T-net Network Communication Series Brushless Motor

DBU Series Operation Manual

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Ver. 1

Directory

1 Precaution – Your attention is our intention

We highly appreciated your purchasing of network communication series product! Before using the product, we remind your attention to the product related item, e.g. packing contents, product specification, wiring, installation, operation setting, safety protection etc.
Should you have any questions in the manual, please do not hesitated to contact our service crew in each region.

■ Packing Contents :

Appearance	Quantity	DBU Series
	1	Driver
 ※Power input cable, please use to AWG14(2.0mm^2) above up specifications.	2	Power Connector and Regeneration resistance Connector CN2,RG
	1	Input Signal Connector CN5
	1	Output Signal Connector CN6
	1	DBVR + VR Use Signal Isolation Cable
	1	Ext-VR Connector CN3
	1	Regeneration resistance

※ Please be advised the aforementioned appearance is for reference only, the actual specification please refer to the product in the packing. We reserve the right to change any Model and/or type without prior notice.

Safety notice for using our product, please make sure to conform with.	
Environment	✓ Do not use the product in the environment with hazardous like corrosion, flammable, dust, radioactive, high voltage, vacuum, strong magnetic field, or abnormal vibration etc.
Installation	✓ Please follow the instructions for installation and provide proper fix and cooling measurements. ✓ Installation shall be conducted by professional or authorized personnel.
Wiring	✓ Please follow the wiring drawing and precaution for each part (i.e. terminal, grounding, communication). Connect correctly and firmly to avoid damage due to incorrect wiring. ✓ The driver, motor, power supply, between the devices shall be provided with adequate grounding to avoid electrical shock or wrong action caused by signal interference. ✓ Motor power cable, intermediate extension cable, each connector shall conform to the product specification. Do not make any modification. ✓ Turn off the power before plugging in or pull out the connector. ✓ If the device shall be used in a place with signal interference (e.g. High power equipment with high frequency, electrostatic, electrical pulse, electrical heater, plasma, laser etc.), certain anti-interference measurement shall be provided to avoid wrong action of motor caused safety issue. ✓ If you want to plug and unplug the connector (CN1, CN2) when it is running at the rated load rate for a long time, please wait for the connector to cool before plugging and unplugging.

Running	✓ Before running, check the input voltage is conform with driver´s specification. ✓ Gearbox,motor,driver, Strictly follow the specification of the product. ✓ During running, if the driver protective mechanism been active and sent warning/alarm signals, follow the troubleshooting procedure according to the warning/alarm code. Do not continue running so as to prevent motor, driver or powertrain mechanism damage. ✓ When there is a possibility of touching the machine during operation, do make sure to put on warning sign at the obvious spot to ensure the safety working.
Maintenance	✓ During maintenance and inspection, cut the power supply to the driver and motor. Conduct maintenance 3 minute after power off. ✓ Check the driver and motor regularly for any dust or oil stain. ✓ Check the driver and motor regularly for any lose or damaged part.
Repair	✓ When malfunction occur, do not dissemble driver, motor or using unauthorized parts to replace or repair. Please contact the service people of the company for repair. ✓ If same damage happened constantly, it is recommended to stop work and consult with the service people of the company.

2 Feature,Specification

T-net network communication system integration

- Through T-net network communication system integration platform『TOP-1』, it can connect multi machine, set parameter, monitor status and test running.
- 『TOP-1』has a color touchscreen operation interface leave out the connection of different machines by Host controller (PLC,PC,HMI……) or internal parameter setting, so as to save maintenance time.

Network communication control

- Compatible to Modbus RTU communication protocol, RS-485 interface with RJ45 cable to control different machines in series to simplify wiring.
- Can be connected to TOP-1,PC,PLC,HMI devices for network communication.

Flexible customized I/O interface.

- IN connection→4 from 8; OUT connection→2 from 6. Terminal function can be customized and configurated.
- Customize I/O terminal to compatible with previous controller without changing wiring or control program.
- Customized compatibility to all TROY brushless driver control Modes. e.g. BMD/DB/SBD/UBD/DBD.

Color indicators shows status

- 7 color LED indicator shows the running status of motor and driver.

DBU Series—Communication, I/O terminal operation

- Through communication Mode, parameter setting, running speed, speed selection, monitor status etc. can be controlled.
- Use only RJ45 network cable to connect host controller so as to simplify wiring and engineering time.
- Through I/O Mode, running speed, speed selection etc. can be controlled.
- Under I/O Mode, it can operate stand-alone, or control by PC program.
- It can be controlled by 2 Modes, i.e. Communication Mode and I/O Mode.
- With screw lock design, faster and easier installation and locking.
- OLED panel display.

Output Power			200W	400W
Motor	Round shaft Model		9BU200S-D T	9BU400S-D4 T
	Gear shaft Model		9BU200P-D T	-
Driver	DBU Series		DBU200-D T	DBU400-D4 T
Input power	Rated Voltage	V	DC24±10%	DC48±10%
	Max. Current	A	21	13.3
	Rated Current	A	15.4	10.7
Rate Torque		Nm	0.65	1.28
Instant Max. Torque		Nm	0.81	1.76
Allowed Inertia	GD^2	$kgcm^2$	54.4	72.6
Rated Revolving Speed		r/min	3000	
Revolving Speed Control Range		r/min	250 ~ 3000	300 ~ 3000

Remarks

1. Instant Max Torque : allowed short time motor output value for revolving speed between 250(300) ~ 2000 r/min range.
2. Rate Torque : continuous motor output value for revolving speed between 250(300) ~ 3000 r/min range.
3. In the table : Torque and revolving speed are actual value without reducer.
4. Allowed Inertia : allowed value for round shaft motor, use GD^2 =4 J to calculate.
5. Torque : 1 Nm = 10.197 kgcm.

Protective Mechanism	Alarm	10 detection conditions like over voltage, over current, over speed(>3800RPM), overload, abnormal start, Hall signal error, memory error, external interrupt, overheat(>80℃), power supply protection.	
	Warning	4 alarm conditions like over speed(> 3500RPM), overload rate(%), low voltage, overheat(>70℃).	
Electrical Specification	Temperature	Drive：0℃ ~ +40℃, Not frozen	Motor：0℃ ~ +50℃, Not frozen
	Humidity	Below 85%RH, no condensed water (RH：Relative Humidity)	
	Elevation	Under 1000m above sea level	
	Environment	Avoid to use in special environment with such as corrosive/flammable (dust, gas), radioactive, high pressure/vacuum, high magnate field etc.	
Storage, Transportation	Temperature	-25℃~ +70℃, Not frozen	
	Humidity	Below 85%RH, no condensed water (RH：Relative Humidity)	
	Elevation	Under 3000m above sea level	
	Environment	Avoid to use in special environment with such as corrosive/flammable (dust, gas), radioactive, high pressure/vacuum, high magnate field etc.	
Ingress Protection	Dust/Water Protection	Driver：IP20	Motor：IP54

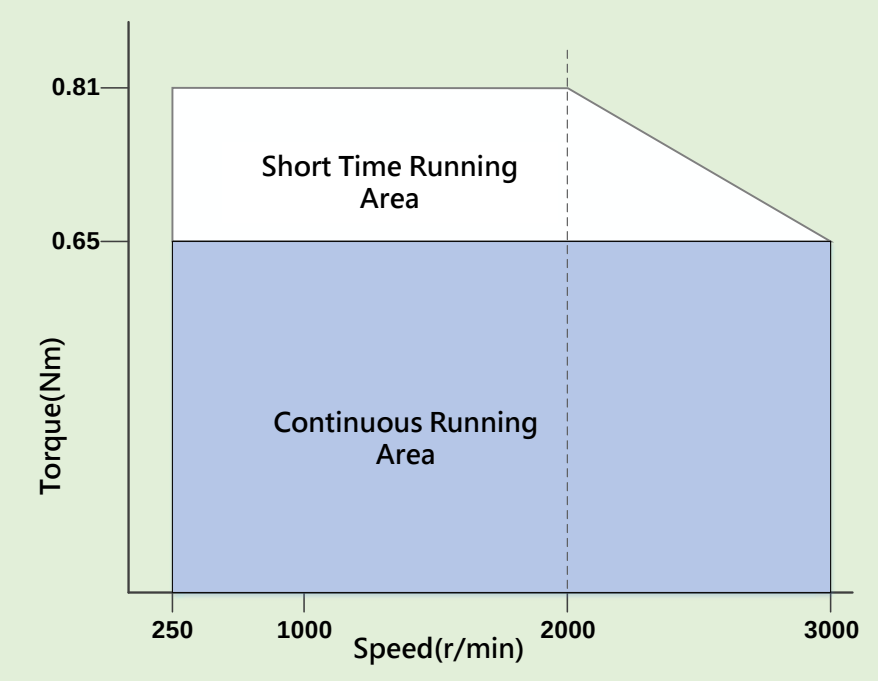
Remarks

Wrong Power Supply Voltage Protection：

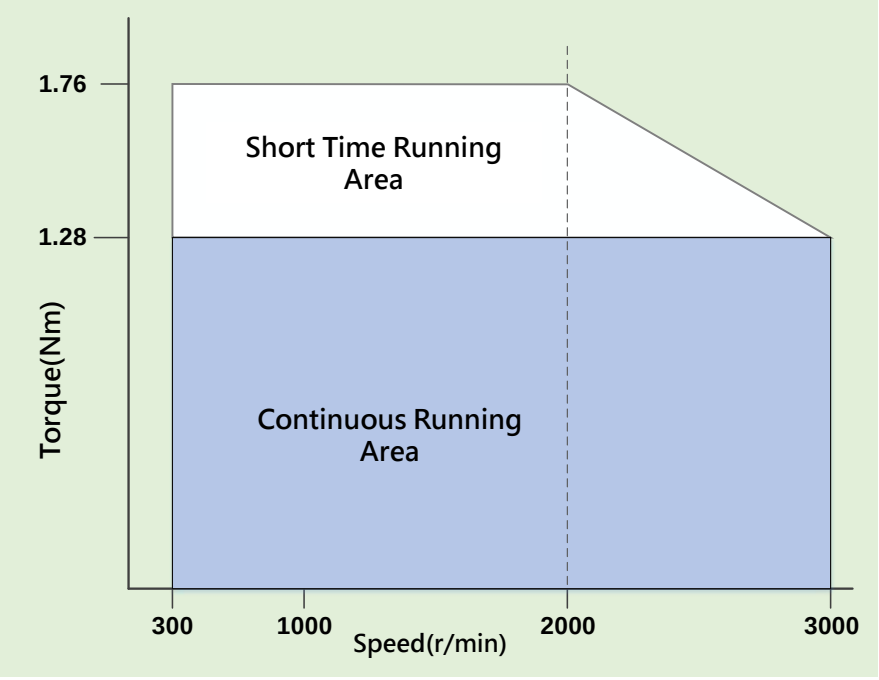
(1).Model 200W：When plug into DC48V, will send[AL001] Overvoltage Alarm, The drive is not work until power shut down and change to correct power supply. Plug in correct power supply to run the driver.

(2).Model 400W：When plug into AC110V, incorrect power supply, record shows [WR017] and [17h] low voltage alarm saved to memory. The motor can continue running but cannot reach the rated output power.

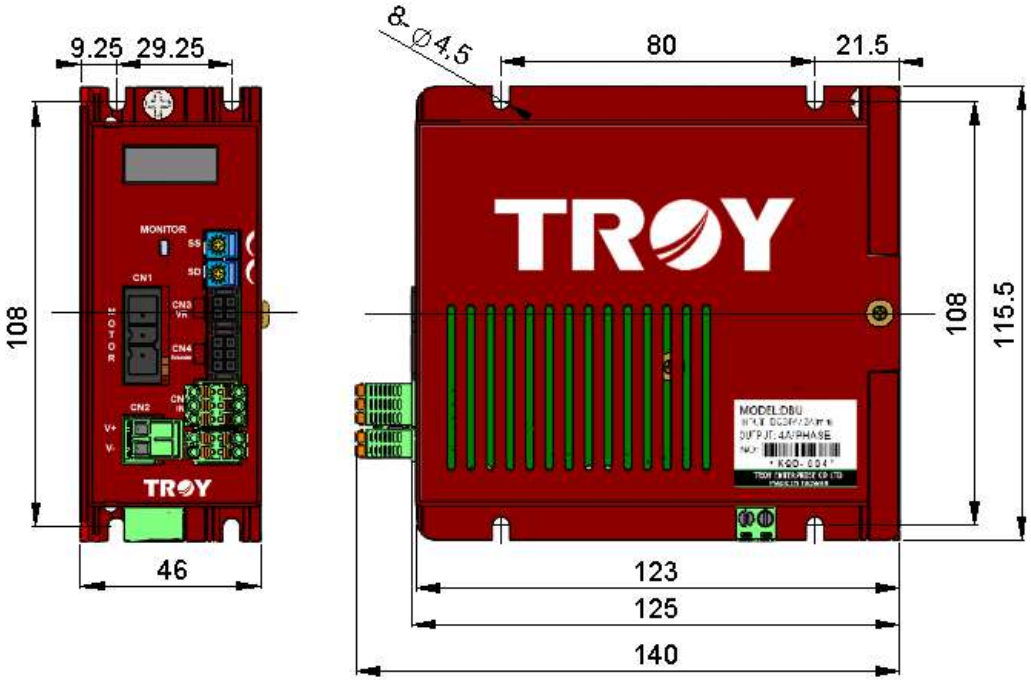
9BU200T Specification curve chart



9BU400T Specification curve chart



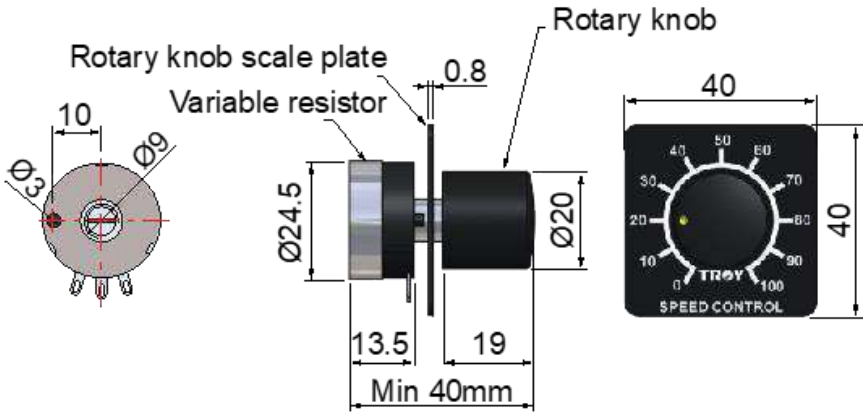
3 Dimensional Drawing



Front View

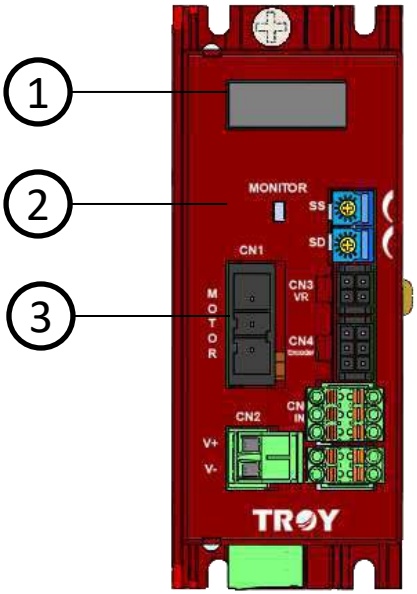
Side View

■ DBVR (accessory)



Special parts for DBU series Name：DBVR

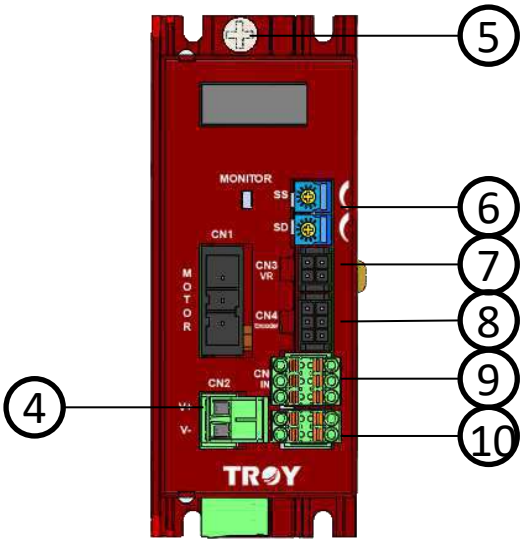
4 Introduction on Each Function



No.	Item	Function Description
1	Display	5 digits 7 section display, shows current "running information"
2	MONITOR Status indicator	build-in 7 color LED indicator display for motor and driver status

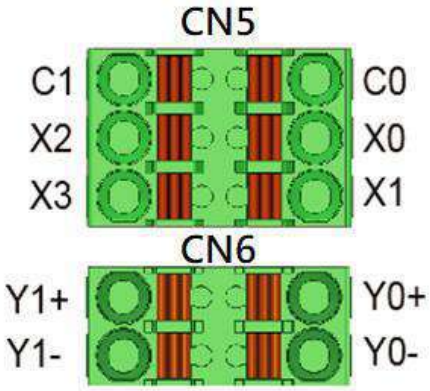
LED color	Status
Rad	Alarm
Green	RUN / EDIT
Orange	CW
Sky blue	CCW
purple	External interrupt
Blue	Memory,CPU,Communication abnormal
White	No power supplies

3	Motor connection socket CN1	Please plug in **"motor power"** connector



No.	Item	Function Description
4	DC Power connection socket CN2	Please provide adequate voltage of AC power for driver Please refer to description [5-1 Power Connection].
5	Grounding screw for driver	Grounding screw for driver P.E.(Power Earth), please fix to the [grounding] of system power system. Please refer to description [5-4 Motor, Driver grounding].
6	SS / SD	Slow start/ Slow stop time setting VR, **setting range：Slow start 0~30 Sec,Slow stop 0.5；2～30 Sec**(Remarks)
7	Ext-VR Encoder Socket CN3	1. External "Ext-VR speed setting controller" is available for manual speed adjustment. please refer to description [5-3 Input / Output,Ext-VR wiring]. 2. " External DC Voltage" is available for (0~5V) or (0~10V) control . please refer to description [5-3 Input / Output,External DC voltage control connection] .
8	Encoder Socket CN4	Please plug in "Encoder Signal" connector.

