

New ANM Nut Runner Series
GSL/GSLW Torque Control System
(Current Control Type)
Instruction Manual

Mar, 2020

GIKEN INDUSTRIAL CO., LTD.

Before beginning operation:



■ Note

- (1) Please read this instruction manual carefully in order to ensure that you use this product correctly.
- (2) A part or all part of this instruction manual may not be used or reproduced without the permission of Giken Industrial Co., Ltd.
- (3) Regarding the handling process and operation that are not listed in this instruction manual, please think that they cannot be operated, and do not attempt to operate them. Any defect that would occur when the handling process or the operation that is not listed in this instruction manual is executed should be excluded in the scope of the warranty.
- (4) Matters listed in this instruction manual are subject to change for the improvement without notice.
- (5) For the product with special specifications, please consult us because it may not be pertinent to the use of this instruction manual.
- (6) The personal computer for setup operation is an option. Please contact us if it is required.



■ Measures in case of an emergency

If this product is in a dangerous condition, immediately turn OFF all power switches of the main unit or the connected equipment, or pull out all power cords from the plug outlets.

(“Dangerous condition” means the condition when the fire break out or the danger to personal injury can be expected due to the excessive heat generation, smoking or ignition.)



■ Precautions to turn ON the power for the first time

1. Check the cable connection prior to turning ON the power. (Check by your eyes)
2. Set resistor(110.220Ω) on the connector part (COM port) of the arc net for communication of each axis. However, it is unnecessary when only one axis is used. Please refer to P95 page for details.
3. When the power is turned ON, input the SIO satellite station address setting of “Fn. 12 No. 3” of the GSL controller. If it is not input, the SIO communication will not be established.
(The contents mentioned above is M-net version only . CC-Link version don't need. it)
4. Make sure to set the axis setting of “Fn.01 No. 26” from the panel section when the GSL controller driver is replaced. (If the axis number is not set, the communication from the setup personal computer is impossible.)
*Axis number must be set up when the unit is replaced.
5. To confirm the wiring again after supplying power, check **[Fn.03 No.2]**. (Electrical check)
Please refer to P100 for details.
6. Perform entering the setting or other operation after the contents mentioned above are finished.

Note)

At CC-Link version IF , there is not the function of print about which the output can be done through RS422.

Contents

1. System outline	P7
2. Specifications	
2-1 Specifications of nut runner and dimensions table	P8
2-1-1 Specifications of nut runner	P8
2-1-2 Dimensions table of nut runner (straight type)	P9
2-1-3 Dimensions table of nut runner (offset type)	P9
2-2 Controller specification	P10
2-3 Basic specification	P11
2-4 Functions/Features	P12
2-5 Dimensions	
2-5-1-1 Dimensional drawing (with M-net ver. interface): Standard specification GSL-11 (13)-N04-M	P13
2-5-1-2 Dimensional drawing (with CC-Link ver. interface): Standard specification GSL-11 (13)-N04-M	P14
2-5-2-1 Dimensional drawing (with M-net ver. interface): Standard specification GSL-14 (15)-N04-M	P15
2-5-2-2 Dimensional drawing (with CC-Link ver. interface): Standard specification GSL-14 (15)-N04-M	P16
2-5-3-1 Dimensional drawing (with M-net ver. interface): Standard specification GSLW-11 (13)-N04-M	P17
2-5-3-2 Dimensional drawing (with CC-Link ver. interface): Standard specification GSLW-11 (13)-N04-M	P18
2-5-4-1 Dimensional drawing (with M-net ver. interface): T specification GSL-T1 (T3)-N04-M	P19
2-5-4-2 Dimensional drawing (with CC-Link ver. interface): T specification GSL-T1 (T3)-N04-M	P20
2-5-5-1 Dimensional drawing (with M-net ver. interface): T specification GSL-T4 (T5, T7)-N04-M	P21
2-5-5-2 Dimensional drawing (with CC-Link ver. interface): T specification GSL-T4 (T5, T7)-N04-M	P22
2-5-6-1 Dimensional drawing (with M-net ver. interface): T specification GSLW-T1 (T3)-N04-M	P23
2-5-6-2 Dimensional drawing (with CC-Link ver. interface): T specification GSLW-T1 (T3)-N04-M	P24
2-5-7 Dimensional drawing: Standard specification GSL-11(13)-N04-M	P25
2-5-8 Dimensional drawing: Standard specification GSL-14(15)-N04-M	P26
2-5-9 Dimensional drawing: Standard specification GSLW-11(13)-N04-M	P27
2-5-10 Dimensional drawing: T specification GSL-T1(T3)-N02	P28
2-5-11 Dimensional drawing: T specification GSL-T4(T5)-N02	P29
2-5-12 Dimensional drawing: T specification GSLW-T1(T3)-N02	P30
2-5-13 Dimensional drawing: (Display): Model GSL-D2	P31
2-5-14 Dimensional drawing: (Display): Model GS-D3	P32
3. Wiring connection	
3-1 Wiring referential layout	
3-1-1-1 【M-net ver.】GSL controller system wiring referential layout	P33
3-1-1-2 【CC-Link ver.】GSL controller system wiring referential layout	P34
3-1-2-1 【M-net ver.】GSLW controller system wiring referential layout	P35
3-1-2-2 【CC-Link ver.】GSLW controller system wiring referential layout	P36
3-2 Connector to be used and the other side connector	

3-2-1 GSL connector and the other side connector	P37
3-2-1 GSSW connector and the other side connector	P38
3-3 External connection	
3-3-1 External connection diagram (between the GSL controller and NR):	
Standard specification and T specification	P39
3-3-2 External connection diagram (between the GSLW controller and NR):	
Standard specification and T specification	P40
3-3-3 External connection diagram (between the M-net ver. interface and equipment to connect):	
Standard specification and T specification	P41
3-3-4 External connection diagram (between the CC-Link ver. interface and equipment to connect):	
Standard specification and T specification	P42
3-4 Model table of cable	
3-4-1 Model table of GSL cable	P43
3-4-2 Model table of GSLW cable	P43
 4. Signal	
4-1 Input/Output signal	P44
4-2 Input/Output signal (PIO)	
4-2-1 Input signal (PIO)	P45
4-2-2 Output signal (PIO)	P46
4-3 Function of I/F unit	P47
4-4 SIO input/output signal	
4-4-1 Input signal (SIO)	P47
4-4-2 Output signal (SIO)	P49
4-5 Multiaxial operation function	P53
 5. Operation timing chart	
5-1 Power ON and inching operation	P54
5-2 Program operation - 2 step operation 1	P55
5-3 Program operation - 2 step operation 2	P56
5-4 Program operation - 2 step operation 3	P57
5-5 Program operation - 1 step operation 1	P58
5-6 Program operation - 1 step operation 2	P59
5-7 Program operation - 2 step operation 4	P60
5-8 Program operation - 1 step operation 3	P61
5-9 Interruption of the program operation (Reset)	P62
5-10 Operation ready OFF and program start OFF during the program operation	P63
5-11 Alarm generation and alarm reset during the program operation	P64

6.	Setting	
6-1	Display/setting function	
6-1-1	Display section layout	P65
6-1-2	Operation of the display section	P66
6-2	Program	
6-2-1	Tightening program	P68
6-2-2	Program configuration	P69
7.	Setting function list	
7-1	Fn.**display setting function list	P70
7-2	Driver parameter setting	P71
7-3	Rotation and the inching setting	P72
7-4	Pretightening setting	P73
7-5	Reverse rotation setting	P75
7-6	Final tightening setting	P76
7-7	Rating setting	P78
7-8	Input monitor	P79
7-9	Output monitor	P79
7-10	Operation result monitor	P80
7-11	Printer operation	P80
7-12	Unused	P80
7-13	RAM monitor for debugging	P80
7-14	Unused	P80
7-15	I/F unit setting	P81
7-16	Unit setting	P81
7-17	ID controller connection setting	P81
8.	Supplementary	
8-1	Sub serving function for operation	P82
8-2	Driver function	P82
9.	Monitor output	P83
10.	Code table	
10-1	NG code list	P84
10-2	Alarm code list	P85
11.	Display layout	P87

12. Maintenance and check

12-1 Precautions

12-1-1 Precautions for maintenance and check	P92
12-1-2 Check items	P92
12-1-3 Operating life	P92
12-1-4 Capacitor	P92
12-1-5 Relay	P92
12-1-6 Battery	P93
12-1-7 E2PROM	P93
12-2 Guarantee	P93
12-3 Tightening operation glossary	P93

Supplemental explanation

<u>☆Precautions for wiring the arc net.</u>	P95
<u>☆Precautions to use M-net communication.</u>	P96
<u>☆Precautions to use CC-Link communication.</u>	P96
<u>☆Password to write the setting data to GSS PC</u>	P99
<u>☆Difference between GSS-D-2 and GS-D3</u>	P99
<u>☆Precautions to replace the unit</u>	P99
<u>☆How to set axis No.</u>	P99
<u>☆Order of the wiring check with the encoder cable</u>	P100
<u>☆Explanation of additional items for GSS tightening setting</u>	P101
<u>☆Precautions for Input/Output communication</u>	P101
<u>☆Precautions to read the history</u>	P101
<u>☆About connection setting of ID controller</u>	P102
<u>☆Items of setting possible and setting not possible</u>	P106
<u>☆Heat release fan</u>	P106
<u>☆Precautions to install the cable (about antinoise measures and noise influence)</u>	P107
NR setting operation list	P108
Revised Contents	P109

1. System outline

- The new type current sensor feedback control system “GSL” is the stall type nut runner system that enables the various tightening methods to many types of tightening objects.
- This system has the name specified as GSL (Giken Single sensor Less system) and it can be divided into the controller section, AC nut runner section and IF unit section (Interface).

Controller section

- Tightening accuracy : Target torque $\pm 15\%$
- Compact design is provided by integrating the conventional GPC controller and driver amplifier for GSL Series.
- Tightening program sets the rotation number and torque control, facilitating the wide variety of tightening patterns.
- High-speed and highly accurate tightening control is provided by combining the position control and the torque control.
- Self diagnosis function displays the program number/operating condition/alarm information on the front LED display.
- Two setup methods are provided to setup the tightening program: The input method from the setup personal computer; and that from the controller front panel. (Please refer to P106 page for the items with setting-possible and items with setting- not- possible.)
- It is easy even for beginners to set up and input because the automatic setup and input function has been installed.

AC nut runner section

- Conventional AN series motor part and gear reduction part are improved to design miniaturization and improvement of durability.
Motor part: The latest neo-magnet is used for magnet and the coil is changed to the mold type for miniaturization.
- Rotation number can be freely set in a range from low-speed to high-speed rotation.
- Wide torque range from low torque to high torque with a variety range of types.

IF unit section

- IF unit is the communication device to communicate with the external unit such as the sequencer/display/setup personal computer/printer or other equipment.
- GSL system allows you to check the information related to the tightening control such the setting data/tightening results by connecting a personal computer to the IF unit.
- It is possible to check the information by connecting to a printer without inputting the data such as the setting/tightening results into a personal computer.
- Communication setting is applicable to both specifications of PIO and SIO(M-net ver. / CC-Link ver.).
(M-net ver. IF and CC-Link ver. IF is not same model.)
- One IF unit is always required by set of controller. (2 units for 31 axes or more)

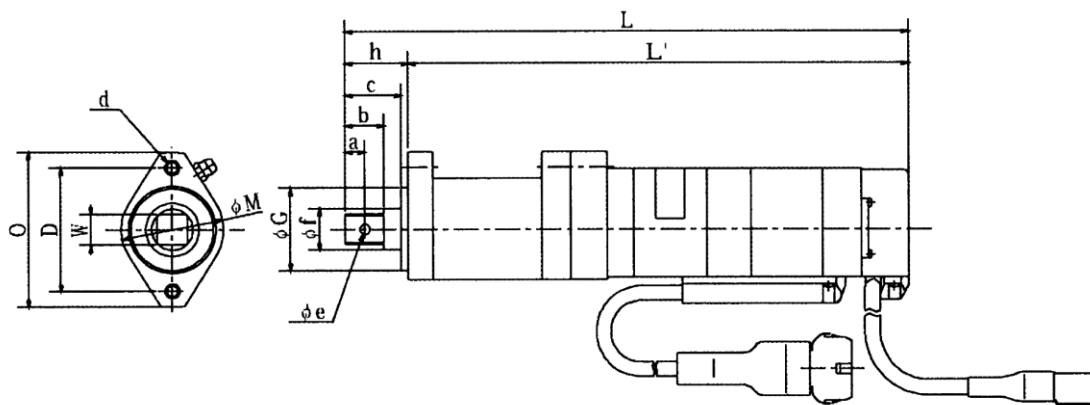
2. Specifications

2-1. Specifications of nut runner and dimensions table

2-1-1. Specifications of nut runner

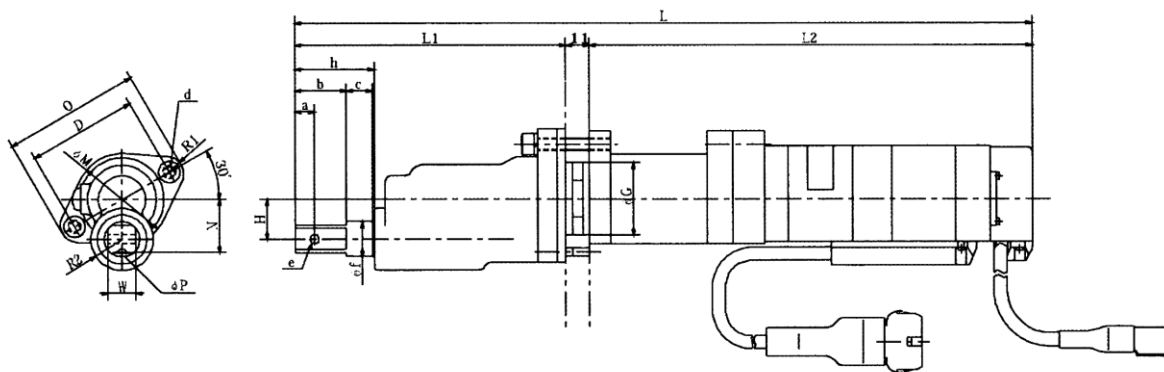
Nut runner model	Capacity (N•m)	Rotation (rpm)	Motor model	Weight (kg)
ANM-220	18	310	TS4603	1.3
ANM-320	28	430	TS4617	1.6
ANM-400	35	310		1.6
ANM-640	55	420	TS4609	3.2
ANM-1200	110	420	TS4618	4.5

2-1-2. Dimensions table of nut runner (straight type)



MODEL	a	b	c	D	d	e	f	G		L	L'	h	M	O	W	
								standard dimensi	Tolerance						standard dimensi	Tolerance
ANM-220	5	11	18	51	2-M6	3.2	12	34	-0.025 -0.050	179.5	158.5	21	42	64	9.52	-0.04
ANM-320	8	16	23			4.2	17			232.7	206.7	26			12.7	-0.07
ANM-400																
ANM-640	9	18	28	62	2-M8	5.2	19	44		246.9	215.9	31	61	80	15.87	-0.05
ANM-1200																

2-1-3 Dimensions table of nut runner (offset type)



MODEL	a	b	c	D	d	e	f	G		L	L1	L2	h	M	N	O	P	R1	R2	W		H
								standard dimension	Tolerance											standard dimension	Tolerance	
ANM-220L	7.5	21	11	51	2-M6	3.2	11.5	34	-0.025 -0.050	286.5	117	158.5	33	43	25	64	4	8	14.5	9.52	-0.04	18.75
ANM-320L	9	24	12			4.2	16.5			343.7	126	206.7	37							12.7	-0.07	
ANM-400L										369.7												
ANM-640L	9.5	26	13.5	62	2-M8	5.2	19.5	44		344.9	118	215.9	40	61	30	76	5	9	20	15.87	-0.05 -0.10	30

2-2. Controller specification

Composition	IF unit	1 type
	Controller unit	GSL Standard specification: 4 types, GSL T specification: 4 types GSLW Standard specification: 2 types, GSLW T specification: 2 types
Data	DATA communication function (PC)	RS232C conversion
	Other unit control	Arc-Net
	DATA control (PC)	RS422
	DATA saving	Tightening data: about 6000 items When IF is connected: Can be output from PC.
	Printer connection	Connected to IF unit or a personal computer (output to a commercial printer)
	Max. axis number for connection	30 axes control (60 axes as of software)
Display	DATA display	4-digit 7 SEG. LED
	Extraordinary display	Alarm code display + NG code display
Indicator	Display	OK/NG, axial arrangement, tightening setting (applicable to the 60 axes display)
Setting	Setting input method	A personal computer or the controller front panel
	Memory backup	EEPROM
	Setting value backup	PC⇒FD, HD
Outside dimensions (See P13 to 26)	IF unit	25*220*170 (M-net ver.) 41*220*170 (CC-Link ver.)
	Controller unit (Standard specification) GSL-11-N04-M, GSL-13-N04-M	59 (65)*238*170.5 The dimension in parentheses shows the dimension including the heatsink.
	GSL-14-N02, GSL-15-N04-M GSLW-11-N04-M, GSLW-13-N04-M	59 (81)*238*170.5 The dimension in parentheses shows the dimension including the heatsink.
	Controller unit (T specification)	65*243*171.5 (220) The dimension in parentheses shows the dimension including the heatsink.
	Display GSL-D2	182.5*138.8*57.3 Install it taking account of the protrusion clearance of the connector.
	Display GS-D3	182.5*138.8*42.5
Tightening setting	Program number	24 programs
	Step number	77 steps
	Block number	Maximum 19 blocks
	Setting items	T: Rating 30 types H: Final tightening, K: Pretightening, G: Reverse rotation, S: Rotation, Axial arrangement Each 24 types
Tightening method	Torque method	Torque method by the current sensor torque feedback system
Tightening control	Sequencing tightening	Maximum 19 blocks
	Block tightening	19 blocks (77 steps)
	Retry	Setting of Yes/No per program
	Baking determination	Reverse torque
	Reverse rotation for fixed quantity	Time, angle
	Speed switching	3 steps, angle control, torque control
Accuracy	Torque waveform	Display, all axes display or a personal computer
	Angle stop accuracy	Within $\pm 0.5^\circ$ (30rpm or less)
	Angle display minimum unit	0.1°
	Tightening accuracy	Target torque $\pm 15\%$
Connection	Connection cable	Standard specification: CN (Connector) type
		T specification: CN (Connector) type
Alarm ,extracts (See P72 and 73)	Motor overcurrent, (Driver over heating)	AL10
	Over load	AL20
	Over speed	AL30
	Encoder initial failure	AL40
	TOOL wrong connection	AL60, AL80
Others	Axis cutting function	Can be connected from a personal computer or the controller front panel.
	Communication with other unit	Arc-Net
	Setting input	RS232C conversion
	Communication with PLC	SIO (M-NET) or parallel communication DC24V PIO
	Display connection	Connected to IF unit

2-3. Basic specification

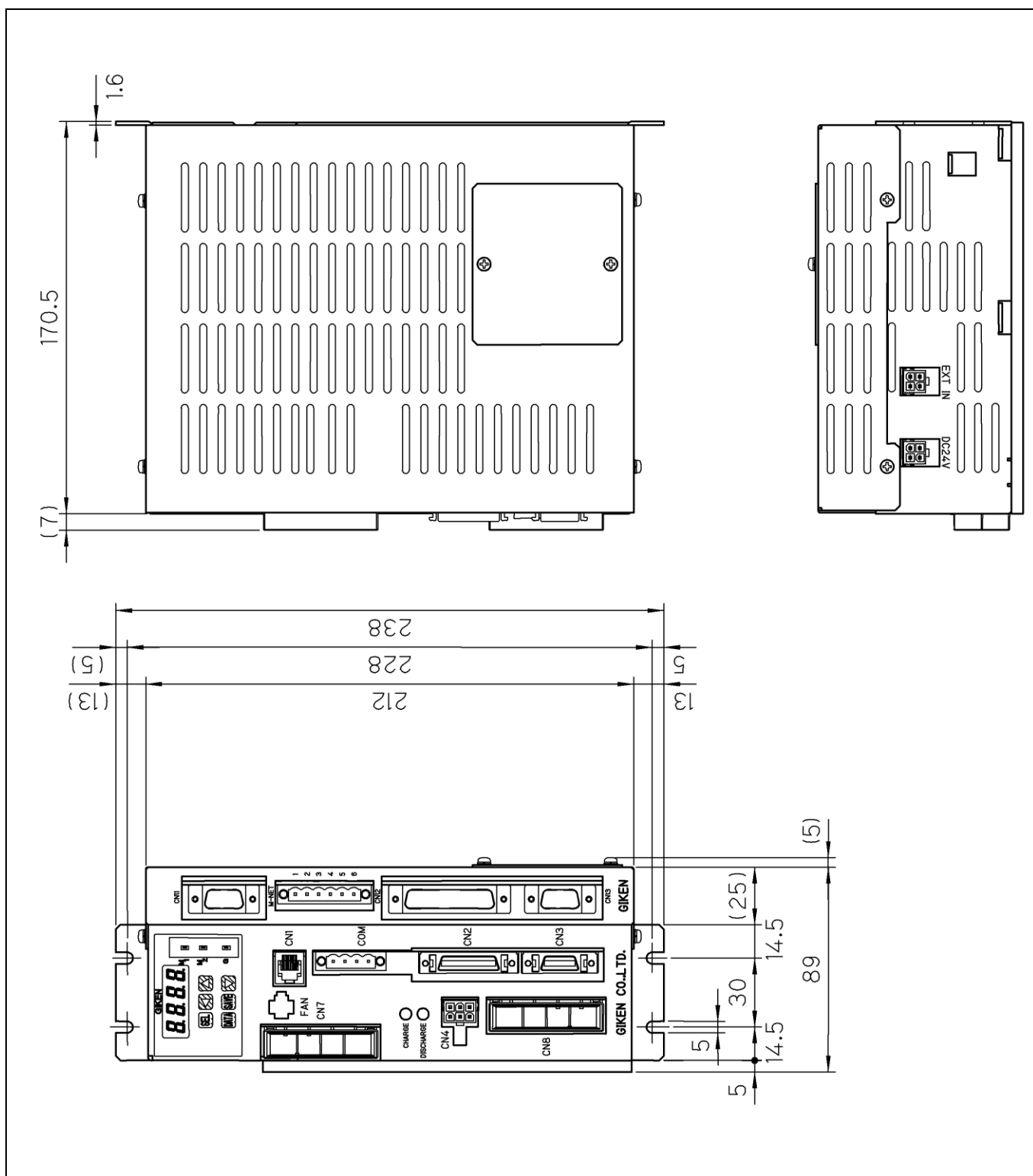
GSL Standard specification model	GSL-11-N04-M	GSL-13-N04-M	GSL-14-N04-M	GSL-15-N04-M
GSLW Standard specification model	GSLW-11-N04-M	GSLW-13-N04-M		
GSL T specification model	GSL-T1-N04-M	GSL-T3-N04-M	GSL-T4-N04-M	GSL-T5-N04-M
GSLW T specification model	GSLW-T1-N04-M	GSLW-T3-N04-M		
I/F model (common)	GSL-IF-N2 (M-net ver.) / GSL-IF-CCN1 (CC-Link ver.)/ GSL-IF-CCN1 (CC-Link ver. for AISIN)			
Control power input	Single phase, AC 100 to 220 V±10% 50/60 Hz (CC-Link ver. IF need power supply of DC 5V more than 2A)			
Drive power input	3-phase AC200 to 220 V±10% 50/60 Hz			
Withstand voltage	AC1,500 V for 1 minute			
Insulation resistance	DC500 V 10 MΩor more			
Electric capacity (per one axis of nut runner)	1A	2A	3A	5A
Momentary power failure	No effect in the range less than 50 msec (excluding the driving time)			
Nut runner model	ANM-220	ANM-320 ANM-400	ANM-640	ANM-1200
Specifications of applicable motors	TS4603N1920	TS4617N1920	TS4609N1920	TS4618N1920
Instantaneous maximum current	5.4 Arms	10.7 Arms	19. 6Arms	38.6 Arms
Maximum stall torque	0.95 N.m	1.91 N.m	3.82 N.m	7.64 N.m
Maximum rotation number without loads	12,500 rpm			
Motor drive system	Transistor PWM Rectangular wave drive			
Angle sensor	Incremental encoder (With the zero magnification signal, line driver output, 256C/T)			
Specification temperature and humidity	0 to 50°C, Less than 90%RH (No condensation)			

2-4. Functions/Features

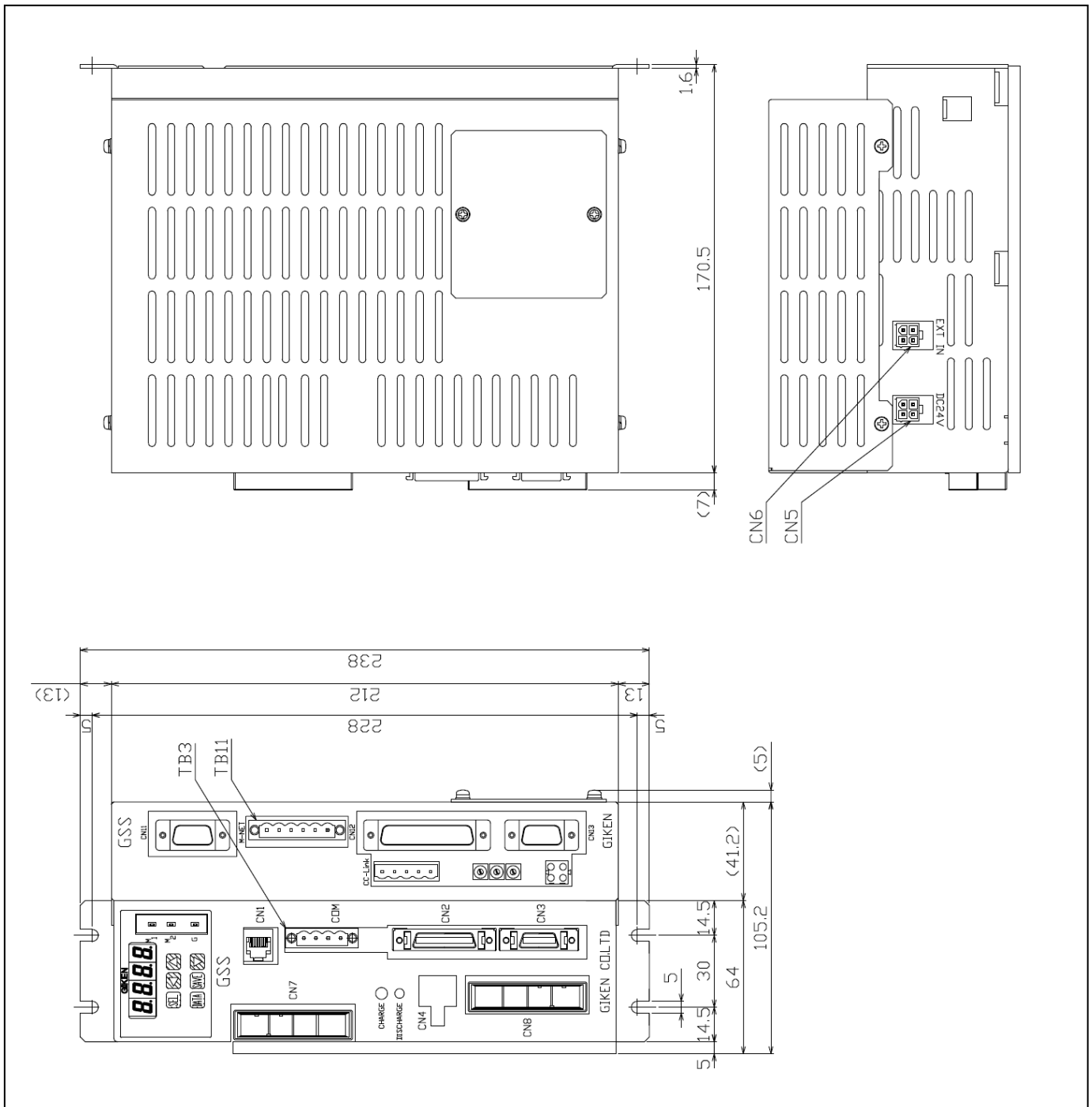
Protective function		Overcurrent, over load, over speed, encoder failure, drive power failure, EEPROM failure and CPU failure, etc.
Display function	7 SEGMENT LED	Alarm No., NG information Program No., block No. Operation monitor Tightening result (Torque, etc.)
Parameter setting		Set the following parameters by a personal computer and input them to the IF unit. <ul style="list-style-type: none"> • Program 24 types • Rating 30 types • Pretightening • Final tightening • Reverse rotation • Rotation Each 24 types
Storing the tightening data		Tightening data: Stores about 6000 data. (When it exceeds over 6000, the older data are overwritten in order.) It is possible to confirm by the setup software when necessary.
Applicable to the multiaxial		It is possible to connect single controller 1~30 sets or double controller 1~15 sets per one IF unit. Max. 30 axes multiaxial control is available.
Communication with the sequencer (in serial or parallel)		Serial communication (M-NET): Communication between IF unit and sequencer Parallel communication: Communication between each controller and sequencer
Axis cutting function		Setting for axis cutting is possible by the PC setting or the operation from the front panel. (Used when the controller malfunctioned)
Gear check function		Diagnosis function for biting of the gear and motor shaft (Selectable for Yes/No)
Simulation operation		Simulation operation is available by the personal computer operation (Sampling start for the seating angle by tightening)
Calendar function		Stores Year, Month, Day, Hour, Minute and Second per data.
Regenerative function (Over voltage detection)		Regenerative circuit is built in to make it consume by the internal resistor when the drive voltage exceeds a certain value.
Discharge function		Discharges the drive charge voltage by pressing the press-button switch on the front panel.
Standard inertia (Inertia)		$J_L \leq 30 J_M$
Rotating direction		Direction of CCW should be the forward rotation viewed from the motor shaft end.
Monitors (see 70)		Monitor signal output at the check pin on the front panel: M1: Current monitor M2: Speed monitor G: Monitor GND

2-5. Dimensions

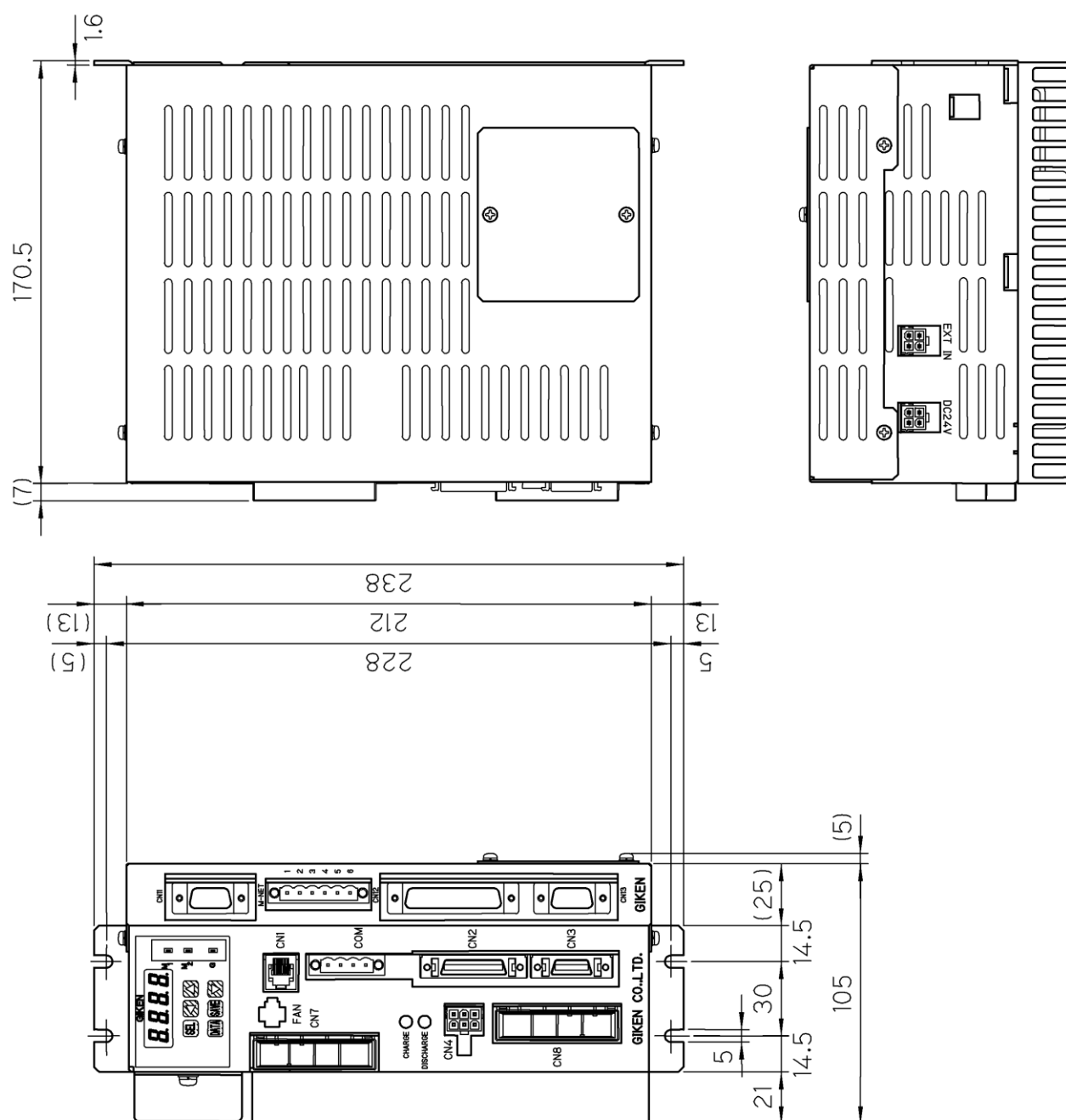
2-5-1-1 Dimensional drawing (with M-net ver. interface): Standard specification *** GSL-11 (13)-N04-M



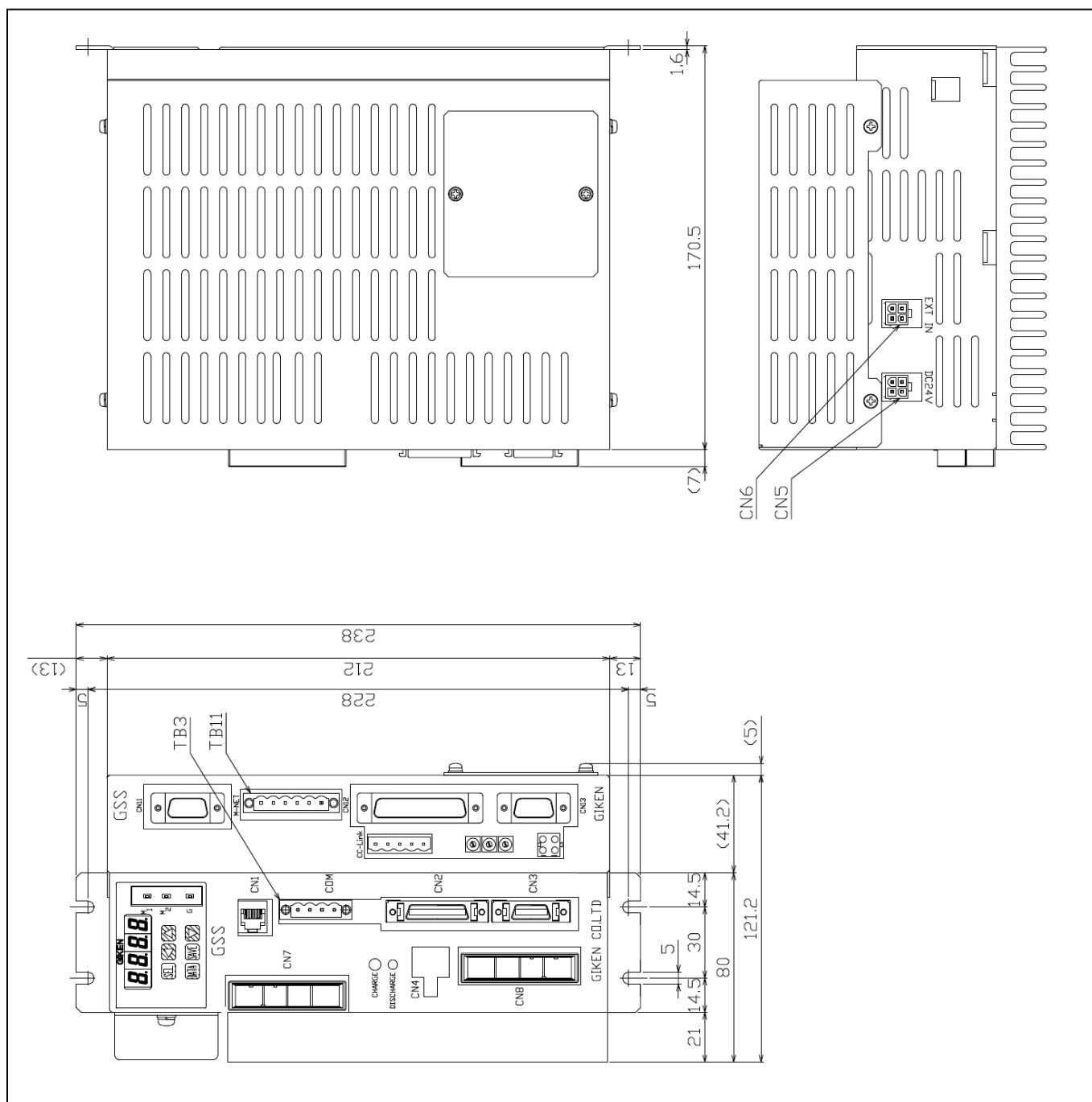
2-5-1-2 Dimensional drawing (with CC-Link ver. interface): Standard specification *** GSL-11 (13)-N04-M



