Description

AFS (F02) Series is a 3-phase brushless DC (BLDC) motor drive for AC power source with Torque Limit function.
It can be controlled by analog signal or serial communication (RS485 model only).
The drive include the following protect function: Overload, Under-Voltage,
Over-Voltage (from motor regenerative power), feedback error detection…
AFS (F02) Series can drive high efficiency BL Series BLDC motor with 200 ~ 500W output, 100 ~4000 RPM rotating speed.

Features

- ■ Smooth speed and torque output
- ■ Programmable I/O Function and Operation Parameter
- ■ Programmable Protect Functions (Overload, Under-Voltage, Over-Voltage, feedback error detection…)
- ■ Torque Limit Function
- ■ RS485 Communication Function (specific model only).
- ■ 4 Quadrant Control Function (specific model only).

MODES OF OPERATION

- Speed Control Mode
- Duty Control Mode
- Position Control Mode (encoder model only)

COMMAND SOURCE

- Internal Potentiometer (SPD VR)
- External Analog (0 ~ 5 or 0 ~ 10 VDC)
- External Potentiometer
- Digital Indexing
- Pulse/PWM Input
- RS485 (RS485 model only)

I/O (Programmable Function)

- 5 Digital Inputs (X1 ~ X5)
- 1 High Speed Digital Input (XH1 for pulse/PWM input)
- 2 Digital Outputs (Y1 ~ Y2)
- 1 High Speed Digital Output (YH1 for speed pulse output)
- 2 Analog Input (A1, A2)
- 3 Internal Potentiometer (SPD, ACC, DEC)

Application

- ■ General industry and automation
- ■ Torque limit required applications.

Product Number Code

AFSDR - C 400 R T

① ② ③ ④ ⑤

①	Series	**AFSD**: AFS Standard Model **AFSDR**: AFS with RS485 Communication		
②	Power Supply Voltage	**A**: 110VAC Single Phase	**B**: 220VAC Single Phase	**C**: 220VAC Single/Three Phrase
		U: 100 ~ 240VAC		
③	Rated Power	**200** : 200W	**400** : 400W	**500**: 500W
④	Feature	**R** : Regular		
⑤	**Q**: Standard(Only 1 analog input) **T**: Torque Limit Control model (by external voltage/potentiometer) **S**: Simplified Model (No Regenerative Discharge and lesser I/O) **TE**: Encoder model			

Product List

Model	Rated Voltage	Rated Power	Max. Output Current	Continuous Output Current	Digital Input	Pulse Input	Digital Output	Analog Input	RS-485 Comm.	Regenerative Brake	Position Control
AFSD-A200RQ	1 Phase 110VAC	200 W	7.2 A	3.6 A	5	1	3	1	X	O	
AFSD-C200RS	1/3 Phase 220VAC	200 W	5.2 A	2 A	4	0	2	1	X	X	
AFSD-C400RQ	1/3 Phase 220VAC	400 W	7.2 A	3.6 A	5	1	3	1	X		X
AFSDR-C400RT	1/3 Phase 220VAC	400 W	7.2 A	3.6 A	5	1	3	2	O		
AFSD-B500RQ	1 Phase 220VAC	500 W	9.6 A	4.5 A	5	1	3	1	X	O	
AFSDR-C400RTE	1/3 Phase 220VAC	400 W	7.2 A	3.6 A	5	1	3	2	O		O
AFSD-U400RQ	100 ~ 240 VAC	400 W	7.2 A	3.6 A	5	1	3	1	X		X

Product Version

Some Function is Updated in new Version as Following:

Ver.	Mark	New Function
C.00	C.00	RS485 Modbus exception response now supports standard message format. FREE Input can release MBRAKE-OUT output when in alarm status.
D.00	D.00	Motor overheat protect function can be disabled.

Power Specifications

Item / Model			AFSD-A200RQ	AFSD-C200RS	AFSD□-C400R□	AFSD-B500RQ	AFSD-U400RQ
Rated Output Power		W	200	200	400	500	400 (220VAC) 200 (110VAC)
Power Source	Rated Voltage Supply	VAC	1 Phase 100 ~ 120	1/3 Phase 200 ~ 240		1 Phase 200 ~ 240	100 ~ 240
	Permissible Voltage Range	%	-15 ~ +10				
	Supply Frequency	Hz	50 / 60				
	Permissible Frequency Range	%	±5				
	DC BUS Over Voltage Limit *1	VDC	200	390			390
	DC BUS Under Voltage Limit *1	VDC	115	226			115
Rated Continuous Input Current		A	5.47	2	3	6.5	3 (220VAC) 5.47 (110VAC)
Peak Output Current *2		A	7.2	5.2	7.2	9.6	7.2
Rated Continuous Output Current (rms)		A	3.6	2	3.6	4.5	3.6
Low Voltage Supply Output(Control Power)*3		VDC	+5VDC (For I/O only).				

*1. DC BUS over voltage and under voltage can be set between the limit range
*2. Hardware protection limit.
*3. Only for the drive I/O
NOTE The power specification is the for drive NOT including the motor.

