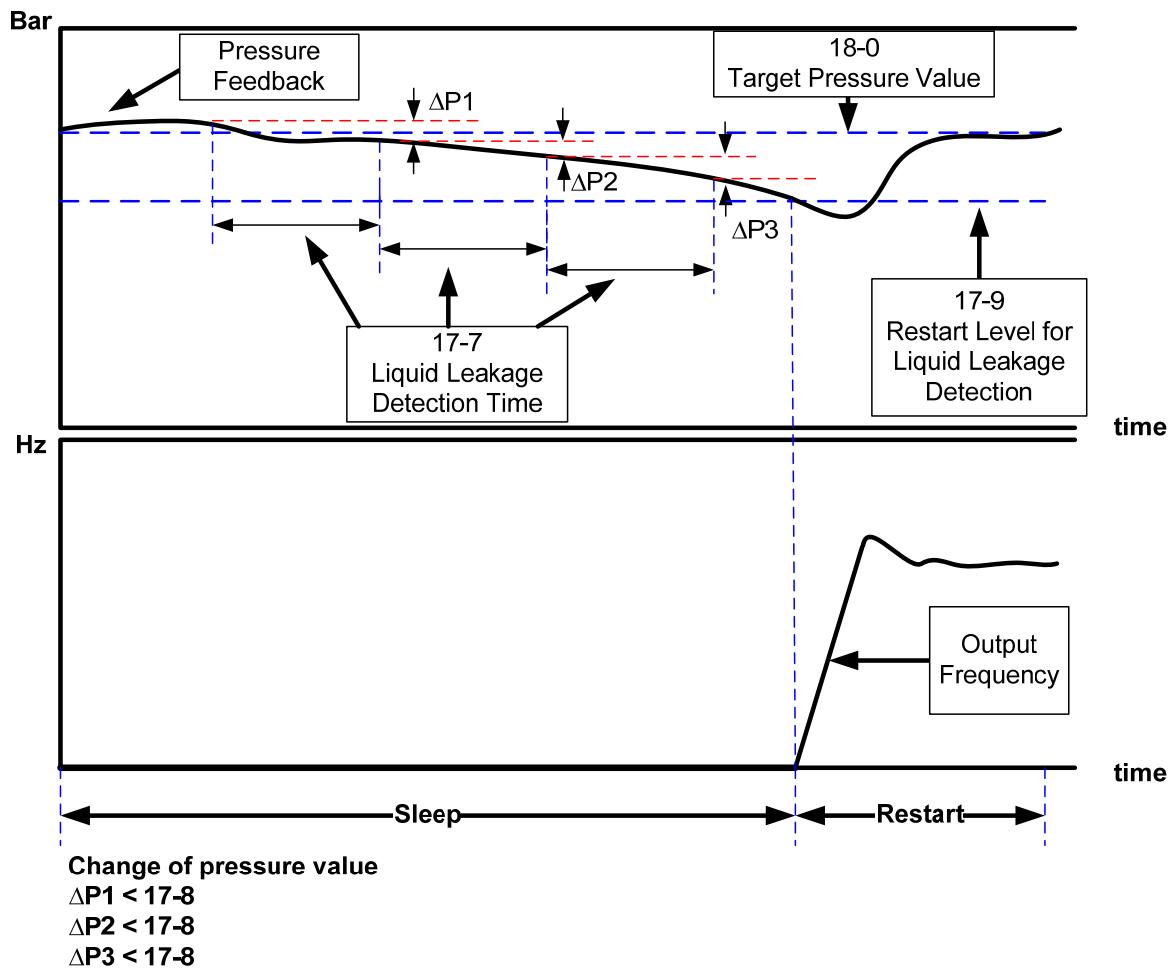
Change of pressure value
ΔP1 < 17-8
ΔP2 < 17-8
ΔP3 < 17-8

✸17-7 = 0.0(sec) : Disable Liquid Leakage Detection.

✸When pump is sleeping, the pressure value maybe decrease because liquid leakage, if the change of pressure value is lower than 17-8 during every 17-7 detection time, the pump will keep in sleep mode, until the pressure value is higher than the setting of 17-9 (restart level).

✸Setting the value of 17-7/17-8/17-9 properly can improve the pump restart condition due to the liquid leakage.

✸Water leakage detection function only enable in single pump application.

(17):18-0 Target Pressure Value 0.10 – 25.50Bar

   18-1 Max. Pressure limit 0.10 – 25.50 Bar

   18-2 Min. Pressure limit 0.10 – 25.50 Bar

Bar

- 18-1 Max. Pressure limit

- 18-0 Target Pressure Value

AI2/S6 Feedback signal

- 18-2 Min. Pressure limit
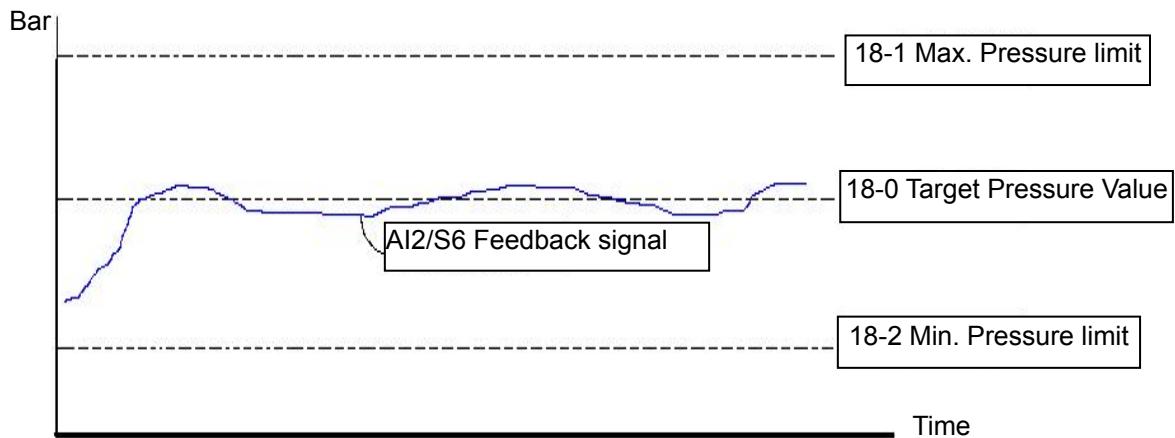
Time

When using PID control, system pressure will intervene (18-1 Max. Pressure limit) and (18-2 Min. Pressure limit).

(18):18-0 Target Pressure Value 0.10 – 25.50Bar

   18-3 High pressure alarm time 0.0 – 600.0 sec

   18-4 High pressure stop time 0.0 – 600.0 sec

Bar

- 18-1: Max. Pressure limit

AI2/S6 Feedback signal

- 18-0 Target Pressure Value

- 18-2 Min. Pressure limit

time

Hz

High pressure deceleration time depend by the (16-3 deceleration time) setting.

time

T1   T2   T3

Hip   Hi-p
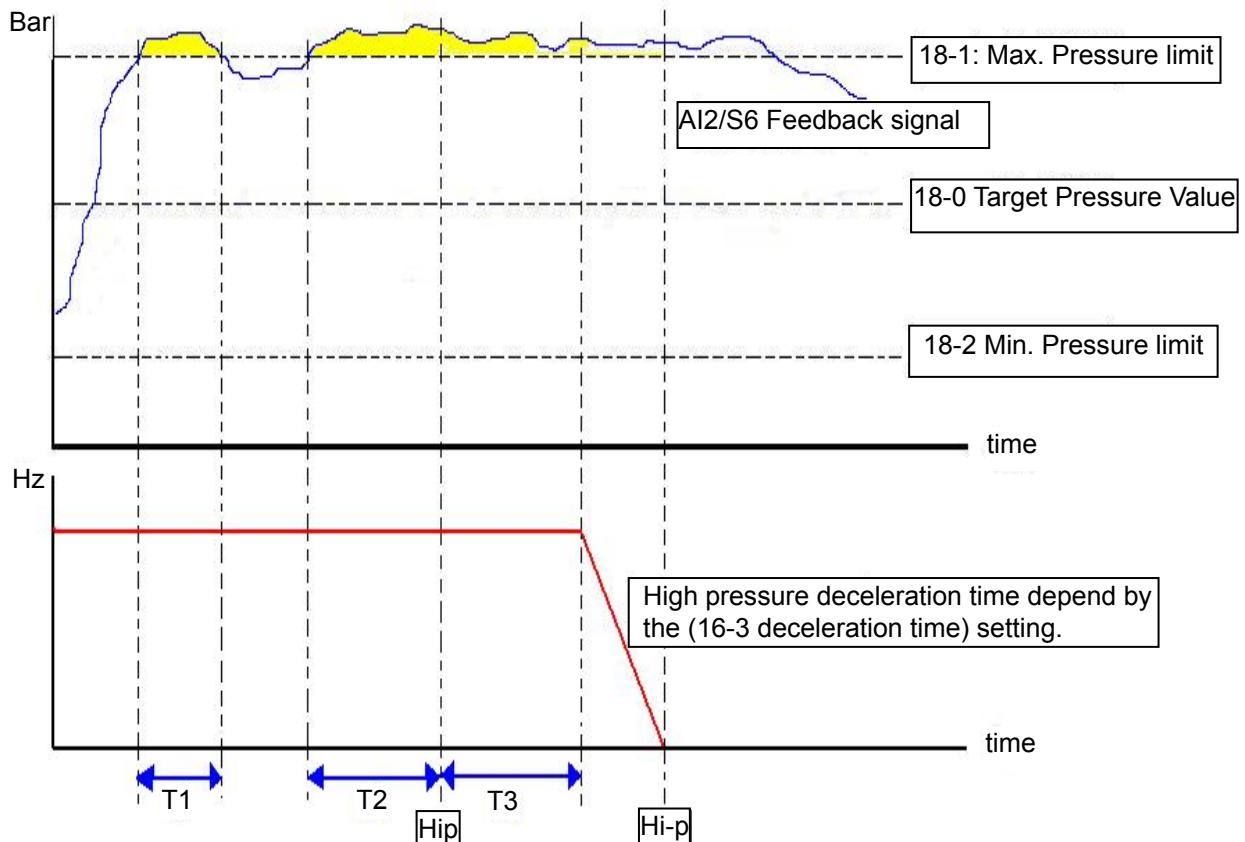
T1 < (18-3 High Pressure Alarm Time), the Hip accumulate time will be reset after T1.

T2 = (18-3 High Pressure Alarm Time), Counting high pressure time again and keypad blink Hip.

T3 = (18-4 High Pressure Stop Time), keypad blink Hi-p and deceleration to stop.

(19):18-5 Low pressure alarm time 0.0 – 600.0 sec

　　　18-6 Time ow pressure stop time 0.0 – 600.0 sec

Bar

18-1 Max. Pressure limit

18-0 Target Pressure Value

AI2/S6 Feedback signal

18-2 Min. Pressure limit

time

Hz

Low pressure deceleration time depend by the (16-3 deceleration time) setting.

time

T1　　T2　　T3

Lop　　Lo-p
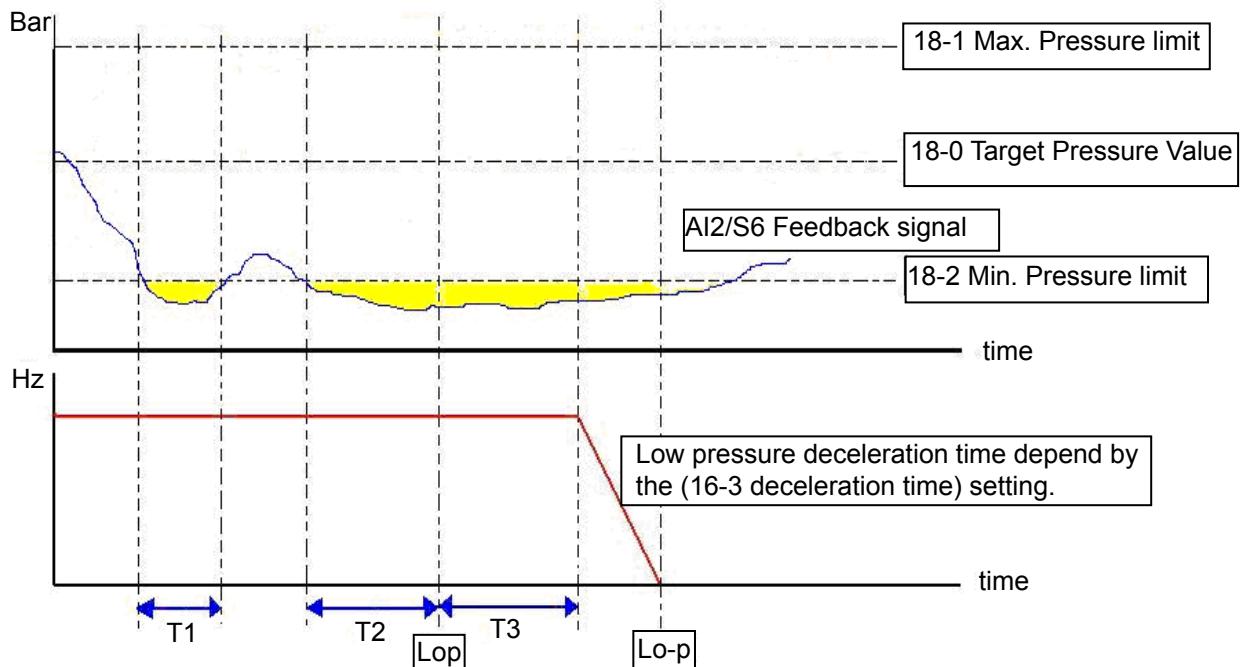
T1 < (18-5 Low Pressure Alarm Time); the Lop accumulate time will be reset after T1.
T2 = (18-5 Low Pressure Alarm Time); Counting low pressure time again and keypad blink Lop.
T3 = (18-6 Low Pressure Stop Time); keypad blink Lo-p and deceleration to stop.

(20):18-7 Sleep Delay Time 0.0 – 120.0 sec

　　　18-8 Sleep Tolerance Range 0.00 – 5.00 Bar

Bar

18-8
Sleep Tolerance Range

Pressure Feedback

18-0
Target Pressure Value

time

Hz

18-7
Sleep Delay Time

Output Frequency

16-4
Sleep Deceleration Time

time

Deviation： |(18-0) – Pressure Feedback| < 18-8
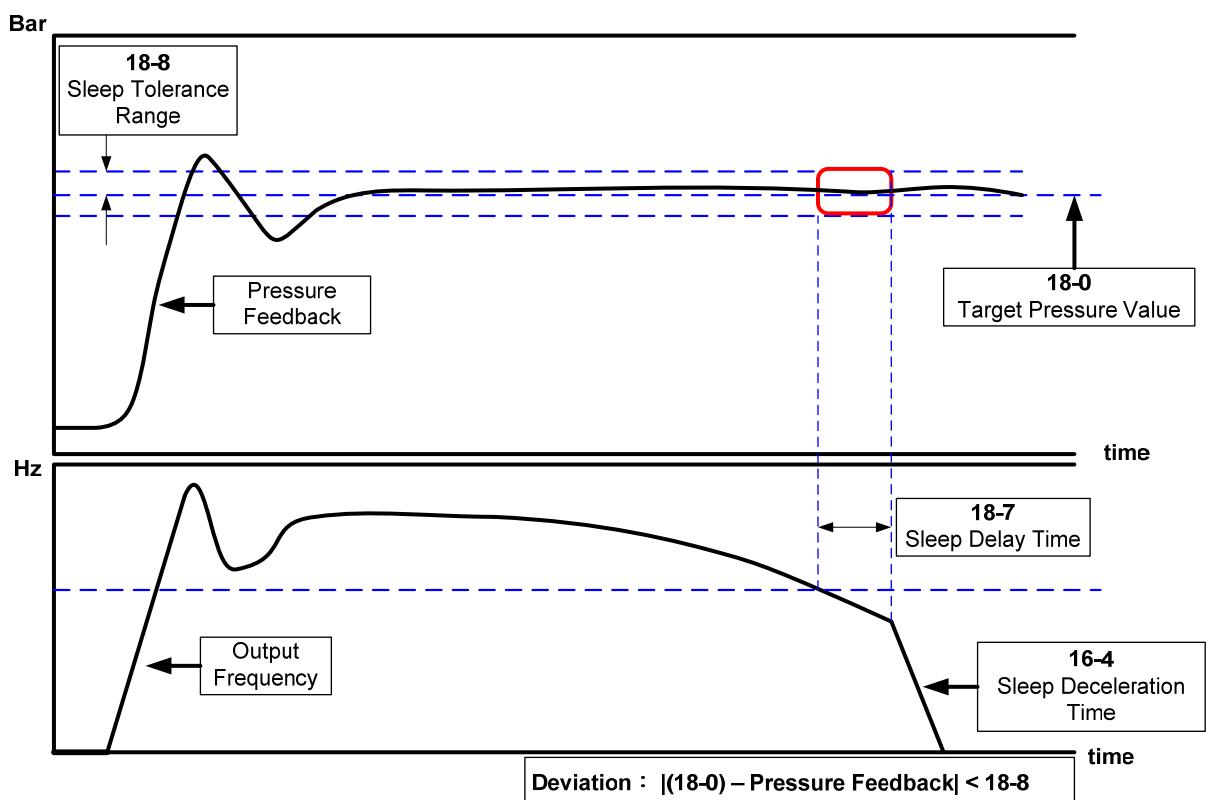
Notes: Sleep function can save energy when pressure reached target pressure value.

> (21):18-9 HiP/LoP/1BrE Protection Auto Restart Times 0 – 999

1.) 18-9=0: Amount of auto restart is infinite.

2.) 18-9=1~999: When amount of auto restart is over 18-9 setting, then inverter never
restart, until re-power-on or using reset function.

> (22): 18-A Pressure losing prevention level (%)   0 – 100 rate
>
>   18-B Detection time of pressure losing   0.0 – 25.0 (sec)

1.) When 18-A = 0: Disable.

2.) When 18-A > 0: If Pressure feedback is less than **(**Pressure setting (18-0) x
Pressure losing prevention level (18-A)**)** and exceed the detection time (18-B), the
pump will stop and show "PbL"

> (23): 18-C Forced operating frequency $0.00 - 200.0$ (Hz)

When S1~S5 any DI setting = 6(PID disable), pump will not operate according to PID
function, then set another DI = 7(Forced operating frequency), now the pump will
operate depending on 18-C (Forced operating frequency), and pump stops if remove
the DI(S1~S5=7). This function is use for when pressure sensor is offline or breakdown.