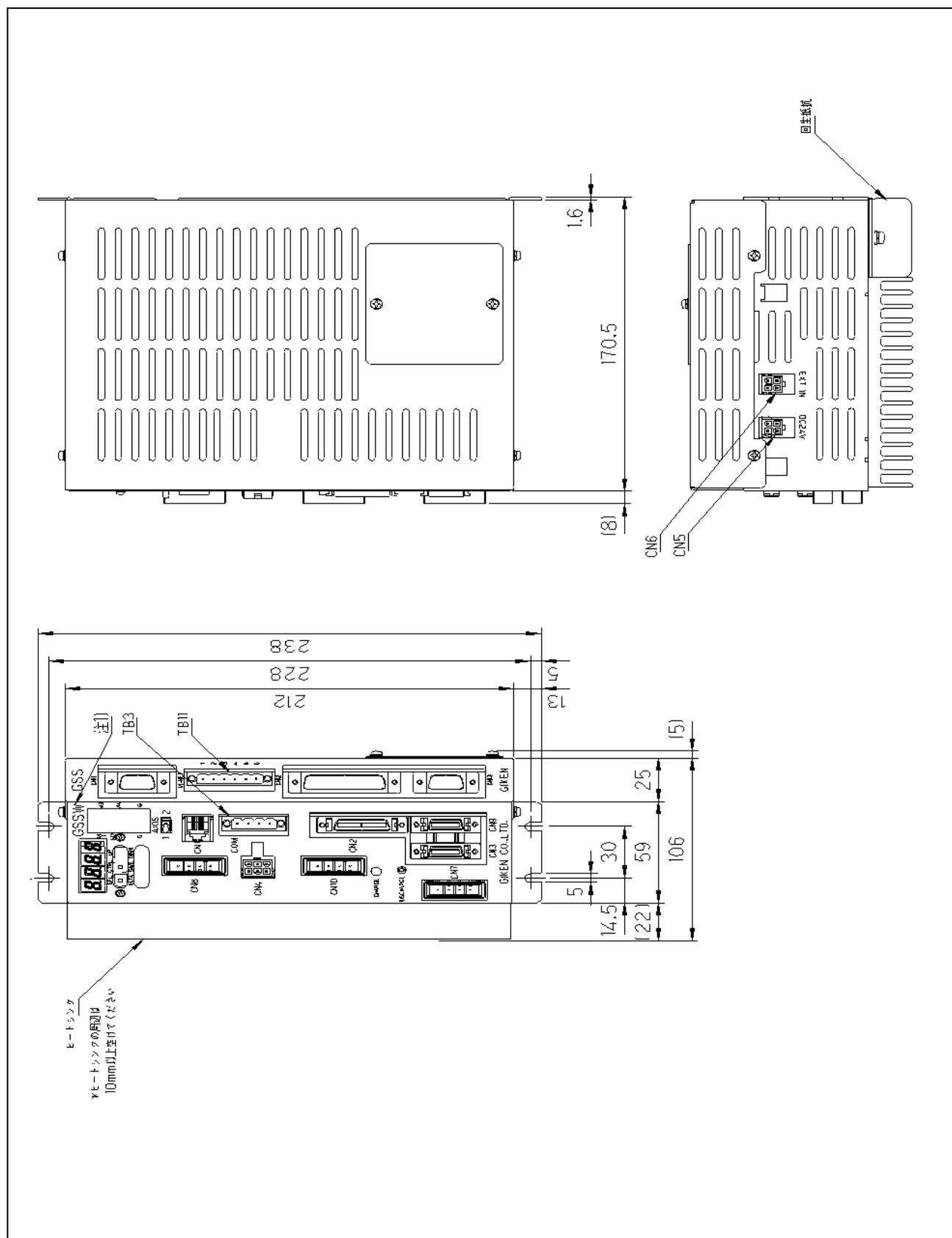
2-5-2-1 Dimensional drawing (with M-net ver. interface): Standard specification ••• GSL14 (15)-N04-M



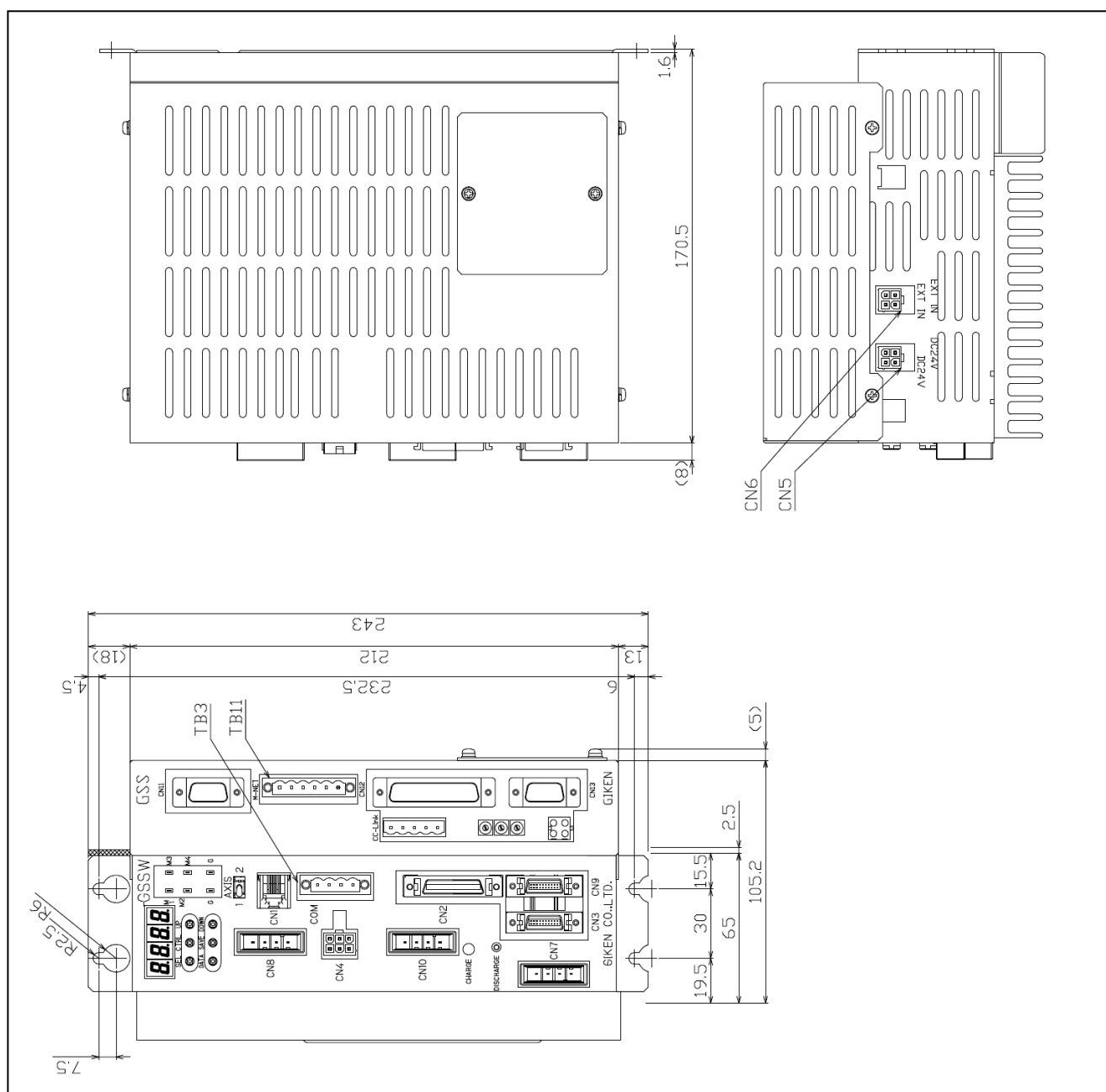
2-5-2-2 Dimensional drawing (with CC-Link ver. interface): Standard specification •• GSL14 (15)-N04-M



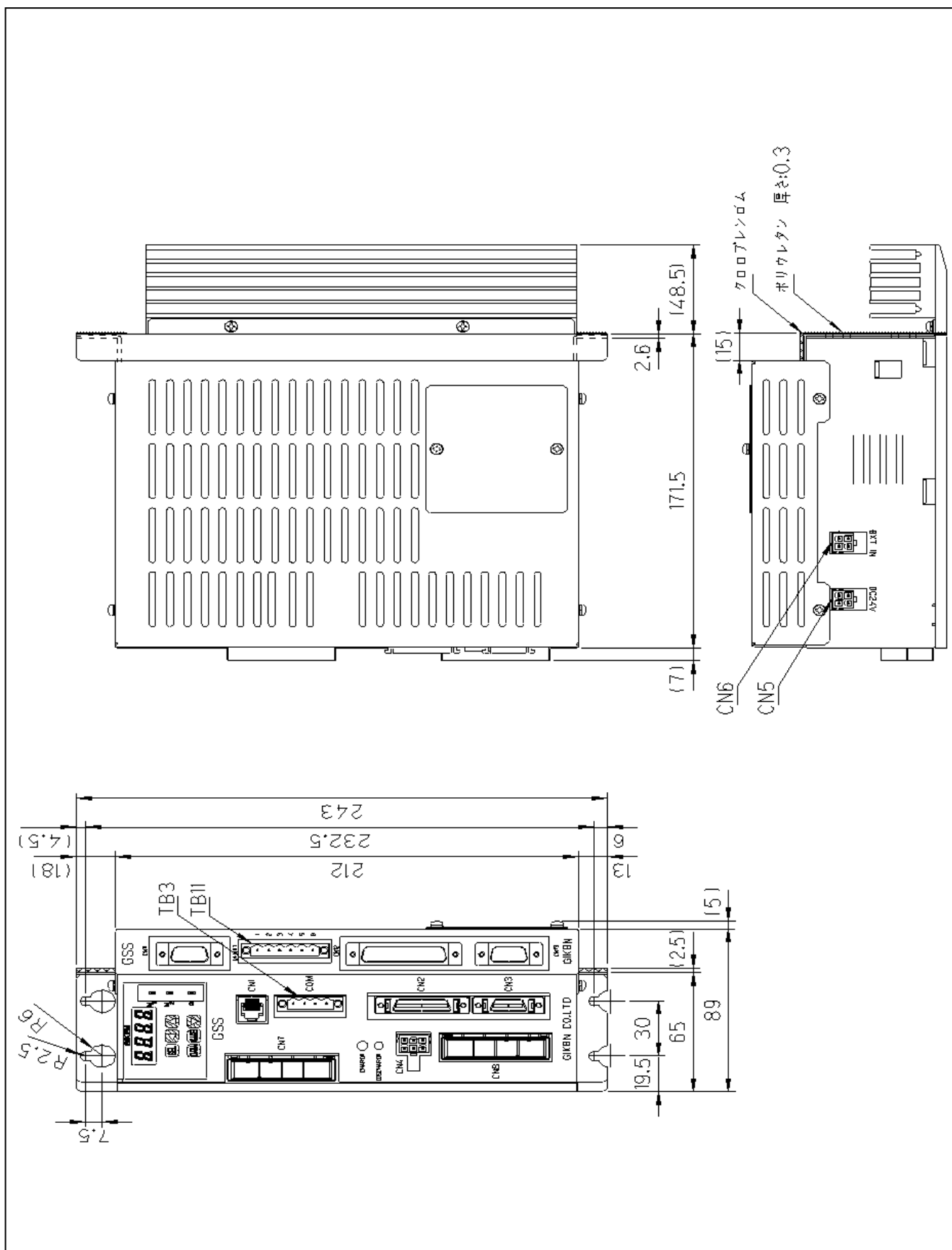
2-5-3-1 Dimensional drawing (with M-net interface): Standard specification ••• GSLW-11(13)-N04-M



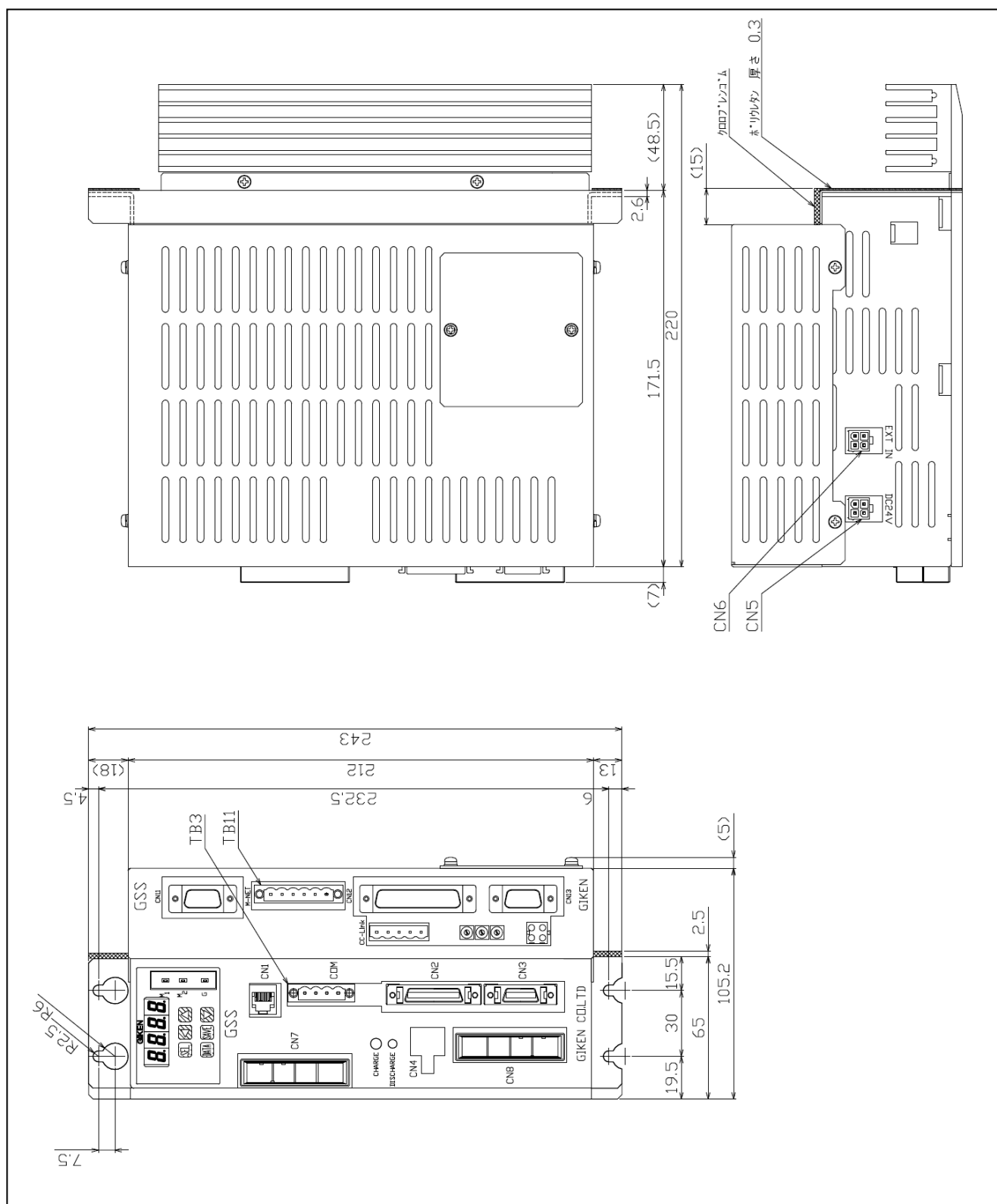
2-5-3-2 Dimensional drawing (with CC-Link interface): Standard specification ••• GSLW-11(13)-N04-M



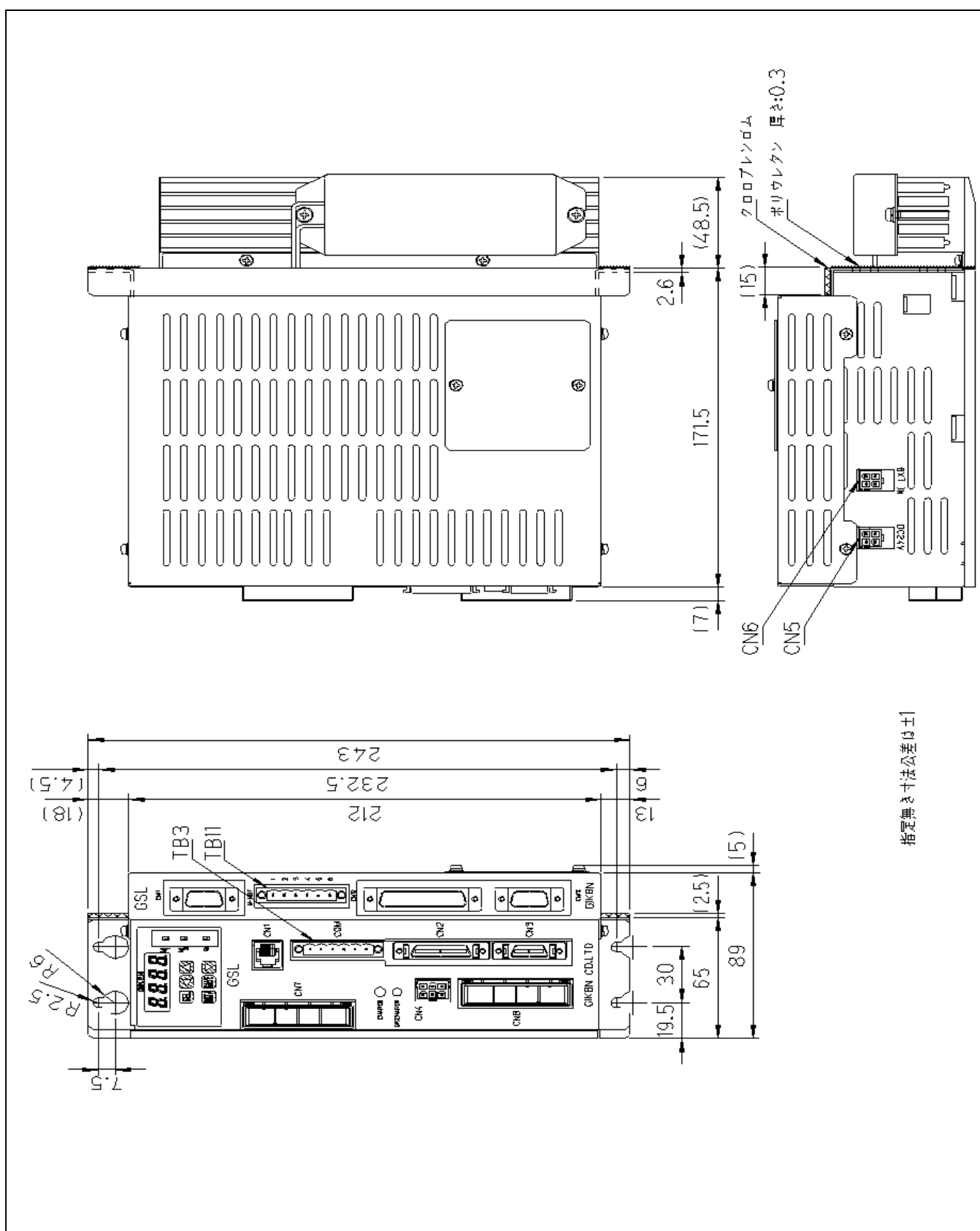
2-5-4-1 Dimensional drawing (with M-net interface): T specification *** GSL-T1(T3)-N04-M



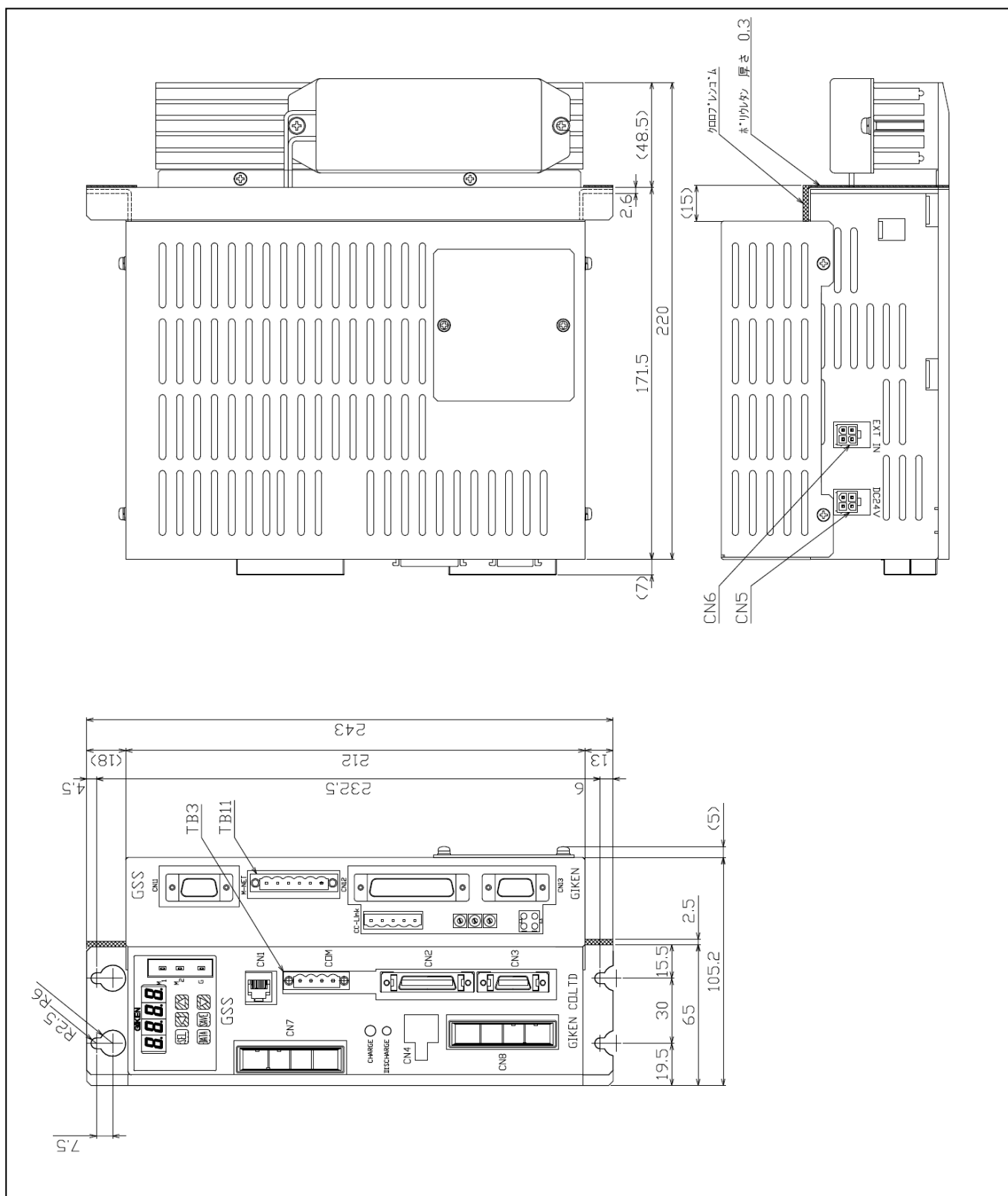
2-5-4-2 Dimensional drawing (with CC-Link interface): T specification *** GSL-T1(T3)-N04-M



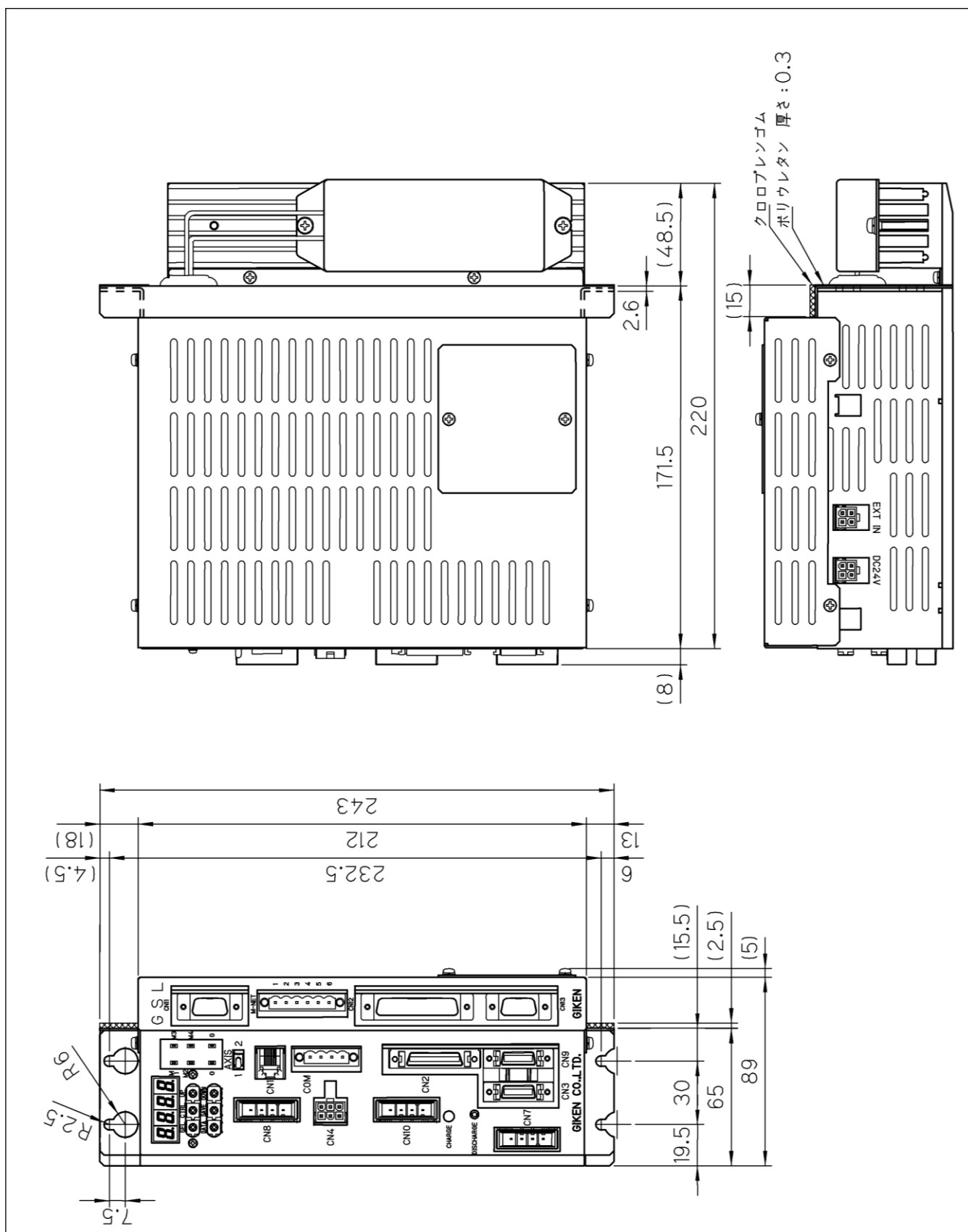
2-5-5-1 Dimensional drawing (with M-net interface): T specification •• GSS-T4(T5)-N04-M



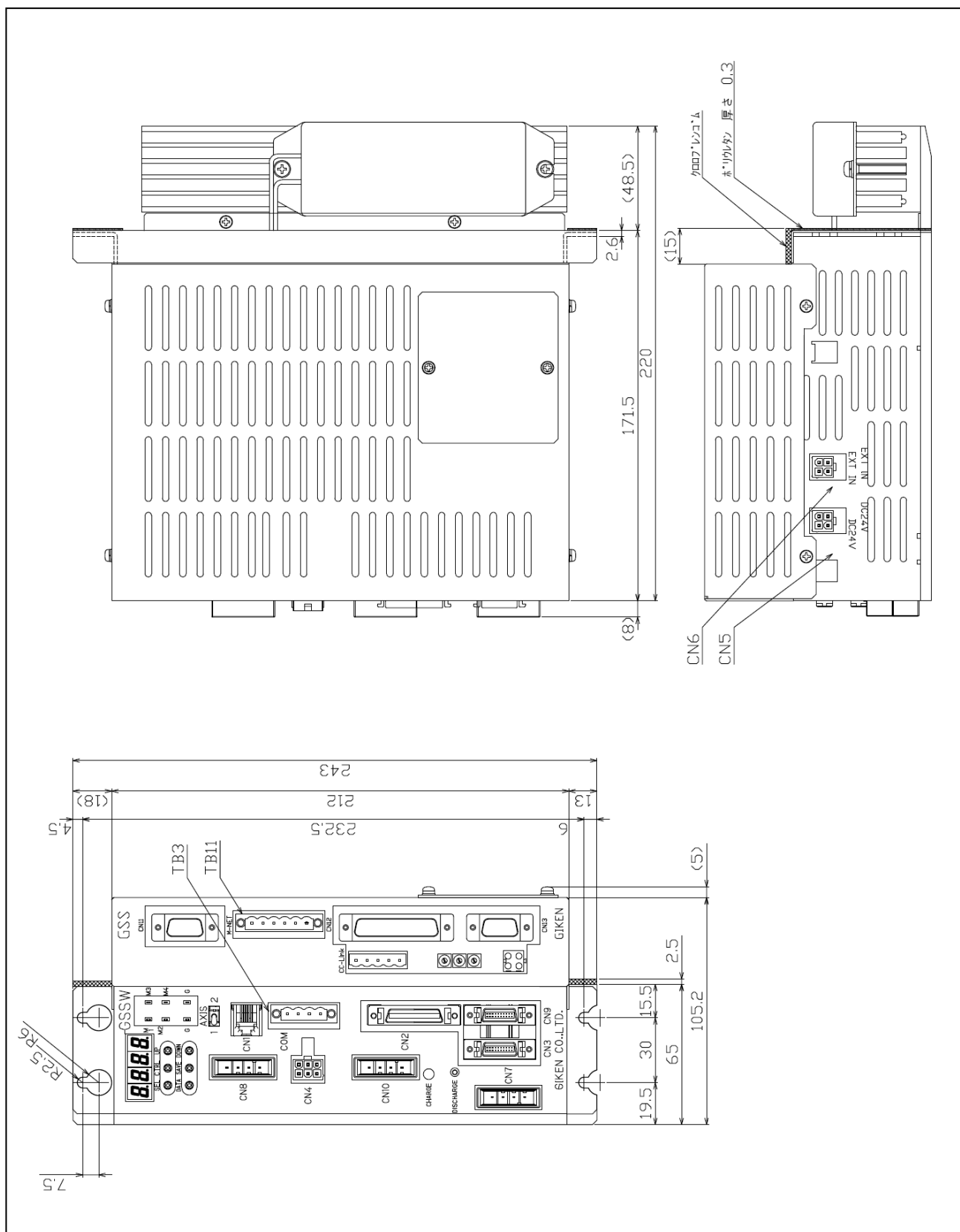
2-5-5-2 Dimensional drawing (with CC-Link interface): T specification •• GSS-T4(T5)-N04-M



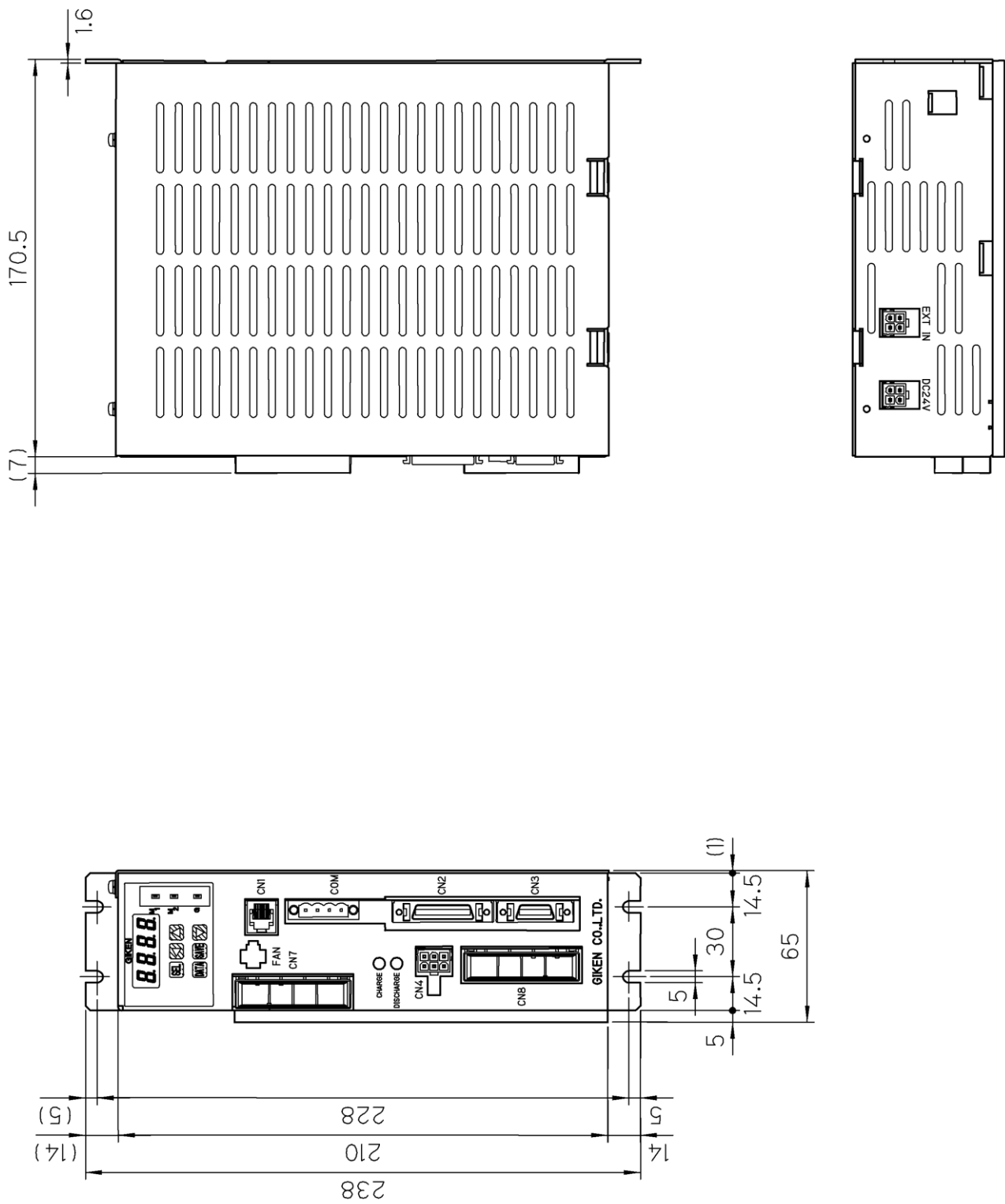
2-5-6. Dimensional drawing: (with M-net interface): T specification *** GSLW-T1(T3)-N04-M



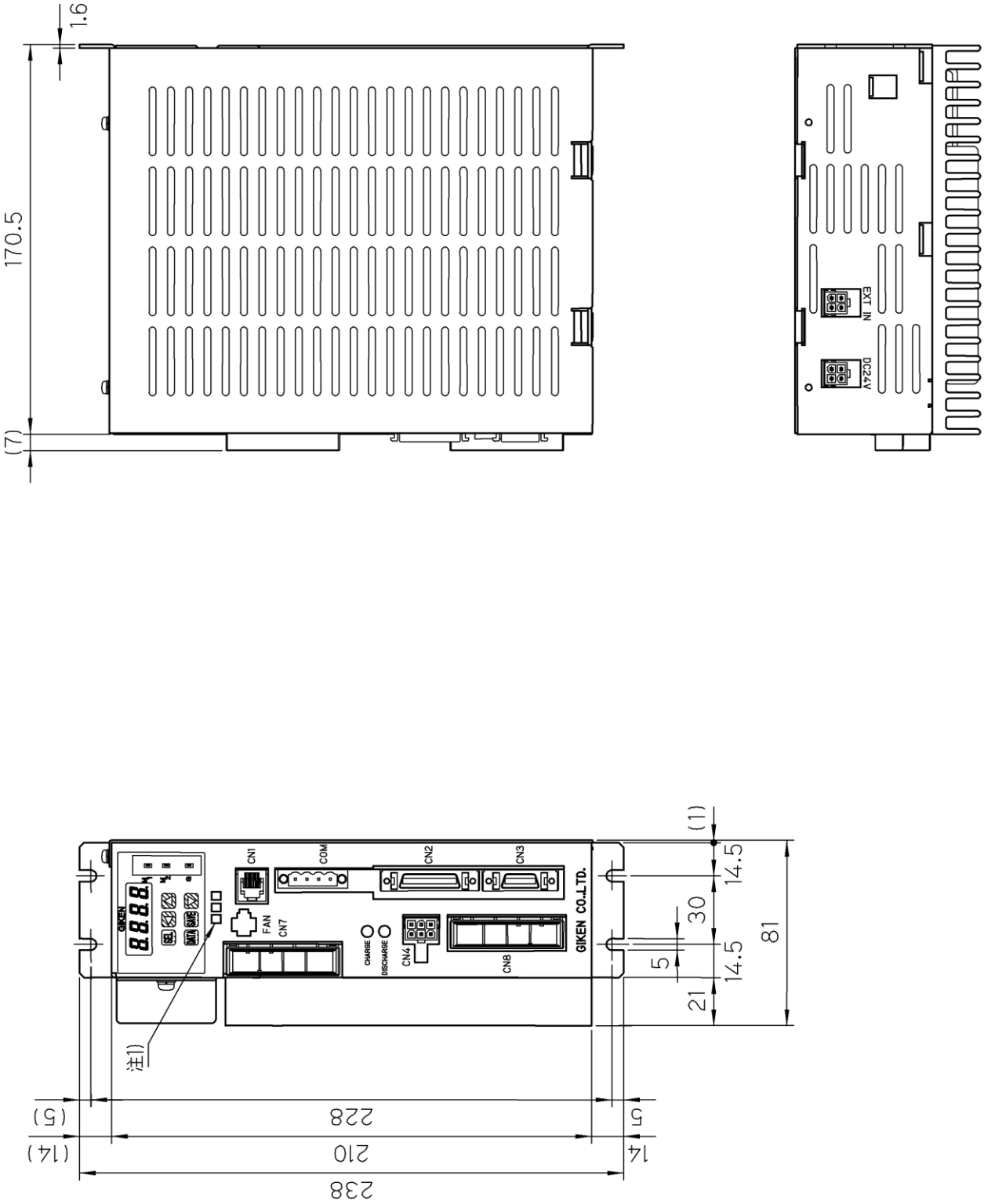
2-5-6. Dimensional drawing: (with CC-Link interface): T specification *** GSLW-T1(T3)-N04-M