Control Specification

Item / Model		AFSD-A200RQ、AFSD-C400RQ、AFSDR-C400RT、AFSD-B500RQ AFSD-U400RQ	AFSDR-C400RTE	AFSD-C200RS
Feedback Support		Hall	Incremental Encoder	Hall
Mode of Operation		Speed Control, Duty Control, Default: Speed Control Mode	Speed Control, Duty Control, Position Control. Default: Speed Control Mode	Speed Control, Duty Control, Default: Speed Control Mode
Digital Input (X1 ~ X5)		Photocoupler Input. Internal Power Supply 5VDC (On Voltage ≦ 0.5VDC) External Power Supply: 24VDC -15%~+20% 50mA min. Input Resistance 6.2kΩ SINK/SOURCE Input: applied through external wiring		
High Speed Digital Input*3 (X6/XH1)		Photocoupler Input 5VDC (On Voltage ≦ 0.5VDC) External Power Supply: 24VDC -15%~+20% 50mA min. (On Voltage ≦ 2VDC) Input Resistance 6.2kΩ SINK only. Pulse Input Frequency Control: 100 ~ 2kHz PWM Control: 100 ~ 500Hz, 1 ~ 99% duty		NA
Input Function*3		Programmable Digital Input Function for X1 ~ X6/XH1 [ ]: Default [NC (PULSE-INPUT)] 、[START/STOP(FWD)] 、[CCW/CW(REV)] 、FREE 、STOP-MODE 、EBRAKE/ALM-RST 、[ALM-RST] 、[M0] 、M1 、M2 、[EBRAKE/RUN] 、EXT-ERROR		
Digital Output (Y1 、Y2)		Open-Collector Output External Power Supply: 4.5 ~ 30VDC 100mA Max. On Voltage ≦ 1.6V SINK/SOURCE Output: applied through external wiring		
High Speed Digital Outputs (Y3/YH1)		Open-Collector Output External Power Supply: 4.5 ~ 30VDC 20mA Max On Voltage ≦ 0.5V SINK only.		NA
Output Function		Programmable Digital Output Function for Y1, Y2,YH1 [ ]: Default [SPD-OUT] 、[ALM-OUT] 、BUSY-OUT 、VA-OUT 、EN-OUT 、ALM-PULSE 、BUSY-ALM-PULSE 、RUN-OUT 、DIR-OUT 、MBRAKE 、MBRAKE-RELEASE **NOTE** MBRAKE and MBRAKE-RELEASE need external relay(with diode) to control electromagnetic brake.		
Analog Input		The input voltage range (0 ~ 5VDC or 0 ~ 10VDC) gain and off set can be set by parameter		
Operation Function		Regenerative brake (with external regenerative Unit) Slight position keeping (keep 50% of rated torque during motor stop.)	Regenerative brake (with external regenerative Unit) Multi-Drive position control	Motor short brake Slight position keeping (keep 50% of rated torque during motor stop.)
Protect Function		Over-voltage, Under-voltage, Over-current, Overload, Main circuit overheat, Feedback sensor error, Over-Speed, EEPROM error, Communication error		
Speed Control	Speed Setting Method*3	Select one of the following methods: [ ]: Default • [External Potentiometer (20k ohm) or external voltage 0~5/10VDC through A1] • [Internal Potentiometer SDP] (Switch by M0) • 8 Digital Indexing can be switch by M0, M1, M2 (RS485 model can set through communication)		
		• X6/XH1 Pulse Frequency Input (100 ~ 2kHz) • X6/XH1 Pulse PWM Input(100 ~ 500Hz, 1 ~ 99% duty)		-
		-	• RS485 Multi-Drive	-
	Speed Control Range*1	Hall: 100 ~ 3500 r/min	Hall: 100 ~ 3500 r/min Encoder: 10 ~ 3500 r/min	Hall: 100 ~ 3500 r/min
	Speed Regulation *2	± 0.5 %	Hall: ± 0.5 % Encoder: ± 0.2 %	± 0.5 %
	Acceleration/Deceleration Time Setting Method	Select One of the Following Method: [ ]: Default • [Internal VR ACC for Acceleration; Internal VR DEC for Deceleration] • 8 Digital Indexing can be switch by M0, M1, M2		

	Acceleration/Deceleration Time	0.1 ~ 15.0s (3000 r/min，No Load)		
Torque Limit	Setting Method	Select one of the following methods: [ ]: Default • External Analog Setting A2: External Potentiometer(20k ohm) or External DC Voltage(0 ~ 5VDC 或 0 ~ 10VDC) For torque Limit Control model only. • [8 Digital Indexing can be switch by M0, M1, M2]		
	Setting Range	0 ~ 200% (Rated Output Power=100%) Default: 200%		
Position Control	Traveling Amount Setting Range	NA	-327,680,000 ~ +327,670,000 step	NA
	Resolution		Max. 5000 pulse per rev.	
	Speed Setting Range		2 ~ 3500 r/min	
	Operating Mode		Incremental or Absolute	
	Position Command Source		Communication RS485 Multi-Drive	
	Speed Setting Method		8 digital indexing: Operation data No. 0 ~ 7 select by M0, M1, M2.	
	Acceleration/Deceleration Time Setting Method		8 digital indexing: Operation data No. 0 ~ 7 select by M0, M1, M2.	
	Acceleration/Deceleration Time		0.1 ~ 15.0 s (3000 r/min，no load)	

*1. Other speed range can be set through parameter.
*2. Operation condition: 0 ~ rated load, rated voltage, 25℃
*3. **NOTE** PWM input use low side duty as default (on voltage ≦0.5VDC). NC(PULSE-INPUT) can only be assigned to X6/XH1 and used in PWM or PFM control mode.
*4. The torque limiting value may cause a difference up to maximum of approximately ±20% between the setting value and the generated torque due to the setting speed, power supply voltage and motor cable extension length..

RS-485 Communication Specification

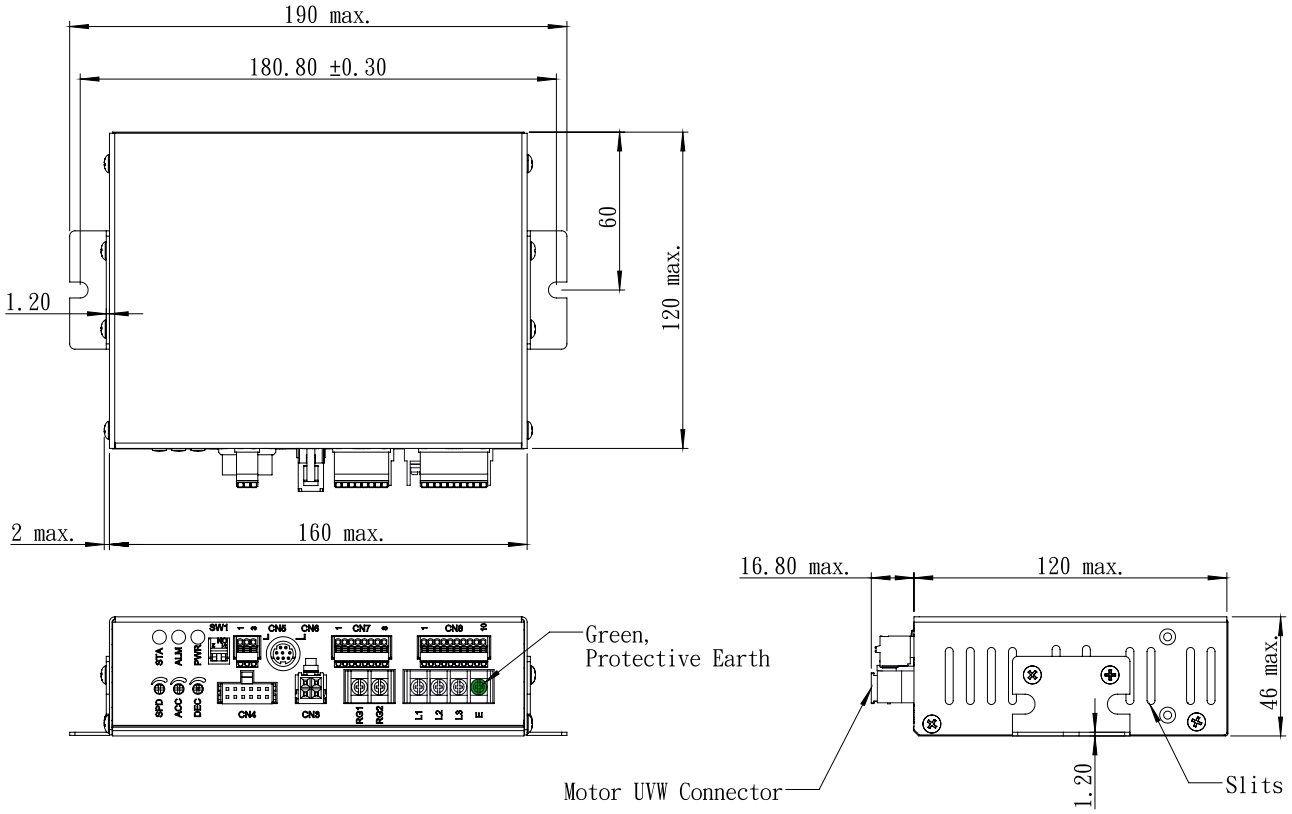
Item	Value
Communication Protocol	Modbus Protocol (Modbus RTU or Modbus ASCII set by parameter)
Electrical Characteristics	EIA-485。For use of Twisted-Pair Wire
Transmit/Receive Method	Half-duplex communication
Baud Rate	19200 bps, 38400 bps, 57600 bps, 115200 bps
Physical Layer(default)	UART can be set by switch (Data: 8-bit, stop-bit: 1-bit, Parity: None)
Number of Connection Units	31 units max. / Multi-Drive 6 max.