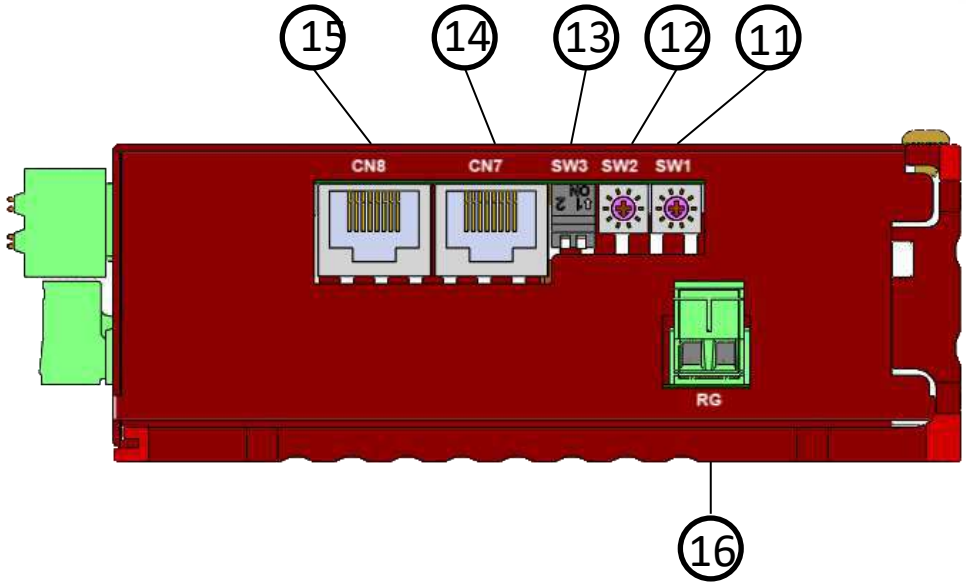
Remarks	When reducing at high speed, please set the speed decreasing time to more than 2 seconds.



No.	Item	Function Description			
		NO.	Abbreviation	Function Name	Function
9	Input signal socket CN5 (Remarks 1)	1	C0	COM0	Input signal grounding point (External power supply)
		2	X0	[CW]	Input signal benchmark is " L" , motor CW rotation
		3	X1	[CCW]	Input signal benchmark is " L" , motor CCW rotation
		4	C1	COM1	Input signal grounding point (Internal power supply)
		5	X2	[M0]	Running data---Speed group selection
		6	X3	[M1]	Running data---Speed group selection
10	Output signal socket CN6 (Remarks 1)	1	Y0+	[SPEED OUT]	Running speed pulse signal output
		2	Y0-		
		3	Y1+	[ALARM OUT]	Alarm signal output
		4	Y1-		

Remarks

1. Function Name[ ] is default setting, input terminal (X0,X1,X2,X3) /output terminal(Y0+,Y0-,Y1+,Y1-) Each terminal function can be customized according to demand.
2. SBU series Please refer to **[7-1-1 DBU Series—Input/ Output signal parameters]**.

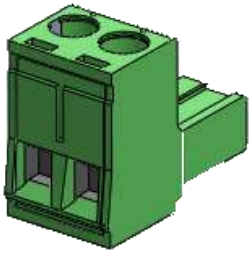


No.	Item	Function Description
11	Communication Machine No. SW1	Machine No. setting switch "H-byte" 0~F hex (Remarks 1)
12	Communication Machine No. SW2	Machine No. setting switch "L-byte" 0~F hex (Remarks 1)
13	Terminal Resistor SW3	Communication transmission terminal resistor setting(Remarks 2)
14	Communication port CN6	In series network connection "previous"device (Remarks 3)
15	Communication port CN7	In series network connection "next" device (Remarks 3)
16	Regenerative resistor connector RG	For vertical mechanism and large inertia load, please install regenerative resistor

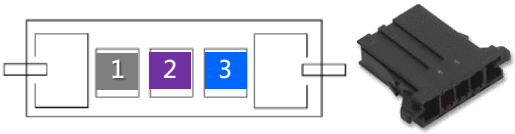
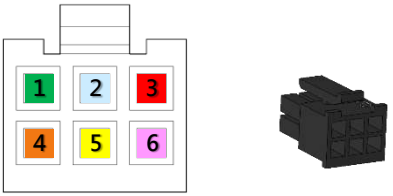
Remarks	
	3. Setting method, Please refer to [10-1 Communication machine number setting]. 4. Please refer to [10-2 Communication Transmission Terminal Resistor setting] . 5. Communication socket is RJ45 specification, Please refer to description [10-3 Communication port] .

5 Wiring

Power connector specification	
Type	Protective plug in terminal UL/VDE/CSA Certificate
Part No.	2ESDV-02P (DINKLE)
Basic Specification	Pitch : 5.08 mm 300V/20A
Screw Specification	PH1 Straight screwdriver M2.5x0.6x3.5
Locking force	0.5 Nm
Lead wire specification	AWG 12~28 (Single/Multiple core) ※please use to AWG 14 (2.0mm^2) above up specifications.



※Do not plug in/out the power connector in live line, cut off the power to connect the lead wire.

Motor power connector	Encoder Signal Connector
	
White housing6-Pin	Black housing 6-Pin
	

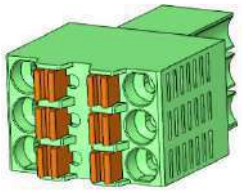
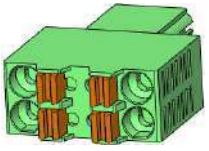
Pin-No.←→Lead wire color, core material

Pin-No. ： 1,2,3	AWG-20	Pin-No. ：2,4,5,6	AWG-24
		Pin-No. ： 1,3	AWG-22
PVC flexible rubber housing		PVC flexible rubber housing (incl. shield layer)	

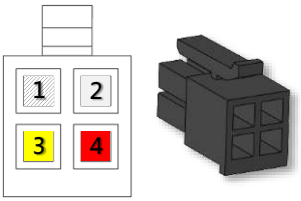
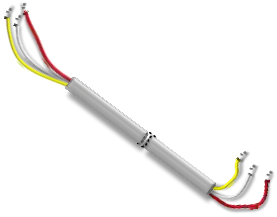
Extension cable group (motor power cable + Encoder signal cable)	
Name	Length
CBD-010	1 m
CBD-020	2 m
CBD-030	3 m
CBD-050	5 m
CBD-070	7 m
CBD-100	10 m

Extension motor connection distance：

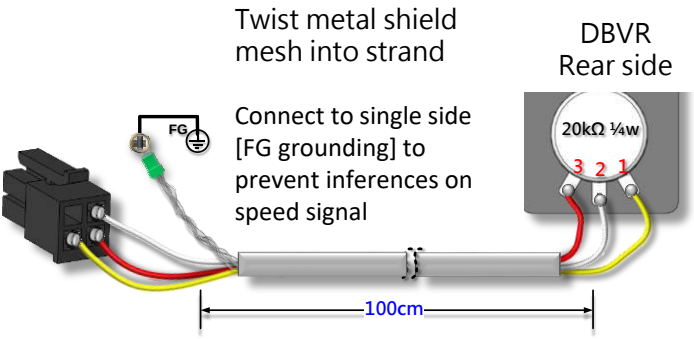
- Please use the designated [motor power cable + Encoder signal cable], please note the longest distance is 11m. (cable on motor itself is 1m + 10m extension cable).
- Avoid connect multiple extension cable, the higher impendence will compromise the transmission efficiency 2 cable at most.**(connect length extension cable<10m)**。
- The extension cable already equipped with shielding layer which can suppress the interferences from radiational clutter signal. However, it is highly recommended to separate the machine cable away from other high power equipment (e.g. high frequency, electrostatic, electrical pulse, electrical heater, plasma, laser etc.) cables in the machine cable duct so as to avoid unpredicted interferences.

Input / Output Signal Connector		Output Connector
Protective plug in terminal 6-Pin		Protective plug in terminal 6-Pin
		
Part No.	0156-2B06-BK (DINKLE)	0156-2B04-BK (DINKLE)
Basic Specification	Pitch ：3.50 mm 150V/8A UL/VDE/CSA Certification	
Lead wire specification	AWG 16~28 (Single/Multiple core)	
Lock method	Press the straight screw driver into the catch (orange), insert lead wire through round hole and release the catch to hold the wire	

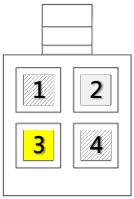
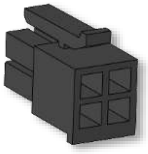
Special parts for DBU

Ext-VR speed setting controller		Connector for Ext-VR CN3	Isolated signal cable for VR
DBVR Front side 			
Part No.	DBVR	Housing ：H6630R1-04 Mates Pin ：H6630TP × 5	3-Core isolated signal cable
Basic Specification	20kΩ ±20% 1/4W	Black housing 3.00mm 4-Pin AC/DC 250V 3A	Gray rubber sleeve L=1m AWG 28

Wiring for Ext-VR speed setting

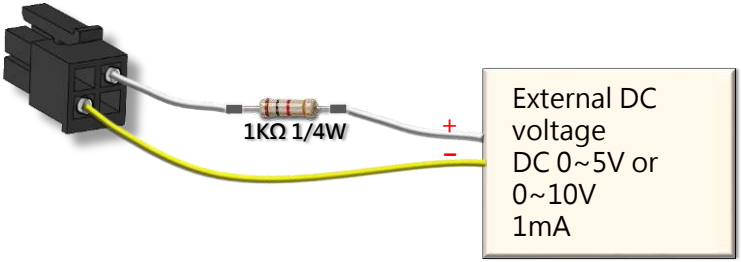


External DC voltage control

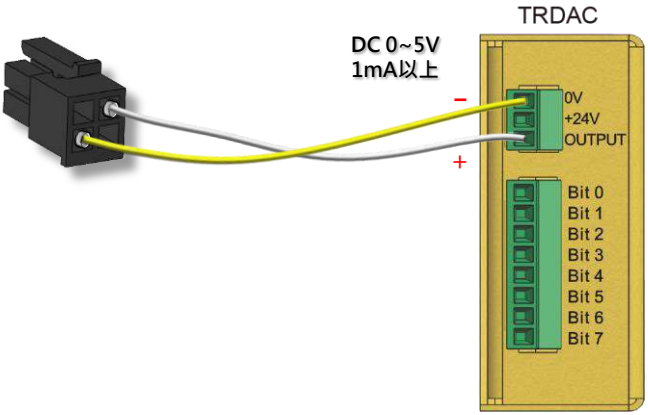
Connector for Ext-VR CN3	External DC voltage specification
 	1.DC 0~5V 1mA above 2.DC 0~10V 1mA above (Remarks)

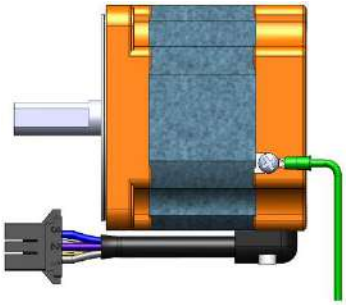
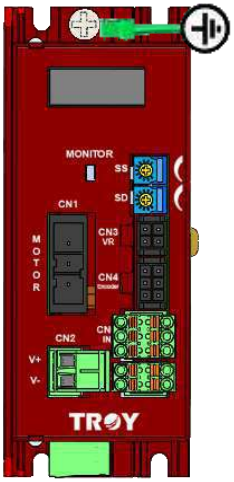
Remarks	External DC Voltage wiring method, please refer to description 【12-5 HML input voltage range set】

External DC voltage connection method

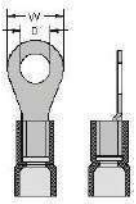


Connection method for D/A speed setting controller



Motor— Housing grounding	DBU Driver— Housing grounding
	

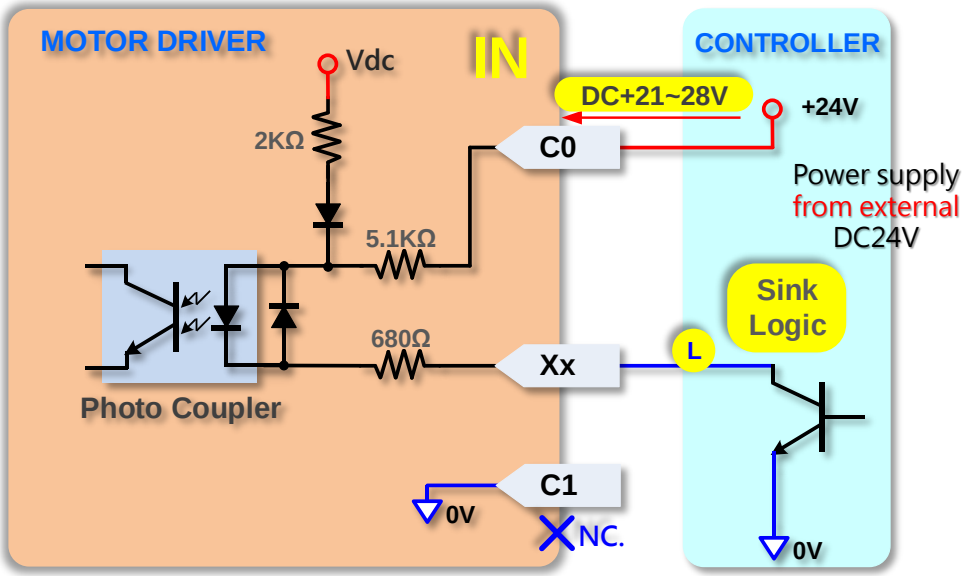
F.G and P.E grounding terminal specification

Type	Round press terminal (with insulated sleeve)	Recommended specification : 1502R ERF2-4 (KSS) D : 4.3mm W : 8.5mm 
Screw specification on terminal	M4 (Motor/Driver with accessory)	
Locking force	1.0 Nm	
Lead wire specification	AWG 12~14	

■ Matter needing attention：

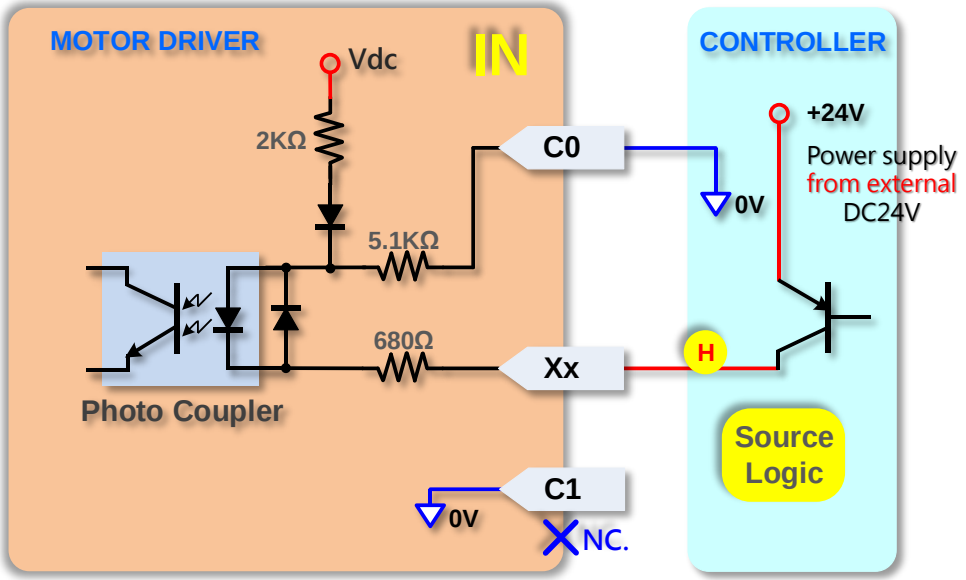
- Confirm the motor and driver are well grounded. All the locking screw are attached to each grounding terminal. Do not use unauthorized replacement (different length or thread) to prevent poor locking or product damage.
- Lock to the distributor metal board or machine metal structure in the shortest distance.
- Use adequate wiring according to [round press terminal] and [lead wire diameter] specification Input connection interface circuit.
- To avoid electrical current leakage, accumulation of electrostatics, electrical shock, product damage, signal interferences etc., Please refer to description make sure [all grounding method] are executed.

■ Sink Logical wiring method



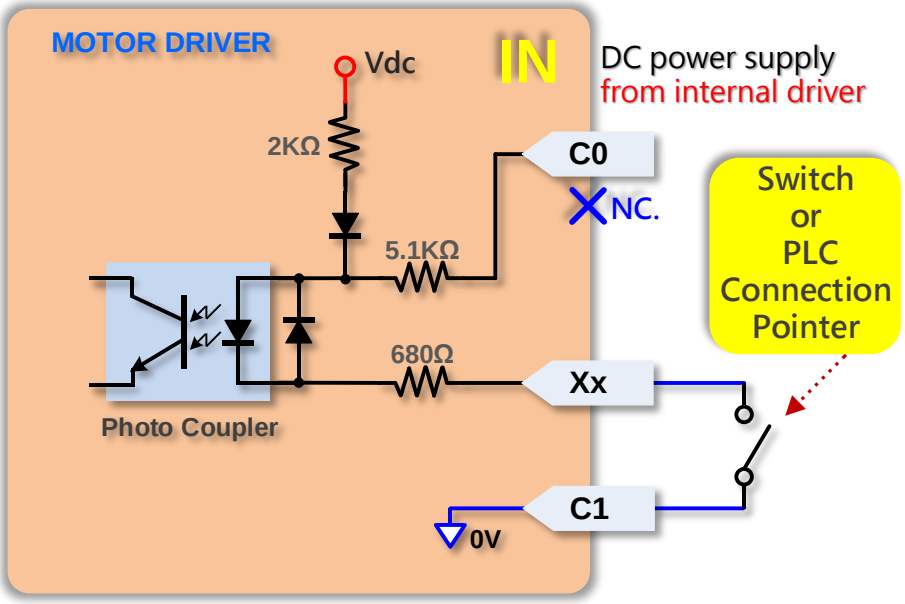
※ Power supply from external：voltage range above DC20~28V/100mA.

■ Source Logical wiring method



※ Power supply from external：voltage range above DC20~28V/100mA.

