

HEDY

HD700 Advanced User Manual

(0.4kW~90kW)



V4.1

Contents

Group 0: Easy Menu parameters	1
Group 1: Speed Reference parameter descriptions	2
Group 2: Ramps parameter descriptions	13
Group 3: Start and Stop parameter descriptions	23
Group 4: Preset speeds and PLC functionality parameter descriptions	32
Group 5: Keypad and display parameter descriptions	40
Group 6: Voltage/frequency control parameter descriptions	46
Group 7: Current limits and torque control parameter descriptions	50
Group 8: Analogue Inputs & Outputs parameter descriptions	56
Group 9: Digital Inputs & Outputs parameter descriptions	64
Group 10: Communications and general functions parameter descriptions	80
Group 11: Diagnostics parameter descriptions	87
Group 12: Protection parameter descriptions	90
Group 13: Motor parameter descriptions	98
Group 14: Textile application parameter descriptions	104
Group 15: PID controller parameter descriptions	112
Group 16: Programmable logic & binary sum parameter descriptions	121
Group 17: Threshold & Variable selector parameter descriptions	129
Group 18: Brake logic control parameter descriptions	144
Group 19A: IO Option module parameter descriptions	149
Group 19B: Profibus Option module parameter descriptions	151
Group 22: Additional parameter descriptions	152
Troubleshooting	155

The parameter descriptions described in this Advanced User Manual are for software V2.08.

Group 0

Group 0: Easy Menu

Parameter quick look up table

Parameter	Parameter name	Associated advanced parameter	Modbus register address	Setting
00.01	Motor Rated Voltage	P13.06	0000H	
00.02	Motor Rated Current	P13.07	0001H	
00.03	Motor Rated Frequency	P13.08	0002H	
00.04	Control Mode	P10.07	0003H	
00.05	Reference Source Selector	P01.01	0004H	
00.06	Minimum Reference (Speed)	P01.03	0005H	
00.07	Maximum Reference (Speed)	P01.02	0006H	
00.08	Acceleration Time	P02.04	0007H	
00.09	Deceleration Time	P02.05	0008H	
00.10	Stop Mode	P03.10	0009H	
00.11	AI1 Mode Selector	P08.02	000AH	
00.12	Voltage Boost Level	P06.08	000BH	
00.13	V/f Control Mode	P06.01	000CH	
00.14	Digital Input Selector	P09.22	000DH	
00.15	Relay 1 Selector	P09.10	000EH	
00.16	Preset Speed 1	P04.01	000FH	
00.17	Auto-Start After Power Off	P03.03	0010H	
00.22	Password	P10.06	0015H	
00.23	Extended Group Access	P05.03	0016H	
00.24	Load Defaults	P10.08	0017H	

For detailed information on the above parameters, please see the HD700 Easy Start Guide

Group 1

Group 1: Speed Reference

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
01.01	Reference Selector	0064H	
01.02	Maximum Frequency Reference	0065H	
01.03	Minimum Frequency Reference	0066H	
01.04	Jog Reference	0067H	
01.05	Skip Frequency 1	0068H	
01.06	Skip Frequency 2	0069H	
01.07	Skip Frequency Window	006AH	
01.08	Keypad reference after STOP button pressed	006BH	
01.09	Keypad Reference	006CH	
01.10	E-Pot Reference	006DH	
01.11	Keypad Reference At Power-Up	006EH	
01.12	Zero Speed Threshold	006FH	
01.13	Frequency Arrival Window	0070H	
01.14	Reference Selected	0071H	
01.15	Preset Speed Bit 0	0072H	
01.16	Preset Speed Bit 1	0073H	
01.17	Preset Speed Bit 2	0074H	
01.18	Preset Speed Bit 3	0075H	
01.19	Preset Selected	0076H	
01.20	AI1 Reference	0077H	
01.21	AI2 Reference	0078H	
01.22	RUN/STOP Indicator	0079H	
01.23	Frequency Arrival Indicator	007AH	
01.24	Zero Speed	007BH	
01.25	Main Speed Source Set To AI1	007CH	
01.26	Main Speed Source Set To AI2	007DH	
01.27	User Defined Main Auxiliary Reference	007EH	
01.28	Output Frequency Detection Threshold	007FH	
01.29	Output Frequency Detection Width	0080H	
01.30	Output Frequency Detection Indicator	0081H	

Group 1: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
01.01	Reference Selector	0 - 8 [0]	Run or stop

Note: P00.05 (P10.07) - Control Mode - must be set to the correct value depending on the reference selected

0: Keypad

- The frequency reference is changed using the ▲ or ▼ buttons on the drives keypad
- The Power up frequency reference is decided by parameter P01.11

1: E-Pot (Motorised potentiometer)

The E-Pot function allows the speed reference to be controlled by two momentary normally open switches that are connected to two of the drives digital inputs. When the UP switch is closed the frequency reference increases and when the DOWN switch is closed the frequency reference decreases

Example set up:

Digital inputs DI4 and DI5 are set up as the UP and DOWN function as follows:

P09.05 = 8 DI4 function is UP
P09.06 = 9 DI5 function is DOWN

2: Preset (Preset speeds)

Controlled by the digital input terminals, this setting can be used to select up to 16 Preset speeds. The frequency reference is the value of P04.01 (Preset speed 1) to P04.16 (Preset speed 16)

Example set up for 4 preset speeds:

Digital inputs DI4 and DI5 are set up as the preset select bits:

P09.05=0 DI4 is preset select bit 0
P09.06=1 DI5 is preset select bit 1

The frequency reference can then selected as show in the table below:

DI5 status	DI4 status	Speed
OPEN	OPEN	Preset speed 1 (P04.01)
OPEN	CLOSED	Preset speed 2 (P04.02)
CLOSED	OPEN	Preset speed 3 (P04.03)
CLOSED	CLOSED	Preset speed 4 (P04.04)

3: AI1 (Analog input 1)

In this mode, the frequency reference can be adjusted by changing the level of analog input 1

Note: AI1 can be set up in current and voltage modes, please refer to parameter P08.02 for more information

4: AI2 (Analog input 2)

In this mode, the frequency reference can be adjusted by changing the level of analog input 2

Note: AI2 has only voltage mode, for detailed setup of AI2 please refer to group 8

5: Serial communications.

In this mode, users can change the value of P04.01 (Preset 1) for the reference via the serial communications

6: DI7 Pulse input

In this mode, the frequency can be adjusted by the external pulse counter of DI7

Set P09.24 = 2 for the speed reference to be controlled by input pulse/frequency on DI7

Group 1

Example:

The maximum frequency of input pulse (P09.27) is set to 20.0 kHz. The actual input pulse is 10.0kHz

The percentage of DI7 pulse input (P09.38) is 50.0%. Then the reference is:

Reference = DI7 input percentage (P09.38) × maximum reference (P01.02)

= 50.0% × 50.00Hz

= 25.00Hz

Note: For more information please refer to group 09

7: IO Option or fieldbus card

The frequency reference is controlled by option modules i.e. Profibus module

8: User-programmed

The user can set up where the reference comes from. For example, the output of the PID controller could be sent to P01.27 (User defined main auxiliary reference)

Parameter	Parameter name	Range 【Default】	Change mode
01.02	Maximum Frequency Reference	0.00Hz - 300.00Hz [50.00Hz]	Stop only

Sets maximum frequency/speed reference

Parameter	Parameter name	Range 【Default】	Change mode
01.03	Minimum Frequency Reference	0.00Hz - P1.02Hz [0.00Hz]	Stop only

Sets minimum frequency/speed reference

Parameter	Parameter name	Range 【Default】	Change mode
01.04	Jog Reference	0.00Hz - 50.00Hz [5.00Hz]	Run or stop

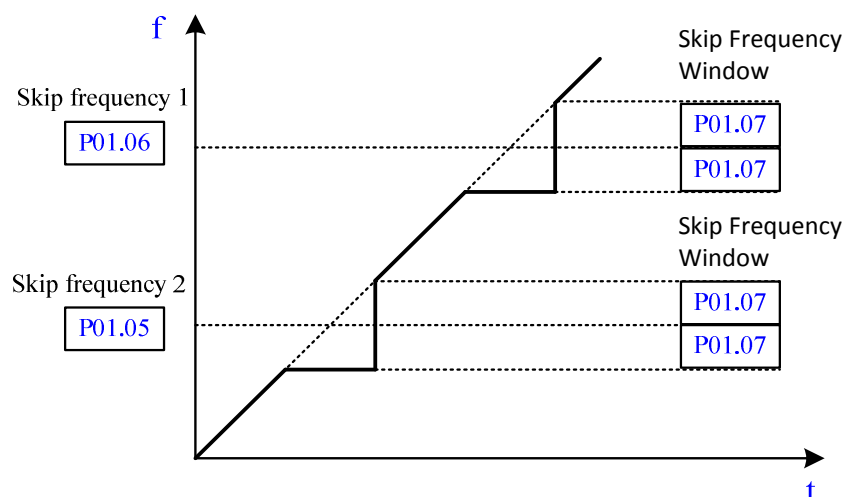
Sets the drive jogging frequency/speed reference

Parameter	Parameter name	Range 【Default】	Change mode
01.05	Skip Frequency 1	0.00Hz - P1.02Hz [0.00Hz]	Stop only

Skip frequencies are used to skip over frequencies that would cause mechanical vibration

When a skip frequency parameter is set to 0, the skip function is disabled

This parameter is used with P01.07 (Skip frequency window) as illustrated in following diagram:



Parameter	Parameter name	Range 【Default】	Change mode
01.06	Skip Frequency 2	0.00Hz - P1.02Hz [0.00Hz]	Stop only

See description for P01.05

Parameter	Parameter name	Range 【Default】	Change mode
01.07	Skip Frequency Window	0.00Hz - 30.00Hz [0.00Hz]	Stop only

See description for P1.05

Parameter	Parameter name	Range 【Default】	Change mode
01.08	Keypad reference after STOP button pressed	0 - 1 [1]	Run or stop

When the drives frequency reference is coming from the keypad, the setting of P01.08 determines if the reference starts from zero Hz or the frequency the drive was running at before the STOP button was pressed.

0: Non-retentive. When the RUN key is pressed, the reference will start at zero Hz.

1: Retentive. When the RUN key is pressed, the reference will ramp to the frequency the drive was running at before the STOP button was pressed.

Parameter	Parameter name	Range 【Default】	Change mode
01.09	Keypad Reference	-P1.02Hz - P1.02Hz [0.00Hz]	Run or stop

When the drives frequency reference is coming from the keypad (P10.07 = 0), the value adjusted using the ▲ or ▼ buttons on the keypad is displayed in this parameter

Parameter	Parameter name	Range	Change mode
01.10	E-Pot Reference	-P1.02Hz - P1.02Hz	Read only

Reference used when E pot function is selected (See P01.01)

Parameter	Parameter name	Range 【Default】	Change mode
01.11	Keypad Reference At Power-Up	0 - 2 [0]	Run or stop

The Keypad reference when the drive is powered up:

0: Starting reference is 0

1: Starting reference is the keypad reference before the drive powered off

2: Starting reference is preset speed 1 (P04.01)

Parameter	Parameter name	Range 【Default】	Change mode
01.12	Zero Speed Threshold	0.00Hz - P1.02Hz [0.50Hz]	Run or stop

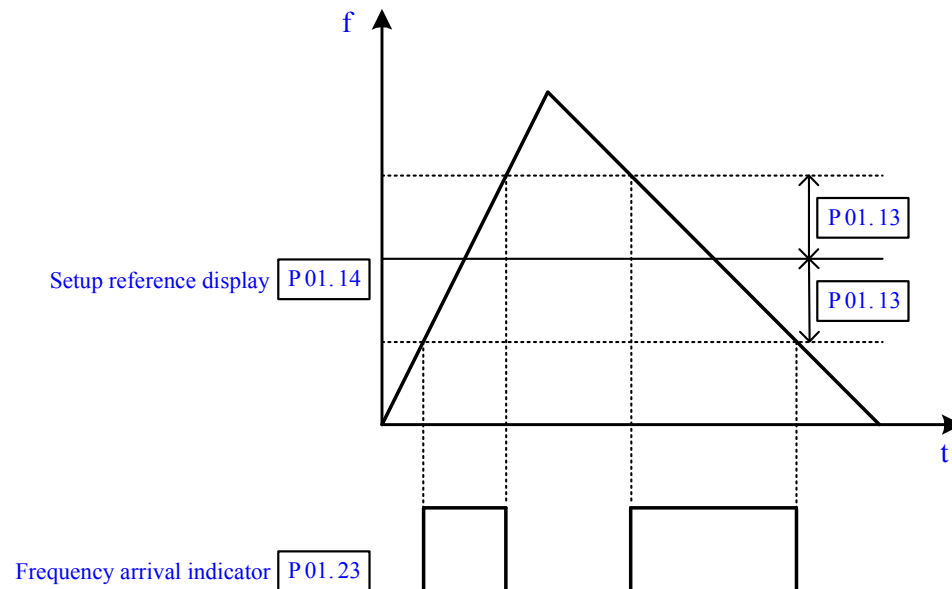
Used to set the level where zero speed is indicated, see also P01.24

Example: If this parameter was set to 0.50Hz then zero speed would be indicated when the output frequency of the drive is below 0.50Hz

Group 1

Parameter	Parameter name	Range 【Default】	Change mode
01.13	Frequency Arrival Window	0.00Hz - P1.02Hz [2.50Hz]	Run or stop

Used to define the frequency range where the frequency arrival indicator (P01.23) is activated as illustrated below:



Parameter	Parameter name	Range	Change mode
01.14	Reference Selected	-P1.02Hz - P1.02Hz	Read only

The parameter shows the value of the frequency reference the drive is using

Parameter	Parameter name	Range	Change mode
01.15	Preset Speed Bit 0	0 - 1	Read only

Used to select preset speeds, see description for P01.19

Parameter	Parameter name	Range	Change mode
01.16	Preset Speed Bit 1	0 - 1	Read only

Used to select preset speeds, see description for P01.19

Parameter	Parameter name	Range	Change mode
01.17	Preset Speed Bit 2	0 - 1	Read only

Used to select preset speeds, see description for P01.19

Parameter	Parameter name	Range	Change mode
01.18	Preset Speed Bit 3	0 - 1	Read only

Used to select preset speeds, see description for P01.19

Group 1

Parameter	Parameter name	Range	Change mode
01.19	Preset Selected	1 - 16	Read only

Shows what preset speed reference is selected

If P01.01 = 2 (reference source = preset speed reference), the digital input terminals can be used to control the value of P01.15 to P01.18

When P09.01 = 0 (default) - 4 preset speeds can be selected

When P09.01 = 1 – 16 preset speeds can be selected

Refer to group P09 for more information

The relationship between P01.15 to 01.18 and P01.19 are shown below:

P01.18	P01.17	P01.16	P01.15	Reference selector	P01.19
OFF	OFF	OFF	OFF	Preset speed 1	1
OFF	OFF	OFF	ON	Preset speed 2	2
OFF	OFF	ON	OFF	Preset speed 3	3
OFF	OFF	ON	ON	Preset speed 4	4
OFF	ON	OFF	OFF	Preset speed 5	5
OFF	ON	OFF	ON	Preset speed 6	6
OFF	ON	ON	OFF	Preset speed 7	7
OFF	ON	ON	ON	Preset speed 8	8
ON	OFF	OFF	OFF	Preset speed 9	9
ON	OFF	OFF	ON	Preset speed 10	10
ON	OFF	ON	OFF	Preset speed 11	11
ON	OFF	ON	ON	Preset speed 12	12
ON	ON	OFF	OFF	Preset speed 13	13
ON	ON	OFF	ON	Preset speed 14	14
ON	ON	ON	OFF	Preset speed 15	15
ON	ON	ON	ON	Preset speed 16	16

Parameter	Parameter name	Range	Change mode
01.20	AI1 Reference	-P1.02Hz - P1.02Hz	Read only

Indicates the value of AI1 input

Parameter	Parameter name	Range	Change mode
01.21	AI2 Reference	-P1.02Hz - P1.02Hz	Read only

Indicates the value of AI2 input

Parameter	Parameter name	Range	Change mode
01.22	RUN/STOP Indicator	0 - 1	Read only

Indicates whether the drive is running or stopped

0: STOP is active

1: RUN is active

Parameter	Parameter name	Range	Change mode
01.23	Frequency Arrival Indicator	0 - 1	Read only

See P01.13. When the drive's output frequency is within the range set, this parameter will change to 1

Parameter	Parameter name	Range	Change mode
01.24	Zero Speed	0 - 1	Read only

When the output frequency is below the value in P01.12 (zero speed threshold) this parameter will be 1

Parameter	Parameter name	Range	Change mode
01.25	Main Speed Source Set To AI1	0 - 1	Read only

See description for P01.26

Parameter	Parameter name	Range	Change mode
01.26	Main Speed Source Set To AI2	0 - 1	Read only

When in Keypad control, P01.01 = 0, P01.25 and P01.26 allow the user to switch between AI1 frequency or AI2 reference by setting digital inputs to control these parameters. Therefore the keypad reference can be set either by the keypad UP and DOWN buttons, analog input 1 or analog input 2

Example setup:

P01.01 = 0 (Speed source given by keypad)

P09.01 = 1 (Digital terminal in programmable mode)

P09.02 = 1.25 (DI1 controls that main speed source switch to AI1)

P09.03 = 1.26 (DI2 controls that main speed source switch to AI2)

The following table shows the corresponding condition:

P01.01	DI1	DI2	P01.14 (Reference selected)
0	OPEN	OPEN	= P01.09 (Keypad)
0	OPEN	CLOSED	= P01.21 (AI2)
0	CLOSED	OPEN	= P01.20 (AI1)
0	CLOSED	CLOSED	= P01.20 (AI1)

Note: As shown in the table AI1 has priority over AI2

Parameter	Parameter name	Range	Change mode
01.27	User Defined Main Auxiliary Reference	-P1.02Hz - P01.02Hz	Read only

When P01.01 is set to 8 the reference can be viewed using this parameter

Parameter	Parameter name	Range 【Default】	Change mode
01.28	Output Frequency Detection Threshold	0.00Hz – P01.02Hz [0.01Hz]	Run & Stop

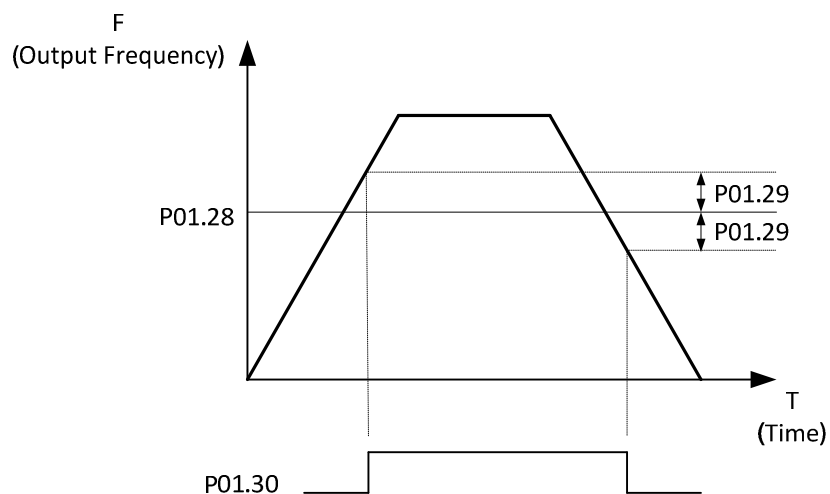
See description following parameter P01.30 for details on the Output frequency detection threshold indicator

Parameter	Parameter name	Range 【Default】	Change mode
01.29	Output Frequency Detection Width	0.00Hz – P01.28 [0.01Hz]	Run & Stop

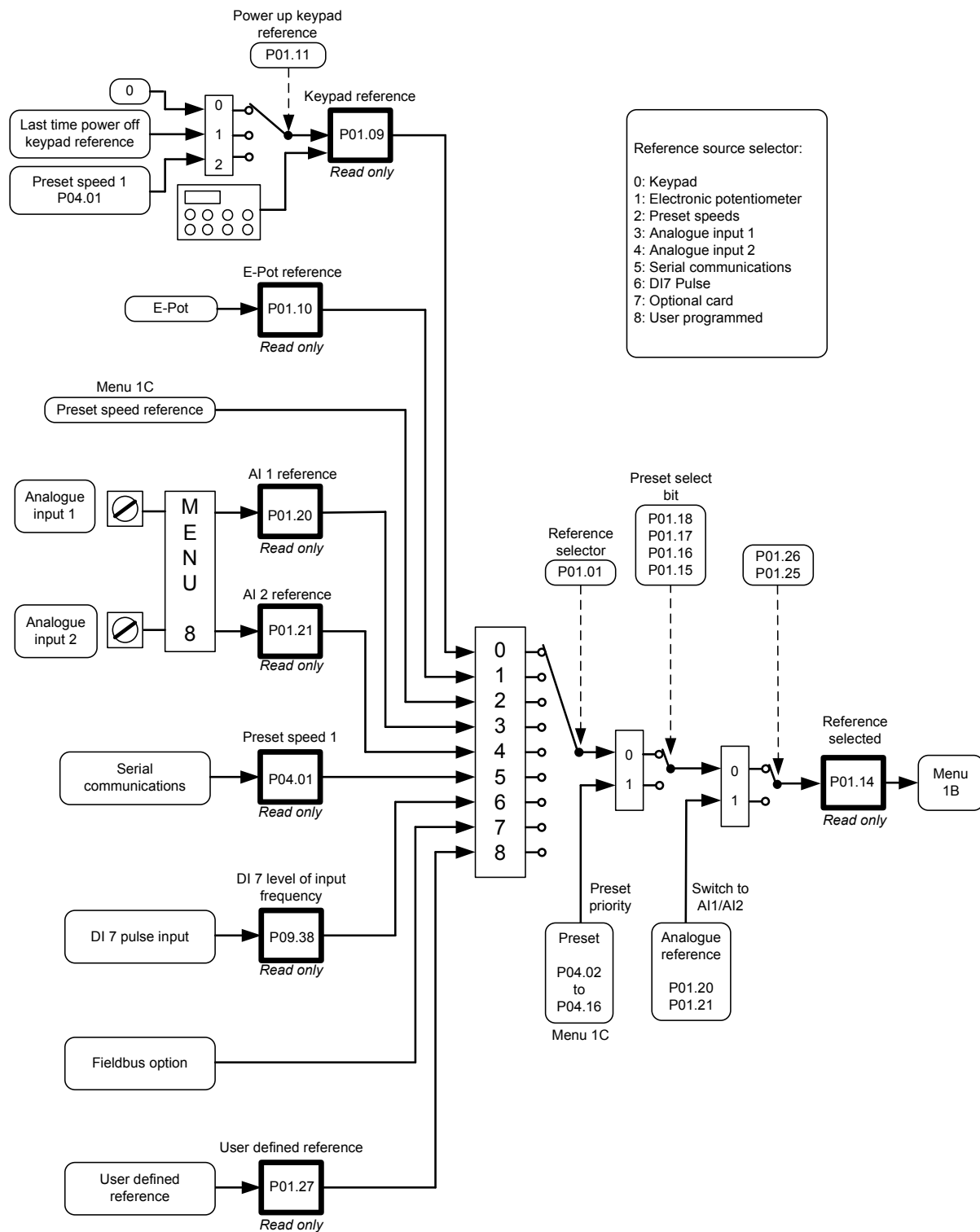
Group 1

Parameter	Parameter name	Range	Change mode
01.30	Output Frequency Detection Indicator	0 - 1	Run & Stop

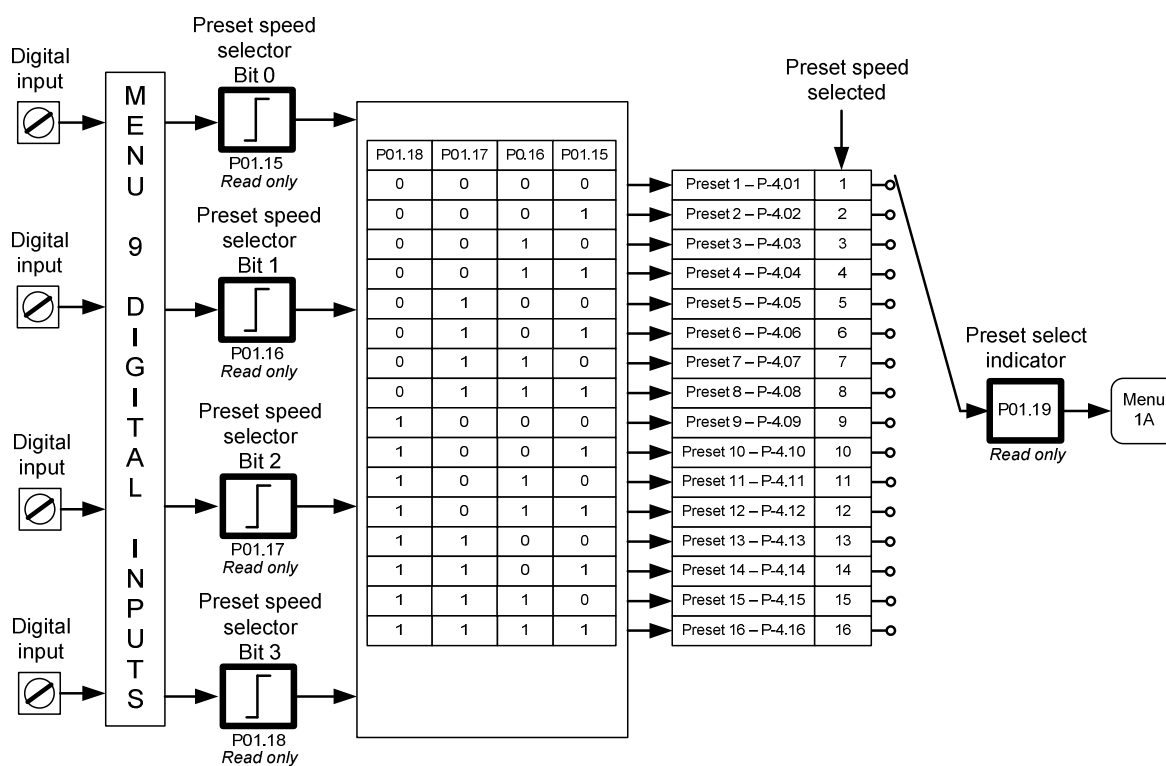
If the absolute value of P05.11 (output frequency) is equal to or more than the value of P01.28 plus P01.29, the output frequency detection signal is set to a logic 1. If the absolute value of P05.11 (output frequency) is equal to or less than the value of P01.28 minus P01.29, the output frequency detection signal is set to a logic 0. See diagram below:



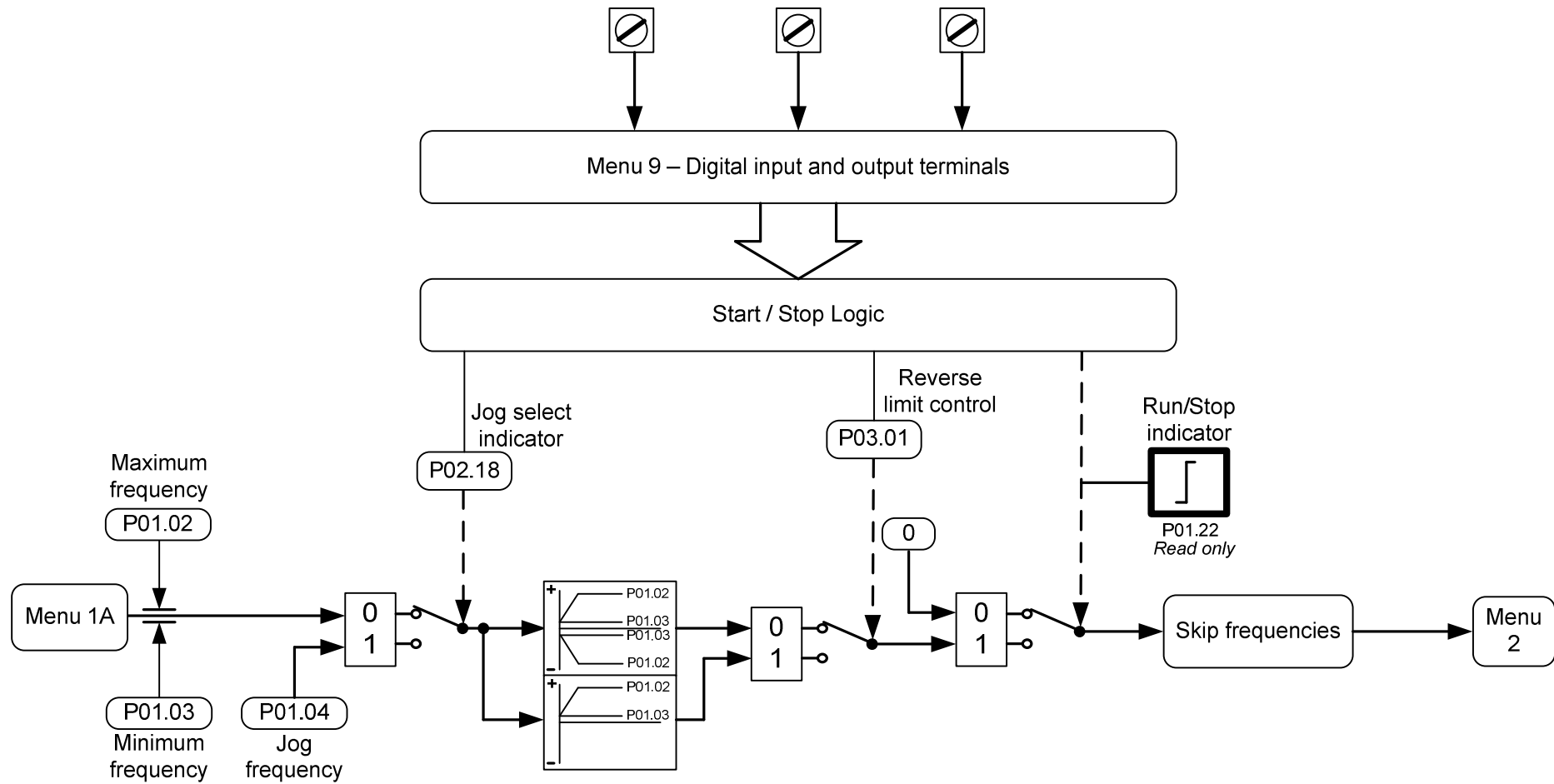
Menu 1A Speed reference selector



Menu 1B Preset speed selector



Menu 1C Speed limits



Group 2

Group 2: Ramps

Parameter quick look up table

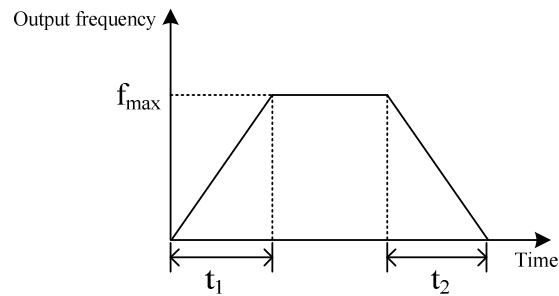
Parameter	Parameter name	Modbus register address	Settings
02.01	Acceleration/Deceleration Mode Select	00C8H	
02.02	Ramp Hold	00C9H	
02.03	Not Used		
02.04	Acceleration Time 1	00CBH	
02.05	Deceleration Time 1	00CCH	
02.06	Acceleration Time 2	00CDH	
02.07	Deceleration Time 2	00CEH	
02.08	Acceleration Time 3	00CFH	
02.09	Deceleration Time 3	00D0H	
02.10	Acceleration Time 4	00D1H	
02.11	Deceleration Time 4	00D2H	
02.12	S Ramp Start Time	00D3H	
02.13	S Ramp Finish Time	00D4H	
02.14	Acceleration Time Bit 0	00D5H	
02.15	Acceleration Time Bit 1	00D6H	
02.16	Deceleration Time Bit 0	00D7H	
02.17	Deceleration Time Bit 1	00D8H	
02.18	Jog Selected	00D9H	
02.19	Acceleration Selector	00DAH	
02.20	Deceleration Selector	00DBH	
02.21	Acceleration Deceleration Time Unit	00DCH	
02.22	Jog Acceleration Time	00DDH	
02.23	Jog Deceleration Time	00DEH	
02.24	Jog Interval Time	00DFH	
02.25	Allow E-Pot Negative Reference	00E0H	
02.26	E-Pot Up And Down Accel/Decel Time	00E1H	
02.27	E-Pot Output Scaling	00E2H	
02.28	E-Pot Output Function	00E3H	
02.29	E-Pot Reset	00E4H	
02.30	E-Pot Up	00E5H	
02.31	E-Pot Down	00E6H	
02.32	E-Pot Output	00E7H	
02.33	Power Up E-Pot Reference	00E8H	
02.34	E-Pot Reference At Stop	00E9H	

Group 2: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
02.01	Acceleration/Deceleration Mode Select	0 - 3 [0]	Stop only

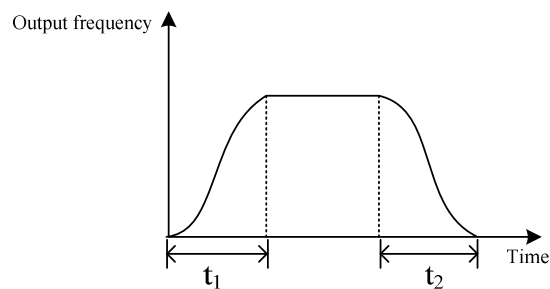
Selects the Acceleration/Deceleration mode

0: Linear



1: S curve

The S ramp mode can be used in applications where smooth starting and stopping is required; in some applications linear ramps can cause undesirable jerks and mechanical shocks. As illustrated below this mode applies a start and end curve to the acceleration and deceleration



2: Reserved

3: Reserved

Parameter	Parameter name	Range	Change mode
02.02	Ramp Hold	0 - 1 [0]	Run or stop

If this bit is set to 1 the ramp will be held. For example if the output frequency is ramping from 0 to 50Hz and this bit is set when the output frequency is at 20Hz, the frequency will be held at 20Hz

Note: If S ramp is enabled (P02.01 = 1) the output frequency will S curve to a frequency past the frequency where this bit was set

Parameter	Parameter name	Range 【Default】	Change mode
02.04	Acceleration Time 1	0.0s - 3600.0s [10.0s]	Run or stop

Time taken for output frequency to change from 0Hz to P01.02 (maximum reference)

Group 2

Parameter	Parameter name	Range 【Default】	Change mode
02.05	Deceleration Time 1	0.0s - 3600.0s [20.0s]	Run or stop

Time taken for output frequency to change from P01.02 (maximum reference) to 0Hz

Parameter	Parameter name	Range 【Default】	Change mode
02.06	Acceleration Time 2	0.0s - 3600.0s [30.0s]	Run or stop

Time taken for output frequency to change from 0Hz to P01.02 (maximum reference)

Can be selected using the digital inputs, See P02.14 to P02.17 and P02.19, P02.20 for more information

Parameter	Parameter name	Range 【Default】	Change mode
02.07	Deceleration Time 2	0.0s - 3600.0s [30.0s]	Run or stop

Time taken for output frequency to change from P01.02 (maximum reference) to 0Hz

Can be selected using the digital inputs, See P02.14 to P02.17 and P02.19, P02.20 for more information

Parameter	Parameter name	Range 【Default】	Change mode
02.08	Acceleration Time 3	0.0s - 3600.0s [30.0s]	Run or stop

Time taken for output frequency to change from 0Hz to P01.02 (maximum reference)

Can be selected using the digital inputs, See P02.14 to P02.17 and P02.19, P02.20 for more information

Parameter	Parameter name	Range 【Default】	Change mode
02.09	Deceleration Time 3	0.0s - 3600.0s [30.0s]	Run or stop

Time taken for output frequency to change from P01.02 (maximum reference) to 0Hz

Can be selected using the digital inputs, See P02.14 to P02.17 and P02.19, P02.20 for more information

Parameter	Parameter name	Range 【Default】	Change mode
02.10	Acceleration Time 4	0.0s - 3600.0s [30.0s]	Run or stop

Time taken for output frequency to change from 0Hz to P01.02 (maximum reference)

Can be selected using the digital inputs, See P02.14 to P02.17 and P02.19, P02.20 for more information

Parameter	Parameter name	Range 【Default】	Change mode
02.11	Deceleration Time 4	0.0s - 3600.0s [30.0s]	Run or stop

Time taken for output frequency to change from P01.02 (maximum reference) to 0Hz

Can be selected using the digital inputs, See P02.14 to P02.17 and P02.19, P02.20 for more information

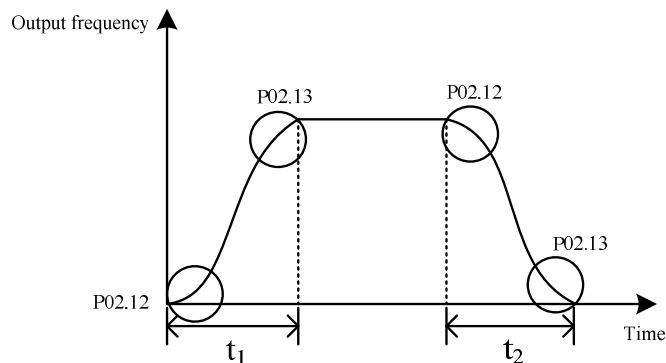
Parameter	Parameter name	Range 【Default】	Change mode
02.12	S Ramp Start Time	0.0% - 40.0% [20.0%]	Run or stop

See description for P02.13

Parameter	Parameter name	Range 【Default】	Change mode
02.13	S Ramp Finish Time	0.0% - 40.0% [20.0%]	Run or stop

P02.12 is used to set the start curve time in acceleration or deceleration

P02.13 is used to set the end curve time in acceleration or deceleration



NOTE:

1) P02.12 and P02.13 only become effective when P02.01 = 1

2) The value of P02.12 and P02.13 is a percentage of the actual acceleration or deceleration rate

For example:

P01.02 (the maximum frequency) = 50.00Hz, P02.04 (acceleration rate 1) = 10s, P02.12 = 20%, P02.13 = 30%

If the reference is set to 25.00Hz, the acceleration rate is 5s from 0Hz to 25Hz (10s from 0Hz to 50Hz)

S curve start time = 5s × 20.0% = 1s, S curve finish time = 5s × 30.0% = 1.5s

Parameter	Parameter name	Range	Change mode
02.14	Acceleration Time Bit 0	0 - 1	Read only

This bit can be controlled by a digital input so ramp rates can be selected by external control. See P02.19

Parameter	Parameter name	Range	Change mode
02.15	Acceleration Time Bit 1	0 - 1	Read only

This bit can be controlled by a digital input so ramp rates can be selected by external control. See P02.19

Parameter	Parameter name	Range	Change mode
02.16	Deceleration Time Bit 0	0 - 1	Read only

This bit can be controlled by a digital input so ramp rates can be selected by external control. See P02.20

Parameter	Parameter name	Range	Change mode
02.17	Deceleration Time Bit 1	0 - 1	Read only

This bit can be controlled by a digital input so ramp rates can be selected by external control. See P02.20

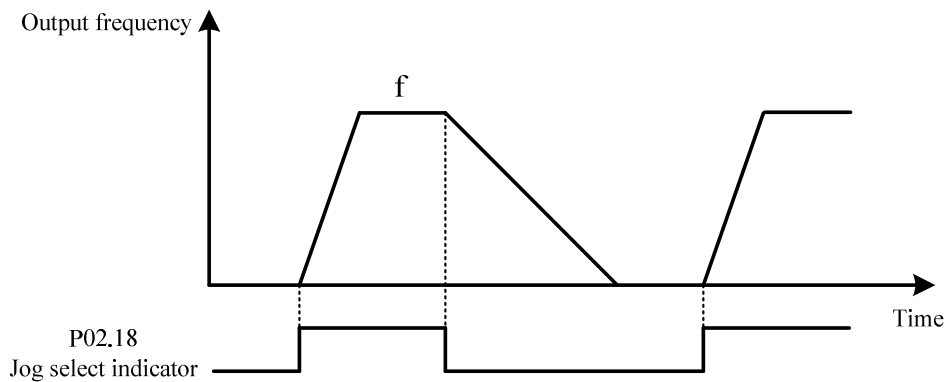
Parameter	Parameter name	Range	Change mode
02.18	Jog Selected	0 - 1	Read only

0: Jog disabled

1: Jog enabled

Group 2

P02.18 = 0, jog is disable; P02.18 = 1, jog is enabled



Parameter	Parameter name	Range	Change mode
2.19	Acceleration Selector	1 - 4	Read only

Indicates the acceleration time being selected, it is controlled by P02.14 to P02.15

P02.15 (Acceleration Time Bit 1)	P02.14 (Acceleration Time Bit 0)	P02.19
0	0	1 (Accel. Time 1 P02.04)
0	1	2 (Accel. Time 2 P02.06)
1	0	3 (Accel. Time 3 P02.08)
1	1	4 (Accel. Time 4 P02.10)

Parameter	Parameter name	Range	Change mode
2.20	Deceleration Selector	1 - 4	Read only

Indicates the deceleration time being selected, it is controlled by P02.16 to P02.17

P02.17 (Decel Time Bit 1)	P02.16 (Decel Time Bit 0)	P02.20
0	0	1 (Decel. Time 1 P02.05)
0	1	2 (Decel. Time 2 P02.07)
1	0	3 (Decel. Time 3 P02.09)
1	1	4 (Decel. Time 4 P02.11)

Parameter	Parameter name	Range 【Default】	Change mode
2.21	Acceleration Deceleration Time Unit	0 - 1 [0]	Stop only

Sets the unit of acceleration and deceleration time 1 to 4: Parameters P02.04 to P02.11

0: s (second)

1: m (minute)

Parameter	Parameter name	Range 【Default】	Change mode
2.22	Jog Acceleration Time	0.1s - 60.0s [10.0s]	Run or stop

See description for P02.24

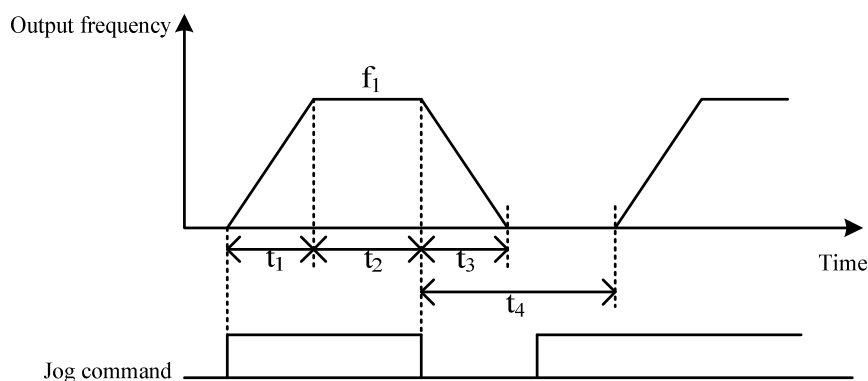
Parameter	Parameter name	Range 【Default】	Change mode
2.23	Jog Deceleration Time	0.1s - 60.0s [10.0s]	Run or stop

See description for P02.24

Parameter	Parameter name	Range 【Default】	Change mode
2.24	Jog Interval Time	0.1s - 60.0s [0.1s]	Run or stop