> (24):19-0 Single/Dual Pump and Master/Slave Selection 0000: Single
>
>   0001: Dual – Master
>
>   0002: Dual – Slave 1
>
>   0003: Dual – Slave 2
>
>   0004: Dual – Slave 3
>
>   19-2 Dual pump synchronal setting   0：Disable
>
>   1: Target Pressure Value & Run/Stop
>
>   2: Only Target Pressure Value
>
>   3: Only Run/Stop
>
>   19-3 Auto Shift Time 0 – 240 hour
>
>   19-4 Launch Delay Time (Slave Unit) 0 – 30.0 sec

19-0 Single/Dual Pump and Master/Slave Selection,

0000: Single   0001: Dual – Master   0002: Dual – Slave

When select dual pump control method (19-0=1, 2), set one inverter 19-0 to "1" another
to "2".
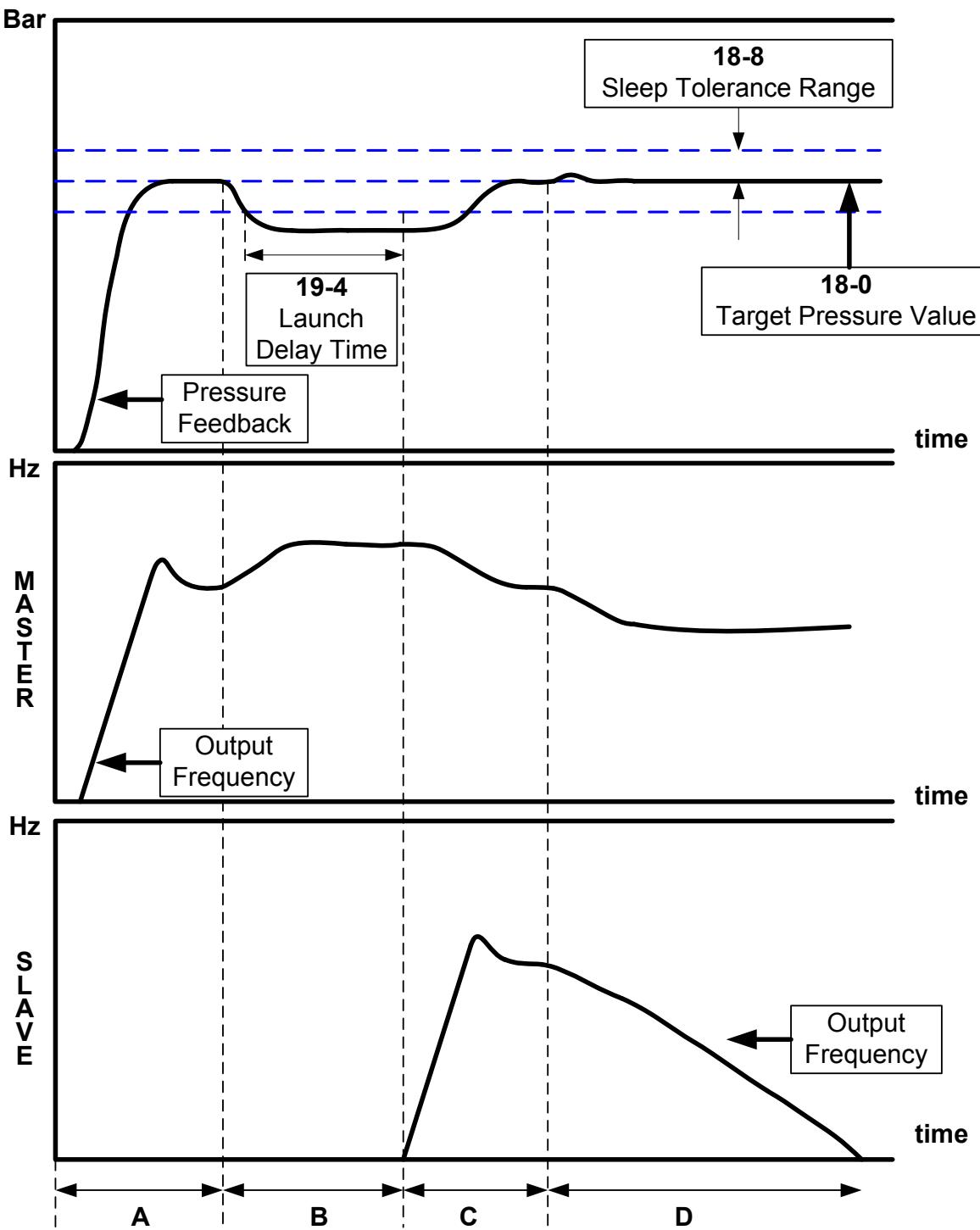
A : When dual pump operate, Master start and Slave(1~3) is standing by, then system is operating in the constant pressure.

B : When water usage become larger, then the output frequency of Master will increase. If the feedback pressure does not reach setting range of 18-8(Sleep Tolerance Pressure) and 19-4(Launch Delay Time) is not finished, Slave is still standing by.

C : When 19-4 is finished, Master request Slave to operate simultaneously to keep constant pressure. If water usage reduced, the output frequency will decrease.

D : When the water usage become less, through Water Usage Detection, and the output frequency will decrease again, when the water usage reduce to only 1 drive can afford (means still can keep constant pressure), then the output frequency of Slave will decrease again and get into sleeping mode.(More detail about Slave sleeping conditions please refer 19-6 and 19-7). Now, only the Master is operating.

19-3 Auto Shift Time

Mater and Slave unit will exchange the status after the setting time of 19-3, thereby Master will operate as Slave and Slave operate as Master. The S1 can be a switch to start or stop operation.

19-4 Launch Delay Time (Slave Unit)

When the feedback signal is lower than 18-8, Master will start immediately. If the feedback signal is still lower than 18-8 and over 19-4, the Slave will operate.

1.When using dual pump 19-0$\neq$0, the two drives parameter 19-0 cannot be set as 1 or 2 for both, and modifying 19-5=200 and 17-4 is needed which helps to make sure the feedback signal of the two drive is the same

(25):19-1 Max. Pressure of Pressure Transmitter 0.10 – 25.50 Bar

According to the specification of pressure transmitter to set pump system pressure base.

(26):19-5 AI2 (S6)Gain(%) adjustment $0 - 200$ %

The dual pump operation AI2 (S6) Gain is 200% and 17- 4 Feedback Signal Offset should be the same for both Master and Slave drives.

(27):19-6 Start Frequency for Slave Pump Running 0 – 100 % (100% = 16-0)
    19-7 Start Frequency for Slave Pump Stopping 0 – 100 % (100% = 16-0)

19-6 = 0% : Disable.

19-7 = 0% : Disable.

When dual pump is operation and Master is running, as the pressure is lower than (18-0 – 18-8), the Slave will restart by follow condition:

1.19-6 = 0%: Disable restart frequency condition

   After the setting time of 19-4, Master request Slave to start.

2.19-6 = 1 ~ 100%: Enable restart frequency condition

   When the output frequency of Master is over than 19-6(%) × 16-0, and after the setting time of 19-4, then Master request Slave to start.

When Master and Slave are running, the Slave will stop by follow condition:

1.19-7 = 0%: Disable stop frequency condition

   When output frequency of Slave is less then 16-5 Sleep Frequency, and persist time is bigger than 18-7 Sleep delay time, then Slave will get into sleep mode.

2.19-7 = 1 ~ 100%: Enable stop frequency condition

When the output frequency of Master is over than 19-7(%) × 16-0, and 19-4 is finished, or output frequency of Slave is less then 16-5 Sleep Frequency, and persist time is bigger than 18-7 Sleep delay time, then Slave will get into sleep mode.

Note: The 19-6/19-7 setting values of Master and Slave must be the same.

(28): 20-0 Run command source	0 : Keypad
	1 : External Terminal

1.) 20-00 = 0 inverter is controlled by keypad.

2.) 20-00 = 1 When inverter is controlled by external terminal, the stop button on keypad still enable for emergency stop.

(29): 20-1~20-5   S1~S5 Terminal Function
0 : Forward
1 : E.S. terminal A
2 : Base Block (b.b.)
3 : RESET command
4 : Control signal switch
5 : Communication control signal switch
6 : PID function disable
7 : Forced operating frequency

1.) S1-S5 on TM2 are multi-function input terminals which can be set to the above 7 functions.

2.) 20-01~05 Function descriptions:

A. 20-01~05 = 0   Forward run

When forward command is on, motor will operate, when command is off, motor will not operate.

B. 20-01~05 = 1   E.S. terminal A

When external E.S. is on, the drive will decelerate depend on the Deceleration Time, and blink E.S. after stops. Please remove the E.S. signal before turn the switch from off to on on (20-00=1) or press Run (20-00=0), then the drive will operate from the starting frequency.

C. 20-01~05 = 2   Free run stop(Base block)

When Base block is on, the drive will block the PWM immediately and blink "b.b." on screen. After Base block command is removed, the drive will restart by Speed search automatically.

D. 20-01~05 = 3   RESET command

When terminal is on, reset the drive; off, does not work.

E. 20-01~05 = 4   Control signal switch

External control terminal off: operating signal is controlled by 20-00

External control terminal on: operating signal is controlled by Keypad display.

F. 20-01~05 = 5   Communication control signal switch reserve.

G. 20-01~05 = 6   PID function disable

   When on, the PID function is disable, drive doesn't concern about the sensor feedback, in the same time, output frequency= 0.

H. 20-01~05 = 7   Forced operating frequency

   This function is match with PID disable function to start the forced operating frequency. More detail please refer to 18-C.

---

(30)：20-6~7 Multifunction output terminal:

   20-6 : RELAY1(R1C, R1B, R1A terminal inTM2)

   20-7 : RELAY2(R2B, R2A terminal inTM2)

   0: Run

   1: Auto restart

   2: Auto restart

   3: Momentary power loss

   4: E.S.

   5: Free run stop

   6: Motor overload

   7: Inverter overload protection

   8: High/Low pressure alarm

   9: Power On

   10: PID feedback signal offline

   11: Over torque detection

---

(31)：20-8 Source of bias target pressure

   0 : Disable

   1 : AIN

   2 : VR(15-6 password is a must)

   20-9 Range of bias target pressure 0.0 – 10.00

1.) 20-8 = 0 : Disable

2.) 20-8 = 1 : Voltage command is given by TM2 AIN, the target pressure cannot be set from keypad now, target pressure will adjust according to 20-9 setting range and AIN voltage, and it is based on 5V, it decreases (by ration) according to the AIN voltage if it is lower than 5V, it will increase (by ration) if higher.

EX : 18-0 (Pressure setting) = 5.0 (Bar)

   20-9 (Range of bias target pressure) = 3.0 (Bar)

If AIN input voltage 8V ➔ Target Pressure = 5 + ((8V-5V) / 5) x 3(Bar) = 6.8(Bar)

If AIN input voltage3V ➔ Target Pressure = 5 + ((3V-5V) / 5) x 3(Bar) = 3.8(Bar)

✸ **Target pressure still limit by 18-1(Max. pressure limit), 18-2(Min. pressure limit).**

Control of multifunction analog output

(32)：20-A Multifunction analog output selection:

      0: Output Frequency

      1: Frequency command

      2: Output voltage

      3: DC voltage

      4: Output circuit

      5: PID feedback signal

   20-B Gain control of multifunction analog output = 0~200%

Multifunction analog output terminal (TM2) is a 0~10Vdc analog output, it is selectable as 20-A, and when external voltage meter or peripheral equipment has an error, 20-B is use for adjust it.

Chapter 5   Troubleshooting and Maintenance

5.1 Error display and remedy

5.1.1 Errors which can not be recovered manually

	Display	Error	Cause	Remedy
	CPF	Program problem	External noise interference	Connect a parallel RC burst absorber across the magnetizing coil of the magnetic contactor that causes interference
	EPR	EEPROM problem	Faulty EEPROM	Replace EEPROM
@	-OV-	Voltage too high during stop	Detection circuit malfunction	Send the inverter back for repairing
@	-LV-	Voltage too low during stop	1. Power voltage too low 2. Restraining resistor or fuse burnt out. 3. Detection circuit malfunctions	1. Check if the power voltage was correct or not 2. Replace the restraining resistor or the fuse 3. Send the inverter back for repairing
@	-OH-	The inverter is overheated during stop	1. Detection circuit malfunctions 2. Ambient temperature too high or bad ventilation	1. Send the inverter back for repairing 2. Improve ventilation conditions
	CTER	Current Sensor detecting error	Current sensor error or circuit malfunctions	Send the inverter back for repairing

Note： "@" the Failure contact does not function.

5.1.2 Errors which can be recovered manually and automatically

Display	Error	Cause	Remedy
OC-S	Over current at start	1. the motor wind and enclosure short circuit 2. the motor contacts and earth short circuit 3. the IGBT module ruined	1. inspect the motor 2. inspect the wire 3. replace the transistor module
OC-D	Over-current at deceleration	The preset deceleration time is too short.	Set a longer deceleration time
OC-A	Over-current at acceleration	1. Acceleration time too short 2. The capacity of the motor higher than the capacity of the inverter 3. Short circuit between the motor coil and the shell 4. Short circuit between motor wiring and earth 5. IGBT module damaged	1. Set a longer acceleration time 2. Replace a inverter with the same capacity as that of the motor 3. Check the motor 4. Check the wiring 5. Replace the IGBT module
OC-C	Over-current at fixed speed	1. Transient load change 2. Transient power change	Increase the capacity of the inverter
OV-C	Voltage too high during operation/ deceleration	1. Deceleration time setting too short or large load inertia 2. Power voltage varies widely	1. Set a longer deceleration time 2. Add a brake resistor or brake module 3. Add a reactor at the power input side 4. Increase inverter capacity
Err4	Illegal interrupt of CPU	Outside noise interference	Send back to repair if it happens many times
OVSP	Over speed during operating	1. Moter load too big or Inverter capacity too small 2. The Current detect circuit fault	1. Increase acceleration / deceleration time (16-2/16-3) 2.Send back to Teco
LoP	Low Pressure Alarm	Pressure lower than min. pressure limit, low pressure persist time greater than low pressure alarm time setting	1. Decrease setting value of min. pressure limit 2. Check pressure meter
Hip	Low Pressure Stop	Pressure lower than min. pressure limit, low pressure persist time greater than low pressure stop time setting	1.Decrease setting value of min. pressure limit 2. Check pressure meter
Lo-P	High Pressure Alarm	Pressure higher than max. pressure limit, High pressure persist time greater than high pressure alarm time setting.	1. Increase setting value of max. pressure limit 2. Check pressure meter
Hi-p	High Pressure Stop	Pressure higher than max. pressure limit, High pressure persist time greater than high pressure stop time setting.	1. Increase setting value of max. pressure limit 2. Check pressure meter

Display	Error	Cause	Remedy
PbL	**Pressure Loss Stop**	When feedback pressure is lower than 18-A (Pressure losing ratio) and longer then pressure losing detection time.	1. Decrease the value of min. pressure limit 2. Check pressure meter

5.1.3 Errors which can be recovered manually but not automatically

Display	Error	Cause	Remedy
OC	Over-current during stop	1. Detection circuit malfunctions 2. Bad connection for CT signal cable	1. Check the noise between Power line and motor line 2. Send the inverter back for repairing
OL1	Motor overload	Heavy load	Increase the motor capacity
OL2	Inverter overload	Heavy Load	Increase the inverter capacity
OL3	Over torque	Heavy Load	Increase the inverter capacity
LV-C	Voltage too low during operation	1. Power voltage too low 2. Power voltage varies widely 3. Main Circuit Relay error	1. Improve power quality 2. Set a longer acceleration time 3. Increase inverter capacitor Add a reactor at the power input side Send the inverter back for repairing
OH-C	Heatsink temperature too High during operation	1. Heavy load 2. Ambient temperature too high or bad ventilation	1. Check if there are any problems with the load 2. Increase inverter capacity 3. Improve ventilation conditions

5.1.4 Special conditions

Display	Error	Description
STP0	Zero speed stop	Happened when preset frequency <0.1Hz
PDER	PID feedback loss	PID feedback loss detect
1BrE	Inverter mal-function	When one unit show " 1BrE " error the other unit can operate continuously.

5.1.5 Operation errors

Display	Error	Cause	Remedy
Err1	Key operation error	Attempt to modify the parameter can not be modified during operation (refer to the parameter list).	Modify the parameter while STOP

5.2 General troubleshooting

Status	Checking point	Remedy
Motor can not run	Is power applied to L1(L), L2, and L3(N) terminals (is the charging indicator lit)?	• Is the power applied? • Turn the power OFF and then ON again. • Make sure the power voltage is correct. • Make sure screws are secured firmly.
	Are there voltage across the output terminal T1, T2, and T3?	• Turn the power OFF and then ON again.
	Is overload causing the motor blocked?	• Reduce the load to let the motor running.
	Are there any abnormalities in the inverter?	• See error descriptions to check wiring and correct if necessary.
	Is forward or reverse running command issued?	
	Has analog frequency signal been input?	• Is analog frequency input signal wiring correct? • Is voltage of frequency input correct?
	Is operation mode setting correct?	• Operate operations through the digital panel.
Motor runs inversely	Are wiring for output terminals T1, T2, and T3 correct?	• Wiring must match U, V, and W terminals of the motor.
	Are wiring for forward and reverse signals correct?	• Check wiring are correct if necessary.
The motor speed can not be regulated.	Are wiring for analog frequency inputs correct?	• Check wiring are correct if necessary.
	Is the setting of operation mode correct?	• Check the operation mode of the operator.
	Is the load too heavy?	• Reduce the load.
Motor running speed too high or too low	Are specifications of the motor (poles, voltage…) correct?	• Confirm the motor's specifications.
	Is the gear ratio correct?	• Confirm the gear ratio.
	Is the setting of the highest output frequency correct?	• Confirm the highest output frequency.
Motor speed varies unusually	Is the load too heavy?	• Reduce the load.
	Does the load vary largely?	• Minimize the variation of the load. • Increase capacities of the inverter and the motor.
	Is the input power lack of phase?	• Add an AC reactor at the power input side if using single-phase power. • Check wiring if using three-phase power.

Appendix

The definition of Pressure:

$$P = \frac{F}{A} \quad \text{or} \quad P = \frac{dF}{dA}$$

Where:

    p is the pressure,
    F is the normal force,
    A is the area.

Non-SI measures such as *pound per square inch* (psi) and *bar* are used in parts of the world Conversion between Kg/Cm^2 and P.S.I are list as below formula:

$$1\,Kg/Cm^2 = 14.22 \ \text{P.S.I} \quad \text{or} \quad 1\text{P.S.I} = 0.07 \ Kg/Cm^2$$

$$1\,\text{Bar} = 1\,00 \ \text{kPa} = 1.02 \ Kg/Cm^2 = 14.5 \ \text{P.S.I}$$

Conversion of the Pressure unit						
MPa	KPa	Bar	Kg/cm²	P.S.I	atm	mHg
1	1000	10	10.2	145	9.87	7.5
0.001	1	0.01	0.011	0.145	9.87×10^{-3}	7.5×10^{-1}
0.1	100	1	1.02	14.5	0.987	0.75
0.09807	98.07	0.981	1	14.22	0.968	0.736
0.00689	6.89	0.069	0.07	1	0.068	0.052
0.101	1.01×10^2	1.013	1.033	14.7	1	0.76
0.133	1.33×10^2	1.33	1.36	19.3	1.32	1

目 錄

前言

0.1 前言

　　為了充分地發揮本變頻器的功能及確保使用者的安全，請詳閱本操作手冊。當您使用中發現任何疑難而本操作手冊無法提供您解答時，請連絡東元各地區經銷商或本公司業務人員，我們的專業人員會樂於為您服務，並請您繼續採用東元產品。

※使用須知

　　變頻器乃電力電子產品，為了您的安全，本手冊中有「危險」「注意」等符號提醒您於搬運、安裝、運轉時，檢查變頻器之安全防範事項，請您配合而使變頻器之使用更加安全。

| ⚠ 危險 | 錯誤使用時，可能造成人員傷亡。 |

| ⚠ 注意 | 錯誤使用時，可能造成變頻器或機械系統損壞。 |

⚠ 危險

- 在關閉電源後，於充電指示燈熄滅前，請勿觸摸電路板及零組件。
- 不可在送電中實施配線，執行運轉時請勿檢查電路板上之零組件及信號。
- 請勿自行拆裝更改變頻器內部連接線或線路與零件。
- 變頻器接地端子請務必正確接地。（200V 級：接地阻抗<100Ω，400V 級：接地阻抗<10Ω。）

⚠ 注意

- 請勿對變頻器內部的零組件進行耐壓測試，這些半導體零件易受高電壓損毀。
- 絕不可將變頻器輸出端子 T1(U)、T2(V)、T3(W) 連接至 AC 電源。
- 變頻器主電路板 CMOS IC 易受靜電影響及破壞，請勿觸摸主電路板。

※產品檢查

　　每台東元變頻器在出廠前均做過功能測試，客戶於變頻器送達拆封後，請執行下列檢查步驟。

- 變頻器的機種型號是否正確符合您所訂購之型號與容量。
- 變頻器是否因運送不慎造成損傷，若有損壞請勿接入電源。

當您發現有上述問題時請立即通知東元電機各區業務人員。

第一章　型號說明

```
┌─────────────────────────────────────────┐
│                                           │
│   MODEL        : JNTHBCBA0001BEAU-        │
│   Motor Rating : 1HP/0.75kW               │
│                                           │
│   INPUT        : AC 3 phases 50/60Hz      │
│   VOLTAGE      : 380~480V (+10%, -15%)    │
│   Amps         : 4.2A                     │
│                                           │
│   OUTPUT       : AC 3 phases 0~400Hz      │
│   VOLTAGE      : 0~480V                    │
│   Amps         : 2.3A                     │
│                                           │
│   TECO Electric & Machinery Co., Ltd.     │
│                                           │
└─────────────────────────────────────────┘
```

變頻器型號→

輸入電源規格→

輸出規格→

| JNTH | BC | BA | 0001 | AC | A | U | F |

系列別

按鍵面板
BC：LED
BG：LCD
BL：BLIND

保護等級
BA：IP00 or IP20
BB：NEMA1

馬力數
R500：0.5 馬力
0001：1.0 馬力
0002：2.0 馬力
0003：3.0 馬力
0005：5.0 馬力
7R50：7.5 馬力
0010：10 馬力
0015：15 馬力
0020：20 馬力
0025：25 馬力
0030：30 馬力
0040：40 馬力
0050：50 馬力
0060：60 馬力
0075：75 馬力