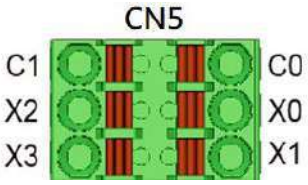
■ Wiring method for Switch or PLC



Specification introduction on input interface circuit

1.Input circuit is「Photo Coupler」interface circuit.
2.There are 「X0 / X1 / X2 / X3」4 groups of input connection.
3.It supports customizing the output contact.
please refer to [12-4 Input / Output Signal—Memory address].
4. Input signal triggering time gap shall >500ms .
5. Input signal status description：H(switch on) –ON ,L(switch off) –OFF.

5-5-1 Input port and function description table

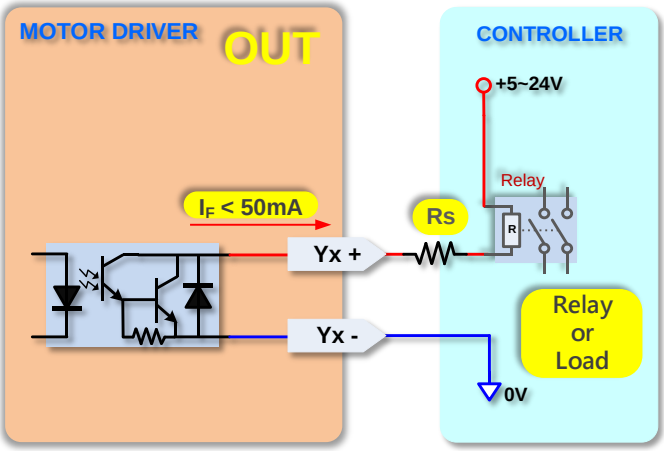


- There are 4 input connection points： [X0],[X1],[X2],[X3]
- There are 10 functions (refer to the following table) can be configured on 4 connection points.
- Common connection point：
  C0,C1 ,As per the wiring of [Source Logic], connect to [+24V] and [0V] will have deviations. Please be advised.

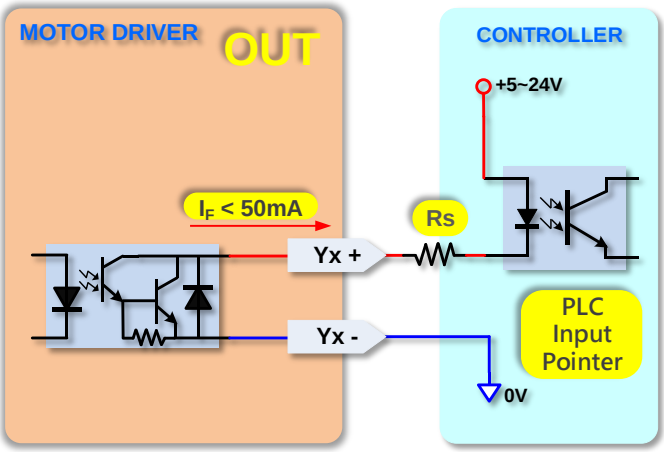
Connection point name	Signal status	Action
RUN / STOP	H	Stop running
	L	Start running
CW / CCW	H	CW rotation
	L	CCW rotation
CW / STOP	H	Stop running
	L	CW rotation
CCW / STOP	H	Stop running
	L	CCW rotation
A.R. (Alarm-reset)	H	System under protective monitoring status
	H→L→H	Clear alarm (with [triggered signal] method)
M0	H	Running data---8 stage selection
	L	
M1	H	
	L	
M2	H	
	L	
EX-Er	H	External interrupt stop
	L	External interrupt release
Hold / Free	H	Excitation maintains (Remarks)
	L	Excitation release

Remarks	Hold excitation maintain does not have safety brake function. Do not use on vertical mechanism to avoid dangerous caused by power cut.

■ PLC Input Connection wiring method

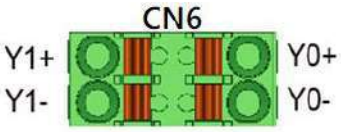


■ Relay Load wiring method



Description of output interface circuit

1. Output circuit is [Open Collector Optical Coupler] interface circuit.
2. There are 2 groups of connection「Y1+ / Y1-,Y2+ / Y2-」point.
3. Connection points function can be customized：
   Please refer to description [12-4 input/output signal—Memory address].
4. Wiring of "Relay Load" or "PLC Input Connection" are all powered by external DC+5~24V supply .
5. Connect series "Current limit resistor Rs" in the current direction if necessary I_F>50mA. Calculation of Rs resistance value ：
   DC24V While：680Ω~2.7KΩ(2W)　DC5V While：150Ω~560Ω(1/2W).

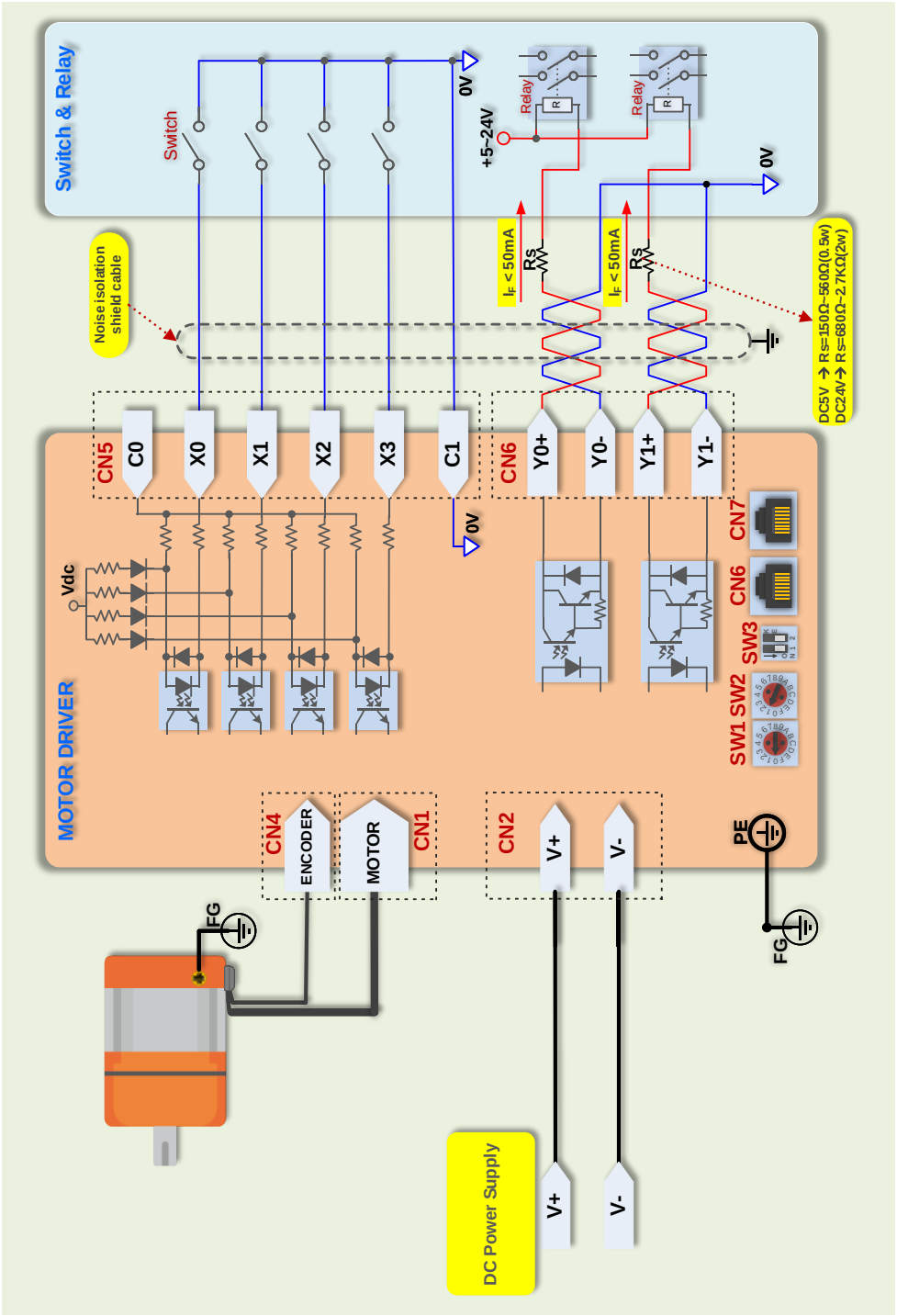


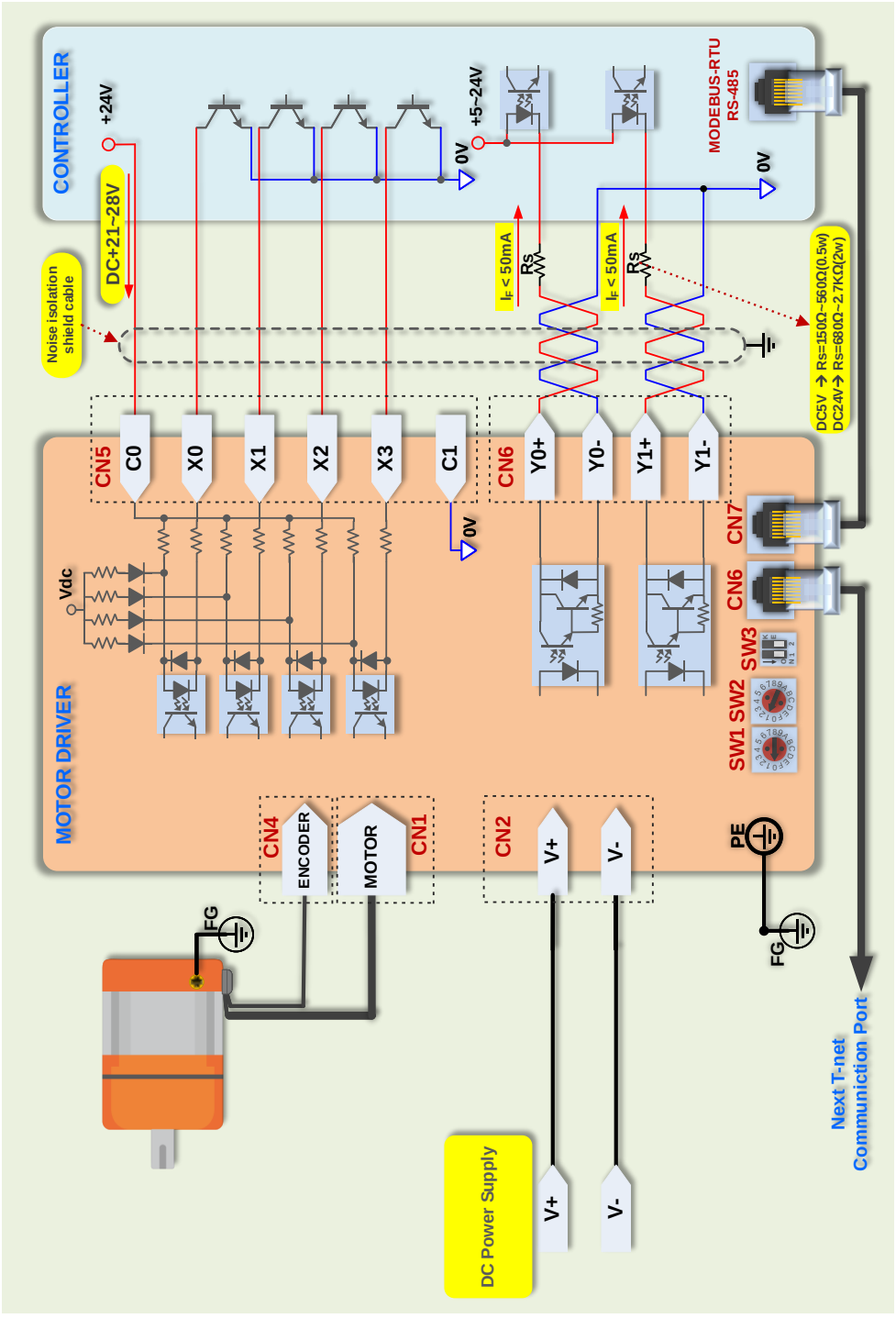
- There are 2 groups of output connection point：[Y0+,Y0-],[Y1+,Y1-].
- There are 6 functions (refer to the following table) on the output, can be configured on 2 connection points.

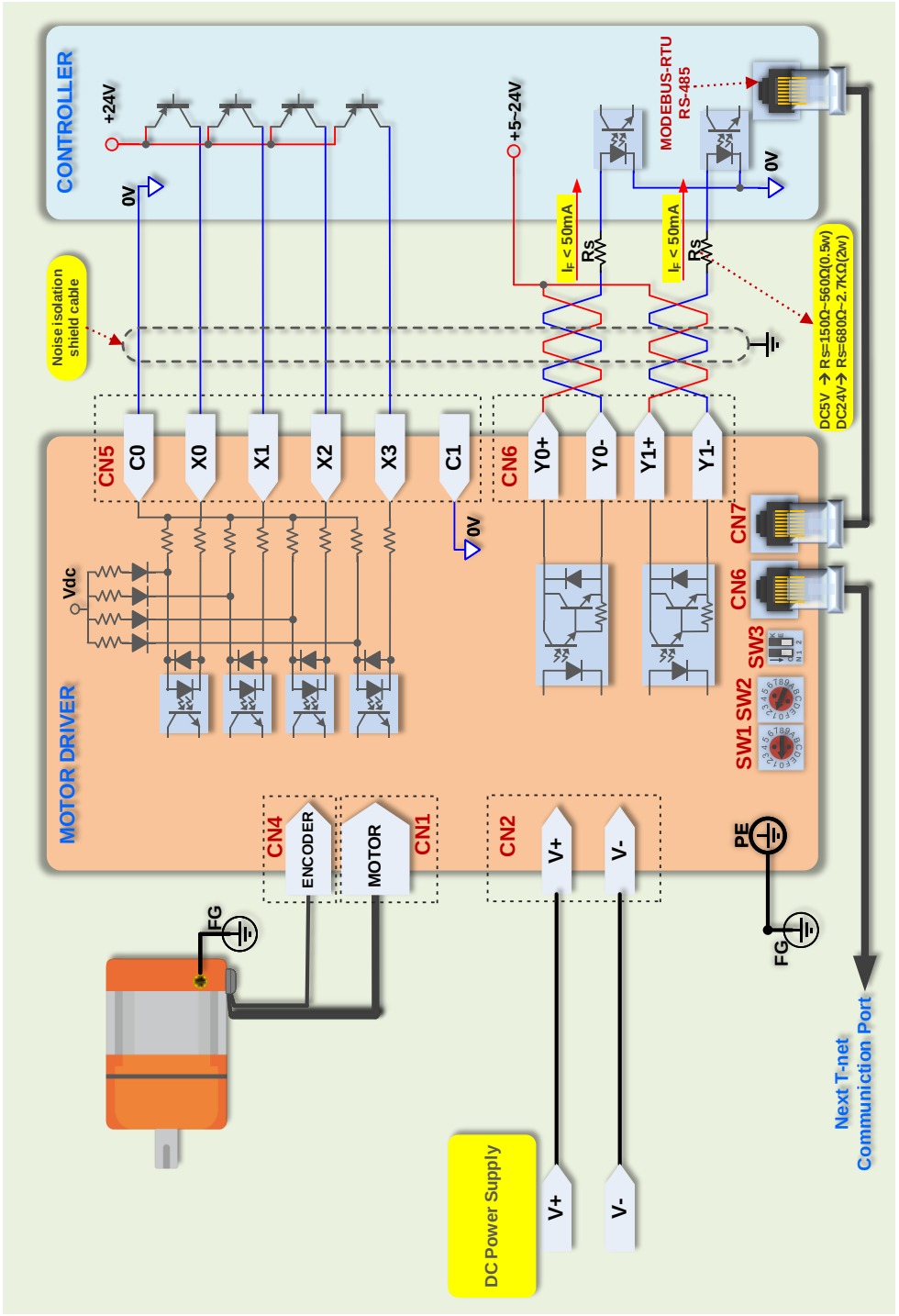
Function name	Signal status while action	Action
Alarm out	NO → NC	Output while alarm has been alarmed, the motor will stop running at once. (Remarks 1)
Reach out	NC → NO	Motor revolving speed reaches [target speed] will output.
VA out	NC → NO	Motor revolving speed reaches [target speed – VA value = upfront speed] will output. (Remarks 2)
Speed out	Pulse	Speed signal output 24 Pluses /rev → 1Pluse ≒ 0.6ms.
Warning out	NC → NO	Output while alarm has been sent, the motor will continue running. (Remarks 3)
MOVE	NC → NO	Motor will output while it is in running status.

Remarks 1 / Remarks 2/ Remarks 3 Description

1. Motor will stop running while alarm has been alarmed, the relevant color will show on indicator of the setting knob. Warning out changes from NO to NC signal status, Please refer to description [13-1 Alarm] .
2. For example：speed setting 3000RPM/ VA setting 200RPM →when motor speed reach 2800rpm [upfront speed], VA output switch from NC to NO signal status.
3. Motor will continue running while warning has been sent; Warning out switch from NC to NO signal status.
   Please refer to description [13-3 Warning] .
4. Output signal status description：NC：normal close –ON, NO：normal open –OFF.