As shown in the diagram below: t_1 is the jog acceleration time (P02.22) and t_3 is the jog deceleration time (P02.23). t_2 is jog time and t_4 is jog interval time (P02.24). f_1 is jog frequency (P01.04). The actual jog acceleration time t_1 can be determined by the following formula. The same formula can be applied for the jog deceleration time t_3

$$t_1 = \frac{P01.04 \text{ (Jog frequency)} \times P02.22}{P01.02 \text{ (Maximum frequency)}}$$

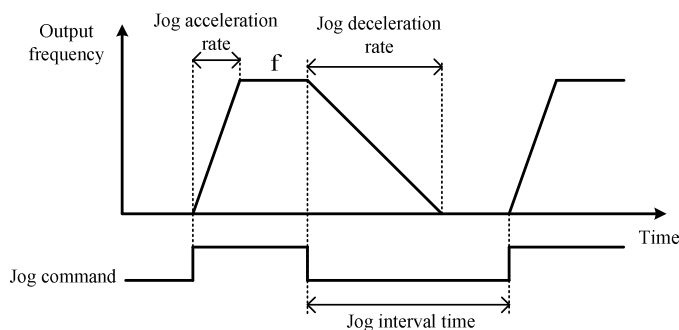


The jog interval time (P02.24) is the waiting time from the jog command being removed to the next jog command being applied and acted upon

Example: If a jog interval time of 5s is set, when the jog command is removed, the drive will decelerate and stop/disable. If another jog command is given, the drive will wait 5s before re-enabling and jogging. If the jog command is given at any time during the 5s interval time, the drive will wait for the 5s to elapse and then jog

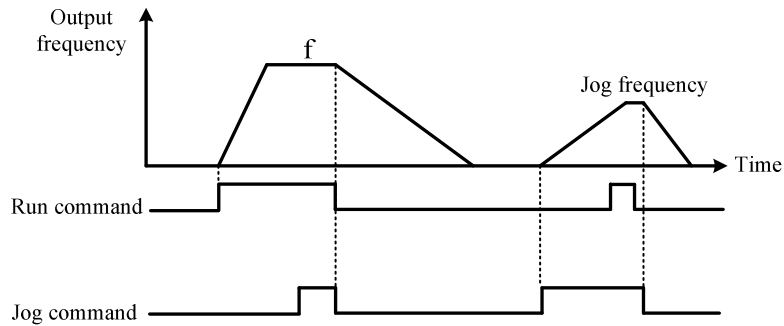
NOTE:

- 1) In the keypad control mode, the jog operation can be implemented by pressing and holding the MF button on the drives display. Release the MF key and the drive stops according to the stop mode set in P03.10. In the terminal control mode, the jog operation can be realized by setting jog FWD and REV terminals. The jog operation can also be implemented by serial communication
- 2) When the drive is jogging, acceleration/deceleration time is determined by P02.22/P02.23



- The jog operation is effective in when the drive is enabled (DI6) but not running
- When the drive is jogging, the run command is disabled

Group 2



Parameter	Parameter name	Range 【Default】	Change mode
02.25	Allow E-Pot Negative Reference	0 - 1 [0]	Run or stop

E-Pot output range:

0: 0-100%

1: -100% to 100%

Parameter	Parameter name	Range 【Default】	Change mode
02.26	E-Pot Up And Down Accel/Decel Time	0.0s - 250.0s [10.0s]	Run or stop

Sets the time taken for the E-Pot function to change from 0 to 100.0%

Parameter	Parameter name	Range 【Default】	Change mode
02.27	E-Pot Output Scaling	0.000 - 4.000 [1.000]	Run or stop

Used to scale the output of the E-Pot

Parameter	Parameter name	Range 【Default】	Change mode
02.28	E-Pot Output Function	1.01 - 18.08 [1.10]	Stop only

Sets what parameter the E-Pot will control

Parameter	Parameter name	Range	Change mode
02.29	E-Pot Reset	0 - 1	Read only

When set to On (1), the E-Pot output is reset to 0.0%

Parameter	Parameter name	Range	Change mode
02.30	E-Pot Up	0 - 1	Read only

When this parameter is 1 the output of the E-Pot will increase

Group 2

Parameter	Parameter name	Range	Change mode
2.31	E-Pot Down	0 - 1	Read only

When this parameter is 1 the output of the E-Pot will decrease

DI terminals must be programmed to control the E-Pot parameters

Example:

Advanced application (P09.01=1)	Basic applications (P09.01=0)	Result
P09.05=2.30	P09.05=8	DI4 is UP terminal
P09.06=2.31	P09.06=9	DI5 is DOWN terminal

NOTE: UP and DOWN terminals are effective at the same time, E-pot output (P02.32) hold the current value

Parameter	Parameter name	Range	Change mode
2.32	E-Pot Output	-100.0% - 100.0%	Read only

Shows the output of the E-Pot

Parameter	Parameter name	Range 【Default】	Change mode
2.33	Power Up E-Pot Reference	0 - 3 [0]	Run or stop

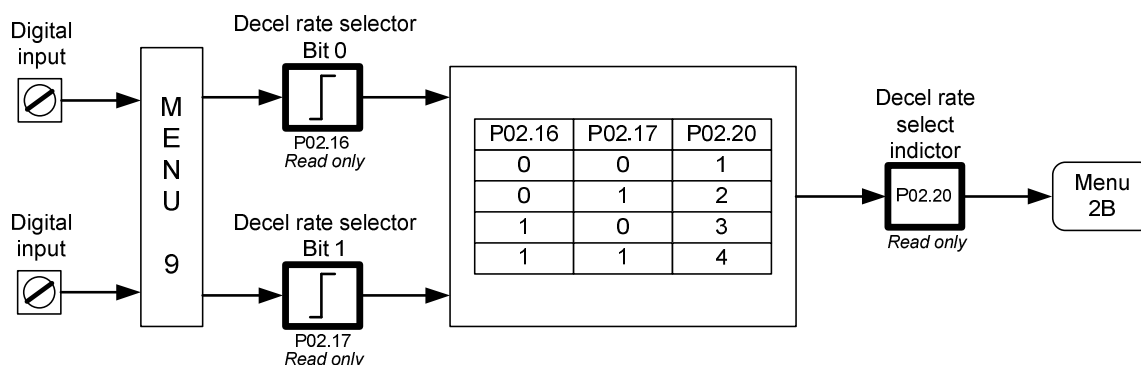
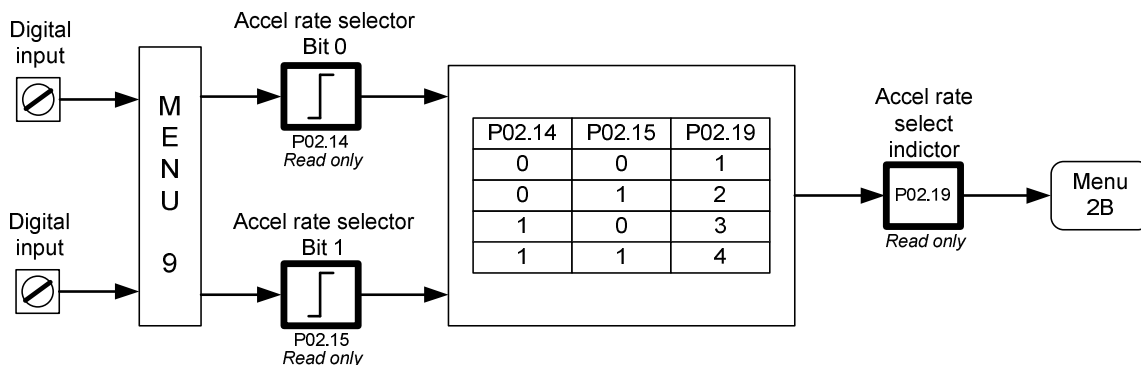
The Power up E-pot reference is given in the table below:

- 0:** Set to 0.00Hz at power up
- 1:** Set to last E-Pot frequency at power up
- 2:** Set to 0.00Hz at power up, E-Pot up and down will have no effect until drive is running
- 3:** Set to last E-Pot frequency at power up, E-Pot up and down will have no effect until drive is running
- 4:** Set to preset speed 1 (P04.01)
- 5:** Set to preset speed 1 (P04.01). UP/DOWN are only active when drive is running. Reset is active at all times.

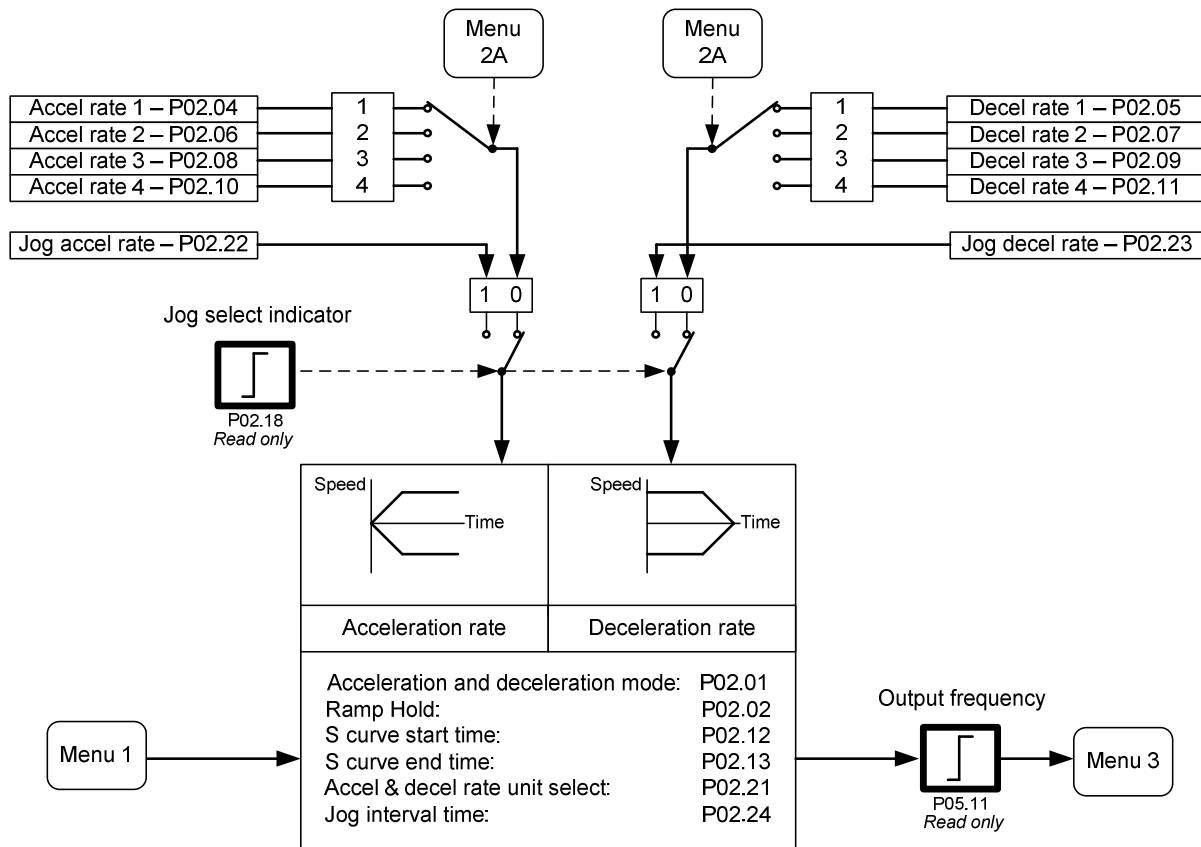
Parameter	Parameter name	Range 【Default】	Change mode
2.34	E-Pot Reference At Stop	0 - 1 [0]	Run or stop

When this parameter is set to 1 the E-Pot output is held when the drive is in a stop state and P02.33 = 0;
Otherwise it is reset when the drive is in a Stopped state

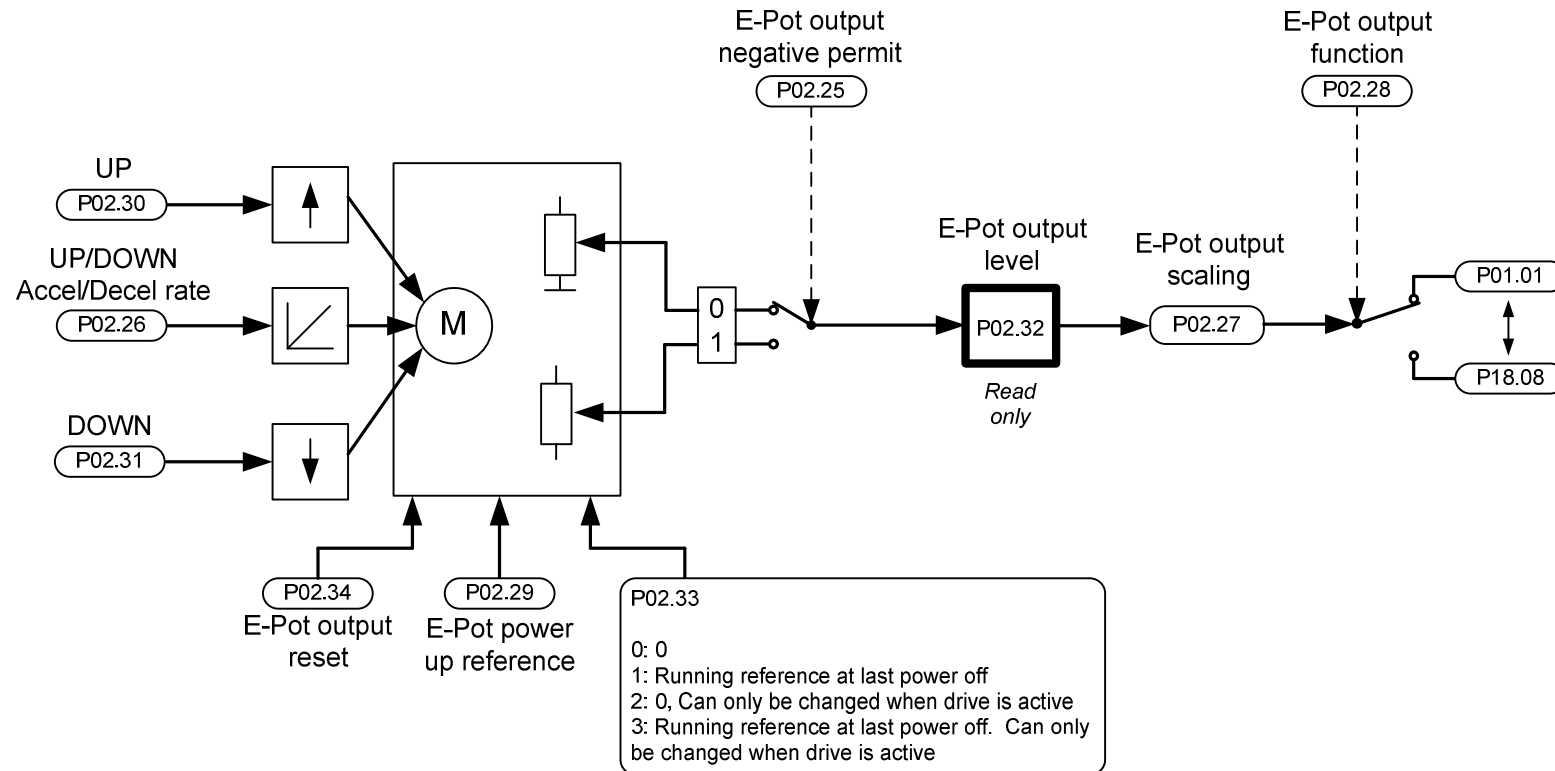
Menu 2A Ramp selector



Menu 2B



Menu 2 Motorised/Electronic potentiometer



Group 3: Start and Stop

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
03.01	Allow Reverse	012CH	
03.02	Dead Time For Running Direction Change	012DH	
03.03	Auto-Start After Power Off	012EH	
03.04	Wait Time For Auto-Start	012FH	
03.05	Start Mode	0130H	
03.06	Start Frequency	0131H	
03.07	Hold Time For Start Frequency	0132H	
03.08	Start DC Injection Current	0133H	
03.09	Start DC Injection Time	0134H	
03.10	Stopping Mode Select	0135H	
03.11	Stop Frequency	0136H	
03.12	Stop DC Injection Frequency	0137H	
03.13	Stop DC Injection Current	0138H	
03.14	Stop DC Injection Time	0139H	
03.15	Dynamic Brake Enable	013AH	
03.16	Dynamic Brake Rate	013BH	
03.17	Dynamic Brake DC Voltage Points	013CH	
03.18	Not Used	013DH	
03.19	Drive Enable	013EH	
03.20	Run	013FH	
03.21	Not Stop	0140H	
03.22	Run Forward	0141H	
03.23	Run Reverse	0142H	
03.24	For/Rev	0143H	
03.25	Jog Forward	0144H	
03.26	Jog Reverse	0145H	
03.27	Serial Comms Control Word	0146H	
03.28	Serial Comms Control Word Enable	0147H	
03.29	Not Used		
03.30	Drive Direction Indicator	0149H	

Group 3: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
03.01	Allow Reverse	0 - 1 [0]	Stop only

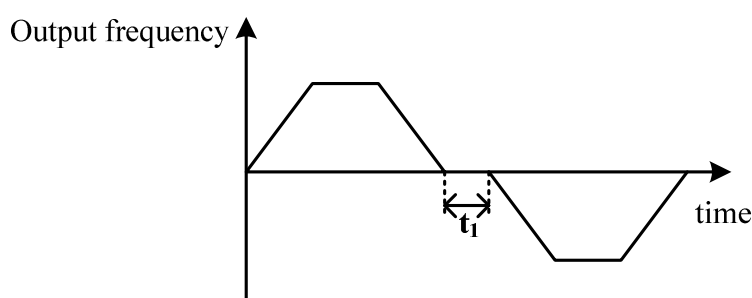
Used to control whether the motor is allowed to run reverse

0: Reverse is allowed

1: Reverse is NOT allowed

Parameter	Parameter name	Range 【Default】	Change mode
03.02	Dead Time For Running Direction Change	0.0s - 3000.0s [0.0s]	Run or stop

Used to define a dead time for running direction change. Such as t_1 shown below:



Parameter	Parameter name	Range 【Default】	Change mode
03.03	Auto-Start After Power Off	0 - 2 [2]	Stop only

0: Auto-Start After Power Off = Disabled

The drive will not start automatically after power up

1: Auto-Start After Power Off = Mode 1

When powering up, the drive will start automatically after time defined by P03.04 (wait time for auto-start, default = 0.0 seconds)

When P00.17=1:

- In keypad control mode, the drive will start automatically after power up
- In terminal control mode a run signal change from off to on needs be seen by the drive after power up, then the drive will start

2: Auto-Start After Power Off = Mode 2

The same as mode 1 except:

- In terminal control mode – if there is an active run signal at power up the drive will start



Warning: Please use this function carefully

Parameter	Parameter name	Range 【Default】	Change mode
03.04	Wait Time For Auto-Start	0.0s - 60.0s [0.0s]	Run or stop

Used with P03.03. Refer to the explanation of parameter P03.03

Group 3

Parameter	Parameter name	Range 【Default】	Change mode
03.05	Start Mode	0 - 4 [0]	Stop only

0: Start directly

Start with the set start frequency (P03.06) and start frequency hold time (P03.07). See P03-07 for further information

1: DC brake then start

DC injection brake (Refer to P03.08 & P03.09), then start with mode 0

DC voltage is injected into the motor, providing a braking force to the rotor. This can be useful to stop an already spinning motor before the drives output ramp starts

2: Flying start

The drive automatically reconnects to an already spinning motor. The drive identifies the motor speed and direction and picks up at the speed it is already spinning at. The drive then ramps to the set speed.

This method avoids over current and mechanical stress that can be caused when using mode 0 on a motor that is already spinning at start

3: Reserved

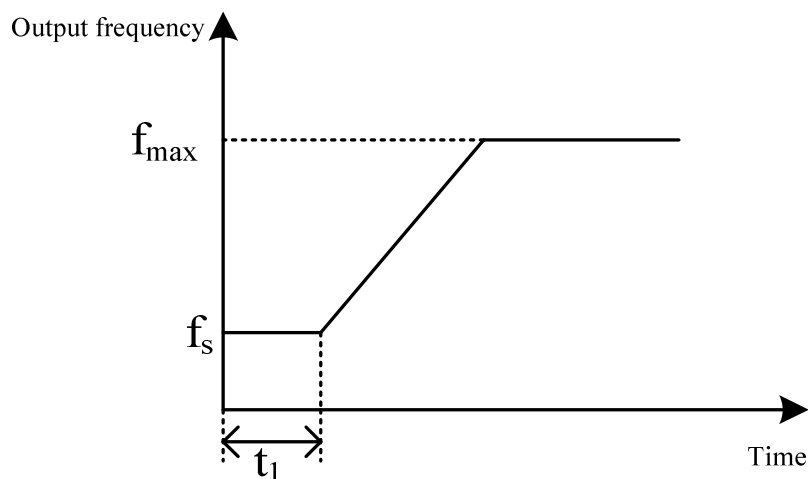
4: Reserved

Parameter	Parameter name	Range 【Default】	Change mode
03.06	Start Frequency	0.00Hz - 50.00Hz [0.00Hz]	Run or stop

See description for P03.07

Parameter	Parameter name	Range 【Default】	Change mode
03.07	Hold Time For Start Frequency	0.0s - 60.0s [0.0s]	Run or stop

Start frequency (P03.06) is the initial frequency when the drive starts, as shown in the following picture f_s . The start frequency hold time (P03.07) is the time running at the start frequency when the drive starts, as shown in the following figure t_1



Parameter	Parameter name	Range 【Default】	Change mode
03.08	Start DC Injection Current	0.0% - 300.0% [0.0%]	Run or stop

See description for P03.09

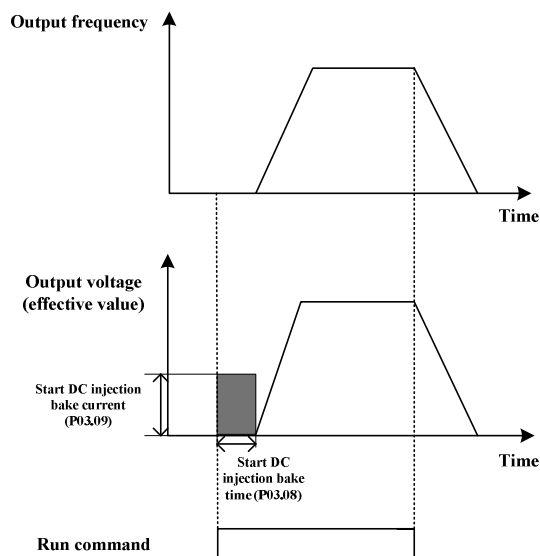
Group 3

Parameter	Parameter name	Range 【Default】	Change mode
03.09	Start DC Injection Time	0.0s - 60.0s [0.0s]	Run or stop

P03.08, P03.09 only are only effective when P03.05 = 1

P03.08 defines the DC injection current level applied to the motor as a percentage of motor rated current (P13.07).

P03.09 defines the time period that the DC injection current will be applied to the motor



Parameter	Parameter name	Range 【Default】	Change mode
03.10	Stopping Mode Select	0 - 3 [0]	Stop only

0: Ramp stop

When receiving the stop command, the drive ramp down to zero frequency, then disable

1: Coast stop

When receiving the stop command, the drives output immediately disables. The motor coasts (freewheels) to a stop

2: Ramp stop + DC injection

- When receiving the stop command, the drive reduces the output frequency according to deceleration time
- When the output frequency gets to the 'stop DC injection frequency' (P03.12), the DC injection brake phase begins

Please refer to P03.12 & P03.13 for information on DC injection braking

3: Ramp and then coast to stop

Ramp until P03.11 then disable

Parameter	Parameter name	Range 【Default】	Change mode
03.11	Stop Frequency	0.00Hz - P1.02Hz [0.10Hz]	Run or stop

Sets the frequency where 'coast to stop' will occur. See P03.10 mode 3

Parameter	Parameter name	Range 【Default】	Change mode
03.12	Stop DC Injection Frequency	0.0Hz - 20.0Hz [0.0Hz]	Run or stop

Sets the frequency where DC injection will begin

Parameter	Parameter name	Range 【Default】	Change mode
03.13	Stop DC Injection Current	0.0% - 300.0% [0.0%]	Run or stop

Sets the level of DC braking current as a percentage of motor rated current (P13.07)

Parameter	Parameter name	Range 【Default】	Change mode
03.14	Stop DC Injection Time	0.0 - 60.0s [0.00s]	Run or stop

DC injection during stop will be applied for the time set in this parameter

Parameter	Parameter name	Range 【Default】	Change mode
03.15	Dynamic Brake Enable	0 - 1 [1]	Stop only

0: Disable

1: Enable

- Dynamic braking requires a braking resistor to be fitted to the drive. A dynamic brake is used to dissipate excess regenerated energy from the motor
- When the drives DC bus reaches the level set in P03.17, the dynamic brake will be switched on

Parameter	Parameter name	Range 【Default】	Change mode
03.16	Dynamic Brake Rate	0.0% - 100.0% [50.0%]	Run or stop

The value and power of the brake resistor must be considered when set this parameter

Parameter	Parameter name	Range 【Default】	Change mode
03.17	Dynamic Brake DC Voltage Points	240Vunits: 350V - 390V [390V] 400V units: 650V - 780V [780V]	Stop only

P03.17 gives the voltage at which the dynamic brake will switch on

Parameter	Parameter name	Range	Change mode
03.19	Drive Enable	0 - 1	Read only

Can be controlled by a digital input or other control source to enable the drive. By default when set in terminal control this parameter is controlled by DI6 (P09.07 = 10)

- This parameter is reset to zero after power up
- This parameter only has an effect in terminal control mode

Parameter	Parameter name	Range	Change mode
03.20	Run	0 - 1	Read only

Can be controlled by a digital input or other control source

- This parameter is reset to zero after power up
- This parameter is only enabled in terminal control mode

Parameter	Parameter name	Range	Change mode
03.21	Not Stop	0 - 1	Read only

Can be controlled by a digital input or other control source

- This parameter is reset to zero after power up
- This parameter is only enabled in terminal control mode

Parameter	Parameter name	Range	Change mode
03.22	Run Forward	0 - 1	Read only

Can be controlled by a digital input or other control source. By default when set in terminal control this parameter is controlled by DI1 (P09.02 = 3)

- This parameter is reset to zero after power up
- This parameter is only enabled in terminal control mode

Parameter	Parameter name	Range	Change mode
03.23	Run Reverse	0 - 1	Read only

Can be controlled by a digital input or other control source. By default when set in terminal control this parameter is controlled by DI2 (P09.03 = 4)

- This parameter is reset to zero after power up
- This parameter is only enabled in terminal control mode

Parameter	Parameter name	Range	Change mode
03.24	Forward/Reverse	0 - 1	Read only

Can be controlled by a digital input or other control source

- This parameter is reset to zero after power up
- This parameter is only enabled in terminal control mode

Parameter	Parameter name	Range	Change mode
03.25	Jog Forward	0 - 1	Read only

Can be controlled by a digital input or other control source. By default when set in terminal control this parameter is controlled by DI3 (P09.04 = 7)

- This parameter is reset to zero after power up
- This parameter is only enabled in terminal control mode

Parameter	Parameter name	Range	Change mode
03.26	Jog Reverse	0 - 1	Read only

Can be controlled by a digital input or other control source

- This parameter is reset to zero after power up
- This parameter is only enabled in terminal control mode

Parameter	Parameter name	Range	Change mode
03.27	Serial Comms Control Word	0 - 65535	Read only

When P03.28 (Serial comms control word enable) is set to 1, this parameter can be used to control the drive

P03.27 is a 16-bit binary number (displayed in decimal form on the drive's keypad)

The meaning of each bit is shown as the following table:

Bit	Decimal	Bit function	As same parameter
0	1	Drive enable	P03.19
1	2	Run	P03.20
2	4	Not Stop	P03.21
3	8	Run forward	P03.22
4	16	Run reverse	P03.23
5	32	FOR/REV	P03.24
6	64	Jog forward	P03.25
7	128	Jog reverse	P03.26
8	256	Reset trips	P12.15
9	1024	Save parameters	–
10	2048	clear trip parameters	–
11	4096	Update floating logic	–
12	8192	Communication watchdog enable	–
13	-	Reserved	–
14	-	Reserved	–
15	-	Reserved	–

- Bit 0 ~ 7: Start and stop logic control of the drive. In serial communication control mode (P10.07=1), the user can control the drive by changing comms control word (P03.27)
- Bit 8: The bit changing from 0 to 1 will reset the drive (If the fault condition no longer exists and the failure code < F030)
- Bit 9: Changing from 0 to 1 will save parameters to the EEPROM
- Bit 10: Changing from 0 to 1 will clear fault tracking information in group 11 parameters
- Bit 11: Changing from 0 to 1 will update floating logic
- Bit 12 communication watchdog enable. When this bit is set to 1 the drive will trip 19 if a valid communication frame is not received every 2s after the first valid frame
- Bit 0 ~ 7: Start and stop logic control of the drive. They have the same function with P03.19 to P03.27 but they are not affected by P03.19 to P03.27. Changing the value of P03.27 each bit will not cause P03.19 to P03.26 to change and vice versa. In serial communication control mode (P00.04 or P10.07 = 2), the user can control the drive by changing the communications control word (P03.27)

Group 3

Parameter	Parameter name	Range 【Default】	Change mode
03.28	Serial Comms Control Word Enable	0 - 1 [0]	Run or stop

When this parameter is set to 1, P03.27 can be used to control the drive

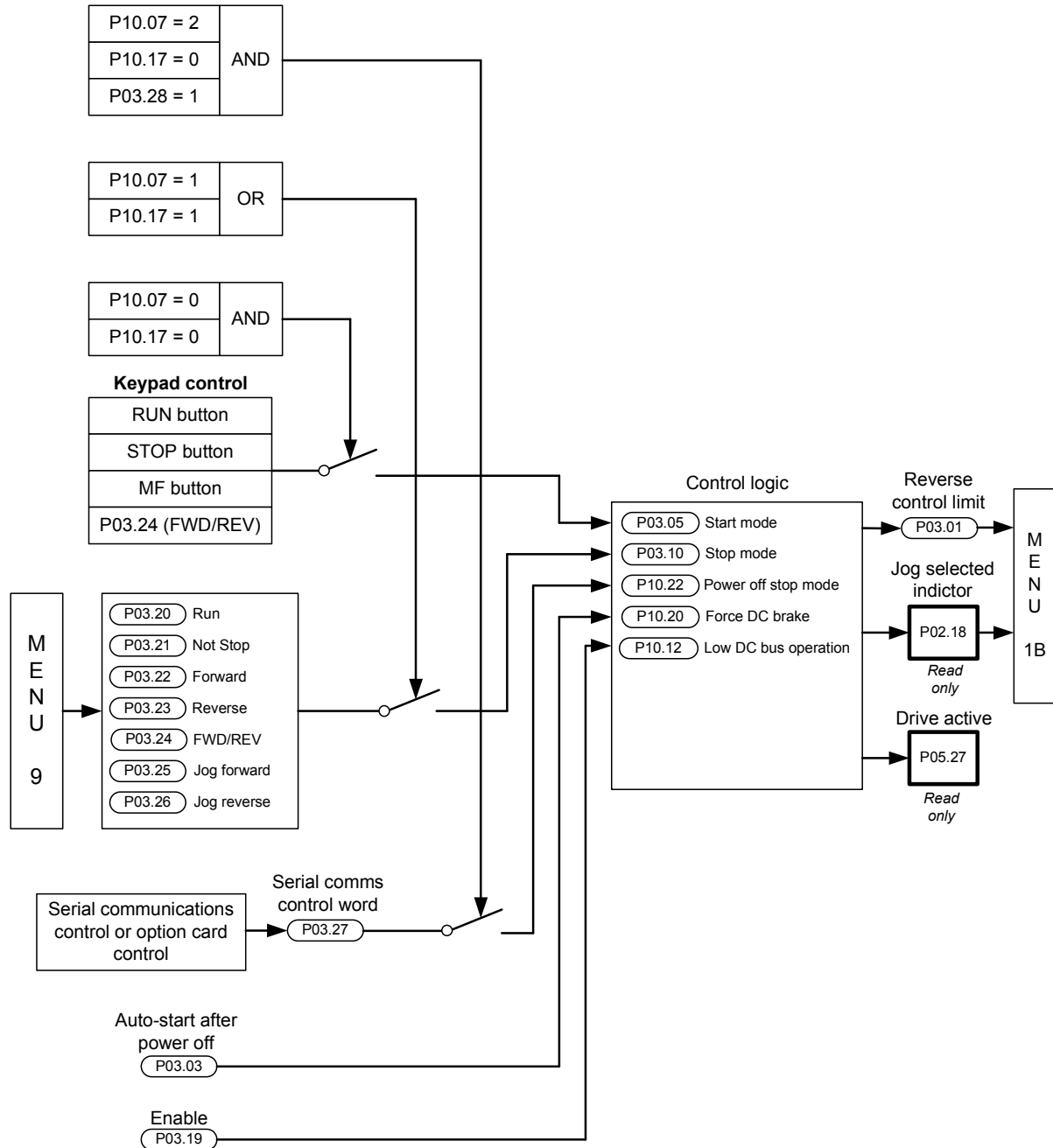
Parameter	Parameter name	Range	Change mode
03.30	Drive Direction Indicator	0 - 1	Read only

Used to indicate what direction the drive is running:

0: Running forward

1: Running reverse

Menu 3 Start & Stop Logic



Group 4: Preset speeds and PLC functionality

Parameter quick look up table

Parameter	Parameter name	Setting	Parameter	Parameter name	Setting
04.01	Preset 1		04.21	PLC Step 1 Accel/Decel Rate Selector	
04.02	Preset 2		04.21	PLC Step 1 Accel/Decel Rate Selector	
04.03	Preset 3		04.23	PLC Step 2 Accel/Decel Rate Selector	
04.04	Preset 4		04.24	PLC Step 3 Running Time	
04.05	Preset 5		04.25	PLC Step 3 Accel/Decel Rate Selector	
04.06	Preset 6		04.26	PLC Step 4 Running Time	
04.07	Preset 7		04.27	PLC Step 4 Accel/Decel Rate Selector	
04.08	Preset 8		04.28	PLC Step 5 Running Time	
04.09	Preset 9		04.29	PLC Step 5 Accel/Decel Rate Selector	
04.10	Preset 10		04.30	PLC Step 6 Running Time	
04.11	Preset 11		04.31	PLC Step 6 Accel/Decel Rate Selector	
04.12	Preset 12		04.32	PLC Step 7 Running Time	
04.13	Preset 13		04.33	PLC Step 7 Accel/Decel Rate Selector	
04.14	Preset 14		04.34	PLC Step 8 Running Time	
04.15	Preset 15		04.35	PLC Step 8 Accel/Decel Rate Selector	
04.16	Preset 16		04.36	PLC Step 9 Running Time	
04.17	PLC Mode		04.37	PLC Step 9 Accel/Decel Rate Selector	
04.18	PLC Power Off Saving Mode		04.38	PLC Step 10 Running Time	
04.19	PLC Restart Mode		04.39	PLC Step 10 Accel/Decel Rate Selector	
04.20	PLC Step 1 Running Time		04.40	PLC Step 11 Running Time	

Group 4: Preset and PLC functionality

Parameter quick look up table cont..

Parameter	Parameter name	Setting	Parameter	Parameter name	Setting
04.41	PLC Step 11 Accel/Decel Rate Selector		04.48	PLC Step 15 Running Time	
04.42	PLC Step 12 Running Time		04.49	PLC Step 15 Accel/Decel Rate Selector	
04.43	PLC Step 12 Accel/Decel Rate Selector		04.50	PLC Step 16 Running Time	
04.44	PLC Step 13 Running Time		04.51	PLC Step 16 Accel/Decel Rate Selector	
04.45	PLC Step 13 Accel/Decel Rate Selector		04.52	PLC Running Time Unit	
04.46	PLC Step 14 Running Time		04.53	PLC Finished Indicator	
04.47	PLC Step 14 Accel/Decel Rate Selector		04.54	PLC Repeat Cycle Mode Indicator	
04.55	PLC reset indicator				

Group 4: Preset speeds

Parameter descriptions

Parameter	Parameter name	Range 【Default】	Modbus register address	Change mode
04.01	Preset speed 1	-P1.02Hz-P1.02Hz [5.00Hz]	0190H	Run or stop
04.02	Preset speed 2	-P1.02Hz-P1.02Hz [10.00Hz]	0191H	Run or stop
04.03	Preset speed 3	-P1.02Hz-P1.02Hz [20.00Hz]	0192H	Run or stop
04.04	Preset speed 4	-P1.02Hz-P1.02Hz [30.00Hz]	0193H	Run or stop
04.05	Preset speed 5	-P1.02Hz-P1.02Hz [40.00Hz]	0194H	Run or stop
04.06	Preset speed 6	-P1.02Hz-P1.02Hz [45.00Hz]	0195H	Run or stop
04.07	Preset speed 7	-P1.02Hz-P1.02Hz [50.00Hz]	0196H	Run or stop
04.08	Preset speed 8	-P1.02Hz-P1.02Hz [5.00Hz]	0197H	Run or stop
04.09	Preset speed 9	-P1.02Hz-P1.02Hz [10.00Hz]	0198H	Run or stop
04.10	Preset speed 10	-P1.02Hz-P1.02Hz [20.00Hz]	0199H	Run or stop
04.11	Preset speed 11	-P1.02Hz-P1.02Hz [30.00Hz]	019AH	Run or stop
04.12	Preset speed 12	-P1.02Hz-P1.02Hz [40.00Hz]	019BH	Run or stop
04.13	Preset speed 13	-P1.02Hz-P1.02Hz [45.00Hz]	019CH	Run or stop
04.14	Preset speed 14	-P1.02Hz-P1.02Hz [50.00Hz]	019DH	Run or stop
04.15	Preset speed 15	-P1.02Hz-P1.02Hz [50.00Hz]	019EH	Run or stop
04.16	Preset speed 16	-P1.02Hz-P1.02Hz [50.00Hz]	019FH	Run or stop

The drive has 16 preset speeds that can be programmed to different frequencies. They can be selected by digital inputs or be used for the PLC function.