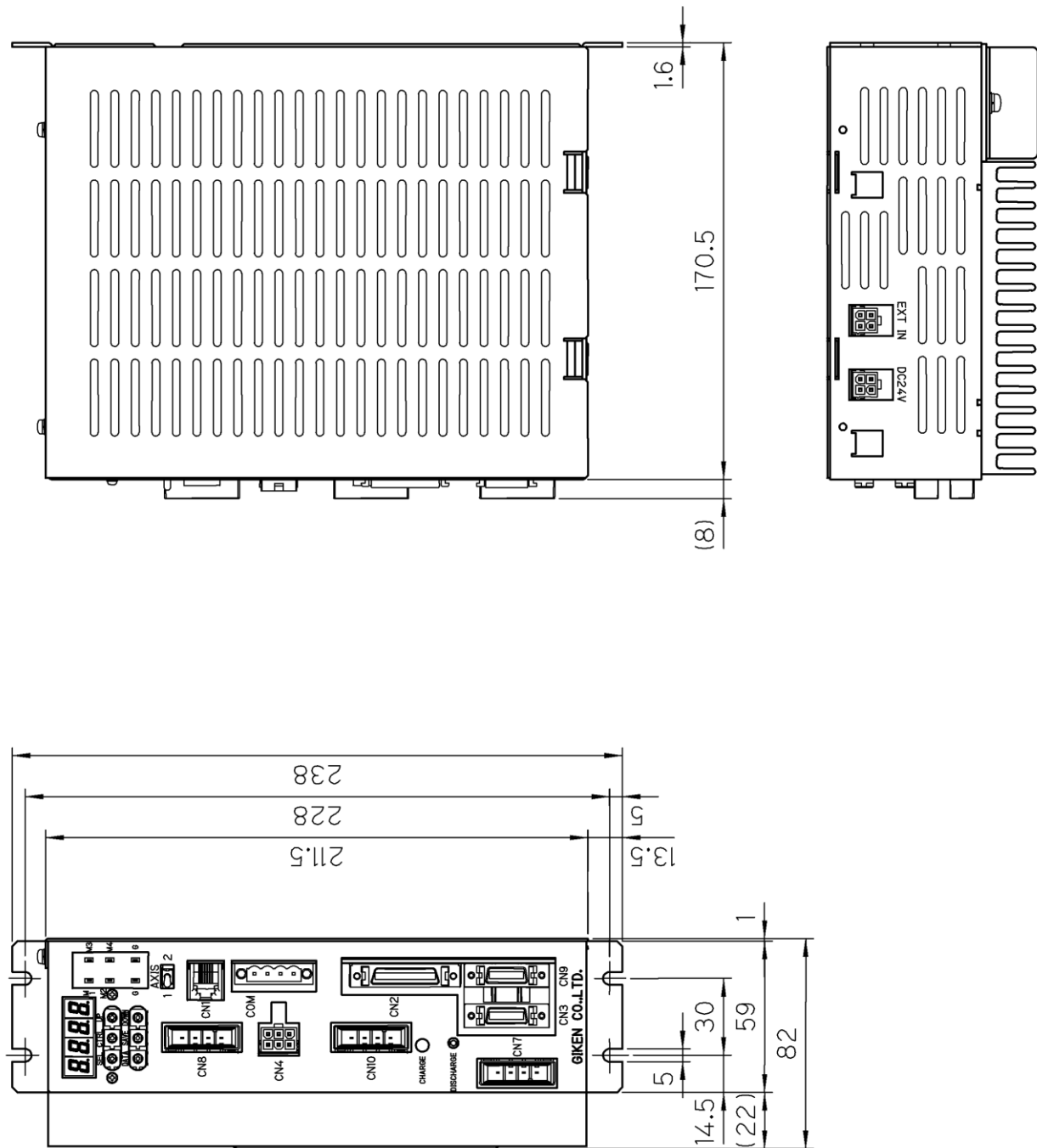
2-5-7. Dimensional drawing: Standard specification *** GSL-11(13)-N04-M



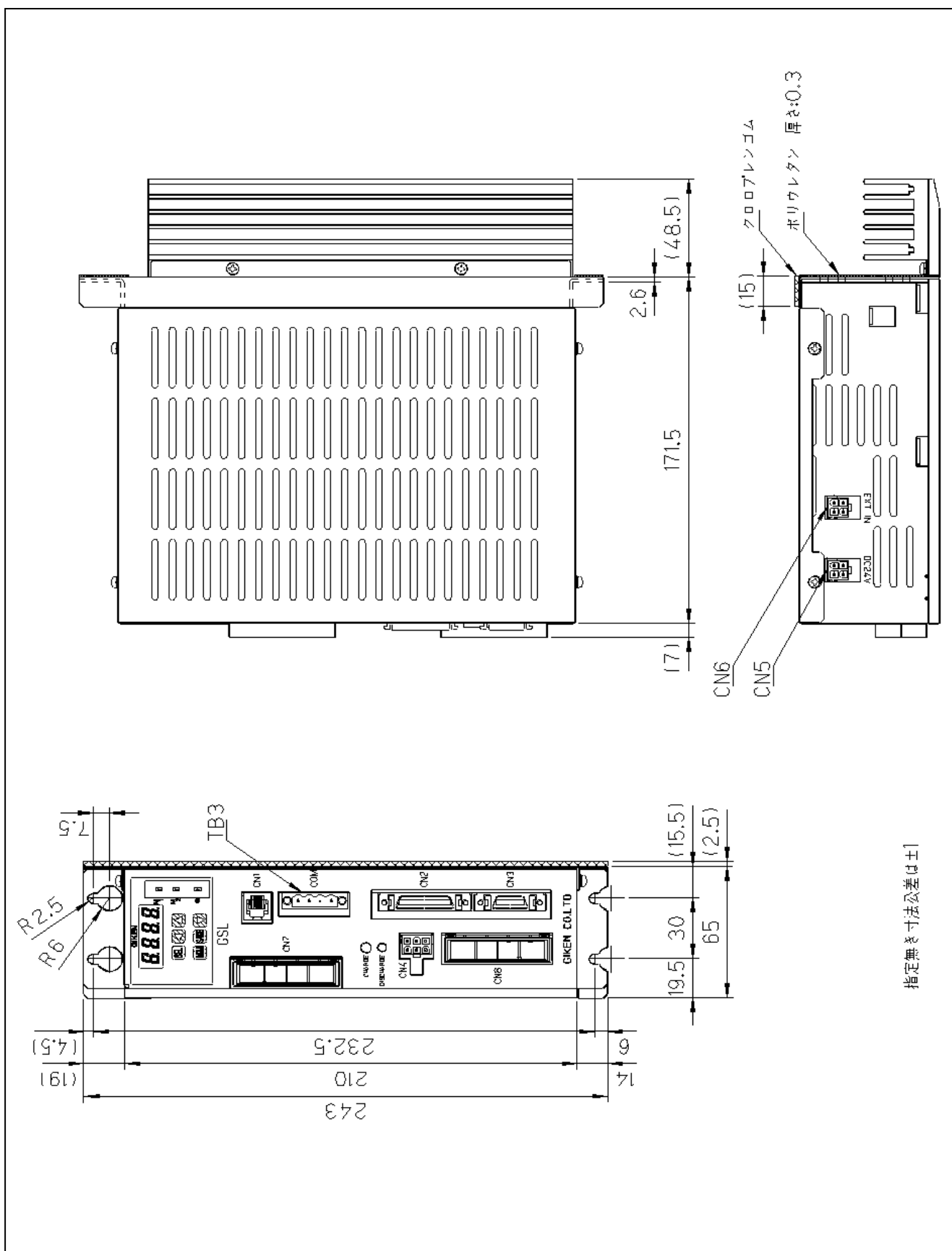
2-5-8. Dimensional drawing: Standard specification *** GSL-14 (15)-N04-M



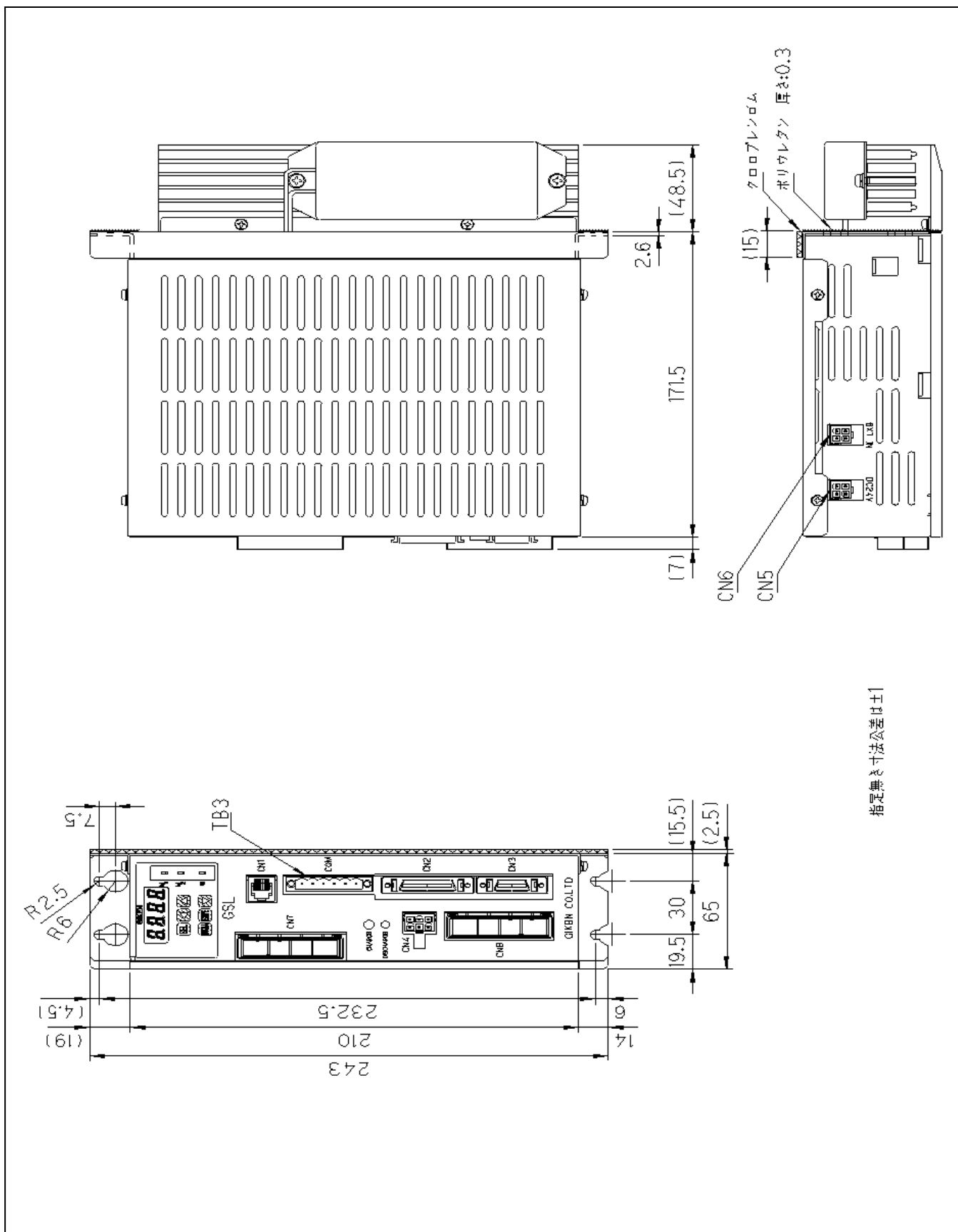
2-5-9. Dimensional drawing: Standard specification *** GSLW-11 (13)-N04-M



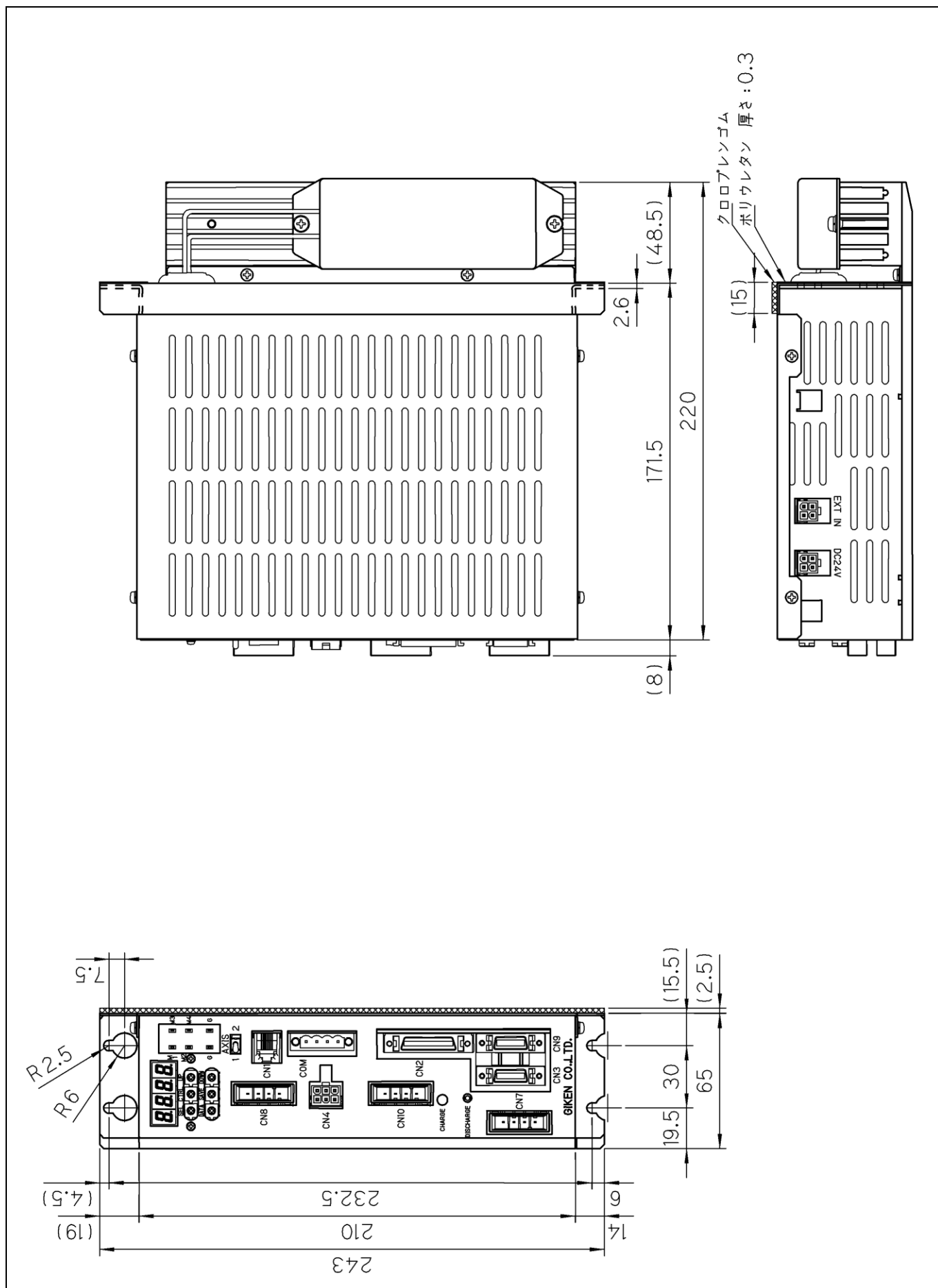
2-5-10. Dimensional drawing: T specification *** GSL-T1(T3)-N04-M



2-5-11. Dimensional drawing: T specification *** GSL-T4(T5)-N04-M



2-5-12. Dimensional drawing: T specification *** GSLW-T1(T3)-N04-M

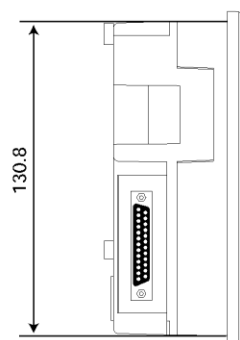


2-5-13 Dimensional drawing (Display)

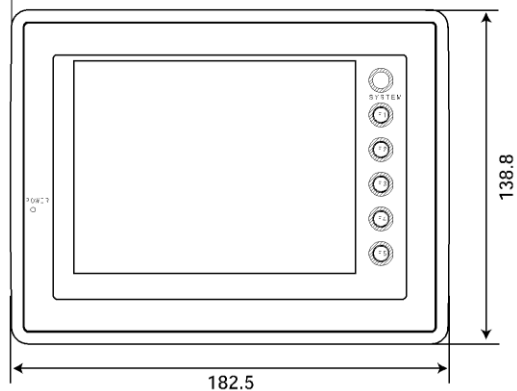
Model: GSL-D2

単位 : mm

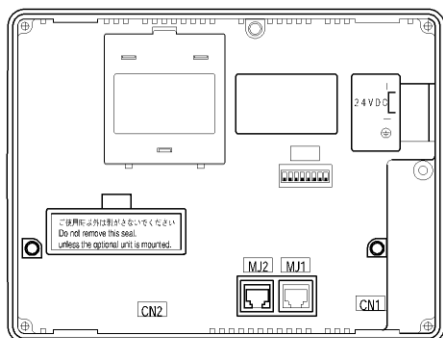
○側面図



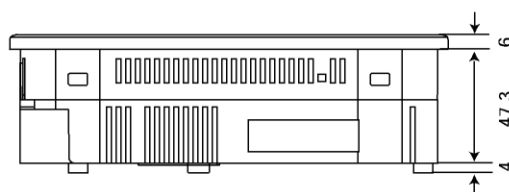
○正面図



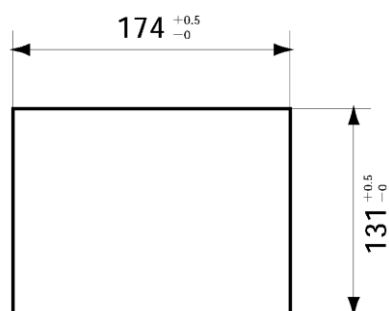
○背面図



○下面図

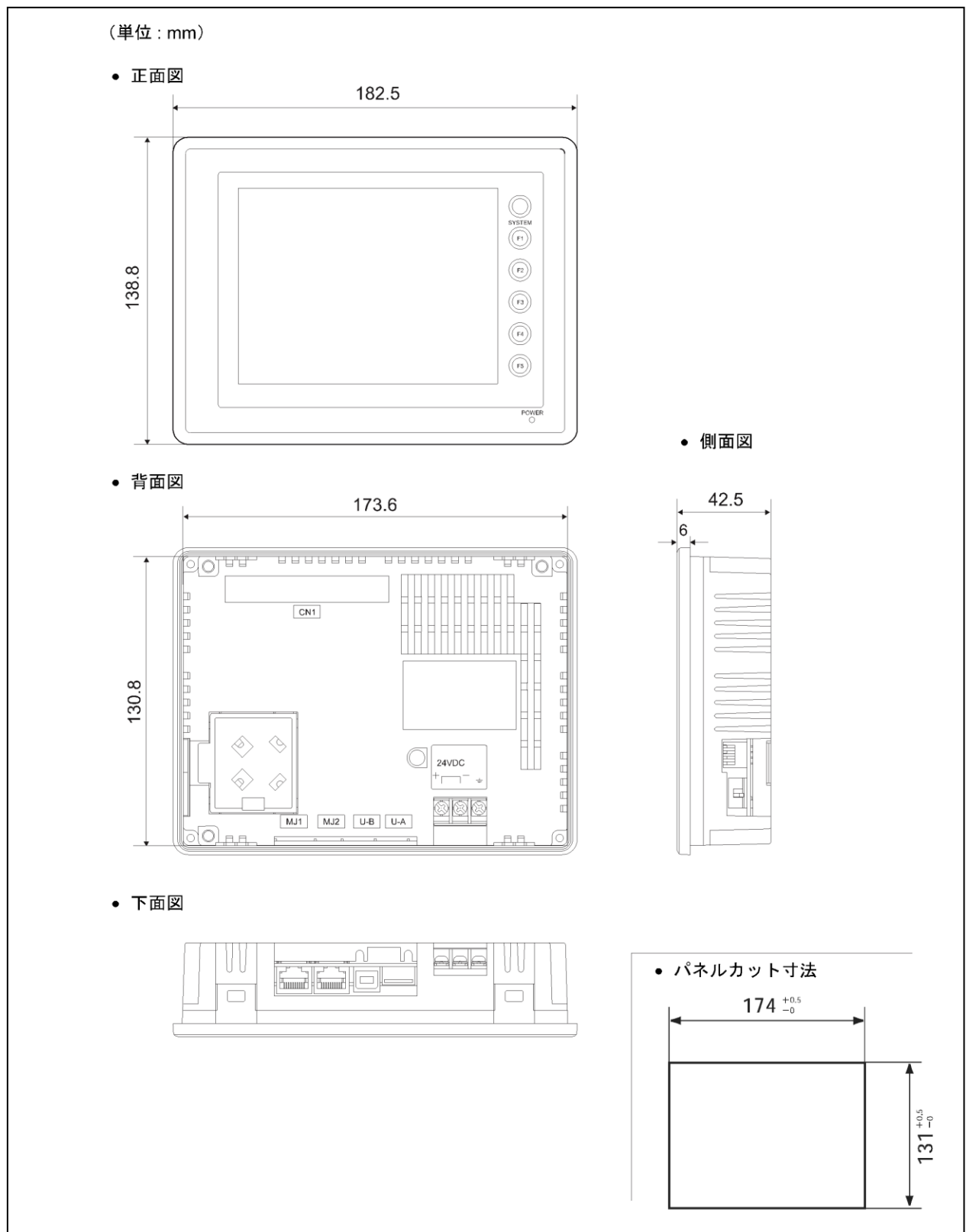


・パネルカット寸法



2-5-14 Dimensional drawing (Display)

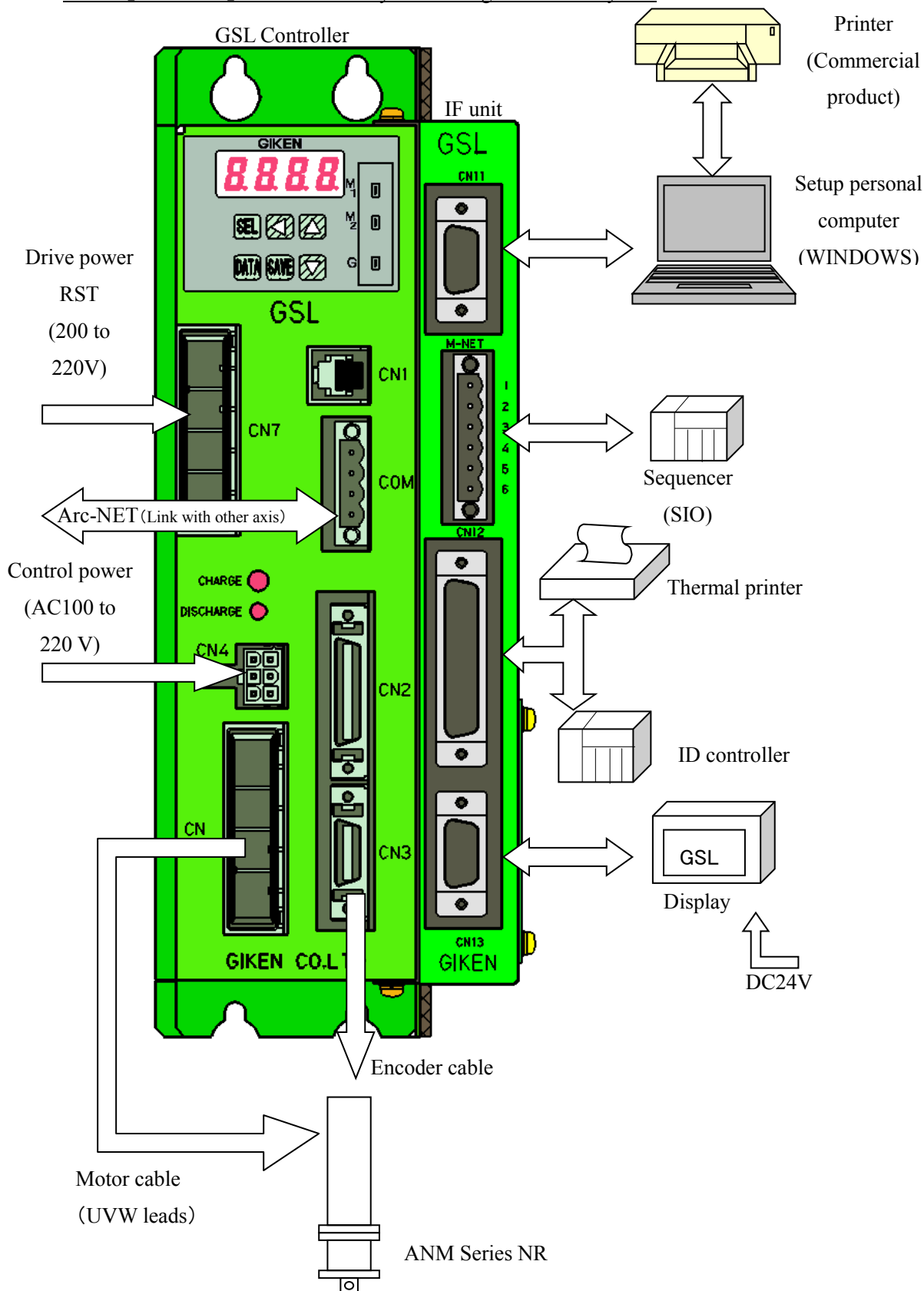
Model: GS-D3



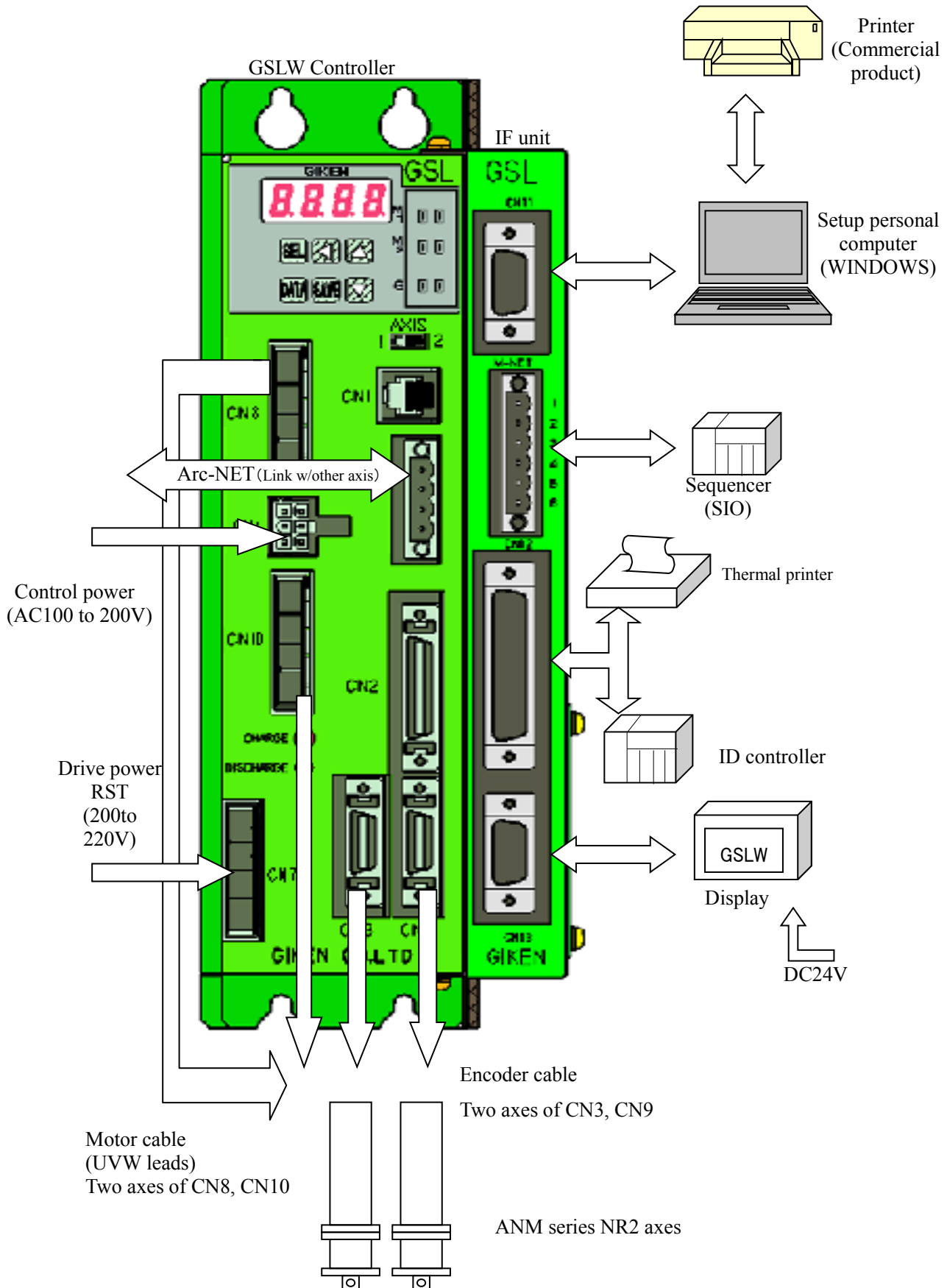
3. Wiring connection

3-1 Wiring referential layout

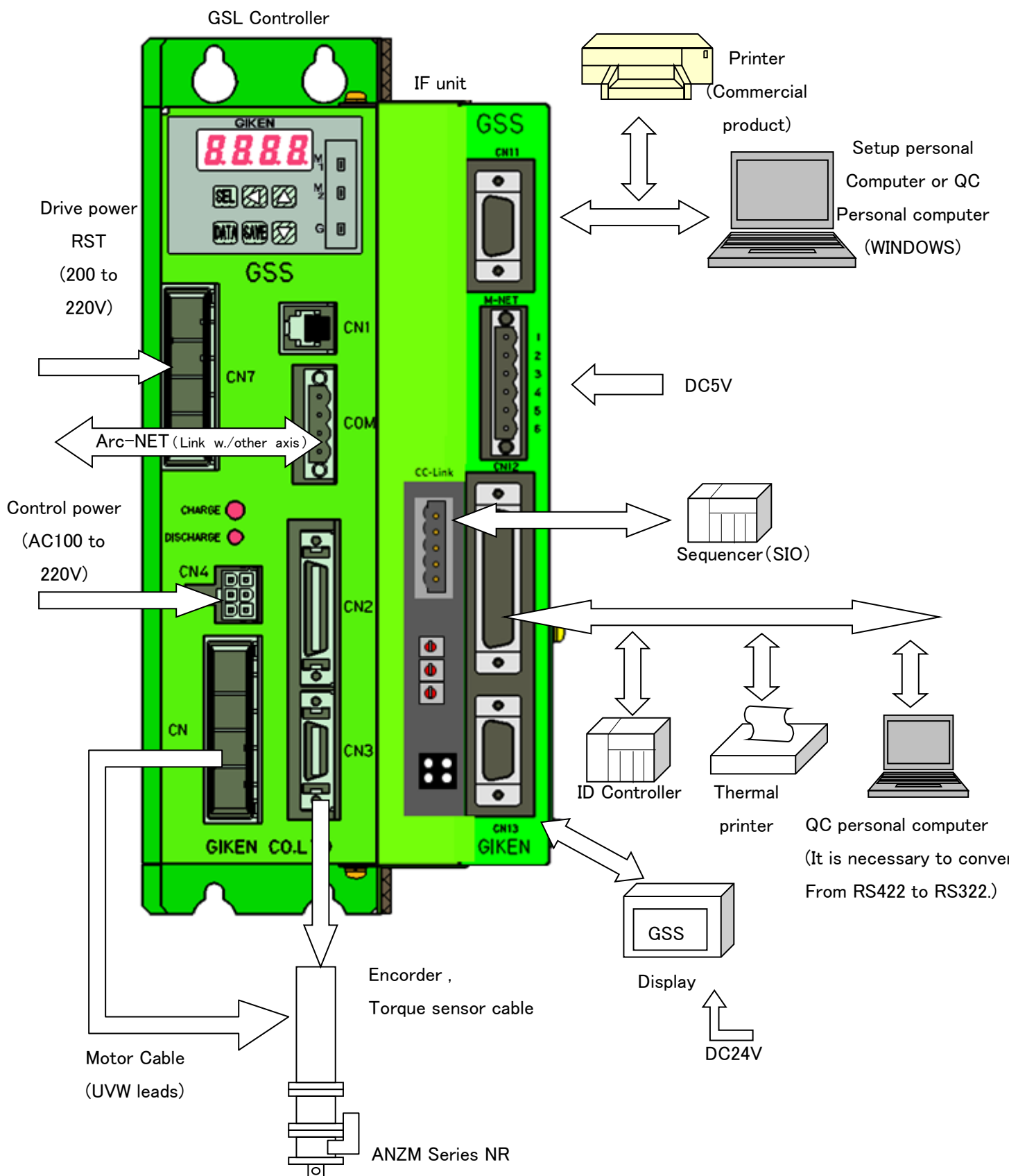
3-1-1. 【M-net ver.】GSL controller system wiring referential layout



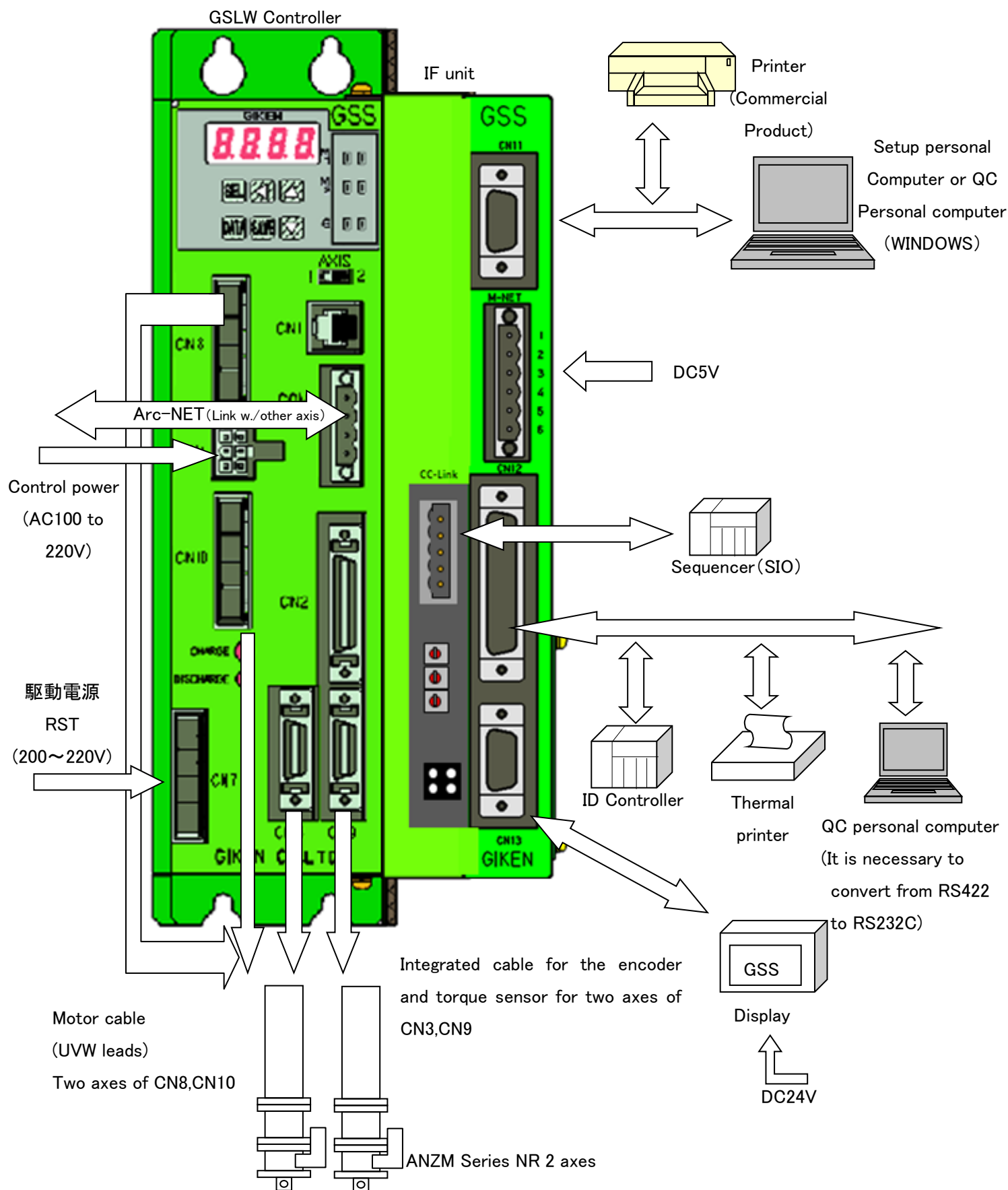
3-1-2 【M-net ver.】GSLW controller system wiring referential layout



