

G **Series** **Nutrunner**

SPINDLE UNIT INSTRUCTION MANUAL

VERSION 1.3

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URYU SEISAKU, LTD.

About this book

This book will explain installation, wiring, handling, and troubleshooting of G-type nutrunner system. G-System will be used as the collective term covering all materials and software-related configuration. Hereafter this book will use the underlined names G-Unit, G-Tool (*motor*), Cables, and G-Console as individual terms. Utilize G-System's rich functions to the full reading through everything in this book before use. Save this book at the place where you can read any time.

Precautions

- ◆ Arrange for this book to be kept and read by end-users.
- ◆ Contents of this book, specifications and appearance of G-System are subject to change without prior notice.
- ◆ No part of this book may be reproduced or transmitted in any form or by any means without our permission in writing.
- ◆ We have taken all possible means to ensure contents of this book, however, should you find any questions, errors or omissions in this book, please contact us immediately.

Request for compliance

- ◆ Understand all the contents reading through [Safety Instructions] and use G-System correctly following all safety instructions.
- ◆ After reading, save this book at hand always.
- ◆ Only expert engineers carry out wiring and parameter setting.
- ◆ Always make an indication highlighting "Danger High Voltage" in instruction manuals for machines having G-System within.
- ◆ Never carry out withstand voltage test and insulation test for G-System and the products.

Check point when unpacking

- ◆ Does the product agree to types ordered?
- ◆ Examine the products against invoice and packing list to see any short shipment.
- ◆ Check the products for any damages caused during transportation.

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Safety instructions

(Never fail to read)

Safety instructions show rules which we request users to observe for safety use of G-System and prevention of damages for properties and harms for users and non-user. Use G-System only after mastering the knowledge, safety information and safety instructions.

- ◆ This book has divided safety instructions into DANGER and CAUTION depending upon harm and damage due to bad use ignoring displayed contents.



A dangerous situation can happen and a fatality or severe injury is possible in the event of mishandling.



A dangerous situation can happen when mishandling, and personal injury or only physical damage is supposed.



sign also warns the risk of serious consequences depending upon the situation. Follow all the instructions as they state important contents.

- ◆ We will explain the instructions by pictorial signs.



SHOCK
DANGER



FIRE
DANGER



PINCH
DANGER



FIRE
CAUTION



SHOCK
CAUTION



HEAT
CAUTION



DON'TS



NO
DISASSEMBLE



OBLIGATORY



EARTH
GROUNDING

Safety instructions

(Never fail to read)



DANGER



Don't touch tools in operation.

Make sure that even a part of the body and G-Tool's movable part do not cross.

There is a risk of injury.



Do not detach motor and gear case from G-Tool.

G-Tool's output shaft rotates and is dangerous to touch. There is a risk of injury.



Never repair, disassemble and modify G-Unit, G-Tools, and Cables.

There is a risk of injury, shock, fire and breakdown.



Avoid place where tools can be damaged by water. Don't use G-tools nearby corrosive gas or combustible gas atmosphere. There is a risk of fire.



Do not touch connectors while applying current and also for a while after power-off.

There is a risk of shock and injury.



Only expert engineers conduct wiring, maintenance and inspection with power supply turned off. There is a risk of shock and injury.



Don't give scratch, apply unreasonable force and pinch the Cables. Don't use damaged Cables. There is a risk of shock and fire.



It takes 15 minutes for G-Unit to make condenser discharge. Don't touch G-Unit and the terminals for the mean time after power-off.



Provide an independent grounding for FG terminal avoiding terminal share with strong electric circuit (not exceeding 100Ω, tension strength 0.39kN or more by metal wire, or 1.6mm or thicker annealed copper wire). There is a risk of shock.



Immediately stop the operation and shut the power off if G-tool outputs unusual smell, sound, or behavior. There is a risk of injury and fire.



Install stop device in the machine side to secure safety.

There is a risk of injury.



For immediate operation stop, install emergency stop circuit outside of whole device of the machine. There is a risk of injury.



Don't approach whole device of the machine after power recovery from an instantaneous power failure because it can restart all of a sudden. Carry out management securing safety even if the restart takes the place. There is a risk of injury.

Safety instructions

(Never fail to read)

Transport and storage



CAUTION



Transport G-System by right method and procedure appropriate to its weight.
There is a risk of injury and breakdown due to fall and overturn.



Follow below instructions for G-System shipment by boatlift.

- ◆ Ambient temperature: -5~+55 deg C (No freeze)
- ◆ Ambient humidity: Below 50%RH (No dew)
- ◆ Packaging: Fully sealed
- ◆ Rust-proofing: Apply grease or oil to G-Tool.