使用電壓及相數
AC：單相 220V
BC：三相 220V
BE：三相 440V

UL 申請
U：申請

A：CVP 系列
恆壓泵浦專用機

雜訊濾波器
-：無 FILTER
F：內含 FILTER

第二章 安全注意事項

2.1 使用時之注意事項

2.1.1 送電前

⚠ 注意
所選用之電源電壓必須與變頻器之輸入電壓規格相同。

⚠ 危險
主迴路端子配線必須正確，L1(L)、L2、L3(N)為電源輸入端子，T1、T2、T3 為變頻器輸出端子，請勿接電源於輸出端子上，以避免造成變頻器的損壞。

⚠ 注意
● 搬運變頻器時，請勿直接提取前蓋，應由變頻器本體搬運，以防止前蓋脫落，避免變頻器掉落造成人員受傷或變頻器損壞。 ● 請將變頻器安裝於金屬類等不燃物材料之上，請勿安裝於易燃性材料上或附近，以防止發生火災。 ● 若多台變頻器同放在一個控制盤內，請外加散熱風扇，使盤內溫度低於 40℃ 以下，以防過熱或火災等發生。 ● 請於關閉電源後，再拆卸或裝入操作器，並請按圖操作固定操作器，以免接觸不良造成操作器故障或不顯示。

警告
本產品係通過 IEC 61800-3 限制區域使用等級. 在某些環境下使用本產品時,可能造成電磁干擾，故在使用前請先進行適當的量測。

⚠注意
為確保周邊設備安全，建議在變頻器輸入側外加高速保險絲，尤其是大馬力系統。所採用的高速保險絲規格請參閱 P57　　　　　　　　　。

2.1.2 送電中

⚠ 危險
送電中絕不可插拔變頻器上之連接器(CONNECTOR)，以避免控制板因插拔所產生之突波衝入造成損壞。

2.1.3 運轉前

⚠ 注意
電源投入時，變頻器會先閃爍電源電壓 5 秒。

2.1.4 運轉中

⚠ 危險
運轉中不可將馬達機組投入或切離，否則會造成變頻器過電流跳機甚或將變頻器主迴路燒燬。

⚠ 危險
● 變頻器送電中請勿取下前蓋，以防人員感電受傷。 ● 有設定自動再啟動之功能時，馬達於運轉停止後會自動再啟動，請勿靠近機器以免危險。 ● 停止開關的功能須設定才有效，與緊急停止開關的用法不同，請注意使用。

⚠ 注意
● 散熱座、煞車電阻等發熱元件請勿觸摸。 ● 變頻器可以很容易的使馬達由低速到高速運轉，請確認馬達與機械的容許範圍。 ● 使用煞車模組等搭配產品時，請注意其使用之相關設定。 ● 變頻器運轉時，請勿檢查電路板上的信號。

⚠ 注意
請先確認電源切斷後，在按鍵面板顯示熄滅 5 分鐘後，方可進行拆裝或實施檢查。

2.1.5 檢查保養時

⚠ 注意
變頻器周圍溫度應在 -10℃ ~+40℃　95%RH 不結露環境中使用

⚠ 注意
去掉變頻器防塵蓋後,則周圍溫度應在 -10℃ ~+50℃　95%RH 不結露環境中使用,但需確保周圍環境無滴水及金屬粉塵。

第三章 安裝及注意事項

3.1 週邊設備之應用及注意事項：

電源

無熔線斷路器

電磁接觸器

功率改善
AC 電抗器

外加高速保險絲

輸入側雜訊
濾波器

CVP 變頻器

接地

三相馬達

接地
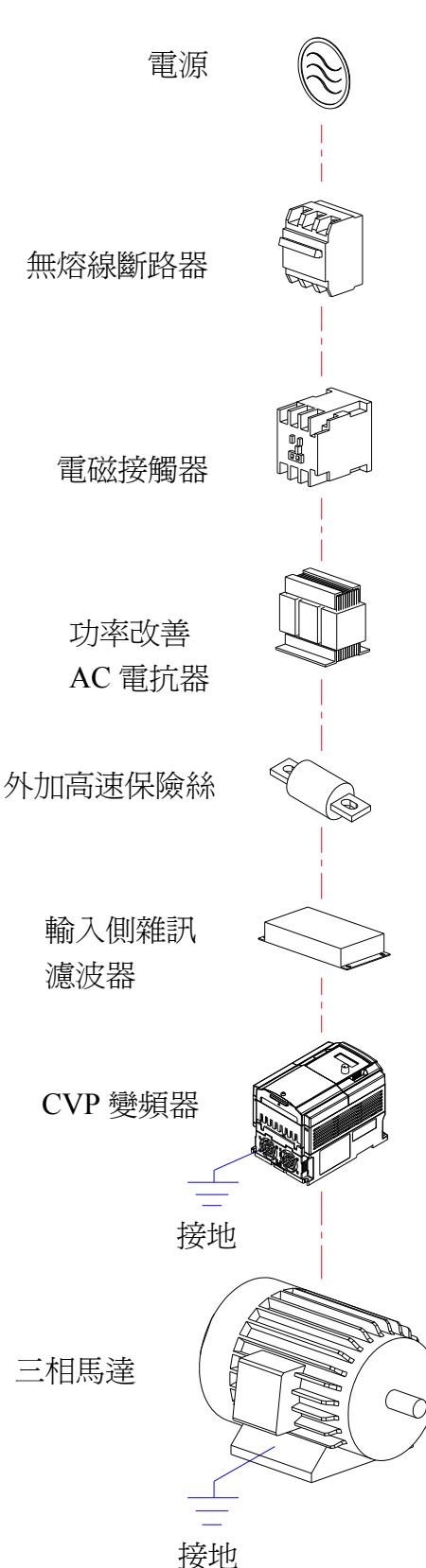
電源：

● 請注意電壓等級是否正確，以避免損壞變頻器。

● 交流電源與變頻器之間必須安裝無熔絲斷路器。

無熔絲斷路器：

● 請使用符合變頻器額定電壓及電流等級之無熔絲斷路器做變頻器之電源 ON/OFF 控制，並做變頻器之保護。

● 無熔線斷路器請勿做為變頻器之運轉/停止切換功能使用。

漏電斷路器：

● 請加裝漏電斷路器，防止漏電造成之誤動作，並保護使用人員之安全。

● 若加裝漏電斷路器以做漏電故障保護時，請選用感度電流 200mA 以上，動作時間 0.1 秒以上，以防止高頻誤動作。

電磁接觸器：

● 一般使用時可不加電磁接觸器，但做外部控制、停電後自動再啟動等功能或使用煞車控制器時，須加裝一次側之電磁接觸器。

● 電磁接觸器請勿做為變頻器之運轉/停止切換功能使用。

功率改善之 AC 電抗器：

● 200V/400V 15KW 以下之變頻器，若使用大容量(600KVA 以上)的電源時或為改善電源之功率可外加 AC 電抗器。

外加高速保險絲：

● 為確保周邊設備安全，請務必外加高速保險絲(保險絲規格請參閱 P57)。

輸入側雜訊濾波器：

● 變頻器週邊有電感性負載時，請務必加裝使用。

變頻器：

● 輸出端子 T1、T2、T3，接至馬達的 U、V、W 端子，如果變頻器執行正轉時，馬達為逆轉，只要將 T1、T2、T3 端子中任意兩相對調即可。

● 輸出端子 T1、T2、T3，請勿接交流電源以免變頻器損壞。

● 接地端子請正確接地，（200V 級：接地阻抗<100Ω，400V 級：接地阻抗<10Ω。

3.2 保險絲的型式：

當變頻器元件故障時,驅動器輸入端裝置保險絲可用來有效地中斷與系統間的連接！而變頻器的電子式保護線路可用來清除輸出短路及接地故障,而不會讓輸入端保險絲燒毀！以下是建議裝置保險絲規格表,爲了能夠最有效的保護變頻器,應該使用電子式高速保險絲。

	JNTHBCBA-	HP	KW	KVA	100% 連續 輸出電流(A)	Max.RK5 保險絲額定(A)	Max.CC or T 保險絲額定(A)
220V 級(單相)	R500AC	0.5	0.4	1.2	3.1	10	20
	0001AC	1	0.75	1.7	4.5	15	30
	0002AC	2	1.5	2.9	7.5	20	40
	0003AC	3	2.2	4.0	10.5	25	50
220V 級(三相)	R500BC	0.5	0.4	1.2	3.1	8	10
	0001BC	1	0.75	1.7	4.5	12	15
	0002BC	2	1.5	2.9	7.5	15	20
	0003BC	3	2.2	4.0	10.5	20	30
	0005BC	5	3.7	6.7	17.5	30	50
	7R50BC	7.5	5.5	9.9	26	50	60
	0010BC	10	7.5	13.3	35	60	70
	0015BC	15	11.0	20.6	48	80	100
	0020BC	20	15.0	27.4	64	100	125
	0025BC	25	18.5	34.0	80	125	150
	0030BC	30	22.0	41.0	96	160	200
	0040BC	40	30.0	54.0	130	200	250
440V 級(三相)	0001BE	1	0.75	1.7	2.3	6	10
	0002BE	2	1.5	2.9	3.8	10	15
	0003BE	3	2.2	4.0	5.2	10	20
	0005BE	5	3.7	6.7	8.8	20	30
	7R50BE	7.5	5.5	9.9	13	25	35
	0010BE	10	7.5	13.3	17.5	30	50
	0015BE	15	11.0	20.6	25	50	60
	0020BE	20	15.0	27.4	32	60	70
	0025BE	25	18.5	34.0	40	70	80
	0030BE	30	22.0	41.0	48	80	100
	0040BE	40	30.0	54.0	64	100	125
	0050BE	50	37.0	68.0	80	125	150
	0060BE	60	45.0	82.0	96	150	200
	0075BE	75	55.0	110.0	128	200	250

*Fuse ratings are based upon 300V fuses for 230V inverter, and 500V for 460V inverters

注意事項：

1. 當電源接上時,或電源剛從主機脫離的時候,不要碰觸任何電路元件,以避免觸電。必須等待按鍵面板顯示燈熄滅之後,才能進行其他動作。

2. 在變頻器未跟電源脫離之前,不要對變頻器實施任何配線的動作。忽略以上警告可能會導致嚴重的傷亡。

※**註**：本產品設計於第二級污染環境或其他相同環境使用。

3.3 配線規則

A.螺絲扭力：請依照下列表中之螺絲扭力，以螺絲起子或其他工具進行配線工作：

鎖固扭力			
馬力數	電源規格	TM1 端子之額定扭力	
0.5/1/2(3φ)	200-240V	0.59/0.08	7.10/8.20
1/2	380-480V	(LBS-FT / KG-M)	(LBS-IN/KG-CM)
2(1φ)/3/5/7.5/10	200-240V	1.5/0.21	18.00/20.28
3/5/7.5/10/15	380-480V	(LBS-FT/KG-M)	(LBS-IN/KG-CM)
15/20/25	200-240V	1.84/0.3	22.1/30
20/25/30	380-480V	(LBS-FT / KG-M)	(LBS-IN/KG-CM)
30/40	200-240V	4.42/0.66	53.1/66
40/50/60/75	380-480V	(LBS-FT/KG-M)	(LBS-IN/KG-CM)

B.電源線：

電源線為連接到 L1、L2、L3、T1、T2、T3、P、BR、P1 的這些線材，電源線的選定必須依下列規定：

    (1) 僅能使用銅線，線徑的選擇依攝氏 105 度為基準。

    (2) 線材額定電壓的選擇，240VAC 系統最小值為 300V，480 VAC 系統最小值為 600V。

    (3) 為確保安全，電源線應使用 O 型端子鎖固。

C.控制線：

控制線為連接到 TM2 控制端子的線材，其選定必須依下列規定：

    (1) 僅能使用銅線，線徑的選擇依攝氏 105 度為基準。

    (2) 線材額定電壓的選擇，240VAC 系統最小值為 300V，480 VAC 系統最小值為 600V。

    (3) 控制線不應該與電源線及馬達線在同一導管或電線保護管中實施配線，以避免被雜訊干擾。

D.端子台的電氣額定：TM1 額定如下表：

馬力數	電源規格	Volts	Amps
0.5/1/ 2(3φ)	200-240V		15A
1/ 2	380-480V		15A
2(1φ)/ 3/ 5/ 7.5/ 10	200-240V		40A
3/ 5/ 7.5/ 10/15	380-480V		40A
15/20/25	200-240V		80A
20/25/30	380-480V	600	60A
30	200-240V		100A
40/50	380-480V		100A
40	200-240V		150A
60/75	380-480V		150A

※註：輸入及輸出訊號(TM2)的額定－等級 2 配線規定。

3.4 規格

單相，200~240V 機種

JNTHBCBA□□□□ACAU(F)	R500	0001	0002	0003
馬力數(HP)	0.5	1	2	3
適用馬達容量(KW)	0.4	0.75	1.5	2.2
額定輸出電流(A)	3.1	4.5	7.5	10.5
額定容量(KVA)	1.2	1.7	2.9	4.0
輸入最大電壓	單相 200~240V +10% -15%，50/60Hz ± 5%			
輸出最大電壓	三相 0~240V			
輸入電流(A)	8.5	12	16	23.9
淨重/含濾波器(KG)	1.2/1.3	1.2/1.3	1.5/1.8	1.9/2.3
允許瞬停時間(秒)	1.0	1.0	2.0	2.0

三相， 200~240V 機種

JNTHBCBA□□□□BCAU	R500	0001	0002	0003	0005	7R50	0010	0015	0020	0025	0030	0040
馬力數(HP)	0.5	1	2	3	5	7.5	10	15	20	25	30	40
適用馬達容量(KW)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30
額定電流(A)	3.1	4.5	7.5	10.5	17.5	26	35	48	64	80	96	130
額定容量(KVA)	1.2	1.7	2.9	4.0	6.7	9.9	13.3	20.6	27.4	34	41	54
輸入最大電壓	三相 200~240V +10% -15%，50/60Hz ± 5%											
輸出最大電壓	三相 0~240V											
輸入電流(A)	4.5	6.5	11	12.5	20.5	33	42	57	70	85	108	138
淨重(KG)	1.2	1.2	1.2	1.75	1.9	5.6	5.6	15	15	15	33	34
允許瞬停時間(秒)	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

三相， 380~480V 機種

JNTHBCBA□□□□ BEAU(F)	0001	0002	0003	0005	7R50	0010	0015	0020	0025	0030	0040	0050	0060	0075
馬力數(HP)	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75
適用馬達容量(KW)	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55
額定電流(A)	2.3	3.8	5.2	8.8	13.0	17.5	25	32	40	48	64	80	96	128
額定容量(KVA)	1.7	2.9	4.0	6.7	9.9	13.3	19.1	27.4	34	41	54	68	82	110
輸入最大電壓	三相 380~480V +10% -15%， 50/60Hz ± 5%													
輸出最大電壓	三相 0~480V													
輸入電流(A)	4.2	5.6	7.3	11.6	17	23	31	38	48	56	75	92	112	142
淨重(KG)	1.2 (1.3)	1.2 (1.3)	1.8 (2.2)	1.8 (2.2)	5.6 (6.6)	5.6 (6.6)	5.6 (6.6)	15	15	15	33	33	50	50
允許瞬停時間(秒)	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

註 1：200V 級 30HP(含)以上機種內建 DC Reactor

註 2：400V 級 40HP(含)以上機種內建 DC Reactor

3.5 CVP 配線圖

配線圖一
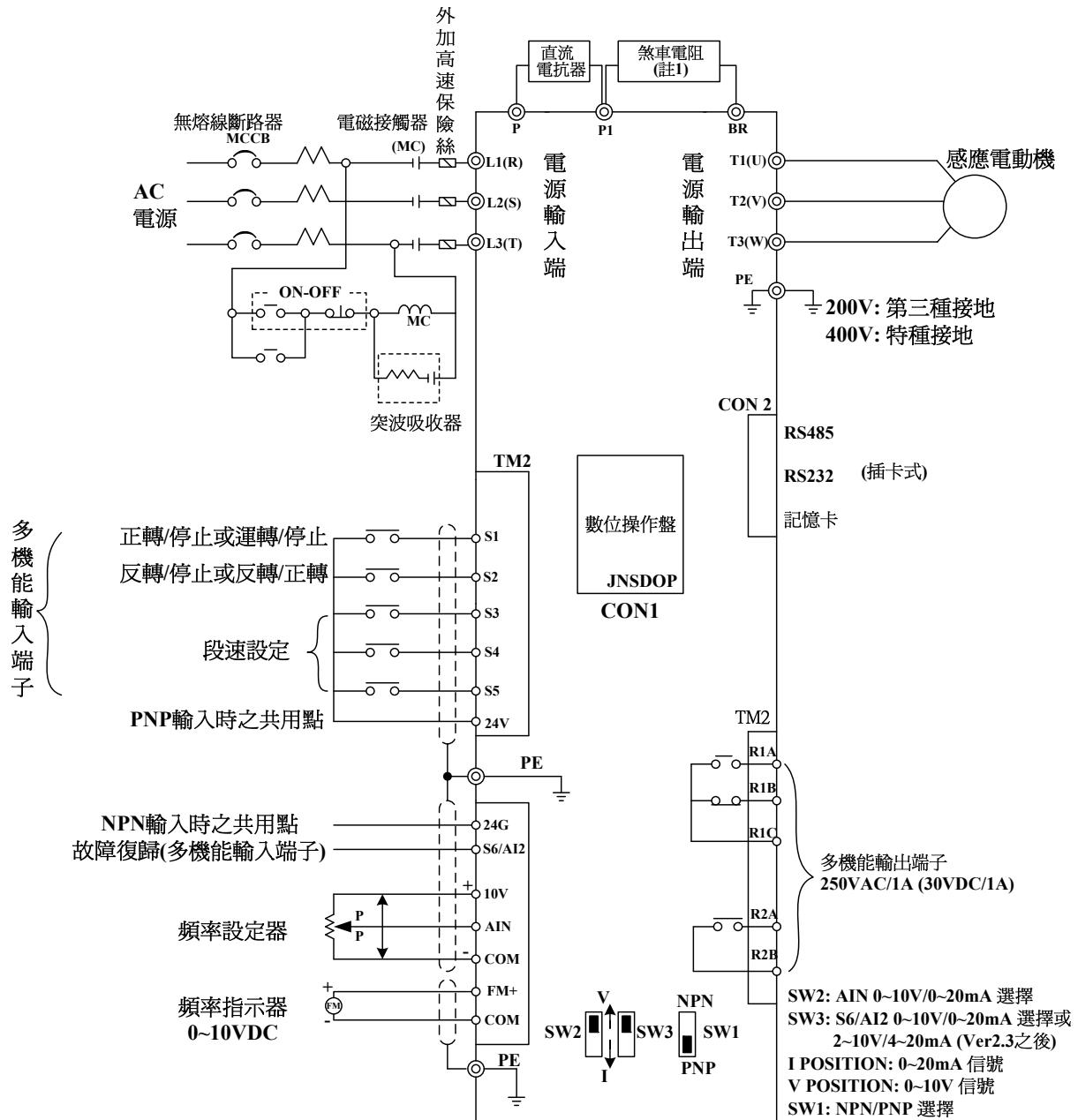
※註 1：使用時機請參考主迴路端子(P1、BR)之說明，阻值選用參照煞車電阻規格。
※註 2：以上配線圖適用於 220V：0.5~2HP 及 440V：1~2 HP