3-1-3 【CC-Link ver.】GSS controller system wiring referential layout



3-1-4 【CC-Link ver.】GSSW controller system wiring referential layout



3-2 Connector to be used and the other side connector

3-2-1 GSL connector and the other side connector

Driver unit

Code	Application/contents	Applicable type	Counter side type	Counter attachment
CN1	Manufacturer use RS232C connection	3MJ66HOPLP-N3(OKI WIRE) or equivalent	Modular jack 6 pin (Each manufacturer)	
CN2	For the parallel interface	10236-52A2JL(SUMITOMO 3M) or equivalent	Plug: 10136-3000VE (SUMITOMO 3M) Shell: 10336-52A0-008 (SUMITOMO 3M)	
CN3	For the connection with the encoder	10220-52A2JL(SUMITOMO 3M) or equivalent	Plug: 10120-3000VE (SUMITOMO 3M) Shell: 10320-52A0-008 (SUMITOMO 3M)	
CN4	For the connection of control power supply	5569-6A1(MOLEX) or equivalent	Connector: 5557-06R (MOLEX) Terminal: 5556TL (MOLEX)	○
CN5	Power supply for I/O For the connection of (DC24V)	5569-4A1(MOLEX) or equivalent	Connector: 5557-04R (MOLEX) Terminal: 5556TL (MOLEX)	
CN6	Unused	5569-4A1(MOLEX) or equivalent	Connector: 5557-04R (MOLEX) Terminal: 5556TL (MOLEX)	
CN7	For the connection of drive power supply	1-917541-2 (Tyco electronics amplifier) X key Or equivalent	Housing: 1-179958-4 (Tyco electronics amplifier) X key Contact: 316041-2 (Tyco electronics amplifier) for AWG10,AWG12	○
CN8	For the connection to a motor	2-917541-2 (Tyco electronics amplifier) Y key or equivalent	Housing: 2-179958-4 (Tyco electronics amplifier) Y key Contact: 316041-2 (Tyco electronics amplifier) for AWG10,AWG12	
COM	For communication among Controllers	MSTB 2,5/4-FG-5,08 (POHENIX CONTACT)	MSTB 2,5/4-STF-5,08 (POHENIX CONTACT) Wire directly installed type Applicable wire: : AWG24 ~ AWG12	○ (Resistor to be attached)

I/F unit

Code	Application/contents	Applicable type	Counter side type	Counter attachment
CN11	Inputs/outputs the related data to tightening from the personal computer with RS232C port.	D-SUB 9 pins Male	D-SUB 9 pins Female (Each manufacturer)	
CN12	For the connection with a printer, ID controller or QC personal computers	D-SUB 25 pins Female	D-SUB 25 pins Male (Each manufacturer)	
CN13	For the connection with a indicator (RS422 interface)	D-SUB 9 pins Female	D-SUB 9 pins Male (Each manufacturer)	
M-NET	For M-NET communication (CC-Link ver. IF need 5V power supply)	MSTB 2,5/6-FG-5,08 (POHENIX CONTACT)	MSTB 2,5/6-STF-5,08 (POHENIX CONTACT) Wire directly installed type Applicable wire: AWG24 ~ AWG12	○
CC-Link (only for CC-Link ver. IF)	For CC-Link communication	MSTB 2,5/5-FG-5,08-AU (POHENIX CONTACT)	MSTB 2,5/5-ST-5,08 (POHENIX CONTACT)	○

3-2-2 GSL connector and the other side connector

Driver unit

Code	Application/contents	Applicable type	Counter side type	Counter attachment
CN1	Manufacturer use RS232C connection	3MJ66HOPLP-N3(OKI WIRE) or equivalent	Modular jack 6 pin (Each manufacturer)	
CN2	For the parallel interface	10236-52A2JL(SUMITOMO 3M) or equivalent	Plug: 10136-3000VE (SUMITOMO 3M) Shell: 10336-52A0-008 (SUMITOMO 3M)	
CN3 CN9	For the connection with the encoder	10220-52A2JL(SUMITOMO 3M) or equivalent	Plug: 10120-3000VE (SUMITOMO 3M) Shell: 10320-52A0-008 (SUMITOMO 3M)	
CN4	For the connection of control power supply	5569-6A1(MOLEX) or equivalent	Connector: 5557-06R (MOLEX) Terminal: 5556TL (MOLEX)	○
CN5	Power supply for I/O For the connection of (DC24V)	5569-4A1(MOLEX) or equivalent	Connector: 5557-04R (MOLEX) Terminal: 5556TL (MOLEX)	
CN6	Unused	5569-4A1(MOLEX) or equivalent	Connector: 5557-04R (MOLEX) Terminal: 5556TL (MOLEX)	
CN7	For the connection of drive power supply	2-179277-2 (Tyco electronics amplifier) X key Or equivalent	Housing: 2-178128-4 (Tyco electronics amplifier) X key Contact: 1-353717-2 (Tyco electronics amplifier) for AWG10,AWG12	○
CN8 CN10	For the connection to a motor	1-179277-2 (Tyco electronics amplifier) Y key or equivalent	Housing: 1-178128-4 (Tyco electronics amplifier) Y key Contact: 1-353717-2 (Tyco electronics amplifier) for AWG10,AWG12	
COM	For communication among Controllers	MSTB 2,5/4-FG-5,08 (POHENIX CONTACT)	MSTB 2,5/4-STF-5,08 (POHENIX CONTACT) Wire directly installed type Applicable wire: : AWG24~ AWG12	○ (Resistor to be attached)

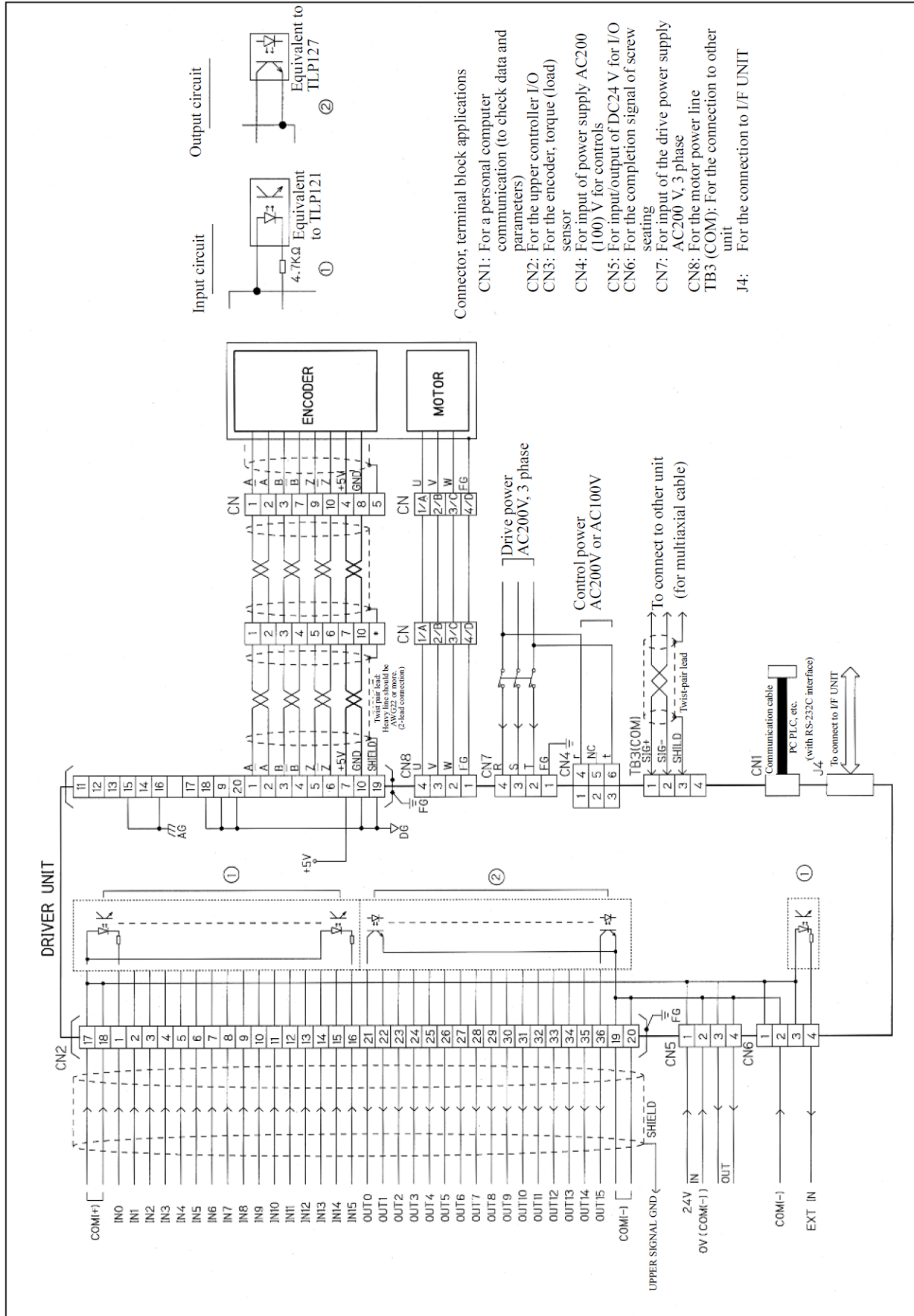
I/F unit

Code	Application/contents	Applicable type	Counter side type	Counter attachment
CN11	Inputs/outputs the related data to tightening from the personal computer with RS232C port.	D-SUB 9 pins Male	D-SUB 9 pins Female (Each manufacturer)	
CN12	For the connection with a printer, ID controller or QC personal computers	D-SUB 25 pins Female	D-SUB 25 pins Male (Each manufacturer)	
CN13	For the connection with a indicator (RS422 interface)	D-SUB 9 pins Female	D-SUB 9 pins Male (Each manufacturer)	
M-NET	For M-NET communication (CC-Link ver. IF need 5V power supply)	MSTB 2,5/6-FG-5,08 (POHENIX CONTACT)	MSTB 2,5/6-STF-5,08 (POHENIX CONTACT) Wire directly installed type Applicable wire: : AWG24~ AWG12	○
CC-Link (only for CC-Link ver. IF)	For CC-Link communication	MSTB 2,5/5-FG-5,08-AU (POHENIX CONTACT)	MSTB 2,5/5-ST-5,08 (POHENIX CONTACT)	○

3-3 External connection

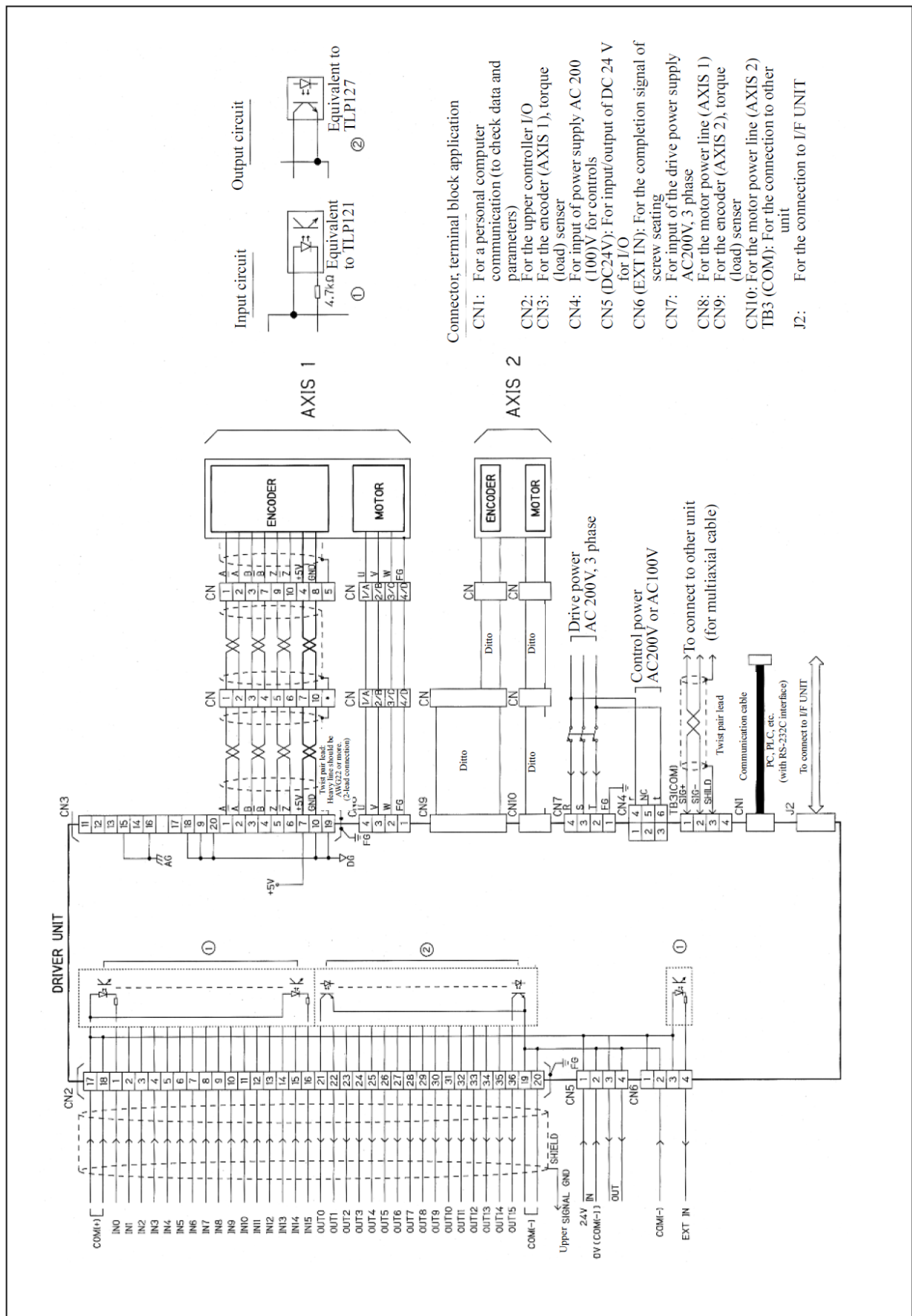
3-3-1 External connection diagram(between the GSL controller and NR):

Standard specification and T specification



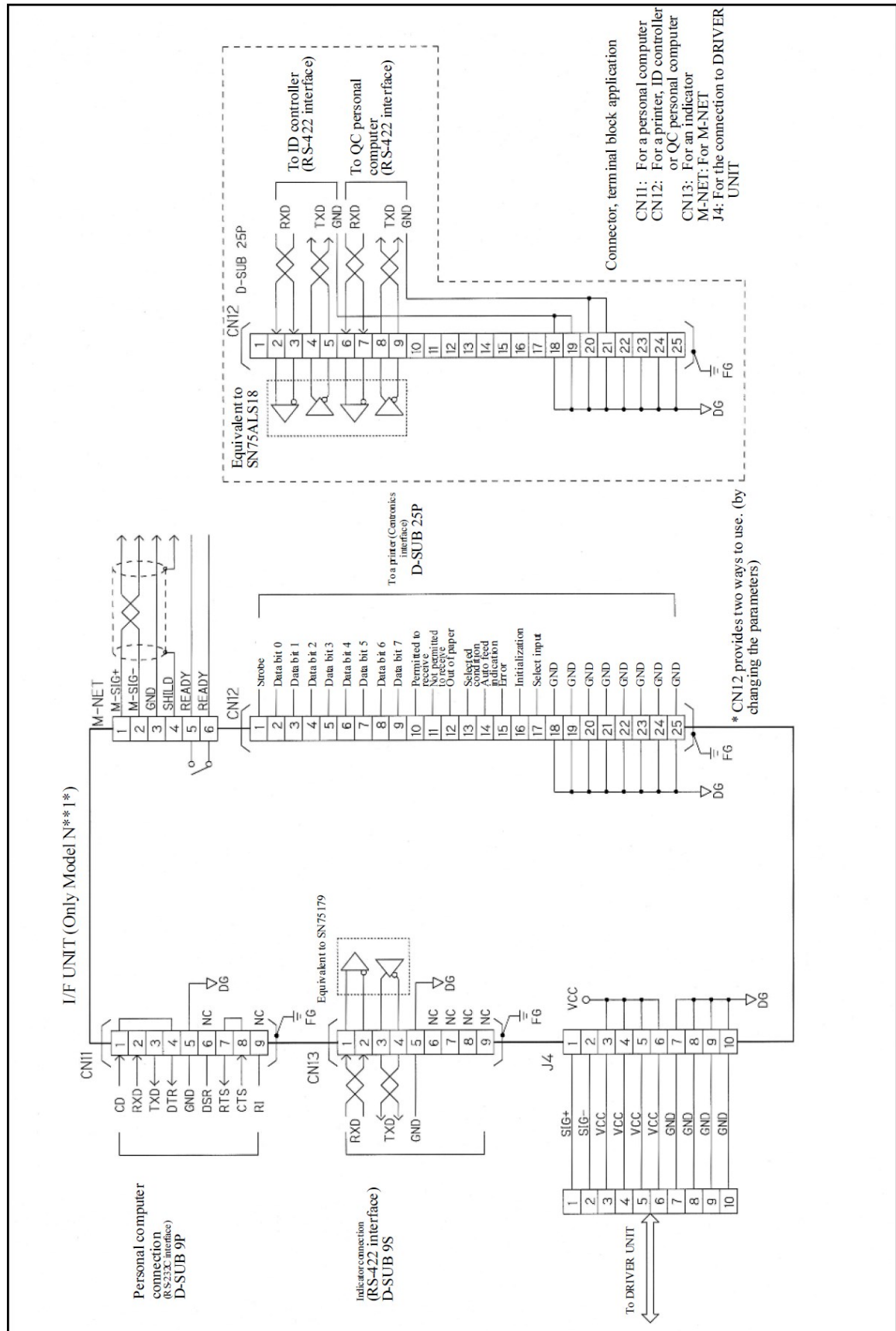
3-3-2 External connection diagram(between the GSLW controller and NR):

Standard specification and T specification

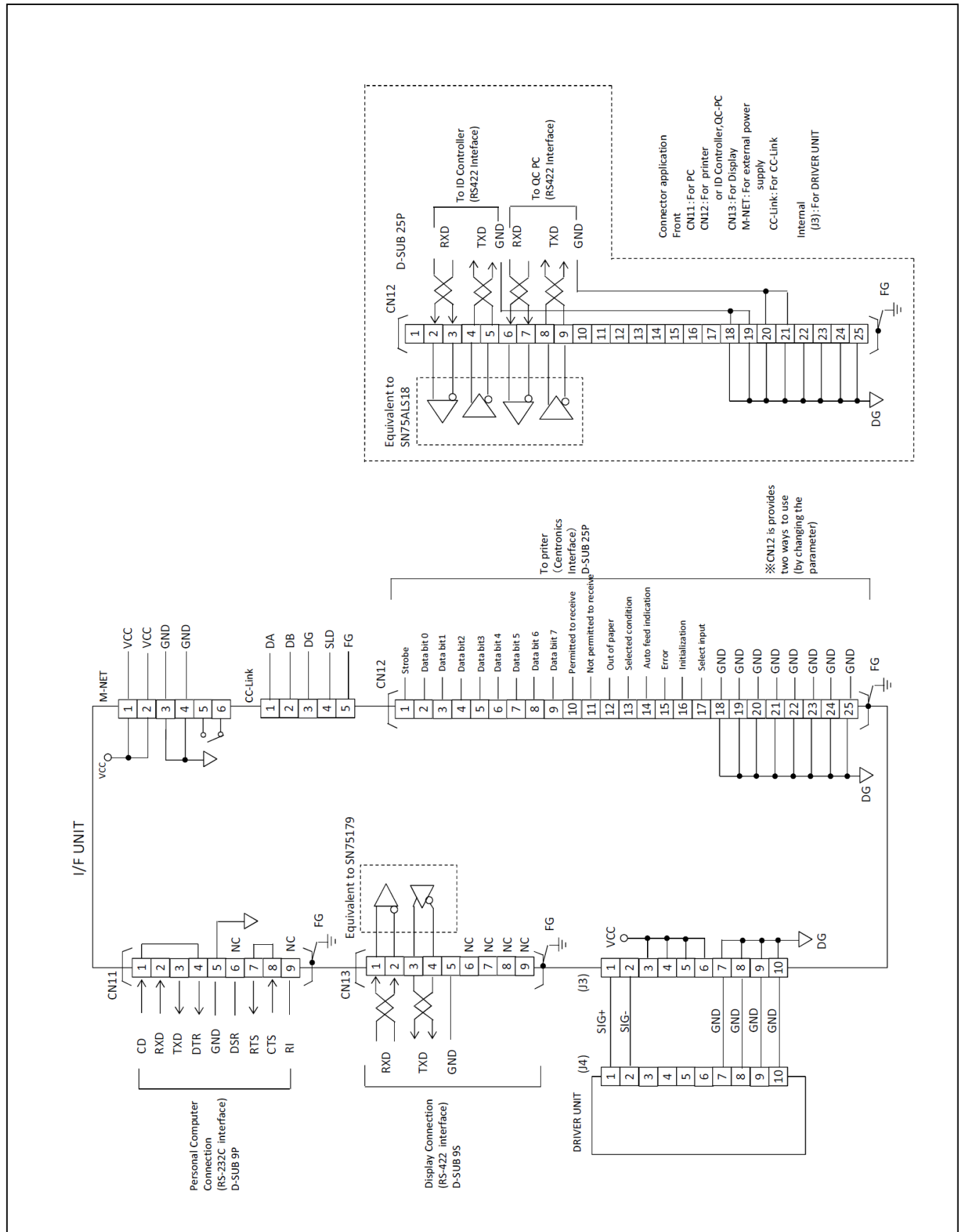


3-3-3 【M-net ver.】External connection diagram (between the interface and equipment to connect):

Standard specification and T specification



3-3-4 【CC-Link】External connection diagram (between the interface and equipment to connect):
Standard specification and T specification



3-4 Table of Cable model

3-4-1 Table of GSL Cable model

[Please be sure to read the following points to notice.]

Cable name	NR to be used	Cable model
Motor integrated cable [NR ~ Controller]	ANM-220~ANM-640	8M6D-4R (5.10.15.20) M
	ANM-1200	8M12D-4R (5.10.15.20) M
Motor relay movable (NR ~ Relay part)	ANM-220~ANM-640	8M6T-4R (2.3.5.7) M
	ANM-1200	8M12T-4R (2.3.5.7) M
Motor relay fixed cable (Relay part ~ Controller)	ANM-220~ANM-640	8M6T-4A (5.10.15.20) M
	ANM-1200	8M12T-4A (5.10.15.20) M
Encoder integrated cable (NR~Controller)	ANM-220~ANM-1200	8ED-8R (5.10.15.20) M
Encoder relay movable cable (NR~Relay part)	ANM-220~ANM-1200	8ET-8R (2.3.5.7) M
Encoder relay fixed cable (Relay part~Controller)	ANM-220~ANM-1200	8ET-8A (5.10.15.20) M

3-4-2 Table of GSLW Cable model

Cable name	NR to be used	Cable model
Motor integrated cable [NR ~ Controller]	ANM-220~ANM-400	8M6DW-4R (5.10.15.20) M
Motor relay movable (NR ~ Relay part)	ANM-220~ANM-400	8M6TW-4R (2.3.5.7) M
Motor relay fixed cable (Relay part ~ Controller)	ANM-220~ANM-400	8M6TW-4A (5.10.15.20) M
Encoder integrated cable (NR~Controller)	ANM-220~ANM-1200	8ED-8R (5.10.15.20) M
Encoder relay movable cable (NR~Relay part)	ANM-220~ANM-1200	8ET-8R (2.3.5.7) M
Encoder relay fixed cable (Relay part~Controller)	ANM-220~ANM-1200	8ET-8A (5.10.15.20) M

Notice (Cable overall)

Figures in () are cable length in meter. Please select from the figures indicated.

Cables other than indicated in () are also available with some delivery time.

4. Signal

4-1. Input/Output signal

Parallel I/O

I/O	Points	Name	Specification	内容
Parallel input signal	16 points	IN0 to IN15	DC24V 11 mA	See P36
Parallel output signal	16 points	OUT0 to OUT15	DC24V 30 mA max.	See P37

Serial I/O

I/O	Points	Application
RS232C	1 point	Manufacturer use (Should not be used by a customer)
ARC net	1 point	Communication among controllers at multi-axial control (Provide jumping at COM)

Analog monitor

	Output item	Description
M1	TORQUE	Current sensor monitor
M2	SPEED	Motor rotation speed monitor (Note: Positive output during CW rotation)

※The above data can be changed at setting before shipment. (See P70)

I/F unit

I/O	Points	Application
RS232C	1 point	Inputs/outputs parameters and various data by the personal computer connection
Centronics or RS422	1 point 2 points	Parallel printer connection, ID controller and QC personal computer connection (Simultaneous use with the printer is not permitted.)
RS422	1 point	Connection with an indicator
RS485	1 point	Connection via SIO interface with a sequencer and other devices (Option)
CC-Link (only for CC-Link)	1 point	Connection via SIO interface with a sequencer and other devices (Option)

4-2 Input/Output signal (PIO)

4-2-1 Input signal (PIO)

PIO input (“PLC”→“GSL”)

Input contents to the first axis in the unit

I/O	Name	Contents	Auto- matic	Inch- ing
IN 0	Operation ready	Signal to start the motor operation (Level determination) 0: Stop (Motor does not run. It stops immediately during operation.) "0" during operation results in cycle stop output. 1: Condition in which the operation can start.	○	○
IN 1	Automatic/ inching	Motor operating method selection (Level determination) 0: Inching motion Motor rotates in the specified direction according to the inching start signal. Using parameter depends on the rotating direction. 1: Automatic operation Motor operates according to the program selected by the program selection input.	○	○
IN 2	Program start	Signal to start the automatic operation (Processed at the rising edge) 0: Automatic operation stops. 1: Automatic operation starts. (Only a specified block operates. If no block is specified, operation starts from the block 1.) When it becomes “O”/”1” during operation, it will run from the first step of block which stopped at “0”.	○	
IN 3	Inching start	Signal to start inching motion (Processed at the rising edge) 0: Inching operation stops. 1: Inching motion starts.		○
IN 4	Determination reset	Signal to reset the tightening determination output (Processed at the rising edge) 1: All determination signals (Determination data on OUT 3, OUT 4 and M-NET) are turned OFF. No object while inching.	○	
IN 5	Alarm reset	Signal to reset the GSL alarm (Processed at the rising edge) 1: Resets only GSL alarm.	○	○
IN 6	QL input	QL processing input signal (Processed at the rising edge) 1: QL processing input (It is limited when QL mode is 1.)	○	
IN 7	QL mode	Signal that enables the QL input signal according to the signal input (Level determination) 1: QL input valid 2: QL input invalid	○	
IN 8 to IN 12	Program selection input	Program selection input (Level determination) Inputs the operation program number (Note 7). Inputs the number with ON state of the photocoupler power supply = "1" and OFF state = "0" by accounting as 5-bit information with IN 12 set to MSB side and IN 8 set to LSB side.	○	○
IN 13	Input ENABLE	Program selection importing timing signal (Level determination) 1: Imports the program selection input. Monitor the program selection input/output on the higher rank and make it "0" when they match. Output ENABLE will be "1" at the signal falling edge.	○	○,,
IN 14	Reset	Reset input (Level determination) 1: Reset to the state when the drive power supply is turned ON. All determinations are OFF and the stop servo of motor is OFF.	○	○
IN 15	IN delay input	IN signal (Level determination) If the step in the program has “IN delay” attribution, “the step” will not be executed until this signal becomes “1”. 1: IN delay start	○	

(“1”: Photocoupler power supply on, “0”: Photocoupler power supply off)

Note: The action which is enabled when Automatic/Inching is selected is marked with ○.

Input contents to the second axis in the unit

I/O	Name	Contents	Auto-matic	Inch-ing
IN 0 to IN 15	Axis cutting for 1st axis to 16th axis	Set the axis cutting of the corresponding axis by setting IN 0=1st axis, IN 1=2nd axis, ... IN 15=16th axis. After changing the setting, the changed contents will be valid by turning the control power supply OFF/ON. "0": Normal "1": Axis cutting	○	○

("1": Photocoupler power supply on, "0": Photocoupler power supply off)

Input contents to the third axis in the unit

I/O	Name	Contents	Auto-matic	Inch-ing
IN 0 to IN 13	Axis cutting for 17th axis to 30th axis	Set the axis cutting of the corresponding axis by setting IN 0=17th axis, IN 1=18th axis, ... IN 13=30th axis. After changing the setting, the changed contents will be valid by turning the control power supply OFF/ON. "0": Normal "1": Axis cutting	○	○

("1": Photocoupler power supply on, "0": Photocoupler power supply off)

* Axis cutting is not possible with the controller (1st axis) which is connected to the interface unit.

4-2-2 Output signal (PIO)

PIO output ("GSL"→"PLC")

Output contents from the first axis in the unit

I/O	Name	Contents	Auto-matic	Inch-ing
OUT 0	Operation ready	0: Operation ready incomplete This is the state that the controller cannot operate. (GSL alarm, drive power supply disconnected, motor not initialized yet or operation ready signal OFF) 1: Operation ready complete	○	
OUT 1	Device OK	0: Operation error (GSL alarm) 1: Operation normal	○	
OUT 2	Battery OK	0: Battery voltage drop (2.7 V or less). Determined only when the control power supply is turned on. 1: Battery normal	○	
OUT 3	Total OK	0: 1: All axes programs in the unit advanced to the final step and tightening of all blocks is correctly completed.	○	
OUT 4	Total NG	0: 1: Program advanced to the final step (operations of all blocks) and error occurred with either of tightening.	○	
OUT 5	Operating	0: Motor is stopped. (Servo motors are turned off on all axes) 1: Motor is running. (Either axis is controlled with motor)	○	
OUT 6	QL processing end	It is "1" when the QL input of NG frequency in the unit entered in the state of block NG/total NG. It will be Block OK/total OK.	○	
OUT 7	Program running	Outputs while the program is running.	○	
OUT 8 to OUT 12	Program selection output	Outputs the currently selected program number Outputs the number with ON state of the photocoupler power = "1" and OFF state = "0" by accounting as 5-bit information with OUT12 set to MSB side and OUT8 set to LSB side.	○	
OUT 13	Output ENABLE	0: Initial value 1: It is "1" when the program selection completion signal is confirmed and "0" at rising of the input ENABLE.	○	
OUT 14	Block OK	0: 1: Program advanced to the final step in the unit and tightening in the block is correctly completed.	○	
OUT 15	Block NG	0: 1: Program advanced to the final step and error occurred with either of tightening in the block.	○	

("1": Photocoupler ON, "0": Photocoupler OFF)

Output contents from the second axis in the unit

I/O	Name	Contents	Auto-matic	Inch-ing
OUT 0 to OUT 15	1st axis OK to 16th axis OK	Outputs the block OK "1" of the corresponding axis setting OUT0=1st axis, OUT0=1st axis, ... OUT15=16th axis. The corresponding axis advanced to the block end step and final tightening is correctly completed.	○	

(“1”: Photocoupler ON, “0”: Photocoupler OFF)

Output contents from the third axis in the unit

I/O	Name	Contents	Auto-matic	Inch-ing
OUT 0 to OUT 15	17th axis OK to 32nd axis OK	Outputs the block OK "1" of the corresponding axis setting OUT0=17th axis, OUT0=17th axis, ... OUT13=32nd axis. The corresponding axis advanced to the block end step and final tightening is correctly completed.	○	

(“1”: Photocoupler ON, “0”: Photocoupler OFF)

Note: The action which is enabled when Automatic/Inching is selected is marked with ○.

4-3. Function of I/F unit

Connection function for the SIO communication, setup personal computer communication, external display, printer, QC personal computer and ID controller

4-4. SIO input/output signal

4-4-1. Input signal (SIO)

※M-net version

	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
0	Operation ready	Auto/Each (Manual)	Start	Inching start	Determination reset	Alarm reset	QL signal input	QL mode
1	Program bit 1 selection	Program bit 2 selection	Program bit 3 selection	Program bit 4 selection	Program bit 5 selection	Input ENABLE	GSL reset (ALL reset)	IN wait input
2	Block bit selection 1	Block bit selection 2	Block bit selection 3	Block bit selection 4	Block bit selection 5			Tightening angle sampling start

Following signals cannot be input from PIO.

I/O	Name	Contents	Auto-matic	Inch-ing
SIO	Block selection 1 to 5	Input the operation block number “0”: Operates from block 1 in order. “1 to 19”: Operates the specified block. Input the signal accounting as 5-bit information with the block selection 5 set to MSB side and the block selection 1 set to LSB side.	○	
SIO	Tightening angle sampling start	Tightening angle sampling movement start When it is not on the way of block movement but operation ready completion output is ON, the sampling movement starts at standing point of “1”.	○	

Note: The action which is enabled when Automatic/Inching is selected is marked with ○.

※CC-Link version

Address: RYm ~ RYm+DFh m:Initial I/O Number αConstant value of Unit (Note1)

Address	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
RYm+α ~ RYm+αFh	Operation ready	Auto/Each (Manual)	Start	Inching start	Determination reset	Alarm reset	QL signal input	QL mode
	bit 8	bit 9	bit A	bit B	bit C	bit D	bit E	bit F
	Program bit 1 selection	Program bit 2 selection	Program bit 3 selection	Program bit 4 selection	Program bit 5 selection	Input ENABLE	GSS reset (ALL reset)	IN delay input
RYm+α10h ~ RYm+α1Fh	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
	Block bit selection 1	Block bit selection 2	Block bit selection 3	Block bit selection 4	Block bit selection 5			Tightening angle sampling start
	bit 8	bit 9	bit A	bit B	bit C	bit D	bit E	bit F

(Note1) α = Unit1:00h
Unit2:20h
Unit3:40h
Unit4:60h
Unit5:80h
Unit6:A0h
Unit7:C0h

Address: RYm+E0h ~ RYm+FFh

RYm+E0h ~ RYm+EFh	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
	Axis 1 Cutting	Axis 2 Cutting	Axis 3 Cutting	Axis 4 Cutting	Axis 5 Cutting	Axis 6 Cutting	Axis 7 Cutting	Axis 8 Cutting
	bit 8	bit 9	bit A	bit B	bit C	bit D	bit E	bit F
RYm+F0h ~ RYm+FFh	Axis 9 Cutting	Axis 10 Cutting	Axis 11 Cutting	Axis 12 Cutting	Axis 13 Cutting	Axis 14 Cutting	Axis 15 Cutting	Axis 16 Cutting
	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
	Axis 17 Cutting	Axis 18 Cutting	Axis 19 Cutting	Axis 20 Cutting	Axis 21 Cutting	Axis 22 Cutting	Axis 23 Cutting	Axis 24 Cutting
	bit 8	bit 9	bit A	bit B	bit C	bit D	bit E	bit F
	Axis 25 Cutting	Axis 26 Cutting	Axis 27 Cutting	Axis 28 Cutting	Axis 29 Cutting	Axis 30 Cutting		

※No Axis Cutting in case of the value of "0" / Axis Cutting in case of the value of "1"

Application	Address
Unit1	RYm ~ RYm+1Fh
Unit2	RYm+20h ~ RYm+3Fh
Unit3	RYm+40h ~ RYm+5Fh
Unit4	RYm+60h ~ RYm+7Fh
Unit5	RYm+80h ~ RYm+9Fh
Unit6	RYm+A0h ~ RYm+BFh
Unit7	RYm+C0h ~ RYm+DFh
The signal of axis cutting	RYm+E0h ~ RYm+FFh
Not use	RYm+100h ~ RYm+37Fh

※The non using bit data must be value of "0" .

Following signals cannot be input from PIO.

I/O	Name	Contents	Auto-matic	Inch-Ing
SIO	Block selection 1 to 5	Input the operation block number “0”: Operates from block 1 in order. “1 to 19”: Operates the specified block. Input the signal accounting as 5-bit information with the block selection 5 set to MSB side and the block selection 1 set to LSB side.	○	
	Tightening angle sampling start	Tightening angle sampling movement start When it is not on the way of block movement but operation ready completion output is ON, the sampling movement starts at standing point of“1”.	○	

4-4-2 Output signal (SIO)

※M-net version

	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
0	Ready complete	System OK	Battery OK	Total OK	Total NG	NR running	Completion of QL treatment	Program running
1	Completion of program bit 1 selection	Completion of program bit 2 selection	Completion of program bit 3 selection	Completion of program bit 4 selection	Completion of program bit 5 selection	Output ENABLE	Block determination OK	Block determination NG
2	Completion of block bit 1 selection	Completion of block bit 2 selection	Completion of block bit 3 selection	Completion of block bit 4 selection	Completion of block bit 5 selection	Step finished	Cycle stop	OUT
3	Block 1 OK	Block 2 OK	Block 3 OK	Block 4 OK	Block 5 OK	Block 6 OK	Block 7 OK	Block 8 OK
4	Block 9 OK	Block 10 OK	Block 11 OK	Block 12 OK	Block 13 OK	Block 14 OK	Block 15OK	Block 16 OK
5	Block 17 OK	Block 18 OK	Block 19 OK	Block 20 OK	Block 21 OK	Block 22 OK	Block 23 OK	Block 24 OK
6	Block 25 OK	Block 26 OK	Block 1 finished	Block 2 finished	Block 3 finished	Block 4 finished	Block 5 finished	Block 6 Finished
7	Torque over	Time over	Angle over	Zone NG	Snag NG	Passing torque	Zero/Mag.OK	Gear OK
8	Torque under	Time under	Angle under	Gradient NG	NR failure precognition	Baking	Zero/Mag. NG	Gear NG
9	1st axis OK	2nd axis OK	3rd axis OK	4th axis OK	5th axis OK	6th axis OK	7th axis OK	8th axis OK
10	9th axis OK	10th axis OK	11th axis OK	12th axis OK	13th axis OK	14th axis OK	15th axis OK	16th axis OK
11	17th axis OK	18th axis OK	19th axis OK	20th axis OK	21st axis OK	22nd axis OK	23rd axis OK	24th axis OK
12	25th axis OK	26th axis OK	27th axis OK	28th axis OK	29th axis OK	30th axis OK	31st axis OK	32nd axis OK
13	33rd axis OK	34th axis OK	35th axis OK	36th axis OK	37th axis OK	38th axis OK	39th axis OK	40th axis OK
14	41st axis OK	42nd axis OK	43rd axis OK	44th axis OK	45th axis OK	46th axis OK	47th axis OK	48th axis OK
15	49th axis OK	50th axis OK	51st axis OK	52nd axis OK	53rd axis OK	54th axis OK	55th axis OK	56th axis OK
16	57th axis OK	58th axis OK	59th axis OK	60th axis OK				

*Each signal of No.9~16 is only output to the Unit 1.