There is a risk of leak and breakdown.



Don't hold Cables or spindle for G-Tool transportation.

There is a risk of injury and breakdown.



Don't hold Display Unit attached to front panel of G-Unit for transportation because doing so will separate them causing injury and breakdown.

Display Unit is detached and causes injury and breakdown.



Store G-System under the following environment.

- ◆ Ambient temperature: -5~+55 deg C (No freeze)
- ◆ Ambient humidity: Below 90%RH (No dew)
- ◆ Within a building and no direct rays of the sun
- ◆ Place free from vibration and shock
- ◆ Place free from corrosive gases and combustible gases
- ◆ Place free from oil-mist, refuse, water, saline matter, iron powder, and organic solvent

There is a risk of fire, leak, and breakdown.



Dispose of G-System as an industrial waste.

Safety instructions

(Never fail to read)

Installation and wiring



CAUTION



Firmly install G-Tool in the place sustaining G-Tool's weight and reaction of maximum fastening force using designated screws. There is a risk of injury and breakdown.



Firmly install G-Unit in a dust-free housing (in control box) using designated screws. There is a risk of breakdown.



Use G-Tool, G-Unit and Cables in the designated assemblage. There is a risk of fire and breakdown.



Keep designated distance between G-Unit and other equipment within control box. There is a risk of fire and breakdown.



Don't cover vent hole of G-Unit. Avoid foreign matter inclusion in G-Unit. There is a risk of fire and breakdown.



Give power input part a breaker or a circuit protector for safety measures. Select delay action type circuit breaker. There is a risk of fire and breakdown.



Never use G-Tool and G-Unit with worn-out, damaged or less components assembled. There is a risk of fire, injury and malfunction.



Don't put heavy materials on G-Tool, G-Unit and Cables. Don't get on G-Tool, G-Unit and Cables. There is a risk of shock, injury and breakdown.



Don't give G-System strong vibration and shock. There is a risk of breakdown.



Use accessory cable or connector to supply power to G-Unit. Set all connector part of Cables firmly in place. Make Cable arrangement so it will not share space with power cable in the same duct. There is a risk of injury, malfunction and breakdown.



Use G-System by power supply conforming to the standard voltage. Carry out wiring DC24V control power to G-Unit without mistaking the polarity. There is a risk of injury, shock, fire and breakdown.



Use noise filters like surge damper if you install relay or solenoid switch in dust-free housing within control box. Also use noise filter to G-Unit for noise reduction. There is a risk of malfunction and breakdown.

Safety instructions

(Never fail to read)

Operation and adjustment



CAUTION



Do not operate G-System with wet hand. There is a risk of shock.



Do not touch radiator fin of G-Unit and motor of G-Tool while applying current and also for a while after power off as they get hot in the meantime. There is a risk of burn.



Use G-System under the following environment.

- ◆ Ambient temperature: 0~+45 deg C (dry convection necessary)
- ◆ Ambient humidity: Below 90%RH (No dew)
- ◆ Noise free place
- ◆ Place not causing strong electric field and strong magnetic field
- ◆ Place keeping distance from power wire
- ◆ Within a building protected against water and direct rays of the sun
- ◆ Place free from vibration and shock
- ◆ Place free from corrosive gases and combustible gases
- ◆ Place free from oil-mist, refuse, water, saline matter, iron powder, and organic solvent
- ◆ Easy to make inspection and cleaning place

There is a risk of fire, leak, malfunction, and breakdown.



Make confirmation and adjustment of every setting value before operation.
Never make significant adjustment and setting change because doing so causes unstable behavior. There is a risk of injury, malfunction and breakdown.



Execute RESET only after START signal has been confirmed "OFF" status.
There is a risk of injury and malfunction



Don't make frequent power-on and shut-down. There is a risk of breakdown.
Also, make Cable insert and remove of G-System with control power "OFF" status because doing the same with the control power "ON" status can cause breakdown.



Prevent G-Tool from generating torque momentary overrunning its maximum output.
Also, use G-Tool within the prescribed DUTY even if the torque is less than its nominal torque. There is a risk of lifetime decrease and breakdown.



If an error code appears on front panel G-Unit, remove cause of the error first.
Restart G-Unit only after securing safety. There is a risk of injury.



Discharge your static electricity touching grounded metallic object before operating G-Unit with the front panel. There is a risk of malfunction and breakdown.



Wipe G-Unit and G-Tool with a cloth dampened with tepid water or alcohol. Don't use a kind of thinner or organic solvent. There is a risk of breakdown.