配線圖二
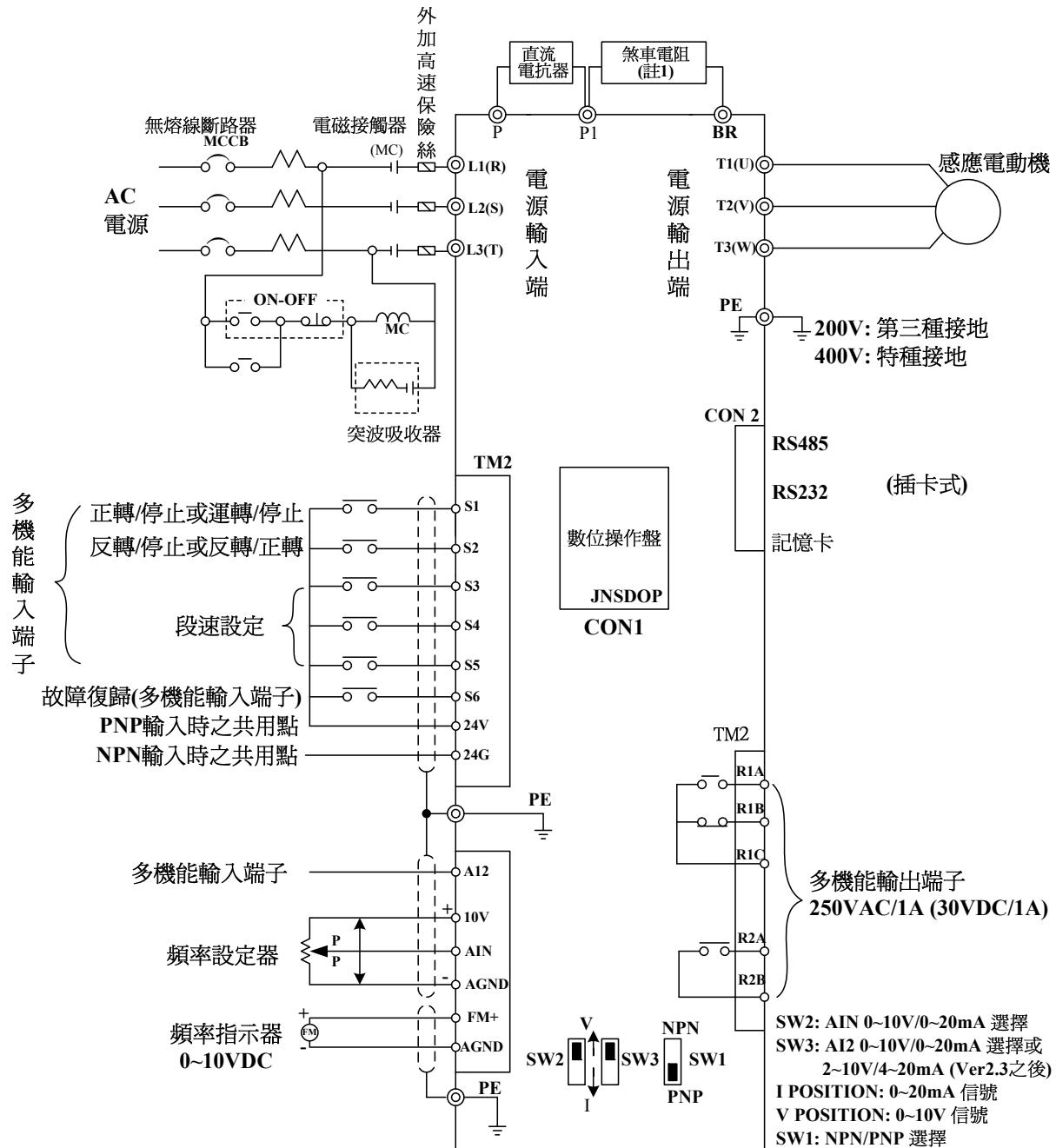
※註1：使用時機請參考主迴路端子(P1、BR)之說明，阻值選用參照煞車電阻規格。
※註2：以上配線圖適用於 220V：3 ~40HP 及 440V：3~75HP 機種適用。

3.6 泵浦控制端子接線圖(樣式一)

單泵浦參數19-0需設爲0

壓力轉換器

運轉開關
20-0 = 1 (外控)

R2B	R2A	S6	S5	S4	S3	S2	S1
R1B	R1C	R1A	10V	AIN	COM	24V	FM+

SW3 V / I
SW1 NPN / PNP

單泵浦 接線圖

主 泵 浦
雙泵浦參數設定：
19-0 = 1(多泵浦運轉：主機)

SW3 V / I
SW1 NPN / PNP

RS485 模組
BLACK COM
RED 24V

壓力轉換器

運轉開關
20-0 = 1
21-1 = 0

R2B	R2A	S6	S5	S4	S3	S2	S1
R1B	R1C	R1A	10V	AIN	COM	24V	FM+

副 泵 浦
雙泵浦參數設定：
19-0 = 2~4(多泵浦運轉：副機)

SW3 V / I
SW1 NPN / PNP

RS485 模組
BLACK COM
RED 24V

R2B	R2A	S6	S5	S4	S3	S2	S1
R1B	R1C	R1A	10V	AIN	COM	24V	FM+

多泵浦 接線圖 (最多可併聯四台)

(樣式二)

單泵浦參數19-0需設爲0

20-0 = 1 (外控)

運轉開關

R2B	R2A	24G	S6	S5	S4	S3	S2	S1
R1B	R1C	R1A	24V	10V	AIN	AI2	AGND	FM+

SW3 V / I
SW1 NPN / PNP

壓力轉換器
+ −

單泵浦 接線圖

主 泵 浦
多泵浦參數設定：
19-0 = 1(雙泵浦運轉：主機)

SW3 V / I
SW1 NPN / PNP

副 泵 浦
多泵浦參數設定：
19-0 = 2~4(多泵浦運轉：副機)

SW3 V / I
SW1 NPN / PNP

RS485 模組
BLACK COM
RED 24V

壓力轉換器
− +

運轉開關
20-0 = 1
20-1 = 0

R2B	R2A	24G	S6	S5	S4	S3	S2	S1
R1B	R1C	R1A	24V	10V	AIN	AI2	AGND	FM+

R2B	R2A	24G	S6	S5	S4	S3	S2	S1
R1B	R1C	R1A	24V	10V	AIN	AI2	AGND	FM+

多泵浦 接線圖 (最多可併聯四台)

3.7 變頻器端子說明

主迴路端子說明

端子符號	功能說明		
R／L1（L）	主電源輸入　單相機種：L／N		
S／L2	三相機種：L1／L2／L3		
T／L3（N）			
P1	煞車電阻或連接端子　當負載慣量大或減速時間短，而使變頻器容易過電壓跳脫時使用(參照煞車電阻規格)		For 220V：0.5~10HP, 440V：1~15HP
BR			
P1／P	直流電抗器連接端子		
B1／P	● B1/P-Ө：直流電源輸入 ● B1/P-B2：外接煞車電阻 For 220V：15~20HP and 440V：20HP	-	
B2			
Ө		● ⊕-Ө：直流電源輸入或接煞車檢出模組 For 220V：25~40HP and 440V：25~75HP	
⊕	-		
U／T1	變頻器輸出		
V／T2			
W／T3			

控制迴路端子說明

端子符號	端　子　功　能　說　明		
R2A	多機能輸出常開端子		接點額定容量：(250VAC/1A 或 30VDC/1A)
R2B			
R1C	共用接點	多機能輸出端子	
R1B	常閉接點		
R1A	常開接點		
10V	頻率旋鈕(VR)電源端子(第三腳)		
AIN	類比頻率信號輸入端子或多機能輸入端子 S7(High 準位：8V 以上/Low 準位：2V 以下，PNP 模式適用)		
24V	PNP(SOURCE)輸入時端子 S1~S5(S6,S7)之共用接點，此時請記得將 SW1 切至 PNP 位置 (如 CVP 配線圖所示)		
COM 24G AGND	1. NPN(SINK)輸入時端子 S1~S5 之共用接點及類比輸入、輸出訊號共同端子 COM，此時請將 SW1 切至 NPN 位置 (如配線圖一所示) 2. NPN(SINK)輸入時端子 S1~S6 共同接點為 24G，類比輸入 AIN、AI2 及類比輸出 FM+共同接點為 AGND，此時請將 SW1 切至 NPN 位置 (如配線圖二所示)		
FM+	多機能類比輸出正端，輸出端子信號為 0-10VDC (2mA 以下)		
S1	多機能輸入端子		
S2			
S3			
S4			
S5			
S6	1. 多機能輸入端子(數位端子時 High 準位：8V 以上/Low 準位：2V 以下，PNP 模式適用)或類比輸入端子 AI2(0~10Vdc/4~20mA) 2. S6 端子僅為多功能使用，AI2 取代 S6 當作類比量輸入使用(僅 220V：3~40HP 及 440V：3~75HP 機種適用以上說明)。		

SW 的功能說明

SW2/SW3	外部信號種類	備註	SW1	外部信號種類	備註
V / I	0~10VDC 類比信號	(1) 出廠設定為 電壓輸入		NPN(SINK) 輸入	
V / I	0~20mA 類比信號			PNP(SOURCE) 輸入	出廠設定

3.8 外型尺寸圖

(1) Frame1：單相 JNTHBCBA __ AC: R500, 0001
三相 JNTHBCBA __ BC/BE: R500, 0001, 0002
(2) Frame2：單相 JNTHBCBA __ AC: 0002, 0003
三相 JNTHBCBA __ BC/BE: 0003, 0005
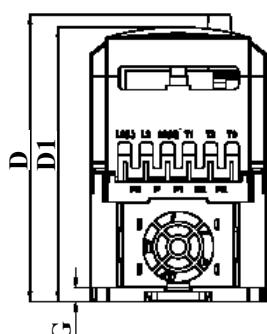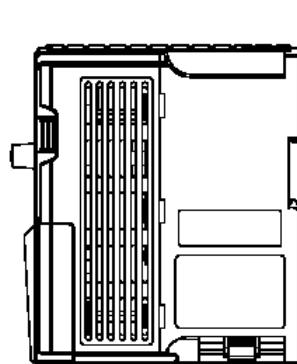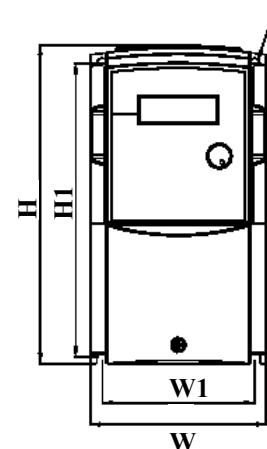
單位：mm / inch

LENGTH MODEL	H	H1	W	W1
Frame 1	163/6.4	150/5.9	90/3.5	78/3.1
Frame 2	187.1/7.4	170.5/6.7	128/5.0	114.6/4.5

LENGTH MODEL	D	D1	G
Frame 1	147/5.8	141/5.6	7/0.3
Frame 2	148/5.8	142.1/5.6	7/0.3

(3) Frame3：

三相 JNTHBCBA __ BC: 7R50, 0010

　　　JNTHBCBA __ BE: 7R50, 0010, 0015
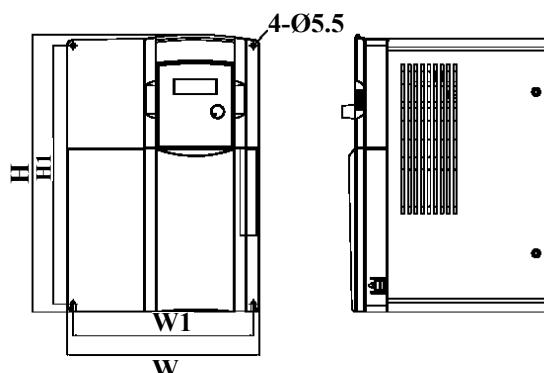
(4)　Frame4：

三相 JNTHBCBB __ BC: 0015, 0020, 0025

　　　JNTHBCBB __ BE: 0020, 0025, 0030
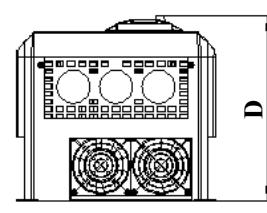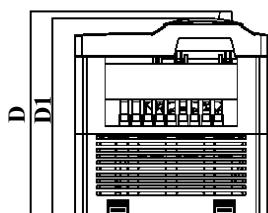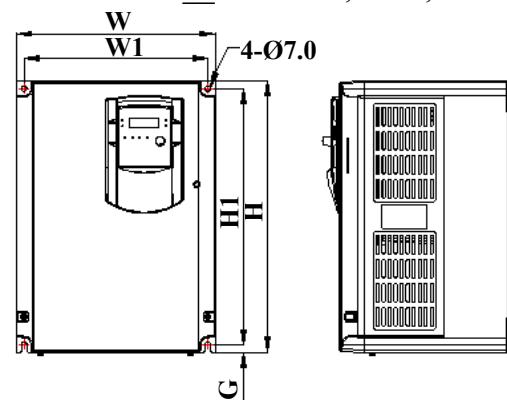
(5) Frame5：

　三相 JNTHBCBA __ BC: 0030, 0040

　　　JNTHBCBA __ BE: 0040, 0050

(6) Frame6：

三相 JNTHBCBA __ BE: 0060, 0075

單位：mm / inch

LENGTH＼MODEL	H	H1	W	W1	D	D1	G
Frame3	260/10.2	244/9.6	186/7.3	173/6.8	195/7.7	188/7.4	
Frame4	360/14.2	340/13.4	265/10.4	245/9.6	248/9.8		10/0.4
Frame5	553/21.8	530/20.9	269/10.6	210/8.3	304/12		10/0.4
Frame6	653/25.7	630/24.8	308/12.1	250/9.8	309/12.1		10/0.4

（盤內安裝型－IP00）

第四章 軟體索引

4.1 鍵盤按鍵操作說明

```
┌──────────┐
│ Power On │
└──────────┘
     │
     ▼
┌──────────┐
│ 電源電壓  │
└──────────┘
```

●　：液晶顯示燈(LED)亮
⊙　：液晶顯示燈(LED)閃

5 秒後或按 DSP 鍵後，改顯示壓力值

```
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
┆ ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐                        ┆
┆ ┆          壓力值(Bar)  *1          ┆                        ┆
┆ ●          ┌──────────────┐                                 ┆
┆ HZ/RPM     │    2.02.0     │          ∧ ∨ <                  ┆
┆ ┆          └──────────────┘                                 ┆
┆ ┆      設定值    回授值               →  ●    欲設定壓力值 (設定時) ┆
┆ ┆     (停止時) (閃爍)                   HZ/RPM                  ┆
┆ ┆          ↕  RUN/STOP                                      ┆
┆ ●          ┌──────────────┐            READ/                ┆
┆ HZ/RPM     │    2.02.0     │   ◄──────  ENTER                ┆
┆ ┆          └──────────────┘                                 ┆
┆ ┆      設定值    回授值                                        ┆
┆ ┆     (運轉時)                                               ┆
┆ └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘                        ┆
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
     │ DSP
     ▼
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
┆ ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐                                ┆
┆ ●    群組化參數選擇            READ/                            ┆
┆ FUN      15-0                ENTER                           ┆
┆            ↕  ∧ ∨       →         ⊙   參數設定值                ┆
┆            DSP                    FUN                        ┆
┆ ●    群組化參數選擇          ◄────                             ┆
┆ FUN      19-0                              READ/             ┆
┆                                            ENTER            ┆
┆                    END  ◄──────                             ┆
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
     │ DSP
     ▼
┌ ─ ─ ─ ─ ─ ─ ─ ─ ┐
┆ 頻率值   ● Frequency ┆
└ ─ ─ ─ ─ ─ ─ ─ ─ ┘
     │ DSP
     ▼
┌ ─ ─ ─ ─ ─ ─ ─ ─ ┐
┆ 馬達電流  ● AMP     ┆
└ ─ ─ ─ ─ ─ ─ ─ ─ ┘
```

DSP
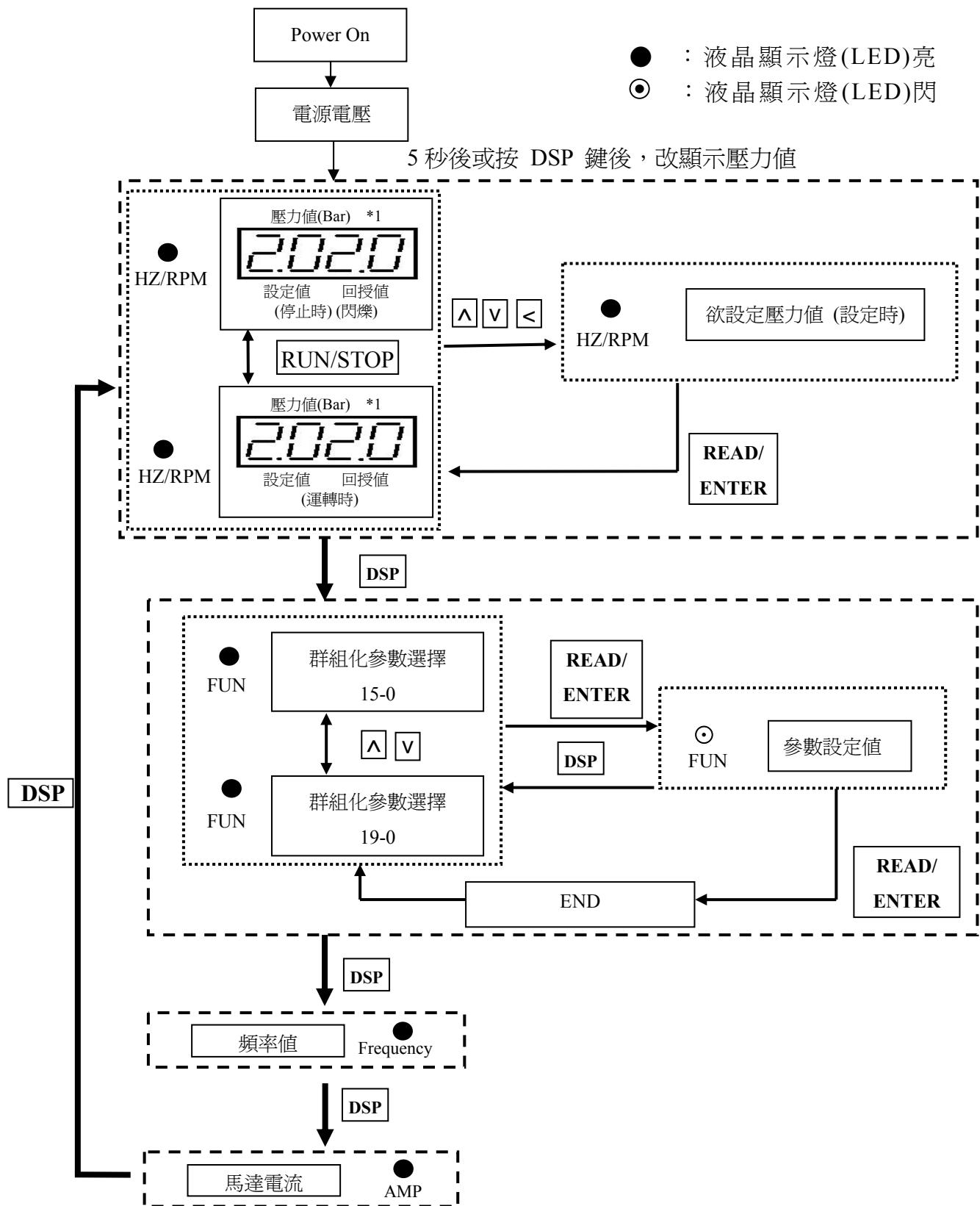
*1：b1.18 版以後才有雙壓力顯示功能。

4.2 參數一覽表

參數群組	說　　　　明
15-	變頻器狀態與功能復歸
16-	馬達運轉參數群
17-	PID 控制參數群
18-	系統保護參數群
19-	雙泵浦參數群
20-	多機能輸入輸出參數群

15-Group 變頻器狀態與功能復歸

功能代碼	功能	範 圍 / 代 碼	出廠設定	通訊位址	備 註
15-0	變頻器馬力代碼	---	---	134 or (0x86)	*3
15-1	軟體版本	---	---	135 or(0x87)	*3
15-2	故障記錄	---	---	136 or(0x88)	*3
15-3	累積工作時間 1 (1 Hours)	0 - 9999	---	139 or(0x8B)	*3
15-4	累積工作時間 2 (10000 * Hours)	0 - 27	---	140 or(0x8C)	*3
15-5	累積工作時間選擇	0：通電時累積時間 1：運轉時累積時間	0000	141 or (0x8D)	*3
15-6	出廠設定功能	1110：將參數復歸為出廠值(50Hz) 1111：將參數復歸為出廠值(60Hz)	0000	142 or (0x8E)	*1
15-7	參數鎖定密碼	0000～0999	0	228 or (0xE4)	*4
15-8	拷貝模組	0：不執行拷貝 1：變頻器程式拷貝至模組 2：模組程式拷貝至變頻器 3：讀寫校驗	0	42 or (0x2A)	*3
15-9	壓力顯示方式選擇	0：顯示設定壓力與回授壓力 1：僅顯示設定壓力 2：僅顯示回授壓力	0	198 or (0xC6)	*4