PLC functionality

Parameter descriptions

Parameter	Parameter name	Range 【Default】	Modbus register address	Change mode
04.17	PLC Mode	0 - 3 [0]	01A0H	Stop only
04.18	PLC Power Off Saving Mode	0 - 1 [1]	01A1H	Stop only
04.19	PLC Restart Mode	0 - 2 [0]	01A2H	Stop only
04.20	PLC Step 1 Running Time	0.0s - 6553.5s [0.0]	01A3H	Run or stop
04.22	PLC Step 2 Running Time	0.0s - 6553.5s [0.0]	01A5H	Run or stop
04.24	PLC Step 3 Running Time	0.0s - 6553.5s [0.0]	01A7H	Run or stop
04.26	PLC Step 4 Running Time	0.0s - 6553.5s [0.0]	01A9H	Run or stop
04.28	PLC Step 5 Running Time	0.0s - 6553.5s [0.0]	01ABH	Run or stop
04.30	PLC Step 6 Running Time	0.0s - 6553.5s [0.0]	01ADH	Run or stop
04.32	PLC Step 7 Running Time	0.0s - 6553.5s [0.0]	01AFH	Run or stop
04.34	PLC Step 8 Running Time	0.0s - 6553.5s [0.0]	01B1H	Run or stop
04.36	PLC Step 9 Running Time	0.0s - 6553.5s [0.0]	01B3H	Run or stop
04.38	PLC Step 10 Running Time	0.0s - 6553.5s [0.0]	01B5H	Run or stop
04.40	PLC Step 11 Running Time	0.0s - 6553.5s [0.0]	01B7H	Run or stop
04.42	PLC Step 12 Running Time	0.0s - 6553.5s [0.0]	01B9H	Run or stop
04.44	PLC Step 13 Running Time	0.0s - 6553.5s [0.0]	01BBH	Run or stop
04.46	PLC Step 14 Running Time	0.0s - 6553.5s [0.0]	01BDH	Run or stop
04.48	PLC Step 15 Running Time	0.0s - 6553.5s [0.0]	01BFH	Run or stop
04.50	PLC Step 16 Running Time	0.0s - 6553.5s [0.0]	01C1H	Run or stop

P04.20 to P04.50 sets the running time for each step (1-16)

Parameter	Parameter name	Range 【Default】	Modbus register address	Change mode
04.21	PLC Step 1 Accel/Decel Rate Selector	0 - 3 [0]	01A4H	Run or stop
04.23	PLC Step 2 Accel/Decel Rate Selector	0 - 3 [0]	01A6H	Run or stop
04.25	PLC Step 3 Accel/Decel Rate Selector	0 - 3 [0]	01A8H	Run or stop
04.27	PLC Step 4 Accel/Decel Rate Selector	0 - 3 [0]	01AAH	Run or stop
04.29	PLC Step 5 Accel/Decel Rate Selector	0 - 3 [0]	01ACH	Run or stop
04.31	PLC Step 6 Accel/Decel Rate Selector	0 - 3 [0]	01AEH	Run or stop
04.33	PLC Step 7 Accel/Decel Rate Selector	0 - 3 [0]	01B0H	Run or stop
04.35	PLC Step 8 Accel/Decel Rate Selector	0 - 3 [0]	01B2H	Run or stop
04.37	PLC Step 9 Accel/Decel Rate Selector	0 - 3 [0]	01B4H	Run or stop
04.39	PLC Step 10 Accel/Decel Rate Selector	0 - 3 [0]	01B6H	Run or stop
04.41	PLC Step 11 Accel/Decel Rate Selector	0 - 3 [0]	01B8H	Run or stop
04.43	PLC Step 12 Accel/Decel Rate Selector	0 - 3 [0]	01BAH	Run or stop
04.45	PLC Step 13 Accel/Decel Rate Selector	0 - 3 [0]	01BCH	Run or stop
04.47	PLC Step 14 Accel/Decel Rate Selector	0 - 3 [0]	01BEH	Run or stop
04.49	PLC Step 15 Accel/Decel Rate Selector	0 - 3 [0]	01C0H	Run or stop
04.51	PLC Step 16 Accel/Decel Rate Selector	0 - 3 [0]	01C2H	Run or stop

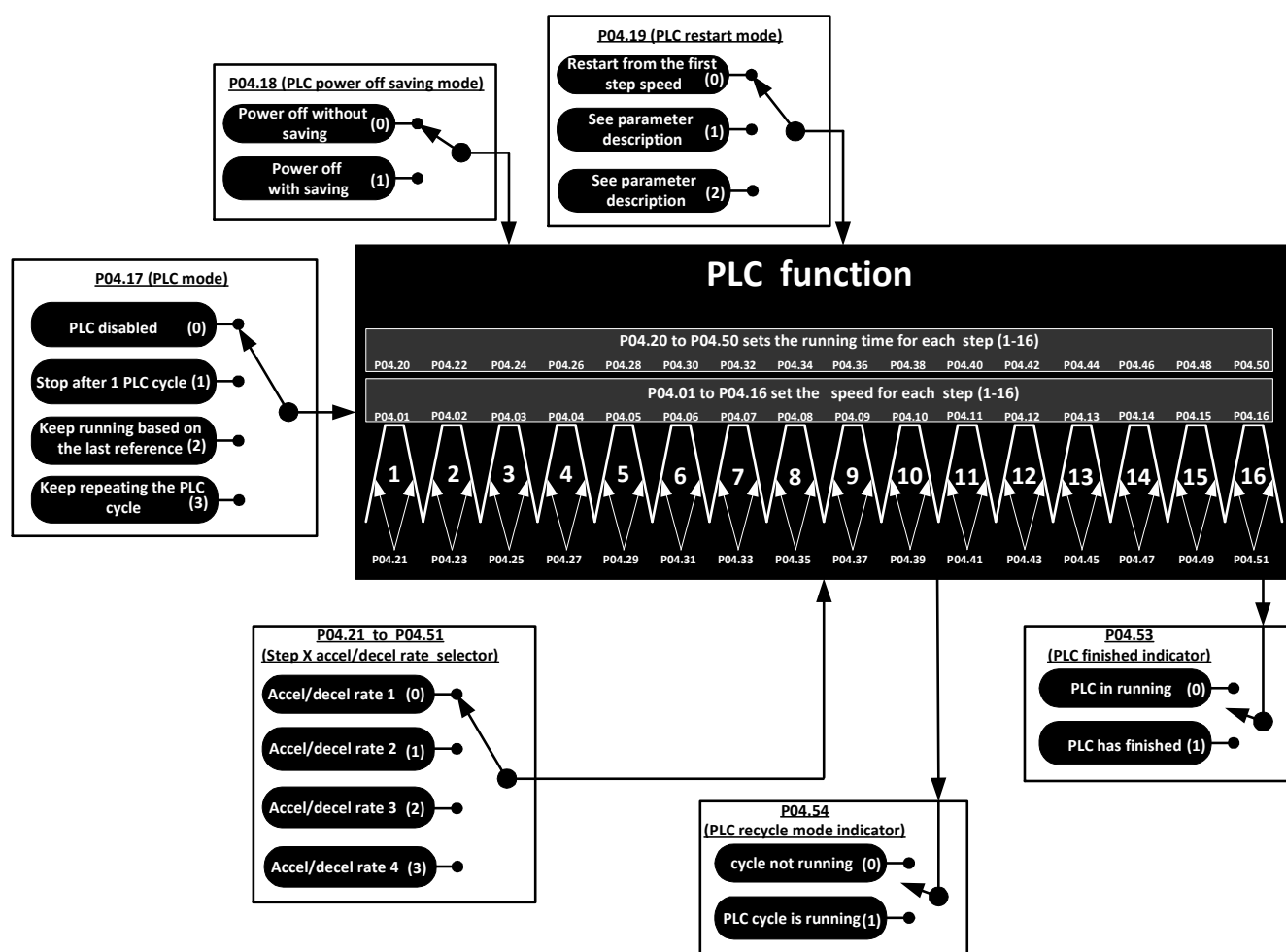
P04.21 to P04.51 are used to set the acceleration/deceleration time for each step (1-16)

Group 4

- 0: Uses acceleration rate P02.04 and deceleration rate P02.05
- 1: Uses acceleration rate P02.06 and deceleration rate P02.07
- 2: Uses acceleration rate P02.08 and deceleration rate P02.09
- 3: Uses acceleration rate P02.10 and deceleration rate P02.11

Parameter	Parameter name	Range 【Default】	Modbus register address	Change mode
04.52	PLC operating time	0 - 1 [0]	01C3H	Run or stop
04.53	PLC finished indicator	0 - 1	01C4H	Read only
04.54	PLC recycle mode indicator	0 - 1	01C5H	Read only
04.55	PLC reset indicator	0 - 1	01C6H	Read only

PLC function diagram overview



Group 4: PLC Functionality

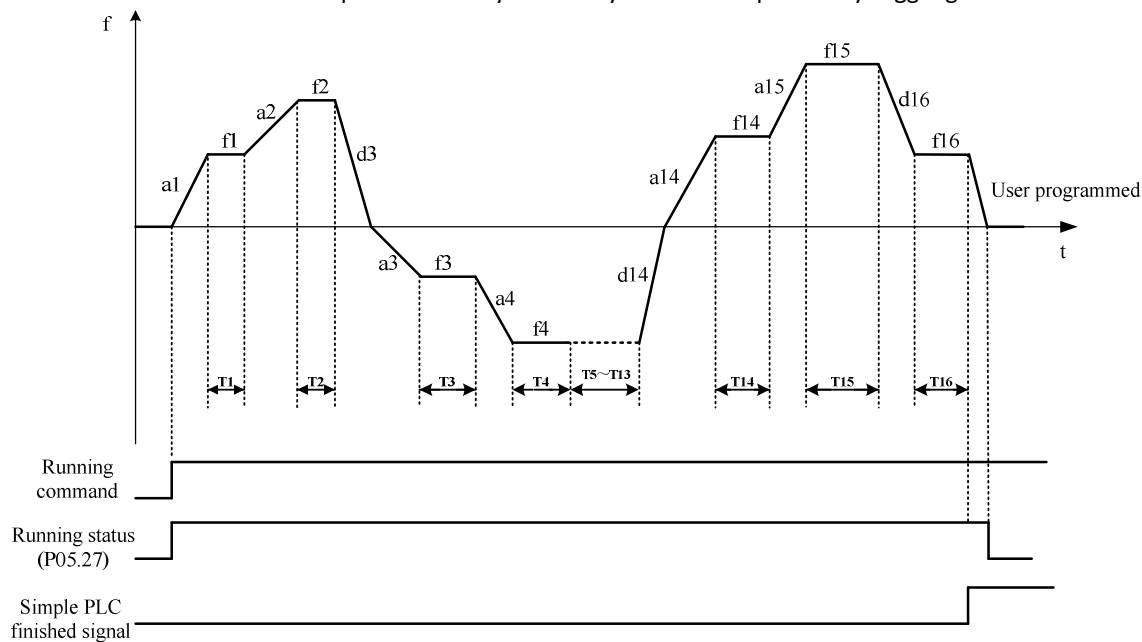
Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
04.17	PLC Mode	0 - 3 [0]	Stop only

0: Disable PLC function.

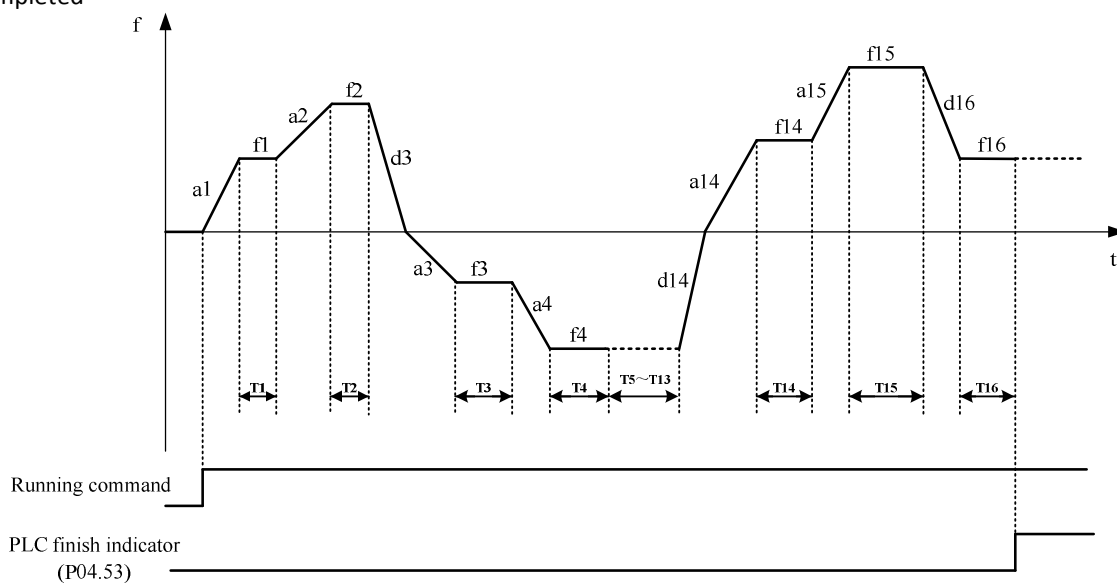
1: Stop after a single PLC cycle

As shown below the drive will stop after a PLC cycle. The cycle can be repeated by toggling the RUN command



2: Keep running based on the last reference

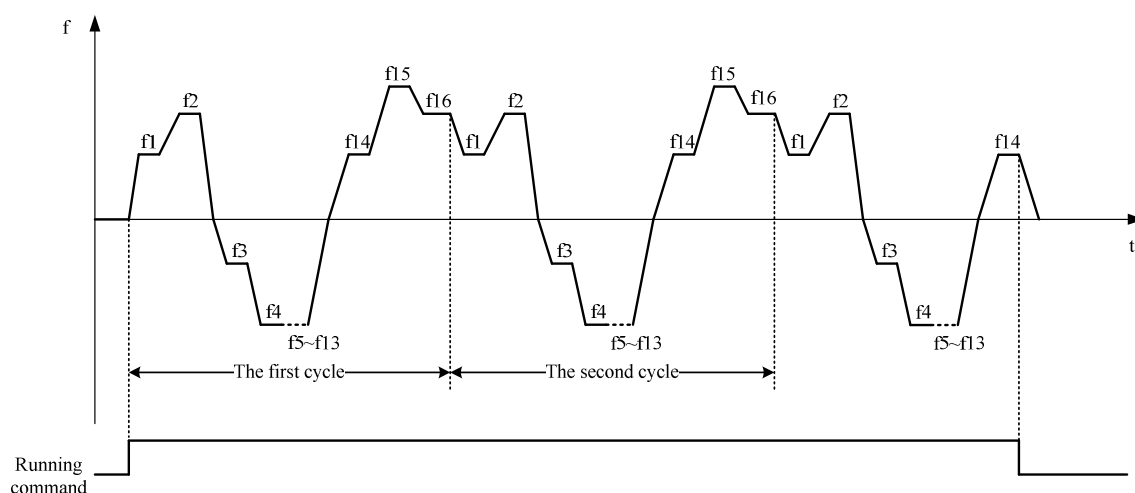
As shown in the example below the drive will keep at the frequency set in f16 when the PLC cycle has completed



3: Keep repeating the PLC cycle

Group 4

As shown in the example below the drive will repeat the cycle until a STOP command



Parameter	Parameter name	Range 【Default】	Change mode
04.18	PLC Power Off Saving Mode	0 - 1 [1]	Stop only

0: Power off without saving

The drive does not store the PLC state when powered off and will restart from preset 1 when powered up again with a RUN command

1: Power off with saving

The drive stores the PLC state including running frequency, etc. when power off

Parameter	Parameter name	Range 【Default】	Change mode
04.19	PLC Restart Mode	0 - 2 [0]	Stop only

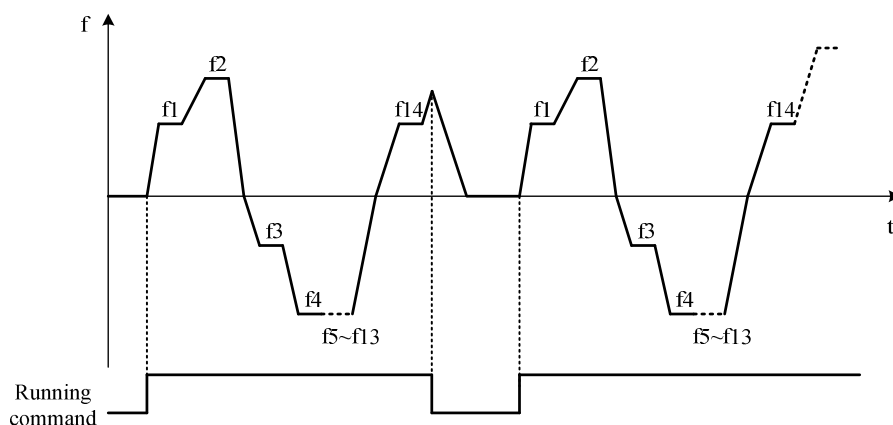
0: Restart from the first step speed

1: Restart from zero and accelerate to the step speed that was current at the last stop (trip)

2: Restart from the frequency that the drive was at prior to the last stop (trip)

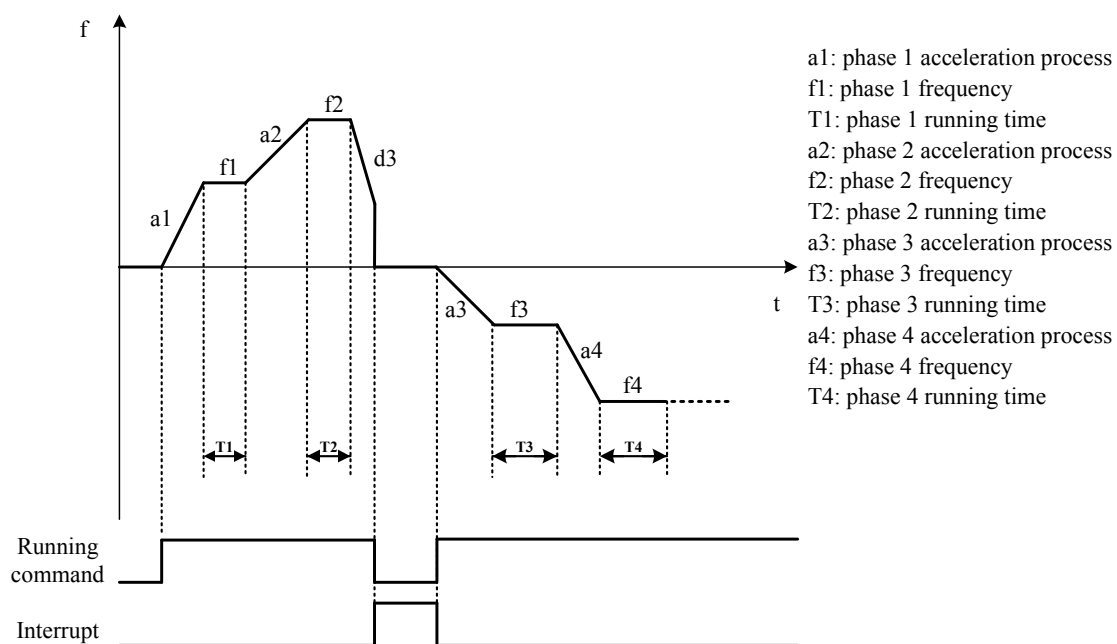
0: Restart from the first step speed

As shown below the drive will start from the first speed:



1: Restart from zero and accelerate to the step speed that was current at the last stop (trip)

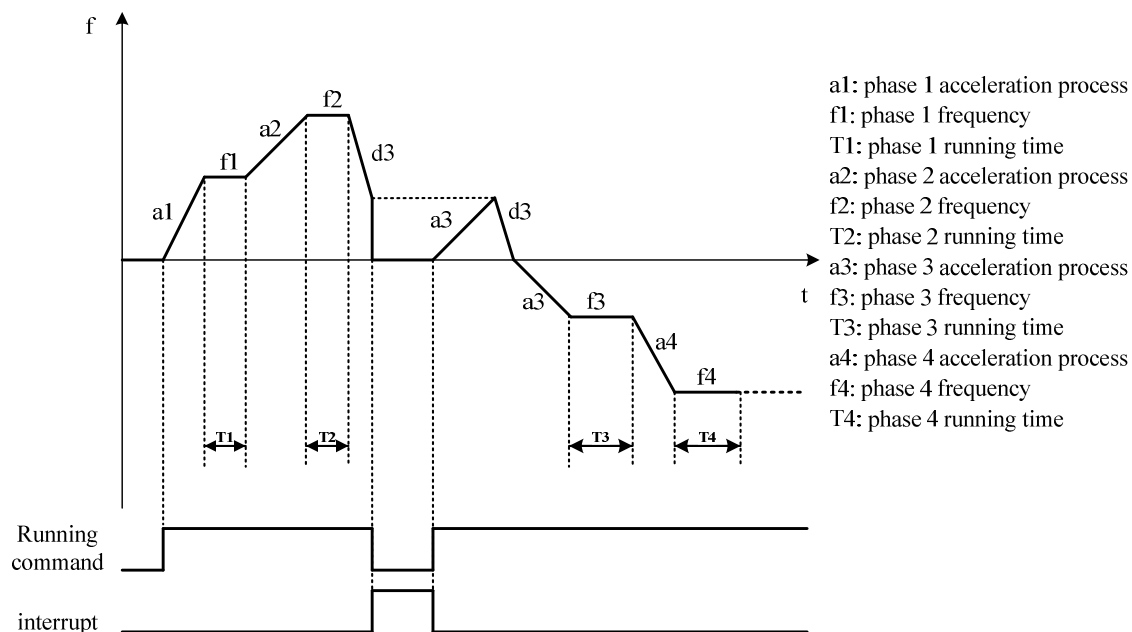
As shown in the example below, the drive will start from zero and accelerate to the step speed that was current before the cycle was interrupted:



Group 4

2: Restart from the frequency that the drive was at prior to the last stop (trip)

As shown in the example below, the drive will start from zero and accelerate to the frequency that the drive was at before the cycle was interrupted:



NOTE:

1) PLC running is limited by Start frequency (P03.06)

Parameter	Parameter name	Range 【Default】	Change mode
04.52	PLC Running Time Unit	0 - 1 [0]	Run or stop

0: Seconds

1: Hours

Parameter	Parameter name	Range	Change mode
04.53	PLC Finished Indicator	0 - 1	Read only

0: PLC in running

1: PLC has finished

Parameter	Parameter name	Range	Change mode
04.54	PLC Repeat Cycle Mode Indicator	0 - 1	Read only

This parameter is 1 when the P04.17 (PLC mode) = 3 (Keep repeating the PLC cycle) and the drive is running

Parameter	Parameter name	Range	Change mode
04.55	PLC reset indicator	0 - 1	Read only

Indicates if the PLC is reset or not

Group 5: Keypad and display

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
05.01	Keypad Display Select	01F4H	
05.02	Not used		
05.03	Extended Parameter Group Access	01F6H	
05.04	Parameter Cloning	01F7H	
05.05	LCD Language Select	01F8H	
05.06	Keypad Lock Control	01F9H	
05.07	MF Key Function Select	01FAH	
05.08	Motor Speed	01FBH	
05.09	Scaling For Motor Speed	01FCH	
05.10	Load Speed	01FDH	
05.11	Output Frequency	01FEH	
05.12	Output Voltage	01FFH	
05.13	DC Bus Voltage	0200H	
05.14	Output Current	0201H	
05.15	Torque Producing Current	0202H	
05.16	Motor Magnetising Current	0203H	
05.17	Output Power	0204H	
05.18	Running Time Years.Days	0205H	
05.19	Running Time Hours.Minutes	0206H	
05.20	Energy Meter MWh	0207H	
05.21	Energy Meter kWh	0208H	
05.22	Electric Price/kWh	0209H	
05.23	Reset Energy Meter	020AH	
05.24	Running Cost	020BH	
05.25	Heatsink Temperature	020CH	
05.26	IGBT Junction Temperature	020DH	
05.27	Running Indicator	020EH	
05.28	Rated Load Is On	020FH	
05.29	Control MCU Software Version	0210H	
05.30	Power MCU Software Version	0211H	
05.31	LCD Keypad Software Version	0212H	
05.32	Rectifier Software Version	0213H	

Group 5: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
05.01	Keypad Display Select	01.01 - 18.08 [5.11]	Run or stop

Used to set what parameter is displayed when not in parameter editing mode

Parameter	Parameter name	Range 【Default】	Change mode
05.03	Extended Parameter Group Access	0 - 2 [0]	Run or stop

0: Only parameter group P00 is displayed

1: All groups are displayed

2: Only display parameters which have different values from default

Parameter	Parameter name	Range 【Default】	Change mode
05.04	Parameter Cloning/Copying	0 - 2 [0]	Stop only

0: No action

1: Clone/copy a parameter set up to the Keypad

If the parameter is set to 1, the parameters saved in the drive are uploaded to the keypad

2: Clone/copy a parameter set down to the drive

If the parameter is set to 2, the parameters saved in the keypad are downloaded into the drive

P05.04 is set back to 0 after cloning parameters

Parameter	Parameter name	Range 【Default】	Change mode
05.05	LCD Language Select	0 - 2 [0]	Run or stop

0: Chinese

1: English

2: Reserved setting, do not use

Parameter	Parameter name	Range 【Default】	Change mode
05.06	Keypad Lock Control	0 - 2 [0]	Run or stop

Used to disable the keys on the keypad:

0: Keys unlocked

1: All keys are locked

2: Keys are locked except for RUN and STOP keys

To unlock press and hold the ESC key for > 5 seconds, P05.07 will flash once to indicate that keys have been unlocked, P05.06 will change to 0

Parameter	Parameter name	Range 【Default】	Change mode
05.07	MF Key Function Select	0 - 3 [0]	Run or stop

Used to define the function of the MF key on the drives display:

- 0: Jog
- 1: Forward/Reverse
- 2: Coast to Stop
- 3: Reserved setting, do not use

Parameter	Parameter name	Range	Change mode
05.08	Motor Speed	-18000rpm - 18000rpm	Read only

Used to display the actual motor speed

NOTE: There is a 5-digit LED display on the HD700 Drive standard keypad. When motor speed is less than or equal to -10000rpm, a decimal point is used to indicate reverse running, see example:

Example:

- 18000rpm is shown as 18000
- 8000rpm is shown as -8000
- 18000rpm is shown as 1.8000

Parameter	Parameter name	Range 【Default】	Change mode
05.09	Scaling For Motor Speed	0.1 - 1000.0 [100.0]	Run or stop

When a gearbox is used between the shaft of the motor and the load, the speed of the load (gearbox output) will be different to P05.08 (Motor speed). This parameter is used to scale P05.08 so that an indication of the speed of the load can be displayed in P05.10 (load speed). See description for P05.10

Parameter	Parameter name	Range	Change mode
05.10	Load Speed	-180000rpm - 180000rpm	Read only

Used to display the actual load speed: $P05.10 = P05.09 \times P05.08$. See description for P05.09

NOTE: There is a 5-digit LED display on the HD700 Drive standard keypad. When motor speed is less than or equal to -10000rpm, a decimal point is used to indicate reverse running, see example:

For example:

- 18123rpm is shown as 18123
- 175426rpm is shown as 1754.2
- 8123rpm is shown as -8123
- 18123rpm is shown as 1.8123
- 175426rpm is shown as 17.542

This parameter cannot be read and written to in serial communications mode

Group 5

Parameter	Parameter name	Range	Change mode
05.11	Output Frequency	-P01.02Hz - P01.02Hz	Read only

Displays the output frequency of the drive

Parameter	Parameter name	Range	Change mode
05.12	Output Voltage	0 - drive rated output voltage	Read only

Displays the output voltage of the drive

Parameter	Parameter name	Range	Change mode
05.13	DC Bus Voltage	0 - model dependant	Read only

Displays the DC bus level of the drive

Parameter	Parameter name	Range	Change mode
05.14	Output Current	0.0 - 3 x motor rated current	Read only

Displays the total drive output current (motor current)

Parameter	Parameter name	Range	Change mode
05.15	Torque Producing Current	- 3 x motor rated current - 3 x motor rated current	Read only

Displays the torque producing current

Parameter	Parameter name	Range	Change mode
05.16	Motor Magnetising Current	0.0 - 3 x motor rated current	Read only

Displays the motor magnetising current

Parameter	Parameter name	Range	Change mode
05.17	Output Power	0.0% - 300.0%	Read only

Used to indicate the output power as a percentage of motor power

Parameter	Parameter name	Range	Change mode
05.18	Running Time Years & Days	0.000 - 9.364	Read only

Used to record how long the drive has been running for in years and days

Parameter	Parameter name	Range	Change mode
05.19	Running Time Hours & Minutes	0.00 - 23.59	Read only

Used to record how long the drive has been running for in hours and minutes

Group 5

Parameter	Parameter name	Range	Change mode
05.20	Energy Meter MWh	0.0MWh - 999.9MWh	Read only

Used to indicate the energy supplied by the drive in MegaWatt hours

When P05.23=1, the energy meter is reset to be 0

Parameter	Parameter name	Range	Change mode
05.21	Energy Meter kWh	0.00kWh - 99.99kWh	Read only

Used to indicate the energy supplied by the drive in kilowatt hours

When P05.23=1, the energy meter is reset to be 0

Parameter	Parameter name	Range 【Default】	Change mode
05.22	Electric Price/kWh	0.0 - 0.99 [0.00]	Run or stop

The cost per kWh is entered into this parameter. For example, if the cost of a kWh is €0.11 P05.22 = 11.0

Parameter	Parameter name	Range 【Default】	Change mode
05.23	Reset Energy Meter	0 - 1 [0]	Stop only

When P05.23 is set to 1, the energy meters P05.20 and P05.21 are reset to 0

Parameter	Parameter name	Range	Change mode
05.24	Running Cost	0 - 10000	Read only

If P05.22 is set correctly, this parameter indicates the cost of running the drive per hour

Parameter	Parameter name	Range	Change mode
05.25	Heatsink Temperature	-25°C - 127°C	Read only

Shows the temperature of the drives heatsink

Parameter	Parameter name	Range	Change mode
05.26	IGBT Junction Temperature	-25°C - 200°C	Read only

The IGBT junction temperature is calculated using heatsink temperature (P05.25) and a thermal model of the drive power stage. The resulting temperature is displayed in this parameter. The calculated IGBT junction temperature is used to reduce the drive switching frequency if the devices become too hot

Parameter	Parameter name	Range	Change mode
05.27	Running Indicator	0 - 1	Read only

Shows whether the drive output stage of the drive is active:

0: Not active

1: Active

Group 5

Parameter	Parameter name	Range	Change mode
05.28	At or above Rated Load	0 - 1	Read only

Used to indicate whether the output current is above or below motor rated current:

0: Output current < Motor rated current

1: Output current > Motor rated current

Parameter	Parameter name	Range	Change mode
05.29	Control MCU Software Version	0.00 - 99.99	Read only

Shows the software version of the control stage micro processor

Parameter	Parameter name	Range	Change mode
05.30	Power MCU Software Version	0.00 - 99.99	Read only

Shows the software version of the power stage micro processor

Parameter	Parameter name	Range	Change mode
05.31	LCD Keypad Software Version	0.00 - 99.99	Read only

Shows the software version of the LCD keypad (when fitted)

Parameter	Parameter name	Range	Change mode
05.32	Rectifier Software Version	0.00 - 99.99	Read only

The larger sizes of the HD700 drives have thyristors front end input stage. This parameter shows the software version for the thyristors control

Group 6

Group 6: Voltage/frequency control

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
06.01	V/f Control Mode	0258H	
06.02	V/f Frequency 3	0259H	
06.03	V/f Voltage 3	025AH	
06.04	V/f Frequency 2	025BH	
06.05	V/f Voltage 2	025CH	
06.06	V/f Frequency 1	025DH	
06.07	V/f Voltage 1	025EH	
06.08	Voltage Boost	025FH	
06.09	Boost Finish Frequency	0260H	
06.10	Reserved	0261H	
06.11	Auto Energy Saving Control	0262H	
06.12	Flux Braking	0263H	

Group 6: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
06.01	V/f Control Mode	0 - 3 [0]	Stop only

Different Voltage/frequency characteristics can be selected by P06.01 to suit different load characteristics

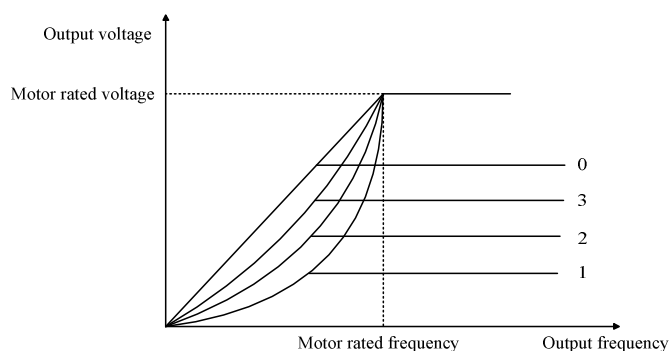
There are four fixed V/f characteristics:

P06.01 = 0 (linear V/f)

P06.01 = 1 (2.0 law ramp, curve 1)

P06.01 = 2 (1.7 law ramp, curve 2)

P06.01 = 3 (1.2 law ramp, curve 3)

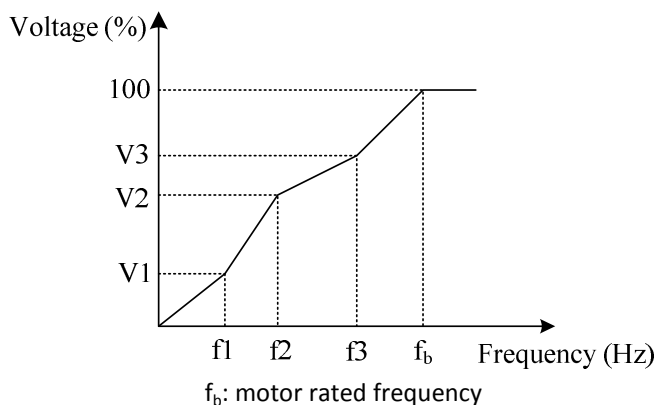


Parameter	Parameter name	Range 【Default】	Change mode
06.02	V/f Frequency 3	P06.02Hz - P13.08Hz [0.00]	Stop only
06.04	V/f Frequency 2	P06.04Hz – P06.02Hz [0.00]	Stop only
06.06	V/f Frequency 1	0.00Hz – P06.04Hz [0.00]	Stop only

Parameter	Parameter name	Range 【Default】	Change mode
06.03	V/f Voltage 3	P6.03% - 100.0% [0.0]	Stop only
06.05	V/f Voltage 2	P6.05% - P6.03% [0.0]	Stop only
06.07	V/f Voltage 1	0.0% - P6.05% [0.0]	Stop only

The voltage is define as a % of motor rated voltage - P13.06

- When P06.01 is set to 0, the user can set up the parameters P06.02 – P06.07 to define the V/f curve, by adding three points (V1, f1), (V2, f2), (V3, f3) on the V/f curve as showed below:
- By defaults, the V/f is a straight line when P06.01 = 0



Parameter	Parameter name	Range 【Default】	Change mode
06.08	Voltage Boost	0.0% - 30.0% [3.0]	Run or stop

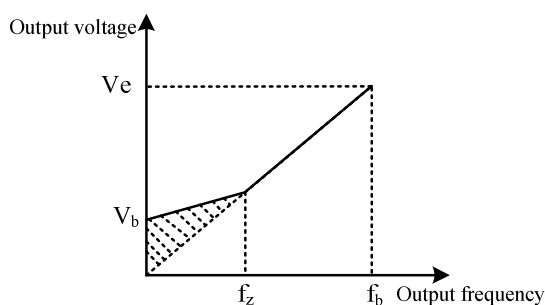
- The voltage boost level can be increased to improve low speed torque (overcome the motor stator voltage drop at low frequencies)
- Increasing voltage boost can cause the motor current and temperature to increase. Forced ventilation of the motor should be considered if running at low speeds for long periods of time
- P06.08 is used with P06.09 (boost finish frequency)

The default of P06.08 is dependent on the drive power as given in the table below:

Drive power	Default
0.4kW~4kW	3.0%
5.5kW~15kW	2.0%
18.5kW~37kW	1.0%
45kW~75kW	0.5%
90kW above	0.0%

Parameter	Parameter name	Range 【Default】	Change mode
06.09	Boost Finish Frequency	0.0% - 50.0% [50.0]	Run or stop

As illustrated below, the boost finish frequency defines the frequency where boost voltage stops being applied



V_e : motor rated voltage

V_b : boost voltage = $V_e \times P06.08$ (P00.12)

f_z : boost finish frequency (P06.09)

f_b : motor rated frequency

Parameter	Parameter name	Range 【Default】	Change mode
06.11	Auto Energy Saving Control	0 - 1 [0]	Stop only

0: Off

The output voltage applied to the motor follows the selected/programmed V/f curve

1: On

The output voltage is dependent on motor load. Under light motor load, the drive reduces the motor voltage in order to save energy

The auto energy saving control is usually used with fan/pump type loads. This feature should not be used in dynamic application

Parameter	Parameter name	Range 【Default】	Change mode
06.12	Flux Braking	0 - 2 [1]	Stop only

0: Flux Braking OFF

1: Flux braking during deceleration on Stop command and when changing speed reference

Increases the flux producing component of the motor current during deceleration. This increases losses and will dissipate some excess energy as heat in the motor instead of being fed back to the drives DC bus. This can, in some cases, eliminate the need for a braking resistor



Warning:

This function is not suitable for all applications where stopping the motor is frequent. Care should be taken to avoid over heating the motor

2: Flux braking when changing speed reference

Group 7: Current limits and torque control

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
07.01	P07.02 Change Mode	02BCH	
07.02	Speed/Torque Mode Selector	02BDH	
07.03	Current Limit	02BEH	
07.04 - 07.11	Not used		
07.12	Current Loop Proportional Gain	02C7H	
07.13	Current loop Integral Gain	02C8H	
07.14	Current limit protection	02C9H	
07.15	Not used		
07.16	Motoring Torque Producing Current Limit	02CBH	
07.17	Regenerating Current Limit	02CCH	
07.18	Maximum Speed Allowed In Torque Mode	02CDH	
07.19	Torque Mode Reference Selector	02CEH	
07.20	Torque Gain	02CFH	
07.21	Torque Offset	02D0H	
07.22	Torque Reference Display	02D1H	
07.23	Not used		
07.24	Torque Being Limited Indicator	02D3H	

Group 7: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
07.01	P07.02 Change Mode	0 - 1 [0]	Run or stop

Used to control whether changing the value of P07.02 (speed/torque control mode) is allowed when the drive is running

0: P07.02 cannot be changed during running

1: P07.02 can be changed during running

Parameter	Parameter name	Range 【Default】	Change mode
07.02	Speed/Torque Mode Selector	0 - 1 [0]	Run or stop

0: Speed Control Mode

- In speed control mode, the drive output frequency is set according to the speed reference
- Output current depends on the load
- Output current is limited by P07.03, P07.16 and P07.17. When the load current increases above these limits, the output frequency is reduced

1: Torque Control Mode

- In torque control, the drive output frequency is changed to achieve the desired torque (current)
- Output frequency depends on the load and the torque reference
- Output frequency is limited by P07.18 (maximum speed under torque mode)
- The torque reference is selected by P07.19 (torque mode reference source). The final torque reference is affected by P07.20 (Torque gain) and P07.21 (Torque offset)

Parameter	Parameter name	Range 【Default】	Change mode
07.03	Current Limit	0.0% - 300.0% [200.0]	Run or stop

Limits the drives output current. When P07.03=100%, it corresponds to motor rated current P13.07

Parameter	Parameter name	Range 【Default】	Change mode
07.12	Current Loop Proportional Gain	0.001 - 10.000 [0.020]	Run or stop
07.13	Current loop Integral Gain	0.00s - 100.00s [0.20]	Run or stop

Sets the proportional and integral gains of the current loop controller

Parameter	Parameter name	Range 【Default】	Change mode
07.14	Current limit protection	0 - 3 [0]	Stop only

0: Enable current limit protection

1: Disable current limit protection above fundamental frequency

2: Fast increase or decrease current limit disabled

3: Both disabled

Note: This parameter should be changed from default with caution.

Parameter	Parameter name	Range 【Default】	Change mode
07.16	Motoring Torque Producing Current Limit	0.0% - 300.0% [200.0]	Run or stop

Torque producing current limit. When the parameter is set to 100%, it corresponds to the drive rated torque

Parameter	Parameter name	Range 【Default】	Change mode
07.17	Regenerating Current Limit	0.0% - 300.0% [150.0]	Run or stop

Regeneration current limit. When the parameter is set to 100%, it corresponds to the drive rated torque

Parameter	Parameter name	Range 【Default】	Change mode
07.18	Maximum Speed Allowed In Torque Mode	0.00Hz - 1.2 x P01.02Hz [50.00]	Run or stop

Used to limit the motor speed in torque mode

Parameter	Parameter name	Range 【Default】	Change mode
07.19	Torque Mode Reference Selector	0 - 6 [1]	Stop only

0: Keypad

The torque reference is provided by the keypad reference, the reference is adjusted using the ▲ or ▼ keys, and the Power up value is decided by parameter P01.11.

1: AI1

In this mode, the torque reference is from analogue input 1.

To use AI1 as a torque reference P08.03 must be set to 0 (or P01.02 if P08.01 = 1)

2: AI2

In this mode, the torque reference is from analogue input 2.

To use AI2 as a torque reference P08.08 must be set to 0 (or P1.21 if P08.01 = 1)

3: DI7 pulse input

4: Serial communications

In this mode, the user can adjust the torque reference by changing the value of P04.01 (Preset speed 1)

5: PID

In this mode, the user can adjust the torque reference by using the PID output (P15.22)

6: Option module

Parameter	Parameter name	Range 【Default】	Change mode
07.20	Torque Gain	0.0% - 300.0% [100.0]	Run or stop

Used to scale the torque reference input

Parameter	Parameter name	Range 【Default】	Change mode
07.21	Torque Offset	0.0% - 100.0% [0.0]	Run or stop

Used to add an offset to the torque reference input

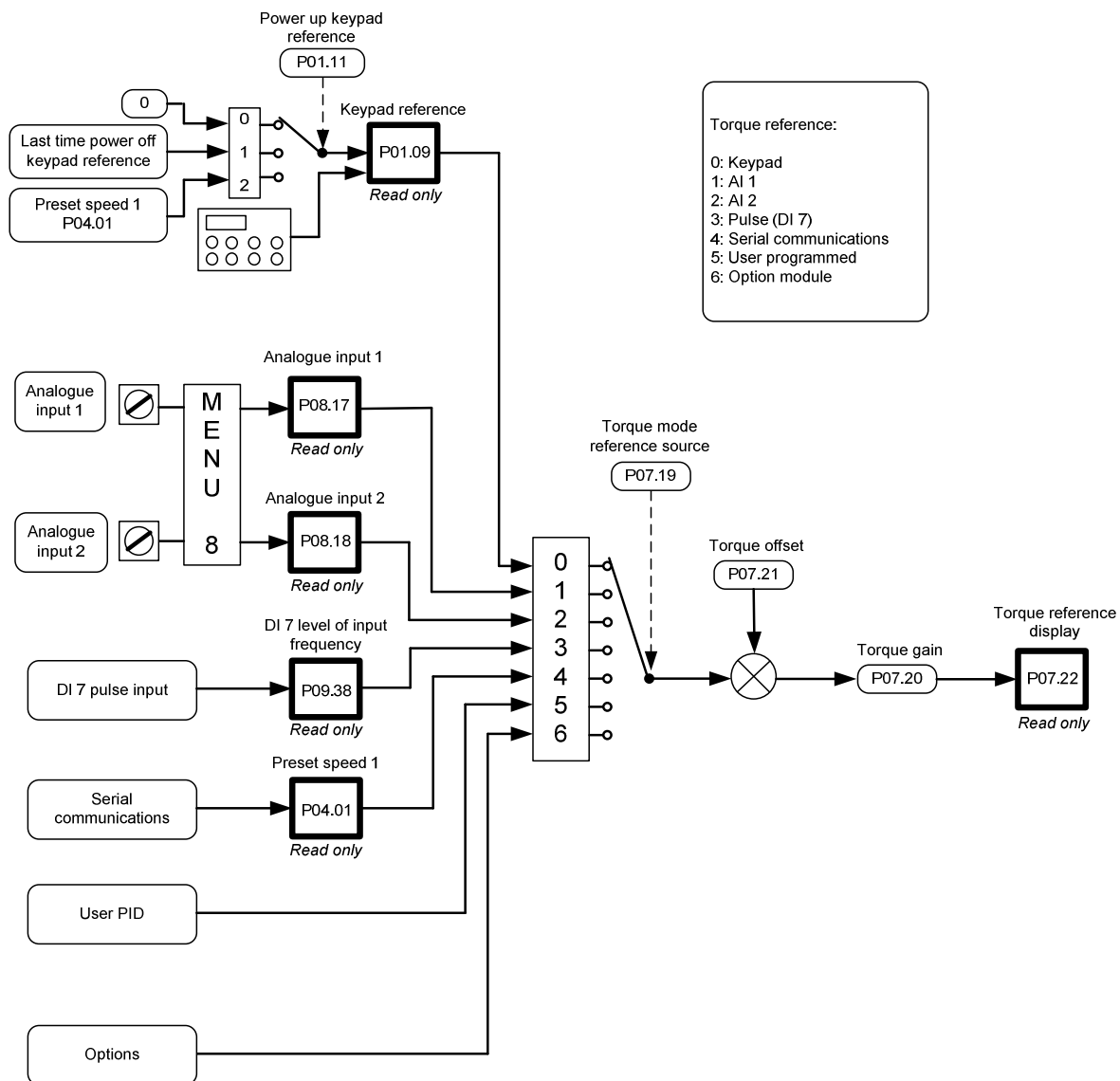
Parameter	Parameter name	Range	Change mode
07.22	Torque Reference Display	-300.0% - 300.0%	Read only

Displays the torque reference

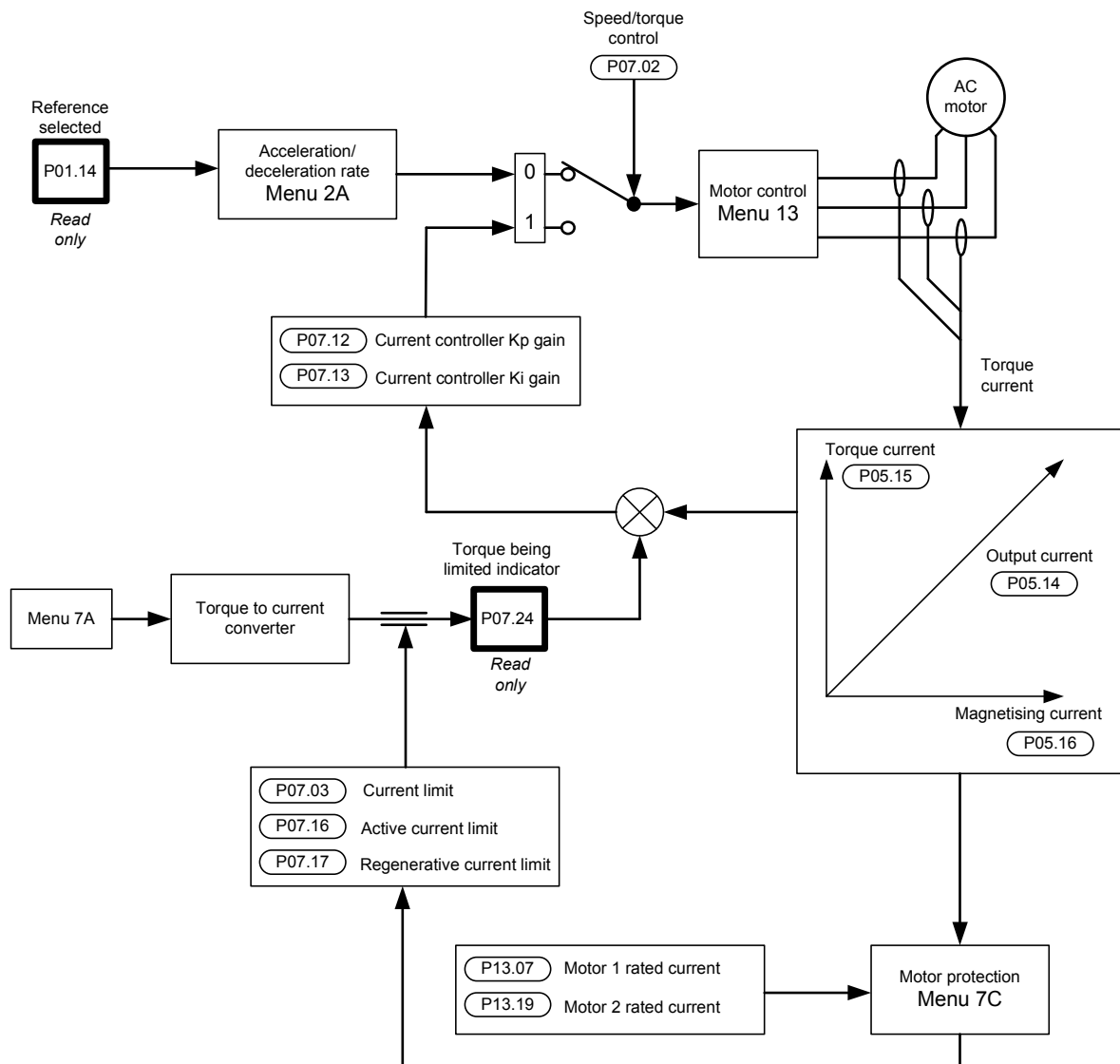
Parameter	Parameter name	Range	Change mode
07.24	Torque Being Limited Indicator	0 - 1	Read only