※CC-Link version

Address : RXm ~RXm+26Fh m: Initial I/O Number β: Constant value of Unit(Note2)

RXm+β ~ RXm+βFh	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
	Ready complete	System OK	Battery OK	Total OK	Total NG	NR running	Completion of QL treatment	Program running
	bit 8	bit 9	bit A	bit B	bit C	bit D	bit E	bit F
RXm+β+10h ~ RXm+β+1Fh	Completion of program bit 1 selection	Completion of program bit 2 selection	Completion of program bit 3 selection	Completion of program bit 4 selection	Completion of program bit 5 selection	Output ENABLE	Block determination OK	Block determination NG
	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
	Completion of block bit 1 selection	Completion of block bit 2 selection	Completion of block bit 3 selection	Completion of block bit 4 selection	Completion of block bit 5 selection	Step finished	Cycle stop	OUT
RXm+β+20h ~ RXm+β+2Fh	bit 8	bit 9	bit A	bit B	bit C	bit D	bit E	bit F
	Block 1 OK	Block 2 OK	Block 3 OK	Block 4 OK	Block 5 OK	Block 6 OK	Block 7 OK	Block 8 OK
	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
RXm+β+30h ~ RXm+β+3Fh	Block 9 OK	Block 10 OK	Block 11 OK	Block 12 OK	Block 13 OK	Block 14 OK	Block 15 OK	Block 16 OK
	bit 8	bit 9	bit A	bit B	bit C	bit D	bit E	bit F
	Block 17 OK	Block 18 OK	Block 19 OK	Block 20 OK	Block 21 OK	Block 22 OK	Block 23 OK	Block 24 OK
RXm+β+40h ~ RXm+β+4Fh	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
	Block 25 OK	Block 26 OK	Block 1 finished	Block 2 finished	Block 3 finished	Block 4 finished	Block 5 finished	Block 6 Finished
	bit 8	bit 9	bit A	bit B	bit C	bit D	bit E	bit F
RXm+β+50h ~ RXm+β+5Fh	Torque over	Time over	Angle over	Zone NG	Snag NG	Passing torque	Zero/Mag. OK	Gear OK
	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
	Torque under	Time under	Angle under	Gradient NG	NR failure precognition	Baking	Zero/Mag. NG	Gear NG
RXm+60h ~ RXm+6Fh	bit 8	bit 9	bit A	bit B	bit C	bit D	bit E	bit F
	1st axis OK	2nd axis OK	3rd axis OK	4th axis OK	5th axis OK	6th axis OK	7th axis OK	8th axis OK
	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
RXm+70h ~ RXm+7Fh	9th axis OK	10th axis OK	11th axis OK	12th axis OK	13th axis OK	14th axis OK	15th axis OK	16th axis OK
	bit 8	bit 9	bit A	bit B	bit C	bit D	bit E	bit F
	17th axis OK	18th axis OK	19th axis OK	20th axis OK	21st axis OK	22nd axis OK	23rd axis OK	24th axis OK
RXm+80h ~ RXm+8Fh	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
	25th axis OK	26th axis OK	27th axis OK	28th axis OK	29th axis OK	30th axis OK	31st axis OK	32nd axis OK
	bit 8	bit 9	bit A	bit B	bit C	bit D	bit E	bit F
RXm+90h ~ RXm+9Fh	33rd axis OK	34th axis OK	35th axis OK	36th axis OK	37th axis OK	38th axis OK	39th axis OK	40th axis OK
	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
	41st axis OK	42nd axis OK	43rd axis OK	44th axis OK	45th axis OK	46th axis OK	47th axis OK	48th axis OK
RXm+100h ~ RXm+10Fh	bit 8	bit 9	bit A	bit B	bit C	bit D	bit E	bit F
	49th axis OK	50th axis OK	51st axis OK	52nd axis OK	53rd axis OK	54th axis OK	55th axis OK	56th axis OK
	bit 0	bit 1	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7
RXm+110h ~ RXm+11Fh	57th axis OK	58th axis OK	59th axis OK	60th axis OK				
	bit 8	bit 9	bit A	bit B	bit C	bit D	bit E	bit F

(Note2) β = Unit1 : 00h
Unit2 : 90h
Unit3 : E0h
Unit4 : 130h
Unit5 : 180h
Unit6 : 1D0h
Unit7 : 220h

Unit	Address	Not use bit
Unit1	RXm ~RXm+ 8Fh	-
Unit 2	RXm+ 90h~RXm+ DFh	RXm+ D8h ~ RXm+ DFh
Unit 3	RXm+ E0h~RXm+12Fh	RXm+ 128h ~ RXm+ 12Fh
Unit 4	RXm+130h~RXm+17Fh	RXm+ 178h ~ RXm+ 17Fh
Unit 5	RXm+180h~RXm+1CFh	RXm+ 1C8h ~ RXm+ 1CFh
Unit 6	RXm+1D0h~RXm+21Fh	RXm+ 218h ~ RXm+ 21Fh
Unit 7	RXm+220h~RXm+26Fh	RXm+ 268h ~ RXm+ 26Fh
Not use	RXm+270h~RXm+37Fh	-

※The non using bit data is the value of “0” .

Result Word

Use WordData

GSS→PLC

Address : RWrm ~ RWrm+7Fh m: station number

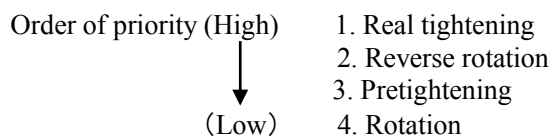
Address	Contents
RWrm	Bolt1 NG code
RWrm + 1h	Bolt1 Time (Unit: 1ms)
RWrm + 2h	Bolt1 Angle (Unit: 0.1 degree)
RWrm + 3h	Bolt1 Torque (Unit: 0.1Nm)
RWrm + 4h	Bolt2 NG code
RWrm + 5h	Bolt2 Time (Unit: 1ms)
RWrm + 6h	Bolt2 Angle (Unit: 0.1 degree)
RWrm + 7h	Bolt2 Torque (Unit: 0.1Nm)
RWrm + 8h	Bolt3 NG code
RWrm + 9h	Bolt3 Time (Unit: 1ms)
RWrm + Ah	Bolt3 Angle (Unit: 0.1 degree)
RWrm + Bh	Bolt3 Torque (Unit: 0.1Nm)
RWrm + Ch	Bolt4 NG code
RWrm + Dh	Bolt4 Time (Unit: 1ms)
RWrm + Eh	Bolt4 Angle (Unit: 0.1 degree)
RWrm + Fh	Bolt4 Torque (Unit: 0.1Nm)
.	.
.	.
RWrm + 78h	Bolt31 NG code
RWrm + 79h	Bolt31 Time (Unit: 1ms)
RWrm + 7Ah	Bolt31 Angle (Unit: 0.1 degree)
RWrm + 7Bh	Bolt31 Torque (Unit: 0.1Nm)
RWrm + 7Ch	Bolt32 NG code
RWrm + 7Dh	Bolt32 Time (Unit: 1ms)
RWrm + 7Eh	Bolt32 Angle (Unit: 0.1 degree)
RWrm + 7Fh	Bolt32 Torque (Unit: 0.1Nm)

Transmission of torque, time, angle data based on the kinds of operation.

Regarding torque data, time data and angle data, data of only one kind of operation is transmitted even if many kinds of operation such as pretightening, real tightening,etc. are carried out within the same block.

Selection with kinds of operation is effected automatically basing on the following order of priority.

When the operation with higher priority is not carried out, it select the operation of following order of priority. In case of carrying out same kind of operation more than two times within the same block, the last operation is selected.



About ResultWord:

NG code: 0000~FFFF(h)

(example) When NG code is 0412 , The value of 0x0412(h)[1042(d)] is input.

ResultWord except NG code: 0000~270F(h) 【0000~9999(d)】 not decimal

(example) When Tightening Torque is 21Nm , D2(h)[210(d)] is input.

ResultWord is set at the timing of Block OK(NG).

0000 is set at the timing of [Determination reset] or [GSS reset].

Note)ResultWord don't be outputted as soon as Block OK(NG) is outputted.

Please take enough wait .

ResultWord (NG code, Final Tightening Time, Angle, Torque) of Bolt number except 1-32 is not outputted.
When there is not tightening ResultWord of bolt number 1-32, the value of it is 0000.

Following signals are not output from PIO.

I/O	Name	Contents	Auto- matic	Inch- ing
SIO	Block selection output 1 to 5	When the block selection input is 0, it does not output. When the block selection input is set except 0, the currently selected block number is output.	○	
SIO	Step end	It outputs "1" for 200msec at each finish of 1 step.	○	
SIO	Cycle stop	It becomes "1" in case of the cycle stop (operation ready signal during movement OFF or start signal OFF).	○	
SIO	OUT	When the step set as OUT in program finishes, it becomes "1".	○	
SIO	Block 1 to 26 OK	When the block movement finishes as OK, it becomes "1".	○	
SIO	Torque over/under	"1" with torque over/under NG.	○	
SIO	Time over	"1" when time over is NG.	○	
SIO	Angle over	"1" when angle over is NG.	○	
SIO	NR failure forecast	When the gear check NG occurs plural times (internal setting times), it becomes "1". At continuous occurrence When the continuous times of the gear check NG exceed the setting value of Fn.01 PA10, it becomes "1". Integration When the gear check NG times from power ON exceed the setting value of Fn.01 PA11, it becomes "1".	○	
SIO	Passing torque	"1" when passing torque is unusual.	○	
SIO	Baking	"1" when baking failure occurred.	○	
SIO	Gear OK/NG	"1" when gear check ends normally/abnormally.	○	
SIO	1st to 60th axes OK	"1" when operation of screws from No.1 to 60 is OK.	○	

Note: The action which is enabled when Automatic/Inching is selected is marked with ○.

Note 4.1) Program selection input and selection output signal

(Relation of program numbers corresponding to the status of IN8 (OUT8) to IN12 (OUT12))

Signal name	Program number																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
IN 8 / OUT 8	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
IN 9 / OUT 9	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0
IN 10 / OUT 10	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0
IN 11 / OUT 11	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1
IN 12 / OUT 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1

("1": Photocoupler ON, "0": Photocoupler OFF)

4-5. Multiaxial operation function

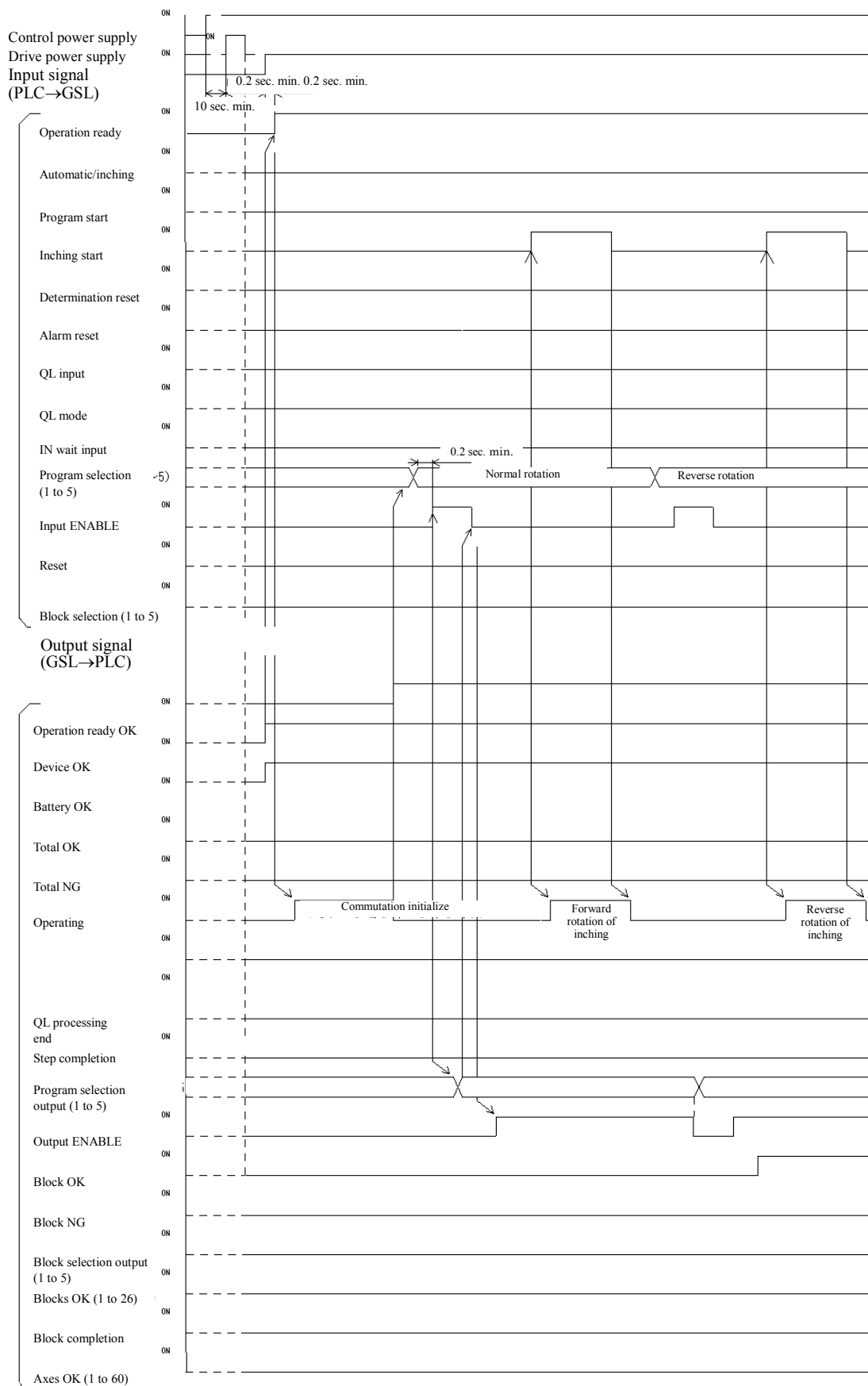
Multiaxial control is possible up to 30 axes for one I/F unit (60 axes on the software).

Axis cutting function: Axis cutting (edge cutting) setting is possible by the push button operation on the panel.

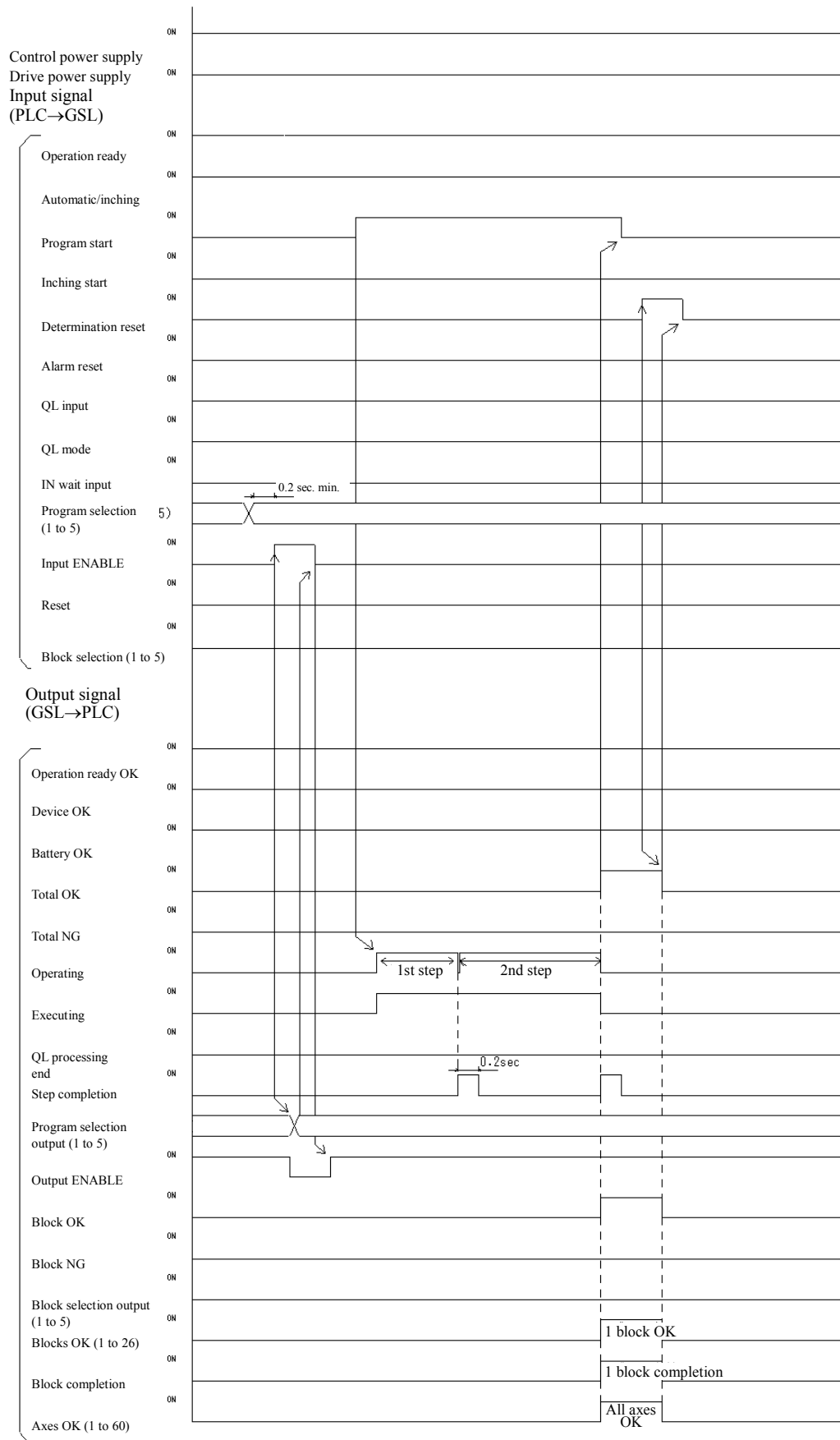
(Fn. 11 SAVE no.** DATA **** Axis cutting with the unit number "-")

5. Operation timing chart

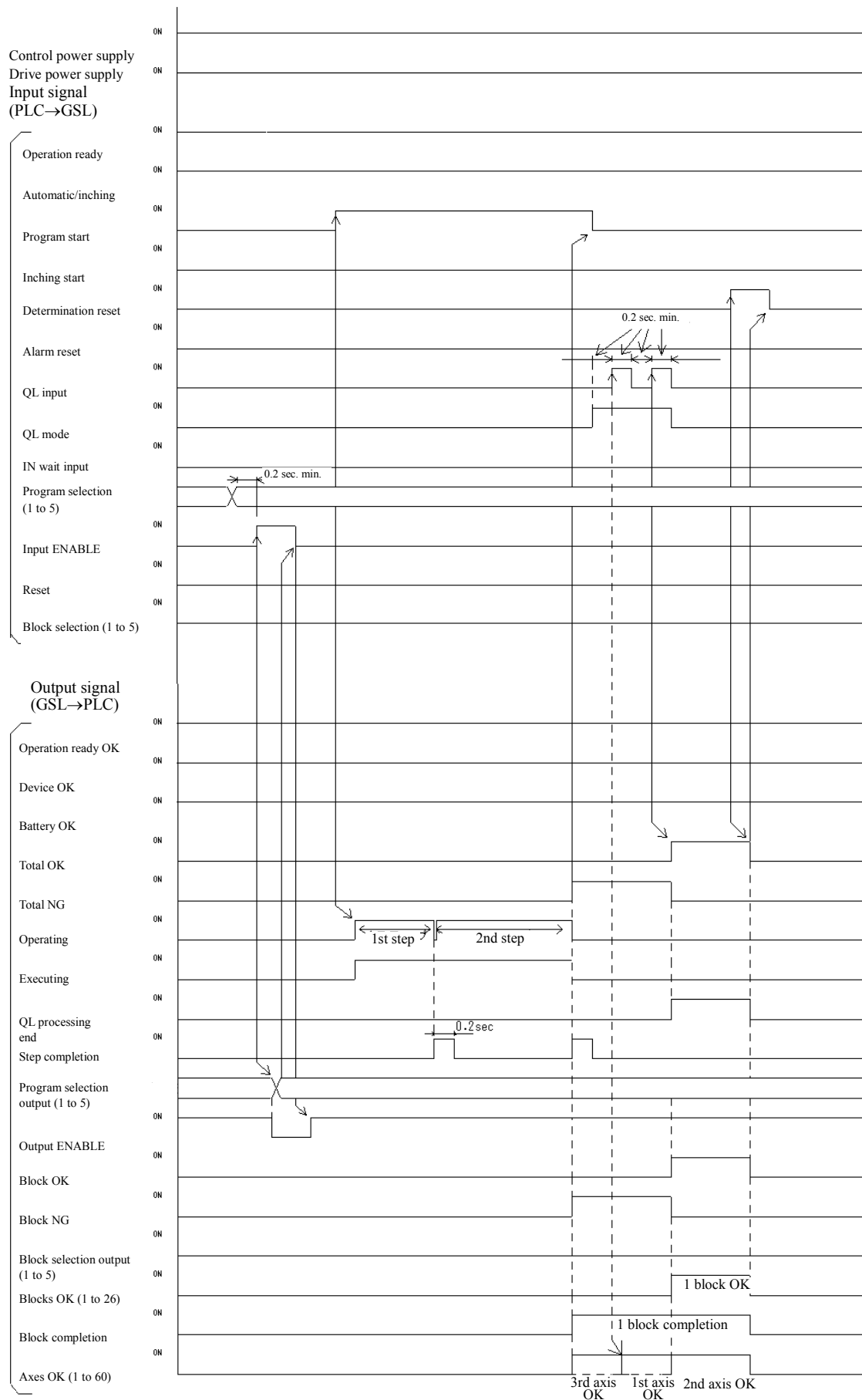
5-1 Power ON and inching operation (Operates by the speed/direction setting of the rotation/inching (1 to 24) selected by the program selection signals (1 to 5))



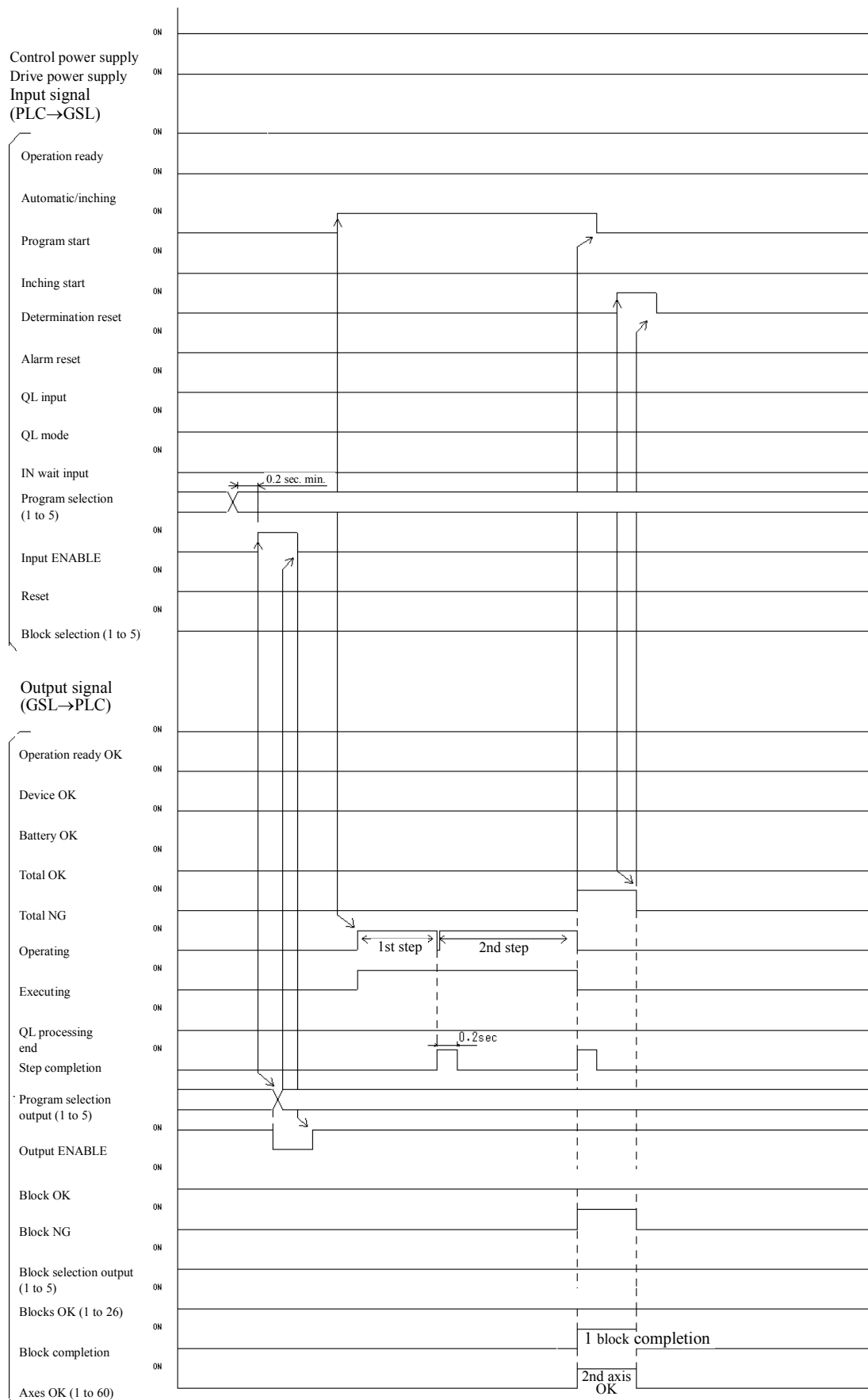
5-2. Program operation - When the determination is OK for 2 step operation x 1 block



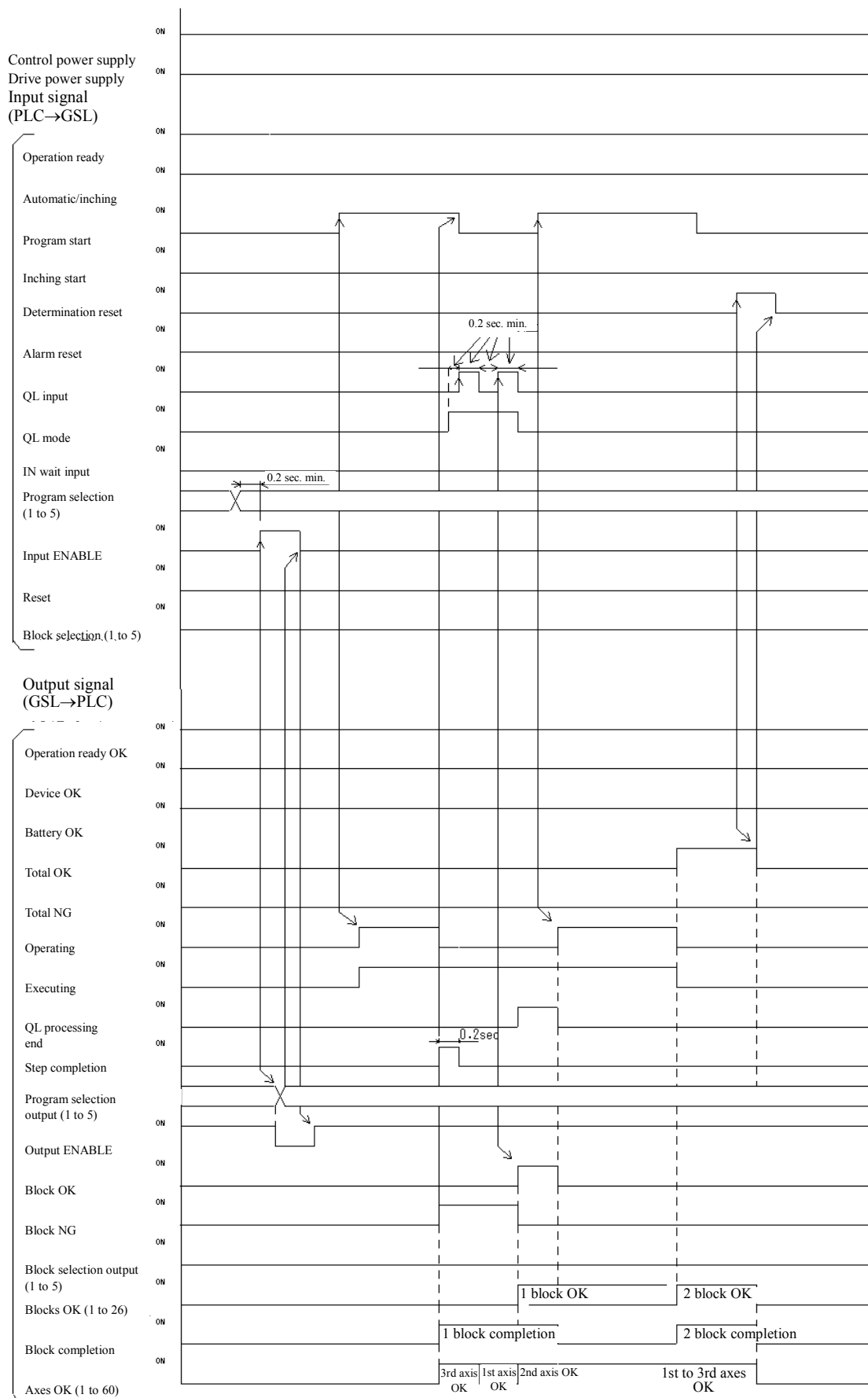
5-3. Program operation - Setting for 2 step operation x 1 block, when 1st/2nd axis is NG on the first step and the 3rd axis is OK until the second step in three axes (with QL)



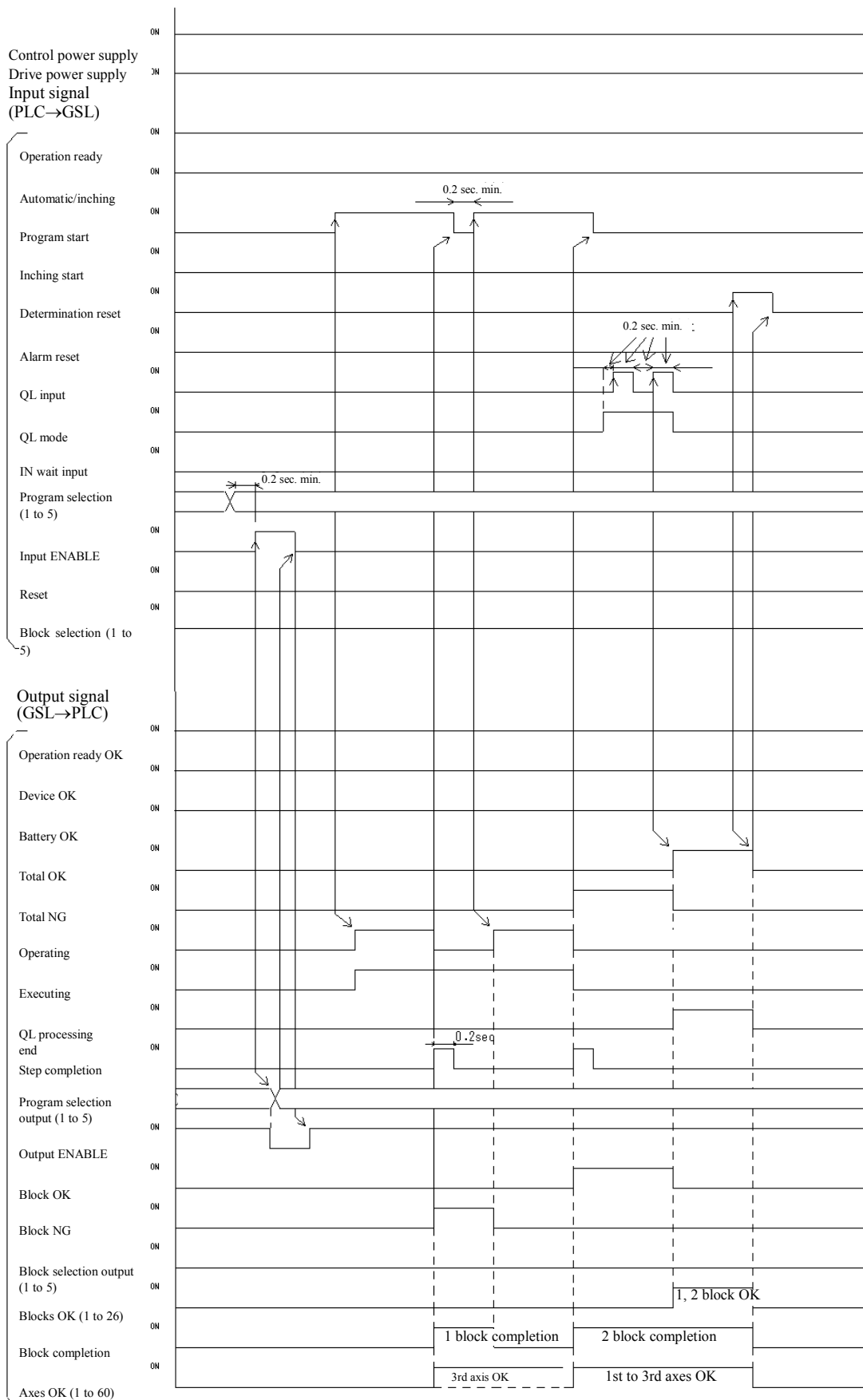
5-4. Program operation - Setting for 2 step operation x 1 block, when 1st axis is NG on the first step and the 2nd axis is OK until the second step in two axes (without QL)



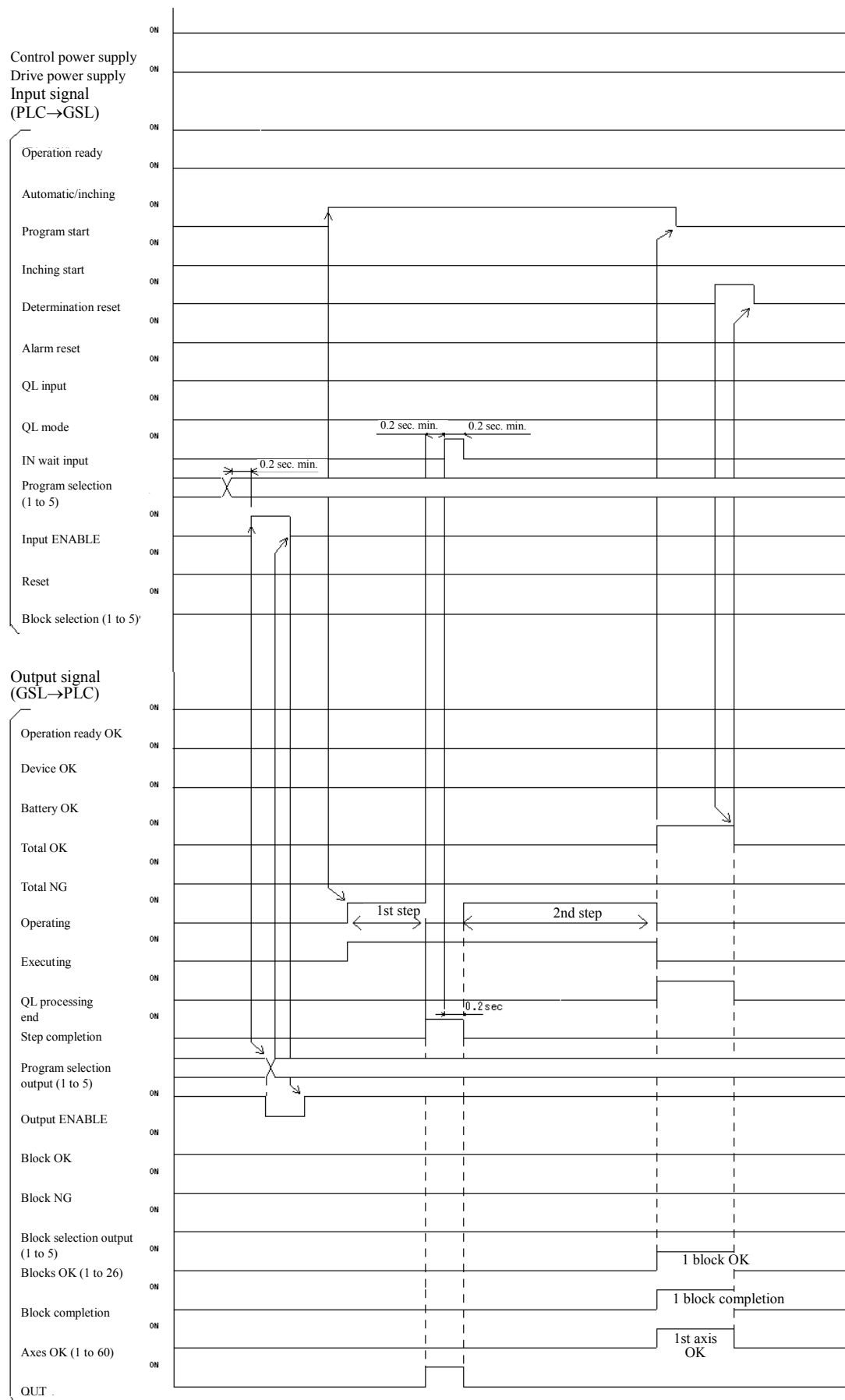
5-5. Program operation - Setting for 1 step operation x 2 blocks, when 1st/2nd axis is NG and 3rd axis is OK on the first block and the all axes are OK on the second block in three axes (with QL after 1 block)