General Specification

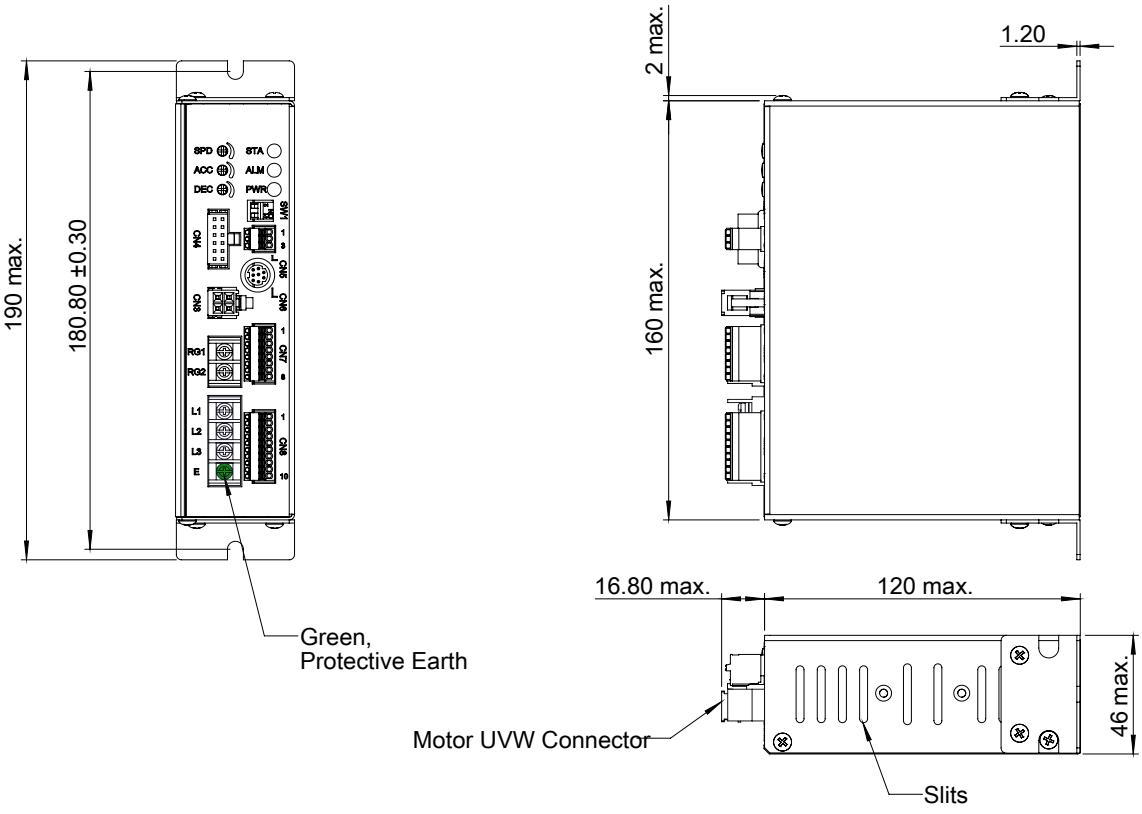
Item		Value
Operating Environment	Ambient Temperature	0℃ ~ +40℃ (*External cooling is required when the environment temperature is higher than 40℃)
	Ambient Humidity	< 85 % RH (non-condensing)

Mounting Dimension (Unit: mm)

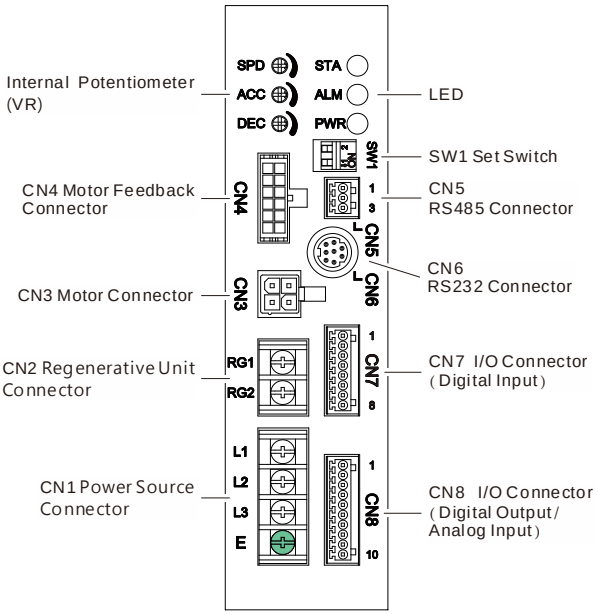
Horizontal Installation



Vertical Installation



Interface



CN5 RS485 Communication Connector

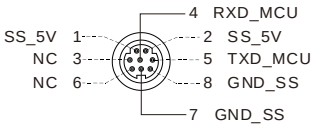
Pin	Name	Description
1	TR+	RS485 Signal(+)
2	TR-	RS485 Signal(-)
3	GND	Ground Signal

Matting Connector:
Euro, 3-pin (male), 2.50mm pitch
Matting Terminal:
Euro, 3-pin (female),
2.50mm pitch
[Included]

NOTE For noise issue, please use cable with twisted-pair wire with isolated shielding.