Indicates whether torque is limited - the current limit is active

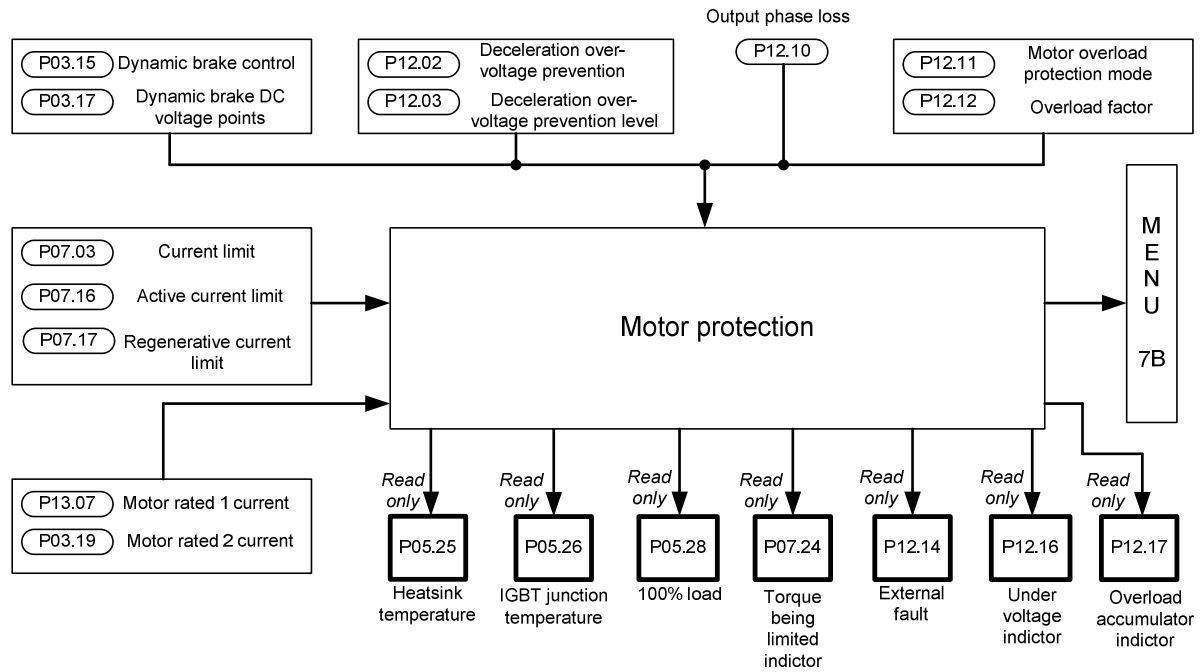
Menu 7A Current limits and torque control



Menu 7B



Menu 7C Motor Protection



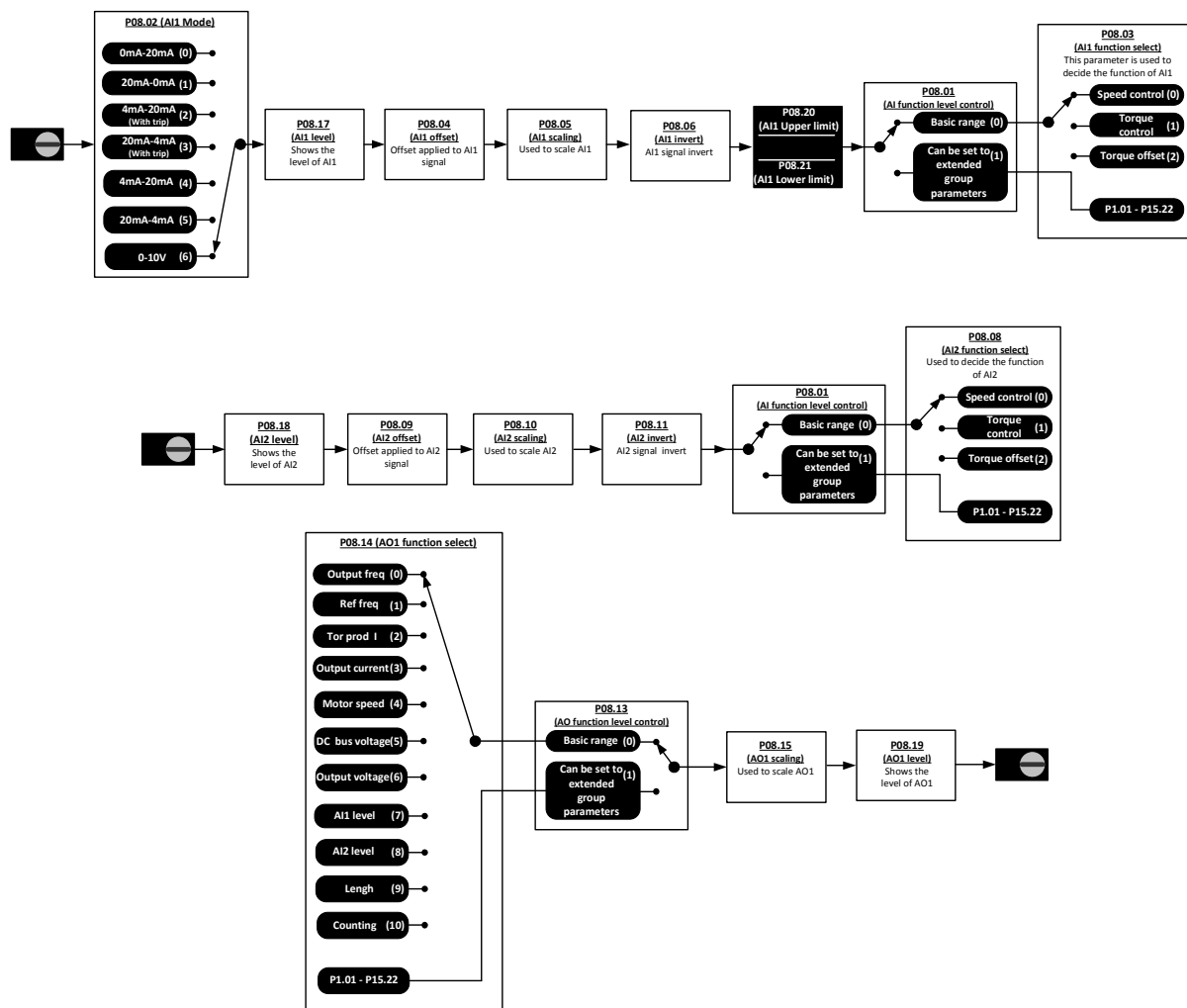
Group 8

Group 8: Analogue inputs and outputs

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
08.01	Analog Input Function Level Control	0320H	
08.02	Analog Input 1 Mode	0321H	
08.03	Analog Input 1 Function	0322H	
08.04	Analog Input 1 Offset	0323H	
08.05	Analog Input 1 Scaling	0324H	
08.06	Analog Input 1 Invert	0325H	
08.07	Analog Input 1 Filtering Time	0326H	
08.08	Analog Input 2 Function Select	0327H	
08.09	Analog Input 2 Offset	0328H	
08.10	Analog Input 2 Scaling	0329H	
08.11	Analog Input 2 Inverter	032AH	
08.12	Analog Input 2 Filtering Time	032BH	
08.13	Analog Output Function Level Control	032CH	
08.14	Analog Output Function Select	032DH	
08.15	Analog Output Scaling	032EH	
08.16	Analog Output 1 Current Loss Indicator	032FH	
08.17	Analog Input 1 Signal Level	0330H	
08.18	Analog Input 2 Signal Level	0331H	
08.19	Analog Output 1 Level	0332H	
08.20	Analog Input 1 Upper Limit	0333H	
08.21	Analog Input 1 Lower Limit	0334H	
08.22	Analog Input 2 Upper Limit	0335H	
08.23	Analog Input 2 Lower Limit	0336H	

Group 8 overview diagram



Group 8: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
08.01	Analog Input Function Level Control	0 - 1 [0]	Run or stop

0: P08.03 (AI1 function select) and P08.08 (AI2 function select) will have a range of 0 - 2

1: P08.03 (AI1 function select) and P08.08 (AI2 function select) can be set to parameters in the range P01.01 - P15.22)

See parameter descriptions of P08.03 and P08.08

Parameter	Parameter name	Range 【Default】	Change mode
08.02	Analog Input 1 Mode	0 - 6 [6]	Stop only

Analog input 1 signal can be voltage or current mode:

0: 0mA – 20mA

1: 20mA – 0mA

2: 4mA – 20mA (With trip F013 on current loss)

3: 20mA – 4mA (With trip F013 on current loss)

4: 4 mA – 20mA (without trip)

5: 20mA – 4mA (without trip)

6: 0V – 10V

Parameter	Parameter name	Range 【Default】	Change mode
08.03	Analog Input 1 Function Select	0 - 2 [0]	Stop only

Selects the function of AI1

When P08.01 = 0, this parameter has a range of 0 - 2 with the following selections possible:

0: AI1 sets the speed reference in P01.20

1: AI1 sets the maximum speed allowed in torque control mode (P07.18). 100.0% corresponds to 1.2 times maximum frequency (P01.02)

2: AI1 sets the torque offset (P07.21)

When P08.01 (Analog input function level control) is set to 1, this parameter can be set to parameters in the range P01.01 – P15.22

Parameter	Parameter name	Range 【Default】	Change mode
08.04	Analog Input 1 Offset	-200.0% - 200.0% [0.0]	Run or stop

Used to apply an offset to the AI1 signal

Parameter	Parameter name	Range 【Default】	Change mode
08.05	Analog Input 1 Scaling	0.000 - 20.000 [1.000]	Run or stop

Used to scale the AI1 signal

Parameter	Parameter name	Range 【Default】	Change mode
08.06	Analog Input 1 Invert	0 - 1 [0]	Run or stop

Used to invert the AI1 signal

Group 8

Parameter	Parameter name	Range 【Default】	Change mode
08.07	Analog Input 1 Filtering Time	0.00s - 10.00s [0.10]	Run or stop

Used to apply a filtering time to the AI1 signal

Parameter	Parameter name	Range 【Default】	Change mode
08.08	Analog Input 2 Function Select	0 - 2 [0]	Stop only

Selects the function of AI2

When P08.01 = 0, this parameter has a range of 0 - 2 with the following selections possible:

0: AI2 sets the speed reference in P01.21

1: AI2 sets the maximum speed allowed in torque control mode (P07.18). 100.0% corresponds to 1.2 times of maximum frequency (P01.02)

2: AI2 set the torque offset (P07.21)

When P08.01 (Analog input function level control) is set to 1, this parameter can be set to parameters in the range P01.01 – P15.22

Parameter	Parameter name	Range 【Default】	Change mode
08.09	Analog Input 2 Offset	-200.0% - 200.0% [0.0]	Run or stop

Used to apply an offset to the AI2 signal

Parameter	Parameter name	Range 【Default】	Change mode
08.10	Analog Input 2 Scaling	0.000 - 20.000 [1.000]	Run or stop

This parameter can be used to scale the AI2 signal

Parameter	Parameter name	Range 【Default】	Change mode
08.11	Analog Input 2 Invert	0 - 1 [0]	Run or stop

Used to invert the AI2 signal

Parameter	Parameter name	Range 【Default】	Change mode
08.12	Analog Input 2 Filtering Time	0.00s - 10.00s [0.10]	Run or stop

Used to apply a filtering time to the AI2 signal

Parameter	Parameter name	Range 【Default】	Change mode
08.13	Analogue Output Function Level Control	0 - 1 [0]	Run or stop

0: P08.14 (Analogue output function select) will have a range of 0 - 10

1: P08.14 (Analogue output function select) can be set to parameters in the range P01.01 - P15.22

See parameter description for P08.14

Parameter	Parameter name	Range 【Default】	Change mode
08.14	Analogue Output Function Select	0 - 10 [0]	Run or stop

Selects the function of analog output 1

When P08.13 = 0, this parameter has a range of 0 - 10 with the following selections possible:

- 0: Output frequency (P05.11)
- 1: Frequency reference (P01.14)
- 2: Torque producing current (P05.15)
- 3: Output current (P05.14)
- 4: Motor speed (P05.08)
- 5: DC bus voltage (P05.13)
- 6: Output voltage (P05.12)
- 7: AI1 level (P08.17)
- 8: AI2 level (P08.18)
- 9: Actual length P14.11)
- 10: Set number (P14.15)
- 11: No function

When P08.13 (Analogue output function level control) is set to 1, this parameter can be set to parameters in the range P01.01 – P15.22.

Parameter	Parameter name	Range 【Default】	Change mode
08.15	Analogue Output Scaling	0.000 - 20.000 [1.000]	Run or stop

Used to scale the AO1 signal

Parameter	Parameter name	Range	Change mode
08.16	Analog Input 1 Current Loss Indicator	0 - 1	Read only

If P08.02 is set to Mode 2 or 3, when the current input falls below 3mA this parameter will change to 1

Parameter	Parameter name	Range	Change mode
08.17	Analog Input 1 Signal Level	0.0% - 100.0%	Read only

Actual level of signal at AI1 in %

Parameter	Parameter name	Range	Change mode
08.18	Analog Input 2 Signal Level	0.0% - 100.0%	Read only

Actual level of signal at AI2 in %

Parameter	Parameter name	Range	Change mode
08.19	Analogue Output Signal Level	0.0% - 100.0%	Read only

Shows the level of AO1 in %

Group 8

Parameter	Parameter name	Range 【Default】	Change mode
08.20	Analog Input 1 Upper Limit	0.0% - 100.0% [100.0]	Run or stop

Used to limit the upper limit of AI1 signal

Parameter	Parameter name	Range 【Default】	Change mode
08.21	Analog Input 1 Lower Limit	0.0 - P08.20 [0.0]	Run or stop

Used to limit the lower limit of AI1 signal

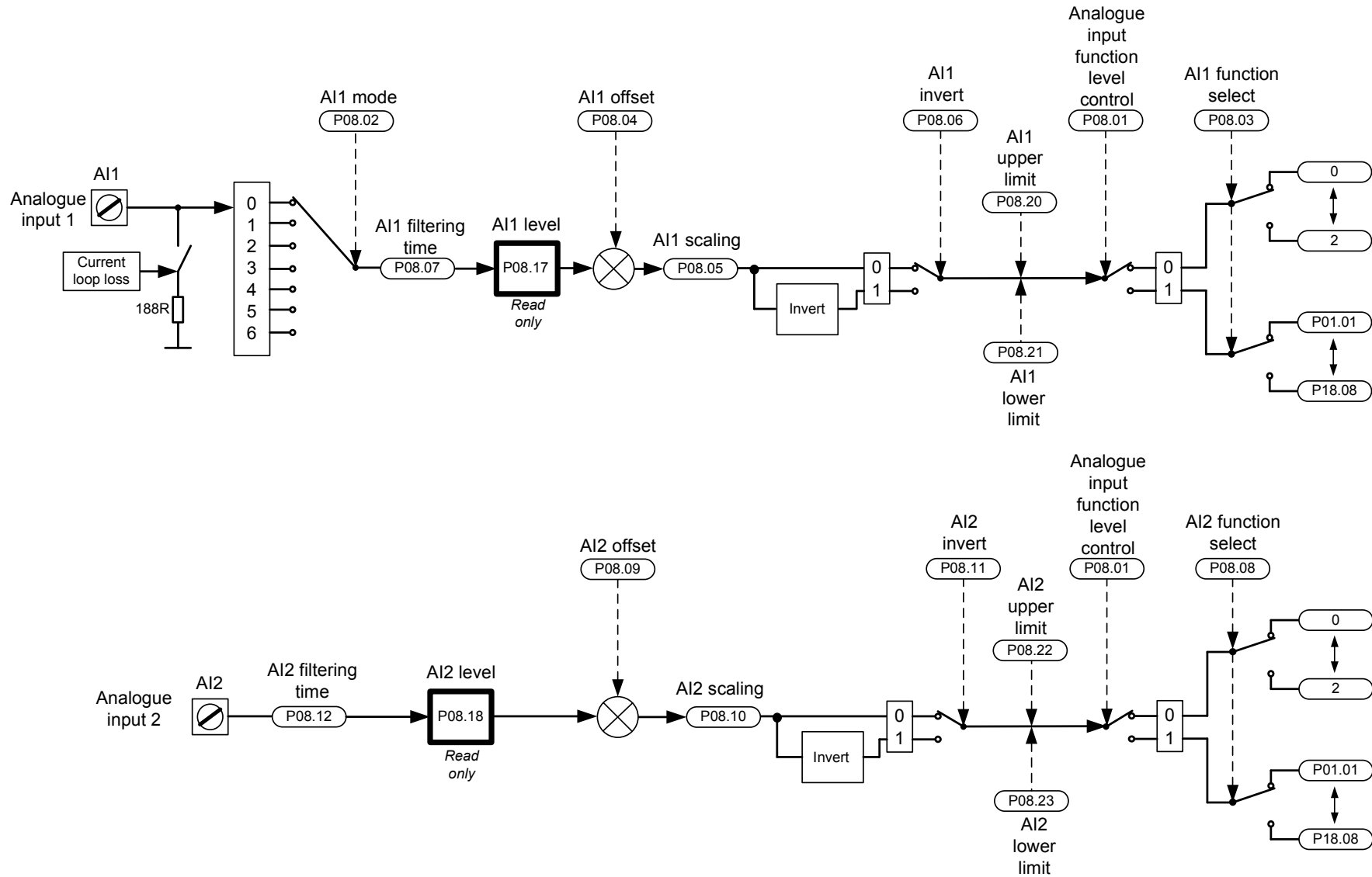
Parameter	Parameter name	Range 【Default】	Change mode
08.22	Analog Input 2 Upper Limit	0.0% - 100.0% [100.0]	Run or stop

Used to limit the upper limit of AI2 signal

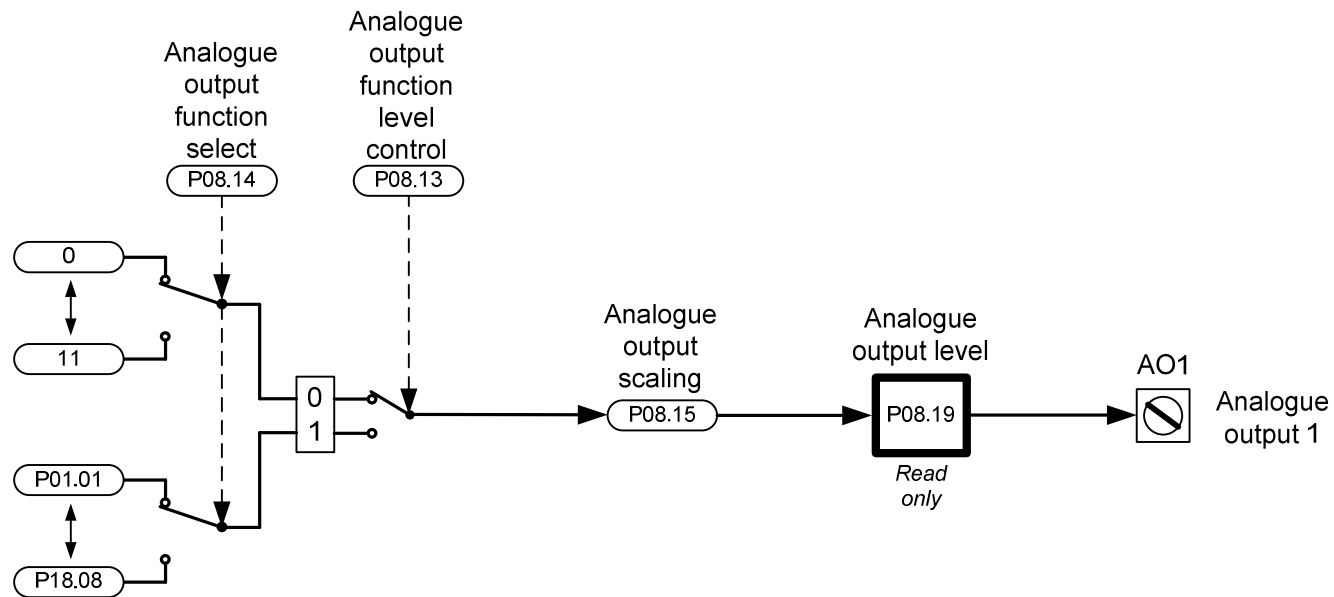
Parameter	Parameter name	Range 【Default】	Change mode
08.23	Analog Input 2 Lower Limit	0.0 - P08.20 [0.0]	Run or stop

Used to limit the lower limit of AI2 signal

Menu 8 Analogue inputs



Menu 8 Analogue output



Group 9: Digital inputs and outputs

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
09.01	Digital Input Function Level Control	0384H	
09.02	Digital input 1 Function	0385H	
09.03	Digital input 2 Function	0386H	
09.04	Digital input 3 Function	0387H	
09.05	Digital input 4 Function	0388H	
09.06	Digital input 5 Function	0389H	
09.07	Digital input 6 Function	038AH	
09.08	Digital input 7 Function	038BH	
09.09	Status Relays Function Level Control	038CH	
09.10	Relay 1 Function	038DH	
09.11	Relay 2 Function	038EH	
09.12	Digital input 1 Invert	038F8	
09.13	Digital input 2 Invert	0390H	
09.14	Digital input 3 Invert	0391H	
09.15	Digital input 4 Invert	0392H	
09.16	Digital input 5 Invert	0393H	
09.17	Digital input 6 Invert	0394H	
09.18	Digital input 7 Invert	0395H	
09.19	Relay 1 Invert	0396H	
09.20	Relay 2 Invert	0397H	
09.21	Digital input Common Select	0398H	
09.22	3-Wire Mode	0399H	
09.23	Digital input 6 Mode	039AH	
09.24	Digital input 7 Mode	039BH	
09.27	Digital input 7 Maximum Frequency Of Input Pulse	039EH	
09.28	Digital input 7 Centre Of Frequency Pulse	039FH	
09.29	Digital Output Function Level Control	03A0H	
09.30	Digital Output 1 Function	03A1H	
9.31	Digital Output 2 Function	03A2H	
9.32	Digital Output 1 Invert	03A3H	
9.33	Digital Output 2 Invert	03A4H	
9.34	Digital Output 2 Maximum Reference Frequency	03A5H	
9.35	Digital Output 2 Mode Selector	03A6H	
9.38	Digital input 7 Level Of Input Frequency	03A9H	
9.40	Digital input 1 State	03ABH	
9.41	Digital input 2 State	03ACH	

Parameter quick look up table cont...

Parameter	Parameter name	Modbus register address	Setting
9.42	Digital input 3 State	03ADH	
9.43	Digital input4 State	03AEH	
9.44	Digital input 5 State	03AFH	
9.45	Digital input 6 State	03B0H	
9.46	Digital input 7 State	03B1H	
9.47	Relay 1 State	03B2H	
9.48	Relay 2 State	03B3H	
9.49	Digital Output 1 State	03B4H	
9.50	Digital Output 2 State	03B5H	

Group 9: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
09.01	Digital Input Function Level Control	0 - 1 [0]	Run or stop

0: P09.02 – P09.08 will have a range of 0 - 19 (99 indicates it is set to advanced setting)

1: P09.02 – P09.08 can be set to parameters in the range P01.01 - P18.08

See parameter descriptions for P09.02 to P09.08

Parameter	Parameter name	Range 【Default】	Change mode
09.02	Digital Input 1 Function	0 – 19 [3] or P01.01 - P18.08 [P03.22]	Stop only
09.03	Digital Input 2 Function	0 – 19 [4] or P01.01 – P18.08 [P03.23]	Stop only
09.04	Digital Input 3 Function	0 – 19 [7] or P01.01 - P18.08 [P03.25]	Stop only
09.05	Digital Input 4 Function	0 – 19 [99] or P01.01 - P18.08 [Advanced]	Stop only
09.06	Digital Input 5 Function	0 – 19 [19] or P01.01 - P18.08 [Off]	Stop only
09.07	Digital Input 6 Function	0 – 19 [10] or P01.01 - P18.08 [P03.19]	Stop only
09.08	Digital Input 7 Function	0 – 19 [11] or P01.01 - P18.08 [P12.15]	Stop only

These parameters are used to select the function of the digital input terminals. When P09.01 = 0 the following functions can be selected:

- 0: Preset select bit 0 (P01.15)
- 1: Preset select bit 1 (P01.16)
- 2: Run (P03.20)
- 3: Run forward (P03.22)
- 4: Run reverse (P03.23)
- 5: 3-wire enable (P03.21)
- 6: FWD/REV (P03.24)
- 7: Jog forward (P03.25)
- 8: UP (P02.30)
- 9: DOWN P02.31)
- 10: Enable (P03.19)
- 11: Reset (P12.15)
- 12: Control channel is switched to terminal (P10.17)
- 13: Reset length counting (P14.18)
- 14: Reset number counting (P14.19)
- 15: External trip (P12.14)
- 16: Preset select bit 2 (P01.17)
- 17: Preset select bit 3 (P1.18)
- 18: PLC reset indicator (P04.55)
- 19: Off – no function
- 99: Advanced setting

- When P09.01 (Digital Input Function Level Control) is set to 1, this parameter can be set to parameters in the range P01.01 – P18.08

Parameter	Parameter name	Range 【Default】	Change mode
09.09	Status Relays Function Level Control	0 - 1 [0]	Run or stop

0: P09.10 and P09.11 will have a range of 0 - 12

1: P09.10 and P09.11 can be set to parameters in the range P01.01 - P18.08

See parameter descriptions for P09.10 and P09.11

Parameter	Parameter name	Range 【Default】	Change mode
09.10	Relay 1 Function	0 - 12 [0] or P01.01 - P18.08 [P12.01]	Run or stop

When P09.09 is set to 0 the following functions can be selected:

- 0: Drive healthy (P12.01)
- 1: Drive active (P5.27)
- 2: Length arrival (P14.13)
- 3: External fault (P12.14)
- 4: Under voltage trip (P12.16)
- 5: PLC finished (P04.53)
- 6: Frequency reached (P01.23)
- 7: Torque being limited (P07.24)
- 8: Time arrival (P10.16)
- 9: Overload is accumulating (P12.17)
- 10: At zero speed (P01.24)
- 11: Brake is on (P18.08)
- 12: User Control

- When P09.09 (Status relays function level control) is set to 1, this parameter can be set to parameters in the range P01.01 – P18.08

Parameter	Parameter name	Range 【Default】	Change mode
09.11	Relay 2 Function	0 - 12 [1] or P01.01 - P18.08 [P05.27]	Run or stop

When P09.09 is set to 0 the following functions can be selected:

- 0: Drive healthy (P12.01)
- 1: Drive active (P05.27)
- 2: Length arrival (P14.13)
- 3: External fault (P12.14)
- 4: Under voltage trip (P12.16)
- 5: PLC finished (P04.53)
- 6: Frequency reached (P01.23)
- 7: Torque being limited (P07.24)
- 8: Time arrival (P10.16)
- 9: Overload is accumulating (P12.17)
- 10: At zero speed (P01.24)
- 11: Brake is on (P18.08)
- 12: User Control

- When P09.09 (Status relays function level control) is set to 1, this parameter can be set to parameters in the range P01.01 – P18.08

Group 9

Parameter	Parameter name	Range 【Default】	Change mode
09.12	Digital Input 1 Invert	0 - 1 [0]	Run or stop
09.13	Digital Input 2 Invert	0 - 1 [0]	Run or stop
09.14	Digital Input 3 Invert	0 - 1 [0]	Run or stop
09.15	Digital Input 4 Invert	0 - 1 [0]	Run or stop
09.16	Digital Input 5 Invert	0 - 1 [0]	Run or stop
09.17	Digital Input 6 Invert	0 - 1 [1]	Run or stop
09.18	Digital Input 7 Invert	0 - 1 [0]	Run or stop

Setting to 1 causes the digital input state to be inverted

Parameter	Parameter name	Range 【Default】	Change mode
09.19	Relay 1 Invert	0 - 1 [0]	Run or stop

Setting to 1 causes Relay 1 output state to be inverted

Parameter	Parameter name	Range 【Default】	Change mode
09.20	Relay 2 Invert	0 - 1 [0]	Run or stop

Setting to 1 causes Relay 2 output state to be inverted

Parameter	Parameter name	Range 【Default】	Change mode
09.21	Digital Input Common Select	0 - 1 [1]	Stop only

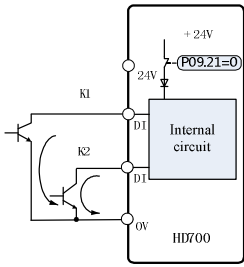
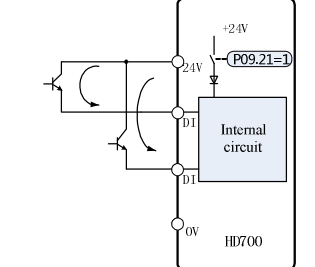
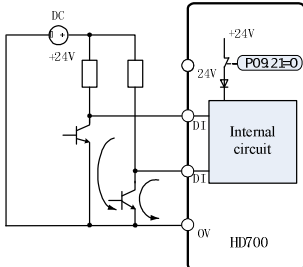
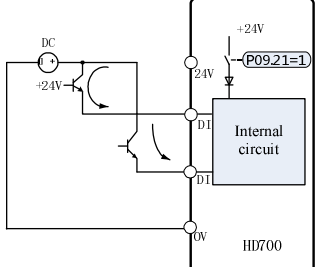
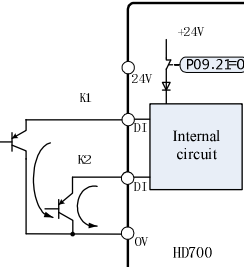
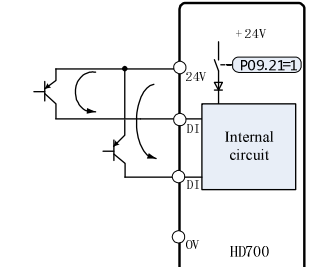
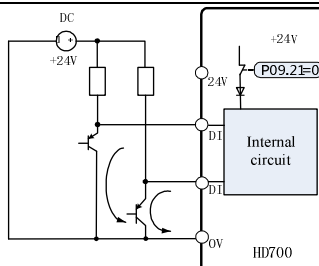
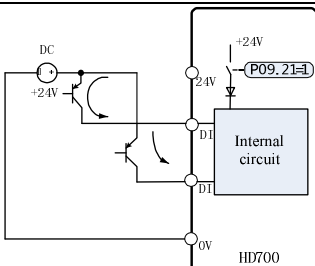
Used to select if the digital inputs are active high or active low:

0: 0V (when the digital input is connected to 0V, digital input state will be 1) (negative logic)

1: 24V (when the digital input is connected to 24V, digital input state will be 1) (positive logic)

Connection examples:

P09.21		P09.21=0 (Source)	P09.21=1 (Sink)
Connection			
Type	Using the drives 24V		
	Using an external supply		

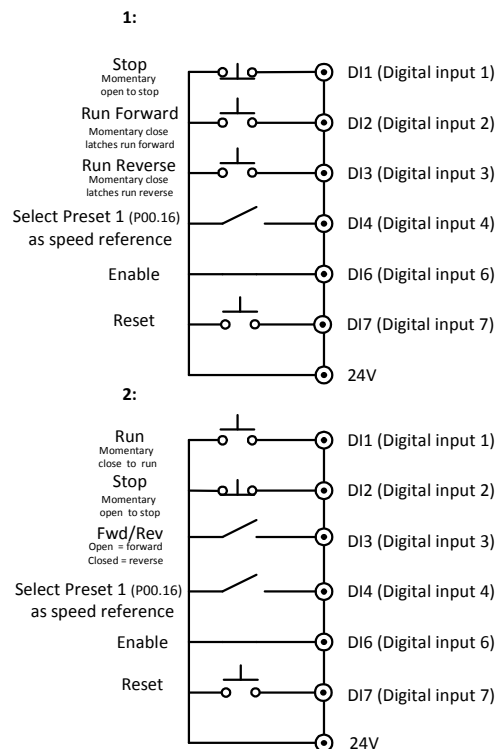
P09.21		P09.21=0 (Source)	P09.21=1 (Sink)
Connection			
OC (NPN)	Using the drives 24V		
	Using an external supply		
OC (PNP)	Using the drives 24V		
	Using an external supply		

Group 9

Parameter	Parameter name	Range 【Default】	Change mode
09.22	3-Wire Mode	0 - 2 [0]	Stop only

Used to select 3-wire modes:

0: Off



Parameter	Parameter name	Range 【Default】	Change mode
09.23	DI6 Mode	0 - 2 [0]	Run or stop

Used to select the mode of DI6:

0: Normal digital input

1: Length counting pulse (used for the textile, see description for P14.13)

2: Number counting pulse (used for the textile, see description for P14.17)

Parameter	Parameter name	Range 【Default】	Change mode
09.24	Digital Input 7 Mode	0 - 2 [0]	Run or stop

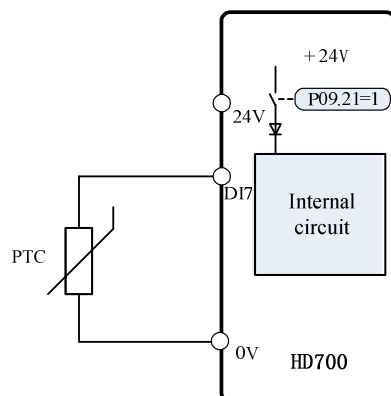
Used to select the mode of DI7:

0: Normal digital input

1: Motor thermistor (PTC) (see information below)

2: High frequency pulse (see descriptions for P09.27, P09.28 and P09.38)

Digital Input 7 as a motor thermistor input, wiring example:



- When the PTC thermistor resistance increases to 3kΩ, the drive will trip F011
- When thermistor resistance decreases to 1.8kΩ, the trip can be reset

NOTE: This function can only be used when P09.21 = 1

Parameter	Parameter name	Range 【Default】	Change mode
09.27	DI7 Maximum Frequency Of Input Pulse	0.1kHz - 50.0kHz [10.0kHz]	Run or stop

When P09.24 (DI7 mode) = 2 (High frequency pulse) this parameter defines the maximum frequency of the input signal.

Group 9

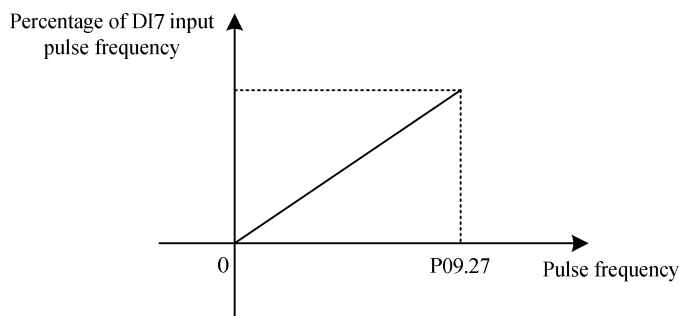
Parameter	Parameter name	Range 【Default】	Change mode
09.28	DI7 Centre Of Frequency Pulse	0 - 2 [0]	Run or stop

0: No centre

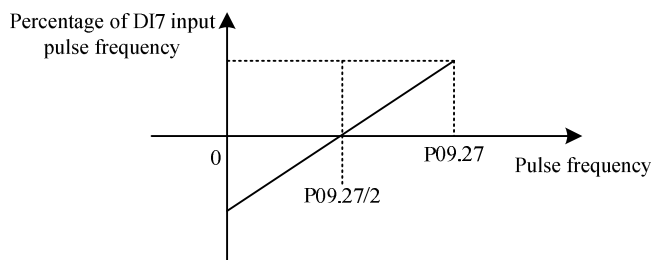
1: Centre = $P09.27/2$, frequency less than centre is negative

2: Centre = $P09.27/2$, frequency less than centre is positive

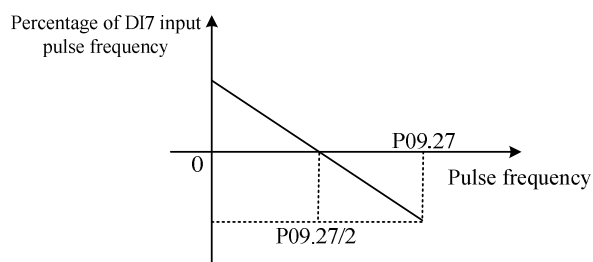
0: No centre



1: Centre = $P09.27/2$, frequency less than centre is negative



2: Centre = $P09.27/2$, frequency less than centre is positive



Parameter	Parameter name	Range 【Default】	Change mode
09.29	Digital Output Function Level Control	0 - 1 [0]	Run or stop

0: P09.30 and P09.31 will have a range of 0-9

1: P09.30 and P09.31 can be set to parameters in the range P01.01 - P18.08

See parameter descriptions for P09.30 and P09.31.

Parameter	Parameter name	Range 【Default】	Change mode
09.30	Digital Output 1 Function	0 – 8 [6] or P01.01 - P18.08 [P01.24]	Run or stop

When P09.29 is set to 0 the following functions can be selected:

- 0: PLC recycle is running (P04.54)
- 1: Drive is active (P05.27)
- 2: Drive is alarming (P12.18)
- 3: 100% current (P05.28)
- 4: Drive healthy (12.01)
- 5: Actual length meets the reference (P14.13)
- 6: Running at zero speed (P01.24)
- 7: Brake is on (P18.08)
- 8: User Control (P01.01 – P18.08)

- When P09.29 (Digital output function level control) is set to 1, this parameter can be set to parameters in the range P01.01 – P18.08

Parameter	Parameter name	Range 【Default】	Change mode
09.31	Digital Output 2 Function	0 – 8 [2] or P01.01 - P18.08 [P12.18]	Run or stop

When P09.29 is set to 0 the following functions can be selected:

- 0: PLC recycle is running (P04.54)
- 1: Drive is active (P05.27)
- 2: Drive is alarming (P12.18)
- 3: 100% current (P05.28)
- 4: Drive healthy (12.01)
- 5: Actual length meets the reference (P14.13)
- 6: Running at zero speed (P01.24)
- 7: Brake is on (P18.08)
- 8: User Control (P01.01 – P18.08)

- When P09.29 (Digital output function level control) is set to 1, this parameter can be set to parameters in the range P01.01 – P18.08

Parameter	Parameter name	Range 【Default】	Change mode
09.32	Digital Output 1 Invert	0 - 1 [0]	Run or stop

Used to invert Digital Output 1:

- 0: Not inverted
- 1: Inverted

Parameter	Parameter name	Range 【Default】	Change mode
09.33	Digital Output 2 Invert	0 - 1 [0]	Run or stop

Used to invert Digital Output 2:

- 0: Not inverted
- 1: Inverted

Parameter	Parameter name	Range 【Default】	Change mode
09.34	Digital Output 2 Maximum Reference Frequency	0.1kHz - 50.0kHz [10.0]	Run or stop

When P09.31 (DO2 function) = 8 (output frequency) is selected, this parameter is used to define the maximum frequency. See description for P09.31.

Parameter	Parameter name	Range 【Default】	Change mode
09.35	Digital Output 2 Mode Selector	0 - 2 [0]	Run or stop

When P09.29 (Digital output function level control) is set to 1 this parameter can be used to change DO2 signal to the following:

- 0: Normal output
- 1: Pulse output
- 2: PWM output

Parameter	Parameter name	Range	Change mode
09.38	Digital Input 7 Level Of Input Frequency	-100.0% - 100.0%	Read only

When P09.24 (DI7 mode) = 2 (high frequency pulse), this parameter displays the level of DI7 as a percentage:

When P09.28=0 (DI7 input pulse has no centre):

$$P09.38 = \frac{\text{DI7 input frequency}}{P09.27 \text{ (DI7 maximum frequency of input pulse)}} \times 100\%$$

When P09.28=1 (DI7 input pulse centre mode1):

$$P09.38 = \left(\frac{\text{DI7 input frequency}}{P09.27 \text{ (DI7 maximum frequency of input pulse)/2}} - 1 \right) \times 100\%$$

When P09.28=2 (DI7 input pulse centre mode2):

$$P09.38 = \left(\frac{\text{DI7 input frequency}}{P09.27 \text{ (DI7 maximum frequency of input pulse)/2}} \right) \times 100\%$$

Parameter	Parameter name	Range	Change mode
09.40	Digital Input 1 State	0 - 1	Read only
09.41	Digital Input 2 State	0 - 1	Read only
09.42	Digital Input 3 State	0 - 1	Read only
09.43	Digital Input 4 State	0 - 1	Read only
09.44	Digital Input 5 State	0 - 1	Read only
09.45	Digital Input 6 State	0 - 1	Read only
09.46	Digital Input 7 State	0 - 1	Read only

Show the status of the digital inputs:

- 0: Off
- 1: On

Note: When (P09.23 Digital Input 6 mode) = 1 or 2, P09.45 will always be 0
When (P09.24 Digital Input 7 mode) = 1 or 2, P09.46 will always be 0

Group 9

Parameter	Parameter name	Range	Change mode
09.47	Relay 1 State	0 - 1	Read only

Shows Status of Relay 1:

0: The relay contacts are open.

1: The relay contacts are closed.

Parameter	Parameter name	Range	Change mode
09.48	Relay 2 State	0 - 1	Read only

Shows the status of Relay 2:

0: The relay contacts are open.

1: The relay contacts are closed.