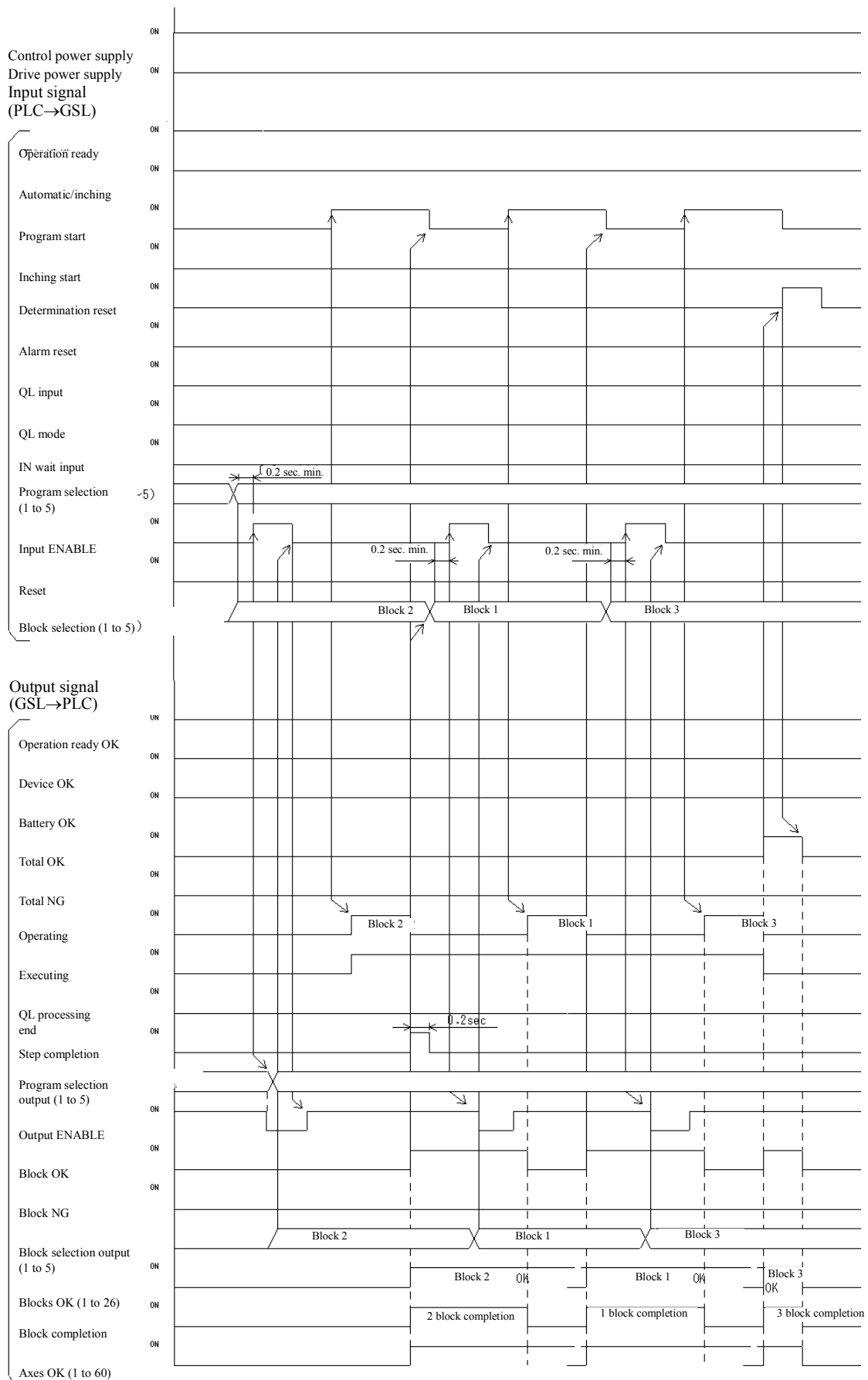
5-6. Program operation - Setting for 1 step operation x 2 blocks, when 1st/2nd axis is NG and 3rd axis is OK on the first block and all axes are OK on the 2nd block in three axes (with batch QL after the program end)



5-7. Program operation - Setting for 2 step operation x 1 block, when there is IN setting on the 2nd step



5-8. Program operation - 1 step operation x 3 blocks, when the unit is operated in sequence specified by the block selection signal (it operates in order from the block 1 when the block selection is OFF for 1 to 5)

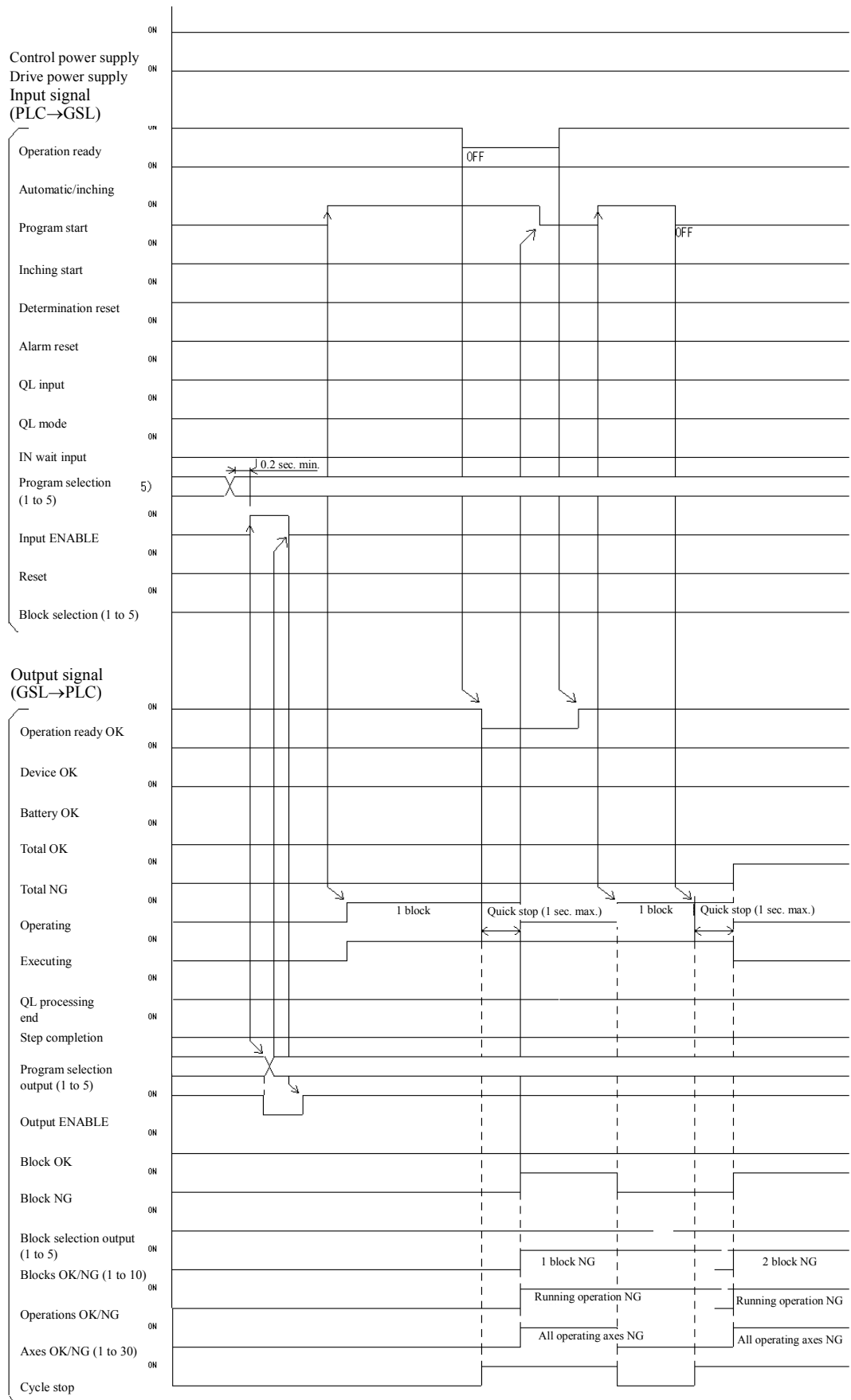


(When the reset is turned ON after 1 block is finished and the reset is turned ON during the 1st block action in the 1 step x 2 blocks operation)



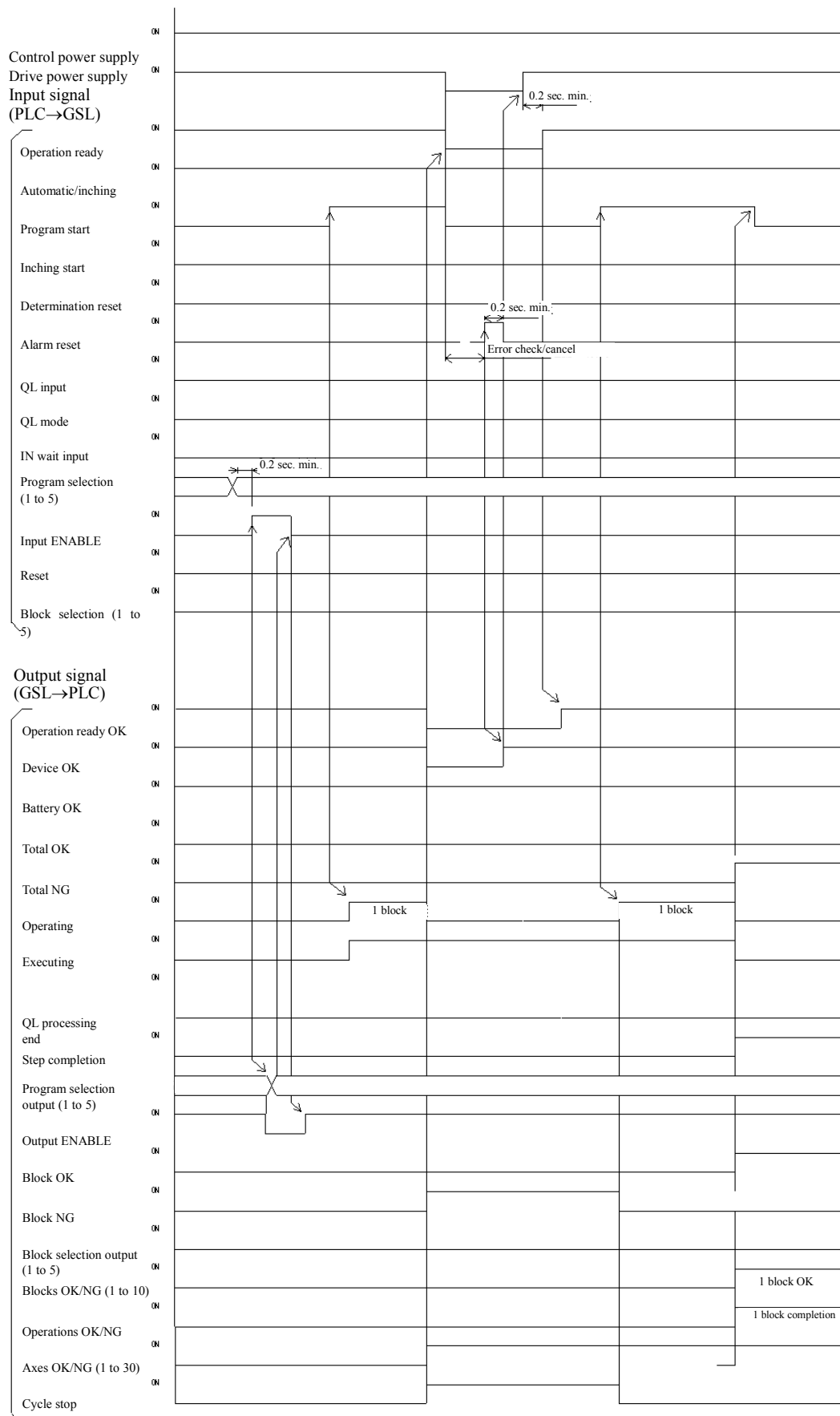
5-10. Operation ready OFF and program start OFF during the program operation

(When the operation ready is OFF on the 1st block and the program start is OFF on the 2nd block in 1 step x 2 blocks operation)



5-11. Alarm generation and alarm reset during the program operation

(When the alarm occurred on the way of 1st block and the unit is rebooted after the alarm is reset in 1 step x 2 blocks operation)

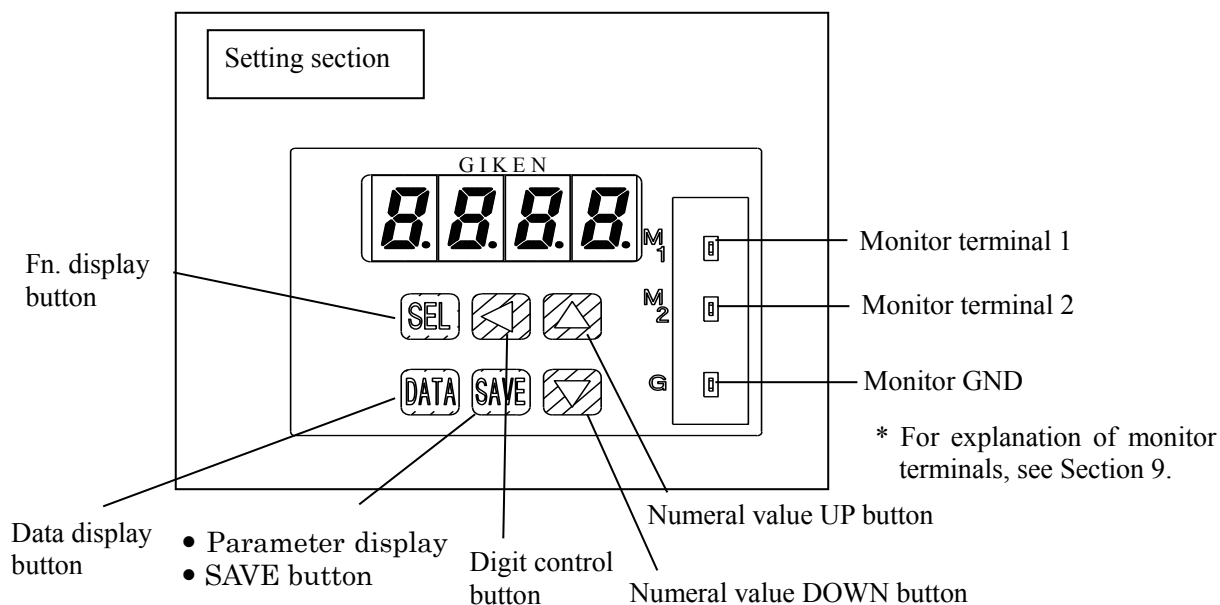


6. Setting

6-1 Display/setting function

Displays various data, parameters and conditions in 7SEG. LED 4-digit. It is possible to set or change the parameters by the operation of push button panel.

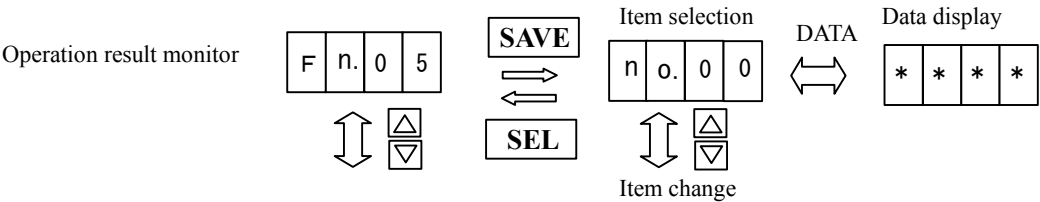
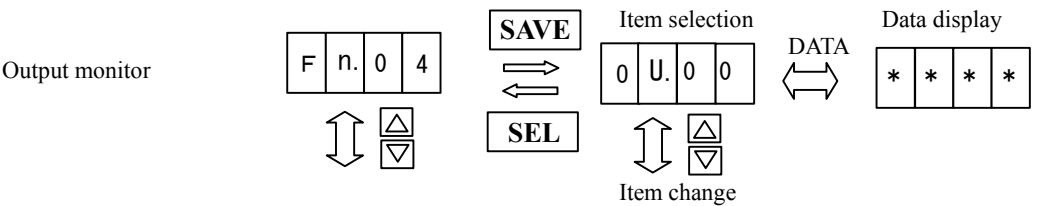
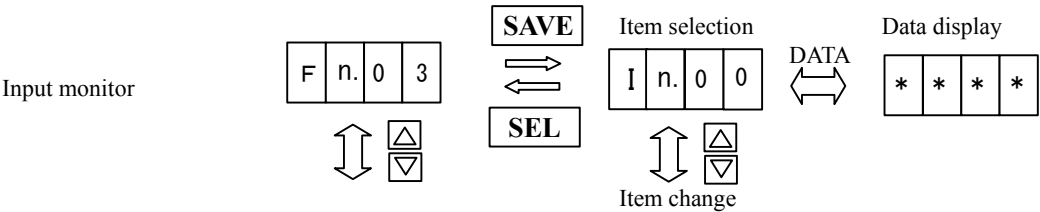
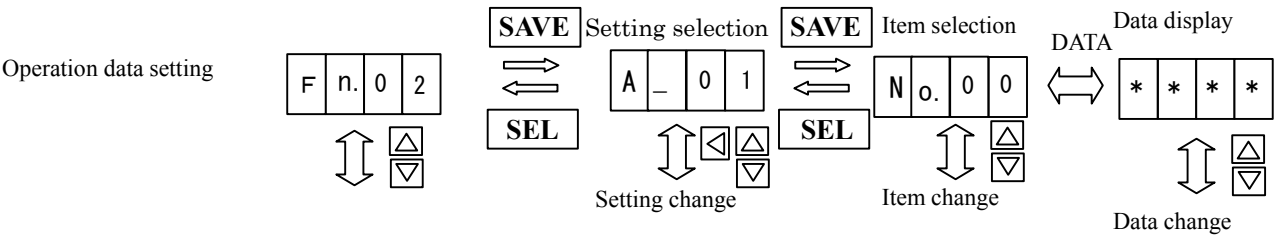
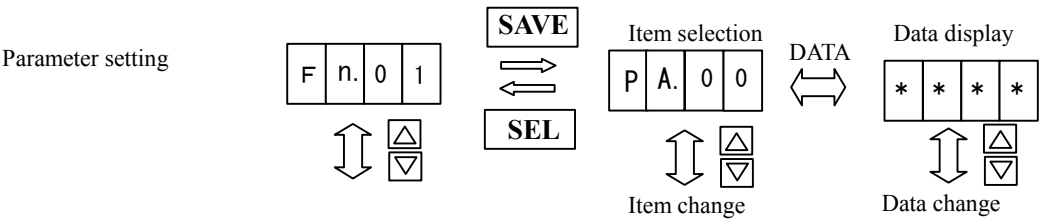
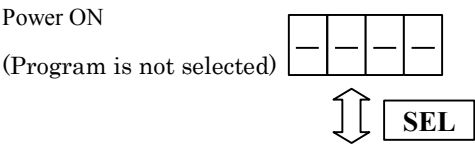
6-1-1 Display section layout



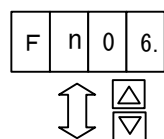
7-segment display	Contents
	Program is not selected.
	A: Program No. B: "0" C: State of driver -: Servo OFF 0: Commutation initialize 1: Rotation 2: Pretightening 3: Reverse rotation 4: Final tightening 5: Inching 7: Stop
****	NG code "*****" occurred
AL**	Alarm "****" being generated

6-1-2 Operation of the display section

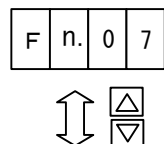
Display unit operation



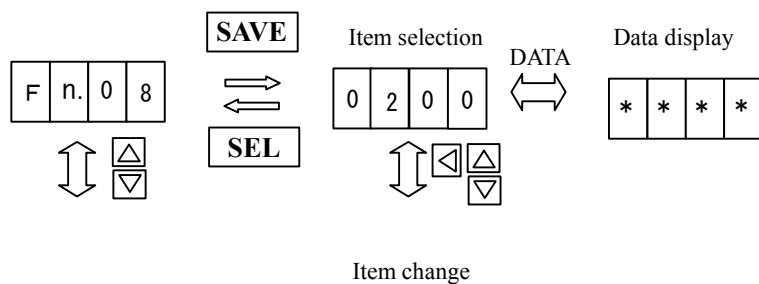
(Reserved)



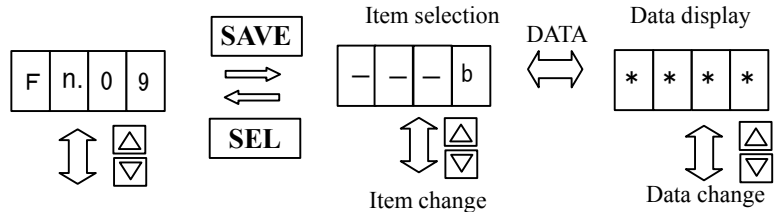
(Reserved)



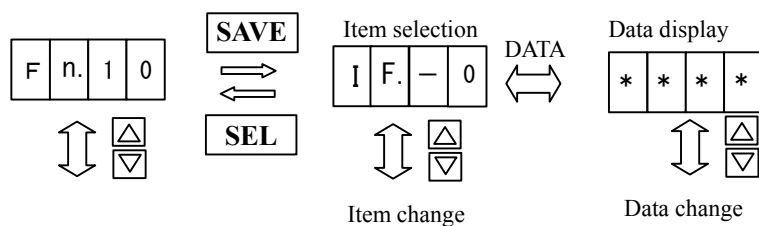
(Used by manufacturer)
*Not permitted
for the customer to use.



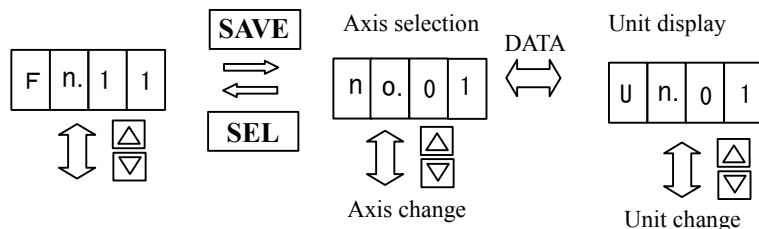
Calender setting



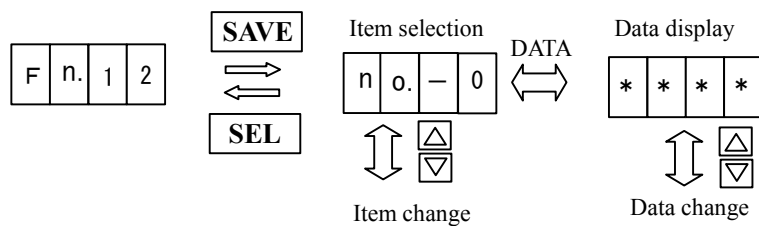
I/F unit setting



Unit setting

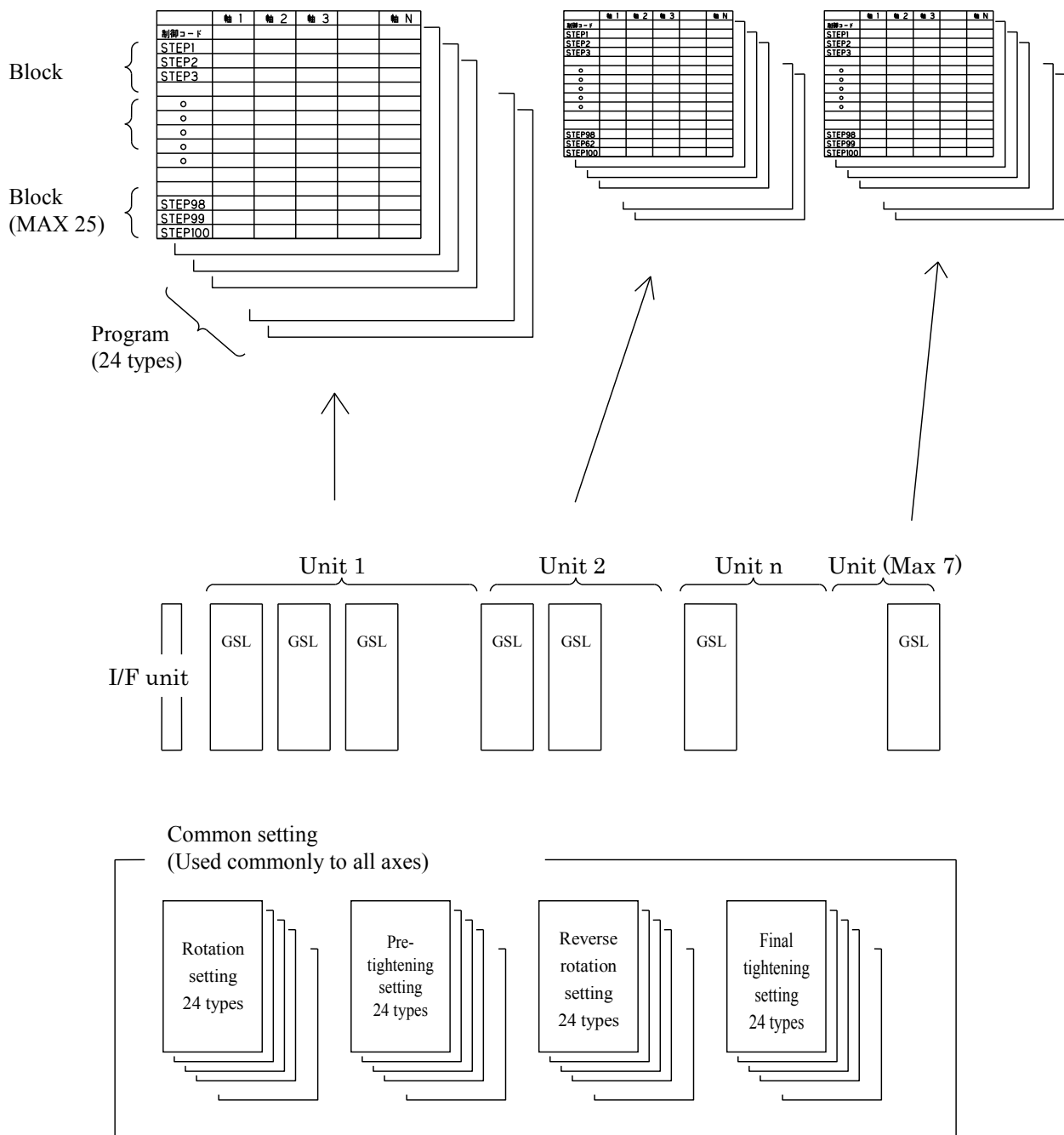


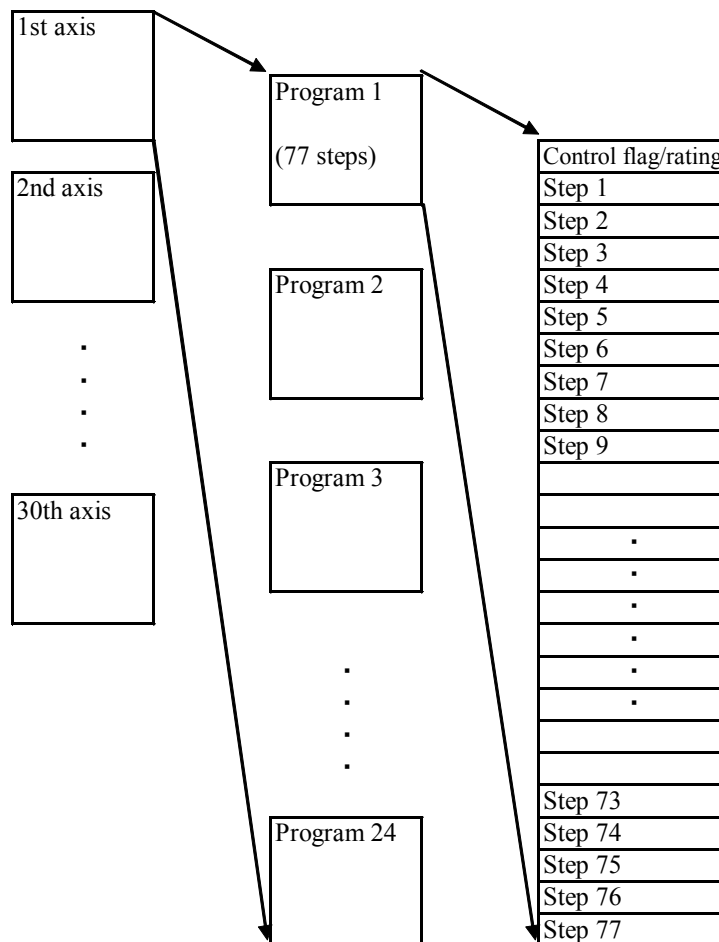
ID controller setting



6-2 Program

6-2-1 Tightening program





Step number	Tightening operation	
Step 1	Rating 1	
Step 2	Screw 1	
Step 3		Rotation 1
Step 4		Pretightening 1
Step 5		Reverse rotation 1
Step 6		Final tightening1
Step 7		End
Step 8	Rating 1	
Step 9	Screw 2	
Step 10		Rotation 2
•		•
•		•
Step 77		

- The control flag (Zero magnification check, IN, with or without finish synchronize) is not included in the step.
 - Rating (block start declaration),finish(block finish declaration), screw number and each operation to be counted as 1 step.
- It is possible to set maximum 77 steps.

7. Setting function list

7-1 Fn.**display setting function list

Internal data can be set, changed and monitored on the panel of each axis of GSL.

Each function is classified by “Fn”.

Fn No.	Functions/Contents	Object to set
Fn. 01	Each axis setting Sets the driver parameter and axis number of each GSL axis.	Each axis
Fn. 02	Tightening setting Changes setting of parameters related to the operation. This setting value can be changed by GSL of each axis, but the changed value will be reflected to all axes. Setting value is used as the common operation setting at all axes. Available conditions are as follows: Rotation, inching condition (A_01 to A_24) Pretightening condition (b_01 to b_24) Reverse rotation condition (C_01 to C_24) Final tightening condition (d_01 to d_24) Rating condition (E_01 to E_30) 24 types (Rating 30 types) of operating conditions can be set respectively.	Common setting
Fn. 03	Input monitor Monitoring of input signal (PIO) is possible. This is effective only with the axis (1st axis) connected with PIO.	
Fn. 04	Output monitor Monitoring of output signal (PIO) is possible. This is effective only with the axes (1st, 2nd and 3rd axes) connected with PIO.	
Fn. 05	Operation result monitor Monitoring of tightening result performed just before is possible.	Each axis
Fn. 06	Printer operation Printing out operation is possible for tightening data, programs and various settings.	Common setting
Fn. 07	Unused	
Fn. 08	Used by manufacturer RAM monitor for debugging is performed.	Each axis
Fn. 09	Unused	
Fn. 10	I/F unit setting Changes setting of printer output timing, setting personal computer communication setting and external display	Common setting
Fn. 11	Unit setting Sets the unit	Common setting
Fn. 12	ID controller connection setting Sets the connection with ID controller	Common setting

Note: Common setting: Can be changed on the panel of each axis, but the changed value will be reflected to all axes.

When the settings of Fn.01•10•11•12 are changed, please operate after switching OFF/ON the power supply.

7-2 (Fn. 01) Each axis setting Driver parameter setting

Number	Contents	Setting range	Unit
PA.00	Position loop gain This is the responsive parameter of position control system. Setting at a large value increases rigidity and shortens the setting time, but the system becomes easy to oscillate.	0-9999	
PA.01	Speed loop gain This is the responsive parameter of speed control system. To set the higher position loop gain, it is needed to make this value larger. Usually increase it proportionate to the load inertia.	0-9999	
PA.02	Speed integral gain Sets the integral gain in the speed loop. When the value is set larger, the response becomes faster and the rigidity increases, but the system becomes easy to oscillate. This function works to drive a slight deviation at the time of stop in zero.	0-9999	
PA.03	Resonance control filter Sets the response of the filter to be inserted to the current command. It may suppress the oscillation caused by torsional resonance in the mechanical system to increase the control gain. When the value is set smaller, the filter effect increases.	0-7FFF	
PA.04	Motor speed limit Sets the motor speed limit value.	0-9999	10rpm
PA.05	Over speed error detecting level Sets the speed to detect the speed alarm "AL30".	0-9999	10rpm
PA.06	Overload error detecting level Sets the current level to detect the overload alarm "AL20".	0-9999	0.1Arms
PA.07 PA.08	Sets the contents to output to Monitor terminal M1 (PA.07) and Monitor terminal M2 (PA.08), respectively. Changing parameters can change the contents to output to each terminal. (See P83) Setting at shipment M1: Current command M2: Speed feed back	0-FFFF	
PA.09	Clears the alarm history Clears it by SAVE after inputting 8089 setting.		
PA.10	NR deterioration forecast (series) When the number of continuously occurring times with gear check NG exceeds the set value, NR failure forecast becomes "ON". (Refer to P49,50 table of output signal.) If the setting value is 0000, it does not work.	0-9999	
PA.11	NR deterioration forecast (integrated) When the integrated number of occurrence with gear check NG from power ON exceeds this setting value, the NG failure forecast becomes "ON". (Refer to P49,50 table of output signal.) If the setting value is 0000, it does not work.	0-9999	
PA.12	Unused		
PA.13	It does not monitor the torque during the preset time when reaching to speed anreaching to speed 2. (It is set to prevent wrong judgment of torque due to the change of speed.)		
PA.14 to18	Unused		
PA.19	No monitoring time for torque No determination related to torque is performed during this time after each operation start in the rotation and reverse rotation modes. Set the value in consideration of the transient torque fluctuation such as an acceleration time.	0-9999	1 ms
PA.20	Magnification check delay time Sets the data importing delay time after the torque sensor bridge short-circuit when the magnification check is performed.	0-9999	1 ms
PA.21	Motor acceleration speed control setting Can suppress the acceleration speed lower than the limit value when controlling the speed. Smooth acceleration and deceleration is possible against the acceleration command in step form.	0-9999	100 rpm/s
PA.22	Standard current limit Sets the maximum current of motor	0-9999	0.1 Arms
PA.23	Torque increase for the premature tightening NG detection Sets the torque increase for the premature tightening NG detection. (When it reaches to speed 3 select torque + torque increase for the premature tightening NG detection within the premature tightening determination angle, it outputs NG.)	0-9999	0.1 Nm
PA.24	Tightening sampling operation end torque Sets the torque value to end the tightening sampling operation	0-9999	0.1 Nm
PA.25	Unused		

Number	Contents	Setting range	Unit
PA.26	Axis number Set from "1" in serial numbers. Make sure to set "1" when I/F unit is provided.	1-0030	
PA.--	Press SAVE button to save all data of Fn. 01 in one lump.		

Storing data: When "PA. ---" is displayed, if "SAVE" button is pressed, all data of Fn. 01 will be saved in memory.

Note: Please do not change the item of this driver parameter items on the user side. However, the customer side should input for items of "PA.26" because they are inputs after the installation of the controller.

7-3 (Fn.02) Rotation and the inching setting (A_01 to 24: 24 types)

Number	Contents	Setting range	Unit
No.00	Rotation/ inching direction, rotation movement 00*□ + ——— Rotation/inching direction specified 0: Rotate to tightening direction 1: Rotate to loosening direction + ——— Torque determination/fitting/gear check 0: No torque determination 1: Torque determination Determines normal/error by using torque upper limit/lower limit values. 2: Fitting end exists When rotation reaches the fitting torque, it stops rotation. Torque upper limit/lower limit determination is not performed. 3: Gear check is performed If the motor current while running exceeded the value equivalent to torque upper limit, it becomes "Gear Check NG".		
No.01	Overtime (only when rotating) If the rotation of cut angle is not performed within the preset time after rotation start, the rotation stops and the rotation is determined. (Excluding the before- time)	0-0065	1 s
No.02	Cut angle Set the rotation end angle.	0-9999	1 degree
No.03	Speed Set the rotation speed.	0-9999	1 rpm
No.04	Before-time Rotation control actually starts when the preset time has elapsed after the rotation start.	0-9999	1 ms
No.05	Torque upper limit	0-9999	0.1Nm
No.06	Torque lower limit		
No.07	Fitting torque Rotation ends when it reaches the preset value while rotating. If it does not reach even if it passes over the cut angle, it becomes "Fitting Angle Over".	0-9999	0.1 Nm
No.08	Unused		
No.09	Unused		
No.—	Press SAVE button to save data. Perform saving operation on each 24 types of data.		

Storing data: When "No. ---" is displayed, if "SAVE" button is pressed, the data will be saved in memory.

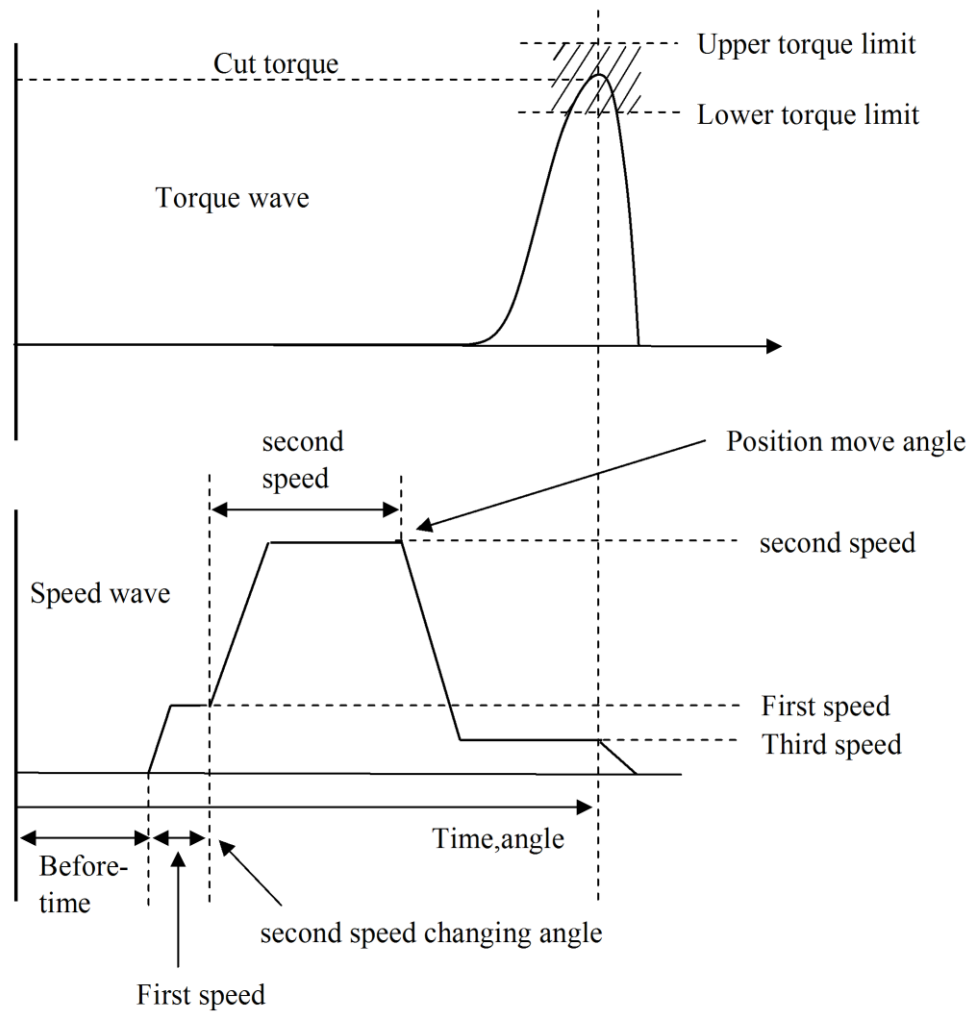
Perform saving operation on each 24 types of data.