Switch & Relay
Switch
0V
+5~24V
Relay
Relay
0V
Noise isolation shield cable
IF < 50mA
Rs
IF < 50mA
Rs
DC5V → Rs=150Ω~560Ω(0.5w)
DC24V→ Rs=680Ω~2.7KΩ(2w)
CN5
C0
X0
X1
X2
X3
C1
0V
CN6
Y0+
Y0-
Y1+
Y1-
CN7
CN6
SW3
SW2
SW1
Vdc
MOTOR DRIVER
CN4
ENCODER
MOTOR
CN1
CN2
V+
V-
PE
FG
FG
DC Power Supply
V+
V-

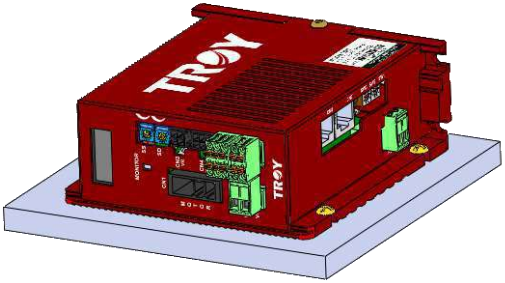

CONTROLLER
+24V
DC+21~28V
0V
+5~24V
0V
MODEBUS-RTU
RS-485
0V
Noise isolation shield cable
IF < 50mA
Rs
IF < 50mA
Rs
DC5V → Rs=150Ω~560Ω(0.5w)
DC24V → Rs=680Ω~2.7KΩ(2w)
MOTOR DRIVER
CN5
C0
X0
X1
X2
X3
C1
0V
CN6
Y0+
Y0-
Y1+
Y1-
CN7
CN6
SW3
SW2
SW1
Vdc
CN4
ENCODER
MOTOR
CN1
CN2
V+
V-
PE
FG
FG
DC Power Supply
V+
V-
Next T-net
Communiction Port


CONTROLLER
+24V
0V
+5~24V
MODEBUS-RTU
RS-485
0V
Noise isolation shield cable
IF < 50mA
Rs
IF < 50mA
Rs
DC5V → R=150Ω~560Ω(0.5w)
DC24V→ R=680Ω~2.7KΩ(2w)
CN5
C0
X0
X1
X2
X3
C1
0V
CN6
Y0+
Y0-
Y1+
Y1-
CN7
CN6
SW3
SW1 SW2
Vdc
MOTOR DRIVER
CN4
ENCODER
MOTOR
CN1
CN2
V+
V-
PE
FG
FG
Next T-net
Communiction Port
DC Power Supply
V+
V-

6 Installation Method

■ Lock by M4 screw mechanism

Horizontal installation



Vertical installation

Remarks	1. The metal housing of the driver is designed, which can increase radiation surface and heat conduction efficiency. 2. When ambient temperature up to 40℃, please take care of the cooling conditions. It is recommended to install cooling fan to increase cooling efficiency. 3.During installation please keep the machine frame >50mm distance for better cooling. If there is high power devices around (e.g. electrical heater, oven, soldering oven, HF, plasma, laser, eon coating, radio etc.) please execute positive cooling and prevention on signal interference. Contact the manufacture for more information and technical support. 4.Prevent the conductive materials (e.g. cutting chips, bolt, cable chips etc.) or dust to entering the driver.

7 Parameter Function Description

- Before first commissioning, DBU series internal system and function parameters are "Default setting", please follow the "parameter description" in the following table to customize them.
- While first use of the product, it is highly recommended you operate the device with "default setting" first, after get familiar with the parameters and then change them. The changes will store in the system memory which will not be erased due to power cut off.

DBU series—System Core Parameters

Contents	Function and Range	Default setting	
While Running Display Value	Revolving speed	RPM	
	communication machine no.		
	Running data No.		
	Countdown		
	load rate(%)		
Alarm protection method Prevent motor sudden running while turn on the machine	Turn on power-running available	on	
	Turn on power- no running		
Alarm erase method	Erase by power reset	Erase by Alarm-Reset	
	Erase by Alarm-Reset		
Upper Lower speed limit	Upper speed limit	hi	3000
	Lower speed limit	Lo	0
Holding forces while motor stop	No holding forces	No holding forces	
	Have holding forces		
Control priority	I/O override	I/O override	
	communication override		
control Mode	RUN/STOP CW/CCW	Mode2 (Remarks)	
	CW/STOP,CCW/STOP		

Remarks	While set **Mode1**, **CW/STOP,CCW/STOP** input connection function will be disabled ; While set **Mode2**, **RUN/STOP,CW/CCW** input connection function will be disabled.

■ Input/ Output signal parameters

Contents	Function and Range	Default setting
Input signal (Remarks 1)	RUN/STOP	[X0] CW/STOP (Remarks 3,4)
	CW/CCW	
	CW RUN/STOP	[X1] CCW/STOP (Remarks3, 4)
	CCW RUN/STOP	
	Alarm-Reset	
	Running data--8 stage selection (Remarks 5) 000-SPno1 / 001-SPno2 010-SPno3 / 011-SPno4 100-SPno5 / 101-SPno6 110-SPno7 / 111-SPno8	[X2] M0
	EX-Er External interrupt	[X3] M1 (Remarks 5)
	Hold-Free Holding force release	
Output signal (Remarks 2)	Alarm-out Alarm signal	[Y0] Alarm-out
	Reach-out Reaches target speed	
	VA-out Before reaches target speed	
	Speed-out Speed pulse	[Y1] Speed-out
	Warning-out Warning signal	
	MOVE Motor in motion	

Remarks	1. There are 4 groups of [X0],[X1],[X2],[X3],[X4] physical connection point for input signal. There are 8 input signal function for configuring according to different requirement. 2. There are 2 groups of [Y0+/Y0-],[Y1+/Y1-] physical connection point for input signal. There are 6 input signal function for configuring according to different requirement. 3. The default setting is **Mode2**, refer to aforementioned table for input/output signal connection point configuration. 4. When set **Mode1, CW/STOP, CCW/STOP** connection point will be disabled. When set **Mode2, RUN/STOP, CW/CCW** connection point will be disabled. Please refer to description [7-2 I/O priority—Mode2 control timing sequence example] [7-3 I/O priority—Mode1 control timing sequence example]. 5. Running data SPno1~SPno8 can be selected by changing connection of M0/M1/M2→[000]~[111]. Please refer to description [9 Speed setting and switch] .

■ Value add function and communication parameters

Contents	Function and Range	Default setting
Revolving speed before reach target speed	0~400 RPM	200
each running time	Running/Stop	Stop
	Set countdown time [D / H / M / S] Day/Hour/Minute/Second	
communication group	--- [Disable]	---
	1~247 組	
Communication Rate	9600,14400 19200,28800 38400,57600 115200 bps	19200
parameter pr initialization	Reset to default value	--- (Remarks)

Remarks	When execute "Parameter Reset", all the parameters will be reset to default setting. If the parameters are contaminated during setting, use this function to reset all the parameters.

■ Alarm / Warning parameter

Contents	Function and Range	Default setting
Alarm Parameter	Record query	--
	Delete record	
Warning Parameter	Record query	--
	Delete record	
When overload Alarm Signal output time	0.1 ~ 30.0 Sec	3.0
Overload rate % Warning %	50 ~ 120 %	100
Query of communication error code	E0h ~ E8h	--

Remarks	
	1. There are 10 Alarm codes; Alarm records are stack stored, the memory can store 15 records, the 1st record is the latest record. Please refer to description [13 Alarm and Warning]. 2. There are 4 Warning codes; Warning records are stack stored, the memory can store 15 records, the 1st record is the latest record. Please refer to description [13 Alarm and Warning]. 3. 5 conditions of communication error code E0h~E8h,Please refer to description [11-5 Communication-Exceptional code, communication error code].

■ Speed display parameters

<table>
<tr><th>Contents</th><th colspan="3">Function and Range</th><th>Default setting</th></tr>
<tr><td>Speed reduction</td><td colspan="3">1.00~9999.9</td><td>1.00</td></tr>
<tr><td>increasing ration setting</td><td colspan="3">1.00~24.00</td><td>1.00</td></tr>
<tr><td rowspan="8">unit</td><td colspan="3">Revolving Speed [r/min]</td><td rowspan="8">RPM
[r/min]</td></tr>
<tr><td rowspan="2">Linear speed</td><td>yard</td><td rowspan="2">Diameter
0~5999.9</td></tr>
<tr><td>Meter</td></tr>
<tr><td colspan="2" rowspan="2">Distance unit</td><td>yard</td></tr>
<tr><td>Meter</td></tr>
<tr><td colspan="2">Diameter</td><td>0~5999.9</td></tr>
<tr><td colspan="2" rowspan="2">Time unit</td><td>Min</td></tr>
<tr><td>sec</td></tr>
<tr><td colspan="2">Distance</td><td>0~5999.9</td></tr>
<tr><td>Speed display refresh time</td><td colspan="3">0.5~30Sec</td><td>0.5</td></tr>
<tr><td>Speed display decimal digit</td><td colspan="3">0~3</td><td>3</td></tr>
<tr><td rowspan="6">Speed display correction quantity</td><td colspan="3">-100 ~ +100</td><td rowspan="6">0
(Remarks)</td></tr>
<tr><td>section</td><td colspan="2">Speed section</td></tr>
<tr><td>ro-0</td><td colspan="2">250(300) ~ 500</td></tr>
<tr><td>ro-1</td><td colspan="2">501 ~ 1000</td></tr>
<tr><td>ro-2</td><td colspan="2">1001 ~ 2000</td></tr>
<tr><td>ro-3</td><td colspan="2">2001 ~ 3000</td></tr>
</table>

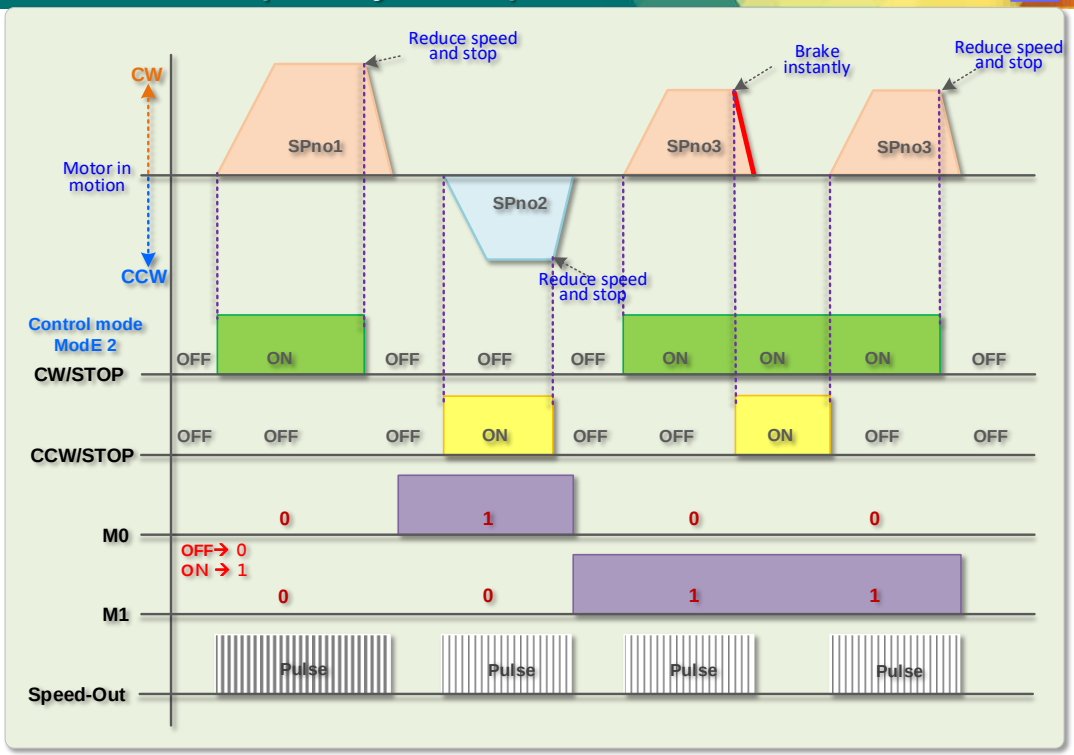
Remarks	DBU series driver calculates and displays speed in a full digital way. Due to different integral division deviation in high, low and medium speed zones, the speed "display value" and "setting value" will have deviation. However, it will not affect.

■ Control priority Io-En parameter

Contents	Function and Range		Default setting
I/O priority	I/O	O	I/O priority
	communication	×	
communication priority	I/O	Only disable EX-Er	
	communication	O	

- DBU series driver has 3 control Mode – [I/O] and [Communication] can be selected. It can be set by [control priority Io-En] parameter.
- While using "communication priority" Mode, system only accept "EX-Er external interrupt" input signal as emergency stop of driver or motor running, should use this function, select this function in "7-1-1 DBU series – input/output signal parameter" .
- After sending offline command, DBU will be enforce into I/O Mode.

Control priority	Description
I/O	Control driver running through "input/output signal" input connection points：[X0],[X1],[X2],[X3] input connection points：[Y0+,Y0-],[Y1+,Y1-] Common connection point：[C0],[C1]
communication	Integrate to "T-net network communication system" compatible with Modbus RTU communication protocol, can be controlled by RS-485 device with communication port such as TOP-1 touch control, PC, PLC, HMI etc.



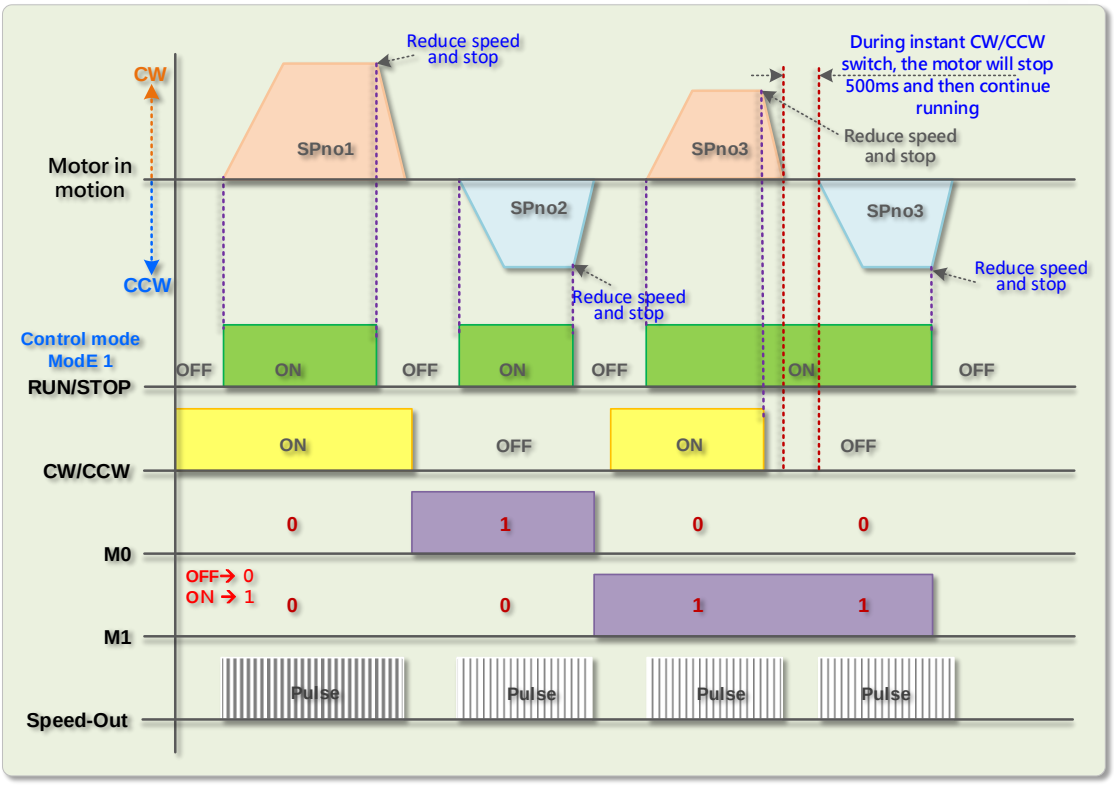
Control Mode--- Mode 1

input terminal	Default value
[X0]	CW/STOP
[X1]	CCW/STOP
[X2]	M0
[X3]	M1
output terminal	**Default value**
[Y0]	Alarm-out
[Y1]	Speed-out

※Default control Mode

STOP	CW	CCW	Running status
OFF	ON	OFF	Connection point status
OFF	OFF	ON	

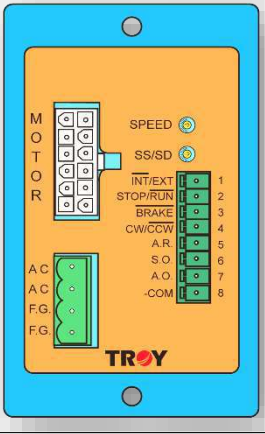
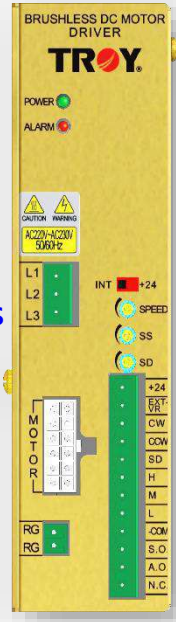
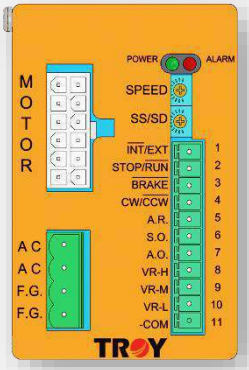
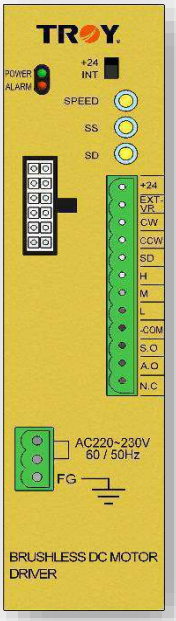
- When the "control priority Io-En" parameter set to [I/O priority] input/output connection point will be defined as refer to [default value]-Mode2 control Mode. Please refer to the configuration table on the left.
- Please refer to the aforementioned [control timing sequence] diagram to plan the control program.
- input/output connection point will Input / Output connection configuration of Mode2 is compatible to our DB series, BMD series brushless motor driver. Change of program is not necessary while upgrade the hardware.



Control Mode--- Mode 1

input terminal	Default value
[X0]	RUN/STOP
[X1]	CW/CCW
[X2]	M0
[X3]	M1
output terminal	**Default value**
[Y0]	Alarm-out
[Y1]	Speed-out

- When the "control priority Io-En" parameter set to [I/O priority] input/output connection point will be defined as refer to [default value]-Mode 1 control Mode. Please refer to the configuration table on the left.
- Please refer to the aforementioned [control timing sequence] diagram to plan the control program.
- input/output connection point will Input / Output connection configuration of Mode1 is compatible to our UBD series, SBD series, DBD series brushless motor driver. Change of program is not necessary while upgrade the hardware.