16-Group 馬達運轉參數群

功能代碼	功能	範 圍 / 代 碼	出廠設定	通訊位址	備 註
16-0	運轉頻率上限	0.01 - 400.00 (Hz)	60.00 (Hz)	24 or (0x18)	*1
16-1	運轉頻率下限	0.00 - 400.00 (Hz)	00.00 (Hz)	25 or (0x19)	*1
16-2	運轉加速時間	0.1 - 3600.0 (sec)	5.00 (sec)	26 or (0x1A)	
16-3	運轉減速時間	0.1 - 3600.0 (sec)	5.00 (sec)	27 or (0x1B)	
16-4	休眠減速時間	0.1 - 3600.0 (sec)	3.00 (sec)	31 or (0x1F)	*3
16-5	休眠頻率	0.00 - 400.00 (Hz)	35.00 (Hz)	155 or (0x9B)	*3
16-6	用水檢測週期	0.0 - 200.0 (sec)	20.0 (sec)	190 or (0xBE)	*3
16-7	用水檢測加速時間	0.1 - 3600.0 (sec)	12.0 (sec)	191 or (0xBF)	*3
16-8	用水檢測壓力範圍	0.00 - 2.50 (Bar)	0.10 (Bar)	193 or (0xC1)	*3
16-9	高低壓與雙泵浦 單機運轉故障 自動復歸時間	0 - 200 (min)	20 (min)	192 or (0xC0)	*3

功能代碼	功能	範 圍 / 代 碼	出廠設定	通訊位址	備 註
16-A	用水檢測方向	0：用水檢測向上 1：用水檢測向下	1	244 or (0xF4)	*1 *5
16-B	用水檢測減速時間	0.1 – 3600.0 (sec)	40.0 (sec)	245 or (0xF5)	*5

17-Group　PID 控制參數群

功能代碼	功能	範 圍 / 代 碼	出廠設定	通訊位址	備 註
17-0	比例(P)增益	0.0 - 10.0 (rate)	1.0 (rate)	111 or (0x6F)	
17-1	積分(I)時間	0.0 - 100.0 (sec)	1.0 (sec)	112 or (0x70)	
17-2	微分(D)時間	0.00 - 10.00 (sec)	0.00 (sec)	113 or (0x71)	
17-3	輸出(O)濾波	0.0 - 2.5 (sec)	0.0 (sec)	116 or (0x74)	
17-4	回授(F)調整	0.00 - 10.00 (rate)	1.00 (rate)	110 or (0x6E)	
17-5	回授(F)種類	0000：0 ~ 10V 0001：4 ~ 20mA	1	123 or (0x7B)	*1*2
17-6	回授(F)濾波	1 - 100 (base on 4ms)	5 (20ms of 5*4ms)	75 or (0x4B)	
17-7	漏水檢測單位時間	0.0 - 10.0 (sec)	0.0 (sec)	177 or (0xB1)	*3
17-8	漏水檢測再啓動壓力變化量	0.01 - 2.50 (Bar)	0.10 (Bar)	178 or (0xB2)	*3
17-9	漏水再啓動壓力誤差範圍	0.01 - 2.50 (Bar)	0.50 (Bar)	179 or (0xB3)	*3

18-Group　系統保護參數群

功能代碼	功能	範 圍 / 代 碼	出廠設定	通訊位址	備 註
18-0	工作壓力設定	0.10 - 25.50 (Bar)	2.00 (Bar)	168 or (0xA8)	*3
18-1	最大壓力限制	0.10 - 25.50 (Bar)	5.00 (Bar)	166 or (0xA6)	*3
18-2	最小壓力限制	0.10 - 25.50 (Bar)	0.50 (Bar)	167 or (0xA5)	*3
18-3	高壓警告時間	0.0 - 600.0 (sec)	10.0 (sec)	169 or (0xA9)	
18-4	高壓停機時間	0.0 - 600.0 (sec)	20.0 (sec)	170 or (0xAA)	
18-5	低壓警告時間	0.0 - 600.0 (sec)	10.0 (sec)	171 or (0xAB)	
18-6	低壓停機時間	0.0 - 600.0 (sec)	20.0 (sec)	195 or (0xC3)	
18-7	恆壓休眠時間	0.0 - 120.0 (sec)	0.0 (sec)	162 or (0xA2)	*3
18-8	恆壓誤差範圍	0.00 – 5.00 (Bar)	0.50 (Bar)	165 or (0xA5)	*3
18-9	高低壓故障自動復歸次數	0 ~ 999	999	199 or (0xC7)	*4

功能代碼	功能	範　圍 / 代　碼	出廠設定	通訊位址	備　註
18-A	失壓比例	0 - 100 (rate)	0 (rate)	229 or (0xE5)	*5
18-B	失壓檢測時間	0.0 – 25.0 (sec)	0.0 (sec)	239 or (0xEF)	*5
18-C	強制設定頻率運轉	0.0 – 200.0 (Hz)	0.0 (Hz)	240 or (0xF0)	*5

19-Group　　雙泵浦參數群

功能代碼	功能	範　圍 / 代　碼	出廠設定	通訊位址	備　註
19-0	單/多泵浦與主副機設定	0：單泵浦 1：多泵浦-主機 2：多泵浦-副機 1 3：多泵浦-副機 2 4：多泵浦-副機 3	0	172 or (0xAC)	*3
19-1	壓力傳送器最大壓力	0.10 – 25.50 (Bar)	10.00 (Bar)	173 or (0xAD)	*3
19-2	多泵浦同步選擇	0：關閉 1：壓力設定及 Run/Stop 同步 2：壓力設定同步 3：Run/Stop 同步	0	243 or (0xF3)	*5
19-3	交換時間	0 - 240 (Hour)	1 (Hour)	175 or (0xAF)	
19-4	偵測時間	0 - 30.0 (Sec)	10.0 (Sec)	176 or (0xB0)	
19-5	AI2 (S6)比例調整	0 - 200 (%)	100 (%)	76 or (0x4C)	
19-6	副機輔助打水啟動頻率 (100% = 16-0)	0 - 100 (%)	0 (%)	196 or(0xC4)	*3
19-7	副機輔助打水停機頻率 (100% = 16-0)	0 - 100 (%)	0 (%)	197 or(0xC5)	*3

20-Group　多機能輸入輸出參數群

功能代碼	功能	範　圍／代　碼	出廠設定	通訊位址	備　註
20-0	運轉命令來源選擇	0：按鍵面板 1：外部端子	0	9 or (0x09)	
20-1	端子 S1 功能設定	0：正轉指令	0	53 or (0x35)	
20-2	端子 S2 功能設定	1：外部急停 A 接點	6	54 or (0x36)	
20-3	端子 S3 功能設定	2：外部遮斷	7	55 or (0x37)	
20-4	端子 S4 功能設定	3：RESET 指令	3	56 or (0x38)	
20-5	端子 S5 功能設定	4：控制信號切換 5：通訊中控制信號切換 6：PID 功能禁止 7：強制設定頻率運轉	1	57 or (0x39)	
20-6	RELAY1(TM2 之 R1C,R1B,R1A 接點)	0：運轉中 1：故障接點 2：自動再啓動 3：瞬間停電 4：外部急停	0	79 or (0x4F)	
20-7	RELAY2(TM2 之 R2B,R2A 接點)	5：自由運轉停止 6：馬達過載保護 7：變頻器過載保護 8：高低壓警告 9：電源投入 10：PID 反饋信號斷線 11：過轉矩檢出 12：頻率輸出檢出	8	80 or (0x50)	
20-8	目標壓力 Bias 來源	0：關閉 1：AIN 給定 2：VR 給定(15-6 需輸入密碼)	0	241 or (0xF1)	
20-9	目標壓力 Bias 範圍	0.0 – 10.00	2.00	242 or (0xF2)	
20-A	多機能類比輸出種類選擇	0：輸出頻率 1：頻率設定 2：輸出電壓 3：直流電壓 4：輸出電流 5：PID 之 FEEDBACK 訊號		77 or (0x4D)	*1
20-B	多機能類比輸出增益控制	0 - 200	100	78 or (0x4E)	*1
20-C	允許反轉指令	0 - 可允許反轉 1 - 反轉禁止	1	11 or (0x0B)	*6

註 *1 變頻器運轉中無法修改
  *2 需要搭配 SW3 選擇
  *3 軟體版本 Vb1.2 版後新增與修改參數
  *4 軟體版本 Vb1.4 版後新增與修改參數
  *5 軟體版本 Vb1.5 版後新增與修改參數
  *6 軟體版本 Vb1.6 版後新增與修改參數
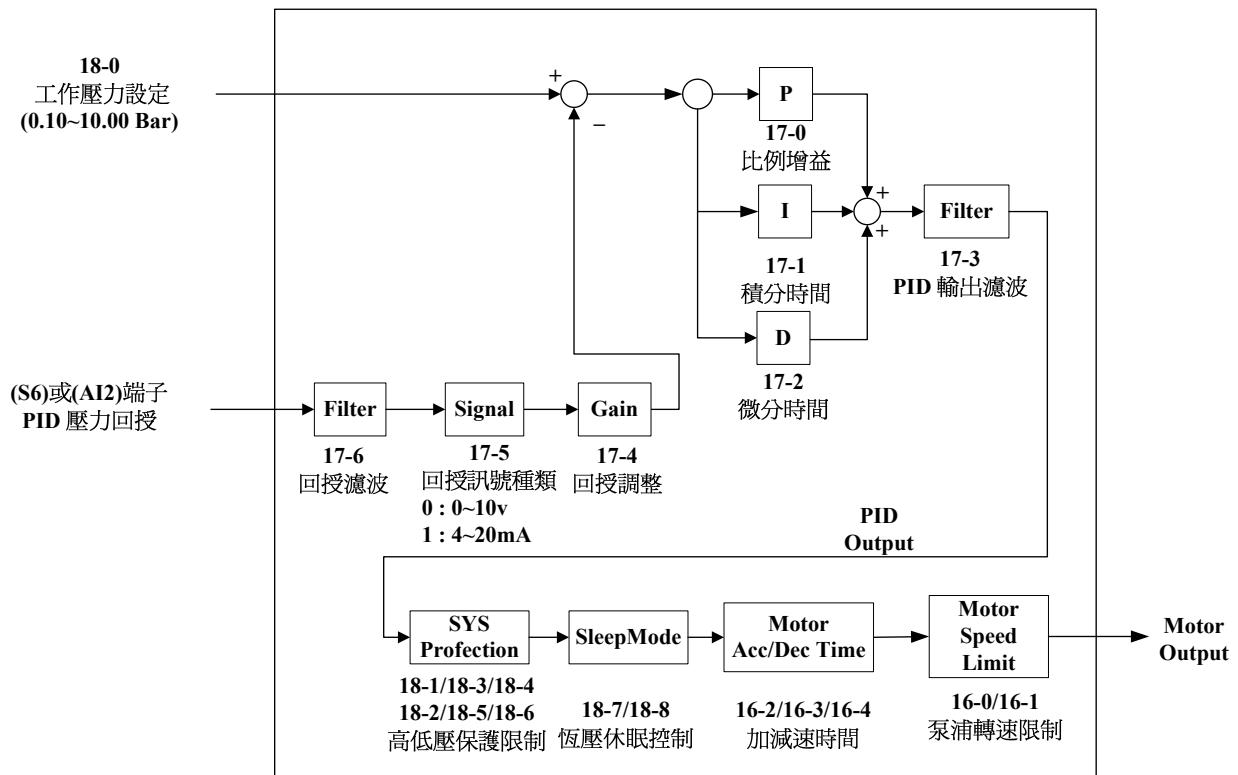
泵浦　流程圖

(1)：15-0 變頻器馬力代碼

15-0	變頻器型號		15-0	變頻器型號	
2P5		R500AC / BC	401		0001BE
201		0001AC / BC	402		0002BE
202		0002AC / BC	403		0003BE
203		0003AC / BC	405		0005BE
205		0005BC	408		7R50BE
208		7R50BC	410		0010BE
210	JNTHBCBA	0010BC	415		0015BE
215		0015BC	420	JNTHBCBA	0020BE
220		0020BC	425		0025BE
225		0025BC	430		0030BE
230		0030BC	440		0040BE
240		0040BC	450		0050BE
			460		0060BE
			475		0075BE

(2)：15-1 軟體版本

(3)：15-2 故障紀錄（最近 3 次）

1. 變頻器發生故障時，會先將故障記憶內容 2.xxx 存放在 3.xxx，之後將故障記憶內容 1.xxx 存在 2.xxx，最後才將此次的故障內容存放在 1.xxx 故 3.xxx 為最早發生之故障，1.xxx 為最近發生之故障。

2. 進入 15-2 後，首先讀出 1.xxx，之後若按▲鍵，則依序讀出 2.xxx→3.xxx→1.xxx 若按▼鍵，則依序讀出 3.xxx→2.xxx→1.xxx→3.xxx。

3. 進入 15-2 後，若按復歸(RESET)鍵，則會將 3 個故障記錄都清除掉，故障記錄清除後故障記憶內容變成 1.---，2.---，3.---。

4. 故障記憶內容為 1.OCC 時，表示最後發生之故障為 OC-C，以此類推。

(4)：15-3 累積工作時間設定 1 (Hours)： 0 – 9999
    15-4 累積工作時間設定 2 (Hours X 10000)： 0 - 27
    15-5 累積工作時間選擇　0000： 通電時累積時間
　　　　　　　　　　　　　　　　0001： 運轉時累積時間

1. 當累積工作時間設定 1 計數至 9999 後，下一小時之計數將進位至累積工作時間設定 2，此時累積工作時間設定 1 將恢復為 0000，而累積工作時間設定 2 則為 01。

2. 累積工作時間選擇之說明如下：

設定值	說明
0	變頻器電源投入時，累積工作時間
1	變頻器運轉時，累積工作時間

(5)：15-6 出廠設定功能　1110：　將參數復歸(RESET) 為出廠值(50Hz)

　　　　　　　　　　　　　1111：　將參數復歸(RESET) 為出廠值(60Hz)

(6)：15-7 參數鎖定密碼　　0000～0999

設定密碼程序：

　15-7 = 888(設定密碼命令) → 15-7 = 設定密碼(設定客戶指定之密碼) → 完成

解除參數鎖定：

　參數鎖定時，僅 15-7 參數可設定，若欲解除參數鎖定，請於 15-7 輸入原設定密碼後，
　即可解除，解除後其餘參數方可做修改與設定。

強制密碼清除：

　若忘記原設定之密碼時，可以此程序先清除原先密碼之設定，後續若有需要做密碼鎖定
　時，請重覆上述『設定密碼程序』操作
　15-7 = 123(清除密碼命令 1) → 15-7 = 999(清除密碼命令 2) → 原密碼已清除

註：1.變頻器若要設定密碼時，請先輸入原設定密碼，解除參數鎖定後，才可使用設定密
　　　碼程序，設定新密碼。
　　2.若變頻器有設定密碼，變頻器於開機後會自動進入參數鎖定狀態。
　　3. 15-7 密碼之設定值請避免使用 123、888、999、000 之設定值。

(7)：15-8 拷貝模組　0000：　不執行拷貝

　　　　　　　　　　0001：　變頻器參數拷貝至模組

　　　　　　　　　　0002：　模組參數拷貝至變頻器

　　　　　　　　　　0003：　讀寫校驗

1.) 當 15-8=0000：變頻器不執行參數拷貝。

2.) 當 15-8=0001：變頻器參數拷貝至模組。

3.) 當 15-8=0002：模組參數拷貝至變頻器。(RUN 機中不能執行)

4.) 當 15-8=0003：參數拷貝至變頻器或模組後，互相作參數校驗。

※註：模組參數拷貝功能僅限於相同容量之變頻器。

(8)：15-9 壓力顯示方式選擇　0000：　顯示設定壓力與回授壓力

　　　　　　　　　　　　　　0001：　僅顯示設定壓力

　　　　　　　　　　　　　　0002：　僅顯示回授壓力

1.) 當 15-9=0000：面板顯示壓力設定及回授壓力值。

 七段顯示器左兩位為設定壓力值，右兩位為回授壓力值

2.) 當 15-9=0001：面板僅顯示設定壓力值。

3.) 當 15-9=0002：面板僅顯示回授壓力值。

(9)：16-0 運轉頻率上限 0.01 – 400.00 Hz
16-1 運轉頻率下限 0.00 – 400.00 Hz


```
                                                        400.00Hz
        ┌─────────────────────────────────────────┐
        │          ┌──────────┐                    │
        │          │PID Output│                     │
        │       ╱╲ └──────────┘                    │
- - - - - - - ╱ ─ ╲ - - - - - - - - - - - - - - -   16-0 運轉頻率上限
        │    ╱┌──────┐ ╲                            │
        │   ╱ │Motor │  ╲                           │
        │  ╱  │Output│   ╲                          │
        │ ╱   └──────┘    ╲                         │
- - - - ─────────────────────────────────────── -   16-1 運轉頻率上限
        │                                           │
        └─────────────────────────────────────────┘
                                                        0.01 Hz
```
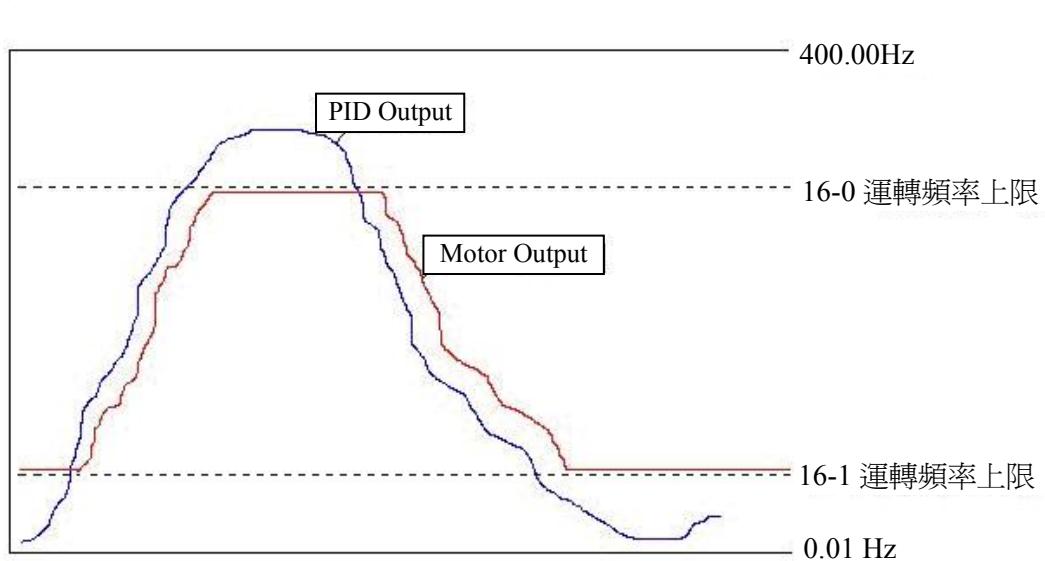
✸限制馬達運轉在額定範圍。

✸下限可增加打水時的反應速度與減少回水震動。

✸上限可避免回授訊號故障導致馬達過轉速運行。

(10)：16-2 運轉加速時間 0.1 – 3600.0 sec
16-3 運轉減速時間 0.1 – 3600.0 sec
16-4 休眠減速時間 0.1 – 3600.0 sec

當 誤差值 ＜ 恆壓誤差範圍
即｜(18-0)-(S6 or AI2)*｜＜(18-8)，且輸
出頻率小於休眠頻率(16-5)，經過恆壓休
眠時間(18-7)後，INV 進入休眠，以休眠
減速時間(16-4)減速停機。

壓力回授為回授訊號 S6 或 AI2 經由 17-4/17-5/17-6 計算後的新回授值
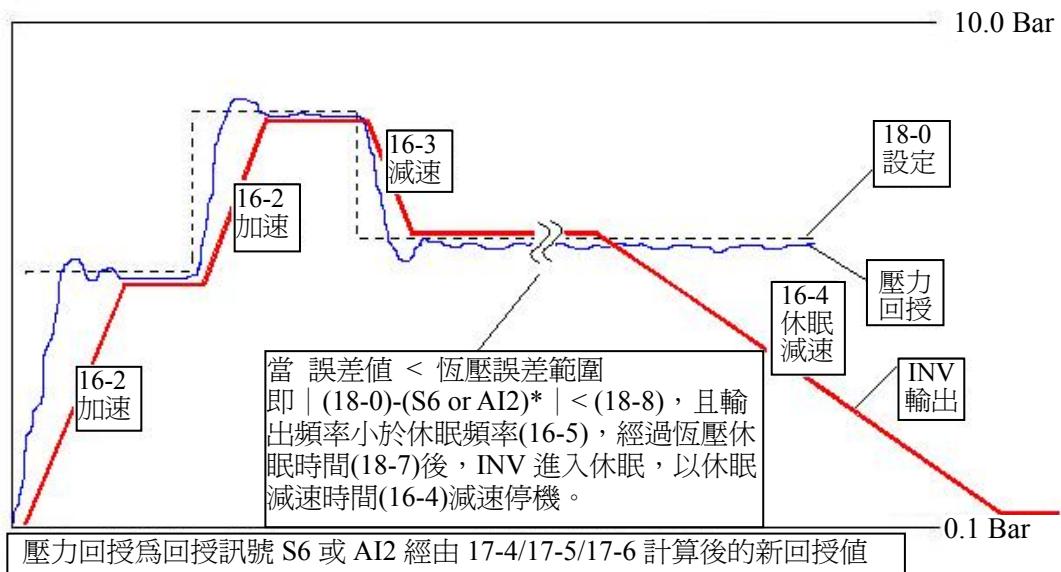
✸進行**恆壓控制**運轉時之加減速時間為 16-2/16-3。