7-4 (Fn.02) Pretightening setting (b_01 to 24: 24 types)

Number	Contents		Setting range	Unit
No.00	Torque upper limit	If the torque value is not within the range when the product stops, it becomes “Pretightening torque over or under”.	0-9999	0.1Nm
No.01	Torque lower limit		0-9999	0.1Nm
No.02 to 05	Unused			
No.06	Overtime When pretightening movement does not complete within the time starting from pretightening, it stops rotation and becomes “Pretightening timeover NG”. (Time before pretightening is not included.)		0-0065	1 s
No.07	First speed Set the pretightening first speed.		0-9999	1 rpm
No.08	Position move angle It will be unconditionally the third speed after the specified angle.		0-9999	1 degree
No.09	Third speed Set the pretightening third speed.		0-9999	1 rpm
No.10	Before-time Rotation control actually starts when the preset time has elapsed after the pretightening operation start.		0-9999	1 ms
No.11	Unused			
No.12	Cut torque Set the target torque for pretightening. (Pretightening stops when it reaches the target torque.)		0-9999	0.1 Nm
No.13	Second speed switching angle Specify the angle to change to the second speed.		0-9999	1 degree
No.14	Second speed Set the pretightening second speed.		0-9999	1 rpm
No.15	Third speed switching torque Set the torque to switch to third speed. (It is given priority over the second switching angle.)		0-9999	0.1 Nm
No.16	Premature tightening determination angle Specify the angle to determine premature tightening NG. If it reaches the cut torque on the way from pretightening start to this angle, it becomes premature tightening NG.		0-9999	1 degree
No.17	Unused			
No.18	No monitoring time for torque Set the time from the pretightening start time to the start time of the torque monitoring.		0-9999	1 ms
No.19	Stall time Set the time from the stop caused by the cut torque to the state with the servo motor turned OFF.		0-9999	1 ms
No.—	Press SAVE button to save data. Perform saving operation on each 24 types of data.			

* For the No.19 stall time, set the numeric value less than 2000. If the number is not complied, the motor may be burned out.

Pre-tightening reference wave

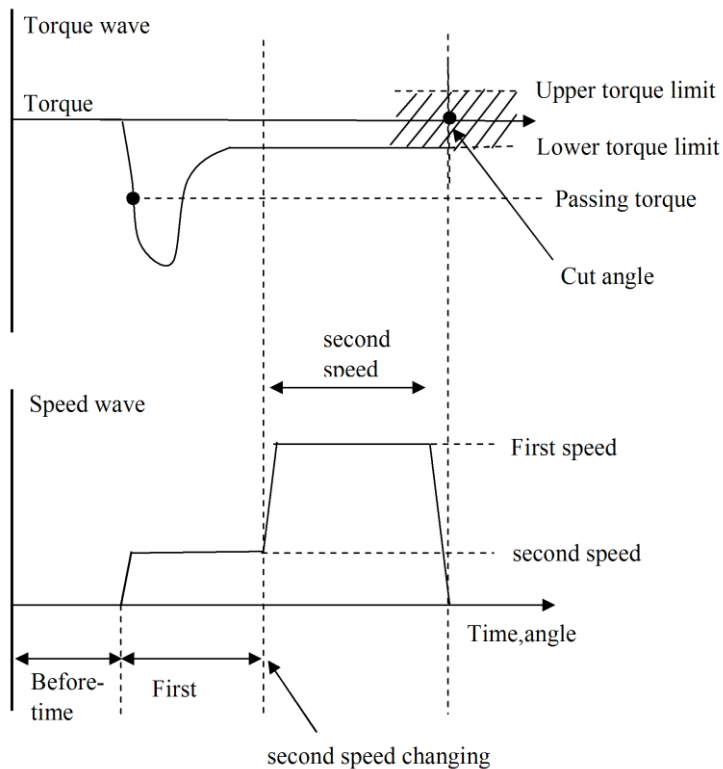


7-5 (Fn.02) Reverse rotation setting (C_01 to 24: 24 types)

(To be used for the lock determination and seating detection determination.)

Number	Contents		Setting range	Unit
No.00	Torque upper limit	If the torque value at the moment of reaching the cut angle is not within the range, it becomes “Reverse rotation torque over or under”.	0-9999	0.1 Nm
No.01	Torque lower limit		0-9999	0.1 Nm
No.04	Overtime If the rotation of cut angle is not performed within the preset time after rotation start, the rotation stops and the reverse rotation determination is performed. (Measured from the start, excluding the before-time.)		0-0065	1 s
No.05	Cut angle Set the angle of reverse rotation.		0-9999	1 degree
No.06	Second speed Set reverse rotation second speed.		0-9999	1 rpm
No.08	Before-time Rotation control actually starts when the preset time has elapsed after the reverse rotation start.		0-9999	1 ms
No.09	Speed switching angle Angle to change speed. (First speed → second speed)		0-9999	1 degree
No.10	First speed Set reverse rotation first speed.		0-9999	1 rpm
No.11	Passing torque If there is no condition more than the preset value during reverse rotation, it becomes the “Reverse Rotation Passing Torque NG”.		0-9999	0.1 Nm
No.12	Seize torque If it reaches larger torque than the specified value during reverse rotation, it becomes the "Reverse Rotation Seizure Torque NG".		0-9999	0.1 Nm
No.13 to19	Unused			
No.—	Press SAVE button to save data. Perform saving operation on each 24 types of data.			

Reverse rotation reference wave

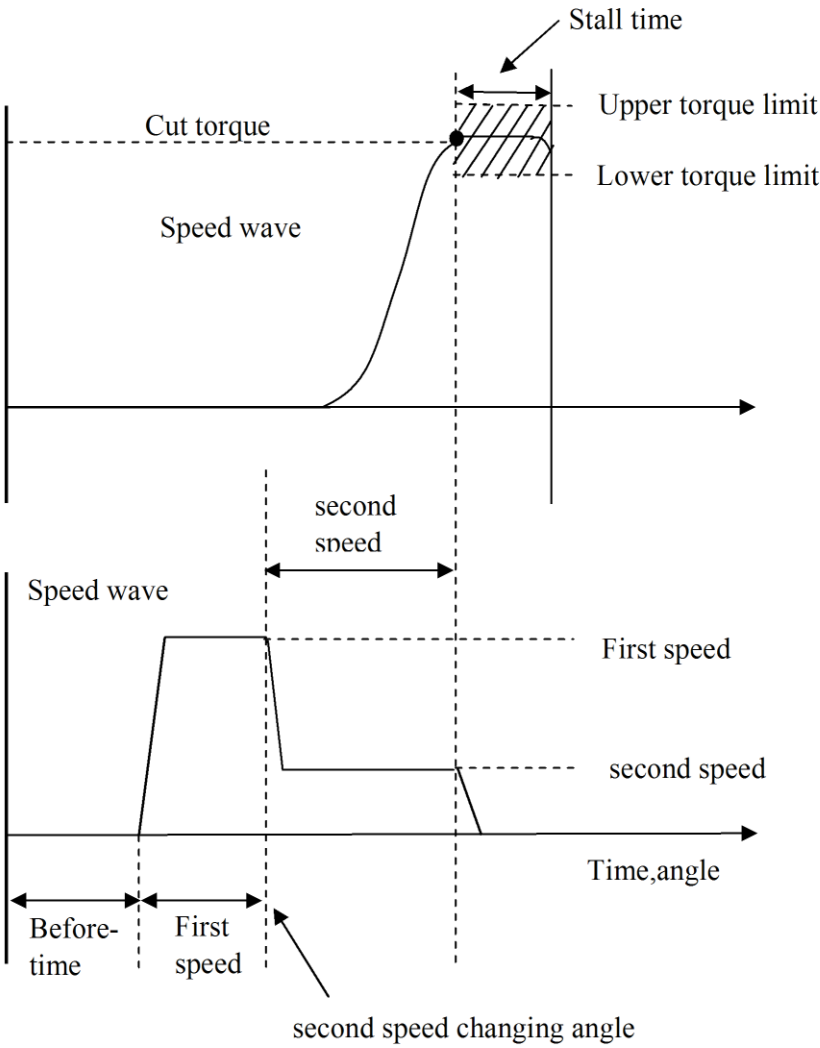


7-6 (Fn.02) Final tightening setting (d_01 to 24: 24 types)

Number	Contents	Setting range	Unit
No.01	Torque upper limit	0-9999	0.1Nm
No.02	Torque lower limit		
No.07	Overtime When the real tightening movement does not finish within the time starting from real tightening, it stops rotation and becomes "Real tightening time over" (Time before real tightening is not included.)	0-0065	1 s
No.08	First speed Set the final tightening first speed.	0-9999	1 rpm
No.09	Speed switching angle Specify the angle to change the first speed to the second speed. (Measured from the start.)	0-9999	1 degree
No.10	Second speed Set the final tightening second speed.	0-9999	1 rpm
No.11	Before-time Rotation control actually starts when the preset time has elapsed after the final tightening operation start.	0-9999	1 ms
No.12	Cut torque (TS2) Set the target torque for pretightening. (Rotation ends when it reaches the preset torque.) Set the sufficient value in the case of angle method.	0-9999	0.1 Nm
No.13 to 25	Unused		
No.26	Over cut angle Set the maximum rotation angle from the start of final tightening. If it exceeds this angle, the rotation ends and it becomes the Final Tightening Over Cut Angle NG.	0-9999	1 degree
No.27 to 31	Unused		
No.32	No monitoring time for torque Set the time from the start of pretightening to the time to start torque monitoring.	0-9999	1ms
No.33	Stall time Set the time from the stop caused by the cut torque to the state with the servo motor turned OFF.	0-9999	1ms
No.34 to 39	Unused		
No.—	Press SAVE button to save data. Perform saving operation on each 24 types of data.		

* For the No.33 stall time, set the numeric value less than 2000. If the number is not complied, the motor may be burned out.

Final tightening reference wave



7-7 (Fn.02) Rating setting (E_ 01 to 30: 30 types)

Number	Contents	Setting range	Unit
No.00	Current sensor rating Initial setting sets the torque at the spindle end of nut runner when instant maximum current is supplied to the motor. Torque compensation is as follows; Torque rate after compensation = Torque rate before compensation x value of torque wrench/value of monitor.	0-9999	0.1 N m
No.01	Tightening direction, Nutrunner model **□□ +—— Specify the Nutrunner type (See the following table.) +—— Existence of torque sensor 0: Equipped 1: No +—— Tightening direction 0: Tighten the motor clockwise as viewed from the encoder side. (Tighten as the motor axis end turned CCW.) 4: Tighten the motor counterclockwise as viewed from the encoder side. (Tighten as the motor axis end turned CW.)		
No.02	Limit over Setting of tolerance when the value of the current sensor is checked at the state of current command 0. When the difference with the previous check is larger than the motor maximum current x limit over/sensor rate, it becomes NG output.	0-9999	0.1Nm
No.03	Set over Setting of tolerance when the value of the current sensor is checked at the state of current command 0. When the difference with the previous check is larger than the motor maximum current x set over/ sensor rate, it becomes NG output.	0-9999	0.1Nm
No.04 to 05	Unused		
No.06	CAL value Sets the value of calibration with the nut runner itself. It is indicated on the body of the nut runner. Ordinary number is 100.	0-9999	0.1%
No.07	Deceleration ratio Input deceleration ratio of Nut runner gear. Set the motor axis rotation number required to rotate the tightening axis one turn.	0-9999	0.1rev
No.08 to 09	Unused		
No.—	Press SAVE button to save data. Perform saving operation on each 30 types of data.		

Saving the data: When the “SAVE” button is pressed at the “No. --” display, the data will be saved. Perform the saving operation for each one of 30 types setting.

Nut runner model specified table

Nut runner number			
□□	Nut unner type	□□	Nut runner type
0a	AN-120	1F	4203E10
0b	AN-300	20	4203E11
0c	AN-640	2b	ANM-220
0d	AN-1100	2d	ANM-320
0E	AN-1800	2F	ANM-400
1c	4200E10	30	ANM-640
1d	4201E10	32	ANM-1200
1E	4202E10	63	Others

7-8 (Fn.03) Input monitor

Number	Contents	Display range
In.00	External input signal monitor Indicates the state of input signal input from CN1.	0-FFFF (bit)
In.02	Encoder counter Integration counter from the motor commutation initialize position (Motor one rotation at 400 hex)	0-FFFF
In.03	Time (hour. minute) (Only when connected with I/F unit) Display example: 07.30: 7:30 To change, perform by Fn. 09.	00.00 to 23.59
In.04	Date (month. day) (Only when connected with I/F unit) Display example: 04.01: April 1st To change, perform by Fn. 09.	01.01 to 12.31
In.05 and In.06	SIO input signal monitor It is possible to monitor SIO input signal. Select the unit to monitor by Fn.10-IF._5. It shows the state as follows: In.05 Upper 8 bit: SIO input "1" Lower 8 bit: SIO input "0" In.06 Upper 8 bit: Preliminary Lower 8 bit: SIO input "2"	0-FFFF (bit)

Monitor display only. Contents cannot be changed.

7-9 (Fn.04) Output monitor

Number	Contents	Setting range
OU.00	External output signal monitor Indicates the state of output signal output from CN1.	0-FFFF (bit)
OU.01	Dummy output It can output the forced ON/OFF command for the external output signal. This output is to check connection with equipment at a higher rank. Internal status will not be changed with this value.	0-FFFF (bit)
OU.02 to OU.10 (Unconfirmed)	SIO output signal monitor It is possible to monitor SIO output signal. Select the unit to be monitored by Fn.10-IF.5. It shows the state as follows: OU.02 Upper 8 bit: SIO output "1" Lower 8 bit: SIO output "0" OU.03 Upper 8 bit: SIO output "3" Lower 8 bit: SIO output "2" OU.04 Upper 8 bit: SIO output "5" Lower 8 bit: SIO output "4" OU.05 Upper 8 bit: SIO output "7" Lower 8 bit: SIO output "6" OU.06 Upper 8 bit: SIO output "9" Lower 8 bit: SIO output "8" OU.07 Upper 8 bit: SIO output "11" Lower 8 bit: SIO output "10" OU.08 Upper 8 bit: SIO output "13" Lower 8 bit: SIO output "12" OU.09 Upper 8 bit: SIO output "15" Lower 8 bit: SIO output "14" OU.10 Upper 8 bit: Not decided Lower 8 bit: SIO output "16"	0-FFFF (bit)

*Points to notice

Indication is displayed in hexadecimal numeral. To convert to data of parallel I/O, carry out the following conversion:

Convert (indication contents of 4 digits) from hexadecimal to binary numeral.

Right end value after conversion (LSB) corresponds to IN 0/OUT 0. As it goes to the left side, it becomes 1,2...IN 15/OUT 15. If there is no corresponding digit, convert as "0".

1: Input/Output signal ON 0: Input/output signal OFF

(Simple example) IN/OUT15 ----- 0

Indication "0007" → "0000000000111" IN/OUT 0~2:ON IN/OUT 3~15:OFF

Indication "E007" → "1110000000000" IN/OUT 0~2:OFF IN/OUT 3~15:ON

7-10 (Fn.05) Operation result monitor

Number	Contents	Setting range	Unit
No.00	Final tightening torque (Torque when final tightening is complete.)	0-999.9	0.1 Nm
No.01	—	—	—
No.02	—	—	—
No.03	—	—	—
No.04	Final tightening total angle (from start)	0-9999	1 degree
No.05	Final tightening total time (from start, including the before-time)	0-99.99	0.01 s
No.06	Pretightening torque (Torque when pretightening is complete.)	0-999.9	0.1 Nm
No.07	—	—	—
No.08	—	—	—
No.09	—	—	—
No.10	Pretightening total angle (from start)	0-9999	1 degree
No.11	Pretightening total time (from start including the before-time)	0-99.99	0.01 s
No.12	Reverse rotation torque (Torque at the measurement angle)	0-999.9	0.1 Nm
No.13	Reverse rotation angle (from start)	0-9999	1 degree
No.14	—	—	—
No.15	Reverse rotation total time (from start including the before-time)	0-99.99	0.01 s
No.16	Rotation torque (maximum value during rotation)	0-999.9	0.1 Nm
No.17	Rotation angle (from start)	0-9999	1 degree
No.18	Rotation time (from start including the before-time)	0-99.99	0.01 s
No.19	Program total time (from start to block end including the before-time)	0-99.99	0.01 s
No.20	Current sensor check value (Converted value to torque)	0-999.9	0.1 Nm
No.21	A half value of the current sensor check value (Converted value to torque)	0-999.9	0.1Nm

[Following functions are valid only when the interface unit is connected.]

7-11 (Fn.06) Printer operation

Number	Contents	Setting range	Unit
Pr.00	Unused	Set data and press SAVE button to print the specified contents.	
Pr.01	Rotation setting print		1 to 24
Pr.02	Reverse rotation setting print		1 to 24
Pr.03	Pretightening setting print		1 to 24
Pr.04	Final tightening setting print		1 to 24
Pr.05	Rating setting print		1 to 30
Pr.06	Program contents print		1 to 24
Pr.07	Axes arrangement data print		1 to 24
Pr.08	Final data print If there is no data, it does not print.		1 to 30
Pr.09	Unused		
Pr.10	All data print	Unnecessary	

Note: Set values cannot be saved.

7-12 (Fn.07) Unused

7-13 (Fn. 08) RAM monitor for debugging (Used by manufacturer)

Note: Please do not change these RAM monitor items by the user.

7-14 (Fn.09) Unused

7-15 (Fn.10) I/F unit setting

Number	Contents	Setting range	Unit
IF_0	Printer output setting 0: No print out 1: All printed out 2: Only NG printed out 3: Only first N units + NG are printed out. Printing is performed at the block end of each unit.	0 to 3	
IF_1	Print item: Bit 0: Rotation result 1: Print 0: No Bit 1: Pretightening result 1: Print 0: No Bit 2: Reverse rotation result 1: Print 0: No Bit 3: Final tightening result 1: Print 0: No Bit 4: Zero magnification result 1: Print 0: No	Bit unit	
IF_2	Number of final tightening for the initial time Set the number of final tightening to print out after the power is turned on when the print mode is set 3.	0 to 99	
IF_3	Set the personal computer communication speed to the digit of 1. 0: 9600 bps 1: 19200 bps 2: 38400 bps Set the display communication speed to the digit of 10. 0*:38400bps 1*:57600bps 2*:76800bps	0 to 22	
IF_4	External display 0: Invalid 1: Valid 11: Language switching (Sends the language switching information to a printer.)	0, 1, 11	
IF_5	SIO signal monitor unit selection Select the unit to monitor the M-NET signal by Fn. 03 and Fn. 04.	1 to 7	
IF_6	Resolution of the wave data to the display. Set the resolution of the wave data to transmit to the external display. (Set at the unit of 0.5 degree.) Example 0.5°:05 1.0°:10 1.5°:15 2.0°:20	5-20	0.1 度
IF_ -	Press SAVE button to save all data of Fn. 10 in one lump.		

7-16 (Fn.11) Unit setting

Number	Contents	Setting range
NO. □□	□□ is the axis number. For data, set the unit number that each axis belongs to in the form of Un-□□. Unit setting value will be the station number of SIO. Make sure to set "Un. 01" for the axis with I/F unit. For axes to axis cutting, set the unit number to "Un. _-".	Un. 01 to Un. 07 Un. _-
NO.—	Press SAVE button to save all data of Fn. 11 in one lump.	

7-16 (Fn.12) ID controller connection setting

Number	Contents	Setting range
No. 0	ID controller connection setting (Output contents setting)	
No. 1	ID controller connection setting (Output digit number setting)	
No. 2	I/F unit Selection of CH2 function (Switching printer/ID&QC personal computer) 0: Connect to printer 1: Connect to ID controller & QC personal computer	
No. 3	SIO start address setting. Enter a number of "1 to 7"	
No. —	Press SAVE button to save all data of Fn. 12 in one lump.	

Please refer to Page 87 for the details of the F12 abovementioned.

8. Supplementary

8-1 Sub serving function for operation

①History data saving function

Saves the history data to each driver by using the reset input as a trigger signal after the tightening total determination is output.

To check the data, read the data from the GSL_PC-Automatic measurement screen-Tightening history screen. (To read, load the history data to PC by specifying an axis or all axes. Cancel switch is provided.)

Saved items of tightening history

Saved items	Contents	Remarks
Screw No.	Screw No. assigned to every screw to tighten. (It is possible to specify the number in the form of xxx-th axis or xxx-th block.)	Personal computer communication function is used to set.
Date	Date the tightening is performed.	
Time	Time the tightening is performed.	
Program No.	Tightening program number that the tightening is actually performed.	
Tightening result	Torque (at the determination time) Angle (from start time) Time (from start time)	
NG code	Records the tightening NG code. Omark appears when tightening is OK.	
Unit No.	Unit number that the tightening is actually performed.	
Work data No.	Data sent from ID controller. "0" when ID controller is not equipped.	

②Waveform sampling function

Stores waveform data of 2048 data in the driver of each axis.

(It overwrites the data from next tightening.)

Waveform data: Stores at 10ms interval from the block start and block complete.

8-2 Driver function

Regenerative function : Regenerative circuit is built in order to consume the excessive drive voltage through the internal resistor when it exceeded the preset value.

(Regenerative resistor is externally attached.)

Discharge function : Discharges the drive charge voltage by pressing the puss button on the panel.

Analog monitor : Outputs the monitor signal by the check pins on the panel. (Can be selected by parameters)

Standard load inertia : $J_L \leq 30J_M$

Parallel input/output : Processes the basic operation with input 16 points and output 16 points.

Any tightening is possible at the multiple timing by connecting the parallel leads to the top axis that is set by the unit when the multiple units is set.

1st axis: Parallel input/output (each 16 points)

2nd axis: 1 to 16 axis OK output, 1 to 16 axis - axis cutting set input

3rd axis: 17 to 30 axis OK output, 17 to 30 axis - axis cutting set input

(* However, the axis cutting input as mentioned above is enabled only when #1 to 3 axis has Unit No.1.)

Tightening history save: Saves about 6000 tightening data at the E2PROM of each axis. Setup software is used to read the history.

Alarm history function: GSL stores 16 times of alarms. Setup software is used to read the alarm history.

9. Monitor output

Usually, the current sensor output and speed feedback values are output to the M1 and M2 terminals on the front of driver. It is possible to change the contents to output to each terminal by changing the parameters.

Fn.-01-PA.07 (MADRS1)	M1,M3 terminal output contents (Setting at shipment: 0238)
Fn.-01-PA.08 (MADRS2)	M2,M4 terminal output contents (Setting at shipment: 0222)

Contents	Setting value	Applicable type	Output scale
Motor current command	0239	GSL-*1-N04-M	8.8 Arms/5 V
		GSLW-*1-N04-M	
		GSL-*3-N04-M	17.7 Arms/5 V
		GSLW-*3-N04-M	
		GSL-*4-N02	29.5 Arms/5 V
		GSL-*5-N02	44.3 Arms/5 V
Speed feedback	0222	Common	16,384 rpm/5 V “+” by rotating to the right (CCW)

* 1: Standard specification (connector type)

* T: T specification (with a heatsink + Connector type)

10. Code table

10-1. NG code list

Operation	Code display	Contents	Related parameters
	FFFF	Emergency stop Operation ready OFF during operation, or START OFF during program operation.	
Zero magnification and others	0001	Zero point offset error Zero point output exceeded the limit over during the zero point check.	Fn02-E □-No03
	0003	Zero point offset fluctuation error Output difference between this time and last time exceeded the set over.	Fn02-E □-No02
	0033	Sampling angle over Rotated more than 9999 degrees during the tightening angle sampling operation.	Fn01-PA.24
Rotation	0107	Gear check NG Motor current exceeded the equivalent value to the upper torque limit while running.	Fn02-A □-No05
	0108	Fitting angle over Does not reach the fitting torque even if it exceeds the cut angle.	Fn02-A □-No02 Fn02-A □-No07
	0111	Rotation torque over Torque at stopping exceeded the upper limit.	Fn02-A □-No05
	0112	Rotation torque under Torque at stopping does not reach the lower limit.	Fn02-A □-No06
Pretightening	0207	Premature pretightening NG Reached the cut torque while operating in the first speed.	Fn02-b □-No15 Fn02-b □-No16
	0208	Twice tightening of pretightening NG Torque reached the total of the 3rd speed switching torque + incremented torque (Fn01 -23) between the start and premature tightening determination angle. Deceleration NG Speed is not the 3rd speed when it reached the sample start torque or cut torque.	Fn02-b □-No15 Fn02-b □-No16 Fn01-PA.23
	0211	Pretightening torque over Torque value at stopping exceeded the upper limit.	Fn02-b □-No00
	0212	Pretightening torque under Torque value at stopping does not reach the lower limit.	Fn02-b □-No01
	0233	Pretightening time over. Reaching to the overtime, the tightening movement finished.	Fn02-b □-No06
Reverse rotation	0306	Reverse rotation passing torque NG Did not reach torque more than the preset torque during operation.	Fn02-c □-No11
	0307	Reverse rotation seizure torque NG Reached torque more than the preset torque during operation.	Fn02-c □-No12
	0311	Reverse rotation torque over Torque value at the measurement angle exceeded the upper limit.	Fn02-c □-No00
	0312	Reverse rotation torque under Torque value at the measurement angle does not reach the lower limit.	Fn02-c □-No01
Final tightening	0411	Final tightening torque over Torque value at stopping exceeded the upper limit.	Fn02-d □-No01
	0412	Final tightening torque under Torque value at stopping does not reach the lower limit.	Fn02-d □-No02
	0433	Real tightening time over. Reaching to the overtime, the tightening movement finished.	Fn02-d □-No07
	0434	Final tightening over cut angle NG Angle from the start of final tightening exceeded the over cut angle.	Fn02-d □-No26

10-2. Alarm code list

Driver alarm display list

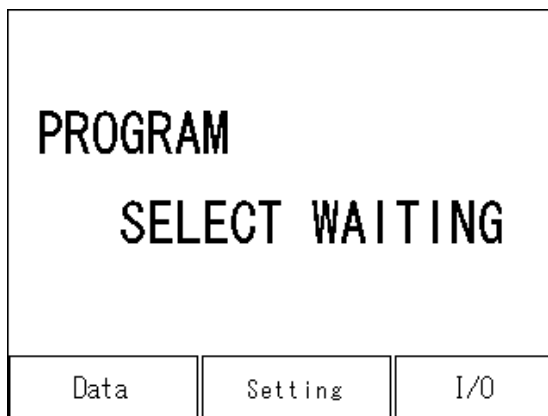
Code display contents	Detected cause	Situation	Cause	Measures
AL10 Power drive error	Power drive error is detected. Over current, over heat error, control power supply error	Occurs simply when power supply is turned on	GSL defect	Replace GSL
		Occurs when operated	Wire short-circuit of motor	Check wiring to motor Replace motor
			GSL defect	Replace GSL
		Occurs during acceleration and deceleration	GSL adjustment improper	Replace GSL
		Occurs during operation	Internal overheat	Improve heat radiating condition Ease operating condition
AL20 Overload alarm	Average value of motor current exceeded the detecting level (Fn01-PA06).	Motor vibrates while running	Adjustment improper	Readjust gain (Fn.01-PA00 to PA03)
		Occurs during acceleration and deceleration	Too much acceleration/deceleration	Lower acceleration/deceleration speed (Fn.01-PA21)
		Occurs during rotation at a constant speed	Too much load torque	Increase motor size
		Occurs simply when operation starts	Motor wire wrong connection/not connected	Check wiring
			Locking of mechanical rotation part	Check mechanism
AL30 Speed alarm	Motor speed exceeded detection level (Fn01-PA05).	Occurs during operation	Speed overshoot	Readjust gain (Fn.01-PA00 to PA03)
			Encoder error	Replace motor
			Sensor signal receiver error	Replace GSL
AL40 Encoder initial error	Failed to initialize commutation	Motor does not rotate after drive power supply is turned on	Wrong wiring to motor	Check wiring to the motor
			Motor defect	Replace motor
			Mechanism is too heavy to operate	Improve mechanism section
		Motor rotates after drive power supply is turned on	Disconnection in sensor signal leads	Check wiring
			Motor defect	Replace motor
			Signal receiver defect	Replace GSL
AL48 Angle data reading error	Sensor position data cannot be read normally.	Occurs during operation	Signal receiver defect	Replace GSL
AL60 Sensor signal error	Sensor is disconnected	Occurs when power supply is turned on	Disconnection of sensor signal	Check wiring Loose connection Replace motor

Code display contents	Detected cause	Situation	Cause	Measures
AL71 Drive power supply over voltage	Drive voltage is high.	Occurs during deceleration	Short of regeneration ability due to high voltage	Check drive voltage
		Occurs simply when power supply is turned on	Drive voltage specification is wrong.	Check drive voltage
AL72 Regeneration circuit error	Regeneration processing circuit malfunctioned.	Occurs during deceleration	Regenerative resistor broken	Replace GSL
			Regenerative processing ability insufficient.	Change GSL
		Occurs simply when power supply is turned on	Drive voltage specification is wrong	Check drive voltage Check power supply wiring
			Voltage detecting circuit malfunction	Replace GSL
AL80 Drive power supply interrupted	Drive voltage is too low. Momentary power interruption (about 0.1 sec.) occurred.	Occurs during operation	Voltage drop and power supply momentary interruption of input power supply	Check input power supply
		Occurs at a specific timing	Drive power supply was cut off during GSL operation.	Check higher rank timing
AL90 Driver section E2PROM error	Data cannot be read/written from/to E2PROM	Occurs when power supply is turned on Occurs when parameters are saved	E2PROM defect/operating life	Replace GSL
ALC0 Program No error	Program selection error/contents error	Occurs when program starts/while executing	Specified program number is 0 or more than 25.	Check program selection signal
			There is no content of specified program.	Reconfigure program
			Block number is not set from 1 in order. Block numbers are doubled. There are more than 15 block numbers in a unit. Block numbers of all axes in the unit do not match.	Reconfigure program
ALC1 Program step error	Undecipherable step has been set.	Occurs when program starts	E2PROM defect/operating life	Replace I/F unit
ALC2 No operating axis error	Specified axis is not actually installed.	Occurs when power supply is turned on	Unit setting mistake	Check unit setting axis
ALC3 I/F unit E2PROM failure	Data cannot be read/written from/to E2PROM.	Occurs when power supply is turned on Occurs when parameters are saved	E2PROM defect/operating life	Replace I/F unit
ALC4 SIO communication error	SIO communication stopped.	Occurs within 10 seconds after control power supply is turned on	SIO connection wrong wiring	Check wiring
			Sequencer failure	Check sequencer setting
		Occurs during the operation	M-NET connecting leads shield treatment defect	Check wiring
= CPU error	CPU cannot operate normally.	Becomes normal when the sensor cable/SIO connection is disconnected	Sensor/SIO signal wrong wiring	Check wiring
		Occurs when power supply is turned on	GSL defect	Replace GSL
LED goes off	CPU is not operating	Becomes normal when sensor cable/SIO connection is disconnected	Sensor/SIO signal wrong wiring	Check wiring Check/replace sensor
		Occurs when power supply is turned on	GSL defect	Replace GSL

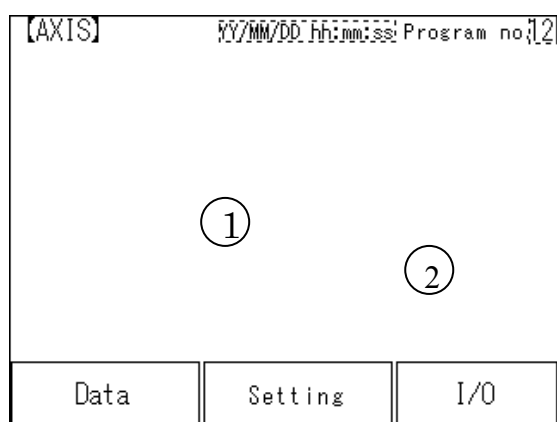
11 Display layout



Displayed when the power is supplied.

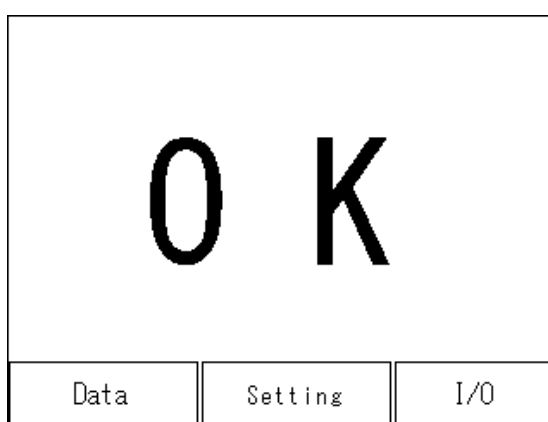


Displays when the program is not selected.



Displays the arrangement of axes.

Displays white display before tightening,
Green when tightening is OK and red when
tightening is NG.



Displays the total OK when output after tightening

【 TIGHTENING DATA 】						
	Torque	Time	Angle	JUDGE	Return	
No. 12	123.4	12345	123.4			
No. 12	123.4	12345	123.4			
No. 12	123.4	12345	123.4			
No. 12	123.4	12345	123.4			
No. 12	123.4	12345	123.4			
No. 12	123.4	12345	123.4			
No. 12	123.4	12345	123.4			
No. 12	123.4	12345	123.4			
No. 12	123.4	12345	123.4			

Displays the data of tightening result.

Tightening result message appears in the MSG section.

(MSG: Message)

Example: Tightening condition

MSG display

1. When tightening is OK

OK

2. Final tightening torque over

Final tightening torque
over and others

【 SETTING MENU 】	
RATE.SET	REV.T SET
MOM.T SET	FIN.T SET
PRE.T SET	PROGRAM LIST
<div>SELECT LANGUAGE</div> <div>Return</div>	

Possible to check the detail of parameters for tightening setting.

* It is impossible to change the setting value from the display.

【 Language Select indication 】		
GSL_DISPLAY		
What language do you select?		
Japanese	English	Polish
<div>1234</div>		Return

It is possible to change the language to be displayed on the display.

Switching languages are Japanese and English.

【 RATE.SET 】		
Setting no. 12	▲+1	▼-1
1. Current sensor rating	123.4	N.m
2. Tightening direction		
3. Rating limit	123.4	N.m
4. Setting limit	123.4	N.m
5. Calibration	123.4	%
6. Reducation gear ratio	123.4	N.m
Return		

It is possible to check the parameter for rating setting of each axis.

Displayed axis can be switched by “+1” and “-1” buttons.

【 MOM.T SET 】

Setting no.

▲+1 ▼-1

1. Rotation direction	FF	
2. Over time	1234	sec.
3. Cutting angle	1234	°
4. Speed	1234	rpm
5. Prerotation time	1234	msec.
6. Upper torque limit	123.4	N.m
7. Lower torque limit	123.4	N.m
8. Fitting Torque.	123.4	N.m

Return

It is possible to check the parameter of the rotation setting.

Setting No. can be switched by “+1” and “-1” buttons.

【 PROGRAM LIST-1 】

Program no.

Axis no.

+1 -1

+1 -1

Step 1		IN syn.	IN syn.	
Step 2		IN syn.	P syn.	
Step 3		IN syn.	P syn.	
Step 4		IN syn.	P syn.	
Step 5		IN syn.	P syn.	
Step 6		IN syn.	P syn.	
Step 7		IN syn.	P syn.	Return

It is possible to check the details of program list.

Program number and axis number can be switched by “+1” and “-1” buttons.

Up/down arrow buttons switch the list number.

【 PRE.T SET-1 】

Setting no.

▲+1 ▼-1

1. Upper torque limit	123.4	N.m
2. Lower torque limit	123.4	N.m
3. Over time	12	sec.
4. Speed 1	1234	rpm.
5. Speed select angle	1234	°
6. Speed 2	1234	rpm.
7. Speed select torque	123.4	N.m
8. Move angle	1234	°

Return

【 PRE.T SET-2 】

Setting no.

▲+1 ▼-1

9. Speed 3	1234	rpm.
10. Premature T.determination angle	1234	°
11. Cutting torque	123.4	N.m
12. Time before pretightening	1234	msec.
13. Monitoring time for no-torque	1234	msec.
14. Stall Time	1234	msec.

Return

It is possible to check the parameter for pretightening. Setting No. can be switched by “+1” and “-1” buttons.

【 REV.T SET-1 】		【 REV.T SET-2 】	
Setting no. 12		Setting no. 12	
<div style="display: flex; justify-content: space-around;"> ▲+1 ▼-1 </div>		<div style="display: flex; justify-content: space-around;"> ▲+1 ▼-1 </div>	
1. Upper torque limit	123.4 N.m	6. Speed select angle	1234 °
2. Lower torque limit	123.4 N.m	7. Speed2	1234 rpm
3. Over Time	1234 sec.	8. Passing torque	123.4 N.m
4. Cutting angle	1234 °	9. Seizure torque	123.4 N.m
5. Speed 1	1234 rpm.	10. Time before reverse rotation	1234 msec.
Return		Return	

It is possible to check the parameter for reverse rotation setting.