Parameter	Parameter name	Range	Change mode
09.49	Digital Output 1 State	0 - 1	Read only

Shows the status of DO1:

0: Output 0V

1: Output 24V

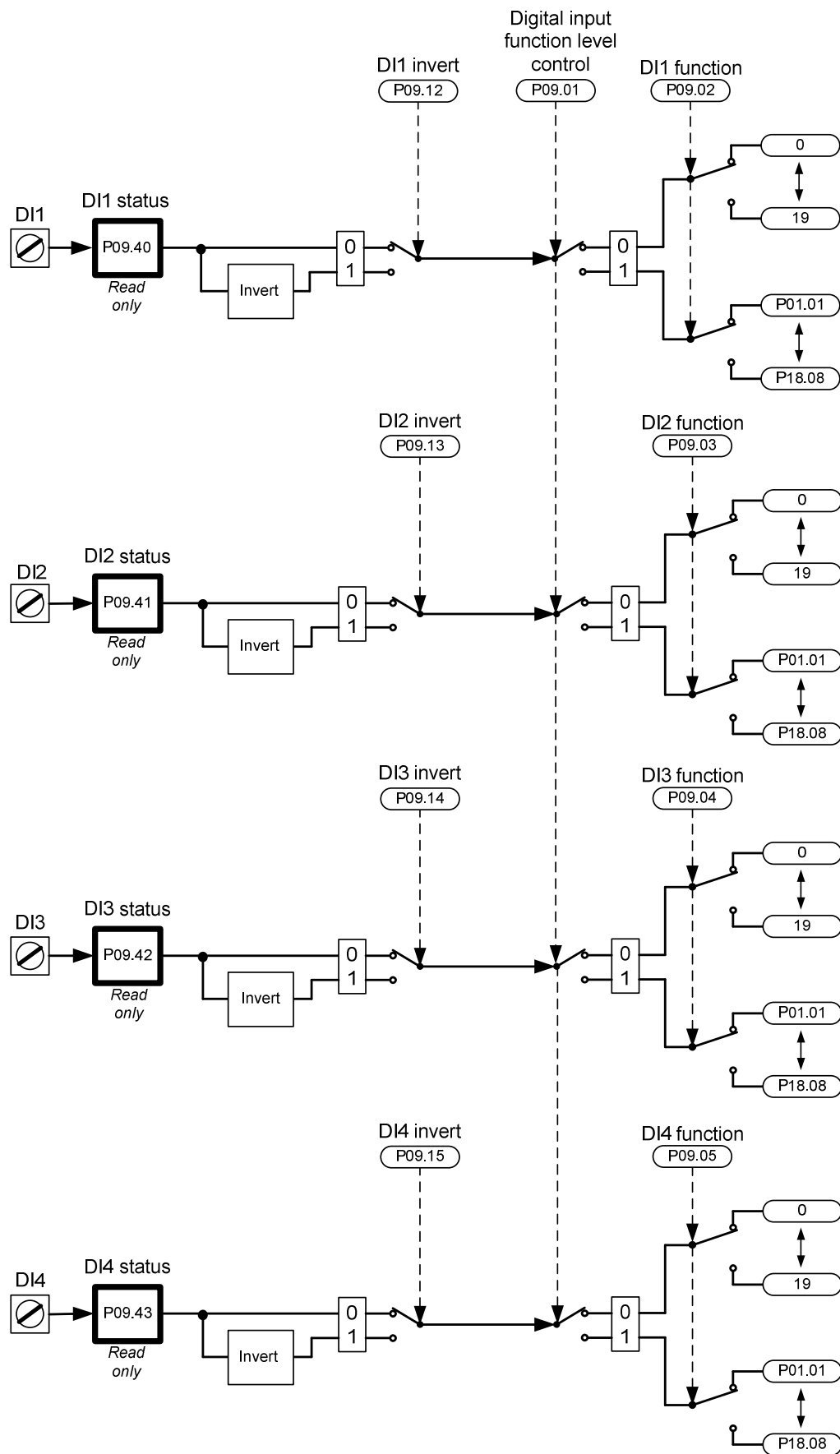
Parameter	Parameter name	Range	Change mode
09.50	Digital Output 2 State	0 - 1	Read only

Shows the status of DO2:

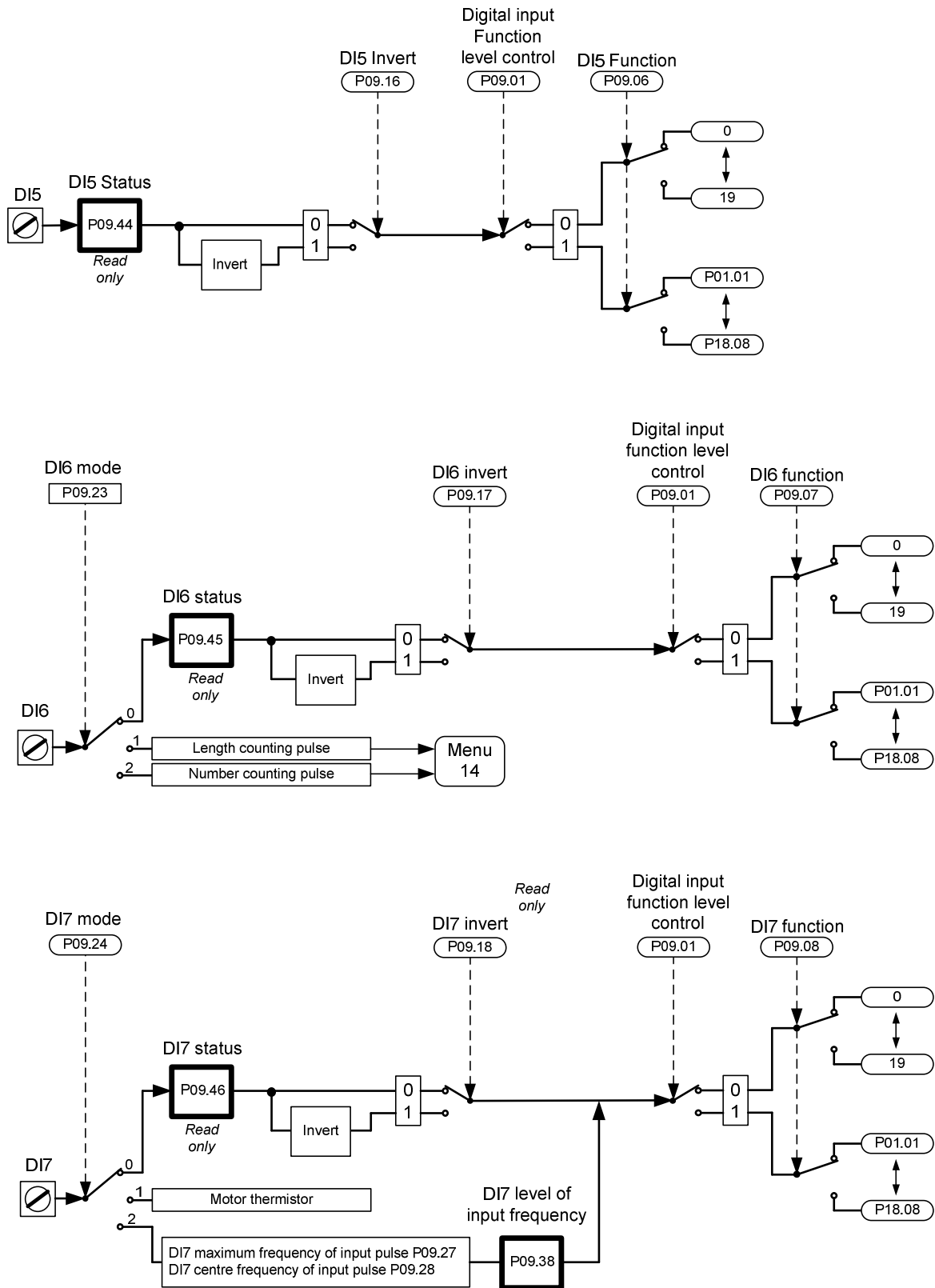
0: Output 0V

1: Output 24V

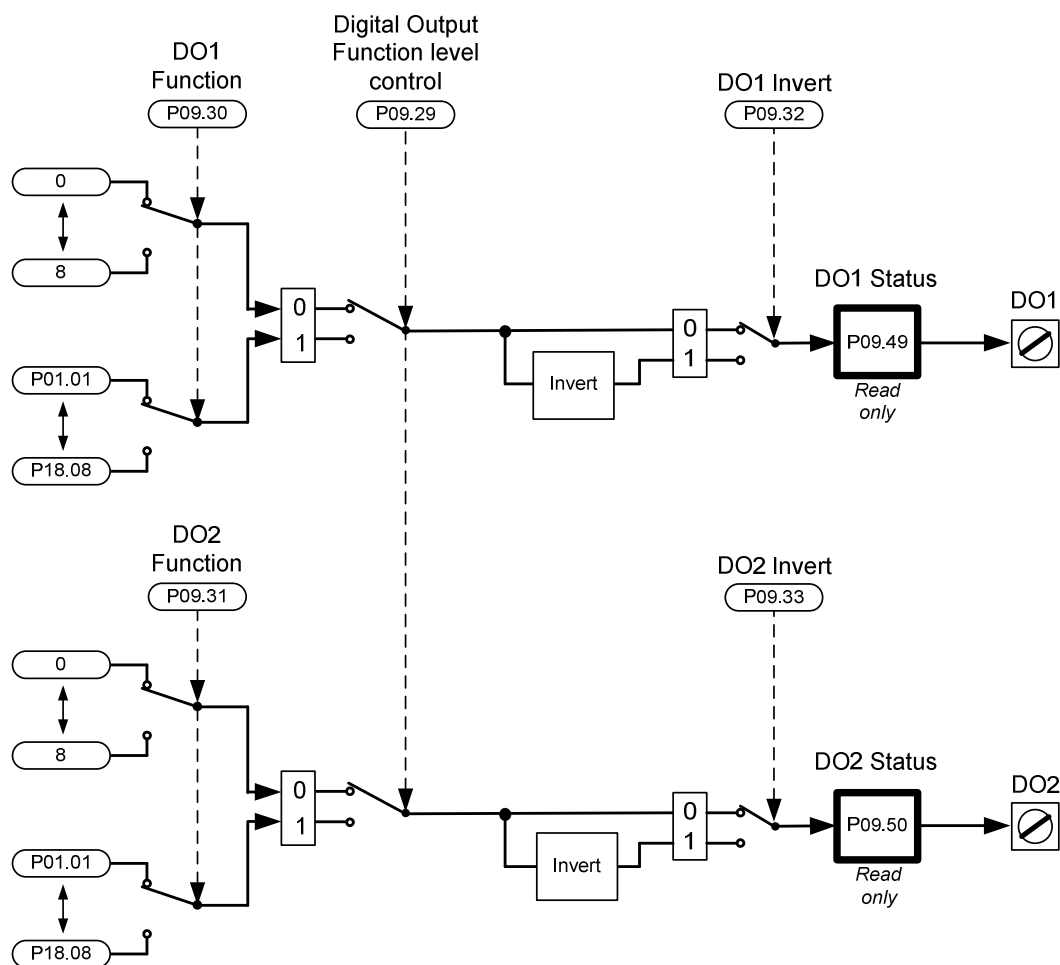
Menu 9 Digital inputs



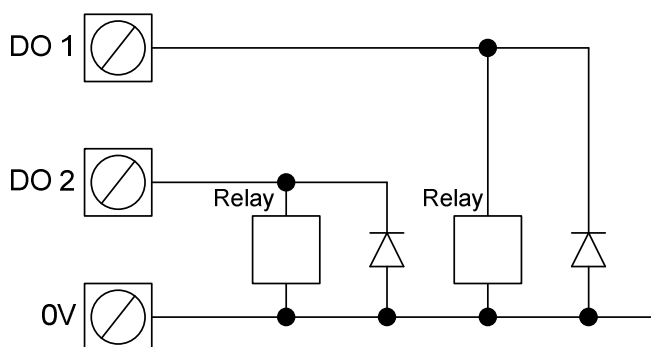
Menu 9 Digital inputs



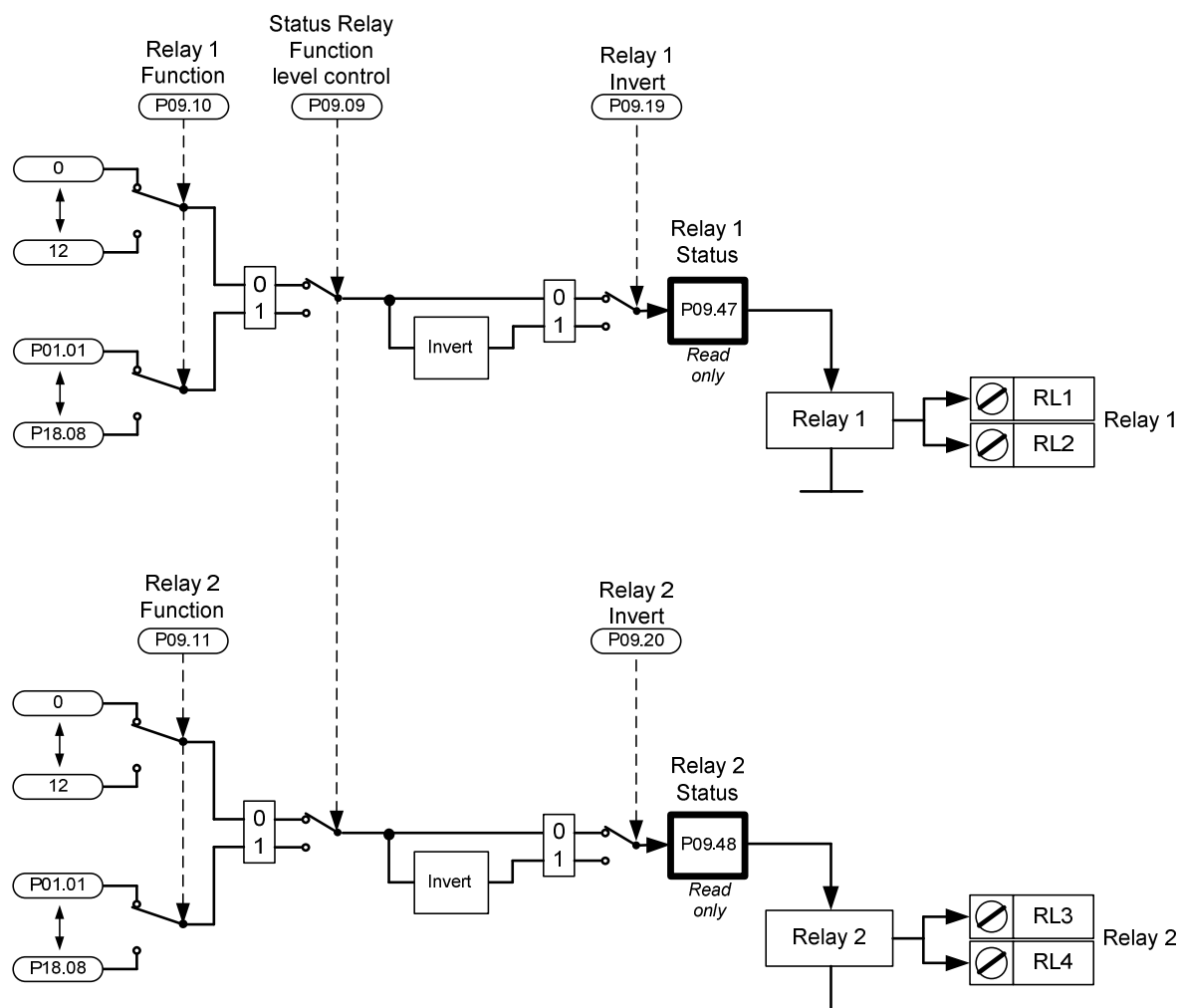
Menu 9 Digital outputs



NOTE: IF DO 1 or DO 2 (Digital outputs 1 or 2) are used to control inductive devices such as relays, a snubber device such as a diode should be connected in parallel with the relay coil as shown in the diagram below.



Menu 9 Status relays



Group 10: Communications and general functions

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
10.01	Protocol	03E8H	
10.02	Address	03E9H	
10.03	Baud Rate	03EAH	
10.04	Network Data Format	03EBH	
10.05	Modbus Silent Interval	03ECH	
10.06	Password	03EDH	
10.07	Control Mode	03EEH	
10.08	Load Defaults	03EFH	
10.09	Fan Control	03F0H	
10.10	Switching Frequency	03F1H	
10.11	Switching Frequency Automatic Adjustment	03F2H	
10.12	Low Mains Supply Operation (400V models only)	03F3H	
10.13	Model Code	03F4H	
10.14	Drive Status	03F5H	
10.15	Set Running Time	03F6H	
10.16	Running >P10.15	03F7H	
10.17	Select Terminal Control	03F8H	
10.18	Drive Response When Keypad Is Removed	03F9H	
10.19	If Password Is Cleared - Load Defaults	03FAH	
10.20	Switch On DC Injection Brake	03FBH	
10.21	PID Output Value Freeze	03FCH	
10.22	Mains Supply Loss Mode	03FDH	
10.23	Reset Running Time	03FEH	
10.24	Set Run Time Units	03FFH	
10.25	Set Running Time Upper Limit	0400H	
10.26	Motor director set up	0401H	

Group 10: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
10.01	Protocol	0 - 1 [0]	Run or stop

Used to select the communications protocol:

0: Modbus protocol

1: Reserved setting, do not use

Parameter	Parameter name	Range 【Default】	Change mode
10.02	Address	0 - 247 [1]	Run or stop

Drive address for serial communications

Parameter	Parameter name	Range 【Default】	Change mode
10.03	Baud Rate	0 - 5 [3]	Run or stop

Selects the communications baud rate:

0: 2.4kbps

1: 4.8kbps

2: 9.6kbps

3: 19.2kbps

4: 38.4kbps

5: 57.6kbps

Parameter	Parameter name	Range 【Default】	Change mode
10.04	Network Data Format	0 - 3 [1]	Run or stop

Sets the communications data format

0: 8-1-N, RTU, without checking (8 data bits, 1 stop bit, no parity)

1: 8-2-N, RTU, without checking (8 data bits, 2 stop bits, no parity)

2: 8-1-O, RTU, with odd bit checking (8 data bits, 1 stop bit, odd parity)

3: 8-1-E, RTU, with even bit checking (8 data bits, 1 stop bit, even parity)

Parameter	Parameter name	Range 【Default】	Change mode
10.05	Modbus Silent Interval	0ms - 250ms [2ms]	Run or stop

Extends the Modbus silent period

Parameter	Parameter name	Range 【Default】	Change mode
10.06	Password	0 - 9999 [0]	Run or stop

- When P10.06 = 0 (default value) the password is disabled and all parameters can be accessed
- When P10.06 is set to a non 0 value and the Esc button is pressed twice the password is enabled and only P10.06 can be accessed
- To access all parameters enter the password into P10.06 then press the PRG button
- To remove the password, after entering the password, change the content of P10.06 to 0 then press the PRG button

Parameter	Parameter name	Range 【Default】	Change mode
10.07	Control Mode	0 - 2 [0]	Stop only

0: Keypad control

1: Terminal control

2: Serial communications control

Parameter	Parameter name	Range 【Default】	Change mode
10.08	Load Defaults	0 - 1 [0]	Stop only

0: No action

1: Load default parameters. When P10.08 (P00.24) is set to 1 and the PRG button is pressed, all parameters are set to their default values

Parameter	Parameter name	Range 【Default】	Change mode
10.09	Fan Control	0 - 1 [0]	Run or stop

Used to set how the drives fan is controlled:

0: The drive controls the heatsink cooling fan according to the drives heatsink temperature

1: The fan is set to run at full speed continuously

Parameter	Parameter name	Range 【Default】	Change mode
10.10	Switching frequency	1kHz - 15kHz 【By model】	Run or stop

Used to change the switching frequency:

- Switching frequency can be increased to reduce audible motor noise
- Increasing switching frequency increases power losses within the drive

Parameter	Parameter name	Range 【Default】	Change mode
10.11	Switching Frequency Automatic Adjustment	0 - 1 [1]	Run or stop

0: Disabled: The drive will **not** automatically reduce the switching frequency if the drive is getting hot. The drive may trip F009 (IGBT junction temperature overheat) if the drive temperatures continue to increase

1: Enabled. The drive will adjust the switching frequency automatically according to IGBT temperature when necessary to prevent the drive from overheating

Group 10

Parameter	Parameter name	Range 【Default】	Change mode
10.12	Low Mains Supply Operation (only for 400V models)	0 - 1 [0]	Stop only

0: Disabled

1: Enabled: The drive can be powered by a single phase 200VAC supply if the 400VAC supply fails.

- The drive will not be able to provide the same power as with a 400VAC supply, but it may be enough to move the application slowly into a required state
- When P10.12 is enabled and the drive is supplied from 200VAC, the drive will display alarm H005

Parameter	Parameter name	Range	Change mode
10.13	Model Code	0 - 255	Read only

Shows the drive model code. Model codes for different models are shown in the table below:

Model name	Model code
HD700-20D00040	0
HD700-20D00075	1
HD700-20D00150	2
HD700-20D00220	3
HD700-20T00400	8
HD700-40T00075	4
HD700-40T00150	5
HD700-40T00220	6
HD700-40T00400	7
HD700-40T00550	9
HD700-40T00750	10
HD700-40T01100	16
HD700-40T01500	17
HD700-40T01850	18
HD700-40T02200	19
HD700-40T03000	20
HD700-40T03700	21
HD700-40T04500	22
HD700-40T05500	23
HD700-40T07500	24
HD700-40T09000	25

Parameter	Parameter name	Range	Change mode
10.14	Drive Status	0 - 65535	Read only

Used to display the drive status in the form of a 16-bit binary number. It is displayed on the keypad as a decimal number

For example:

P10.14 = 3, the binary code is 0000000000000011, the drive is healthy and running

The table below show what bits relate to what functions:

Bit	Function	Related parameters
0	Drive healthy	P12.01
1	Drive active	P05.27
2	Rated load is on	P05.28
3	Frequency arrival indicator	P01.23
4	At zero speed	P01.24
5	Reverse running indicator	P03.30
6	Torque being limited indicator	P07.24
7	Set time is meet	P10.16
8	Control channel is switched to terminal	P10.17
9	Under voltage indicator	P12.16
10	Overload accumulator on indicator	P12.17
11	Alarm indicator	P12.18
12	Actual number meets reference number	P14.16
13	Actual number meets set number	P14.17
14	PLC finished indicator	P04.53
15	PLC recycle mode indicator	P04.54

Parameter	Parameter name	Range 【Default】	Change mode
10.15	Set Running Time	0h - 60000h[0]	Run or stop

See description for P10.16

Parameter	Parameter name	Range	Change mode
10.16	Running >P10.15	0 - 1	Read only

Used to indicate when the drive has run for as long as the time set in P10.15:

0: The time the drive has been running has **not** exceeded the time set in P10.15

1: The time the drive has been running has exceeded the time set in P10.15

- If the drive is disabled then enabled during running, the time will start from zero again
- If P10.15 = 0, P10.16 is always zero

Group 10

Parameter	Parameter name	Range	Change mode
10.17	Select Terminal Control	0 - 1	Read only

A digital input can be set to control this parameter in order to switch to terminal control mode

0: Terminal control mode is not selected by this parameter

1: Terminal control mode selected

Parameter	Parameter name	Range 【Default】	Change mode
10.18	Drive Response When Keypad Is Removed	0 - 1 [1]	Stop only

Used to control how the drive responds to the keypad being disconnected when in keypad control mode:

0: Carry on running

1: Stop

Parameter	Parameter name	Range 【Default】	Change mode
10.19	If Password Is Cleared - Load Defaults	0 - 1 [0]	Run or stop

If the PRG, UP and STOP keys are pressed at the same time for >5s, the user password (P10.06) is cleared

If this parameter is set to 1, default parameters will be loaded when the password is cleared using this method

Parameter	Parameter name	Range	Change mode
10.20	Switch On DC Injection Brake	0 - 1	Run or stop

Used to switch on the DC injection braking. A digital input can be set to control this parameter

Parameter	Parameter name	Range	Change mode
10.21	PID Output Value Freeze	0 - 1	Run or stop

Set to 1, the PID output (P15.22) will not change

For example: a digital input can be set to control this parameter

Parameter	Parameter name	Range 【Default】	Change mode
10.22	Mains Supply Loss Mode	0 - 1 [0]	Stop only

Changing this parameter to 1 helps the drive ride through a mains loss condition. The drive detect the DC bus level dropping and attempts to decelerate, this causes the energy to flow back into the drive which helps to maintain the DC level and keep the drive powered up

0: Coast. When the supply to the drive is lost the drives output will inhibit and the motor will coast to a stop

1: Ramp. When the supply to the drive is lost the drive will decelerate using the rate set in P02.07

Group 10

Parameter	Parameter name	Range	Change mode
10.23	Reset Running Time	0 - 1	Run or stop

Set to 1, the running time in P10.16 is reset to 0.

Parameter	Parameter name	Range 【Default】	Change mode
10.24	Set Run Time Units	0 - 1 [0]	Run or stop

Used to select what units are used for P10.15 (set running time)

0: Hours
1: Seconds

Parameter	Parameter name	Range 【Default】	Change mode
10.25	Set Running Time Upper Limit	0 - 60000 [1000]	Run or stop

Used to set the upper limit of parameter P10.15 (set running Time)

Parameter	Parameter name	Range 【Default】	Change mode
10.26	Motor direction set up	0 - 1 [0]	Run or stop

If any two of the output phases UVW are exchanged, the output frequency will be displayed as negative when the motor runs in reverse.

0: Forward
1: Reverse

Group 11

Group 11: Diagnostics

Parameter quick look up table

Parameter	Parameter name	Modbus register address
11.01	Trip 1 (Oldest trip)	044CH
11.02	Trip 2	044DH
11.03	Trip 3	044EH
11.04	Trip 4	044FH
11.05	Trip 5	0450H
11.06	Trip 6	0451H
11.07	Trip 7	0452H
11.08	Trip 8	0453H
11.09	Trip 9	0454H
11.10	Trip 10 (Last Trip)	0455H
11.11	Last Trip Output Frequency	0456H
11.12	Last Trip Current	0457H
11.13	Last Trip DC Voltage	0458H
11.14	Last Trip Digital Input Status	0459H
11.15	Last Trip Digital Output Status	045AH
11.16	Current Trip	045BH

Group 11

Group 11: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
11.01	Trip 1	0 - 99 [0]	Read only
11.02	Trip 2	0 - 99 [0]	Read only
11.03	Trip 3	0 - 99 [0]	Read only
11.04	Trip 4	0 - 99 [0]	Read only
11.05	Trip 5	0 - 99 [0]	Read only
11.06	Trip 6	0 - 99 [0]	Read only
11.07	Trip 7	0 - 99 [0]	Read only
11.08	Trip 8	0 - 99 [0]	Read only
11.09	Trip 9	0 - 99 [0]	Read only
11.10	Last Trip	0 - 99 [0]	Read only

- Show the last 10 trips. P11.10 is the most recent trip and P11.01 the oldest
- The trip string is “Fxxx”, where “xxx” is the trip number
- Example, overcurrent trip displays F001 will be shown as 1 in these parameters
- The Under voltage trip (F003) is only stored if the power to the drive is turned off while the drive is running. The drive doesn't store the F003 trip at any other time. When the drive powers down from a stand by state (not running) the drives display will show OFF

Parameter	Parameter name	Range 【Default】	Change mode
11.11	Last Trip Output Frequency	-P1.02Hz - P1.02Hz [0.00Hz]	Read only

Used to indicate the running frequency when the last trip occurred

Parameter	Parameter name	Range 【Default】	Change mode
11.12	Last Trip Current	0.0 - 2x motor rated current [0.0]	Read only

Used to indicate the output current when the last trip occurred

Parameter	Parameter name	Range 【Default】	Change mode
11.13	Last Trip DC Voltage	0 - model dependant [0]	Read only

Used to indicate DC bus voltage when the last trip occurred

Group 11

Parameter	Parameter name	Range 【Default】	Change mode
11.14	Last Trip Digital Input Status	0 - 255 [0]	Read only

Used to indicate the condition of the Digital Input terminals when the last trip occurred. P11.14 is a decimal number, which displays all DI terminal levels at the last trip. This value comes from a 7 digit binary number. BIT0 to BIT6 are separately linked to DI1 to DI7 level, when a DI terminal is high, the corresponding BIT is 1:

Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
DI7	DI6	DI5	DI4	DI3	DI2	DI1
64	32	16	8	4	2	1

Example: Both DI3 and DI5 terminals are level 1 when a trip occurs, the corresponding binary value of P11.14 will be 0010100, P11.14 will display 20 (decimal value)

Parameter	Parameter name	Range 【Default】	Change mode
11.15	Last Trip Digital Output Status	0 - 255 [0]	Read only

Used to indicate the condition of the drives Digital Outputs and Status Relays when the last trip occurred. P11.15 is a decimal number, which shows the condition of the DO and RLY when the last trip occurred. This value comes from a 4 digits binary number. BIT0 to BIT3 are separately linked to DO1, DO2, Relay1, Relay2, when high the corresponding the BIT is 1:

Bit 3	Bit 2	Bit 1	Bit 0
DO2	DO1	RLY2	RLY1
8	4	2	1

Example: DO2 is 1, DO1 is 0, Relay 1 is on (1), and Relay 2 is off (0) when the last trip occurred. The binary value of P11.15 is 1001, so the display value of P11.15 will be 9 (decimal value)

Parameter	Parameter name	Range	Change mode
11.16	Current Trip	0 - 99	Read only

- Shows the current trip.
- The trip string is "Fxxx", where "xxx" is the trip number

Group 12

Group 12: Protection

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
12.01	Drive Healthy	04B0H	
12.02	Deceleration Over Voltage Prevention	04B1H	
12.03	Deceleration Over Voltage Prevention Level	04B2H	
12.04	Drive Pre-Overload Alarming	04B3H	
12.05	Threshold Level Of Overload Alarming	04B4H	
12.06	Overload Alarming Delay Time	04B5H	
12.07	Auto Reset	04B6H	
12.08	Auto Reset Delay	04B7H	
12.09	Input Phase Loss Disable	04B8H	
12.10	Output Phase Loss Disable	04B9H	
12.11	Overload Protection Mode	04BAH	
12.12	Overload Protection Factor	04BBH	
12.13	Alarm Display Control	04BCH	
12.14	External Fault	04BDH	
12.15	Reset	04BEH	
12.16	Under Voltage Indicator	04BFH	
12.17	Overload Accumulator On Indicator	04C0H	
12.18	Alarming Indicator	04C1H	
12.19	Under Voltage Trip Disable	04C2H	

Group 12: Parameters descriptions

Parameter	Parameter name	Range	Change mode
12.01	Drive Healthy	0 - 1	Read only

Indicates if the drive is healthy:

0: Tripped

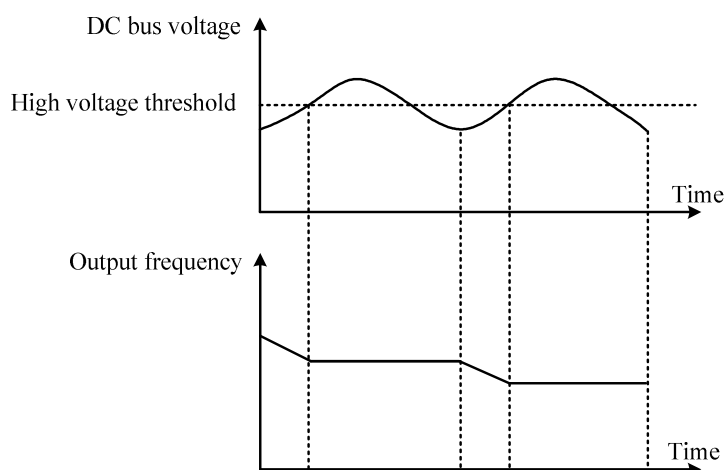
1: Healthy

Parameter	Parameter name	Range 【Default】	Change mode
12.02	Deceleration Over Voltage Prevention	0 - 1 [1]	Stop only

During deceleration of the motor, the DC bus level can rise due to regenerative energy. This can result in an over voltage trip (F002). When this parameter is set to 1, the drive stops decelerating when the DC bus is above the level set in P12.03, to prevent an over voltage trip. When the DC bus level falls below the level set in P12.03, the drive will decelerate again. See the following illustration:

0: Deceleration Over voltage prevention Off

1: Deceleration Over voltage prevention On



Parameter	Parameter name	Range 【Default】	Change mode
12.03	Deceleration Over Voltage Prevention Level	220V: 350V - 370V [370V] 400V: 750V - 780V [780V]	Stop only

Used when P12.02 = 1. See description for P12.02

Parameter	Parameter name	Range 【Default】	Change mode
12.04	Drive Pre-overload Alarming	0 - 1 [1]	Stop only

Used to select whether the pre-overload alarm is effective

0: Off

1: On

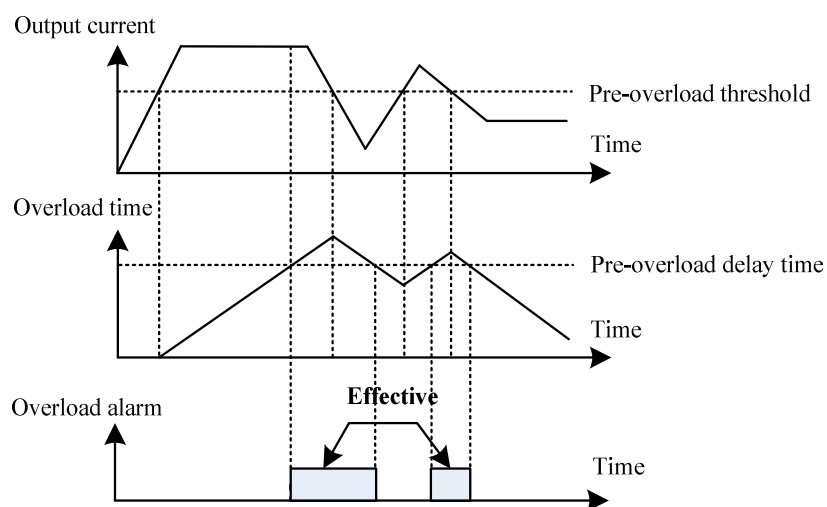
Group 12

Parameter	Parameter name	Range 【Default】	Change mode
12.05	Threshold Level Of Pre-Overload Alarming	80.0% - 150.0% [130.0%]	Run or stop

Sets the level where the output current is considered to be in a pre-overload level. This is set as a percentage of motor rated current. See description for P12.06

Parameter	Parameter name	Range 【Default】	Change mode
12.06	Pre-Overload Alarming Delay Time	0.0s - 60.0s [5.0s]	Run or stop

Sets the time after the drive output current exceeds the value set in P12.05 (Threshold level of pre-overload alarming) where the pre-overload alarm becomes effective, the drive will then display H002. See illustration below:



- When drive output current is larger than P12.05, the time counter increases
- When drive output current is less than than P12.05, the time counter decreases until zero
- The rate of increasing and decreasing is the same

Group 12

Parameter	Parameter name	Range 【Default】	Change mode
12.07	Auto Reset	0 - 100 [0]	Stop only

Sets the number of automatic reset attempts that will be made following a trip. See description for P12.08

Parameter	Parameter name	Range 【Default】	Change mode
12.08	Auto Reset Delay	2.0s - 20.0s [5.0s]	Stop only

Sets the time between a trip and an auto reset (See P12.07). Some trips cannot be reset or have a minimum time before the trip can be reset, see table below:

Trips	Description
F003	F003 (Under voltage), can be auto reset if the DC bus voltage is above the under voltage threshold.
≥F030	Internal faults cannot be reset
F020	To clear this trip defaults need to be loaded before a reset can clear this trip.
F001, F006	Can be reset after 10s, if trip condition is no longer present.
Other trips	Can reset after 1s, if trip condition is no longer present.

NOTE:

- 1) The reset count is only incremented when the trip is the same as the previous trip. When the reset count reaches the programmed value, any further trip of the same value will not cause an auto-reset.
For example:
P12.07 = 10, the drive continuously initiates F001 trips in a period. The drive initiates a F002 trip after auto reset 5 times. Then F002 trip will be auto reset 10 times
- 2) If there has been no trip for 5 minutes then the reset count is cleared.
- 3) Auto reset will not occur on F001, F018, F020, F30 or above F030 trips
- 4) When a manual reset occurs, the auto reset counter is reset to zero.

Parameter	Parameter name	Range 【Default】	Change mode
12.09	Input Phase Loss Disable	0.0 - 3000.0 [0.1]	Stop only

Setting this parameter to 0.0: Disable input phase loss detection

Setting this parameter to a non-zero value: Enable phase loss detection.

If an input phase is lost, the drive will trip in the time set and the drive will trip on F004.

Parameter	Parameter name	Range 【Default】	Change mode
12.10	Output Phase Loss Disable	0 - 1 [0]	Stop only

Setting this parameter to 1 disables output phase loss detection

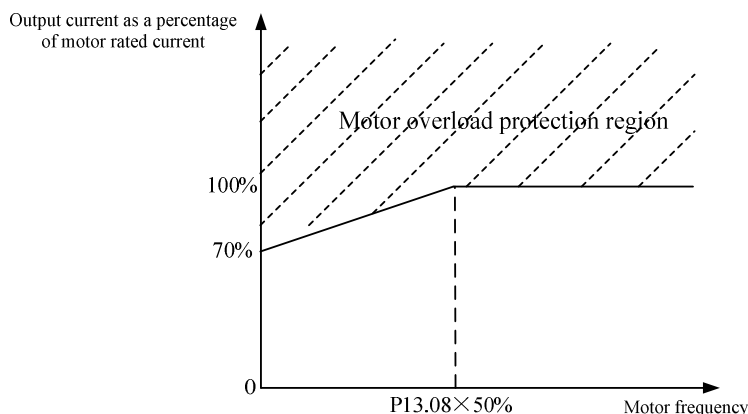
Parameter	Parameter name	Range 【Default】	Change mode
12.11	Overload Protection Mode	0 - 1 [1]	Stop only

This parameter is used to select the overload protection mode:

0: Low speed compensation (for self-cooled motors, shaft mounted fan)

1: No low speed compensation (for force ventilated motors)

On motors that are self-cooled, cooling effects are reduce at low speeds and therefore relevant electronic thermal protection parameters should also be adjusted; low speed compensation of motor protection mode means that when the running frequency is lower than 50% of the maximum running frequency, the motors overload protection value will be decreased as illustrated below:



For example:

Motor rated frequency is 50.00Hz, when output frequency is 10Hz, the corresponding overload protection

action point is: $\frac{100-70}{25-0} \times 10\% + 70\% = 82\%$ motor rated current

When output frequency is 10Hz and output current is 82% motor rated current, the motor overload protection will be active

On motors that are force ventilated, cooling effects **do not** reduce at low speeds and therefore there is no need to adjust the thermal protection for low speeds

Group 12

Parameter	Parameter name	Range 【Default】	Change mode
12.12	Overload Protection Factor	See description below [100%]	Run or stop

Used to protect the motor against overheating, by adjusting how long it takes for the drive to trip when there is an overload condition

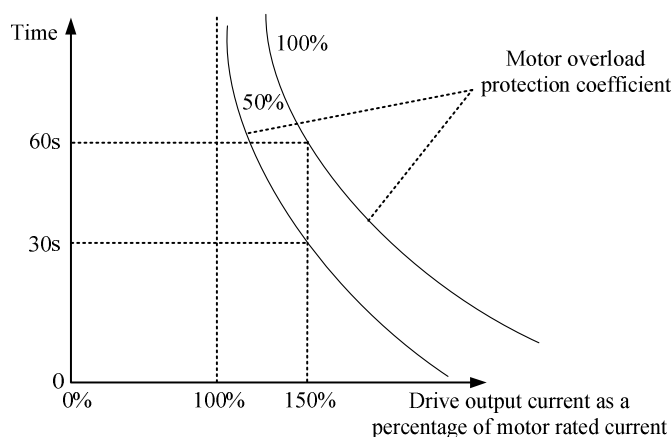
The ratio of drive rated output current and motor rated current defines setting range of this parameter:

For example:

When drive rated output current is 10A and motor rated current is 5A, then the setting range of P12.12 value is 0% to 200.0%

When drive rated output current is 5A and motor rated current is 10A, then the setting range of P12.12 value is 0% to 50.0%

- When motor overload protection factor is set to 0, motor overload protection is disabled
- When P12.12=100% (default), and drive output current is 150% motor rated current, then drive will trips F10 in 60 seconds



The following table shows trip times for different overloads when P12.12 = 100%:

Drive output current/ motor rated current	P12.12=100%, motor overload time before trip
1.1	3000s
1.2	2000s
1.3	500s
1.4	100s
1.5	60s
1.6	30s
1.7	10s
1.8	3s

Parameter	Parameter name	Range 【Default】	Change mode
12.13	Alarm Display Control	0 - 1 [1]	Run or stop

Used to select whether the keypad displays the alarm code when the drive is alarming

0: Alarming is **not** displayed

1: Alarming is displayed

Parameter	Parameter name	Range	Change mode
12.14	External Fault	0 - 1	Read only

If this parameter is set to 1, the drive will trip F018. This parameter can be controlled by a digital input:

For example:

P09.06 = 15 (P12.14): Digital input 5 to control the External fault

P09.16 = 1: Digital input 1 invert

An external trip input is usually a normally closed contact connected between +24V and the assigned digital input. When the normally closed contact connected to Digital Input 5 is opened, the drive will trip F018

Please note: The normally closed contact must be opened for >2s for the External fault to latch

Parameter	Parameter name	Range	Change mode
12.15	Reset	0 - 1	Read only

If this parameter is set to 1, a trip can be reset after eliminating the fault condition. This parameter can be controlled by a digital input:

For example (as default parameters): P09.08 = 11 (P12.15), Digital Input 7 can then be used to reset the drive

Some trips cannot be reset or have a minimum time before the trip can be reset, see table below:

Type	Trips	Description
Auto reset	F003	F003 (Under voltage), can be auto reset if the DC bus voltage is above the under voltage threshold.
Cannot reset	≥F030	Internal faults cannot be reset
EEPROM read & write	F020	To clear this trip defaults need to be loaded before a reset can clear this trip.
Normal trip	F001, F006	Can be reset after 10s, if trip condition is no longer present.
	Other trips	Can reset after 1s, if trip condition is no longer present.

Parameter	Parameter name	Range	Change mode
12.16	Under Voltage Indicator	0 - 1	Read only

Used to indicate if the DC bus voltage is lower than under voltage limit. When the DC bus voltage is lower than under voltage limit, this parameter is set to 1

When this parameter is 1 the drives output stage is inhibited and the drives display will show a F003 trip

Group 12

Parameter	Parameter name	Range	Change mode
12.17	Overload Accumulator On Indicator	0 - 1	Read only

When drive output current exceeds the value in P12.05 for longer than the time set in P12.06, this parameter will change to 1

Parameter	Parameter name	Range	Change mode
12.18	Alarming Indicator	0 - 1	Read only

Used to indicate whether the drive is in alarming:

0: Not alarming

1: Alarming

Parameter	Parameter name	Range 【Default】	Change mode
12.19	Under Voltage Trip Disable	0 - 1 [0]	Run or stop

When this parameter is set to 1, when the drive is powered off in a standby state (not running) the drives display will show OFF while powering down, the healthy state P12.01 will remain at 1 until the drive is completely power off

0: Enable under voltage trip

1: Disable under voltage trip

Group 13: Motor Parameters

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
13.01	Motor Voltage Control Mode	0514H	
13.02	Autotune	0515H	
13.03	Motor map 1 / Motor map 2 Select	0516H	
13.04	Not Used		
13.05	Motor 1 Power Factor	0518H	
13.06	Motor 1 Rated Voltage	0519H	
13.07	Motor 1 Rated Current	051AH	
13.08	Motor 1 Rated Frequency	051BH	
13.09	Motor 1 Poles	051CH	
13.10	Motor 1 Rated Speed	051DH	
13.11	Motor 1 Stator Resistance	051EH	
13.12	Not Used		
13.13	Motor 1 Transient Inductance	0520H	
13.14	Not Used		
13.15	Not Used		
13.16	Not Used		
13.17	Motor 2 Power Factor	0524H	
13.18	Motor 2 Rated Voltage	0525H	
13.19	Motor 2 Rated Current	0526H	
13.20	Motor 2 Rated Frequency	0527H	
13.21	Motor 2 Poles	0528H	
13.22	Motor 2 Rated Speed	0529H	
13.23	Motor 2 Stator Resistance	052AH	
13.24	Not Used		
13.25	Not Used		
13.26	Motor 2 Transient Inductance	052DH	

Group 13: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
13.01	Motor Voltage Control Mode	0 - 2 [0]	Stop only

0: V/f – Voltage / frequency control

1: Open loop vector control 1 (for vector control an autotune must be carried out, see P13.02)

2: Open loop vector control 2 (for vector control an autotune must be carried out, see P13.02). This mode gives a higher starting torque than mode 1.