CN6 RS232Communication Connector

Pin	Name	Description
1	SS_5V	Control Power 5V
2	SS_5V	Control Power 5V
3	NC	Reserved
4	RXD	RS-232 Rx
5	TXD	RS-232 Tx
6	NC	Reserved
7	GND_SS	Control Power GND
8	GND_SS	Control Power GND

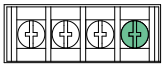


Matting Connector:
8-pin (female), Mini Din
Matting Terminal:
8-pin (male), Mini Din
[Optional]

NOTE For noise issue, please use cable with isolated shielding.

CN1 AC Power Source Connector

Name	Description
L1	AC Main Power Input 1Φ 110VAC: ConnectL2, L3 1Φ 220VAC: ConnectL2, L3 3Φ 220VAC: ConnectL1, L2, L3
L2	
L3	
E	Ground



Applicable Wire
AWG16~14
(1.25~2.0mm²)
Crimping Terminal
Y type 1502-KSS(YF2-3S)

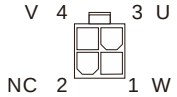
CN2 Regenerative Unit Connector

Name	Description
RG1	Connection Regenerative Unit: >300Ω 100W
RG2	

Applicable Wire
AWG16~14(1.25~2.0mm2)
Crimping Terminal
Y type 1502-KSS(YF2-3S)

CN3 Motor Power Connector

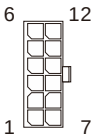
Pin	Name	Description
1	W	Motor W Phase
2	NC	Reserved
3	U	Motor U Phase
4	V	Motor V Phase



Matting Connector:
4-pin (male), 4.20mm pitch
Matting Terminal:
4-pin (female), 4.20mm pitch
[Optional]

CN4 Motor Feedback Connector

Pin	Name	Description
1	NC	Reserved
2	MOT-OT-	Motor Overheat - (Ground Signal)
3	ENC-Z+	Encoder Signal Z+
4	ENC-B+	Encoder Signal B+
5	ENC-A+	Encoder Signal A+
6	GND	Ground signal
7	NC	Reserved
8	MOT-OT+	Motor Overheat+
9	ENC-Z-	Encoder Signal Z-
10	ENC-B-	Encoder Signal B-
11	ENC-A-	Encoder Signal A-
12	5V-OUT	+5V

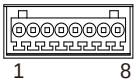


Matting Connector:
12-pin (male),
3.00mm pitch
Matting Terminal:
12-pin (female),
3.00mm pitch
[Optional]

Name	Display	Description
VR SPD (Internal Potentiometer)	SPD	Internal speed control potentiometer Clockwise: Increase speed Counterclockwise: Decrease speed
VR ACC (Internal Potentiometer)	ACC	Internal speed control potentiometer Clockwise: Increase acceleration time Counterclockwise: Decrease acceleration time
VR DEC (Internal Potentiometer)	DEC	Internal speed control potentiometer Clockwise: Increase deceleration time Counterclockwise: Decrease deceleration time
Setting Switch	SW1	No.1: Digital input power source ON: Built-in 5V. (SINK) OFF: External power supply (24v) No.2: Set RS485 terminal resistor (120Ω) (RS485 model only) ON: Terminal resistor enable OFF: Terminal resistor disable
STA-LED (Orange)	STA	ON: RS485 Communication Normal Blink: RS485 Communication error (baud-rate, protocol or other problem) OFF: RS485 No signal (not connected)
ALM-LED (Red)	ALM	ON: Drive in WAIT Status. Blink: Alarm occurs. The type of alarm can be confirmed by the blink count.. OFF: Normal
PWR-LED (Green)	PWR	ON: AC Main Power Supply is ON OFF: AC Main Power Supply is OFF

CN7 I/O Connector (Digital Input)

Pin	Name	Function [NO.]	Description (Default Function)
1	IN-COM	Input Signal COM	-
2	X1	START/STOP [1]	SC Mode: START/STOP Input =[ON],Motor run. START/STOP Input =[OFF], Motor stop. Operation direction can be set by CCW/CW Input. Select how the motor should stop by the STOP-MODE input.
3	X2	CCW/CW [2]	SC Mode: The operation direction is CCW when CCW/CW is ON.
4	X3	M0 [10]	Select Operation Mode No. (Default: OFF=Internal VR Speed Control, ON=External Analog Speed Control)
5	X4	EBRAKE/RUN [13]	Set this input to ON to stop the motor immediately when the motor is running. To run the motor please set this input to OFF.
6	X5	ALM-RST [8]	Toggle this input ON/OFF to reset alarm.
7	X6 (XH1)	NC (PULSE-INPUT) [0]	NC. (pulse input when use PWM of frequency as speed command).
8	GND	GND	I/O signal ground.



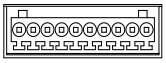
Matting Connector:
Euro 8-pin (male), 2.50mm pitch
Matting Terminal:
Euro 8-pin (female),
2.50mm pitch
[Included]

*1. is default setting.

NOTE I/O and communication signal should be away from the inductance load, power and motor power at least 100mm.
Cables not in use should be insulated well.

CN8 I/O Connector (Digital Output/Analog Input)

Pin	Name	Function [NO.]	Description (Default Function)
1	VH	+5V	5V for external potentiometer.
2	A1	Speed command	External analog input A1. Default: speed command when M0 is ON.
3	A2	NC	External analog input A1. Default: No Function.
4	VL	SGND	Analog signal ground.
5	Y1+	BUSY-OUT [3]	"ON": motor in operation (running); "OFF": motor not in operation (not running).
6	Y1-		
7	Y2+	ALM-OUT [2]	ON": alarm occurs; "OFF": normal.
8	Y2-		
9	YH1	SPD-OUT [1] Encoder model do not have this function.	Speed pulse output. Output 12 pulse per motor revolution for a 8 poles motor. $\text{RPM} = \frac{\text{SPD-OUT freq}}{\text{motor poles}} \cdot \frac{2}{3} \cdot 60 = \frac{\text{SPD-OUT freq}}{\text{motor poles}} \cdot 40$
10	GND	OUT-COM	I/O signal ground.



Matting Connector:
Euro 10-pin (male), 2.50mm pitch
Matting Terminal:
Euro 10-pin (female),
2.50mm pitch
[Included]

*1. is default setting.