✸進行**休眠控制**至停機時之減速時間為 16-4。

✸恆壓控制與休眠控制主要區分於系統輸出頻率是否小於休眠頻率。

(11)：16-5 休眠頻率 0.00 – 400.00 Hz

16-6 用水檢測週期 0.0 – 200.0 sec

16-7 用水檢測加速時間 0.1 – 3600.0 sec

16-8 用水檢測壓力範圍 0.00 – 2.50 Bar

16-A 用水檢測方向　0：用水檢測向上　1：用水檢測向下

16-B 用水檢測減速時間　0.1 – 3600.0 (sec)
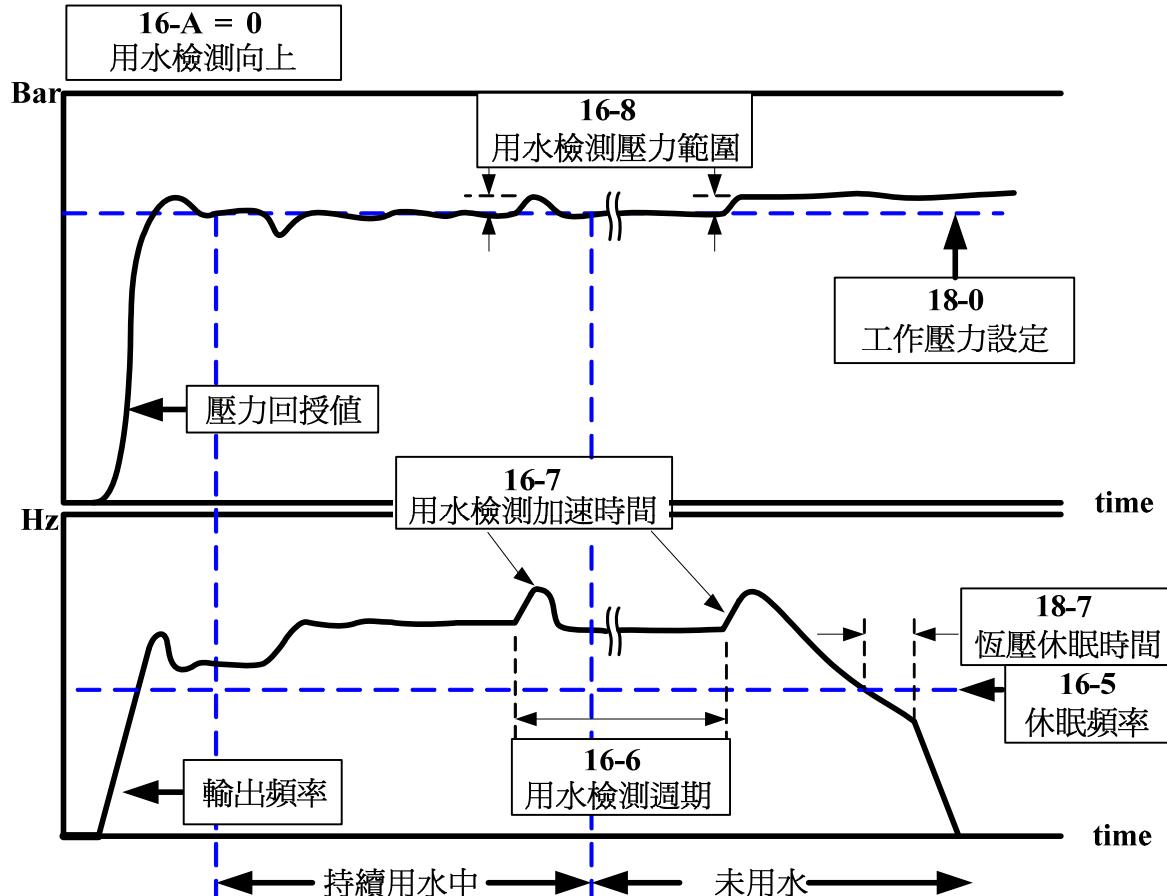
16-A = 0
用水檢測向上

16-8
用水檢測壓力範圍

18-0
工作壓力設定

壓力回授值

16-7
用水檢測加速時間

18-7
恆壓休眠時間

16-5
休眠頻率

輸出頻率

16-6
用水檢測週期

持續用水中　　　　未用水

★16-6 = 0.0 (sec)時，關閉用水檢測機能。

★使用用水檢測機能時，能有效幫助未用水或微少量用水時縮短變頻器進入休眠的時間。

★若持續用水頻繁時，建議可將 16-6 用水檢測週期調長，以減少檢測次數，可避免恆壓時壓力因用水檢測導致飄動或不穩之情形發生。

★因**向上**用水檢測機能動作時，會將壓力稍作提升，若仍持續用水狀況下，可能會造成短暫壓力飄動或不穩，建議可將 16-8 用水檢測壓力範圍調小來改善，但相對的會使變頻器在未用水或微量用水時進入休眠的時間變長。
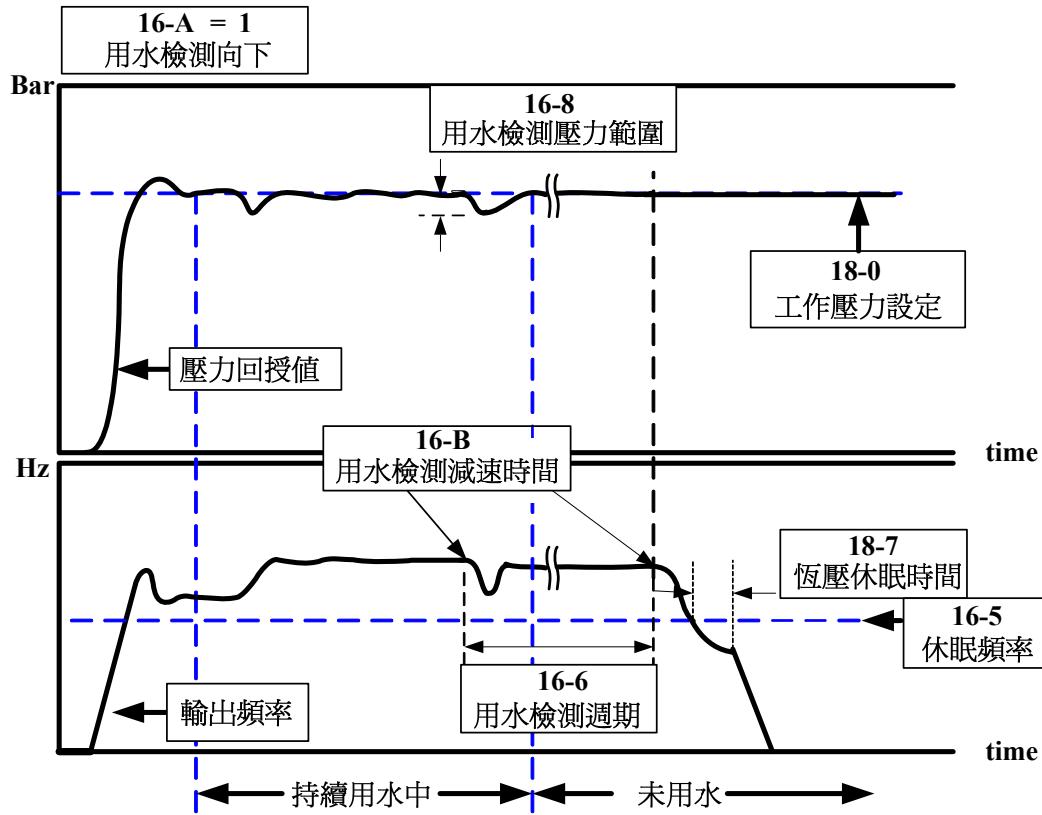
16-A = 1
用水檢測向下

Bar

16-8
用水檢測壓力範圍

18-0
工作壓力設定

壓力回授值

16-B
用水檢測減速時間

time

Hz

18-7
恆壓休眠時間

16-5
休眠頻率

輸出頻率

16-6
用水檢測週期

time

持續用水中　　　　　未用水

★16-6 = 0.0 (sec)時，關閉用水檢測機能。

★使用用水檢測機能時，能有效幫助未用水或微少量用水時縮短變頻器進入休眠的時間。

★若持續用水頻繁時，建議可將 16-6 用水檢測週期調長，以減少檢測次數，可避免恆壓時壓力因用水檢測導致飄動或不穩之情形發生。

★因**向下**用水檢測機能動作時，會使頻率依據 16-B 用水檢測減速時間減速，若仍持續用水狀況下，壓力會因轉速降低導致下降後立即提高轉速補回(壓力回授是否低於(工作壓力設定(18-0)-用水檢測壓力範圍(16-8))作判斷)，過程中可能會造成短暫壓力飄動或不穩，16-8 用水檢測壓力範圍應適當調整，避免壓力飄動過大問題產生，如微量漏水於減速過程中導致壓力調降，則視先到達休眠頻率或壓力是否低於(工作壓力設定(18-0)-用水檢測壓力範圍(16-8))來決定進入休眠會再加速。

	優點	缺點
用水檢測 方向向上	1. 於用水檢測過程中壓力能永遠保持在目標壓力之上，針對較嚴苛與精準的應用場合	1. 如揚程過高導致當微量用水或無用水情況下工作頻率偏高，向上用水檢測效果會受限制較難進入休眠。 2. 多台泵浦並聯用水節能調節不顯著，副機不易休眠。
用水檢測 方向向下	1. 於微量用水或無用水狀態下，快速進入休眠。 2. 多台泵浦並聯下，有效於向下用水檢測過程中，調節線上最佳泵浦運轉狀態，達到省能目的。 3. 啟動依序主機，副 1，副 2，副 3，用水檢測休眠依序副 3，副 2，副 1，主機，待交換時間到達後與副機輪循以達到壽命平均。	1. 如未適當調整用水檢測壓力範圍(16-8)及用水檢測減速時間(16-B)。可能造成向下檢測時產生壓力波動。

(12)：16-9 高低壓與雙泵浦單機運轉故障自動復歸時間 0 – 200 min

✴16-9＝0 (min)時，關閉故障自動復歸功能

✴當泵浦發生 Hi-p 或 Lo-p 時，泵浦跳機停止運轉，當時間超過 16-9 設定時間後，泵浦會
自動再啓動打水。

✴若雙泵浦運轉發生 1BrE 警告(單機運轉，另一台故障)時，在 19-3 交換時間內，且時間
超過 16-9 設定後，1BrE 警告會自動消失，直到本次交換時間後，才會再做 1BrE 警告
偵測。

(13)：17-0　比例增益(P) 0.0 – 10.0 rate
　　　　17-1　積分時間(I) 0.0 – 100.0 sec
　　　　17-2　微分時間(D) 0.00 – 10.00 sec
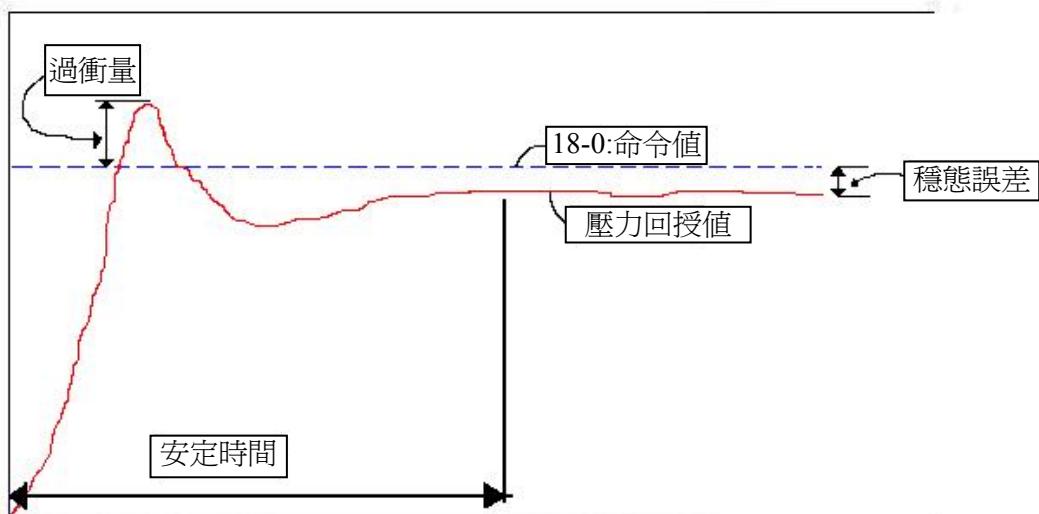
參數調整參考：

	調大影響	調小影響	註
比例增益(P)	(優)增快恆壓控制反應 (缺)太大容易產生回水震動	(優)降低震動 (缺)反應慢	調整 安定時間
積分時間(I)	(優)降低誤差值 (缺)恆壓控制反應變差	(優)反應變快 (缺)誤差變大	調整 穩態誤差
微分時間(D)	(優)減少速度過衝 (缺)馬達容易抖動	(優)減少抖動 (缺)易過衝	調整 過衝量

✸進行 PID 參數調整可在運轉中進行修改。

✸參數調整取決於**恆壓控制反應**與**系統穩定度**中求得平衡。

(14)：17-3 輸出濾波時間(O) 0.0 – 2.5 sec

PID 調整後輸出

PID 調整前輸出
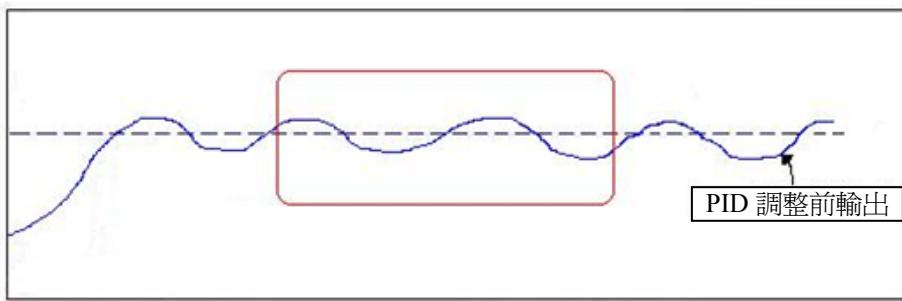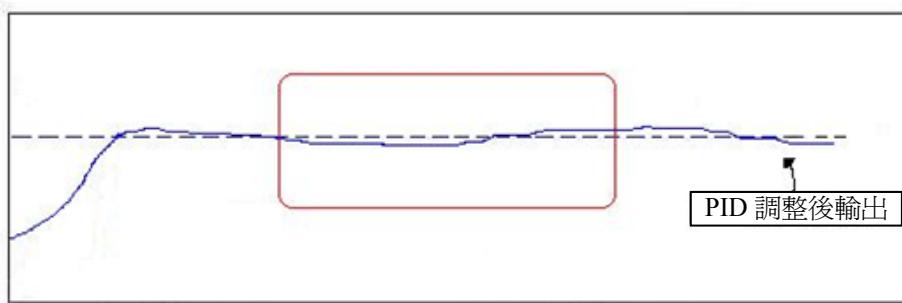
✱ 參數設定可降低**水壓忽大忽小**或**表頭指針左右震盪**問題。
✱ 參數設定太大也會降低**恆壓控制反應**。

(15)：17-4 回授調整(F) 0.00 – 10.00 rate
　　　 17-5 回授種類 0000：0 ~10V 　0001：4 ~ 20mA
　　　 17-6 回授濾波 1 – 100 (base on 4ms)

面板顯示

回授訊號
準位過高
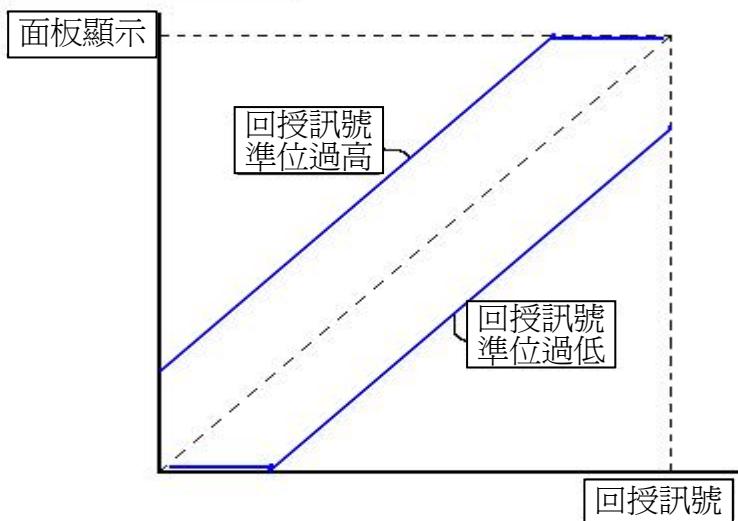
回授訊號
準位過低

回授訊號

✱ 當壓力回授訊號與變頻器讀取有一偏移量，可透過此參數調整。
✱ 例如**回授訊號**與**面板讀取值**有如上圖情況：可適用此參數調整。

(16)：17-7 漏水檢測單位時間 0.0 – 10.0 sec

17-8 漏水檢測再啓動壓力變化量 0.01 - 2.50 Bar

17-9 漏水再啓動壓力誤差範圍 0.01 - 2.50 Bar

漏水檢測 **Case1：壓力變化量大於17-8**

漏水檢測再啓動壓力變化量
ΔP1 < 17-8
ΔP2 > 17-8
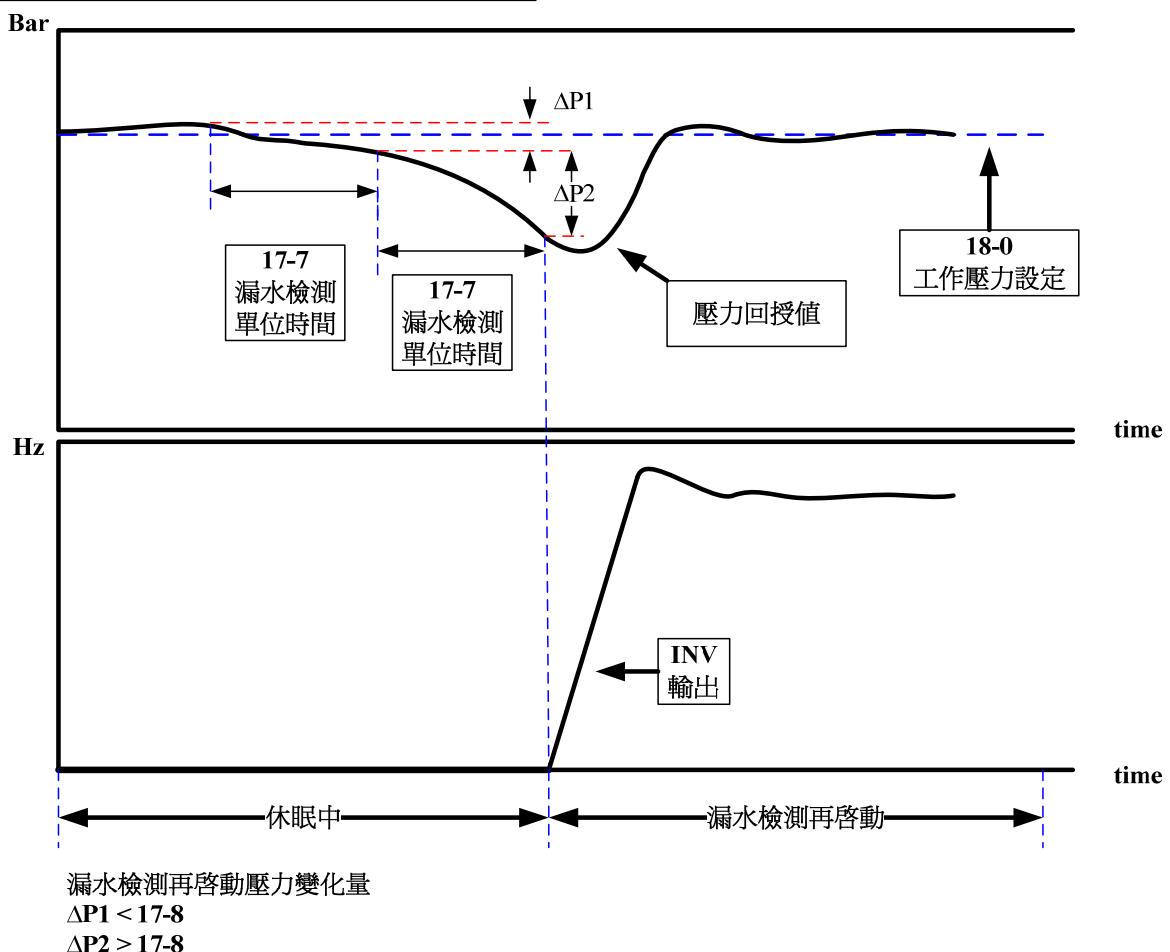
✸17-7 = 0.0 (sec)時，關閉此功能。