Mode1—Compatible series	Mode2—Compatible series
SBD series 	BMD series 
UBD series 	DB series 
DBD series 	

8 DBU Series Operation Procedure

Mode	Function categories	Display Value	Setting item
Standby Mode		SPEED	In standby Mode when the drive is connected
Running Mode	Speed display	1500	Setting per speed unit, shows the current speed value (when reversing "-" will be displayed before the speed)
	communication machine no. display	ID001	Shows driver's [machine number], which is corresponding to machine number setting switch [SW1, SW2]
	Running data display	SPno1	Shows executing running data SPno-x
	timer display	00-00	Shows countdown status of [each running time]
	load rate display	LD015	Real-time display Percentage % of actual load

Remarks	**DBU Series Driver**：select, set and monitor each Mode or function parameters through T-net network communication by RS-485 (compatible to Modbus) communication setting and control

9 Speed Setting and Switch

■ Selection of "Running Data"

1. Running data SPno2~SPno8 has 8 sections which can be set running speed, direction, speed increasing time, speed decreasing time individually, that can be selected through input signal and communication command method.
   SPno1 for external speed setting controller and SS/SD VR make settings.
2. DBU series can select each section through input signal and communication command method.
3. DBU series：use external "Ext-VR speed setting controller" or "external DC voltage controller" to adjust the relation between speed and SPno1.

Please refer to the following cross reference table：

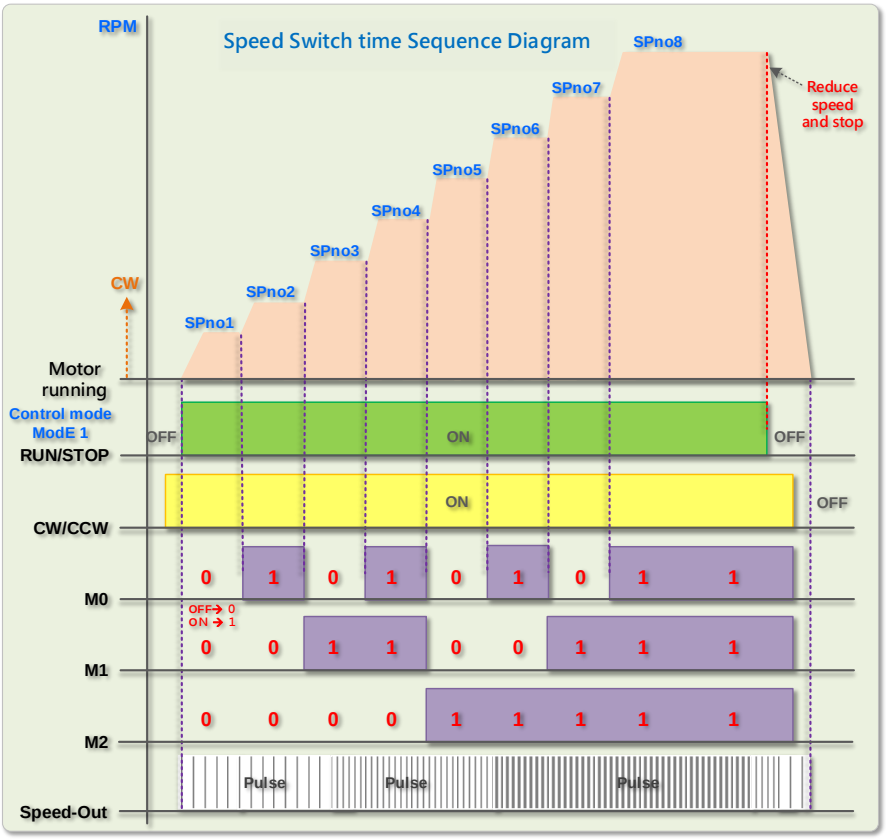
Series	DBU	
Adjust method	Ext-VR speed setting controller	External DC voltage controller
Running speed	Cannot save	
Running director	Synchronize saving	
Speed increasing time	SS (VR)	
Speed decreasing time individually	SD (VR)	
I/O priority	Available	
Communication priority	Available	

4. **Special Remarks：**

- **DBU Series**—When use **input signal** or **communication method** to select **SPno1 running data**：
  Running speed - Refer to the setting value of **"Ext-VR speed setting controller"**.
  Running director - Refer to **input signal** status or **communication command** to running.
- **DBU Series**—When use "Ext-VR speed setting controller" as main speed adjusting method：
  CN3 socket—Connect [DBVR](20KΩ(1/4W) variable resistor on CN3 socket to adjust.
  Accelerate/Slow down time—Set by SS/SD VR, Setting range.
  Accelerate time 0.5~30 Sec ; Slow down time 0.5, 2 ~ 30 Sec.
- **DBU Series**—When use "external DC voltage controller" as main speed adjusting method：
  CN3 socket—Connect to "TRDAC" or "external" DC voltage controller" to adjust.
  Accelerate/Slow down time—Set by SS/SD VR, Setting range.
  Accelerate time 0.5~30 Sec ; Slow down time 0.5, 2 ~ 30 Sec.
- **DBU Series—When reducing at high speed, please set the speed decreasing time to more than 2 seconds.**
- **DBU Series**—When use communication method as setting：
  Please refer to description：
  [12-2 Running data SPno—Memory address]
  [12-12 Select running command, Running data—Memory address]
  Instructions.

Running Data	When I/O priority-input signal			Revolving speed
	M0	M1	M2	
SPno1	0	0	0	500(VR)
SPno2	1	0	0	1000
SPno3	0	1	0	1350
SPno4	1	1	0	1700
SPno5	0	0	1	2150
SPno6	1	0	1	2500
SPno7	0	1	1	2850
SPno8	1	1	1	3000

※ Input signal ：OFF→ 0 ON→ 1 ; Revolving speed is for reface for operator to set according to needs.



■ Communication command speed switch example

Select machine number 01 running data SPno1
Query：01 06 20 0F 00 00 B2 09
Reply：01 06 20 0F 00 00 B2 09 ←Motor running by [running data SPno1]

[Main station query]	machine number	Function cod	Memory address	Write value	CRC Verification code
[Information Contents]	01h	06h	20 0Fh	00 00h	B2 09h

Running data selection Memory address

Select SPno1

[Slave station responding]	machine number	Function cod	Memory address	Write value	CRC Verification code
[Information Contents]	01h	06h	20 0Fh	00 00h	B2 09h

Select machine number 01 running data SPno3
Query：01 06 20 0F 00 02 33 CB
Reply：01 06 20 0F 00 02 33 CB ←Motor switch to running by [running data SPno3]

[Main station query]	machine number	Function cod	Memory address	Write value	CRC Verification code
[Information Contents]	01h	06h	20 0Fh	00 02h	33 CBh

Running data selection Memory address

Select SPno3

[Slave station responding]	machine number	Function cod	Memory address	Write value	CRC Verification code
[Information Contents]	01h	06h	20 0Fh	00 02h	33 CBh

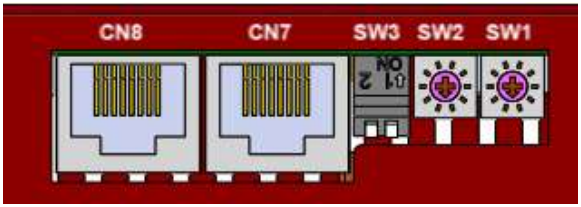
※ Please refer to description of communication command [12 function code and memory]

10 Communication Function Setting

DBU series are equipped with T-net network communication function. Each parameters of system, value-added function, running data etc. of DBU series are set by communication method.

■ Communication interface and setting switch

1. communication port [CN7,CN8],communication machine no. [SW1,SW2] and terminal resistor [SW3], are configured under the bottom of DBU driver (following figure).



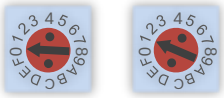
2. **Default setting of DBU**：("single machine use" as default setting)
Communication machine no. [SW1,SW2] →Preset in machine number [01].
Terminal resistor [SW3] →Preset at [OFF] side, without terminal resistor .

3. When use communication connection to control system, please refer to following table and prepare the hardware setting of the driver：

No.	Usage	Specification	Function introduction
CN7	communication port	RJ45	In series network connection [previous] device
CN8			In series network connection [next] device
SW1	Communication machine no.	Rotary Digital On and Off	Machine No. setting switch[H-byte] 0~F h
SW2			Machine No. setting switch[L-byte] 0~F h
SW3	Terminal resistor	Toggle Switch	When connect multiple device in series within network for communication, only need to set [the first and the last], every device [terminal resistor] setting is not needed.

4 . System core parameter "control priority Io-En parameter" shall be set as "communication priority".

■ Communication Machine Number Setting Switch

<table>
<tr>
<td>
H-byte L-byte
0 1
 
SW1 SW2

H-byte L-byte
9 6
 
SW1 SW2
</td>
<td>
■ Default value：As shown in the left figure, SW2 set → machine number 1 as [01].
■ When connect multiple driver for communication control, each driver shall have a specified machine number. Repeat number or [00] is not allowed, Connect to front controller (PC/PLC/TOP-1) to read correct machine number for communication.
■ While setting, use a 3mm straight screw driver to turn the indicator arrow.
■ Under live status to change machine number, the driver shall be turn off and on once to activate the machine number.
</td>
</tr>
<tr>
<td></td>
<td>
Take the left figure for example and precaution：
■ SW1/SW2 is 0~F h [hexadecimal], the system planning machine number utilizes [Decimal] as the sequence, so Decimal to Hexadecimal is needed.
■ The machine number in the left picture is [96 h] (hexadecimal) and transfer to [150 d] (decimal).
</td>
</tr>
</table>

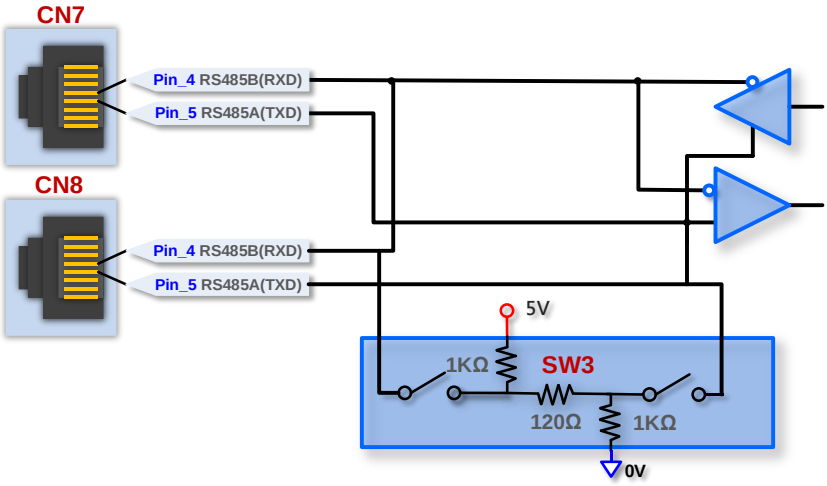
■ Machine No. Decimal←→ Hexadecimal cross-reference table

SW1—High Byte \ SW2—Low Byte	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
2	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
3	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
4	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
5	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
6	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
7	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
8	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
9	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
A	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
B	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
C	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
D	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
E	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
F	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255

- In the cross-reference table, the number in shadow are area is invalid machine number, only 1~247 are valid machine number.

The function and purpose of the terminal resistor

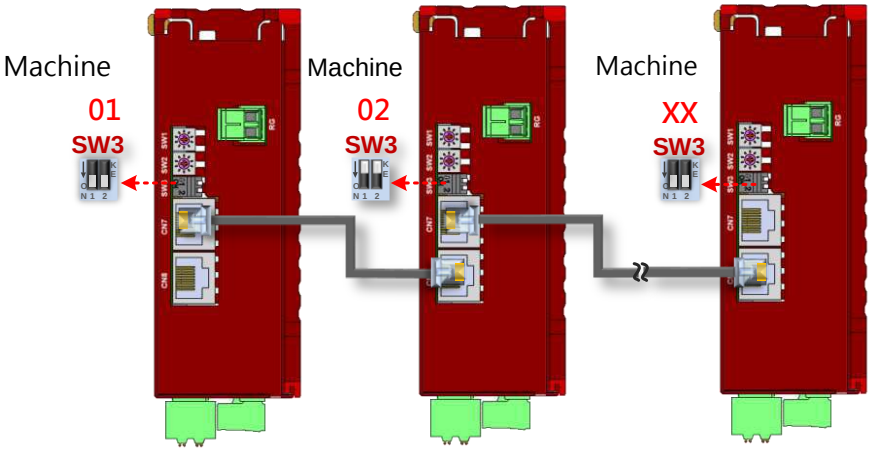
1. In the communication transmission circuit, various transmission cables have their own impedance value. When signal transmitted to the terminal, if its terminals impedance and featured impedance is different, signal reflection will happen and cause signal distortion. If the transmission distance is long enough, correct signal cannot be transmitted, thus, terminal resistor is needed.
2. In the RJ45 socket of driver [CN7, CN8], 1 sets of [terminal resistor (about 120Ω)] and setting switch [SW3] are equipped (refer to the following figure).



Setting method of terminal resistor

1. During communication in series within multiple devices, only the [first machine] and [last machine] shall set the terminal resistor.

2. Figure example：machine number 01→ [CN7] connect to machine number 02 → [CN8]. [SW3] DIP switches 1 and 2 are both set to ON for machine number 01, and other machine in between don’ t need to be set, and set [SW3] DIP switches 1 and 2 are both set to ON for the very end machine.



■Communication specification

Electrical features	● Conform to communication standard—EIA-485
Transmission Mode	● Synchronized half-duplex
Communication Parameters	● Communication Rate：9600,14400,19200,28800,38400,57600, 115200 bps [Default setting：19200 bps] ● Data bit：8 bytes ● Stop bit：1 bytes ● Same bit check：None
Communication Protocol	● T-net Network Communication protocol (Compatible with Modbus RTU Mode)
Connection range	● Connection number：247units machine no.：[01~F7] (Theoretical value) (Use 1-meter-long CAT-6 specification network cable to connect in series, the actual test can connect up to 247 units in series) Actual connection number are affected by work site, cable distance, environment etc. .
Connecting to	● Connecting to PC etc. front controller with RS-485 communication interface. ● Connect to [TOP-1 touchscreen controller] (purchase individually) with [T-net network communication protocol] to conduct monitor, change or adjust of driver internal data or parameters.
Connector Specification	● RJ45 Plug (FCC Part 68,IEC 60603-7,EIA/TIA 568B.2-1) . ● It is recommended to use CAT-5e/CAT-6 24AWG twisted pair cable. (Standard product on the market)

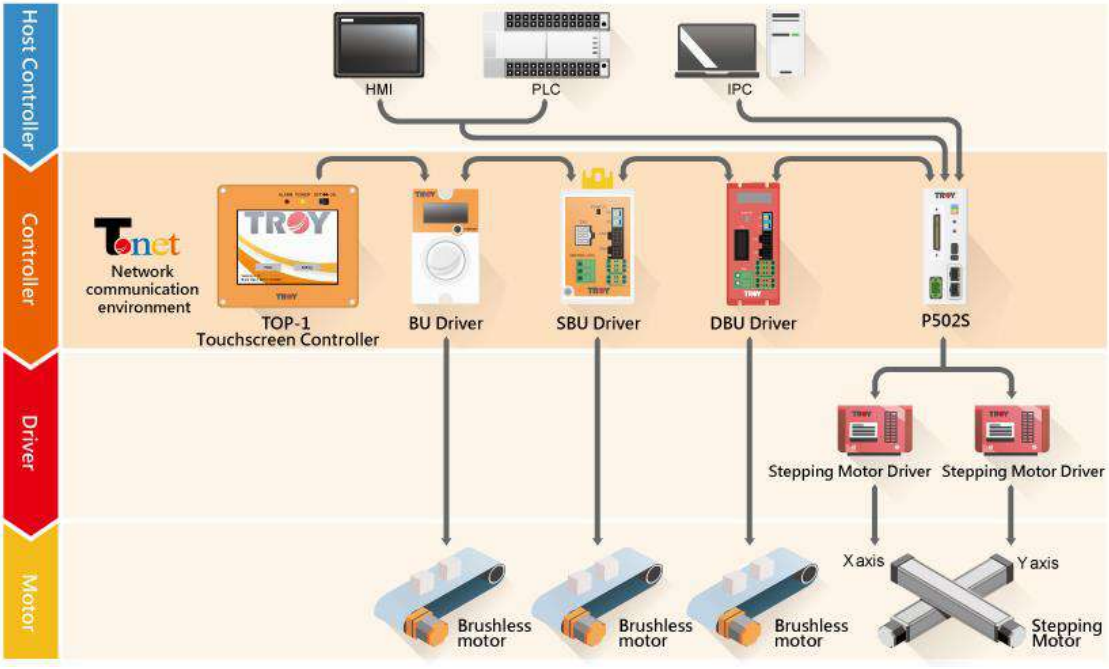
■ Communication port CN7,CN8 Connector specification

Pin No	Function	RJ45 Connector PIN drawing
4	Receive data RS485B [RXD]	
5	Transmission data RS485A [TXD]	
8	GND	
1,2,3,6,7	Not connect to NC	

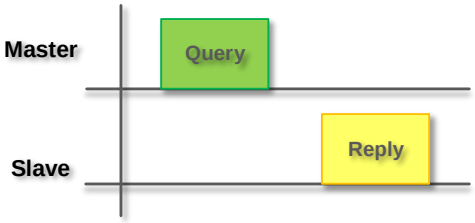
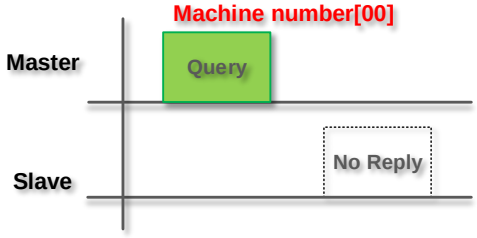
11 T-net Network Communication

■ What is T-net?

1. It is TROY product series with **[T-net network communication protocol]** such as： **DBU,BU,SBU,P502S** and other emerging product. Those products have integrated communication control under **T-net network communication environment** to simplify the complicated program.
2. By **system integration platform [TOP-1 touchscreen controller]**, it can connect to multiple machine to set parameter, monitor status and test running.
3. **[TOP-1 touchscreen controller]** has color touchscreen operation interface, which can view, set, change the internal data and parameter status in real time. For easier system maintenance and adjustment.
4. The communication protocol is compatible with **Modbus RTU** by **RS-485 communication interface**. With **RJ45 connector** and **CAT-5e/CAT-6 cable** to connect multiple machine in series to simplify wiring and shorten construction time.
5. Special reminder：**[TOP-1 touch screen controller]** has no front controller function (purchase individually).