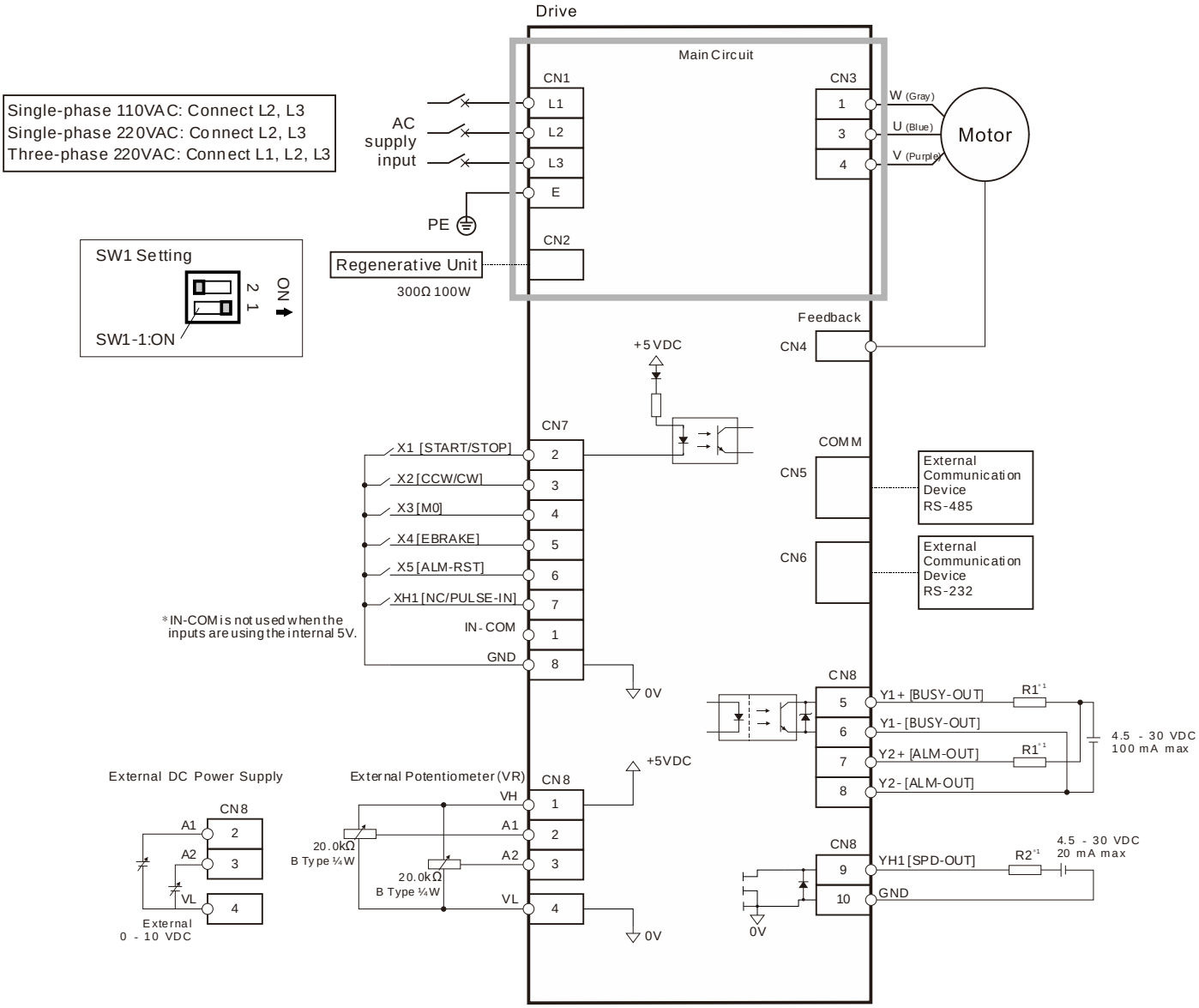
NOTE I/O and communication signal should be away from the inductance load, power and motor power at least 100mm.
Cables not in use should be insulated well.

Connection

NOTE XH1, YH1 can use SINK connection only.

SINK Connection – Digital input with internal 5V

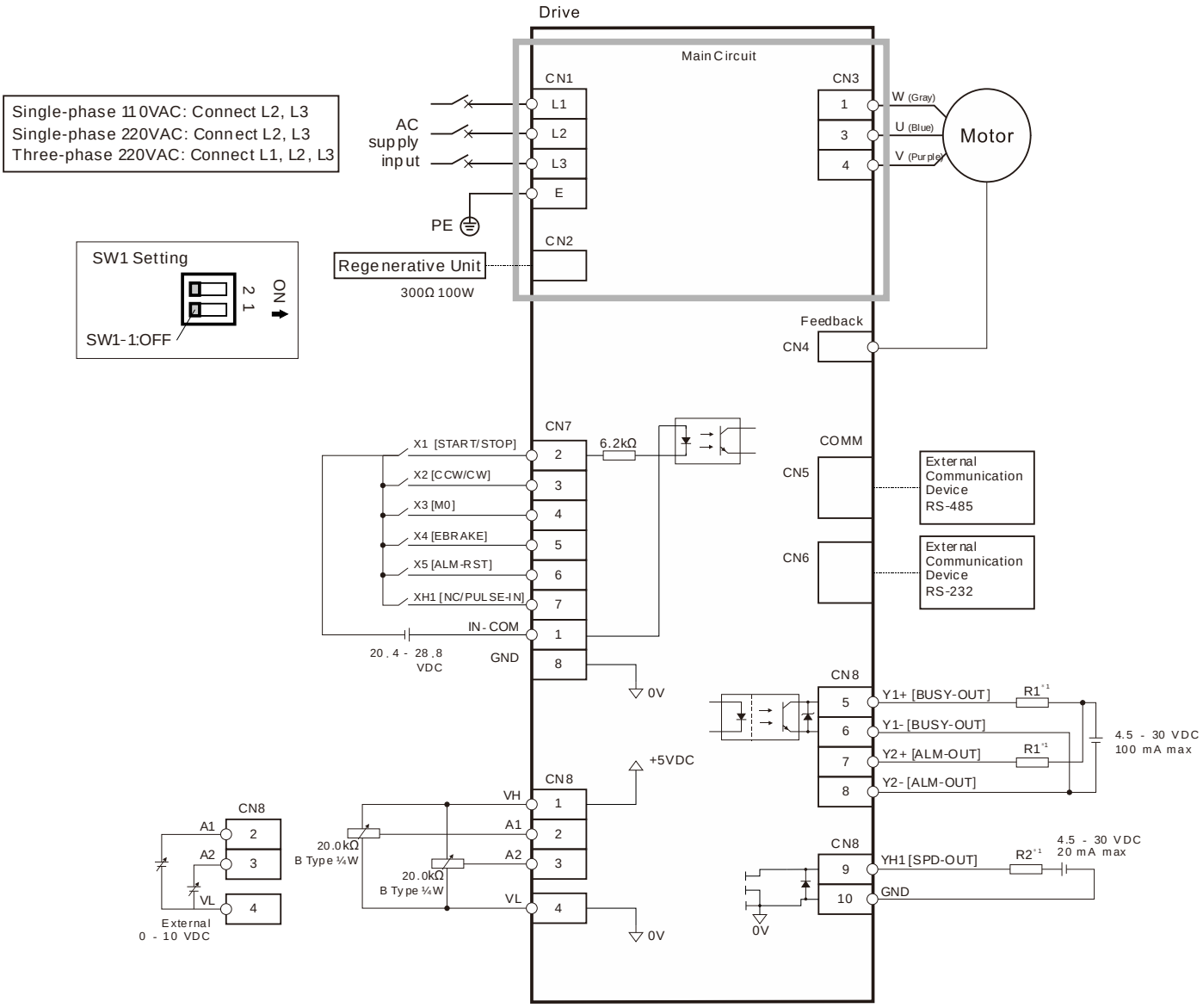
To use internal 5V, set SW1-1 to ON.