✸當泵浦休眠停機時，若管路有漏水導致壓力會隨時間而下降，在每一次 17-7 檢測時間內，若壓力變化大於 17-8 漏水檢測再啓動壓力變化量時，泵浦會再啓動打水。

漏水檢測 Case2：壓力變化量小於17-8

壓力回授值
$\Delta P1$
18-0 工作壓力設定
$\Delta P2$
$\Delta P3$

17-7 漏水檢測單位時間
17-7 漏水檢測單位時間
17-7 漏水檢測單位時間

17-9 漏水再啓動壓力誤差範圍

Bar

Hz

INV 輸出

time

time

休眠中

漏水檢測再啓動

漏水檢測再啓動壓力變化量
$\Delta P1 < 17\text{-}8$
$\Delta P2 < 17\text{-}8$
$\Delta P3 < 17\text{-}8$
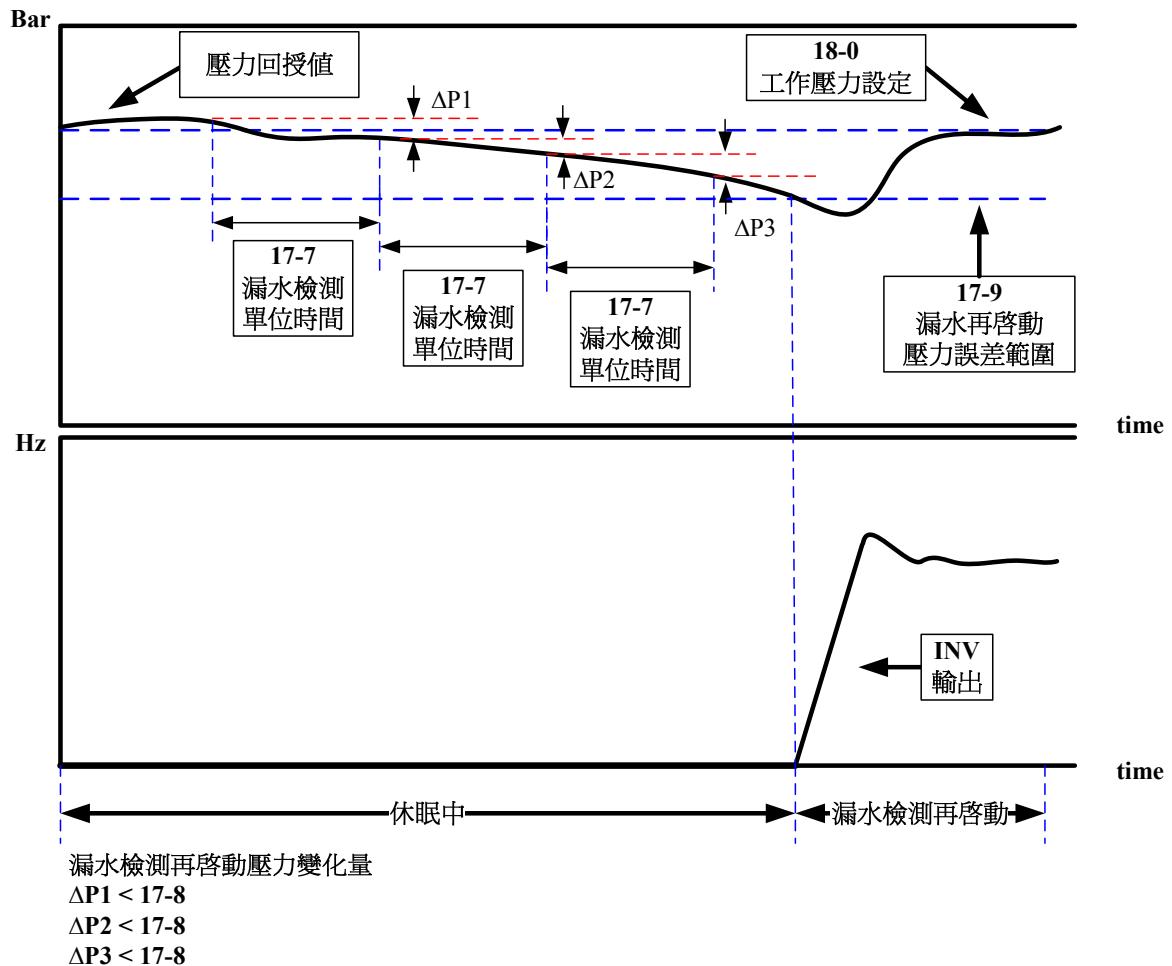
✸17-7 = 0.0 (sec)時，關閉此功能。

✸當泵浦休眠停機時，若管路有漏水導致壓力會隨時間而下降，在每一次 17-7 檢測時間內，若壓力變化小於 17-8 漏水檢測再啓動壓力變化量時，變頻器會繼續保持休眠狀態，直到單位時間內壓力變化大於 17-8 漏水檢測再啓動壓力變化量，或壓力誤差範圍超過 17-9 漏水再啓動壓力誤差範圍，泵浦會再啓動打水。

✸適當調整 17-7/17-8/17-9 漏水檢測相關參數，可改善用水系統因漏水時壓力下降，導致泵浦頻繁啓動停止之情況。

✸漏水檢測機能僅在設定爲單泵浦有效。

(17)：18-0 工作壓力設定 0.10 – 25.50 Bar
　　　 18-1 最大壓力設定 0.10 – 25.50 Bar
　　　 18-2 最小壓力設定 0.10 – 25.50 Bar

Bar

- 18-1:最大壓力限制

- 18-0:工作壓力設定

實際壓力回授值

- 18-2:最小壓力限制

time
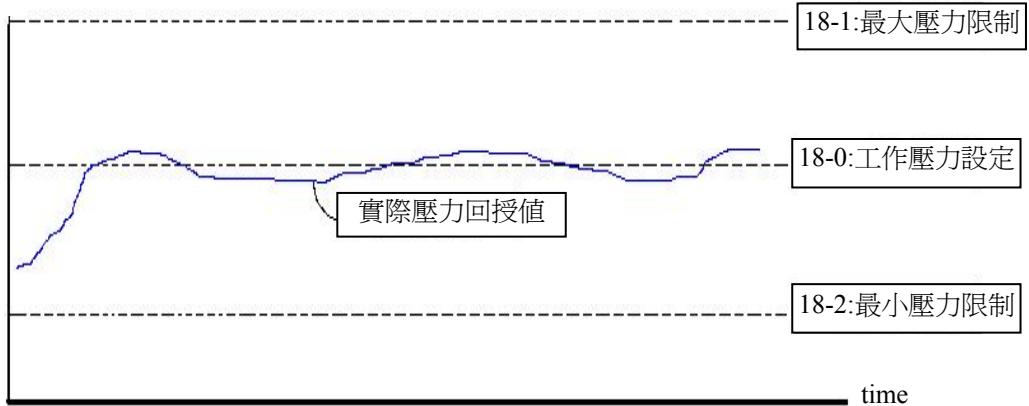
✸在 PID 的控制之下壓力會介於最大壓力(18-1)與最小壓力(18-2)之間。

(18)：18-0 工作壓力設定 0.10 – 25.50 Bar
　　　 18-3 高壓警告時間 0.0 – 600.0 sec
　　　 18-4 高壓停機時間 0.0 – 600.0 sec

Bar

- 18-1:最大壓力限制

實際回授壓力

- 18-0:工作壓力設定

- 18-2:最小壓力限制

time

Hz

沿(16-3)減速時間停機

time

T1　　T2　　T3

Hip　　Hi-p
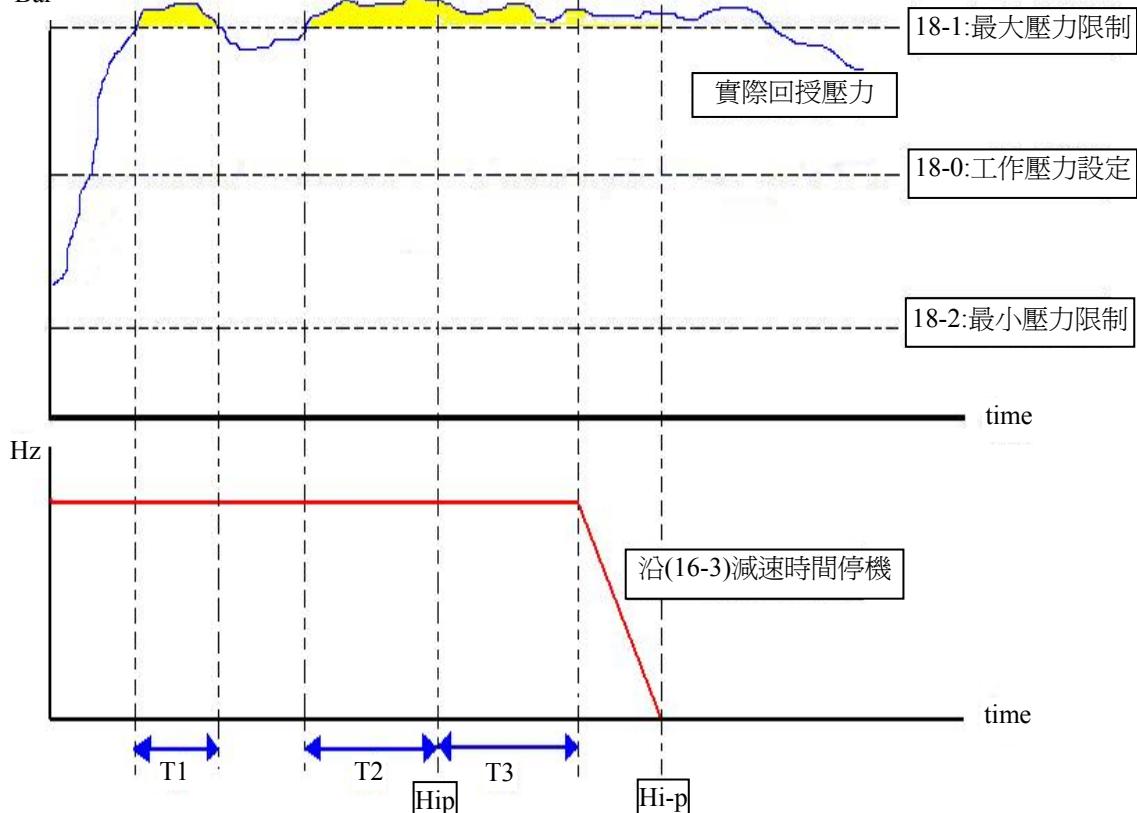
T1 < (18-3 高壓警告時間); T1 後重新計數
T2 = (18-3 高壓警告時間);面板閃爍並顯示 Hip
T3 = (18-4 高壓停機時間);面板閃爍並顯示 Hi-p

84

(19)：18-0 工作壓力設定 0.10 –25.50Bar
18-5 低壓警告時間 0.0 – 600.0 sec
18-6 低壓停機時間 0.0 – 600.0 sec

Bar

18-1:最大壓力限制

實際回授壓力

18-0:工作壓力設定

18-2:最小壓力限制

time

Hz

沿(16-3)減速時間停機

time

T1   T2   T3   Lop   Lo-p

T1 < (18-5 低壓警告時間); T1 後重新計數
T2 = (18-6 低壓警告時間);面板閃爍並顯示 Lop
T3 = (18-7 低壓停機時間);面板閃爍並顯示 Lo-p
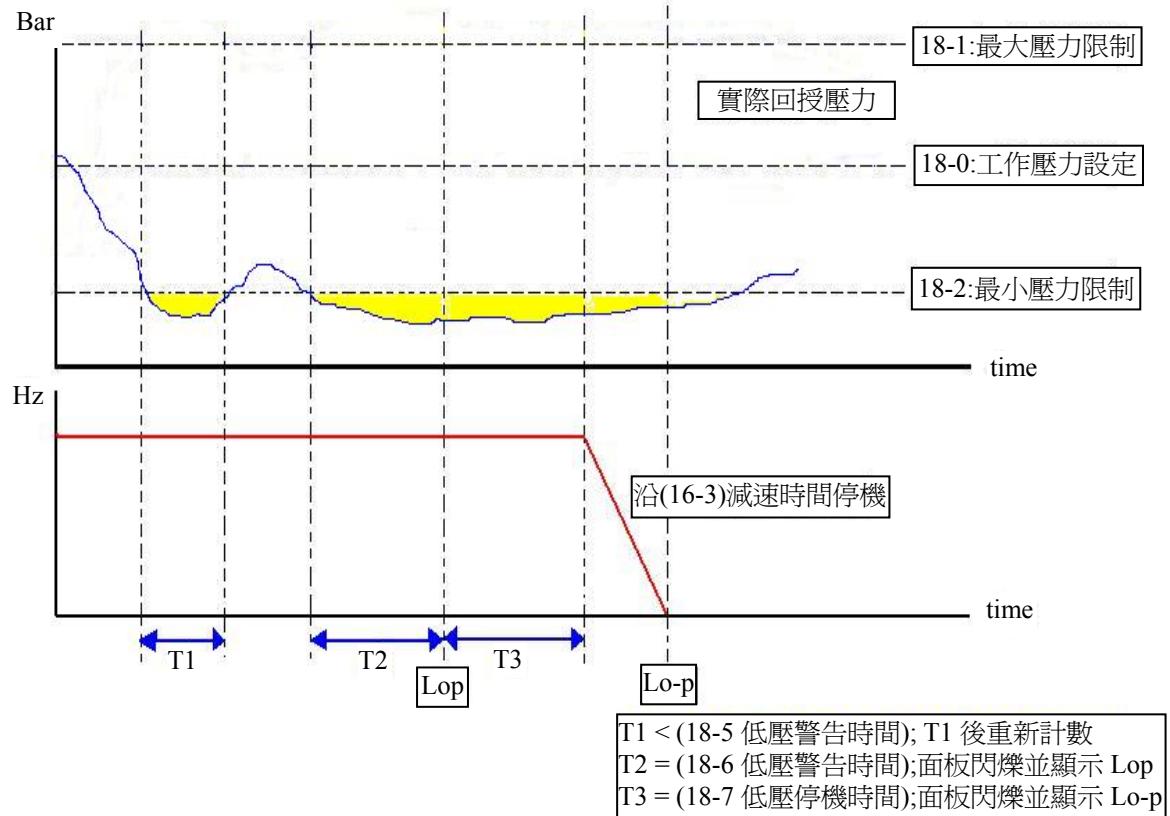
(20)：18-7 恆壓休眠時間 0.0 – 120.0 sec
　　　18-8 恆壓誤差範圍 0.00 – 5.00 Bar

誤差範圍內： |(18-0) - 壓力回授| < 18-8
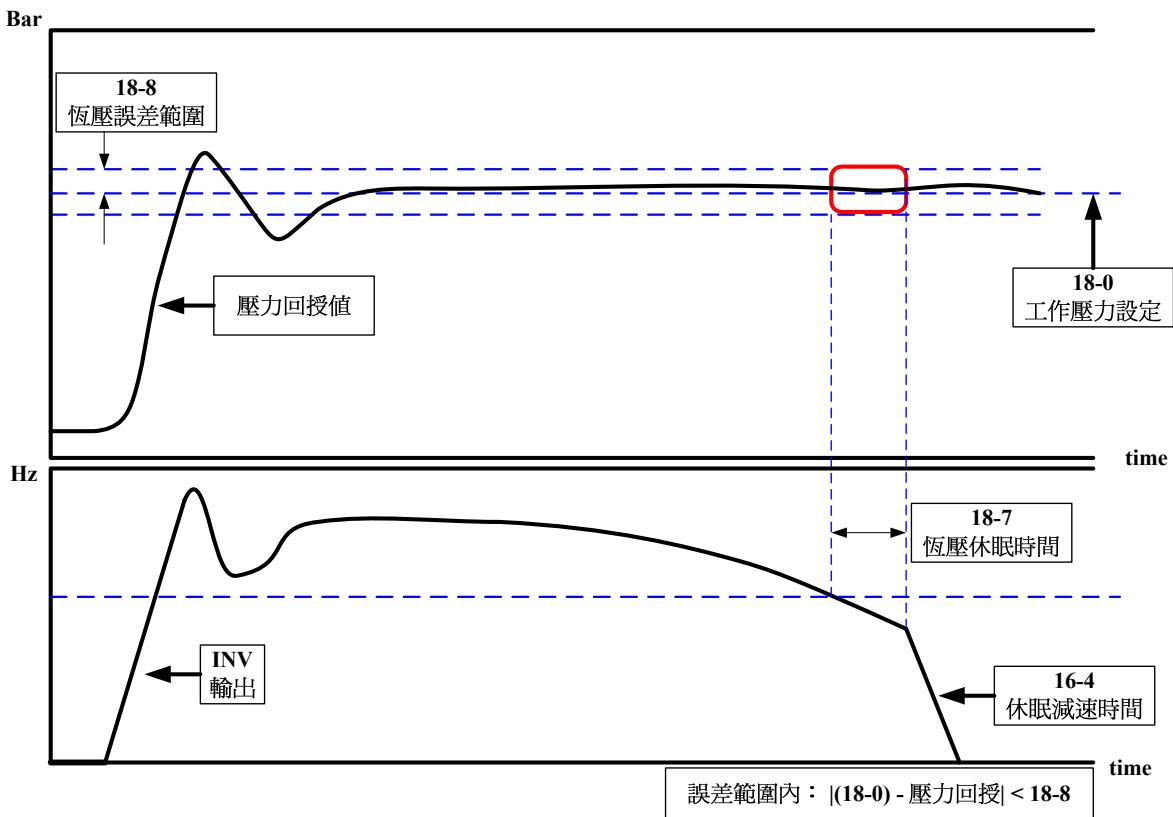
✷恆壓停機目的為節省能源。

(21)：18-9 高低壓故障自動復歸次數 0 – 999 min

1.) 當 18-9=0：發生高低壓故障時，變頻器依 16-9 復歸時間無限次數自動復歸。
2.) 當 18-9=1~999：當高低壓故障自動復歸次數超過 18-9 設定之次數後，變頻器即不再自動復歸，若變頻器 Reset 或重新送電後，復歸次數重新計數。

(22)：18-A 失壓比例   0 – 100 rate
　　　18-B 失壓檢測時間 0.0 – 25.0 (sec)

1.) 當 18-A = 0，關閉。
2.) 當 18-A > 0，變頻器會依據回授壓力是否小於(工作壓力設定(18-0) x 失壓比例(18-A))值，若同時經過失壓檢測時間(18-B)，則跳機警示(故障訊號：PbL)。

(23)：18-C 強制設定頻率運轉 0.00 – 200.0 (Hz)

當 S1~S5 任一 DI 設定為 6(PID 功能禁止)投入時，泵浦將不依據回授做任何 PID 輸出調節，此時將另一 DI 設定為 7(強制頻率運轉)命令投入，此時變頻器將依據參數 18-C (強制頻率運轉) 設定頻率運轉，移除即停止輸出，可運用於當壓力感測器斷線時，利用外部壓力感測器(如壓差開關)控制變頻器輸出。

(24)：19-0 單/雙泵浦與主副機設定　0：單泵浦
　　　　　　　　　　　　　　　1：多泵浦-主機
　　　　　　　　　　　　　　　2：多泵浦-副機 1
　　　　　　　　　　　　　　　3：多泵浦-副機 2
　　　　　　　　　　　　　　　4：多泵浦-副機 3
　　　19-2 多泵浦同步選擇　　0：關閉
　　　　　　　　　　　　　　　1：壓力設定及 Run/Stop 同步
　　　　　　　　　　　　　　　2：壓力設定同步
　　　　　　　　　　　　　　　3：Run/Stop 同步
　　　19-3 交換時間 0 – 240 hour
　　　19-4 偵測時間 0 – 30.0 sec