Note: In an application where a number of motors are connected to one drive, V/f control must be used

Parameter	Parameter name	Range 【Default】	Change mode
13.02	Autotune	0 - 3 [0]	Stop only

Auto tuning is only required when the drive is in open loop vector control, see P13.01

0: no action

1: Static autotune 1 (first run only)

- Set P13.02 = 1
- Press PROG button
- Press ESC button
- Provide a Run command
- The drive will now carry out an autotune and P13.02 will return to 0 when complete

2: Static autotune 2 (every run)

- Set P13.02 = 2
- Press PROG button
- Press ESC button
- Provide a Run command
- The drive will now carry out an autotune every time a run command is given. P13.02 will remain at a value of 2

3: Reserved setting (do not use)

Parameter	Parameter name	Range 【Default】	Change mode
13.03	Motor map 1/ Motor map 2 Select	0 - 1 [0]	Stop only

Selects motor 1 or motor 2 parameters. This parameter can be controlled by a digital input to select between 2 motors and therefore have 2 different motor maps. If controlling the motors in open loop vector mode, motor map 1 should be selected and then an autotune carried out. Then motor map 2 should be selected and another autotune carried out

0: Motor 1 (uses parameters P13.05 to P13.13 for motor settings)

1: Motor 2 (uses parameters P13.17 to P13.26 for motor settings)

NOTE: Each time this parameter is changed the accumulator for motor thermal protection is reset to zero

Parameter	Parameter name	Range 【Default】	Change mode
13.05	Motor 1 Power Factor	0.00 - 1.00 [0.85]	Stop only

Motor 1 nameplate power factor is entered into this parameter

Group 13

Parameter	Parameter name	Range 【Default】	Change mode
13.06	Motor 1 Rated Voltage	200V: 0V - 240V 【230V】 400V: 0V - 480V 【400V】	Stop only

Rated voltage of motor 1 (motor nameplate) is entered into this parameter

Parameter	Parameter name	Range 【Default】	Change mode
13.07	Motor 1 Rated Current	0.1A - By model 【By model】	Stop only

Rated current of motor 1 (motor nameplate) is entered into this parameter

Parameter	Parameter name	Range 【Default】	Change mode
13.08	Motor 1 Rated Frequency	1.00Hz - 300.00Hz [50.00Hz]	Stop only

Rated frequency of motor 1 (motor nameplate) is entered into this parameter

Parameter	Parameter name	Range 【Default】	Change mode
13.09	Motor 1 Poles	0 - 4 [2]	Stop only

0: Auto (according to rated frequency and rated Revolutions Per Minute)

$$\text{Pole pairs} = \frac{60 \times \text{Rated frequency}}{\text{rpm}}$$

Rounded to the nearest even number

For example:

Rated frequency is 50Hz. Rated speed is 1460rpm.

$$N = \frac{60f}{P}$$

$$P = \frac{60f}{N} = \frac{60 \times 50}{1460} = 2.054$$

The motor has 2 pairs of poles (4-pole motor).

1: 2-pole motor

2: 4-pole motor

3: 6-pole motor

4: 8-pole motor

Parameter	Parameter name	Range 【Default】	Change mode
13.10	Motor 1 Rated Speed	0rpm - 18000rpm [0rpm]	Stop only

Rated speed of motor 1 (motor nameplate) is entered into this parameter

Note: For most applications, it is not necessary to enter the motor rated speed. For high inertia applications such as fans, do not enter a motor rated speed as this can lead to instability in the motor and spurious over current or over voltage trips.

Group 13

Parameter	Parameter name	Range 【Default】	Change mode
13.11	Motor 1 Stator Resistance	0.000Ω - 60.000Ω [0.000Ω]	Stop only

After an auto-tune (P13.02 = 1 or 2) has been completed, this parameter will be updated

Parameter	Parameter name	Range 【Default】	Change mode
13.13	Motor 1 Transient Inductance	0.00% - 50.00% [0.00%]	Stop only

After an auto-tune (P13.02 = 1 or 2) has been completed, this parameter will be updated

Parameter	Parameter name	Range 【Default】	Change mode
13.17	Motor 2 Power Factor	0.00 - 1.00 [0.85]	Stop only

Motor 2 nameplate power factor is entered into this parameter

Parameter	Parameter name	Range 【Default】	Change mode
13.18	Motor 2 Rated Voltage	200V: 0V - 240V 【230V】 400V: 0V - 480V 【400V】	Stop only

Rated voltage of motor 2 (motor nameplate) is entered into this parameter

Parameter	Parameter name	Range 【Default】	Change mode
13.19	Motor 2 Rated Current	0.1A - By model 【By model】	Stop only

Rated current of motor 1 (motor nameplate) is entered into this parameter

Parameter	Parameter name	Range 【Default】	Change mode
13.20	Motor 2 Rated Frequency	1.00Hz - 300.00Hz [50.00Hz]	Stop only

Rated frequency of motor 2 (motor nameplate) is entered into this parameter

Group 13

Parameter	Parameter name	Range 【Default】	Change mode
13.21	Motor 2 Poles	0 - 4 [2]	Stop only

0: auto (according to rated frequency and rated rpm)

$$\text{Pole pairs} = \frac{60 \times \text{Rated frequency}}{\text{rpm}}$$

For example:

Rated frequency is 50Hz. Rated speed is 1460rpm.

$$N = \frac{60f}{P}$$

$$P = \frac{60f}{N} = \frac{60 \times 50}{1460} = 2.054$$

The motor has 2 pairs of poles (4-pole motor).

1: 2-pole motor

2: 4-pole motor

3: 6-pole motor

4: 8-pole motor

Parameter	Parameter name	Range 【Default】	Change mode
13.22	Motor 2 Rated Speed	0rpm - 18000rpm [0rpm]	Stop only

Rated speed of motor 2 (motor nameplate) is entered into this parameter

Note: For most applications, it is not necessary to enter the motor rated speed. For high inertia applications such as fans, do not enter a motor rated speed as this can lead to instability in the motor and spurious over current or over voltage trips.

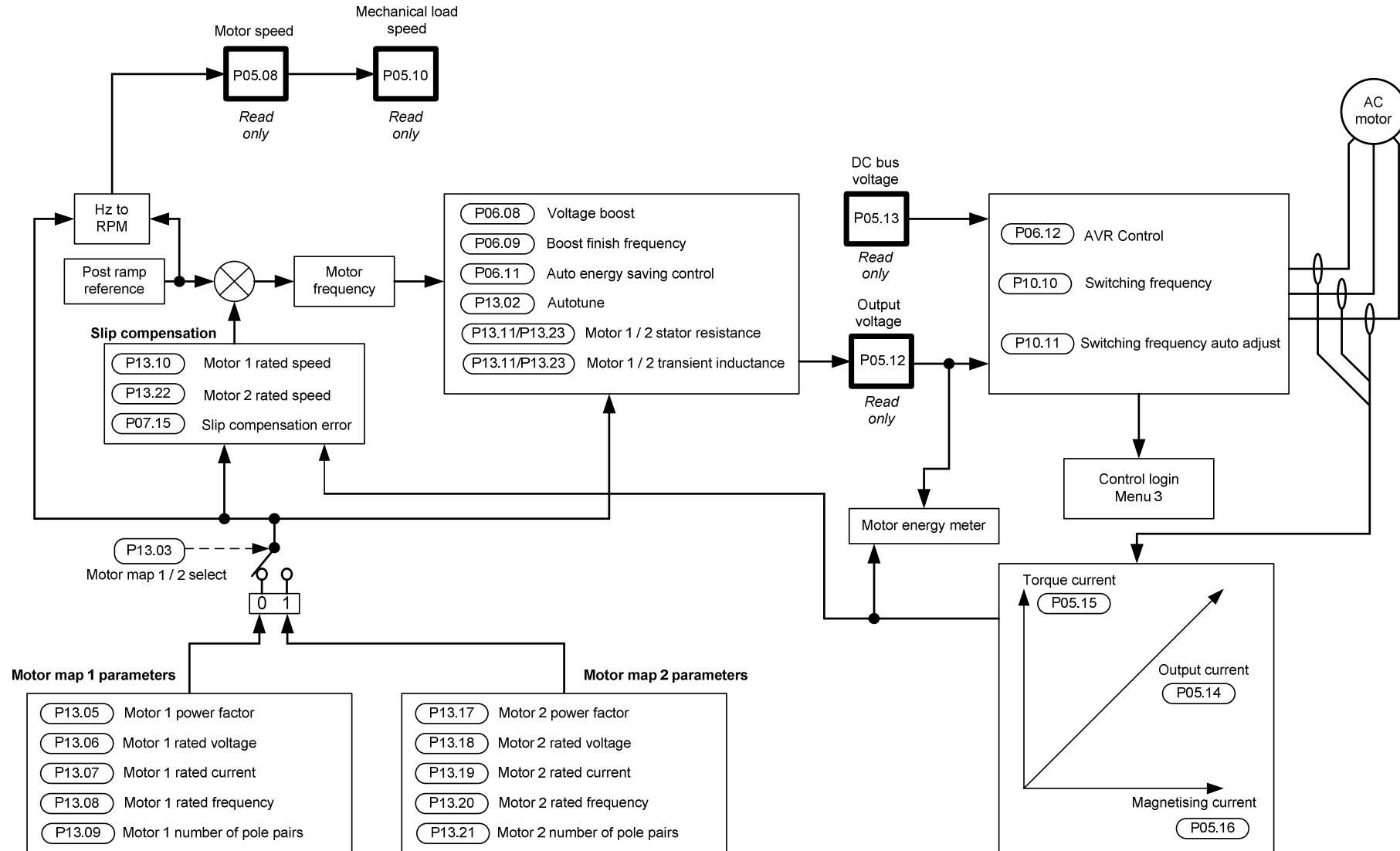
Parameter	Parameter name	Range 【Default】	Change mode
13.23	Motor 2 Stator Resistance	0.000Ω - 60.000Ω [0.000Ω]	Stop only

If Motor 2 is selected, after an auto-tune (P13.02 = 1 or 2) has been completed, this parameter will be updated.

Parameter	Parameter name	Range 【Default】	Change mode
13.26	Motor 2 Transient Inductance	0.00% - 50.00% [0.00%]	Stop only

If Motor 2 is selected, after an auto-tune (P13.02 = 1 or 2) has been completed, this parameter will be updated.

Menu 13 Motor control



Group 14

Group 14: Textile Application Parameters

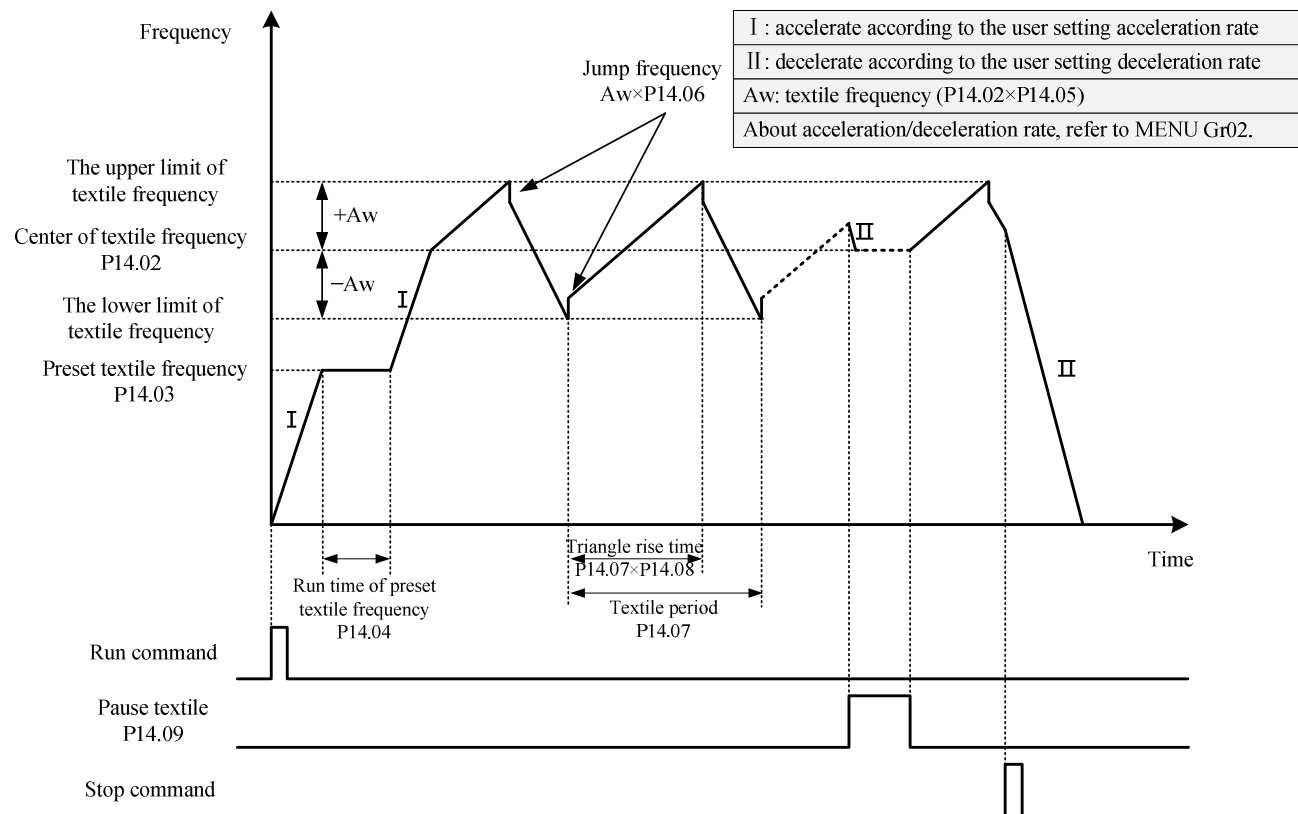
Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
14.01	Textile Function Enable	0578H	
14.02	Centre Of Textile Frequency	0579H	
14.03	Preset Textile Frequency	057AH	
14.04	Run Time Of Preset Textile Frequency	057BH	
14.05	Textile Frequency	057CH	
14.06	Jump Frequency	057DH	
14.07	Textile Period	057EH	
14.08	Triangle Rise Time	057FH	
14.09	Pause Textile	0580H	
14.10	Reference Of Length	0581H	
14.11	Actual Length	0582H	
14.12	Pulse Number Per Unit Length	0583H	
14.13	Actual Length Meets The Reference	0584H	
14.14	Reference Of Number Counting	0585H	
14.15	Set Number	0586H	
14.16	Actual Number Meets Reference Number	0587H	
14.17	Actual Number Meets Set Number	0588H	
14.18	Reset Length Counting	0589H	
14.19	Reset Pulse Counting	058AH	
14.20	Reference Length Upper Limit	058BH	
14.21	Pulse Number per Unit Length Upper Limit	058CH	
14.22	Reference Number Counting Upper Limit	058DH	

Group 14: Textile Application Function Overview

The Textile function is used in the textile, chemical fiber industry and can be adapted to other applications e.g. traversing or winding function

Typical operation diagram:



A typical process is as follows:

- 1) Accelerate to preset textile frequency (P14.03) according to acceleration rate the user selected
- 2) The frequency remains constant for the time set the run time of preset textile frequency (P14.04)
- 3) Accelerate to centre of textile frequency (P14.02)
- 4) Run according to the setting textile frequency (P14.05), jump frequency (P14.06), textile period (P14.07) and triangle rise time (P14.08)
- 5) When as top command is given, the drive stops according to deceleration rate and stop mode selected

Group 14: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
14.01	Textile Function Enable	0 - 1 [0]	Stop only

Used to enable the textile function

0: Textile function is disabled

1: Textile function is enabled

NOTE: When jog or PLC running, textile function is disabled automatically

Parameter	Parameter name	Range 【Default】	Change mode
14.02	Centre Of Textile Frequency	0.00Hz - P1.02Hz [0.00Hz]	Run or stop

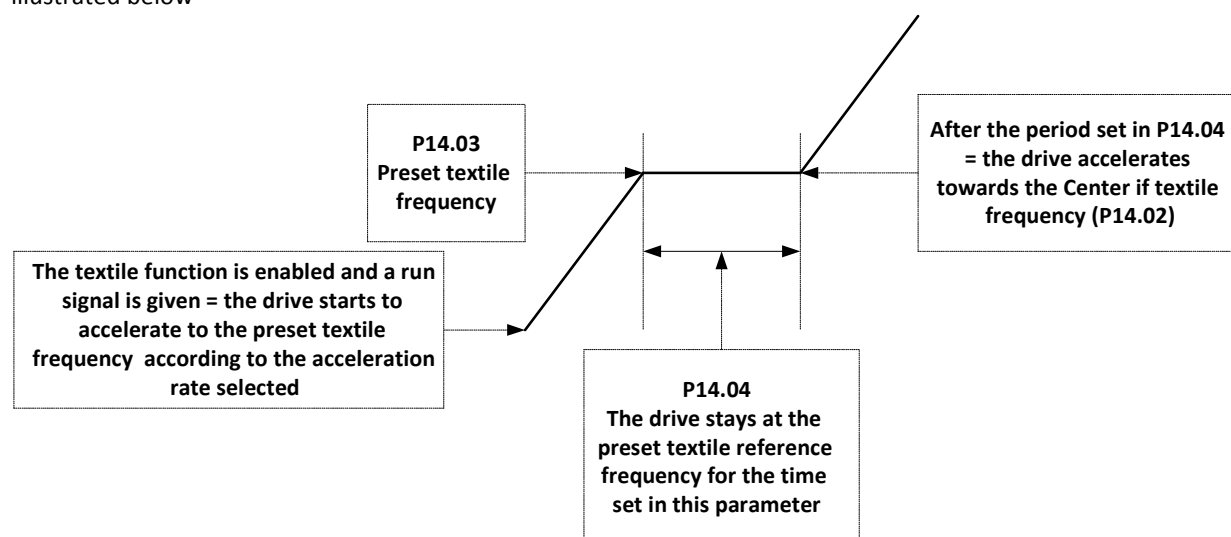
Used to set the centre of textile frequency. The centre of textile frequency is illustrated in the typical operation diagram above

Parameter	Parameter name	Range 【Default】	Change mode
14.03	Preset Textile Frequency	0.00Hz - P1.02Hz [0.00Hz]	Run or stop

When the textile function is enabled the drive will run to the frequency set in this parameter according to the acceleration rate selected. See the illustration in the description for P14.04

Parameter	Parameter name	Range 【Default】	Change mode
14.04	Run Time Of Preset Textile Frequency	0.0s - 3600.0s [0.0s]	Run or stop

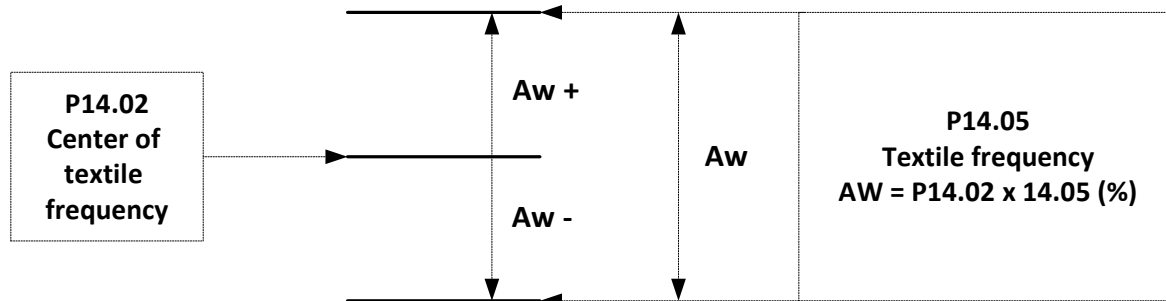
When the textile function is enabled the drive will run to the frequency set in P14.03 parameter according to the acceleration rate selected. Parameter P14.04 sets how long the drive will stay at the preset frequency as illustrated below



Group 14

Parameter	Parameter name	Range 【Default】	Change mode
14.05	Textile Frequency	0.0% - 50.0% [0.0%]	Run or stop

Sets a window around P14.02 as illustrated below



Parameter	Parameter name	Range 【Default】	Change mode
14.06	Jump Frequency	0.0% -50.0% [0.0%]	Run or stop

Jump frequency = $AW \times P14.06$

See the typical operation diagram above, which illustrate how this affects the textile function

Parameter	Parameter name	Range 【Default】	Change mode
14.07	Textile Period	0.1s - 1000.0s [10.0s]	Run or stop

Sets how long 1 textile cycle will last and effects the frequency rise and fall times around the centre of textile frequency (P14.02)

See the Typical operation diagram above, which illustrate how this affects the textile function

Parameter	Parameter name	Range 【Default】	Change mode
14.08	Triangle Rise Time	0.0% - 100.0% [50.0%]	Run or stop

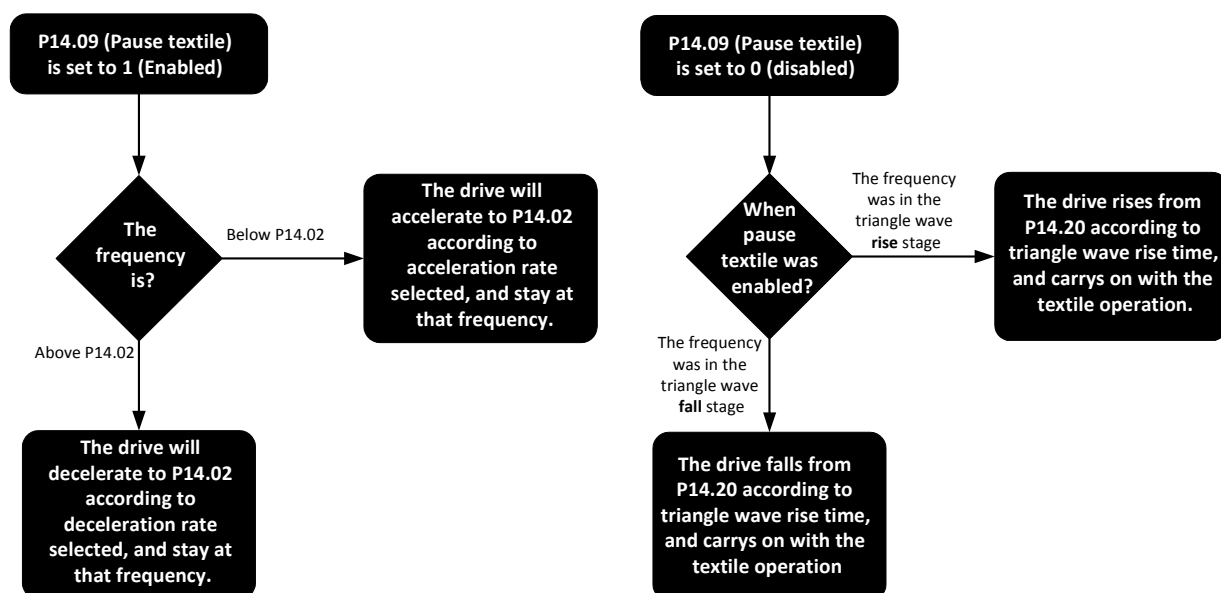
Used to define the triangle wave rise time. The actual triangle wave rise time is $P14.07 \times P14.08$

See the Typical operation diagram above, which illustrate how this affects the textile function

Group 14

Parameter	Parameter name	Range	Change mode
14.09	Pause Textile	0 - 1	Read only

Used to pause the textile function, the flow diagram below illustrates what will happen with this parameter is enabled or disabled



NOTE: When a stop command is given, pause textile (P14.09) is disabled automatically

Parameter	Parameter name	Range 【Default】	Change mode
14.10	Reference of length	0 - 60000 unit length [1000]	Run or stop

The required length is set in this parameter

Parameter	Parameter name	Range	Change mode
14.11	Actual length	0 - 60000 unit length	Read only

Displays the actual length which is counted through digital input DI6 (P09.23 = 1)

- Actual length = length counting pulse number/pulse number per unit length (P14.12)
- The actual length is shown on the display is rounded up; the internal value is accurate to one decimal place
- See description for P14.12

Group 14

Parameter	Parameter name	Range 【Default】	Change mode
14.12	Pulse Number Per Unit Length	0.1 - 6000.0 [100.0]	Run or stop

Sets how many pulses equal 1 unit length. This is required to calculate the actual length (P14.11)

The following table shows an example of different actual lengths with different settings:

Sum of length pulse		2	4	6	8	10
The value of P14.11 when the value of P14.12 is set to different value	P14.12=0.8	2	5	7	10	12
	P14.12=2.0	1	2	3	4	5
	P14.12=2.4	0	1	2	3	4

Parameter	Parameter name	Range	Change mode
14.13	Actual Length Meets The Reference	0 - 1	Read only

Used to indicate when the actual reference meets the reference

Parameter	Parameter name	Range 【Default】	Change mode
14.14	Reference Of Number Counting	1 - 60000 [1000]	Run or stop

When the number of pulses counted reaches the number set in this parameter, P14.16 is set to 1

Parameter	Parameter name	Range 【Default】	Change mode
14.15	Set Number	1 - P14.14 [1000]	Run or stop

When the number of pulses counted reaches the number set in this parameter, P14.17 is set to 1

Parameter	Parameter name	Range	Change mode
14.16	Actual Number Meets Reference Number	0 - 1	Read only

When the actual number of pulses counted meets P14.14, this parameter changes to 1. When the next pulse arrives this parameter changes to 0. See the example in the description for P14.17, which illustrates how this parameter works

Parameter	Parameter name	Range	Change mode
14.17	Actual Number Meets Set Number	0 - 1	Read only

When the actual number of pulses counted meets P14.15, this parameter changes to 1, the counter continues to count. When the actual number meets reference number counting (P14.14), P14.17 is reset. Set number counting (P14.15) should be less than or equal to reference number counting (P14.14). See the example below that illustrates how this parameter works

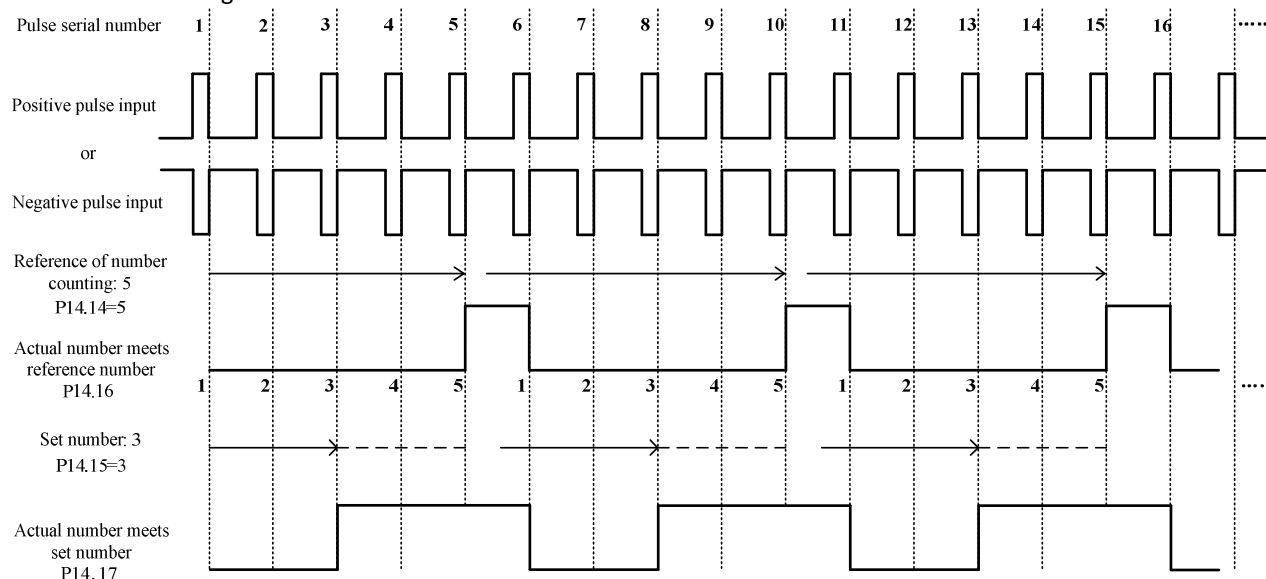
- The number counting is counted through the digital input terminal (DI6) input pulse signal (P09.23 = 2), the maximum input frequency is 60.00Hz.

Example:

P14.14= 5 (reference of number counting is 5)

P14.15= 3 (set number counting is 3)

The results as the figure below:



Parameter	Parameter name	Range	Change mode
14.18	Reset Length Counting	0 - 1	Read only

When the parameter is set to 1, the length counting is reset to 0

Parameter	Parameter name	Range	Change mode
14.19	Reset Pulse Counting	0 - 1	Read only

When the parameter is set to 1, the number counting is reset to 0

Parameter	Parameter name	Range 【Default】	Change mode
14.20	Reference Length Upper Limit	0 - 30000 [1000]	Stop only

Used to limit the range of P14.10

Parameter	Parameter name	Range 【Default】	Change mode
14.21	Pulse Number per Unit Length Upper Limit	0 - 30000 [1000]	Stop only

Used to limit the range of P14.12

Parameter	Parameter name	Range 【Default】	Change mode
14.22	Reference Number Counting Upper Limit	0 - 30000 [1000]	Stop only

Used to limit the range of P14.15

Group 14

Worked example

Settings from defaults:

P01.02 = 120.00: the maximum running frequency is 120.00Hz

P02.04 = 12.0: acceleration rate1 is 12.0s

P02.05 = 6.0: deceleration rate1 is 6.0s

P14.01 = 1: textile function is enabled

P14.02 = 80.00: centre of textile frequency is 80.00Hz

P14.03 = 45.00: preset textile frequency is 45.00Hz

P14.04 = 6.0: run time of preset textile frequency is 6.0s

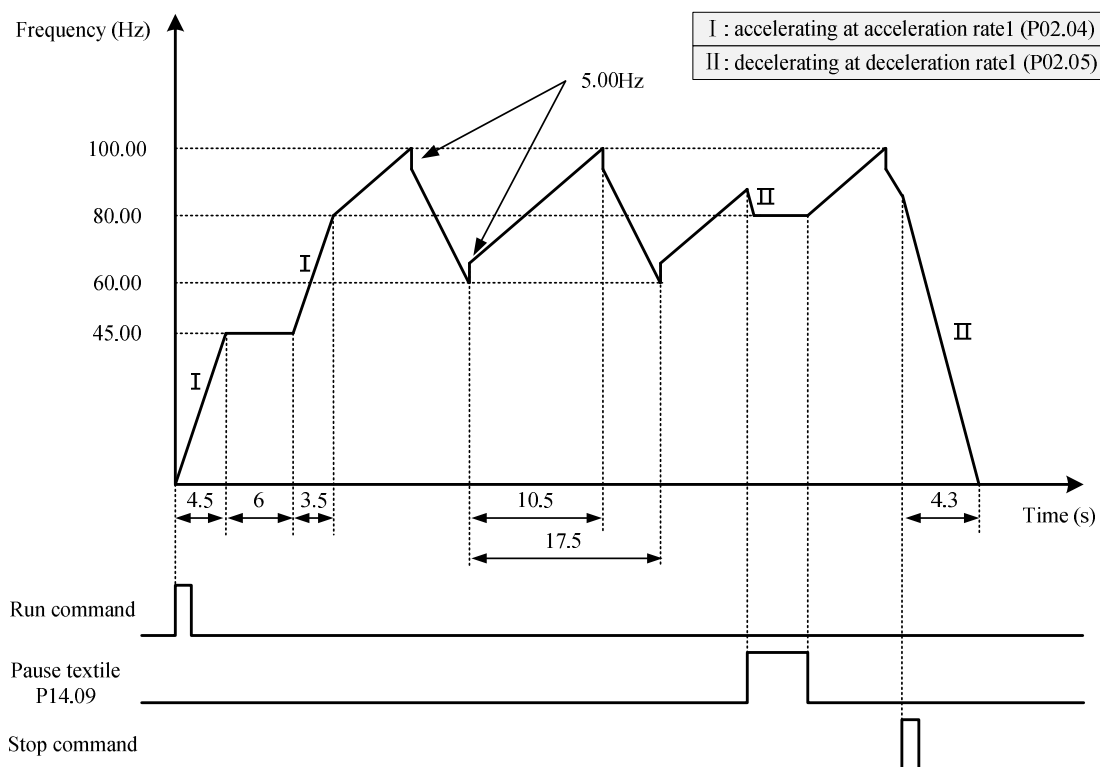
P14.05 = 25.0: textile frequency is $A_w = P14.02 \times 25.0\% = 20.00\text{Hz}$. The upper limit of textile frequency is 100.00Hz and the lower limit of textile frequency is 60.00Hz

P14.06 = 25.0: jump frequency is $A_w \times 25.0\% = 5.00\text{Hz}$

P14.07 = 17.5: textile period is 17.5s

P14.08 = 60.0: triangle rise time is $P14.07 \times 60.0\% = 10.5\text{s}$

Press "RUN" key, and the drive will output as the following diagram:



Group 15

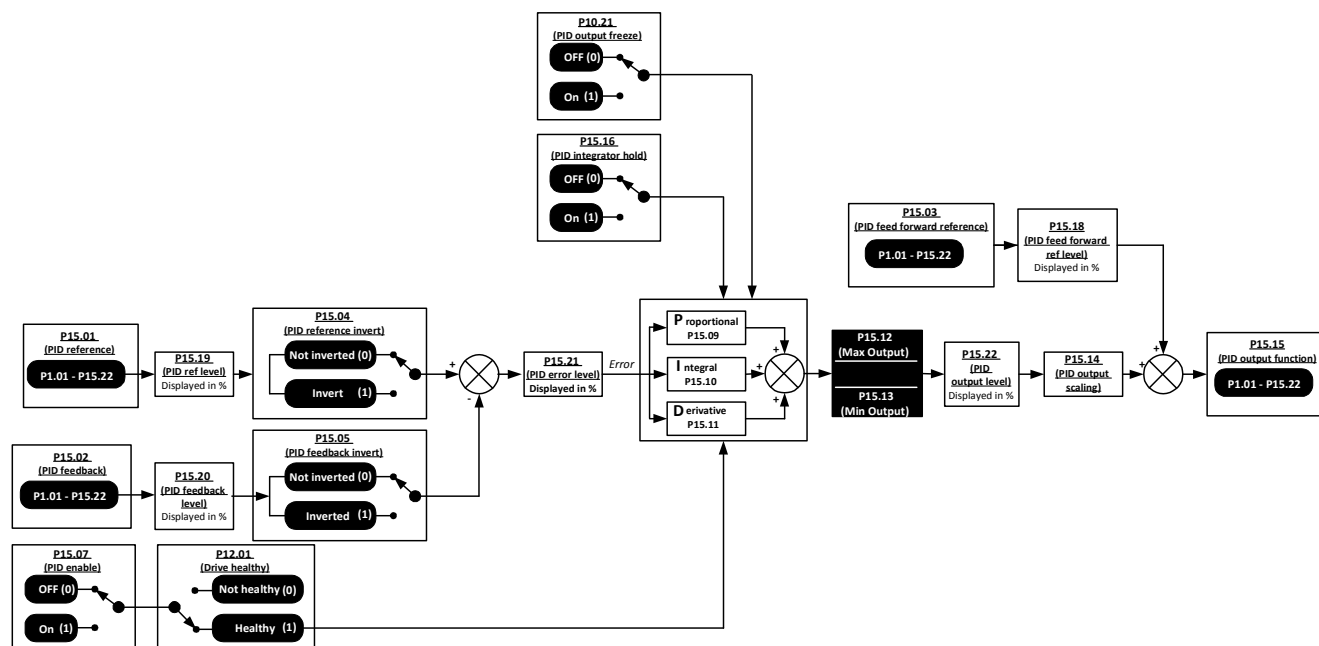
Group 15: PID controller

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
15.01	PID Reference	05DCH	
15.02	PID Feedback	05DDH	
15.03	PID Feed Forward Reference	05DEH	
15.04	PID Reference Invert	05DFH	
15.05	PID Feedback Invert	05E0H	
15.06	PID reference slew rate	05E1H	
15.07	PID Enable	05E2H	
15.08	Not Used		
15.09	PID Proportional Gain	05E4H	
15.10	PID Integral Gain	05E5H	
15.11	PID Derivative Gain	05E6H	
15.12	PID Maximum Output	05E7H	
15.13	PID Minimum Output	05E8H	
15.14	PID Output Scaling	05E9H	
15.15	PID Output Function	05EAH	
15.16	PID Hold	05EBH	
15.17	P15.12 & P15.13 range	05ECH	
15.18	PID Feed Forward Reference Level	05EDH	
15.19	PID Reference Level	05EEH	
15.20	PID Feedback Level	05EFH	
15.21	PID Error Level	05F0H	
15.22	PID Output Level	05F1H	
15.23	Sleep Mode Enable	05F2H	
15.24	Sleep Channel Selector	05F3H	
15.25	Sleep threshold	05F4H	
15.26	Sleep Delay Time	05F5H	
15.27	Wakeup Mode	05F6H	
15.28	Wakeup Channel Selector	05F7H	
15.29	Wakeup Threshold	05F8H	
15.30	Wakeup Delay	05F9H	
15.31	Not Used		
15.32	Not Used		
15.33	Not Used		
15.34	Sleep Status Indicator	05FDH	

NOTE: The PID function is only active if the output destination (P15.15) is routed to a valid unprotected parameter. If only the indicator parameters are required, the destination parameter should be routed to an unused valid parameter

Group 15: PID controller overview diagram



Group 15: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
15.01	PID Reference	P0.00 - P18.08 [P0.00]	Run or stop

Used to set the PID reference (process set point)

For example:

- If this parameter was set to P04.01 (Preset 1), then the PID reference would be the value set in P04.01 as a percentage
- If P04.01 (preset 1) was set to 25Hz and P01.02 (maximum reference) = 50Hz, the PID reference would be 50%

Parameter	Parameter name	Range 【Default】	Change mode
15.02	PID Feedback	P0.00 - P18.08 [P0.00]	Run or stop

Used to set the PID feedback (process variable)

For example:

- If this parameter was set to P01.21 (AI2), then the PID feedback would be the level of AI2 as a percentage (P08.18)
- If AI2 was at 5V, P08.08 (AI2 level) would display 50% and the PID feedback would be 50%

Parameter	Parameter name	Range 【Default】	Change mode
15.03	PID Feed Forward Reference	P0.00 - P18.08 [P0.00]	Run or stop

Used to set a source value that can be added to the output of the PID block, see the logic diagram above.

Although the most likely use of this feature is for a feed forward function it can be used for other functions depending on the application requirements

Parameter	Parameter name	Range 【Default】	Change mode
15.04	PID Reference Invert	0 - 1 [0]	Run or stop

Used to invert the PID reference

Parameter	Parameter name	Range 【Default】	Change mode
15.05	PID Feedback Invert	0 - 1 [0]	Run or stop

Used to invert the PID feedback

Parameter	Parameter name	Range 【Default】	Change mode
15.06	PID reference slew rate	0.0 – 3200.0s [0.0s]	Run or stop

Defines the time taken for the reference input to ramp from 0.0 to 100.0% following a 0 to 100% step change in input

Parameter	Parameter name	Range 【Default】	Change mode
15.07	PID Enable	0 - 1 [0]	Run or stop

Used to enable the PID controller:

0: PID controller disabled

1: PID controller enabled

Parameter	Parameter name	Range 【Default】	Change mode
15.09	PID Proportional Gain	0.000 - 4.000 [1.000]	Run or stop

Used to set the proportional gain applied to the PID error

- The Proportional term produces an output value that is proportional to the present error value
- If the PID proportional gain is set too high, the system can become unstable
- If the PID proportional gain is set to low, the system will be less responsive to an error

Parameter	Parameter name	Range 【Default】	Change mode
15.10	PID Integral Gain	0.000 - 4.000 [0.500]	Run or stop

Used to set the integral gain

- The integral term changes the output according to the past errors. The integral is the sum of the errors over time
- The integral gain eliminates offset

Parameter	Parameter name	Range 【Default】	Change mode
15.11	PID Derivative Gain	0.000 - 4.000 [0.000]	Run or stop

Used to set the derivative gain

- The derivative term calculates the rate of change of the error and adds to the output
- The derivative term can reduce the time taken to respond to a change in the error but can cause overshoots and make the system unstable. It also makes the controller sensitive to noise and is therefore usually left at 0 and only used to enhance the system in a small number of cases

Parameter	Parameter name	Range 【Default】	Change mode
15.12	PID Maximum Output	0.0% - 100.0% [100.0%]	Run or stop

Maximum output of the PID controller

Parameter	Parameter name	Range 【Default】	Change mode
15.13	PID Minimum Output	-100.0% - 100.0% [0.0%]	Run or stop

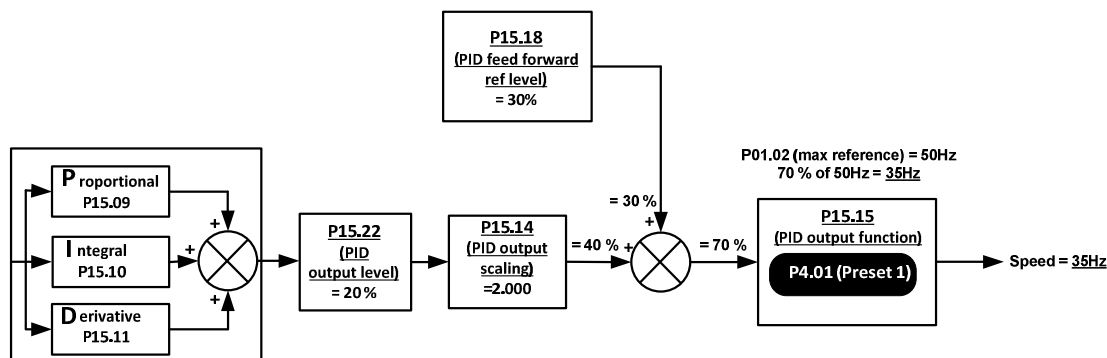
Minimum output of the PID controller

Group 15

Parameter	Parameter name	Range 【Default】	Change mode
15.14	PID Output Scaling	0.000 - 4.000 [1.000]	Run or stop

The PID output is scaled by this parameter before being added to the feed forward reference. After the addition to the feed forward reference, the output is automatically scaled again to match the range of the controlled parameter

Example:



Parameter	Parameter name	Range 【Default】	Change mode
15.15	PID Output Function	P0.00 - P18.08 [P0.00]	Run or stop

Set with the parameter that the PID controller is to control

Parameter	Parameter name	Range 【Default】	Change mode
15.16	PID Hold	0 - 1 [0]	Run or stop

Used to freeze the integrator value

Parameter	Parameter name	Range 【Default】	Change mode
15.17	PID P15.12 & P15.13 range	0 - 1 [0]	Run or stop

0: PID minimum & maximum output is defined by the settings of P15.12 & P15.13

1: PID minimum & maximum output is defined by the setting of P15.12 so min and max are both the same positive and negative value

Parameter	Parameter name	Range	Change mode
15.18	PID Feed Forward Reference Level	-100.0% - 100.0%	Read only

Displays the feed forward reference input of the PID controller

Parameter	Parameter name	Range	Change mode
15.19	PID Reference Level	-100.0% - 100.0%	Read only

Displays the reference input of the PID controller

Parameter	Parameter name	Range	Change mode
15.20	PID Feedback Level	-100.0% - 100.0%	Read only

Displays the feedback input of the PID controller

Parameter	Parameter name	Range	Change mode
15.21	PID Error Level	-100.0% - 100.0%	Read only

Displays the error of the PID controller

PID error = PID reference — PID feedback

Parameter	Parameter name	Range	Change mode
15.22	PID Output Level	-100.0% - 100.0%	Read only

Displays the output of the PID controller

Parameter	Parameter name	Range 【Default】	Change mode
15.23	Sleep Mode Enable	0 - 1 [0]	Stop only

0: Sleep mode disabled

1: Sleep mode enabled

Parameter	Parameter name	Range 【Default】	Change mode
15.24	Sleep Channel Selector	P00.00 - P18.08 [P05.11]	Stop only

This parameter is used to select the sleep channel. As default, the sleep channel is output frequency.