Setting No. can be switched by “+1” and “-1” buttons.

【 FIN.T SET-1 】		【 FIN.T SET-2 】	
Setting no. 12		Setting no. 12	
<div style="display: flex; justify-content: space-around;"> ▲+1 ▼-1 </div>		<div style="display: flex; justify-content: space-around;"> ▲+1 ▼-1 </div>	
1. Upper torque limit	123.4 N.m	7. Cutting torque	123.4 N.m
2. Lower torque limit	123.4 N.m	8. Cutting angle	1234 °
3. Over time	12 sec.	9. Time before final tightening	1234 °
4. Speed 1	1234 rpm.	10. Monitoring time for no-torque	1234 msec.
5. Speed select angle	1234 °	11. Stall time	1234 msec.
6. Speed2	1234 rpm		
Return		Return	

It is possible to check the parameter for final tightening setting.

Setting No. can be switched by “+1” and “-1” buttons.

【I/O monitor input】			
PLC ⇒GSL			
READY		Program bit1	Block bit1
Auto/Manu		Program bit2	Block bit2
START		Program bit3	Block bit3
Jog start		Program bit4	Block bit4
RESET		Program bit5	Block bit5
AL. RESET		Enable	---
QL input		ALL RESET	---
QL mode		IN signal	Sampling S.

Setting no. 12 ▲+1 ▼-1 Return

【I/O monitor output-1】			
GSL ⇒PLC			
Ready_Comp		Program bit1	Block bit1
System_OK		Program bit2	Block bit2
Battery_OK		Program bit3	Block bit3
Total OK		Program bit4	Block bit4
Total NG		Program bit5	Block bit5
RUNNING		Enable	Step End
QL Comp.		BlockOK	Cycle stop
Prg.running		BlockNG	OUT

Setting no. 12 ▲+1 ▼-1 Return

【I/O monitor output-2】			
GSL ⇒PLC			
Block10K		Block90K	Block170K
Block20K		Block100K	Block180K
Block30K		Block110K	Block190K
Block40K		Block120K	Block200K
Block50K		Block130K	Block210K
Block60K		Block140K	Block220K
Block70K		Block150K	Block230K
Block80K		Block160K	Block240K

Setting no. 12 ▲+1 ▼-1 Return

【I/O monitor output-3】			
GSL ⇒PLC			
Block250K		Torque over	Torque under
Block260K		---	---
Block1End		---	---
Block2End		---	---
Block3End		---	---
Block4End		Passing NG	Seizure NG
Block5End		---	---
Block6End		Gear OK	Gear NG

Setting no. 12 ▲+1 ▼-1 Return

It is possible to check the input/output of I/O monitor.

Clicking on the arrow button switches the screen number.

12 Maintenance and check

12-1 Precautions

12-1-1 Precautions for maintenance and check

- To remove the unit, make sure to cut off the power supply and discharge the voltage by operating DISCHARGE and detect the voltage prior to begin working.
- Do not operate when your hands are wet. Doing so may cause electric shock.
- Do not attempt the insulation resistance test of the driver with a Megger tester. Doing so may damage the driver.
- Do not disassemble or repair the product at the customer end.

General operating condition:

Ambient temperature should be at the annual average 30°C and the load ratio should be less than 80% and average operation be less than 20 hours a day.

12-1-2 Check items

Daily check

- Check for unusual vibration or sound.
- Check for abnormal odor.
- Check the wire for flaw and cracks. Special care should be taken to inspect the movable cables.
- Check the driver ventilation hole for foreign matters attached.

Periodical check (1 year)

- Check the screws at tightening point for loosened condition.
- Check the tightening section for alignment failure.

12-1-3 Operating life

Changes depending on the environmental condition and usage. It is required to replace the component if the abnormal condition is detected.

Product	Component	Standard replacement interval	Remarks
Driver	Capacitor	About 5 years	Standard replacement interval is only for your reference. It is required to replace when the defective condition is found even if it has not reached the standard replacement interval.
	Relay	100,000 times operation	
	Cooling fan	10,000 to 30,000 hours	
	Battery	10,000 to 50,000 hours	
	E2PROM	10,000 times of overwriting operation	

12-1-4 Capacitor

- A smoothing capacitor deteriorates its characteristic under the effect of ripple current. The operating life of capacitor varies depending on the ambient temperature and using conditions but it lasts about 5 years under the general operating condition.

12-1-5 Relay

- Contacts wear due to the open/close current. Relay reaches the life limit by about 100,000 times of operation.

12-1-6 Battery

- Battery life is basically about 5 years.
However it varies depending on the application to use.

12-1-7 E2PROM

- E2PROM for parameters storing has the limit of overwriting times. Data holding period is about 10 years.

12-2 Guarantee

The overwriting times under the guaranteed condition are as follows as an outline. It is restricted by the shortest condition in the following terms.

Parameter overwrite (Fn01 to Fn12)	Each 10,000 times/total
Program overwrite	10,000 times/each axis
Tightening history data	Tightening of about 10,000,000 times/each axis
Engine number data	About 59,520,000 units
Alarm history	Alarm 10,000 times occurrence/each axis

12-3 Tightening operation glossary

UNIT:

Multiple axes control up to 30 axes can be treated as each axis to independently operate or as a group of several axes (a unit) to operate together. One interface unit can control the maximum 7 units. At least one controller belongs to one unit (maximum 30 axes control to one unit), and one input command is assigned to one unit and then all belonging axes start operation simultaneously. In SIO, different station numbers are assigned to each unit.

PROGRAM:

Screw tightening program can form the program from 1 to 24 on each axis. One program begins with the control flag and rating setting, and it is possible to set operation to maximum 77 steps.

However, the rating block number, screw number and end is handled as 1 step. At least one block should have been set in the program.

BLOCK:

A set of operations in tightening program. Block start begins from rating step and shows the set of steps to the end declaration. In automatic operation, one-time program start executes one block. It is also possible to start from the block on the way by designating the block number. The determination (Block OK/NG) against the operated block is output on the step in the block end declaration. If "NG" is determined on either step in the block, it becomes the "block NG" determination (excluding the case when there is a retry); the next step will not be executed.

After determination output, the program start initiates the next block.

STEP:

Each operation (rotation, pretightening, reverse rotation and final tightening), block end declaration, and retry are called steps respectively. More than one block is needed in a program. Program is executed from the step 1 and finished by the end declaration at the final block. On the step of the final block end declaration, the total determination (total OK/NG) is output.

Each axis in the unit operates by step synchronization and the axis in which step has been complete turns OFF the servo motor and waits for the step completion of other axes. When steps of all axes are complete, the next step will be operated.

QL INPUT:

In the block where the tightening operation is in progress, if the tightening operation is not within the OK range, “NG” determination is output in this block. At this time, it is possible to change the determination “NG” to “OK” by inputting the tightening output of the manual torque wrench to the controller. This input is called a QL input.

RETRY:

It is possible to retry (try again) operation if NG occurred in each operation (rotation, pretightening, reverse rotation or final tightening) in the block. When the retry operation is set on the step, if NG occurred on the way from the block start declaration till the previous step of retry, the operation following the retry will be executed. If NG did not occur, the operation following the retry will not be executed.

Completion synchronization:

When pretightening, real tightening movement steps finish, torque confirmation is done again with only OK axes.

Confirms torque until it reaches to cut torque, cut angle or overtime at speed 5rpm.

It is ineffective to set the completion synchronization with Rotation and Reverse rotation..

ROTATION:

Used for screw pick up (a socket picks up a screw head) operation before tightening or preventive operation against socket-engagement after tightening.

PRETIGHTENING:

Operation to perform temporary tightening until a screw seats.

REVERSE ROTATION:

Operation to unfasten the seated screw by several turns. It is possible to determine the screw baking by monitoring the residual torque during this tightening operation.

FINAL TIGHTENING:

Final tightening operation of screws

APPLICABLE TO ID CONTROLLERS:

It is possible to transfer the engine number, set the calendar and transmit the result data by connecting the interface unit and ID controller via serial communication. (Exclusive use with a printer.)

APPLICABLE TO PRINTERS:

Connects with a printer through Centronics interface. Setting data and tightening result can be printed. (Exclusive use with a QC personal computer and ID controller.)

TIGHTENING ANGLE SAMPLING OPERATION:

Operation to rotate the screw in the tightening direction at a constant speed and then stop when it reaches the preset torque, in order to measure the screw length. This operation allows you to easily set the tightening program. (Executable only from a personal computer.)

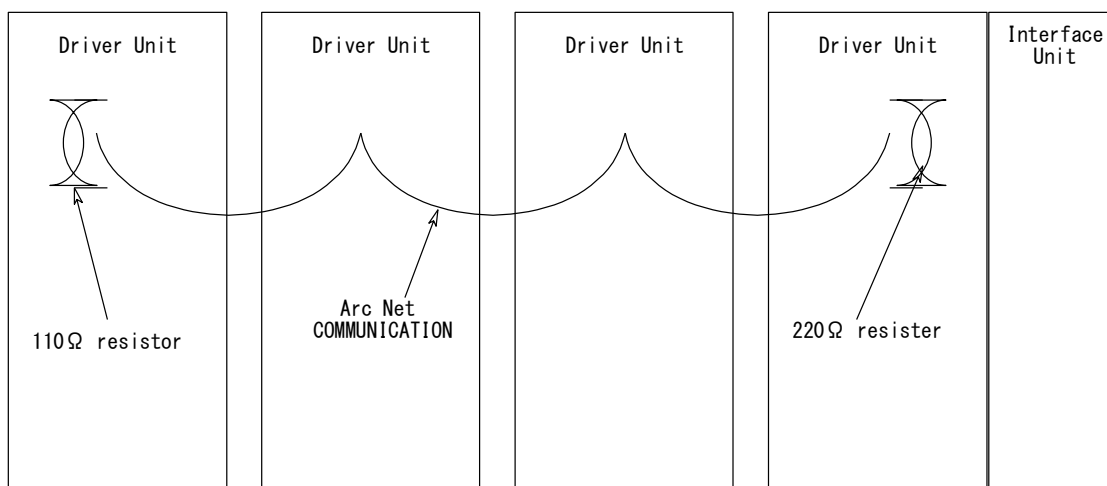
END, STOP:

During tightening operation (rotation, pretightening, reverse tightening and final tightening), the operation may be finished to stop when the condition is matched. This point that the condition matches (during the motor running) is defined as “End” and the point actually the motor stopped is defined as “Stop”. Most NG determination is executed after “Stop” is established.

Supplemental explanation

☆Precautions for wiring the arc net.

Please use the following drawing for the arc net wiring.



*Set 220Ω resistor to (+)(-) on the arc net connector of the driver (1st axis) which is the closest to the Interface unit and set 110Ω resistor to (+)(-) of the end unit for the arc net connection.

*The arc net wiring is unnecessary when the driver unit to be used is one.

☆ **Precautions to use M-net communication**

Make sure to set the SIO start address setting “Fn.12 No.03” from the controller panel when SIO is selected for the communication with PLC. (If the PLC SIO address does not match the GSL controller SIO start address, the communication between PLC and GSL cannot be established.)

☆ **Precautions to use CC-Link communication**

The CC-Link system to use with GSS,GSSW system is below (1).

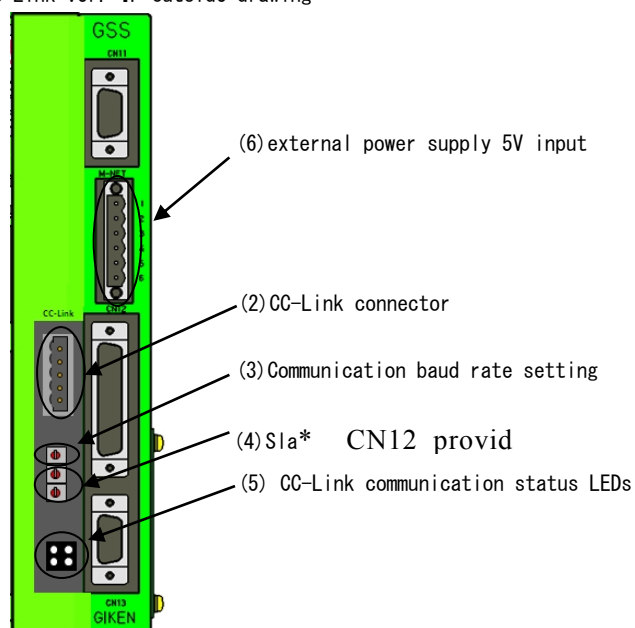
I/F unit can set below (3) communication baud rate and below (4) slave station number.

PLC also must set below (1) system and match the PLC setting of (3)communication baud rate,(4)slave station number to CC-Link I/F setting of the same.

(1)CC-Link System Summary

- Version: CC-Link Ver.2.00
(Can not connect to Ver.1.00 Maseter terminal)
- Terminal type: Remote Device station(Slave station)
- Number of occupied stations 4
- Number of extention Cycles: 8
- Input Output size: at each input points and output points, bit:896, word:128

CC-Link ver. IF outside drawing



(2)CC-Link connector

Connector Pin Number	Signal Name
1 (Up)	DA
2	DB
3	DG
4	SLD
5 (Down)	FG

(3)Communication baud rate setting

I/F unit can set communication baud rate with uppest rotary switch of I/F unit panel .

switch setting	Communication speed
0	156kbps
1	625kbps
2	2.5Mbps
3	5.0Mbps
4	10.0Mbps
5~8	—
9	Reserve

(4)Slave station number setting

I/F unit can set station number with rotary switch at middle and downest(LEDs side).

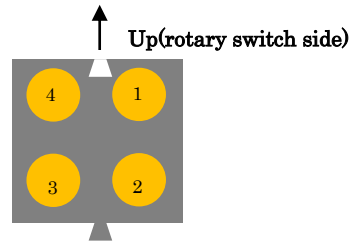
The middle rotary switch is 10x and the down rotary switch 1x.

The setting range is from 1to 64(decimal number). 99 is reserve.

(5)CC-Link communication status LEDs

There is the LEDs which can display CC-Link communication status.

The meaning is following.



Number	Name	Status	Meaning
1	RUN (Green)	On	Anybus Normal Operation
		Off	Anybus Stanby
2	ERROR(Red)	On	Anybus CRC error detected (illegal station number or illegal baud rate selected)
		Off	Anybus Nomal Operation
3	RD(Green)	On	CC-Link Data being received
		Off	CC-Link No data reception
4	SD (Green)	On	CC-Link Data being transmitted
		Off	CC-Link No data transmission

(6)External power supply 5V input

CC-Link IF need to input external power supply 5V at M-net connector

Please see the below table.

Pin	Input voltage
1	5V
2	5V
3	GND
4	GND

Pin1,2 and Pin 3,4 is connected inside

☆ Password to write the setting data to GSL PC

Password when the setting is written: 2003.

☆ Differences between GSL-D2 and GS-D3

GSL-D2: Tightening result (OK.NG), tightening data(torque.time.angle), indication of the setting values.

GS-D3: In addition to the above mentioned contents of GSL-D2, it is possible to use as a versatile operation board.



☆ Precautions to replace the unit

Make sure to set the axis setting of “Fn.01 No.26” from the panel when the GSL controller driver is replaced.

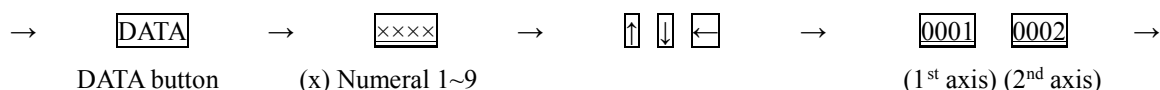
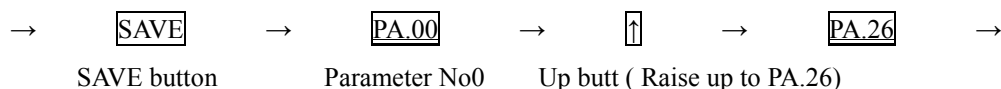
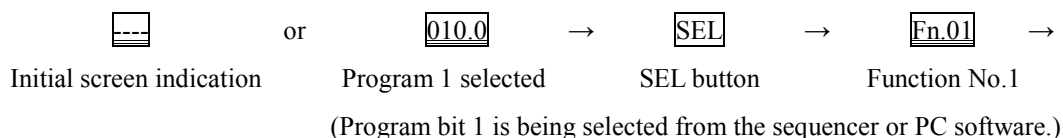
(If the axis number is not set, the communication from the setup personal computer cannot be established.)

☆ How to set axis No.

To set axis No., manual input by the operation of the following push button from the 7 segment indication on the front of the controller. is required.

Manual input operation shows  and 7 segment indication shows .

(Confirming the control power being supplied, set the axis no. at the condition that the machine is not operated.)

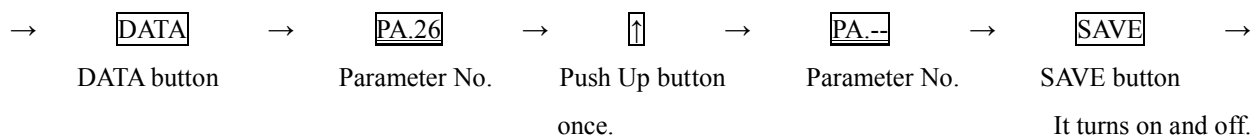


Set axis no. using Up, Down and CTRL button.

Notice (Set the driver with I/F unit as 1st axis and go on 2nd axis,

3rd axis, etc.setting as much as the number of the nut runners.



Please do not double the number.)



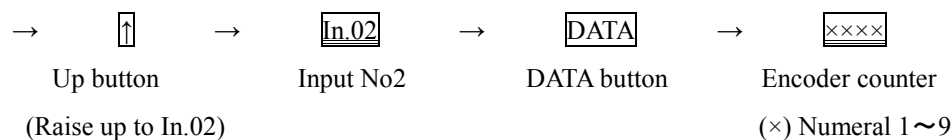
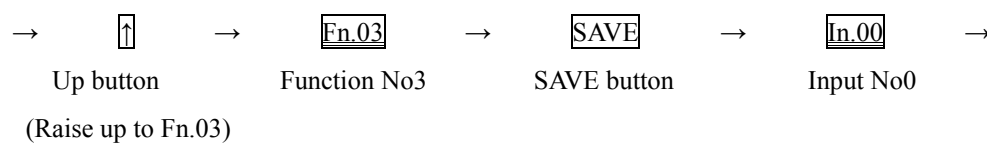
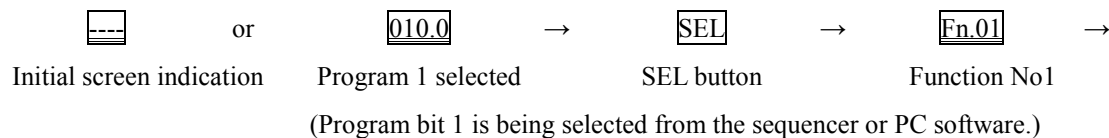
→ To establish the setting, save it and then carry out “On/ Off” of the power supply.

☆ Order of the wiring check with the encoder cable

To check the wiring of the encoder cable, it is necessary to input manually by the following push button operation from the 7 segment indication of the front of the controller and turn the nut runner (the socket of the machine) manually.

Manual input operation shows  and 7 segment indication shows .

(Confirming the control power being supplied, check the wiring at the condition when the machine is not operated.)



After completion of the operation, please turn the nut runner (the socket of the machine)

Manually. If the value of the controller same as the axis turned changes, the wiring is correct.

(If it does not correspond, please check the wiring.)

☆ Explanation of additional items for GSL tightening setting

1. Pretightening setting

1) Speed 3 switching torque: Torque to switch the speed to the pretightening speed 3

When the torque reaches this preset torque, it can be switched from Speed 1 or 2 to Speed 3.

2) Premature tightening determination angle: Set angle in the range for premature tightening NG determination

When the torque reaches the speed switching torque until the preset angle since the pretightening start, the premature tightening NG (NG code 207) occurs.

3) No monitoring time for torque: Time setting to ignore the acceleration reactive force at the pretightening start

It ignores the torque determination during the preset time after the pretightening start.

2. Final tightening

1) No monitoring time for torque: Time setting to ignore the acceleration reactive force at the final tightening start

It ignores the torque determination during the preset time after the final tightening start.

☆ **Precautions for Input/Output communication**

1. Program selection

- Make sure to select the program No.1 to No.24 for the program bit when the program is selected.
- When the program number is 0 or more than 25, it becomes ALC0 (program not selected NG).
- Select the program number by combining the program bit for the program bit selection.
- For the program, it is possible to set the rating setting and axis number setting in each block or axis unit.

2. Input ENABLE

- Please always input “Input ENABLE” after the program bit is selected.

If ENABLE is not input, the program cannot be changed or selected. After the program selection is changed, check that the output of program selection completion and the program number is securely changed.

3. Determination reset

- Determination reset is not accepted except the total determination output after the program is finished.

(To prevent the double tightening, it is always required to input the determination reset after the program is finished (total determination output)).

4. Inching start

- Select the program number by selecting the program bit at the inching start.

Rotating speed and direction are decided during rotation by selecting the program.

(Rotation setting number is selected by the selected program number and the speed and rotating direction by this setting controls the inching movement.) If the program is not selected, inching start is not accepted. Please be careful of it.

Do not input the inching start during the program operation. It may cause malfunction.

5. Alarm reset

- Input for the alarm reset input is enabled only when the alarm occurred.

6. IN input

- Effective only when IN is set in the program setting. If IN setting is performed in the program, make sure to enter IN because the program waits for the input of IN after the program execution until the previous step before the IN is set. Do not input the inching start and alarm reset. It may cause malfunction.

7. Auto/Each selection

- Auto selection: Only the start input is accepted. Do not turn OFF the start signal input until the total determination is output. Doing so causes “FFFF”NG. This is the interruption NG of the program while running.
- Each selection: Only the inching start input is accepted. When the input signal is turned OFF after inching started, it becomes to wait for the inching start and only operates when the inching start is turned ON.

8. GSL reset(ALL reset)

When GSL reset is input, make sure to input from the program selection because all steps return to the initial status.

☆ **Precautions to read the history**

Make sure to give sufficient reading time to read the history data.

(In the case of communication speed at 19200 Bps, about 4 minutes of reading time is needed per axis.)

☆About connection setting of ID controller

1.Outline

Connecting the interface unit with ID controller by serial communication (RS422), transfer of engine number,

setting of the calendar and transmission of result data become possible.

2.Specification of communication

Communication method: RS422

Communication speed: 9600 bps

Start bit : 1

Stop bit : 1

Parity; non

Transmission start character: “#” (23H)

Transmission finish character: CR(0DH)

Transmission character: ASCII code

3.Receive format (ID controller →Interface unit)

Receive of engine no.

#(engine no.) CR Engine number should be maximum 7 figures by decimal numeral.

Data transmit demand or Specify of unit to send the data

#U[n]CR Unit no. specified (n=1 to 6)

Setting of calendar

#C(Calendar) CR Calendar setting (year, month, date, hour, minute each 2 figures)

4.Transmission format (Interface unit →ID controller)

(1) Standard specification setting (1st figure =1 of fn12 no.2)

#[Date and time][Judge][Axis No.][Program No.][Unit No.][Torque][Time][Angle][Gradient][Engine No.]
CR

[Date and time]=01/12/29△15:59	(14 letters) △means blank (20H)
[Each axis judgement]=0000(OK)or NG code	(4 letters)
[Axis no.]=01 to 30	(2 letters)
[Program no.]=01 to 24	(2 letters)
[Unit No.]=1 to 6	(1 letter)
[Torque]=123.4	(Number of letter is according to the parameter.)
[Time]=12.34	(Number of letter is according to the parameter.)
[Angle]=12.3	(Number of letter is according to the parameter.)
[Gradient]=99.9	(Number of letter is according to the parameter.)
[Engine No.]=1234567	(Number of letter is according to the parameter.)

(2)T specification with Torque (1st figure =2 of fn12 no.2)

#[1st axis torque][1st axis judgment][2nd axis torque][2nd axis judgment]•••
[n axis torque][n axis judgment]CR

[Each axis torque]=123.4 (Number of letter is according to the parameter.)

[Each axis judgment]=2 (1=NG 2=OK)

(3)T specification without torque (1st figure=3 of fn12 no.2)

#[1st axis torque][1st axis judgment][2nd axis torque][2nd axis judgment]
[n axis torque][n axis judgment]CR

[Each axis torque =△△△ (Number of letter is according to the parameter.) △ means blank(20H)

[Each axis judgment]=2 (1=NG 2=OK)

Part of torque data always outputs zero.

(4)J specification (1st figure=4 of fn12 no.2)

#[Date and time][Program No.][Unit No.][Engine No.]
[Axis No.(01)][1st axis torque][1st axis time][1st axis angle][1st axis gradient][1st axis judgment]
[Axis No.(02)][2nd axis torque][2nd axis time]•••[n axis gradient][n axis judgment]CR

[Date and time]=01/12/29△15:59 (14 letters) △means blank. (20H)

[Program No.]=01 to 24 (2 letters)

[Unit No.]= 1 to 6 (1 letter)

[Engine No.]= 1234567 (Number of letter is according to the parameter.)

[Axis No.]=01 to 30 (2 letters)

[Torque]= 123.4 (Number of letter is according to the parameter.)

[Time]= 12.34 (Number of letter is according to the parameter.)

[Angle]= 12.3 (Number of letter is according to the parameter.)

[Gradient] = 99.9 (Number of letter is according to the parameter.)

[Each axis judgment] = 0000(K) or NG code (4 letters)

Select with condition of starting transmission

It is possible to set the timing of the transmission from the interface unit by the parameter.

Timing is able to be selected from one of followings;

- Data transmission at the time of the block judgement output
- Data transmission at the time of starting next block and judgment reset input.
- Data transmission according to the request of data transmission from the upper

5. Selecting transmission data

It is possible to set each data to be transmitted or not to be transmitted, specifying figure number, with or without decimal point to the parameter if necessary.

If there are some items which are not transmitted, the following items are transmitted shortening the items not to be transmitted.

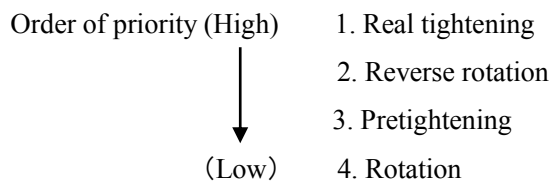
6. Transmission of torque, time, angle data based on the kinds of operation.

Regarding torque data, time data and angle data, data of only one kind of operation is transmitted even if many kinds of operation such as pretightening, real tightening, etc. are carried out within the same block.

Selection with kinds of operation is effected automatically basing on the following order of priority.

When the operation with higher priority is not carried out, it select the operation of following order of priority.

In case of carrying out same kind of operation more than two times within the same block, the last operation is selected.



7. Parameter setting related to the ID controller

Fn.12

No.	Digit	Setting value	Transmission timing
No._0	1st digit	0	Data transmission at block judgment output
		1	Data transmission at start of next block and input of judgment reset input
		2	Data transmission from command from the upper device.
		Min. 3	not used.
	2nd digit	0 to 7	Set the digit no. of engine no. transmission (digit no.-1) In case of the set value ;0, it does not transmit.
	3rd digit	0/1	Setting of with or w/o transmission with axis no. 0: not to be transmitted. 1: to be transmitted.
	4th digit	0/1	Setting yes or no with transmission of each axis judgment. 0: not to be transmitted. 1: to be transmitted.
No._1	1stdigit	Refer to the undermentioned data.	Set the digit no. of transmission with torque.
	2nd digit		Set the digit no. of transmission with time.
	3rd digit		Set the digit no. of transmission with angle.
	4th digit		Set the digit no. of transmission with gradient.
No._2	1st digit	0 to 4	I/F unit Selection of CH2 function 0: Operation as printer port 1: Connection of ID controller of standard specification 2: Output of T spec. torque and judgment 3: Output of T spec. judgment 4: Connection with J spec. ID controller Quality control PC port is possible with operation if the no. is other than zero.
	2nd digit	0/1	Set Yes or No with transmission of date and time. 0: not to be transmitted. 1: to be transmitted.
	3rd digit	0/1	Set Yes or No with transmission of program no. 0: not to be transmitted. 1: to be transmitted.
	4th digit	0/1	Set Yes or No with transmission of unit no. 0: No/select gradient. 1: Yes/select gradient.. 2: No/select snag. 3: Yes/select snag.
No._3		1 to 7	Set address of M-Net station. Set station address of unit 1. Address after 2 is the serial number following to setting value *1.
No._—	Save the whole data of Fn.12 in a lump by the SAVE button.		

Setting value	Torque, angle, gradient	Time	Remark
0	It does not transmit.		
2	* . *	* . *	2 digit with decimal point
3	* * . *	* . * *	3 digit with decimal point
4	* * * . *	* . * * *	4 digit with decimal point
5	* * * * . *	* * . * * *	5 digit with decimal point
6	* * * * * . *	* * * . * * *	6 digit with decimal point
A	* *	* *	2 digit without decimal point
B	* * *	* * *	3 digit without decimal point
C	* * * *	* * * *	4 digit without decimal point
D	* * * * *	* * * * *	5 digit without decimal point
E	* * * * * *	* * * * * *	6 digit without decimal point

In case of setting value not provided, the operation is same as zero.

☆ Items of setting possible and setting not possible

Item	Manual input	Input from setup soft.
Driver parameter internal	○	×
RATE. SET	○	○
MOM.T SET	○	○
PRE.T SET	○	○
REV.T SET	○	○
REA.T	○	○
AXIS ARRANGE SET	×	○
PROGRAM SET	×	○
AXIS CUT INPUT	○	○
ID OUTPUT SET	○	○
M-NETSTARTADDRESS	○	○

☆ **Heat release fan**

1. Standard specification

GSL-1*-N04-M(Standard specification). GSLW-1*-N04-M(Standard specification) should be equipped with a fan or a cooler which cools throughout the controller.

Make sure to provide the interval more than 10 mm between the controllers.

2-1 T specification

GSL-T*-N04-M(T specification). GSLW-T*-N04-M(T specification) is required to equip the fan to radiate heat with the fin of the back of the controller. Please check the following contents and then equip it.

* Depending on the nut runner type, the figure from 1 to 5 will be entered. (For details, see P11.)

2-2 Airflow of the heat release fan

Install the fan which has the airflow of 0.6 m³/min. or more per driver.

If one fan is installed for two drivers, make sure to install the fan with the airflow of twice or more. However, it is not recommended to install one fan for three drivers because the wind will be dispersed.

2-3 Installation method

As the installation method, make sure to install the fan within the downward area of 150 mm from the driver and orient the air flow from the bottom up. If the installation place is 150 mm or further from the driver(s), make sure to take measures so that the airflow is increased or the wind does not escape from the flow line.

☆Precations to set the cable (about antinoise measures and noise influence)

1.Method of set

Please wire separetelly the encorder cable (communication line) and the motor cable (power line).

Please take antinoise measures of using the noise protected hook tube for the encorder cable (communication line) and etc when there is it near the noise source.

2.About phenomenon of output noise

If the signal is not in order because of the noise , Gss (GSSW) Controller show AL20(over loaded).

If the above mentioned phenomenon occurs frequently , please take the antinoise measures grounded on [1.Method of installation].

NR setting operation list

F No.	Category	No.	Item	Remarks
1	Current sensor	0	Position loop gain	
		1	Speed loop gain	
		2	Speed loop integral gain	
		3	Resonance control filter	
		4	Motor Speed limit	
		5	Acceleration error detection level	
		6	Over load error detection level	
		7	Monitor terminal 1	
		8	Monitor terminal 2	
		9	Clears the alarm history	
	Others	19	No monitoring time for torque	
		20	Magnification check delay time	
		21	Motor acceleration limit	
		22	Standard current limit	
		23	Premature tightening NG detection torque	
		24	Tightening sampling operation finish torque	
		25	Not used	
		26	Axis number	1 to 63
		-	Data saving by clicking on the SAVE button	
F No.	Category	No.	Item	Remarks
2	A 1 to 24 Rotation	0	Rotation direction, rotation operation	
		1	Over time	
		2	Cut angle	
		3	Speed	
		4	Before-time	
		5	Upper torque limit	
		6	Lower torque limit	
		7	Fitting torque	
		8	Preliminary 8 to 9	
		-	Data saving by clicking on the SAVE button	
	B 1 to 24 Pretightening	0	Upper torque limit	
		1	Lower torque limit	
		2	Not used	
		3	Not used	
		4	Not used	
		5	Not used	
		6	Over time	
		7	First speed	
		8	Position moving angle	
		9	Third speed	
		10	Before-time	
		11	Not used	
		12	Cut torque	
		13	Second speed switching angle	
		14	Second speed	
		15	Third speed switching torque	
		16	Premature tightening determination angle	
		17	Not used	
		18	No monitoring time for torque	
		19	Stall time	
		-	Data saving by clicking on the SAVE button	
	C 1 to 24 Reverse rotation	0	Upper torque limit	
		1	Lower torque limit	
		2	Not used	
		3	Not used	
		4	Over time	
		5	Cut angle	
		6	Second speed	
		7	Not used	
		8	Before-time	
		9	Speed switching angle	
		10	First speed	
		11	Passing torque	
		12	Baking torque	
		13	Preliminary 13 to 19	
		-	Data saving by clicking on the SAVE button	
	D 1 to 24 Final tightening	0	Tightening mode	
		1	Upper torque limit	
		2	Lower torque limit	
		3	Not used	
		4	Not used	
		5	Not used	
		6	Not used	
		7	Over time	
		8	First speed	
		9	Speed switching angle	
		10	Second speed	
		11	Before-time	
		12	Cut torque	
		13	Not used	
		14	Not used	
		15	Not used	
		16	Not used	
		17	Not used	
		18	Not used	
		19	Not used	
		20	Not used	
		21	Not used	
		22	Not used	
		23	Not used	
		24	Not used	
		25	Not used	
		26	Overcut angle	
		27	Not used	
		28	Not used	
		29	Not used	
		30	Not used	
		31	Not used	
		32	No monitoring time for torque	
		33	Stall time	
		34	Not used	
		35	Preliminary 35 to 39	
		-	Data saving by clicking on the SAVE button	

F No.	Category	No.	Item	Remarks
2	E 1 to 30 rating	0	Torque sensor rating	
		1	Tightening direction, nut runner type	
		2	Limit over	
		3	Not used	
		4	Not used	
		5	Not used	
		6	Gain correction	
		7	Reduction ratio	
		8	Preliminary 8 to 9	
		-	Data saving by clicking on the SAVE button	
F No.	Category	No.	Item	Remarks
3	Input monitor	0	External input signal monitor	
		1	Sensor import value	
		2	Encoder counter	
		3	Time	
		4	Date	
		5	M-NET input 1	
		6	M-NET input 2	
F No.	Category	No.	Item	Remarks
4	Output monitor	0	External output signal monitor	
		1	Dummy output	
		2	M-NET output 0	
		3	M-NET output 1	
		4	M-NET output 2	
		5	M-NET output 3	
		6	M-NET output 4	
		7	M-NET output 5	
		8	M-NET output 6	
		9	M-NET output 7	
		10	M-NET output 8	
F No.	Category	No.	Item	Remarks
5	Operation monitor result	0	Final tightening torque	
		1	Not used	
		2	Not used	
		3	Not used	
		4	Final tightening total angle	
		5	Final tightening total time	
		6	Pretightening torque	
		7	Not used	
		8	Not used	
		9	Not used	
		10	Pretightening total angle	
		11	Pretightening total time	
		12	Reverse rotation torque	
		13	Reverse rotation angle	
		14	Reverse rotation measurement angle	
		15	Reverse rotation total time	
		16	Rotation torque	
		17	Rotation angle	
		18	Rotation time	
		19	Program total time	
		20	Current sensor check value	
		21	A half value of the current sensor check value	
F No.	Category	No.	Item	Remarks
6	Printer operation	0	Not used	
		1	Rotation setting data print	1 to 24
		2	Reverse rotation setting data print	1 to 24
		3	Pretightening setting data print	1 to 24
		4	Final tightening setting data print	1 to 24
		5	Rating setting data print	1 to 30
		6	Program contents print	1 to 24
		7	Axial arrangement data print	1 to 24
		8	Final data print	1 to 30
		9	Not used	
		10	Total data print	Setting value is unnecessary.
F No.	Category	No.	Item	Remarks
7	Program editing			Program for the
F No.	Category	No.	Item	Remarks
8	RAM monitor	no.60 version check		For debugging
		no.61 version check		
F No.	Category	No.	Item	Remarks
9	Calendar setting	b	Set a second	
		F	Set a minute	
		H	Set an hour	
		d	Set a day	
		n	Set a month	
		y	Set a year	
F No.	Category	No.	Item	Remarks
10	I/F unit setting	0	Printer output setting	
		1	Number of print items	
		2	Initial prints number	
		3	PC communication speed	0: 9.6K 1: 19.2K 2:
		4	External display	1: Enabled 11:
		5	SIO signal monitor unit selection	
		6	Resolution of wave data	
F No.	Category	No.	Item	Remarks
11	Unit axis setting	No.:	Axis number 1 to 30	
		Un.:	Unit number 1 to 7	Axis cutting by "-."
F No.	Category	No.	Item	Remarks
12	ID setting	0	Output setting	
		1	Output digit number setting	
		2	Printer/ID and QC PC switching	0: Printer 1: ID and
		3	M-NET start address	1 to 7

Revised Contents

Revised Date	Revised Contents
Jan. 2014 (second edition)	<p>Add the detailed item of supplemental explanation</p> <p>Add HomePageAddress</p> <p>Add precautions of the cable installation</p> <p>Rectify the wrong description of NG code table(at NG code 207)</p> <p>Rectify the wrong description of the premature tightening determination angle (at PreTightening setting)</p> <p>Add the description of CC-Link version IF.</p> <p>Change [Real tightening > Pretightening > Reverse rotation > Rotation] to [Real tightening > Pretightening > Reverse rotation > Rotation]</p> <p>at the priority of the data (torque,angle,time) of ID-Controller output .</p>
Mar. 2020 (third edition)	Change of an e-mail address and the homepage address



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