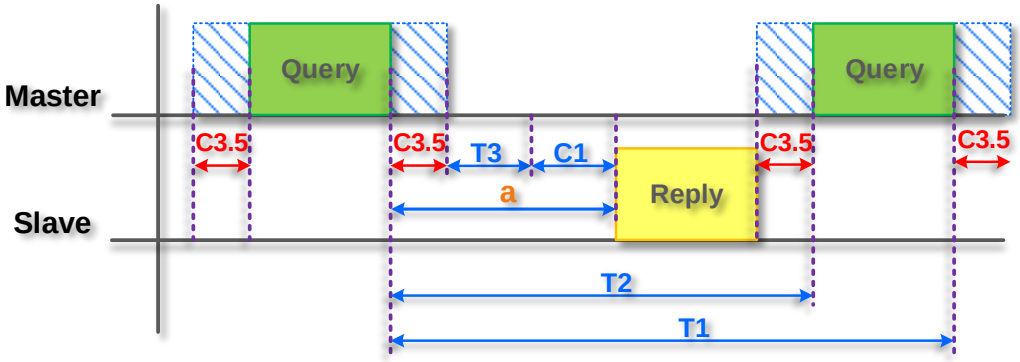
■ Query Mode

Unicast	Broadcast
[master] send [query] information to single [slave station]. [slave station] execute and [reply] to the [master].	[master] can send [query] to each [slave station] connected. [slave station] execute but will not reply. ※When [machine number] of [query] set as [00] will have such function.
	

Master：Object is PC, PLC, HMI etc. front controller or TOP-1.

Slave　：Object is DBU, BU, SBU, P502S etc. product with [T-net network communication protocol].

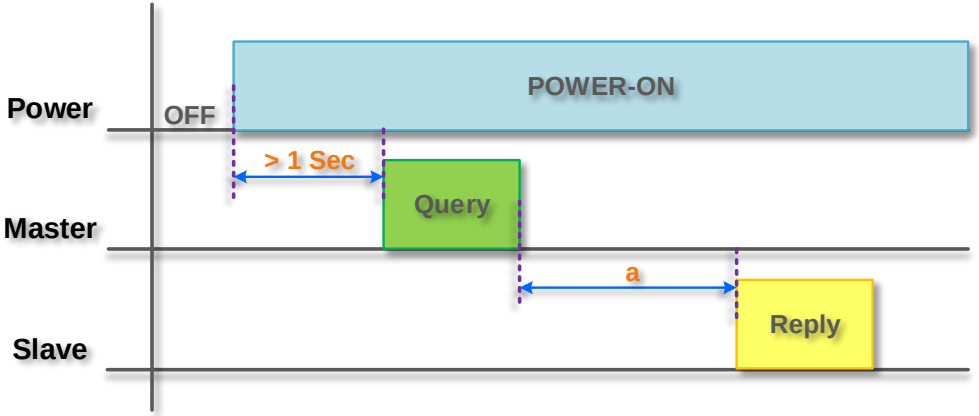
■ Standard communication time sequence



Icon	Name	Description
T1	communication overtime	Monitor receiving information gap ※If set with [communication overtime] and no [reply] received, the system will send [communication error] alarm.
T2	Broadcasting gap	Time for transmitting next broadcasting query. ※ [T2] Broadcasting gap > Time gap [C3.5] + 5ms
T3	Sending time	Time for information transmission of [master] send [query] to [slave station] T3 ≦ 1.5ms Time depending on the length of [information]. [Initial value=10ms]
C3.5	Time gap	Time gap shall be >3.5 characters. [Slave station] cannot [reply] if Time gap <3.5 characters. ※Communication rate= 9600bps →Time gap=4.0ms ※Communication rate=19200bps →Time gap=2.5ms
C1	Command process time	After [slave station] received [query], the relevant internal process time.
a	Waiting time	[master] send [query] to [slave station] send [Reply] to [master] interval. ※ a = C3.5+ T3 + C1

The following is frequently used communication time sequence, which will generate different time sequence according to actual requirements.

■ Start communication time sequence

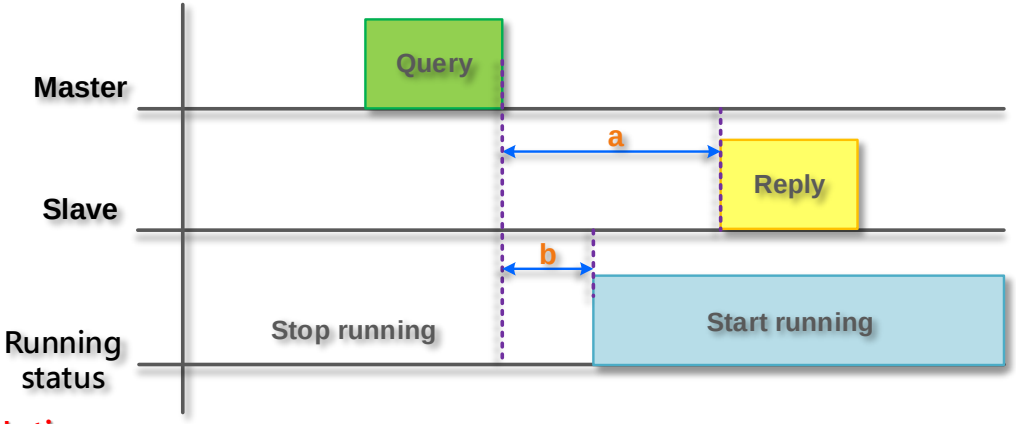


Notice :

Power-ON shall have start time, therefore, 1 second time gap is needed for commencing communication.

a = T3(Send waiting time) + C3.5(Time gap)+C1(Command process time)

■ Running start time sequence



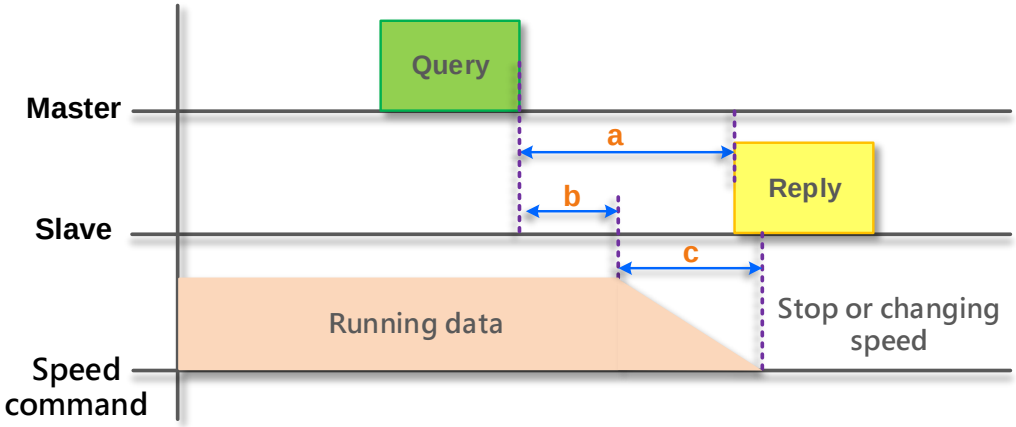
Notice :

a = T3(Send waiting time) + C3.5(Time gap)+C1(C1(Command process time)

b = C3.5(Time gap) + (< 4ms)

[Query] contains [start running] command.

■ Stop running, speed change time sequence



Notice :

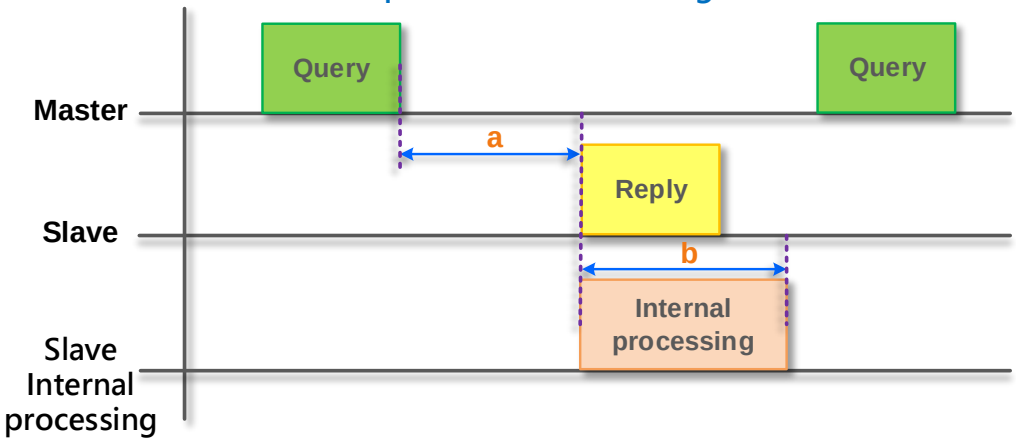
a = T3(Send waiting time) + C3.5(Time gap)+C1(Command process time)

b = C3.5(Time gap)+C1(Command process time)

c = The actual time depends on setting information of previous [command] or [parameter]

[Query] contains command information of [stop running] and [change speed]

■ Communication time sequence structural diagram



Notice :

a = T3(Send waiting time) + C3.5(Time gap)+C1(Command process time)

b = C3.5(Time gap)+ (< 1 Sec)

[Query] contains command information of [communication structure]

■ Group communication function

1. Please set [enable] in advance in [system parameter] → "value added function, group communication".
   Setting range：1~247 group, Default value：--- [Disable]

2. With group communication, it can connect memory from multiple driver in one so as to edit multiple driver parameters by one operation to save setting time.

3. The meaning and function of communication group 1~247 group and[SW1,SW2] machine number：1 ~ 247(01~F7), is different.
   - [SW1,SW2] machine number：is the [identification number] of each communicated machine which is exclusive.
   - Communication group ：is the [virtual address] of each communicated machine which can be repeat.

4. **For example** ：
   Definition：DBU-1 to [Parent Slave], DBU-3, DBU-5 to [Child Slave]
   DBU-2 to [Parent Slave], DBU-4, DBU-6 to [Child Slave]
   Setting：

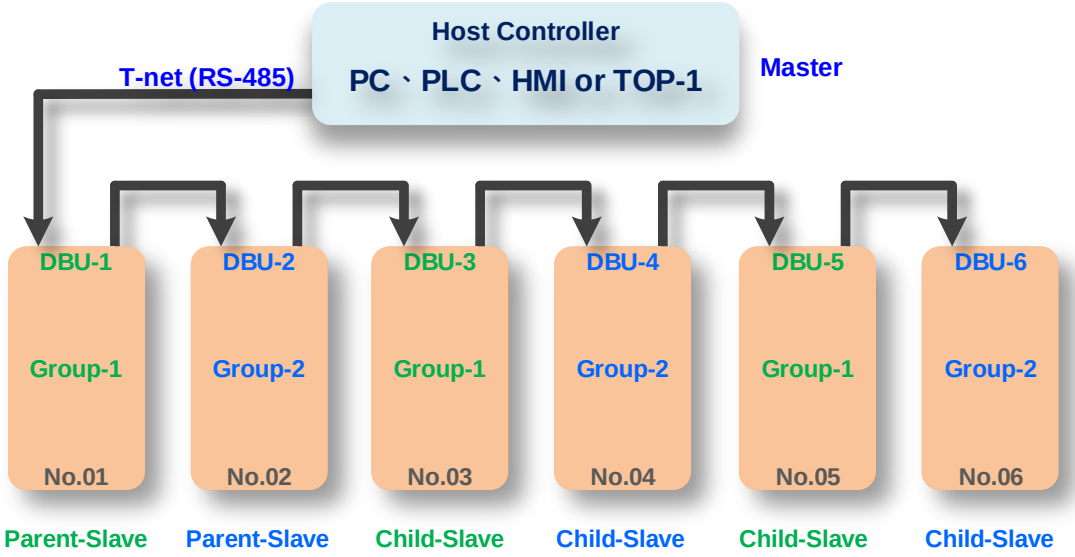
Device	Machine number	Group
DBU-1	01	1
DBU-2	02	2
DBU-3	03	1
DBU-4	04	2
DBU-5	05	1
DBU-6	06	2

Action：

When front controller [PC, PLC, HMI] or [TOP-1 touchscreen controller] i.e. [master station] has only.

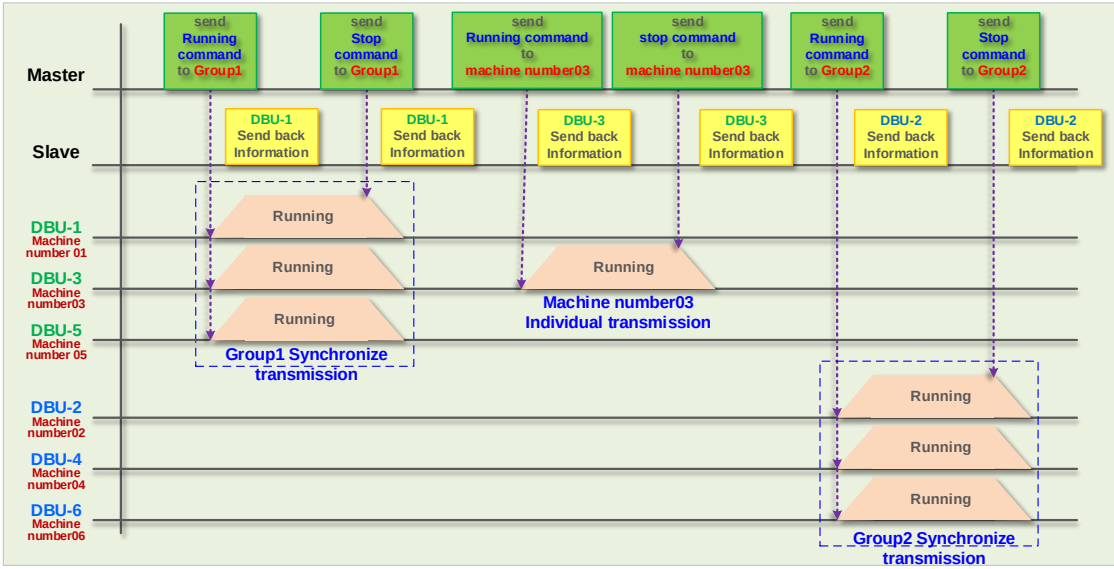
Send [Query Command] When giving DBU-1 ,Will also be sent to DBU-3 and DBU-5.

Send [Query Command] When giving DBU-2 ,Will also be sent to DBU-4 and DBU-6.

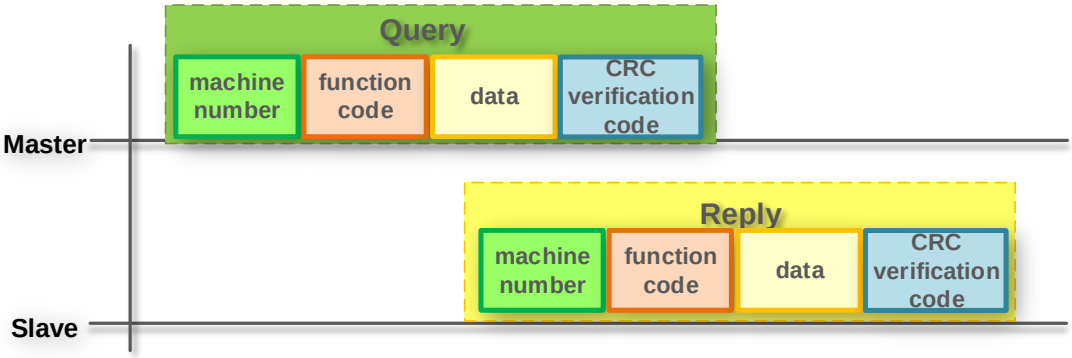


5. **Notice**：DBU-1 [Parent Slave] or DBU-2 [Parent Slave], they can replay information back to [master station], other [Child Slave] will not reply information back to [master station] to confirm its execution status.

6. [Master],[Parent Slave],[Child Slave] Communication time sequence diagram：



Information format of Query, Replay



Information structure

Format	Character length (Bytes)	Instructions
Machine number	1	Each [slave station] has its [machine number] to avoid repetition. ※ Broadcasting Mode：when [machine number] set to [00], it can query all the [slave station], the [slave station] will not reply [master station].
Function Code	1	[Read/Write] data from/to [slave station] memory according to [function code].
Data	N	[Data] length (Bytes) is defined by information format and memory address format of [running data], [system parameter], [alarm/warning], [speed expression], [status monitoring], [running command] etc.

Function code	R/W	Broadcasting	Function description
03h	R	×	Read keep [memory]
04h	R	×	Read input [memory]
06h	W	○	Write one [memory]
10h	W	○	Write multiple [memory]

Information structure

Format	Character length (Bytes)	Instructions
CRC Verification Code	2	To ensure the correctness of information, CRC-16 is utilized to check transmission/receiving data between [master station] and [slave station].

Notice :

All the [information value] adopts [hexadecimal] [(Hexadecimal, Hex)] .
Each information value will add with a [h], but in actual information transmission, no [h] is needed.

■ Reply of information

●There are 3 kinds of reply from [slave station] to [master station], which are [normal reply], [no reply], [exceptional reply].
●Reply and query share the same format.

<table>
<tr><th>Method</th><th colspan="3">Instructions</th></tr>
<tr><td>Normal Reply</td><td colspan="3">[Slave station] received query information, process the query content and replay to [master station].</td></tr>
<tr><td rowspan="6">No Reply</td><td colspan="3">Situations of [Slave station] received query but no reply is as follows：</td></tr>
<tr><td>Situation</td><td>Reason</td><td>Contents</td></tr>
<tr><td rowspan="3">Error</td><td>Format error</td><td>[stop bit] 0 has been found</td></tr>
<tr><td>Parity bit error</td><td>Different parity bit to communication setting has been found</td></tr>
<tr><td>CRC discrepancy</td><td>CRC verification code discrepancy between [master station] and [slave station]</td></tr>
<tr><td rowspan="2">Not error</td><td>Length error</td><td>Communication data length> 256 Bytes</td></tr>
<tr><td>Broadcasting Mode</td><td>[slave station] does not reply but will process query</td></tr>
<tr><td></td><td>Machine number error</td><td>The [machine number] queried is different to driver’ s number</td></tr>
</table>

■ Reply of information

<table>
<tr><th>Method</th><th>Instructions</th></tr>
<tr><td rowspan="2">Exceptional reply</td><td>[slave station] cannot process query, and will reply [exceptional reply] information
The structure is as follows：
※For example：if write function code 06h, then the exceptional reply is 86h.</td></tr>
<tr><td>
<table>
<tr><td>Information Format</td><td>machine number</td><td>function code</td><td>exceptional code</td><td>CRC verification code</td></tr>
<tr><td>Character length Bytes</td><td>1</td><td>1
(+ 80h)</td><td>N</td><td>2</td></tr>
</table>
※Please refer to description [11-5 Communication-exceptional code, communication error code] for the definition of [exceptional code]
</td></tr>
</table>

■Exceptional reply–Exceptional code

Exceptional Code	Communication Error code	Error reason	Content
01h	E0h	Function cod	No such function code
02h	E0h	Data address	No responding memory
03h	E1h	Data format	1.Data length exceed range 2.Memory account is 0 or >17 3.Bytes is not the value of memoryX2
04h	E2h E3h E7h E8h	Slave station	Status 1. Cannot execute command 2. Internal processing (BUSY is ON) 3. EEPROM error 4. Write value exceed setting range

■ Exceptional code—error code

Error reason：

1.00 7B h is the memory address of [error code list] store location for [slave station], it is [read only] and cannot [write].