Parameter	Parameter name	Range 【Default】	Change mode
15.25	Sleep Threshold	0.00Hz - P01.02 [P15.24=P05.11] 0.0% - 100% [P15.24 = other]	Stop only

When P15.24 is set to P05.11, the absolute value of the output frequency is less than or equal to the setting value of P15.25 and it keeps over the sleep delay time (P05.26), then the drive blocks output and the keypad displays “H007”

When P15.24 is set to other parameters, the percentage of the corresponding parameter absolute value is less than or equal to the setting percentage of P15.25 and it keeps over the sleep delay time (P05.26), then the drive blocks output and the keypad displays “H007”

Parameter	Parameter name	Range 【Default】	Change mode
15.26	Sleep Delay Time	0.0 - 3000.0s [30.0s]	Stop only

Parameter	Parameter name	Range 【Default】	Change mode
15.27	Wakeup Mode	0 - 1 [1]	Stop only

When P15.27 = 0, the absolute value of the setup parameter of P15.28 (wakeup channel) is less than P15.29 (wakeup threshold) for a period of time over the wakeup delay time (P15.30), then the drive will access wakeup mode from sleep mode. The drive will run according to the parameter settings.

When P15.27 = 1, the absolute value of the setup parameter of P15.28 (wakeup channel) is more than P15.29 (wakeup threshold) for a period of time over the wakeup delay time (P15.30), then the drive will access wakeup mode from sleep mode. The drive will run according to the parameter settings.

Parameter	Parameter name	Range 【Default】	Change mode
15.28	Wakeup Channel Selector	P00.00 - P18.08 [P15.20]	Stop only

Group 15

Parameter	Parameter name	Range 【Default】	Change mode
15.29	Wakeup Threshold	0.0% - 100.0% [0.0%]	Stop only

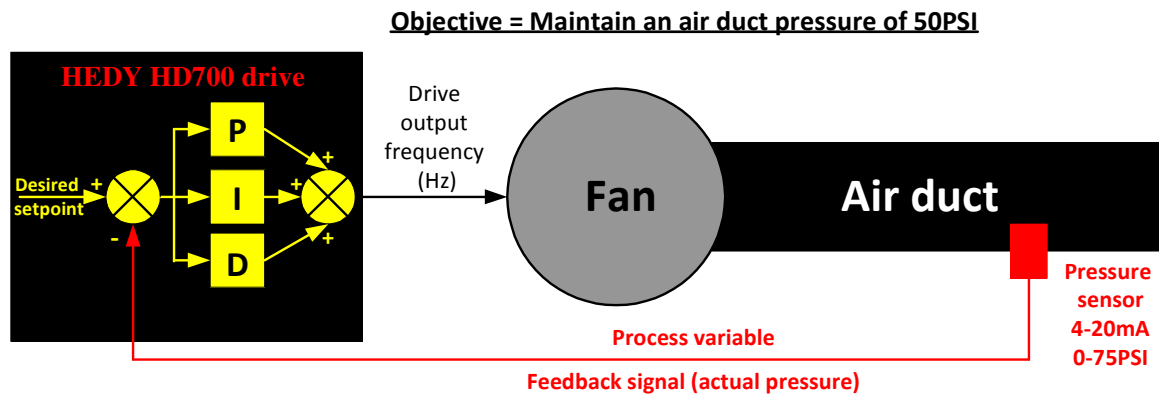
Parameter	Parameter name	Range 【Default】	Change mode
15.30	Wakeup Delay Time	0.0 - 3000.0s [0.0s]	Stop only

P15.31 to P15.33: Not Used

Parameter	Parameter name	Range	Change mode
15.34	Sleep Status Indicator	0 - 1	Read only

When P15.34 is set to a 1, this indicates that the drive is in 'Sleep Mode' and the drives display will show "H007"

Worked example



Set extended parameter group access
P00.23 = 1

Set analogue input 1 as PID feedback
P08.02 (AI1 mode) = **2** (4-20mA with trip)
15.02 (PID feedback) = **08.17** (AI1 level)

Set Preset 1 to be PID reference (desired set point)
P15.01 (PID reference) = **04.01** (Preset 1)

Setting for Preset 1 (desired reference)
 50 PSI in percentage:

75PSI is 100%, 50PSI = $50/75 \times 100 = 66\%$

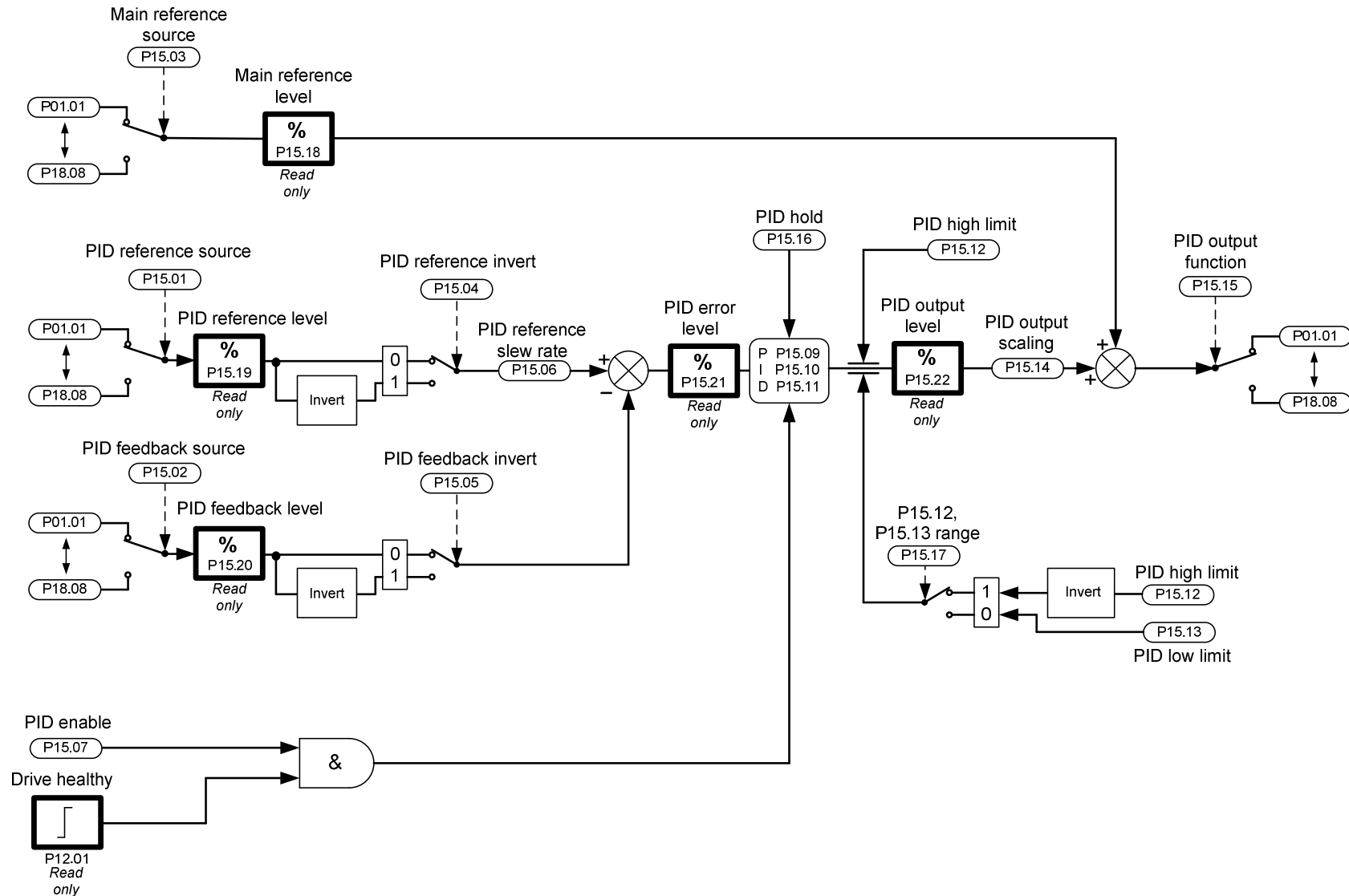
100% of P04.01 = 50Hz, 66% of 50Hz = 33Hz
P04.01 (preset 1) = **33Hz**

Enable the PID
P15.07 (PID enable) = **1** (enable)

Set PID output function
P22.01 (easy mode) = **0** (OFF)
P01.01 (reference selector) = **8** (user defined)
P15.15 (PID output function) = **P01.27** (user defined main auxiliary reference)

- **The PID controller is now set up to control the pressure in the air duct, but the PID loop is not tuned**

Parameters P15.09 (P gain), P15.10 (I gain) & P15.11 (D gain) may need adjusting depending on the response required to a change in feedback signal.



Note: The PID function is only active if the PID output function is routed to a valid unprotected parameter. If only the indicator parameters are required, the PID output function should be routed to a valid unused parameter e.g. P04.16 – preset speed 16

Group 16

Group 16: Programmable logic & binary sum

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
16.01	Block 1 source 1	0640H	
16.02	Block 1 source 1 invert	0641H	
16.03	Block 1 source 2	0642H	
16.04	Block 1 source 2 invert	0643H	
16.05	Block 1 output invert	0644H	
16.06	Block 1 output delay	0645H	
16.07	Block 1 output function	0646H	
16.08	Block 2 source 1	0647H	
16.09	Block 2 source 1 invert	0648H	
16.10	Block 2 source 2	0649H	
16.11	Block 2 source 2 invert	064AH	
16.12	Block 2 output invert	064BH	
16.13	Block 2 output delay	064CH	
16.14	Block 2 output function	064DH	
16.15	Sum one's input	064EH	
16.16	Sum two's input	064FH	
16.17	Sum four's input	0650H	
16.18	Binary sum offset	0651H	
16.19	Binary sum output function	0652H	
16.20	Block 1 output indicator	0653H	
16.21	Block 2 output indicator	0654H	

Group 16: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
16.01	Block 1 source 1	P0.00 - P18.08 [P0.00]	Stop only

The source parameters define the inputs for the logic function blocks.

Bit parameters (0-1) can be used for the source inputs.

If a non-bit parameter is selected as the input of the logic function, the input for the source of the programmable logic function is 1 when the value of source parameter is equal or more than 50% of its maximum. The input for source 1 of the programmable logic function is 0 when the value of source parameter is less than 50% of its maximum.

Parameter	Parameter name	Range 【Default】	Change mode
16.02	Block 1 source 1 invert	0 - 1 [0]	Run or stop

Setting this parameter to a logic 1 causes the logic function input to be inverted

Parameter	Parameter name	Range 【Default】	Change mode
16.03	Block 1 source 2	P0.00 - P18.08 [P0.00]	Stop only

See description for P16.01

Parameter	Parameter name	Range 【Default】	Change mode
16.04	Block 1 source 2 invert	0 - 1 [0]	Run or stop

See description for P16.02

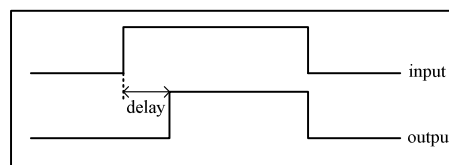
Parameter	Parameter name	Range 【Default】	Change mode
16.05	Block 1 output invert	0 - 1 [0]	Run or stop

Setting this parameter to a logic 1 causes the logic function block output to be inverted

Parameter	Parameter name	Range 【Default】	Change mode
16.06	Block 1 output delay	0.0 - ±3000.0s [0.0s]	Run or stop

The parameter defines the delay time for the output sense from the logic functions changing. When the output changes, the block 1 output (P16.20) will change after the delay time.

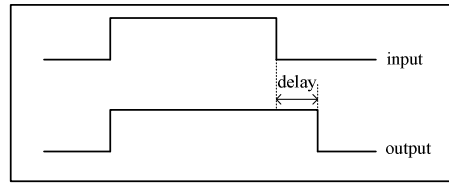
If the delay parameter is positive, the delay ensures that the output does not become active until an active condition has been present at the input for the delay time as shown below.



Logic function 1 delay parameter is positive

Group 16

If the delay parameter is negative, the delay holds the output active for the delay period after the active condition has been removed as shown below. Therefore, an active input that lasts for as long as the sample time or more will produce an output that lasts at least as long as the delay time.



Logic function 1 delay parameter is negative

Parameter	Parameter name	Range 【Default】	Change mode
16.07	Block 1 output function	P0.00 - P18.08 [P0.00]	Stop only

Set with the parameter the programmable logic block 1 is to control

Parameter	Parameter name	Range 【Default】	Change mode
16.08	Block 2 source 1	P0.00 - P18.08 [P0.00]	Stop only

See description for P16.01

Parameter	Parameter name	Range 【Default】	Change mode
16.09	Block 2 source 1 invert	0 - 1 [0]	Run or stop

See description for P16.02

Parameter	Parameter name	Range 【Default】	Change mode
16.10	Block 2 source 2	P0.00 - P18.08 [P0.00]	Stop only

See description for P16.01

Parameter	Parameter name	Range 【Default】	Change mode
16.11	Block 2 source 2 invert	0 - 1 [0]	Run or stop

See description for P16.02

Parameter	Parameter name	Range 【Default】	Change mode
16.12	Block 2 output invert	0 - 1 [0]	Run or stop

See description for P16.05

Group 16

Parameter	Parameter name	Range 【Default】	Change mode
16.13	Block 2 output delay	0.0 - ±3000.0s [0.0s]	Run or stop

See description for P16.06

Parameter	Parameter name	Range 【Default】	Change mode
16.14	Block 2 output function	P0.00 - P18.08 [P0.00]	Stop only

See description for P16.07

Parameter	Parameter name	Range 【Default】	Change mode
16.15	Sum one's input	0 - 1 [0]	Run or stop

Parameters P16.15, P16.16 & P16.17 are three bit input parameters of a binary to decimal conversion function. These bit inputs are processed as 3-bit binary numbers by the binary to decimal conversion function and the output results range is 0 to 7 (before P16.18 output results offset).

These parameters only have two statuses: 0 or 1. When they are routed as destination parameters and the source parameter is a non-bit parameter, the bit input will be 1 if the value of source parameter is equal or more than 50% of its maximum. The bit input will be 0 if the value of source parameter is less than 50% of its maximum.

Parameter	Parameter name	Range 【Default】	Change mode
16.16	Sum two's input	0 - 1 [0]	Run or stop

See parameter P16.15

Parameter	Parameter name	Range	Change mode
16.17	Sum four's input	0 - 1 [0]	Run or stop

See parameter P16.15

Parameter	Parameter name	Range	Change mode
16.18	Binary sum offset	0 - 248 [0]	Run or stop

This parameter is used to increase binary sum output results. The value of this parameter is an integer between 0 and 248.

Parameter	Parameter name	Range	Change mode
16.19	Binary sum output function	P0.00 - P18.08 [P0.00]	Stop only

This parameter defines the parameter to be controlled by the binary to decimal conversion logic function. It is used to route the output to destination parameters.
Only non-protected parameters can be programmed as a destination.

Parameter	Parameter name	Range	Change mode
16.20	Block 1 output indicator	0 - 1	Read only

Displays the state of the block 1 output

Group 16

Parameter	Parameter name	Range	Change mode
16.21	Block 2 output indicator	0 - 1	Read only

Displays the state of the block 2 output

Parameter	Parameter name	Range	Change mode
16.22	Binary sum output level	0 - 255	Read only

Displays the level of the binary sum output.

The binary sum output is given by:

$$P16.22 = P16.17 \times 2^2 + P16.16 \times 2^1 + P16.15 \times 2^0 + P16.18$$

The value written to the destination parameter is defined as follows:

If maximum of the destination parameter is $\leq (7 + P16.18)$:

The value in the destination parameter = the binary sum output (P16.22), if the binary sum output < the maximum of the destination parameter.

The value in the destination parameter = the maximum of the destination parameter, if the binary sum output > the maximum of the destination parameter.

If maximum of the destination parameter > $(7 + P16.18)$:

The value in the destination parameter =

the maximum of the destination parameter X the binary sum output (P16.22)/(7+P16.18)

Examples

The table below shows how the binary sum function operates with 0 offset (P16.18=0)

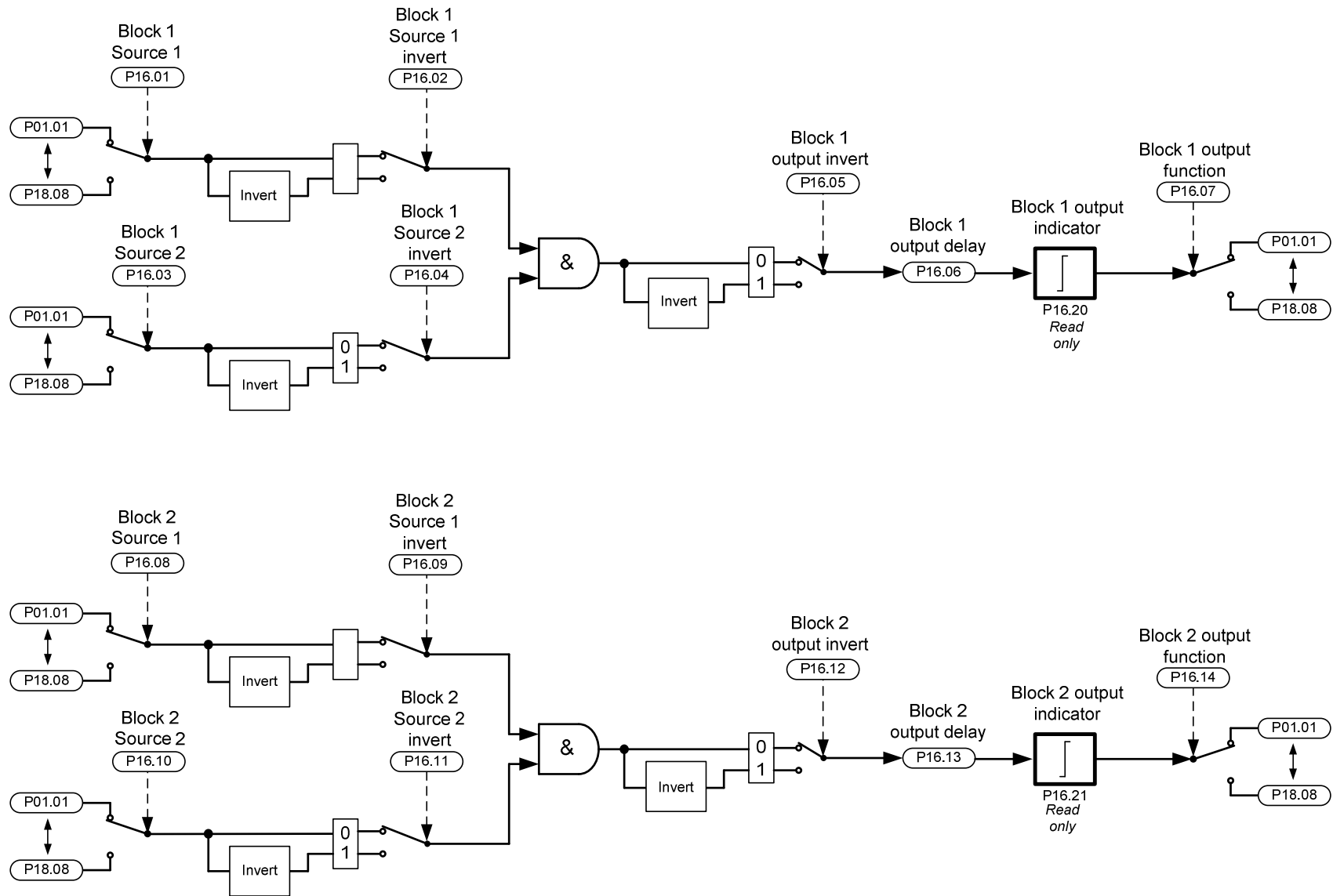
Four's input (P16.17)	Two's input (P16.16)	One's input (P16.15)	Binary sum output (P16.22)	Value in destination parameter	
				Destination parameter with a maximum value of 7 or less, i.e. P03.05 with a range of 0 to 4	Destination parameter with a maximum value of greater than 7, i.e. P10.05 with a range of 0 to 250
0	0	0	0	0	0
0	0	1	1	1	35
0	1	0	2	2	71
0	1	1	3	3	107
1	0	0	4	4	143
1	0	1	5	4	178
1	1	0	6	4	214
1	1	1	7	4	250

Group 16

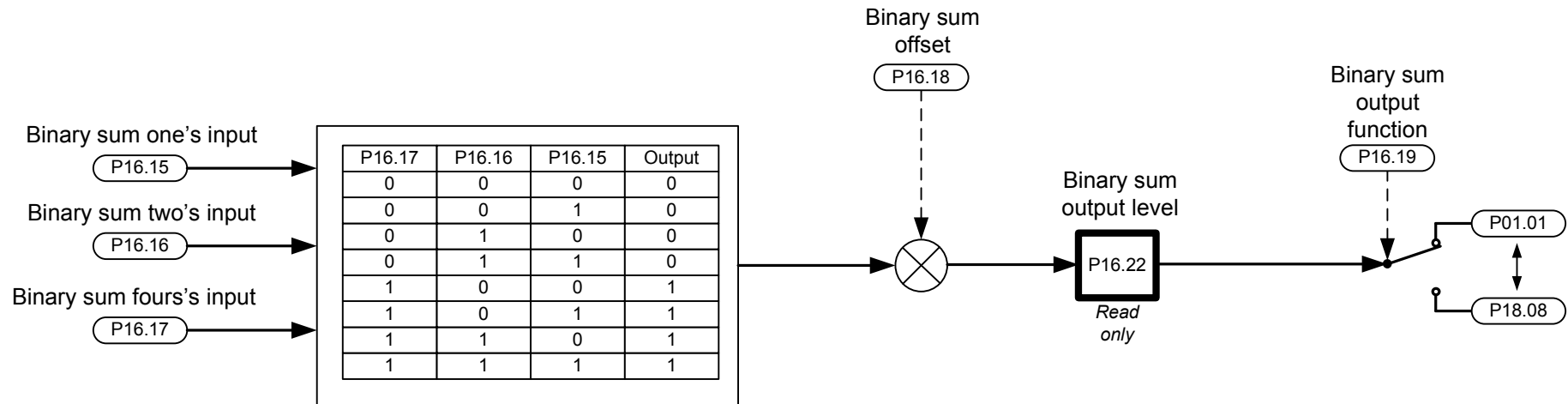
The table below shows how the binary sum function operates with an offset value (e.g. P16.18=3).

Four's input (P16.17)	Two's input (P16.16)	One's input (P16.15)	Binary sum offset (P16.18)	Binary sum output (P16.22)	Value in destination parameter	
					Destination parameter with a maximum value of (7 + offset) or less, i.e. P01.01 with a range of 0 to 8	Destination parameter with a maximum value of greater than 7, i.e. P10.05 with a range of 0 to 250
0	0	0	3	3	3	75
0	0	1		4	4	100
0	1	0		5	5	125
0	1	1		6	6	150
1	0	0		7	7	175
1	0	1		8	8	200
1	1	0		9	8	225
1	1	1		10	8	250

Menu 16 Programmable logic



Menu 16 Binary sum



Group 17: Programmable logic & binary sum

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
17.01	Threshold block 1 source	06A4H	
17.02	Threshold block 1 threshold	06A5H	
17.03	Threshold block 1 hysteresis	06A6H	
17.04	Threshold block 1 invert	06A7H	
17.05	Threshold block 1 output function	06A8H	
17.06	Threshold block 2 source	06A9H	
17.07	Threshold block 2 threshold	06AAH	
17.08	Threshold block 2 hysteresis	06ABH	
17.09	Threshold block 2 invert	06ACH	
17.10	Threshold block 2 output function	06ADH	
17.11	Variable selector 1 source 1	06AEH	
17.12	Variable selector 1 source 2	06AFH	
17.13	Variable selector 1 source 1 scaling	06B0H	
17.14	Variable selector 1 source 2 scaling	06B1H	
17.15	Variable selector 1 mode	06B2H	
17.16	Variable selector 1 control factor	06B3H	
17.17	Variable selector 1 output function	06B4H	
17.18	Variable selector 2 source 1	06B5H	
17.19	Variable selector 2 source 2	06B6H	
17.20	Variable selector 2 source 1 scaling	06B7H	
17.21	Variable selector 2 source 2 scaling	06B8H	
17.22	Variable selector 2 mode	06B9H	
17.23	Variable selector 2 control factor	06BAH	
17.24	Variable selector 2 output function	06BBH	
17.25	Variable selector 3 source 1	06BCH	
17.26	Variable selector 3 source 2	06BDH	
17.27	Variable selector 3 source 1 scaling	06BEH	
17.28	Variable selector 3 source 2 scaling	06BFH	
17.29	Variable selector 3 mode	06C0H	
17.30	Variable selector 3 control factor	06C1H	
17.31	Variable selector 3 output function	06C2H	
17.32	Threshold block 1 output indicator	06C3H	
17.33	Threshold block 2 output indicator	06C4H	
17.34	Variable selector 1 output level	06C5H	
17.35	Variable selector 2 output level	06C6H	
17.36	Variable selector 3 output level	06C7H	
17.37	User defined bit variable 1	06C8H	

Group 17

17.38	User defined bit variable 2	06C9H	
17.39	User defined bit variable 3	06CAH	
17.40	User defined bit variable 4	06CBH	
17.41	User defined bit variable 5	06CCH	
17.42	User defined word variable 1	06CDH	
17.43	User defined word variable 2	06CEH	
17.44	User defined word variable 3	06CFH	
17.45	User defined word variable 4	06D0H	
17.46	User defined word variable 5	06D1H	

Group 17: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
17.01	Threshold block 1 source	P0.00 - P18.08 [P0.00]	Stop only

Parameters P17.01 and P17.06 define the parameter for the input to the programmable threshold. The absolute value of the source parameter variable is taken as the input to the threshold comparator. The input source parameter variable to the threshold comparator is automatically transformed into a percentage of maximum of the source parameter. If a non-valid parameter (e.g. P00.00) is programmed the input value is taken as 0.

Parameter	Parameter name	Range 【Default】	Change mode
17.02	Threshold block 1 threshold	0.0 - 100% [0.0]	Run or stop

Parameters P17.02 and P17.07 are the user defined threshold levels entered as a percentage of the source maximum.

For example:

If P17.01 = 1.20, the threshold level is a percentage of P01.02 maximum.

If P17.01 = 1.01 and P01.01 range is 0 to 8, the threshold level is a percentage of 8.

Parameter	Parameter name	Range 【Default】	Change mode
17.03	Threshold block 1 hysteresis	0.0 - 25.0% [0.0]	Run or stop

Parameters P17.03 and P17.08 define the band within which no change will occur on the output. The value of P17.03 and P17.08 is displayed as a percentage of the source maximum.

The upper limit for switching is: Threshold Level + Hysteresis/2

The lower limit for switching is: Threshold Level - Hysteresis/2

Parameter	Parameter name	Range 【Default】	Change mode
17.04	Threshold block 1 invert	0 - 1 [0]	Run or stop

Parameters P17.04 and P17.09 are used to invert the logic states of the threshold output if required.

Parameter	Parameter name	Range 【Default】	Change mode
17.05	Threshold block 1 output function	P0.00 - P18.08 [P0.00]	Stop only

Parameters P17.05 and P17.10 define the parameter which is to be controlled by the threshold block.

Only parameters which are not protected can be set up as a destination. If a non-valid parameter is programmed the output is not routed anywhere.

Parameter	Parameter name	Range 【Default】	Change mode
17.06	Threshold block 2 source	P0.00 – P18.08 [P0.00]	Stop only

See parameter P17.01

Parameter	Parameter name	Range 【Default】	Change mode
17.07	Threshold block 2 threshold	0.0 - 100% [0.0]	Run or stop

See parameter P17.02

Parameter	Parameter name	Range 【Default】	Change mode
17.08	Threshold block 2 hysteresis	0.0 - 25.0% [0.0]	Run or stop

See parameter P17.03

Parameter	Parameter name	Range 【Default】	Change mode
17.09	Threshold block 2 invert	0 - 1 [0]	Run or stop

See parameter P17.04

Parameter	Parameter name	Range 【Default】	Change mode
17.10	Threshold block 2 output function	P0.00 - P18.08 [P0.00]	Stop only

See parameter P17.05

Threshold application example:

When the drive is accelerating, if the output frequency is less than 30.00 Hz, auto energy saving control is enabled (P06.11=1). When the drive is decelerating, if the output frequency is less than 20.00Hz, auto energy saving control is enabled (P06.11=1). Other cases, auto energy saving control is disabled. Make the following parameters settings:

P01.02=50.00Hz (the maximum frequency is 50.00Hz)

P17.01=5.11 (the input parameter is output frequency)

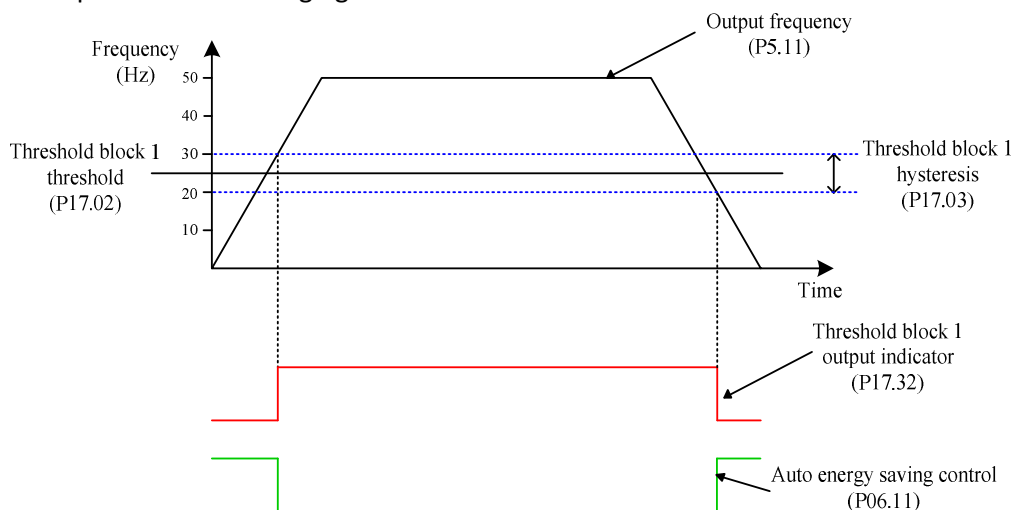
P17.02=50% (threshold is 50%, hysteresis center is 25.00Hz)

P17.03=20% (hysteresis is 20%, the upper limit for switching is 30.00Hz. The lower limit for switching is 20.00Hz)

P17.04=1 (threshold block 1 output inverter)

P17.05=6.11 (output destination is “auto energy saving control”)

Threshold output as the following figure:



Parameter	Parameter name	Range 【Default】	Change mode
17.11	Variable selector 1 source 1	P0.00 - P18.08 [P0.00]	Stop only

Parameters P17.11 and P17.12 define the parameters which are to be switched by the variable selector block.

The source parameters can be bit variables or non bit variables. If programming a reference to a variable selector source, if the reference is a whole number, then the variable source treats the whole number as a percentage, e.g. set P01.02 = 50.00Hz (the maximum frequency is 50.00Hz), P17.11 = P04.01 (the source parameter of Variable selector 1 source 1 is P04.01, the default is 5.00Hz), then 5.0Hz = 10% of reference.

Parameter	Parameter name	Range 【Default】	Change mode
17.12	Variable selector 1 source 2	P0.00 - P18.08 [P0.00]	Stop only

See parameter P17.11

Parameter	Parameter name	Range 【Default】	Change mode
17.13	Variable selector 1 source 1 scaling	0.0 - ±5.000 [1.000]	Run or stop

Parameter P17.13 can be used to scale source 1 input of the variable selector 1.

Parameter	Parameter name	Range 【Default】	Change mode
17.14	Variable selector 1 source 2 scaling	0.0 - ±5.000 [1.000]	Run or stop

Parameter P17.14 can be used to scale source 2 input of the variable selector 1.

Parameter	Parameter name	Range 【Default】	Change mode
17.15	Variable selector 1 mode	0 - 9 [0]	Run or stop

The output of the variable select can be changed by the mode as in the following table:

Mode value (P17.15)	Action	Result
0	Select input 1	output=input1
1	Select input 2	output=input2
2	Add	output=input1+ input2
3	Subtract	output=input1-input2
4	Multiply	output= (input1×input2)/100
5	Divide	output= (input1×100)/ input2
6	Time constant	output=input1/[(P17.16)s+1]
7	Linear ramp	output=Input1 ramp up from 0%~100% in time of (P17.16)
8	Modulus	output= input1
9	Raise to power	P17.16=0.02: output=(input1) ² /100
		P17.16=0.03: output=(input1) ³ /100 ²
		P17.16 has any other value: output=input1

Examples for the settings of P17.05:

P17.15=0: output = input 1:

P17.11 = 4.01, P17.12 = 4.02, P17.17 (variable selector 1 output function) = 4.03

The value of P04.03 will change according to the value of P04.01

P04.03 = Value of P04.01.

P17.15=1: output = input 2:

Input 2 is selected as variable selector 1 output.

For the above example settings:

P04.03 = Value of P04.02.

P17.15=2: output = input 1 + input 2:

P17.11 = 4.01, P17.12 = 4.02, P17.17 = 4.03, P04.01 = 5Hz & P04.02 = 10Hz. The maximum frequency is 50Hz

P04.03 = $(10\% + 20\%) \times 50 = 15\text{Hz}$.

P17.15=3: output = input 1 – input 2:

P17.11 = 4.01, P17.12 = 4.02, P17.15 = 3, P17.17 = 4.03, P04.01 = 5Hz, P04.02 = 10Hz. The maximum frequency is 50Hz

P04.03 = $(10\% - 20\%) \times 50 = -5\text{Hz}$.

P17.15=4: Multiply: Output= (input 1 × input 2)/100

P17.15=5: Divide: Output= (input 1 × 100)/ input2

Because variables are taken as percentages in operation, input 1 and input 2 in formulas above are percentages of the source maximum. The result is displayed as percentage in P17.34.

For example:

Multiplication:

P01.02 = 50.00 (the maximum frequency is 50.00Hz)

P17.11 = 4.16 (variable selector 1 source 1 is P04.16)

P4.16 = 50.00 (P04.16 is set to 50.00Hz)

P17.12 = 8.17 (variable selector 1 source 2 is AI1 level)

P08.17 = 50.0 (P08.17 value range is 0 to 100%. P08.17 is set to 50%.)

P17.15 = 4 (multiplication)

P17.17 = 4.01 (destination parameter for the variable selector 1 output is P04.01)

In multiply operation, input 1 = 100%, and input 2 = 50%

Output = $(\text{input 1} \times \text{input 2}) / 100.0 = (100.0 \times 50.0) / 100.0 = 50.0$

P17.34 displays 50.0

Destination parameter P04.01 = $50.00\text{Hz} \times 50.0\% = 25.00\text{Hz}$

Division:

P01.02 = 50.00 (the maximum frequency is 50.00Hz)

P17.11 = 4.03 (variable selector 1 source 1 is P04.03)

P4.03 = 20.00 (P04.03 is set to 20.00Hz)

P17.12 = 4.05 (variable selector 1 source 2 is P04.05)

P04.05 = 40.00 (P04.05 is set to 40.00Hz)

P17.15 = 5 (division)

P17.17 = 4.01 (destination parameter for the variable selector 1 output is P04.01)

In division operation, input 1 = 40% and input 2 = 80%

Output = $(40.0 \times 100.0) / 80.0 = 50.0$

P17.34 displays 50.0

Destination parameter P04.01 = $50.00\text{Hz} \times 50.0\% = 25.00\text{Hz}$

P17.15 = 6 : Time constant

Variable selector 1 is similar to the first order filter with a time constant of P17.16.

P17.16 value range is 0.01s to 99.9s.

P17.15 = 7 : Linear ramp

If input 1 changes from 0 to 100.0%, the output linear ramps from 0.0% to 100.0% in time set by P17.16.

P17.15 = 8 : Modulus

Output = $|\text{input1}|$

The output is always a positive value.

P17.15 = 9 : Raise to power

When control parameter P17.16 = 0.02, output = $(\text{input1})^2 / 100$

For example:

P17.11 = 4.01 (variable selector 1 source 1 is preset 1), P01.02 = 50.00Hz (the maximum frequency is 50.00Hz), P04.01 = 5.00Hz (input 1 is 10.0%), P17.15 = 9, P17.16 = 0.02

Output = $(10.0)^2 / 100 = 1.0$ (or 1.0%)

When control parameter P17.16 = 0.03, output = $(\text{input 1})^3 / 100^2$

Output = $(10.0)^3 / 100^2 = 0.1$ (or 0.1%)

When P17.16 is set to any other value, output = input 1

NOTE:

P17.16 is a control parameter, and the meaning of P17.16 changes according to P17.15.

- 1) P17.15 = 6, P17.16 is a time constant of the first order filter.
- 2) P17.15 = 7, P17.16 is the time that output increases from 0 to 100% when input 1 changes from 0 to 100.0%.
- 3) P17.15 = 9, the value of P17.16 determines that variable selector 1 output is one power, twice power or three power of input 1.

Parameter	Parameter name	Range 【Default】	Change mode
17.16	Variable selector 1 control factor	0.00 - 99.99 [0.00]	Run or stop

Parameter P17.16 can be used to input a value when modes 6, 7 and 9 of the variable selector 1 are implemented. See parameter P17.15

Parameter	Parameter name	Range	Change mode
17.17	Variable selector 1 output function	P0.00 - P18.08 [P0.00]	Stop only

Defines the destination parameter for the variable selector 1 output. Only non-protected parameters can be programmed as a destination. If an invalid parameter is programmed, the output is not routed anywhere.

For example:

P17.11=1.20 (AI1 reference is selected as variable selector 1 input 1)

P17.12=1.21 (AI2 reference is selected as variable selector 1 input 2)

P17.15=2 (operation mode is addition)

P01.02=50.00Hz (the maximum frequency is 50.00Hz)

P17.17=1.27 (variable selector 1 output is connected to user defined)

P01.01=8 (reference source is user defined)

If P1.20=20.00Hz, P1.21=15.00Hz, then $P17.34 = (20.00/50.00) + (15.00/50.00) = 70\%$

$P1.27 = 50.00 \times 70\% = 35.00\text{Hz}$

The drive output frequency is 35.00Hz.

NOTE:

- 1) The value of the destination parameter = the maximum of the destination parameter × variable selector 1 output level (P17.34)
- 2) When the destination parameter is an integral type parameter, the value of the destination parameter is a percentage of variable selector 1 output.
- 3) When the destination parameter is an enumeration type parameter, the number of the value the destination parameter behind the decimal point will be omitted.

For example:

If P17.17=P01.01, P17.34=30%, then $P01.01 = 8 \times 30\% = 2.4$, so the actual result is P01.01=2.

- 4) When the destination parameter is a bit parameter, the value of the destination parameter is 1 if variable selector 1 output is equal to or more than 50%. Otherwise, the value is 0.

Parameter	Parameter name	Range	Change mode
17.18	Variable selector 2 source 1	P0.00 - P18.08 [P0.00]	Stop only

See P17.11 for details

Parameter	Parameter name	Range	Change mode
17.19	Variable selector 2 source 2	P0.00 - P18.08 [P0.00]	Stop only

See P17.12 for details

Parameter	Parameter name	Range	Change mode
17.20	Variable selector 2 source 1 scaling	0.0 - $\pm$ 5.000 [1.000]	Run or stop

See P17.13 for details

Parameter	Parameter name	Range	Change mode
17.21	Variable selector 2 source 2 scaling	0.0 - $\pm$ 5.000 [1.000]	Run or stop

See P17.14 for details

Parameter	Parameter name	Range	Change mode
17.22	Variable selector 2 mode	0 - 9 [0]	Run or stop

See P17.15 for details

Parameter	Parameter name	Range	Change mode
17.23	Variable selector 2 control factor	0.00 - 99.99 [0.00]	Run or stop

See P17.16 for details

Parameter	Parameter name	Range	Change mode
17.24	Variable selector 2 output function	P0.00 - P18.08 [P0.00]	Stop only

See P17.17 for details

Parameter	Parameter name	Range	Change mode
17.25	Variable selector 3 source 1	P0.00 - P18.08 [P0.00]	Stop only

See P17.11 for details

Parameter	Parameter name	Range	Change mode
17.26	Variable selector 3 source 2	P0.00 - P18.08 [P0.00]	Stop only

See P17.12 for details

Parameter	Parameter name	Range	Change mode
17.27	Variable selector 3 source 1 scaling	0.0 - $\pm$ 5.000 [1.000]	Run or stop

See P17.13 for details

Parameter	Parameter name	Range	Change mode
17.28	Variable selector 3 source 2 scaling	0.0 - $\pm$ 5.000 [1.000]	Run or stop

See P17.14 for details

Parameter	Parameter name	Range	Change mode
17.29	Variable selector 3 mode	0 - 9 [0]	Run or stop

See P17.15 for details

Parameter	Parameter name	Range	Change mode
17.30	Variable selector 3 control factor	0.00 - 99.99 [0.00]	Run and stop

See P17.16 for details

Parameter	Parameter name	Range	Change mode
17.31	Variable selector 3 output function	P0.00 - P18.08 [P0.00]	Stop only

See P17.17 for details

Parameter	Parameter name	Range	Change mode
17.32	Threshold block 1 output function	0 - 1	Read only

These parameters indicate whether the threshold input variable is above (On) or below (OFF) the programmed threshold.