*1 Be sure to connect a current-limiting resistor to Y1, Y2, YH1 signals to keep the current under the maximum rating.
*2 To control electromagnetic brake with Y1,Y2. An external replay with internal diode is required.

SINK Connection – Digital input with external 24VDC

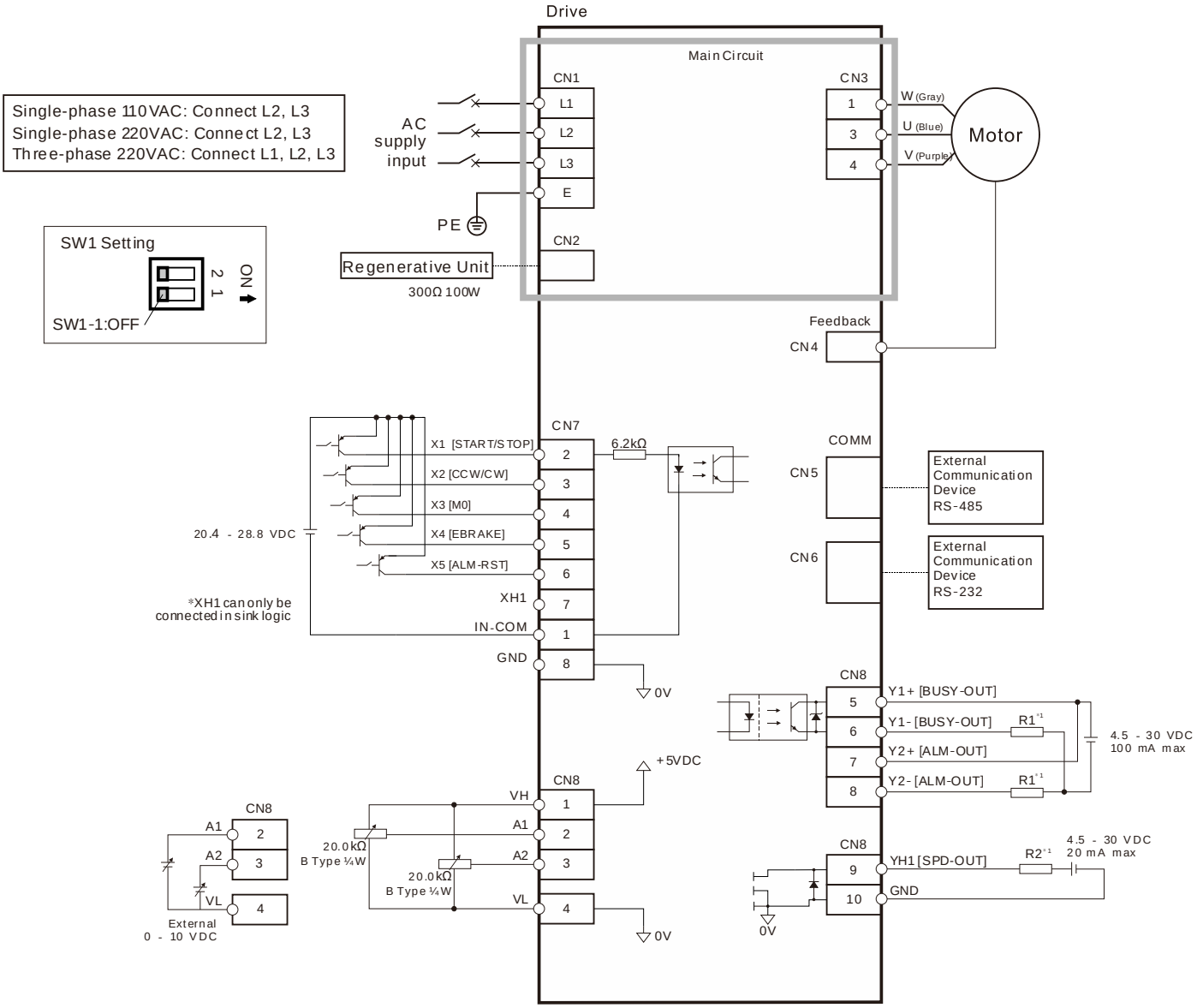
To use external 24VDC, set SW1-1 to OFF.



*1 Be sure to connect a current-limiting resistor to Y1, Y2, YH1 signals to keep the current under the maximum rating.
*2 To control electromagnetic brake with Y1,Y2. An external replay with internal diode is required.

SOURCE Connection – Digital input with external 24VDC

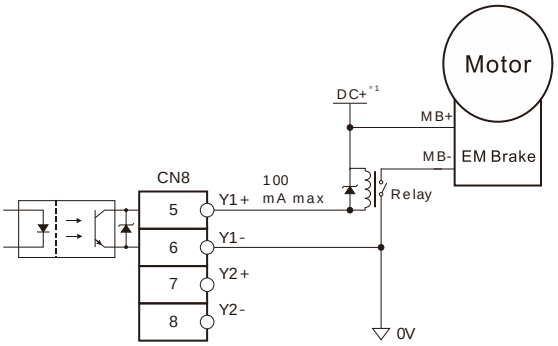
NOTE XH1, YH1 can use SINK connection only.
To use external 24VDC, set SW1-1 to OFF.