2.[master station] use [06h] function code to write memory, and error information from [slave station] is：

(1). Function cod[06h+80h]=[86h]

(2). Exceptional code [02h] for error reason.

[Master station query]	machine number	function code	Memory address	Write value	CRC verification code
[Information Contents]	01h	06h	00 7Bh	00 0Ah	79 D4h

[Slave station responding]	machine number	function code	exceptional code	CRC verification code
[Information Contents]	01h	86h	02h	C3 A1h

■ When communication error

Program occurred by communication error	
Item	Program contents
Conditions	Communication error：function cod, data address, data format error Slave station error：cannot execute command, internal processing, communicating, EEPROM error, alarm, write value exceed setting range
Action	Driver has no reaction, motor continue its previous running status
Record	Record [error code] to [communication error memory 007B h]
Display	[MONITOR Status indicator]—Flash in [blue]

DBU Indicator number display

Memory error
CPU error
Communication error

MONITOR
Flash in[Blue light]

Dealing Method

- ✓ Please confirm what kind of [communication error] is?
  Distinguish [communication error] and [slave station error]
- ✓ Please check：
- ✓ (1). If the communication data is correct?
  Which include contents, address, format, command, exceeding setting range, memory etc..
  (2). What status of the communication object [slave station] is?
  Communicating, Alarm or in processing etc..

Dealing method：please send correct [query] information to [slave station] till the communication is back to normal.

If under [communication Mode], it is recommended to read the following 3 memory status regularly；

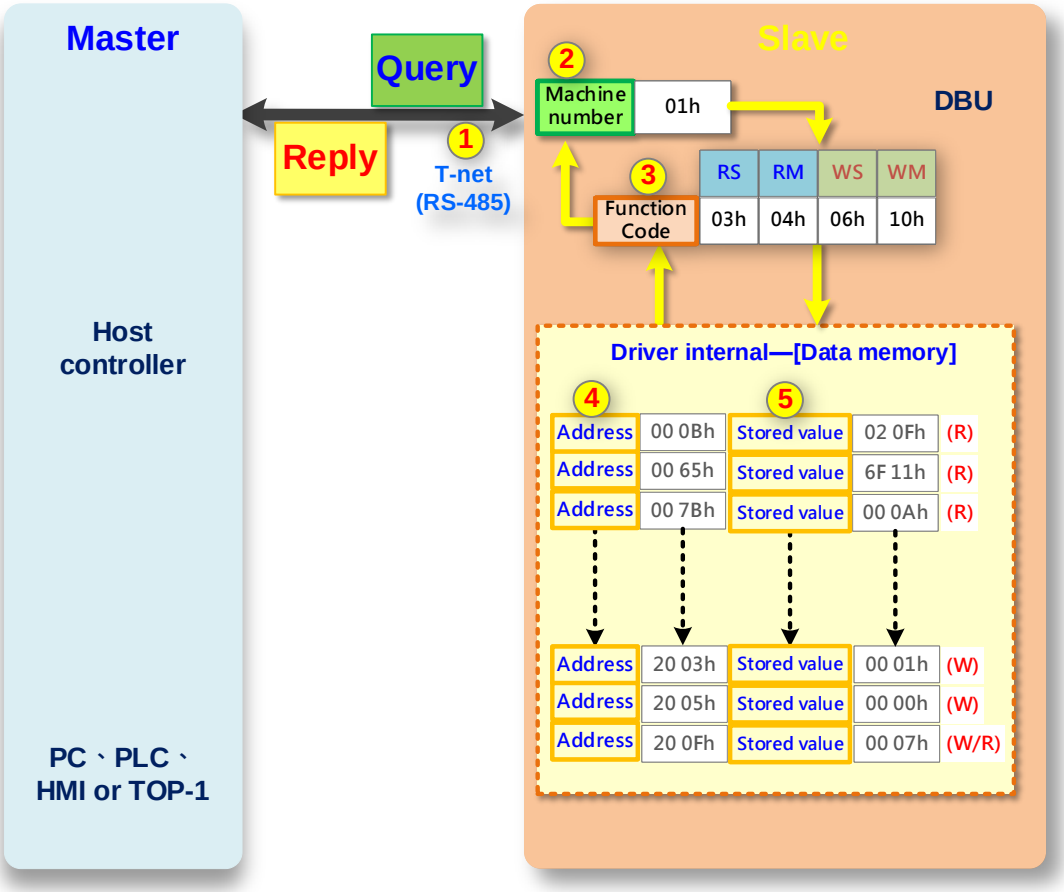
(1). [communication error memory 007B h]

(2). [Alarm record memory 1C01 h~1C1D h]

(3). [Warning records memory 1701 h~171D h]

12 Function code and memory

■ Concept structure



■ Function code：

1.Definition：Under the standard structure of Modbus communication protocol, assign [read], [write] for each [query], [reply].

2.Function code for DBU series as follows：

Function code	R/W	Broadcasting	Function description	Remarks
03h	RH	×	Read keep [memory]	RH：Read Holding register
04h	R I	×	Read input [memory]	R I ：Read Input register
06h	WS	○	Write one [memory]	WS：Write Single register
10h	WM	○	Write multiple [memory]	WM：Write Multiple register

■ Register：

1.Definition：In the memory of BU/SBU series, a buffer zone is specially designed for memory internal/external communication, which is information storage buffer for [transmission data], [system parameter], [alarm/warning], [speed expression], [status monitoring], [running command] etc.

2.Address：The aforementioned [data information] has its own storage address. To control the communication correctly, addressing of [data information] is very important.

3.Byte count：one memory for two Bytes (16 bits=2 bytes).

Function code	03h

■ Function introduction：

RH (Read Holding register) keep read [memory] definition：set by external (front controller), stored in the internal memory [setting value]. Should read this [setting value] externally, used **[Function code：03h]** must be.

■ Example：

Use [function code 03] read [revolving speed 1] – [speed value] stored in memory.

1.Sending sequence is [machine number], [function code], [memory address], [number of memory read], [CRC code]

2.Send/reply information by communication program as follows：

Send： 01 03 CA 03 00 01 4B D2

Reply：01 03 02 **03 E8** B8 FA ← 03 E8 = 1000 RPM

[Master station] query	Machine number	Function code	Memory address	Memory count	CRC Verification code
[Information Contents]	01h	03h	CA 03h	00 01h	4B D2h

[Slave station responding]	Machine number	Function code	Read value Byte count	Memory value	CRC Verification code
[Information Contents]	01h	03h	02h	03 E8h	B8 FAh

Function code **04h**

■ Function introduction ：

R I (Read Input register) definition：driver internal running generates [status value], which will be automatically saved in specified memory address. If external wants read this [status value], **[Function code：04h]** should be used.

■ Example ：

Uses [function code：04h] to read [alarm record 1] – memory saved [record value].

1.Sending sequence is [machine number], [function code], [memory address], [number of memory read], [CRC code]

2.Send/reply information by communication program as follows：

Send： 01 04 1C 01 00 01 67 9A

Reply：01 04 02 00 0B F8 F7 ← 00 0B = Alarm The code is 0B (Hall Sensor Error)

[Master station] query	Machine number	Function code	Memory address	Memory count	CRC Verification code
[Information Contents]	01h	04h	1C 01h	00 01h	67 9Ah
[Slave station responding]	Machine number	Function code	Read value Byte count	Memory value	CRC Verification code
[Information Contents]	01h	04h	02h	00 0Bh	F8 F7h

Function code **06h**

■ Function introduction：

WS (Write Single register) definition：from external (front controller) to write in a specified [setting value] into driver's internal specified address. When such [setting value length=2 bytes], **[Function code：06h]** shall be used.

■ Example：

Use [function code：06h] to send [communication connection command] to driver.

1.Sending sequence is [machine number], [function code], [memory address], [number of memory read], [CRC code].

2.Send/reply information by communication program as follows：

Send：01 06 00 03 00 01 B8 0A
Reply：01 06 00 03 00 01 B8 0A ← Use this method to confirm the connection status of [slave station]

[Master station] query	Machine number	Function code	Memory address	Write value	CRC Verification code
[Information Contents]	01h	06h	00 03h	00 01h	B8 0Ah
[Slave station responding]	Machine number	Function code	Memory address	Write value	CRC Verification code
[Information Contents]	01h	06h	00 03h	00 01h	B8 0Ah

Function code	10h

■ Function introduction：

WM (Write Multiple register) definition：from external (front controller) to write in a specified [setting value] into driver's internal specified address. When such [setting value length >2 bytes], **[Function code：10h]** shall be used.

■ Example：

Use [function code：10h] to set [reduction ratio] to [1.00].

1.The sending sequence is [machine number], [function code], [memory address], [memory count], [write value Byte count], [write value (higher bit)], [write value (lower bit)], [CRC code].

2.Transfer method：1.00×100 =100, and then change [100 (decimal)] into [64h (hexadecimal)].

3.Send/reply information by communication program as follows:

Send：01 10 04 03 00 02 04 00 00 00 64 80 91

reply：01 10 04 03 00 02 B0 F8

Function code	10h

4. Please note the read/write value's byte count is calculated by following：

Each memory address save [2 Bytes] x memory count = write in Byte count

2 Bytes × 2 = 4 Bytes

[Master station] query	Machine number	Function code	Memory address	Memory count	Write value Byte count	Write value (Higher Bit)	Write value (Lower Bit)	CRC Verification code
[Information Contents]	01h	10h	04 03h	00 02h	04h	00 00h	00 64h	80 91h

[Slave station responding]	Machine number	Function code	Memory address	Memory count	CRC Verification code
[Information Contents]	01h	10h	04 03h	00 02h	B0 F8h

Function cod	Read -03h / Write-06h				Write-06h
Memory address	Accelerate time	Slow down time	RPM	Running direction	Initialization
SPno1 (Note)			CA01 h (read only)	0311 h	9E01 h
SPno2	1303 h	4503 h	CA03 h	0313 h	9E03 h
SPno3	1305 h	4505 h	CA05 h	0315 h	9E05 h
SPno4	1307 h	4507 h	CA07 h	0317 h	9E07 h
SPno5	1309 h	4509 h	CA09 h	0319 h	9E09 h
SPno6	130B h	450B h	CA0B h	031B h	9E0B h
SPno7	130D h	450D h	CA0D h	031D h	9E0D h
SPno8	130F h	450F h	CA0F h	031F h	9E0F h

	Setting range	Write/Read value	Bytes
Accelerate time	0.5~30.0 Sec	0005 h ~ 012C h	2
Slow down time	0.5,2~30.0 Sec	0005 h, 0014h ~ 012C h	
RPM	0 RPM 250(300)~3000 RPM	0000 h 00FAh(012Ch)~ 0BB8 h	
Running direction	CW/CCW rotation	0000 h=CW rotation 0001 h=CCW rotation	
Initialization	--	0001 h	

Remarks	
	1.If **[SPno1]** is selected, the speed is manually set by [Ext-VR speed controller] connected to **[connector CN4]**, accelerate/slow down time is determined by VR value set by [SS/SD]. 2. **When reducing at high speed, please set the speed decreasing time to more than 2 seconds.** 3. VR value set by [Ext-VR speed controller], [SS/SD] will not save to **[SPno1]** memory. 4. Motor rotating direction is determined by [running direction] memory or [CW], [CCW], [CW/CCW] input signal.

Function code	Read -03h / Write-06h			
Memory	Address	Setting range	Write/Read value	Bytes
Panel initial display	1001 h	RPM	0000 h	2
		Driver machine number	0001 h	
		Running data No.	0002 h	
		Each running time	0003 h	
		Load rate %	0004 h	
Alarm protection method (after turn on power)	1003 h	running available	0000 h	
		no running	0001 h	
Alarm erase method	1005 h	Restart power	0000 h	
		Alarm-Reset	0001 h	
Set speed upper limit	1007 h	0 250(300)~4000	0000 h 00FA h(012C h) ~0FA0 h	
Set speed lower limit	1009 h			
Holding forces while motor stop	100B h	No holding forces	0000 h	
		Have holding forces	0001 h	

Function code	Read -03h / Write-06h			
Memory	Address	Setting range	Write/Read value	Bytes
Control priority	100D h	I/O priority	0001 h	2
		Communication priority	0002 h	
Control Mode	2015 h	Mode1	0000 h	
		Mode2	0001 h	

Remarks	when there is decimals in the set value, it shall change to [integer] and then change to hexadecimal. ex1. Set value is 0.5--> 0.5 × 10 = 5 Change to hexadecimal 0005 h ex2. Set value is 10.00 → 10.00 × 100 = 1000 Change to hexadecimal 03E8 h

Function code	Read -03h / Write-06h			
Memory	Address	Default value[Mode2]	Write/Read value	Bytes
IN-1	2101 h	CW/STOP	0011 h	2
IN-2	2103 h	CCW/STOP	0012 h	
IN-3	2105 h	M0	0015 h	
IN-4	2107 h	M1	0016 h	
OUT-1	2109 h	Speed-Out	0004 h	
OUT-2	210B h	Alarm-Out	0001 h	

IN	Mode1 write value	Mode2 write value
RUN/STOP	0001 h	--
CW/CCW	0002 h	--
CW/STOP	--	0011 h
CCW/STOP	--	0012 h
Alarm-Reset	0004 h	0014 h
M0	0005 h	0015 h
M1	0006 h	0016 h
M2	0007 h	0017 h
Ext-Error	0008 h	0018 h
H-Free	0009 h	0019 h
Not functioning	0000 h	0010 h

OUT	Mode1 write value
Alarm-Out	0001 h
Reach Speed-Out	0002 h
VA-Out	0003 h
Speed-Out	0004 h
Warning-Out	0005 h
Move-Out	0006 h
Not functioning	0000 h

Function code		Read -03h / Write-06h			
Memory		Address	Default value	Write/Read value	Bytes
Revolving speed before reach target speed		100F h	0 ~ 400	0000 h ~ 0190 h	2
Each running time(Countdown)		1017 h	Stop	0000 h	
			Running	0001 h	
Countdown	Day	1019 h	0 ~ 30 Day	0000 ~ 001E h	
	Hour	101B h	0 ~ 23 Hour	0000 ~ 0017 h	
	Minute	101D h	0 ~ 59 Minute	0000 ~ 003B h	
	Second	101F h	0 ~ 59 Second	0000 ~ 003B h	
HML input voltage range set (note 1)		1023 h	0~5V	0000 h	
			0~10V	0001 h	
Group set (note 2)		00F5 h	Stop	FFFF h	
			1 ~ 247	0001 h~00F7 h	

Remarks	1.HML input voltage range set, the default value is 0~5V 2. Please refer to description：[11-3 Group communication] .

Function code	Read -03h / Write-06h			
Memory	Address	Default value	Write/Read value	Bytes
Communication Rate	1021 h	9600	0000 h	2
		14400	0001 h	
		19200	0002 h	
		28800	0003 h	
		38400	0004 h	
		57600	0005 h	
		115200	0006 h	

Function code	Write-06h			
Memory	Address	Default value	Write/Read value	Bytes
parameter pr initialization (Remarks)	1025 h	0001 h		2

Remarks	When execute [parameter pr initialization], all the parameters will be reset to default value. If the parameters are contaminated during setting, use this function to reset all the parameters.

Function code		Read -04h				
Memory		address	Read value			Bytes
Alarm Record	1	1C01 h	Alarm code table			
	2	1C03 h	Code	Code value	Name	Erase
	3	1C05 h	AL001	01 h	over voltage	×
	4	1C07 h	AL003	03 h	over current	O
	5	1C09 h	AL005	05 h	over speed	O
	6	1C0B h	AL007	07 h	overload	O
	7	1C0D h	AL009	09 h	abnormal start	×
	8	1C0F h	AL00B	0B h	Hall signal error	×
	9	1C11 h	AL00D	0D h	memory error	O
	10	1C13 h	AL00F	0F h	external interrupt	O
	11	1C15 h	AL019	19 h	overheat	O
	12	1C17 h	AL021	21 h	power supply protection	O
	13	1C19 h				
	14	1C1B h				
	15	1C1D h				

※ **Code**—[AL0XX] is panel display code
Code value —applicable to BU/SBU, read [memory saved value] by communication cable to understand the alarmed error.
Erase— **[O]**—Use input signal [Alarm-Reset Signal] to erase.
[×]—Use [turn off power] to erase.。
※ During alarm, [code value] will be saved automatically to the [record memory], record can be saved 15 pieces in stack. The first one is the latest alarm record.
※ Alarm error and dealing method, please refer to description [13 Alarm and Warning].

Function code		Read -04h			
Memory		Address	Read value		Bytes
Warning Record	1	1701 h	Warning code table		2
	2	1703 h	Code value	Name	
	3	1705 h	05 h	over speed	
	4	1707 h	07 h	Overload %	
	5	1709 h	17 h	Low voltage	
	6	170B h	19 h	overheat	
	7	170D h			
	8	170F h			
	9	1711 h			
	10	1713 h			
	11	1715 h			
	12	1717 h			
	13	1719 h			
	14	171B h			
	15	171D h			

※ **Code value** —Applicable to DBU series, read [memory saved value] by communication cable to understand the Warning Ed error.

※ During Warning, [code value] will be saved automatically to the [record memory], record can be saved 15 pieces in stack. The first one is the latest Warning record.

※ Warning error and dealing method, please refer to description [13 Alarm and Warning].