If the threshold input variable is above Threshold Level + Hysteresis/2, the keypad displays 1

If the threshold input variable is below Threshold Level - Hysteresis/2, the keypad displays 0

Parameter	Parameter name	Range	Change mode
17.33	Threshold block 2 output function	0 - 1	Read only

See parameter P17.32 for details

Parameter	Parameter name	Range	Change mode
17.34	Variable selector 1 output level	-100.0% - 100.0%	Read only

Indicates the level of output signal from the variable selectors and are displayed as percentage.

See P17.17 for further details.

Parameter	Parameter name	Range	Change mode
17.35	Variable selector 2 output level	-100.0% - 100.0%	Read only

See parameter P17.34 for details

Parameter	Parameter name	Range	Change mode
17.36	Variable selector 3 output level	-100.0% - 100.0%	Read only

See parameter P17.34 for details

Group 17

Parameter	Parameter name	Range	Change mode
17.37	User defined bit variable 1	0 - 1 [0]	Run or stop

Parameter	Parameter name	Range	Change mode
17.38	User defined bit variable 2	0 - 1 [0]	Run or stop

Parameter	Parameter name	Range	Change mode
17.39	User defined bit variable 3	0 - 1 [0]	Run or stop

Parameter	Parameter name	Range	Change mode
17.40	User defined bit variable 4	0 - 1 [0]	Run or stop

Parameter	Parameter name	Range	Change mode
17.41	User defined bit variable 5	0 - 1 [0]	Run or stop

Parameter	Parameter name	Range	Change mode
17.42	User defined word variable 1	-300.0% - 300.0%	Run and stop

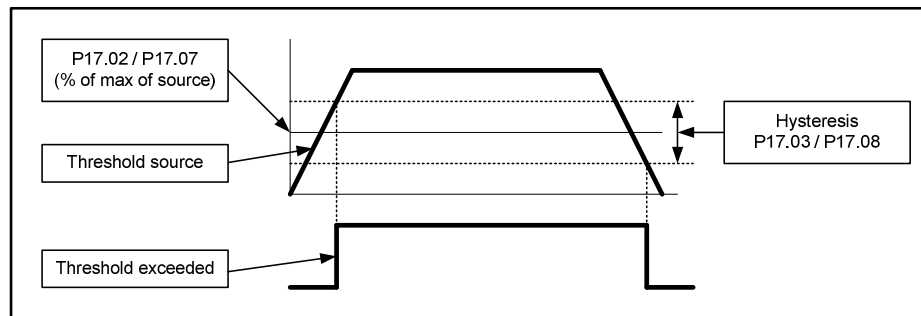
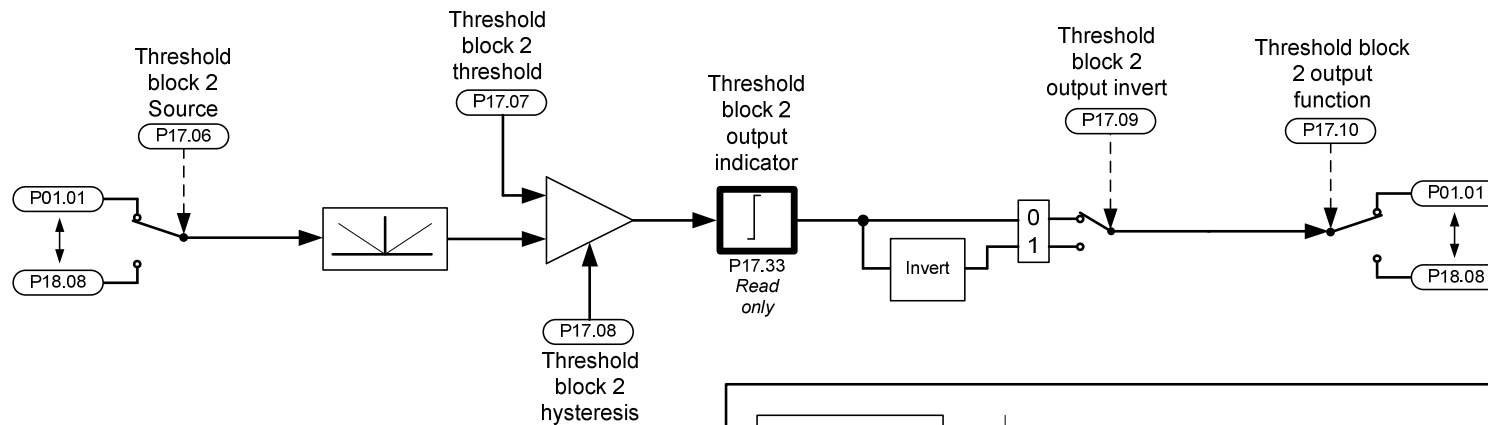
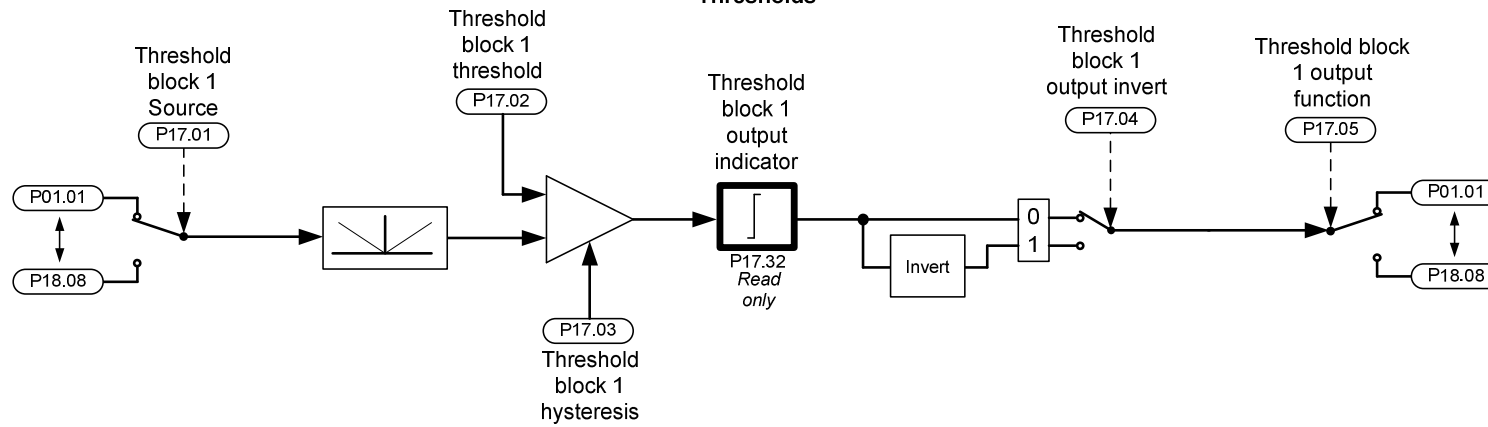
Parameter	Parameter name	Range	Change mode
17.43	User defined word variable 2	-300.0% - 300.0%	Run and stop

Parameter	Parameter name	Range	Change mode
17.44	User defined word variable 3	-300.0% - 300.0%	Run and stop

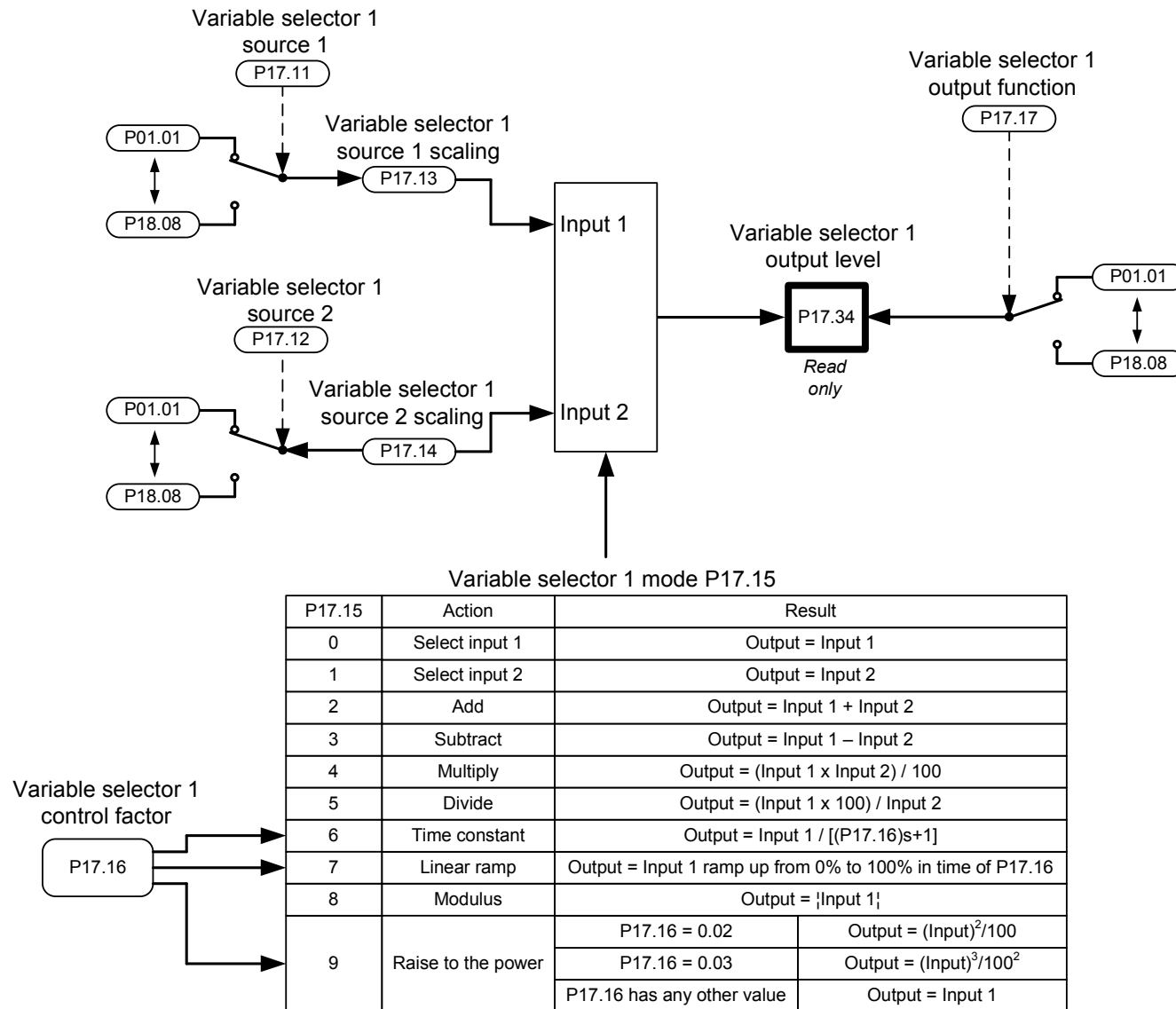
Parameter	Parameter name	Range	Change mode
17.45	User defined word variable 4	-300.0% - 300.0%	Run and stop

Parameter	Parameter name	Range	Change mode
17.46	User defined word variable 5	-300.0% - 300.0%	Run and stop

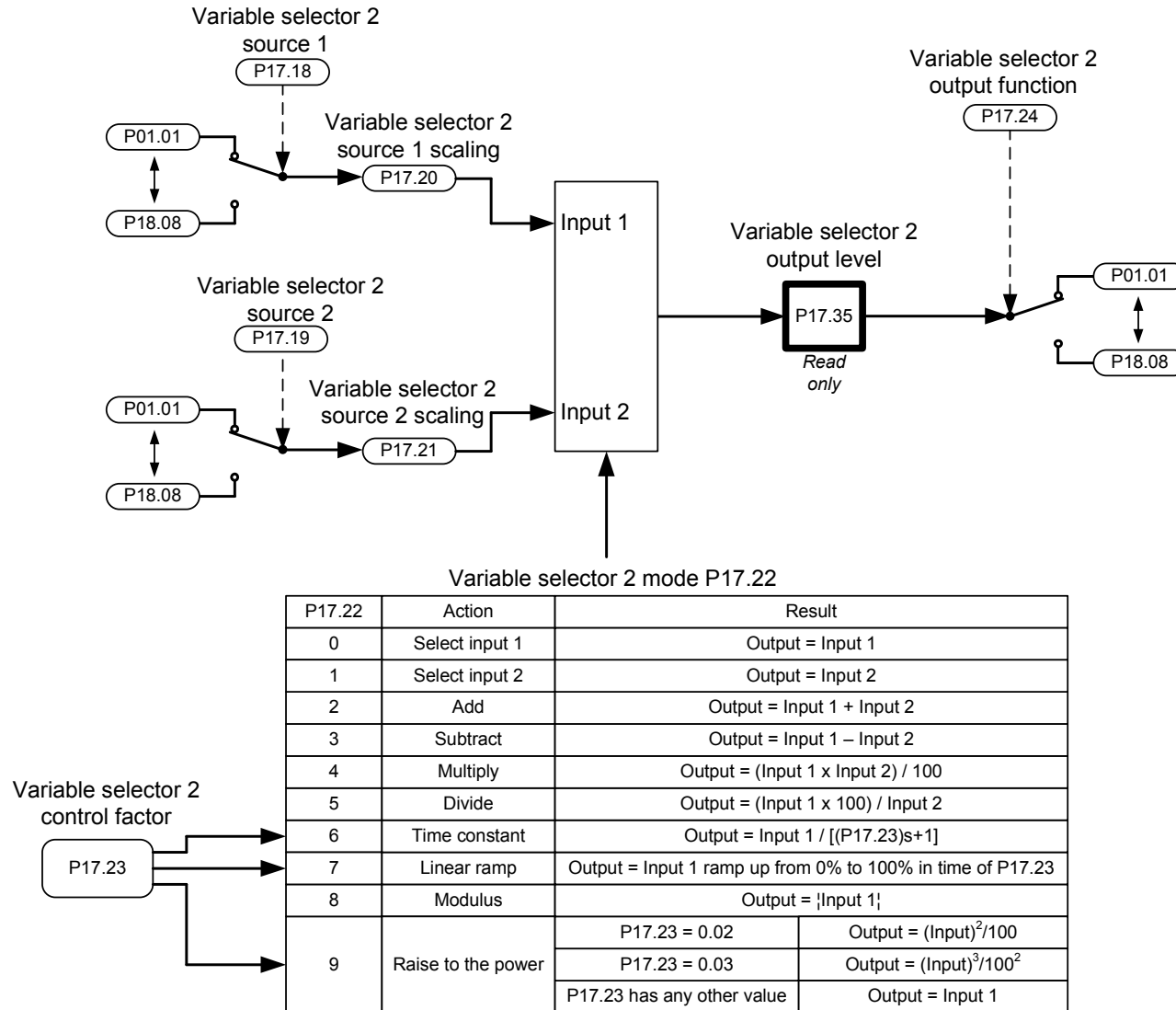
Menu 17 Thresholds



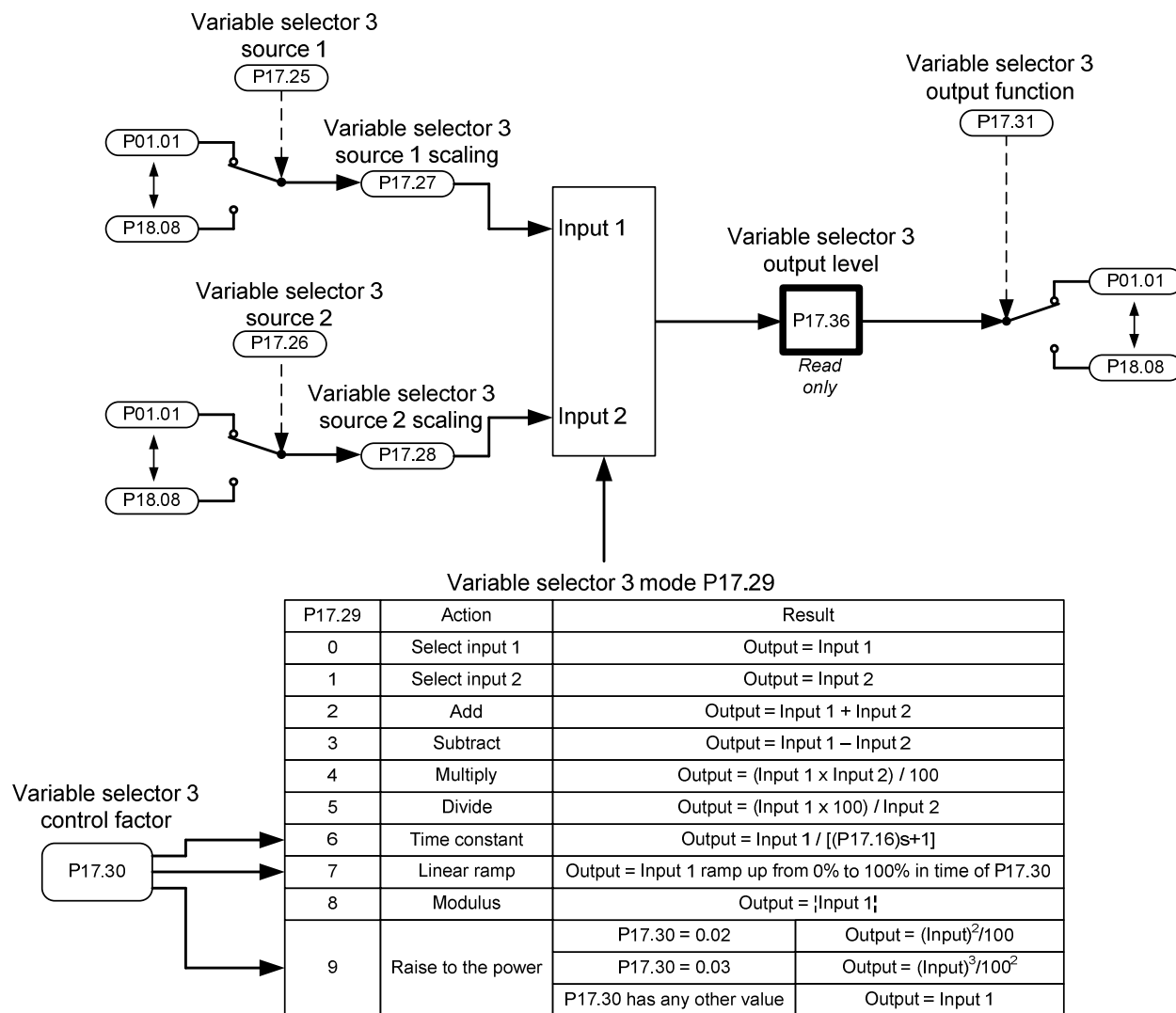
Menu 17 Variable selector 1



Menu 17 Variable selector 2



Menu 17 Variable selector 3



Group 18

Group 18: Motor brake logic control

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
18.01	Brake controller enable	0708H	
18.02	Brake release current threshold	0709H	
18.03	Brake apply current threshold	070AH	
18.04	Brake release frequency threshold	070BH	
18.05	Brake apply frequency threshold	070CH	
18.06	Pre-brake release delay	070DH	
18.07	Post-brake release delay	070EH	
18.08	Brake logic indicator	070FH	

Group 18: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
18.01	Brake controller enable	0 - 1 [0]	Stop only

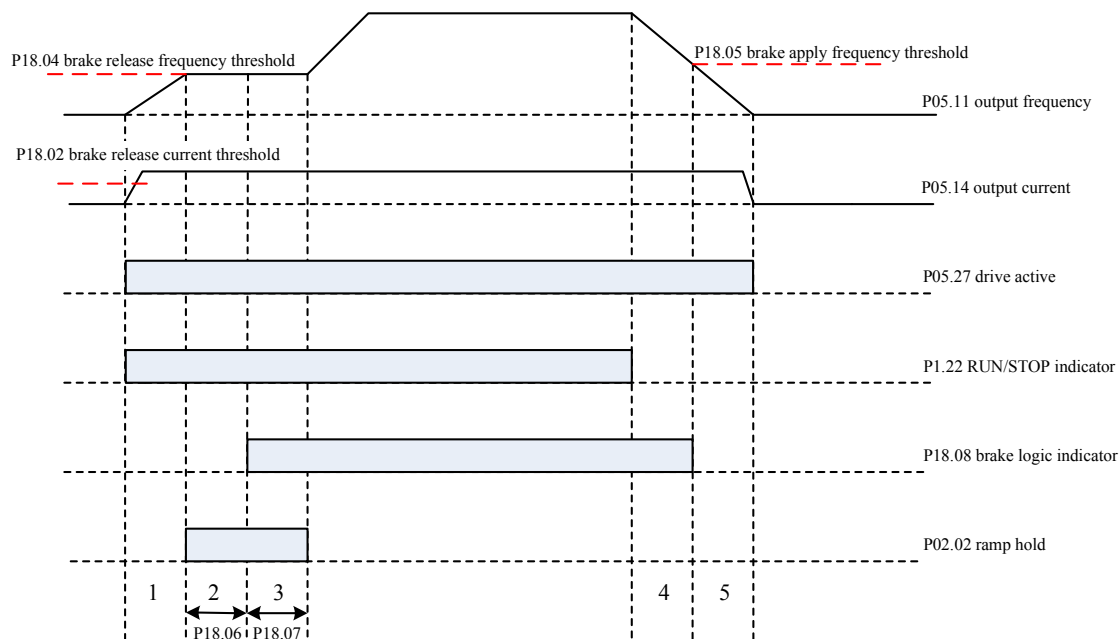
Defines if the brake controller logic is enabled or disabled.

0: the brake controller is disabled and the brake logic indicator (P18.08) is set to 0.

1: the brake controller is enabled and the brake logic indicator (P18.08) is set to 0 or 1 according to actual conditions.

P18.08=0: brake apply

P18.08=1: brake release



1. Wait for brake release current threshold and brake release frequency threshold
2. Pre-brake release delay
3. Post-brake release delay
4. Wait for brake apply frequency
5. Wait for zero frequency

Parameter	Parameter name	Range 【Default】	Change mode
18.02	Brake release current threshold	0.0% - 200.0% [50.0%]	Run or stop

Defines the brake release current threshold.

The value of the parameter is the upper threshold of hysteresis comparator. It is given as a percentage of motor rated current defined by P13.07 (or P13.09 if P13.03 = 1 - motor map 2 is selected).

Parameter	Parameter name	Range 【Default】	Change mode
18.03	Brake apply current threshold	0.0% - 200.0% [10.0%]	Run or stop

Defines the brake apply current threshold.

The value of the parameter is the lower threshold of hysteresis comparator. It is given as a percentage of motor rated current defined by P13.07 (or P13.09 if P13.03 = 1 - motor map 2 is selected).

Parameter	Parameter name	Range 【Default】	Change mode
18.04	Brake release frequency threshold	0.00 - 20.0Hz [1.00Hz]	Run or stop

Defines the brake release frequency threshold.

The frequency comparator can be used to detect when the motor frequency has reached a level (frequency defined by P18.04) where the motor can produce the required amount of torque to ensure that the motor rotates in the demanded direction when the brake is released.

This parameter should be set to a level slightly above the motor slip frequency that is likely to occur under the highest expected load that is applied to the motor when the brake is released.

Parameter	Parameter name	Range 【Default】	Change mode
18.05	Brake apply frequency threshold	0.00 - 20.0Hz [2.00Hz]	Run or stop

Defines the brake apply frequency threshold.

The brake apply frequency threshold is used to ensure that the brake is applied before the motor frequency reaches zero and to prevent the motor rotating (in the reverse direction due to an overhauling load for example) during the brake apply time. If the frequency falls below this threshold, but the motor is not required to stop (i.e. reversing direction without stopping), provided the reference on P01.22 (RUN/STOP indicator) remains at one, the brake is not applied. This prevents the brake from activating and de-activating as the motor passes through zero speed.

Parameter	Parameter name	Range 【Default】	Change mode
18.06	Pre-brake release delay	0.0 - 25.0s [1.0s]	Run or stop

Defines the pre-brake release delay.

The pre-brake release delay is used to allow time for the motor torque to reach the required level before the brake is released. This time should allow for the motor flux to reach a significant proportion of the rated level (2 or 3 times the rotor time constant of the motor), and the time for slip compensation to become fully active (at least 0.5s). During the Pre-brake delay period the frequency reference is held constant (P02.02 = 1).

Parameter	Parameter name	Range 【Default】	Change mode
18.07	Post-brake release delay	0.0 - 25.0s [1.0s]	Stop only

Defines the post-brake release delay.

The post-brake release delay is used to allow for the brake release time. During this period the frequency reference is held constant (P02.02 = 1), so that there is no sudden increase in motor speed when the brake actually releases.

Group 18

Parameter	Parameter name	Range 【Default】	Change mode
18.08	Brake logic indictor	0 - 1	Read only

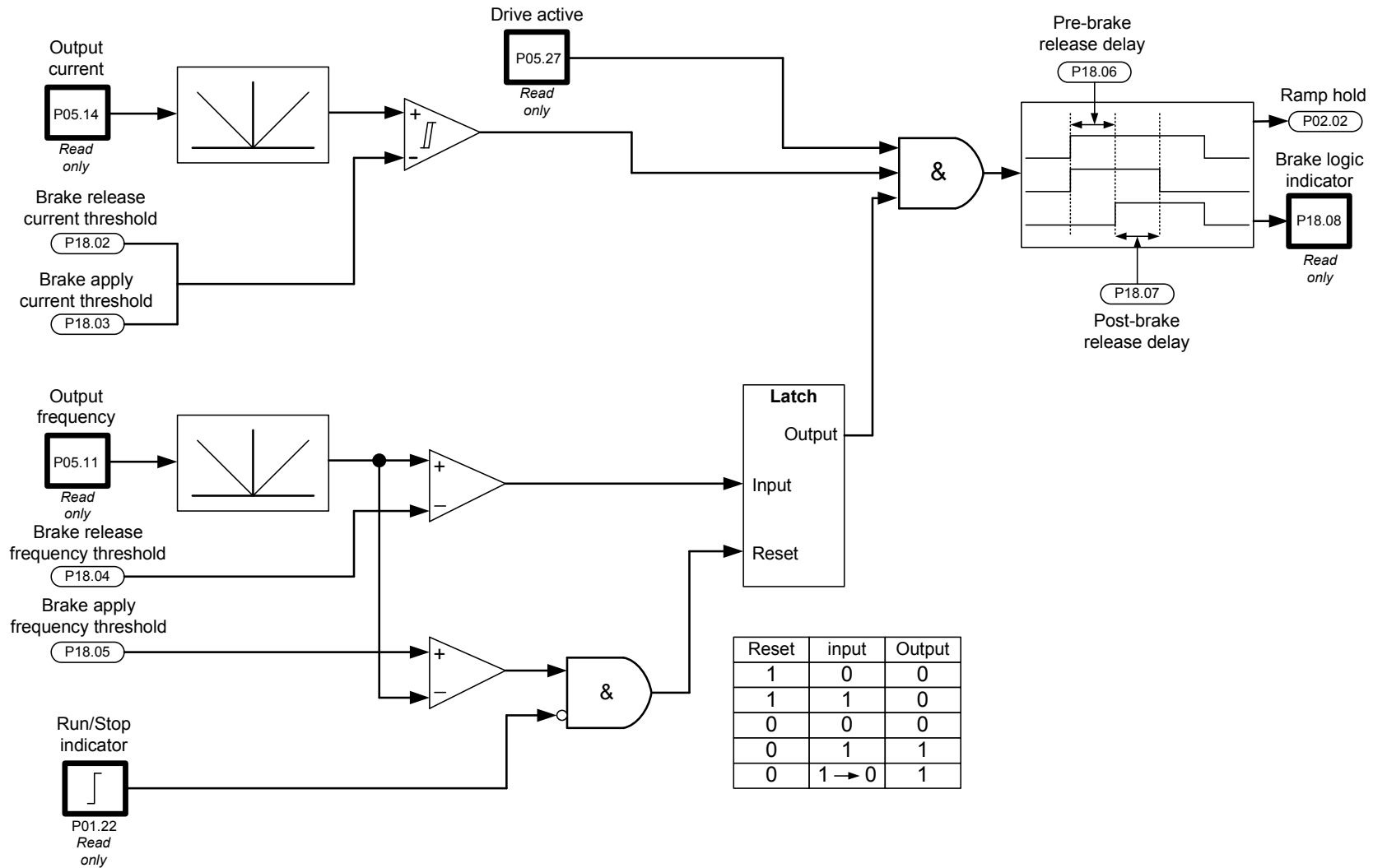
The parameter can be used as the output source to control electro-mechanical motor brake.

P18.08=0: brake apply

P18.08=1: brake release

This parameter usually controls a digital output to control an external control relay to control the motor brake or this parameter controls one of the drives control relays to control the motor brake.

Menu 18 Logic Diagram Motor brake logic control



Group 19: HDOM IO Logic Option module parameter descriptions

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
19.01	Module ID code	076CH	
19.02	X1 function select	076DH	
19.03	X2 function select	076EH	
19.04	X3 function select	076FH	
19.05	Analogue input function select	0770H	
19.06	Encoder input function select	0771H	
19.07	Relay function select	0772H	
19.08	Digital output select	0773H	
19.09	Analogue output select	0774H	
19.10	X1 invert	0775H	
19.11	X2 invert	0776H	
19.12	X3 invert	0777H	
19.13	Reserved	0778H	
19.14	X1 state	0779H	
19.15	X2 state	077AH	
19.16	X3 state	077BH	
19.17	Analogue input mode select	077CH	
19.18	Analogue input offset	077DH	
19.19	Analogue input scaling	077EH	
19.20	Analogue input filter time	077FH	
19.21	Analogue input invert	0780H	
19.22	Analogue input upper limit	0781H	
19.23	Analogue input lower limit	0782H	
19.24	Analogue input current disconnect display	0783H	
19.25	Analogue input display	0784H	
19.26	Not used		
19.27	Not used		
19.28	Not used		
19.29	Not used		
19.30	Not sued		
19.31	User 5v/24V select	078AH	
19.32	Not used		
19.33	Relay invert	078CH	
19.34	Relay state display	078DH	
19.35	Digital output invert	078EH	
19.36	Digital output state	078FH	

Group 19

Parameter	Parameter name	Modbus register address	Setting
19.37	Analogue output scaling	0790H	
19.38	Analogue output mode select	0791H	
19.39	Analogue output display	0792H	
19.40	HDOM IO module software version	0793H	
19.41	HDOM IO module hardware version	0794H	

See the HDOM IO Option Module user guide for further information

Group 19: HDOM Profibus Option module parameter descriptions

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
19.01	Module ID code	076CH	
19.02	Node address	076DH	
19.03	Network data rate	076EH	
19.04	Re-initialisation Profibus-DP network	076FH	
19.05	Operating status	0770H	
19.06	Profibus error codes	0771H	
19.07	Trip time set at communication interruptions	0772H	
19.08	Data endian select	0773H	
19.09	PPO select	0774H	
19.10	Cyclic data IN channel	0775H	
19.11	Cyclic data IN channel	0776H	
19.12	Cyclic data IN channel	0777H	
19.13	Cyclic data IN channel	0778H	
19.14	Cyclic data IN channel	0779H	
19.15	Cyclic data IN channel	077AH	
19.16	Cyclic data IN channel	077BH	
19.17	Cyclic data IN channel	077CH	
19.18	Cyclic data OUT channel	077DH	
19.19	Cyclic data OUT channel	077EH	
19.20	Cyclic data OUT channel	077FH	
19.21	Cyclic data OUT channel	0780H	
19.22	Cyclic data OUT channel	0781H	
19.23	Cyclic data OUT channel	0782H	
19.24	Cyclic data OUT channel	0783H	
19.25	Cyclic data OUT channel	0784H	
19.26	Restore defaults	0785H	
19.27	Store P19 parameters to Profibus EEPROM	0786H	
19.28	Restore previous parameter configuration	0787H	
19.29	Re-initialise the Profibus module	0788H	
19.30	Profibus software version	0789H	
19.31	Profibus firmware version	078AH	

See the HDOM Profibus Option Module user guide for further information

Group 22: Easy mode

Parameter quick look up table

Parameter	Parameter name	Modbus register address	Setting
22.01	Easy Mode Selector	0898H	
22.02	Easy Mode Reference Selector	0899H	
22.03	Easy Mode Stop Mode	089AH	
22.04	Easy Mode Energy Saving Selector	089BH	
22.05	Easy Mode Relay 1 Selector	089CH	
22.06	Easy Mode Select Preset 1 As Main Reference	089DH	
22.07	Easy Mode Keypad Reference Allow Negative Reference	089EH	

Group 22: Parameter descriptions

Parameter	Parameter name	Range 【Default】	Change mode
22.01	Easy mode selector	0 – 1 [0]	Stop only

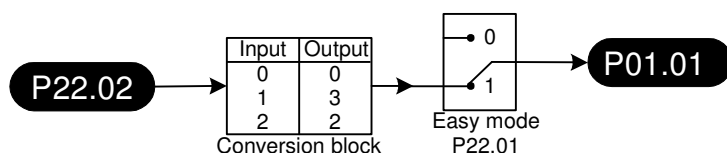
Used to select easy mode:

0: Easy mode is OFF

1: Easy mode is ON (default)

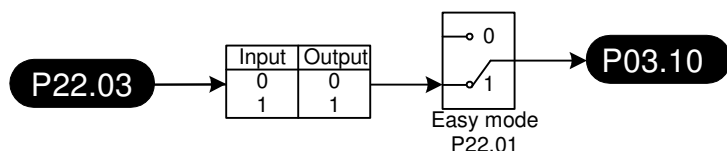
Parameter	Parameter name	Range 【Default】	Change mode
22.02	Easy Mode Reference Selector	0 - 2 [0]	Run or stop

- By default parameter P01.01 reference selector is controlled by P22.02 (P00.05)
- When P22.01 is set to 1 P01.01 and can only set to 0, 2 or 3
- To use the full range of P01.01, P22.01 (easy mode) needs to be set to 0
- When P22.01 = 0, P22.02 – 22.07 will no longer have any effect on the drive set up



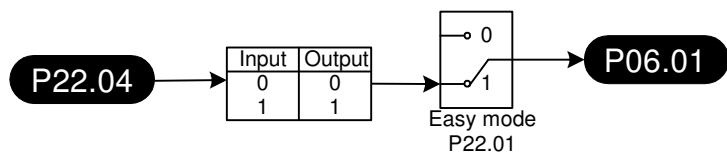
Parameter	Parameter name	Range 【Default】	Change mode
22.03	Easy Mode Stop Mode	0 - 1 [0]	Stop only

- By default this P03.10 is controlled by P22.03 (P00.10)
- When P22.01 is set to 1 P03.10 can only set to 0 or 1
- To use the full range of P03.10, P22.01 (easy mode) needs to be set to 0
- When P22.01 = 0, P22.02 – 22.07 will no longer have any effect on the drive set up



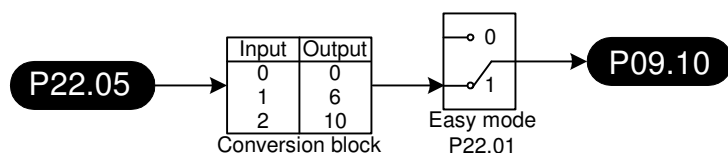
Parameter	Parameter name	Range 【Default】	Change mode
22.04	Easy Mode Energy Saving Selector	0 - 1 [0]	Stop only

- By default P06.01 is controlled by P22.04 (P00.13)
- When P22.01 is set to 1 P06.01 can only set to 0 or 1
- To use the full range of P06.01, P22.01 (easy mode) needs to be set to 0
- When P22.01 = 0, P22.02 – 22.07 will no longer have any effect on the drive set up



Parameter	Parameter name	Range 【Default】	Change mode
22.05	Easy Mode Relay 1 Selector	0 - 2 [0]	Stop only

- By default P09.10 is controlled by P22.05 (P00.15)
- When P22.01 is set to 1 P09.10 can only set to 0,6 or 10
- To use the full range of P09.10, P22.01 (easy mode) needs to be set to 0
- When P22.01 = 0, P22.02 – 22.07 will no longer have any effect on the drive set up



Parameter	Parameter name	Range 【Default】	Change mode
22.06	Easy Mode Select Preset 1 As Main Reference	0 - 1	Read only

When this parameter is set to 1 preset 1 (P04.01) is selected as the main reference.

Note: P01.25 (Main speed source set to AI1) and P01.26 (Main speed source set to AI2) have priority over P22.06

Parameter	Parameter name	Range 【Default】	Change mode
22.07	Easy Mode Keypad Reference Allow Negative Reference	0 - 1 [1]	Run or stop

Used to set the allowed range of the keypad reference:

0: Range = 0 to P01.02 (maximum set speed)

1: Range = -P01.02 to + P01.02

Faults & corrective actions

Note: Trip information is recorded in Group 11 parameters (Fault tracking)

Trip Code	Trip Description	Possible Reasons	Corrective Actions
F001	Output over current <i>The drive will not allow a reset until 10 seconds after the trip</i>	Output short circuit	Check the motor & motor cabling
		Accel or decel time is too short	Increase accel or decel time
		The motor was still spinning when the drive was given a run command	See P03.05 in the Advanced User Manual. The drive needs to be setup if the motor is spinning on start.
F002	Over voltage	Supply voltage is too high	Make sure the supply to the drive is within the specification
		Sudden load change	Avoid sudden load changes
		Deceleration time is too short	Increase the Deceleration time & consider whether a brake resistor is required for the application
F003	Under voltage	Supply voltage is too low	Check the supply to the drive is within specification
		During drive power off	This is normal
F004	Supply phase loss	Supply phase missing	Check all supply phases
F005	Output phase loss	Output phase lost	Check motor & motor cabling
F006	Braking over current <i>The drive will not allow a reset until 10 seconds after the trip</i>	Brake resistor faulty or incorrect value (too low a value)	Check the brake resistor and cabling
F007 & F008	F007-Heatsink 1 over temperature F008-Heatsink 2 over temperature (>45kW)	Ambient temperature around the drive is too high	Reduce the ambient temperature around the drive
		Air flow channel blocked	Unblock air flow channel
		Fan failed	Replace the fan
F009	IGBT junction over temperature	High switching frequency	Reduce the switching frequency. Change P10.11 = 1 to automatically reduce switching frequency when IGBTs get hot.
		Frequently accelerating and decelerating under a heavy load condition	Increase the acceleration and deceleration times.
F010	Motor overload	Motor wired incorrectly for input voltage	Check correct motor star or delta connection for input voltage
		V/f not set according to motor nameplate	Setup V/f and voltage boost correctly
		Supply voltage is low	Check the power supply
		Motor load is jammed or the load change is excessive	Check the motor load
		P12.12 is set incorrectly	See the description for P12.12 in the Advanced User Manual
F011	Motor over temperature (If motor thermistor is used)	The motor load is excessive	Check the motor load
		Motor heat dissipation channel is blocked	Check the motor
		Motor fan is not working	Change the motor fan
		Motor thermistor faulty	Check the thermistor

Trip Code	Trip Description	Possible Reasons	Corrective Actions
F012	AI1 Over current	AI1 input current is over 26mA	Check AI1 input
F013	AI1 Input current loss	AI1 input current <3mA	Check AI1 input
F014	User +24V supply overload	Output current of user +24V, DO1 and DO2 >100mA	Check if there is short circuit on the output of +24V, DO1 or DO2
F015	Parameter cloning incorrect	Keypad EEPROM is empty when cloning attempted	Upload parameter set to keypad and attempt cloning again
F016	Auto-tune failed	The drive size doesn't match the motor power size	Change the drive to the correct rating
		The wrong motor data has been set	Enter the correct motor nameplate data into drive
		Before the auto-tune finished the user attempted to stop the drive	Try to autotune again, do not attempt to stop the drive when the autotune is taking place
F017	Output motor terminal short circuit at power up (Sizes C, D & E)	Output motor terminal short circuit	Check motor wiring and motor insulation
F017	Input Thyristor issue (Sizes F & G)	Possible issue with input supply	Check input supply connections, fuses & circuit breaker
F018	External fault	An external fault input to one of the DI terminals	Check the external trip circuitry
F019	Communications fault	Internal drive fault	Contact supplier of the drive
F020	EEPROM read & write failure	Error occurred when reading or writing the control word	Press STOP key to reset the drive and try again
F021	Destination fault	Two destination parameters set to the same destination	Check parameter set up Load default parameters and try again
F022	Option module fault	Option module not fitted correctly Option module not fault	Re-fit option module Replace option module
F024	Internal logic fault	Internal drive fault	Contact supplier of the drive
F030	Soft start circuit fault	Internal drive soft start circuit failed	Contact supplier of the drive
F031	Main fan fault	Fan blade not rotating correctly	Check the fan blades
		Fan wiring is wrong	Checking fan wiring. Contact the supplier of the drive
F032	Control fan fault (30kW and above)	Fan blade not rotating correctly	Check the fan blades
F033	Current sense fault	Internal drive fault	Contact the supplier of the drive
F034	Power PCB DSP fault	Internal drive fault	Power off and on. Contact the supplier of the drive
F035	MCU cannot receive data from DSP	Internal drive fault	Power off and on. Contact the supplier of the drive
F036	MCU receives wrong data from DSP	External disturbance	Check cable layout
		Internal drive fault	Contact the supplier of the drive
F037	Over current during power up	Current sense circuit failure	Contact the supplier of the drive
F039	IGBT thermistor failure	IGBT failure	Contact the supplier of the drive
F040	Drive software issue	MCU or DSP failure	Contact the supplier of the drive

NOTE: When using the “External fault” trip feature which can be programmed to a digital input terminal to cause the HD700 to trip on (F018), the trip condition must be present for > 2 seconds for the trip to latch under all conditions.

NOTE: F017 trip is not available on HD700 size A & B.

Alarms

When drive is in an alarm condition, the drive will keep running and Keypad will display the alarm Code (Hxxx). The Alarm code will flash for 3 seconds, then return to the normal display (selected by P05.01). The normal display will flash for 3 seconds, then return back to flashing alarm code. This cycle will continue until the alarm condition is removed or the drive trips.

Parameter P12.13 can be set to decide if to display the alarm warning or not.

Code	Description	Possibilities	Treatments
H001	Current limit is active	The output current has reached the value set in P07.03 (current limit). This may be because the drive is trying to accelerate the load faster than it is able to with the value set in P07.03.	If the actual acceleration rate achieved in the application is acceptable then there is no need to adjust parameters. The current limit is an indication not a fault. If faster acceleration is required with the maximum value set in P07.03 then a larger motor and drive may be needed.
		The load on the motor is excessive	Check the load
		The motor is spinning on start	Check P03.05 (start mode) is set correctly
H002	Motor overload is integrating	Output current is higher than the value of P00.02 (motor rated current)	This can be a normal occurrence if only for short periods of time during acceleration of a heavy load. A larger motor and drive may be required for the application if F010 trips occur frequently
H003	Heatsink is hot	High ambient temperature	Reduce the environment temperature
		Air flow channel blocked	Unblock the flow channel
		Fan failed	Replace the fan
H004	IGBT junction temperature is high	Frequently accelerating and decelerating	Modify the parameter setup A larger drive may be required
H005	Low DC bus operation (only for 400V models)	Power supply voltage is low	Checking the power supply
H007	Sleep mode	Drive is in sleep mode	When the drive quits sleep mode, the alarm is removed