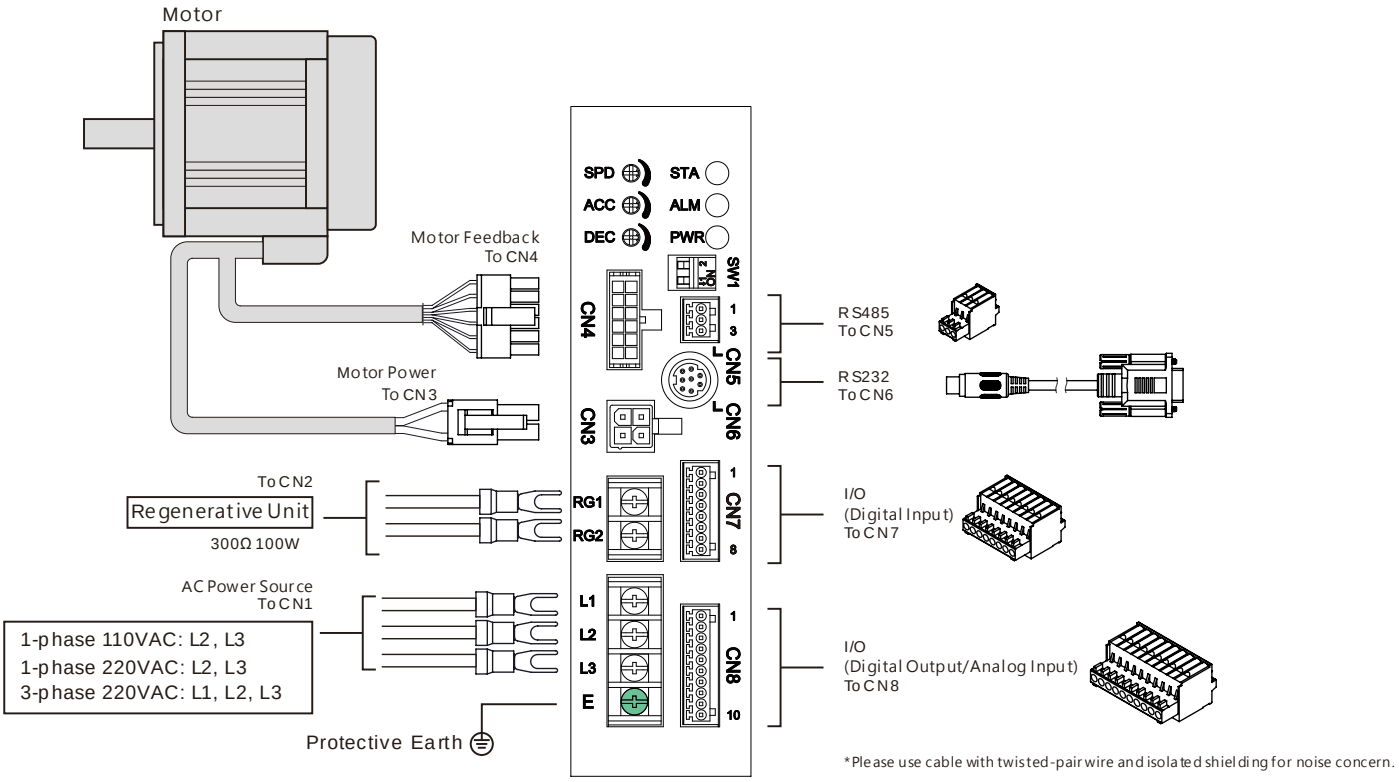
*1 Be sure to connect a current-limiting resistor to Y1, Y2, YH1 signals to keep the current under the maximum rating.
*2 To control electromagnetic brake with Y1,Y2. An external replay with internal diode is required.

External Relay Wiring

Y1 need an external relay to control electromagnetic brake.
Set Y1 function (param ID:06-09) to 13:MBRAKE
The voltage range is 4.5 ~ 30VDC. Please use the voltage required by the electromagnetic specifications.



Connection Example



*Please use cable with twisted-pair wire and isolated shielding for noise concern.

Basic Function

Input Functions

IO signal logic can be programmed through parameter (RS232 model)

I/O	No	Function	Description	Setting	
				ON	OFF
Input	0	NC	No function. Set when the terminal is not connected.	-	-
	1	START/STOP (SC mode)	SC mode: When START/STOP is "ON", motor start operation. When START/STOP is "OFF", motor stops. Operation direction set by CCW/CW, stop method set by STOP-MODE.	Run	Stop
		FWD (CC mode)		CW operation	Stop
	2	CCW/CW (SC mode)	CC mode: When FWD is "ON", motor start CW operation. When REV is "ON", motor start CW operation. When FWD and REV are both "ON" and parameter 08-07 is 1, motor stops. When FWD and REV are both "OFF", motor stops Stop method set by STOP-MODE.	CCW	CW
		REV (CC mode)		CCW operation	Stop
	5	FREE	When FREE is "ON" motor output is cut off.	FREE	FREE deactivate
	6	STOP-MODE	Set the motor stop method: "ON": motor instant stop (brake). "OFF" or not in use: motor decelerate to stop.	Instant stop	Deceleration stop
	7	EBRAKE/ ALM-RST	When normal operation, the function of EBRAKE/ALM-RST is the same as EBRAKE. When alarm occurs, the function of EBRAKE/ALM-RST is the same as ALM-RST.	-	-
	8	ALM-RST	Alarm reset: Set ALM-RST "OFF" more than 0.5 sec then set it to "ON" more than 0.5 sec then set it back to "OFF" again to reset an alarm. For safety concern, alarm can only be reset when all the operation signals (START/STOP, FWD, REV…) are "OFF"	-	-
	10	M0	Operation data No. select: M0, M1, M2 as 3 bits binary to select operation data No. M0 as bit0, M1 as bit1, M2 as bit2. E.g.: 000b=No.0, 001b=No.1, 010b=No.2…	M0 is 1	M0 is 0
	11	M1		M1 is 1	M1 is 0
	12	M2		M2 is 1	M2 is 0
	13	EBRAKE/RUN	When EBRAKE is "ON" motor instant stop (dynamic brake / motor short brake). To operate the motor, set the EBRAKE to "OFF".	EBRAKE	EBRAKE deactivate
Output	0	NC	No function. Set when the terminal is not connected.	-	-
	1	SPD-OUT	Speed pulse output. Output 12 pulse per motor revolution for a 8 poles motor. RPM = $\frac{\text{SPD-OUT freq}}{\text{motor poles}} \cdot \frac{2}{3} \cdot 60 = \frac{\text{SPD-OUT freq}}{\text{motor poles}} \cdot 40$	-	-
	2	ALM-OUT	"ON": alarm occurs; "OFF": normal.	Alarm	No Alarm
	3	BUSY-OUT	"ON": motor in operation (running); "OFF": motor not in operation (not running).-		
	4	VA-OUT	VA-OUT is "ON" when the motor speed is in the setting range.		
	5	EN-OUT	The EN-OUT is ON when the motor rotating speed is over the set value.		
	6	ALM-PULSE	The ALM-PULSE generates pulse signals depends on the alarm code when an alarm has generated.		
	7	BUSY-ALM-PULSE	The function of BUSY-ALM-PULSE output is the same as BUSY-OUT output when normal operation. The function of BUSY-ALM-PULSE output is the same as ALM-PULSE when an alarm has generated.		
	11	RUN-OUT	The RUN-OUT is ON while the motor is in operation.		
	12	DIR-OUT *	The DIR-OUT is OFF while the motor is in CW operation. The DIR-OUT is ON while the motor is in CCW operation.		
	13	MBRAKE	MBRAKE is "ON" to when motor is running. MBREAKE is "OFF" when motor stops. Can use an external relay(with diode) to control electromagnetic brake.		
	14	MBRAKE-RELEASE	MBRAKE-RELEASE is always "ON"		
	15	VA-OUT2 *	The VA-OUT2 is OFF when the motor is not rotating. The VA-OUT2 is ON when the motor rotating speed is in the set value.		
	16	VA-EN-OUT *	When motor is in operation the function of VA-EN-OUT is the same as VA-OUT. After any stop command: When the motor rotating speed is under the set value of EN-OUT speed, the VA-EN-OUT is OFF. When the motor rotating speed is over the set value of EN-OUT speed, the function of VA-EN-OUT is the same as VA-OUT.		