Function code	Read -03h / Write-06h			
Memory	Address	Default value	Write/Read value	Bytes
Overload Alarm signal output time	1011 h	0.1 ~30.0 Sec	0000 h ~ 012C h	2
Overload % Warning	1013 h	50 ~ 100 %	0032 h ~ 0078 h	

Function code	Write-06h			
Memory	Address	Default value	Write value	Bytes
Alarm erase	1200 h	0000 h		2
Erase Alarm record	3101 h	0001 h		
Erase Warning record	3171 h	0001 h		

<table>
<tr><td>Function code</td><td colspan="4">Read -04h</td></tr>
<tr><td>Memory</td><td>Address</td><td colspan="3">Read value</td><td>Bytes</td></tr>
<tr><td rowspan="6">Communication Error</td><td rowspan="6">007B h</td><td>Exceptional code</td><td>Communication error code</td><td>Error reason</td><td rowspan="6">2</td></tr>
<tr><td>01h</td><td>E0h</td><td>function code</td></tr>
<tr><td>02h</td><td>E0h</td><td>Data address</td></tr>
<tr><td>03h</td><td>E1h</td><td>Data format</td></tr>
<tr><td>04h</td><td>E2h
E3h
E7h
E8h</td><td>Slave station error code as follows：
1
2
3
4</td></tr>
<tr><td colspan="3">Please refer to description [11-5 Communication —Exceptional code, communication error code]</td></tr>
</table>

Function code	Read -03h / Write-10h			
Memory	Address	Default value	Write/Read value	Bytes
Speed reduction	0403 h	1.00 ~ 9999.90	0000 0064 h ~ 000F 423F h .	4
Time—Distance	0417 h	0 ~ 99999	0000 0000 h ~ 0001 869F h .	

Function code			Read -03h / Write-06h			
Memory			Address	Default value	Write/Read value	Bytes
increasing ration setting			0405 h	1.00~24.00	0064 h ~ 0960 h	4
Speed unit			0409 h	Revolving speed—RPM	0000 h	
				Linear speed—Code	0001 h	
				Linear speed—in meter	0002 h	
				Time—Minute : Second	0003 h	
Linear speed	Diameter	in yard	040B h	0 ~ 5999.9	0000 h ~ EA5F h	2
		in meter	040F h	0 ~ 5999.9	0000 h ~ EA5F h	
Time	Distance unit		0415 h	in meter	0000 h	
				Code	0001 h	
	Diameter		0413 h	0 ~ 5999.9	0000 h ~ EA5F h	
	Unit		041B h	Minute	0000 h	
				Second	0001 h	
Speed display	Updating time		0401 h	5 ~ 300	0005 h ~ 012C h	
	Decimals		0407 h	0 ~ 3	0000 h ~ 0003 h	

Function code		Read -03h / Write-06h			
Memory		Address	Default value	Write/Read value	Bytes
Speed display correction quantity	ro-0	0421 h	-100 ~ +100 RPM	FF9C ~ 0064 h (Remarks)	2
	ro-1	0423 h			
	ro-2	0425 h			
	ro-3	0427 h			

Remarks	Minus shows in [complement] For example：-1→FFFF h -2→ FFFE h

Function code	Write-06h			
Memory	Address	Write value	Remarks	Bytes
Connection	0003 h	0001 h	Send [communication connection command] to driver(Remarks)	2
Offline	0005 h	0001 h	Send [communication offline command] to driver(Remarks)	

Function code	Read -04h			
Memory	Address	Number of Memory Read	Read value	Bytes
Device name	0007 h	0004 h	ASCII in yard DBU 44 42 55 20 20 20 20 20	8
Version	000B h	0001 h	Bit[15~8]-High Byte : Primary version Bit[7~0]-Low Byte : Secondary version ex : V1.0 = 01 00 h V2.15 = 02 0F h	2

Function code	Read -04h					
Memory	Address	Number of Memory Read	Read value			Bytes
Driver Status	0065 h	0002 h	Bit-No.	Definition	status	4
			31~16	--	--	
			12	Mode	0 =Mode1 1 =Mode2	
			11	Alarm	0 =OFF 1 =ON	
			10	M3		
			9	M2		
			8	M1		
			7~5	--	--	
			4	Hold	0 =OFF 1 =ON	
			2	Running Direction	0 =CW 1 =CCW	
			1	Running Status	0 =Stop 1 =in motion	
			0	--	--	

Remarks	After the drive is powered on, the communication can be connected. If the offline command is issued, the connection needs to be restored, and the connection can be restored by issuing the connection command again.

Function code	Write-06h			
Memory	Address	Default value	Write value	Bytes
Start/Stop	2003 h	[STOP]	0000 h	2
		[START]	0001 h	
CW/CCW	2005 h	[CW]	0000 h	
		[CCW]	0001 h	

Function Code	Read -03h / Write-06h			
Memory	Address	Default value	Write/Read value	Bytes
Holding Forces	2011 h	Have holding [Holding]	0000 h	2
		No holding [No Holding]	0001 h	
Select Running Data	200F h	SPno1 (Remarks)	0000 h	
		SPno2	0001 h	
		SPno3	0002 h	
		SPno4	0003 h	
		SPno5	0004 h	
		SPno6	0005 h	
		SPno7	0006 h	
		SPno8	0008 h	

Remarks	When use DBU series : 1. If [SPno1] is selected, the speed is manually set by [Ext-VR speed controller] connected to [connector CN3], accelerate/slow down time is determined by VR value set by [SS/SD]. 2.VR value set by [Ext-VR speed controller], [SS/SD] will not save to [SPno1] memory. 3.Motor rotating direction is determined by [running direction] memory or [CW], [CCW], [CW/CCW] input signal.

Function Code	Read -04h						
Memory	Address	Read value					Bytes
IN status	2009 h	input connection point	X3	X2	X1	X0	value	2
			0	0	0	0	0000h	
			0	0	0	1	0001h	
			0	0	1	0	0002h	
			0	0	1	1	0003h	
			0	1	0	0	0004h	
			0	1	0	1	0005h	
			0	1	1	0	0006h	
			0	1	1	1	0007h	
			1	0	0	0	0008h	
			1	0	0	1	0009h	
			1	0	1	0	000Ah	
			1	0	1	1	000Bh	
			1	1	0	0	000Ch	
			1	1	0	1	000Dh	
			1	1	1	0	000Eh	
			1	1	1	1	000Fh	
OUT Status	200B h	output connection point	Y1		Y0		value	
			0		0		0000h	
			0		1		0001h	
			1		0		0002h	
			1		1		0003h	
Load rate	200D h	0000 d ~ 0200 d (d : In decimal)						
Target Speed	0107 h							
Current Speed	0109 h							

13 Alarm and Warning

Definition of Alarm

- When the driver in connection, operation or running, exceed [rated usage] condition, error or abnormal operation:

Alarm generation program	
Item	Program contents
Alarm conditions	10 error detection conditions such as：Overvoltage, overcurrent, over speed (>3800RPM), overload, start error, Hall signal error, memory error, external interruption, overheat (>80℃), or power start up protection.
Protection action	Stop motor, driver in standby status
Send signal	[Alarm-Out signal] —Connection point output
Record	Record [code value] to [Alarm record memory 1C01h~1C1D h]
	Please refer to [12-7 Alarm record—Memory address] for operation procedure
Display	Panel displays [AL0XX code] flash in [red]
	MONITOR status flash in [red]

■ Definition of Warning

●Warning is a pre-determined [precaution mechanism] as [prenotice] before error happen

●When the driver in connection, operation or running, exceed [precaution usage] condition：

Warning generation program	
Item	Program contents
Warning Conditions	4 precaution detection conditions Over speed (>3500rpm), overload %, low voltage, overheat (>70℃)
Protection Action	Driver, motor continue normal running
Send signal	[Warning-Out signal] —Connection point output
Record	Record [code value] to [warning record memory 1701h~17D1h]
	Please refer to [12-8 Alarm record—Memory address] for operation procedure
Display	Panel display and monitor will not show any light

■ Alarm—DBU series [MONITOR Status indicator] light color and code value

Flash in[red]	01 h,03 h,05 h,07 h,09 h,0B h,19 h,21 h
Flash in[purple]	0F h
Flash in[blue]	0D h, communication error (must read error code from [communication error memory 007B h])
Alarm happened in running will be recorded in [Alarm record memory 1C01 h~1C1D h]	

Alarm Reason	Dealing method
Alarm Overvoltage AL001 01h RESET ×	
Power supply voltage > 120% of rated voltage	■ Check supply voltage ■ Check power cable
When load [up/down vertical drive condition], [exceed allowed inertia], motor will generate [Regenerative voltage]	■ If motor in [start] or [stop] procedure, please extend accelerate/slow down time or change acceleration or slow down Mode ■ Lower load inertia[GD^2]conditions ■ Check whether a regenerative resistor is installed
Alarm Overcurrent AL003 03h RESET ○	
Overcurrent caused by system short circuit or exceeds driver max. Allowed current.	■ Please check cabling between driver and motor for any poor contact, damage, wrong cabling or housing short circuit.
Alarm Over speed AL005 05h RESET ○	
When motor revolving speed >3800RPM	■ Bigger inertia will cause motor acceleration driven by load ■ Lower load inertia [GD^2] conditions ■ Adjust accelerate/slow down time, running cycle condition

Alarm Reason	Dealing method
Alarm Overload AL007 07h RESET ○	
Load [load rate >100%] continuously applied on motor and application time exceed [overload alarm output] time.	■Lower load conditions ■Adjust accelerate/slow down time, straight/running cycle condition ■Adjust [overload alarm output time] Setting range：0.1~30.0 Sec
Alarm Start error AL009 09h RESET ×	
Loosen motor U/V/W cable	■ Check the motor power cable of U/V/W to find any insufficient power supply caused by poor contact or loosen connector.
Motor shaft or driving mechanism confined by external force and cannot start smoothly.	■ Please check load condition for any over-force (viscous force, constrain force, stuck) affected conditions for motor cannot start normally.
Alarm Hall signal error AL00B 0Bh RESET ×	
Hall signal cable of the motor cut or connect lose.	■ Please check the cable connection between the driver and motor.
Interferences by strong clutter signals the signal is poor.	■ Review external anti-interference solution

Alarm Reason	Dealing method
Alarm Memory error AL00D 0Dh RESET ○	
EEPROM cannot read/write data. Saved data structure damage	■ Please run [parameter initialization] to reset default value condition, Please refer to description 12-6 .
Alarm External interruption AL00F 0Fh RESET ○	
External interruption EX-er signal is [OFF].	■Please confirm input of [EX-Er].
Alarm Overheat AL019 19h RESET ○	
Diver internal temperature >85°C	■ Please confirm ambient temperature is <40°C ■ Please review the installation condition for sufficient heat exchange or heat radiation. ■ Enhance cooling solution.
Alarm Power start up protection AL021 21h RESET ○	
Control sequence error： Send [external startup signal] to driver, and then startup driver power.	■ For safety reason, it is prohibited to use [power ON-OFF] to control the motor running. ■ [external startup signal] is differed from the setting of [control Mode 1/Mode 2]. ■ Please refer to [Mode1/Mode2 control sequence diagram] suggestion review the system control priority.

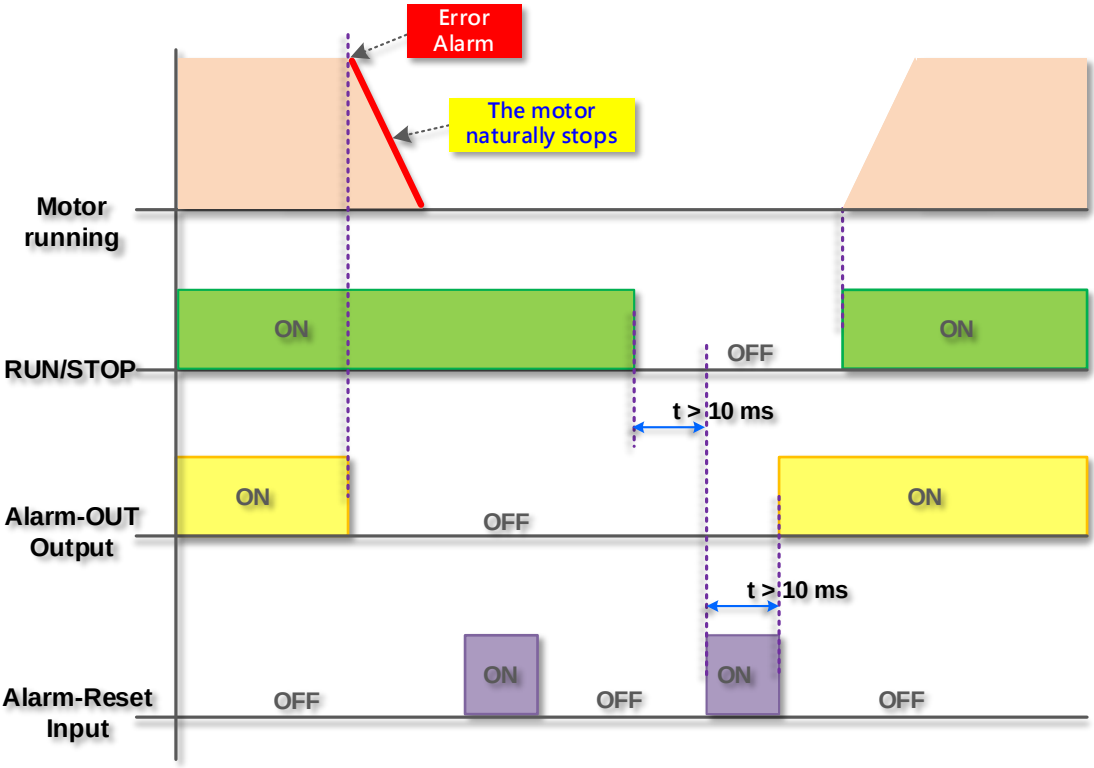
1. After [Alarm], please refer to the suggestion of [Alarm reason], [solution], exclude the reason first and turn off [start running signal], and then [erase alarm].

2. There are 3 ways to **[Erase Alarm]：**

(1). By [Alarm-Reset] input signal or [communication command] to erase alarm status.

(2). By [turn off power] to erase Alarm status.

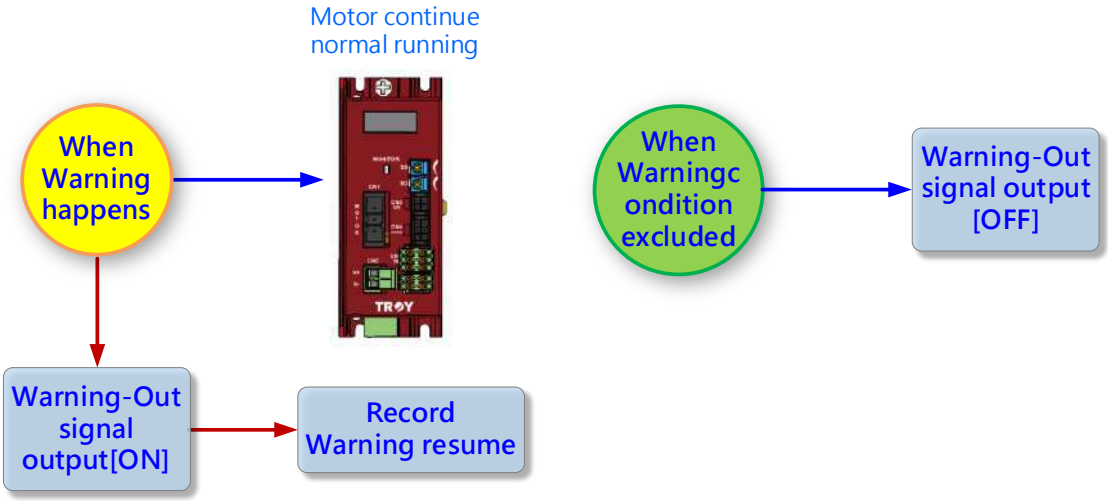
Control priority	RESET ○ Available Alarm-Reset	RESET × Not available Alarm-Reset
I/O priority	By [Alarm-Reset input signal] to erase Alarm status.	[Turn off power] for 5 seconds and then [restart power] to erase Alarm status. ※Special reminder：[overvoltage], [startup error] and [Hall signal error] are major unsafety error. Turn off the power and check and exclude the reason thoroughly to restart the power.
Communication priority	By [communication command] to erase Alarm status.	


Error Alarm
The motor naturally stops
Motor running
ON
OFF
ON
RUN/STOP
t > 10 ms
ON
OFF
ON
Alarm-OUT Output
t > 10 ms
ON
ON
Alarm-Reset Input
OFF
OFF
OFF

Warning Reason				Dealing method
Warning	Over speed	WR005	05h	RESET / NA
When motor revolving speed >3500rpm				■ Bigger inertia will cause motor acceleration driven by load. ■ Lower load inertia [GD^2] conditions. ■ Adjust accelerate/slow down time, straight/running cycle condition.
Warning	Load rate %	WR007	07h	RESET / NA
When [Load rate %] of load > [load rate warning setting %]				■ Lower load conditions ■ Adjust accelerate/slow down time, straight/running cycle condition
Warning	Low voltage power supply	WR017	17h	RESET / NA
When voltage power supply < 60% of rated voltage.				■ Please check the voltage of power supply ■ Please check the cabling of power supply. ■ Please check the load capacity of power supply.
Warning	Overheat	WR019	19h	RESET / NA
Diver internal temperature >70°C				■ Please confirm ambient temperature is <40°C. ■ Please review the installation condition for sufficient heat exchange or heat radiation. ■ Enhance cooling solution.

1. When [Warning] happens :
[warning out signal output] changes from [OFF] to [ON], and motor still running.
2. When [Warning] excludes :
[warning out signal output] changes from [ON] to [OFF].

■ Warning happen and excluding procedure



For detailed product selection, please consult with each agent or dealership of the company.

※Responsibility for environmental protection

The company is committed to the promotion of environmental protection. All packaging
materials used can be recycled and resources can be reused. After the product has
been used for a period of time, please follow the waste disposal procedures to carry
out resource separation and recycling when it is necessary to replace the old one with
the new one.

---With your participation and concerns,
let us protect the earth environment together.---

※ In order to promote the improvement of product performance, any product design change performed by the company will not be notified individually. If you need more detailed information, please contact each sales office.

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