Bar

18-8 恆壓誤差範圍

19-4 偵測時間

壓力回授值

18-0 工作壓力設定

time

Hz

主機

INV 輸出

time

Hz

副機

INV 輸出

time

A　　B　　C　　D
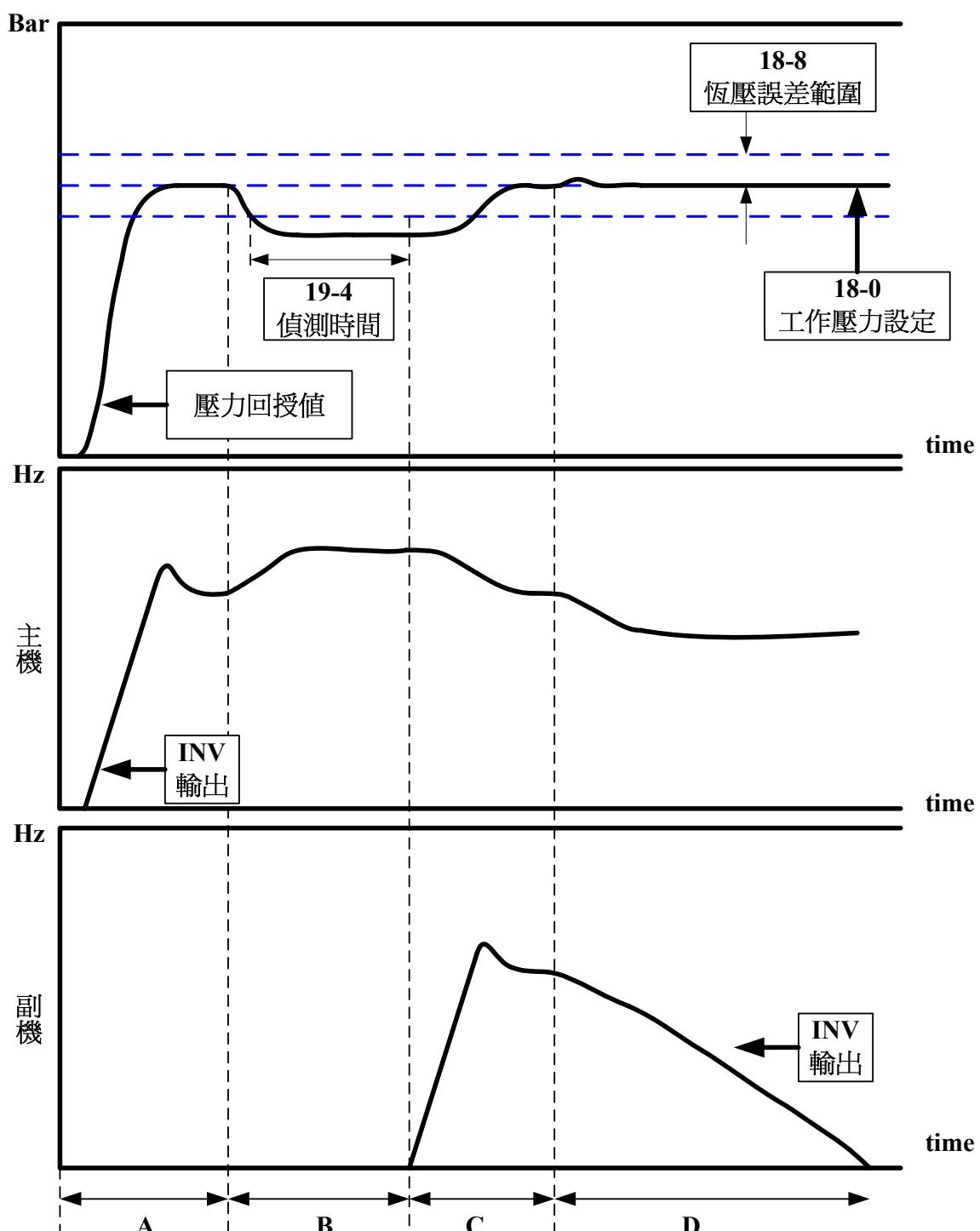
說 明：

A：雙泵浦啓動，主機先啓動打水，副機停機待命，進入恆壓運轉。

B：用水量變大，主機運轉頻率升高，若水壓未到達恆壓誤差範圍內，且時間未超過 19-4 偵測時間，副機仍停機待命。

C：若超過 19-4 偵測時間，主機告知副機啓動輔助打水，主、副機共同運轉後即可維持系統恆壓，若用水量減少則副機運轉頻率下降。

D：當用水量再變小，透過用水檢測功能，副機運轉頻率則再下降，當用水量減少至單一泵浦運轉即可應付時，僅主機運轉即可維持恆壓，副機則會停機休眠（雙泵浦副機休眠條件於 19-6 與 19-7 說明），剩下主機運轉。

19-3 雙泵浦運轉時，若運轉時間超過 19-3 交換時間後，主機與副機角色對調，交換運轉。

19-4 當回授訊號低於 18-8，主機立即啓動，副機啓動條件爲壓力低於 18-8 且時間大於 19-4 時，副機啓動輔助主機打水

註:當使用雙泵浦 19-0≠0 時，兩台變頻器參數 19-0 不可同時設爲 1 或同時設爲 2，

　　同時亦需調整 19-5=200 且微調 17- 4，使兩台變頻器的回授值爲相同值。

| (25)：19-1 壓力傳送器最大壓力 0.10 – 25.50 Bar |

依據泵浦系統所使用之壓力傳送器(Pressure Transmitter)之最大壓力值設定。

| (26)：19-5 AI2(S6)比例調整 0 – 200 ％ |

雙泵浦運轉 AI2(_S6)增益爲 200%且主副機 17-4 回授訊號校正應相同。

| (27)：19-6 副機輔助打水啓動頻率 0 – 100 ％ (100% = 16-0) |
| 　　　　19-7 副機輔助打水停機頻率 0 – 100 ％ (100% = 16-0) |

19-6＝0% 副機輔助打水啓動頻率條件關閉。

19-7＝0% 副機輔助打水停機頻率條件關閉。

雙泵浦運轉時，主機啓動，若壓力未到達恆壓誤差範圍(18-8)內，
則副機輔助打水啓動條件如下：

1. 19-6＝0%時，關閉啓動頻率判斷條件：
　　 經過偵測時間(19-4)後，主機告知副機啓動輔助打水。

2. 19-6＝1～100%時，開啓啓動頻率判斷條件：
　　 若主機輸出頻率高於 19-6(%)×16-0 頻率時，且經過偵測時間(19-4)後，主機告知副機啓動輔助打水。

若主機與副機皆啓動運轉打水時，則副機輔助打水停機條件如下：

1. 19-7＝0%時，關閉停機頻率判斷條件：
　　 若副機輸出頻率低於休眠頻率(16-5)，且經過恆壓休眠時間(18-7)後，副機自行停機。

2. 19-7＝1～100%時，開啓停機頻率判斷條件：
　　 若主機輸出頻率低於 19-7(%)×16-0 頻率時，且經過偵測時間(19-4)後，主機告知副機停機；或副機輸出頻率低於休眠頻率(16-5)，且經過恆壓休眠時間(18-7)後，副機自行停機。

註：19-6 與 19-7 設定值主機與副機需相同。

(28)：20-0 運轉命令來源　0：按鍵面板
1：外部端子

1.) 20-00 = 0 變頻器為按鍵面板運轉控制。

2.) 20-00 = 1 變頻器為外部端子運轉控制時，可以按面板上之 Stop 鍵緊急停止。

(29)：20-1~20-5　S1~S5　端子功能設定
0：正轉指令
1：外部急停 A 接點
2：外部遮斷
3：RESET 指令
4：控制信號切換
5：通訊中控制信號切換
6：PID 功能禁止
7：強制設定頻率運轉

1.) 端子台(TM2)之端子 S1-S5 為多機能輸入點，共可設成上述之 7 種功能。

2.) 20-01~05 之功能說明如下：

   A.　20-01~05 = 0　正轉指令

     正轉指令 ON 時，馬達運轉，OFF 時馬達不動作。

   B.　20-01~05 = 1　外部急停 A 接點

     當外部緊急停止信號輸入時，變頻器依照減速時間減速停止，停止後閃爍 E.S.，待緊急停止信號脫離後，將運轉開關 OFF 再 ON(20-00=1)或按運轉鍵 (20-00=0)，變頻器才從啟動頻率重新啟動。

   C.　20-01~05 = 2　自由運轉停止(外部遮斷)

     當外部 Base Block 信號輸入後，變頻器立刻遮斷，並閃爍 b.b.待 Base Bolck 信號脫離後，變頻器會自動以 Speed search 方式重新啟動。

   D.　20-01~05 = 3　RESET 指令

     Reset 指令 ON 時同 Reset 指令，OFF 時不動作。

   E.　20-01~05 = 4　控制信號切換

     外部控制端子 OFF：運轉信號/之控制權由 20-00 決定。

     外部控制端子 ON：運轉信號由 Keypad 控制。

   F.　20-01~05 = 5　通訊中控制信號切換

     保留。

   G.　20-01~05 = 6　PID 功能禁止

     PID 功能禁止 ON 時停止 PID 功能，輸出頻率為零不受回授壓力影響。

   H.　20-01~05 = 7　強制設定頻率運轉

     搭配 PID 功能禁止 ON 時，當強制設定頻率運轉同時 ON 時，變頻器依據 18-C 設定頻率運轉。

(30)：20-6~7 多機能輸出接點控制：

20-6：RELAY1(TM2 之 R1C，R1B，R1A 接點)

20-7：RELAY2(TM2 之 R2B，R2A 接點)

0：運轉中

1：故障接點

2：自動再啟動

3：瞬間停電

4：外部急停

5：自由運轉停止

6：馬達過載保護

7：變頻器過載保護

8：高低壓警告

9：電源投入

10：PID 反饋信號斷線

11：過轉矩檢出

---

(31)：20-8 目標壓力 Bias 來源

0：關閉

1：AIN 給定

2：VR 給定(15-6 需設定密碼)

20-9 目標壓力 Bias 範圍　0.0 – 10.00

1.) 20-8 = 0：Disable

2.) 20-8 = 1：由 TM2 AIN 給定電壓命令，此刻目標壓力無法從面板變更，目標壓力會依據 20-9 設定之範圍及 AIN 給定電壓作調整，以 5V 為基準，低於 5V 則依據 AIN 給定電壓以比例遞減，高於 5V 則往上遞增。

EX：18-0 (工作壓力設定) = 5.0 (Bar)

　　20-9 (目標壓力 Bias 範圍) = 3.0 (Bar)

若 AIN 輸入電壓 8V ➜ 目標壓力 = 5 + ((8V-5V) / 5) x 3(Bar) = 6.8(Bar)

若 AIN 輸入電壓 3V ➜ 目標壓力 = 5 + ((3V-5V) / 5) x 3(Bar) = 3.8(Bar)

✱ 目標壓力仍受 18-1(最大壓力限制)，18-2(最小壓力限制) 保護。

多機能類比輸出之控制

(32)：20-A　多機能類比輸出之種類選擇 ：

　　　　0： 變頻器輸出頻率

　　　　1： 變頻器設定頻率

　　　　2： 變頻器輸出電壓

　　　　3： 變頻器直流電壓

　　　　4： 變頻器輸出電流

　　　　5： 變頻器 PID 之 FEEDBACK 訊號

　　　20-B　多機能類比輸出之增益控制 ＝ 0~200%

端子臺(TM2)多機能類比輸出端子為一 0~10Vdc 之類比輸出，其輸出種類由 20-A 決定，而當外部電表或其他週邊設備有誤差時，可利用 20-B 調整。

第五章 故障排除及保養

5.1 故障指示及對策

5.1.1 無法手動復歸且無法自動復歸之故障

顯 示	內 容	異 常 原 因	對 策
CPF	程式異常	外部雜訊干擾	於產生干擾之電磁接觸器之激磁線圈並聯 RC 突波吸收器
EPR	EEPROM 異常	EEPROM 故障	更換 EEPROM
-OV-	停機中偵測到電壓過高	偵測線路故障	變頻器送修
-LV-	停機中偵測到電壓過低	1. 電源電壓過低 2. 限流電阻(R1)或保險絲燒斷 3. 偵測線路故障	1. 檢查電源電壓是否正常 2. 換修限流電阻或保險絲 3. 變頻器送修
-OH-	停機中偵測到變頻器過熱	1. 偵測線路故障 2. 周溫過熱或通風不良	1. 變頻器送修 2. 改善通風條件
CTER	電流感測器偵測錯誤	電流感測元件或線路故障	變頻器送修

（@ 符號標示於 -OV-、-LV-、-OH- 列左方）

※**註**：〝@〞符號表示當此故障發生時，故障接點不動作。

5.1.2 可手動復歸及自動復歸之故障

顯 示	內 容	異 常 原 因	對 策
OC-S	啟動瞬間過電流	1.馬達繞組與外殼短路 2.馬達接線與大地短路 3.電晶體模組損壞	1. 檢修馬達 2. 檢查配線 3. 更換電晶體模組
OC-D	減速時過電流	減速時間設定太短	設定較長之減速時間
OC-A	加速時過電流	1.加速時間設定太短 2.使用之馬達容量，超過變頻器容量 3.馬達繞組與外殼短路 4.馬達接線與大地短路 5.電晶體模組損壞	1. 設定較長之加速時間 2. 更換相同容量之變頻器 3. 檢修馬達 4. 檢查配線 5. 更換電晶體模組
OC-C	定速中過電流	1.負載瞬間變化 2.電源瞬間變化	加大變頻器容量
OV-C	運轉中/減速中電壓過高	1.減速時間設定太短或負載慣性較大 2.電源電壓變化過大	1. 設定較長之減速時間 2. 外加煞車電阻或煞車模組 3. 電源輸入側加電抗器 4. 加大變頻器容量
Err4	CPU 不合法中斷	外界雜訊干擾	如時常發生，請與東元電機連絡
OVSP	運轉中過速度(超出額定 20%)	1.馬達負載太大或變頻器容量太小 2.電流迴路故障	1. 增加加減速(16-2/16-3)時間 2. 送廠修復
LoP	壓力過低	壓力低於設定的最小壓力限制，且已達所設定的低壓警告時間	1. 降低最小壓力限制的壓力值 2. 檢查壓力計或實際水量
Lo-P	壓力過低	壓力低於設定的最小壓力限制，且已達所設定的低壓停機時間	1. 降低最小壓力限制的壓力值 2. 檢查壓力計或實際水量
Hip	壓力過高	壓力高於設定的最大壓力限制，且已達所設定的高壓警告時間	1. 提高最大壓力限制的壓力值 2. 檢查壓力計或實際水量
Hi-p	壓力過高	壓力高於設定的最大壓力限制，且已達所設定的高壓停機時間	1. 提高最大壓力限制的壓力值 2. 檢查壓力計或實際水量

顯 示	內 容	異 常 原 因	對 策
PbL	失壓故障	壓力低於設定之失壓比例且超過失壓檢測時間	1. 降低最小壓力限制的壓力值 2. 檢查壓力計或實際水量

5.1.3 可手動復歸但不可自動復歸之故障

顯 示	內 容	異 常 原 因	對 策
OC	停機中偵測到過電流	1. 偵測線路故障 2. CT 訊號線連接不良	1. 檢查配線確認是否受到干擾 2. 變頻器送修
OL1	馬達過載	負載太大	加大馬達容量
OL2	變頻器過載	負載太大	加大變頻器容量
OL3	過轉矩	負載太大	加大變頻器容量
LV-C	運轉中電壓過低	1. 電源電壓過低 2. 電源電壓變化過大 3. 主回路 Relay 故障	1. 改善電源品質 2. 設定較長之加速時間 3. 電源輸入側加電抗器 4. 加大變頻器容量 5. 變頻器送修
OH-C	運轉中散熱片過熱	1. 負載太大 2. 周溫過熱或通風不良	1. 檢查負載是否異常 2. 加大變頻器容量 3. 改善通風條件

5.1.4 特殊情況說明

顯 示	內 容	說 明
STP0	零速停止中	設定頻率為<0.1Hz 時發生
PDER	PID 迴授斷線	PID 迴授信號線路故障檢出
1BrE	變頻器異常	顯示"1BrE"之變頻器會持續以單泵浦模式運轉，另一台則發生異常

5.1.5 按鍵操作錯誤說明

顯 示	內 容	錯 誤 原 因	對 策 或 說 明
Err1	按鍵操作方式錯誤	運轉中企圖修改運轉中不可修改之參數(參考參數一覽表)	停機後再修改

5.2 一般故障檢查方法

異 常 現 象	檢 查 要 點	處 理 內 容
馬達不運轉	電源電壓是否有送入 L1 (L)、L2、L3 (N) 端(充電指示燈是否亮)嗎？	·電源是否有投入·將電源先斷電後再送電一次 ·電源電壓等級確認·端子螺絲是否鎖緊
	輸出端子 T1、T2、T3 是否有電壓輸出嗎？	·將電源先斷電後再送電一次
	負荷是否過重，造成馬達堵死嗎？	·減輕負荷使馬達可以運轉
	變頻器有異常發生嗎？	·參考故障指示排除處理配線檢查並更正。
	正轉或反轉運轉指令有下達嗎？	
	類比頻率設定值有輸入嗎？	·類比頻率輸入信號配線是否正確 ·頻率輸入設定電壓是否正確
	運轉模式設定值正確嗎？	·由數位操作運轉
馬達運轉 方向相反	輸出端子 T1、T2、T3 配線正確嗎？	·要與馬達之 U、V、W 相配合
	正轉或反轉信號配線正確嗎？	·配線檢查並更正
馬達運轉 無法變速	類比頻率輸入配線正確嗎?	·配線檢查並更正
	運轉模式設定正確嗎？	·操作器運轉模式設定檢查
	負荷是否過重嗎？	·減輕負荷
馬達運轉速度 過高或過低	馬達的規格(極數電壓)正確嗎？	·確認馬達規格
	齒輪比正確嗎？	·確認齒輪比
	最高輸出頻率設定值正確嗎？	·確認最高輸出頻率值
馬達運轉時 速度變動異常	負荷會過重嗎？	·減輕負荷
	負荷的變動很大嗎？	·負荷變動要減少·變頻器及馬達容量加大
	輸入電源是否有欠相之情形嗎？	·使用單相規格時，在輸入電源側加 AC 電抗器 ·使用三相規格時檢查配線

附錄.

壓力（Pressure）

壓力之定義為單位面積上所受力之大小。若一大小為 F 之力，作用於大小為 A 之面積上，則此面積所承受之壓力 P 為

$$P = \frac{F}{A} \qquad (\quad 壓力 = \frac{正向力}{受力面積} \quad)$$

壓力常用之單位在公制為 Kgf / Cm^2，亦即每平方公分上作用多少公斤力，常簡略以 Kg / Cm^2 表示。英制則為 P.S.I，亦即每平方英吋上作用多少磅之力，二者間之換算關係約為：

$1\, Kg / Cm^2$ ＝ 14.22 P.S.I 或 1P.S.I ＝ 0.07 Kg / Cm^2

1 Bar ＝ 1 00 kPa ＝ 1.02 Kg / Cm^2 ＝ 14.5 P.S.I

壓力單位換算						
MPa	**KPa**	**Bar**	**Kg/cm^2**	**P.S.I**	**atm**	**mHg**
1	1000	10	10.2	145	9.87	7.5
0.001	1	0.01	0.011	0.145	9.87×10^{-3}	7.5×10^{-1}
0.1	100	1	1.02	14.5	0.987	0.75
0.09807	98.07	0.981	1	14.22	0.968	0.736
0.00689	6.89	0.069	0.07	1	0.068	0.052
0.101	1.01×10^2	1.013	1.033	14.7	1	0.76
0.133	1.33×10^2	1.33	1.36	19.3	1.32	1

TECO

TECO Electric & Machinery Co., Ltd.
東元電機股份有限公司

10F., No.3-1, Yuancyu St., Nangang District,
Taipei City 115, Taiwan
115台北市南港區園區街3-1號10樓
Tel ：+886-2-6615-9111
Fax：+886-2-6615-0933

http://www.teco.com.tw

This manual may be modified when necessary because of improvement of the product, modification, or changes in specifications, This manual is subject to change without notice.

為持續改善產品，本公司保留變更設計規格之權利。