Operation Data (Speed, ACC/DEC)

Operation No.	M2	M1	M0	Parameter ID				
				Speed	Duty	ACC	DEC	Torque Limit
0	OFF	OFF	OFF	03-01	03-09	04-01	04-09	07-01
1	OFF	OFF	ON	03-02	03-10	04-02	04-10	07-02
2	OFF	ON	OFF	03-03	03-11	04-03	04-11	07-03
3	OFF	ON	ON	03-04	03-12	04-04	04-12	07-04
4	ON	OFF	OFF	03-05	03-13	04-05	04-13	07-05
5	ON	OFF	ON	03-06	03-14	04-06	04-14	07-06
6	ON	ON	OFF	03-07	03-15	04-07	04-15	07-07
7	ON	ON	ON	03-08	03-16	04-08	04-16	07-08

Speed Control

Control motor operation by direct IO or NET-IO. The operation data can be set are speed, ACC/DEC time, torque limit.

■ **Speed Setting**

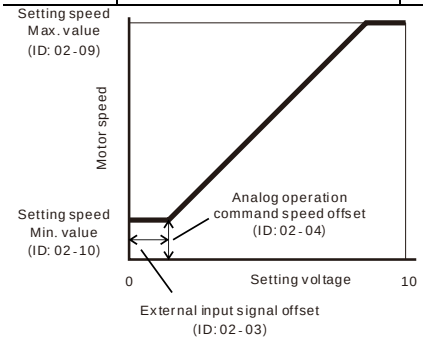
The speed setting method can be set by 「Speed Command Source」parameter(01-10).

The default speed setting can use M0 input to select between internal VR or external analog A1.

M0	Speed command source	Description
OFF	Internal VR SPD	Use insulated screwdriver to rotate SPD VR in clockwise direction to increase the speed.
ON	External analog A1	Use external potentiometer or DC voltage to control speed.

When using external analog A1:

ID	Name	Contents	Range	Default
02-01	Analog input voltage	Set the voltage range of external voltage input	0: 0 ~ 5 VDC 1: 0 ~ 10 VDC	0
02-02	Analog input gain	Sets the speed command per 1 VDC of the analog input.	0 ~ 10000 r/min perV	813
02-03	Analog input OFFSET voltage	Set the offset of the speed command input voltage.	0 ~ 200 (1=0.01 VDC)	20
02-04	Analog input OFFSET speed	Set the offset of the speed command speed.	0 ~ 10000 r/min	100
02-05	Analog input Min. action	Motor operation when analog input voltage is under OFFSET value.	0 = Stop 1 = The lowest speed in continue.	0
02-09	Analog Speed Setting Max. Limit	Sets the maximum value of the operation speed by the analog speed setting.	100 ~ 10000 r/min	4000
02-10	Analog Speed Setting Min. Limit	Sets the minimum value of the operation speed by the analog speed setting.	60 ~ 10000 r/min	100



Setting Description

$$\text{Speed} = (\text{intput voltage} - \text{Analog input OFFSET voltage}) \times \text{Analog input gain} + \text{Analog input OFFSET speed}$$

Protect Function (Alarm)

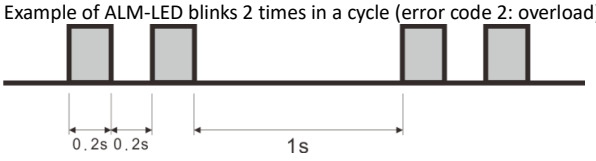
When an alarm occurs, the motor coasts to stop, the ALM-OUT outputs ON and the ALM-LED blinks.
Before resetting an alarm, always remove the cause of the alarm and ensure safety then perform one of the reset operations specified below.

- Set the ALM-RST input "OFF" for more than 0.5 sec then set it to "ON" for more than 0.5 sec then set it to "OFF".
- Cycle the power. When cycling the power please turn the power off for at least 1 min or till the PWR LED off then turn the power on again.

NOTE Some alarm can only be rest by cycling the power.
NOTE The alarm cannot be reset if the drive operation command is "ON" (e.g. START/STOP input is ON). Please set all the operation command/signal to "OFF" before rest the alarm.

- **ALM LED**

ALM LED blinks in a cycle when an alarm occurs. The blink time in each cycle is corresponding to the alarm error code.
Example of ALM-LED blinks 2 times in a cycle (error code 2: overload).



Error Code (Blinks)	Protect Function	Description
1	Over current	Excessive current has flown through the drive. Could be motor power short or drive power is not enough.
2	Over load	The load exceeds the rated value has applied to the motor more than the allowed time. (time can be set through parameter)
3	Motor feedback fault	Motor hall signal bad or not connected.
4	Over voltage	The input power supply voltage has exceeded the maximum limit. Or the inertia of the load is too large.
5	Under voltage	The input power supply voltage is under the low limit. Or bad power connection.
6	Drive overheat	The drive's heat sink temperature is over maximum limit.
7	Startup failed	Motor UVW bad connection or motor stuck.
8	EEP data error	Error in EEPROM data (Can NOT be reset by ALM-RST).
10	Motor overheat	The motor temperature is too high. Or parameter 01-06 setting incorrect.
12	Over speed	Motor operation speed is over the parameter 05-03 setting.
13	Encoder Error	(1) Encoder not connected (Can NOT be reset by ALM-RST). (2) Encoder position overflow. Reset the position with CS command before ALM-RST.
14	Power On Inhibit	A run command is ON during power on.
15	External stop	EXT-ERROR input is ON.
20	Hall sequence fault	The hall sequences no matching the drive's setting.
21	Communication error	The parameter setup value exceeds its limit, or the communication command was not supported.
22	Parameter error	Parameter setup value was incorrect.

Revision History

REV	Date	Remark
1.0	20190405	1st Release
2.0	20190801	Add wide range supply input model AFSD-U400RQ.