Revision history

Date of revision	Revision number	Revision	Revised Inside	Volume
2018/08/30	Edition 1.0	First Edition (ver1.001 compatible)		
2022/11/16	Edition 1.1	Correct the content of the alarm, correct the output items of the spindle format, and correct other mistakes.		
2023/01/26	Edition 1.2	Corrected the name and format of CompactFlash's verified memory card.		
2023/06/26	Edition 1.3	Addition of items of full scale torque to the tool type straight type list Addition of the display screen of D-No.7 to the bottom of the list of real-time mode display contents Spindle format output item error correction		

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Chapter 1 Introduction

1



1-1. How to use this manual

This manual describes the system configuration, specifications, and handling methods of the UNR-G series nutrunner unit. This manual is presented in the following order.

Chapter	Items	Contents
Chapter 1	Introduction	Functions and basic specifications of the UNR-G series unit, and names of the units, tools, and cables
Chapter 2	Installation	Actual installation of the UNR-G series unit
Chapter 3	Wiring and test operation	Actual Wiring Method and Confirmation Contents before Power-on of UNR-G series Unit and Procedure for Trial Run
Chapter 4	Extension unit	About the UNR-G series Extension unit
Chapter 5	Setting Operation	Display contents and setting method of tightening setting value
Chapter 6	System Parameters	Functions and contents of system setting values
Chapter 7	Fastening Parameters	Function and description of tightening setting value
Chapter 8	Maintenance and Inspection	Inspection items and inspection methods for the UNR-G series system
Chapter 9	Trouble shooting	Alarm display and processing during operation
Chapter 10.	Warranty and service	On the warranty period and service system of the UNR-G series system



The G series user console is not included in this manual. See also related instructions.

CAUTION

Related manuals

G type system User Console User's Manual

1-2. UNR-G series system

The UNR-G series nutrunner is an electric nutrunner. The UNR-G series nut runner is a tool to tighten bolts or nuts automatically.

The UNR-G series system is the latest clamping system developed with the aim of making UNR-F series systems even simpler and more flexible. The function of the main unit is incorporated in the conventional spindle unit, and the multi-spindle system control and external communication functions are enhanced to realize a tightening system that flexibly responds to the ever-evolving futuristic production facilities.

For the UNR-G series, a servomotor is used as the drive source, and a torque transducer (torque sensor) can be used to detect the torque and tighten it to the set torque.

○ Reduced startup time

No complicated PLC ladders are required for controlling multi-spindle systems.

The tightening procedure requires no expertise, as it can be incorporated by very easy-to-understand parameter settings. Contributes to work improvement on the site.

○ Ease of setting change

Tightening parameters, tightening workpieces, and various other settings can be easily executed with the dedicated software UNR-G series user console.

○ Diversification of external control interfaces

Various fieldbuses can be supported by mounting an Extension unit. All communication of control signals between the external device and the system can be controlled.

○ CF card-based tightening data-saving

By installing an Extension unit, you can save the tightening result and the tightening wave form to Compact Flash (CF). The number of data that can be saved varies depending on the number of connected spindles, the tightening method, etc., but in 8GB, approximately 1,800,000 data for 1-spindle systems, approximately 900,000 data for 2-spindle systems, approximately 600,000 data for 4-spindle systems, approximately 400,000 data for 8-spindle systems, approximately 200,000 data for 16-spindle systems, and approximately 100,000 data for 32-spindle systems can be saved.

○ High-speed communication with the host system

Ethernet communication is used to communicate with PC, which reduces data communication times. Also, the dedicated communication method is used for communication between units, enabling a communication rate approximately 250 times faster than that of UNR-F series.

○ Power supply and I/O for a variety of safety measures

Since it is equipped with an independent emergency stop signal, it responds to interruption of tightening operation.

In addition, since the unit is operated with DC 24V control power supply, the status of the system can be communicated to the host system even if the drive power supply is cut off during an emergency stop.

○ Multi-functionalization of the unit

By incorporating the function of the main unit into the function of the conventional spindle unit, it is possible to cope with the fieldbus specification with a single unit, realizing a drastic size reduction of the installation area.

1-3. Functional Description

(1) Tightening function

The following tightening methods can be selected for the UNR-G series nutrunner system.

1. Torque method 2. Angle method 3. Plastic zone angle method 4. Pin hole control
5. Position Adjustment 6. Preload Detection 7. Idling check

(2) BYPASS (spindle cutting) function

PLC I/O input-signal "BYPASS": "ON" or RUN/BYPASS switching: BYPASS

BYPASS LED lights in red in BYPASS mode. Operation cannot be started even if START is turned "OFF"→"ON" in BYPASS status. If BYPASS occurs during the tightening operation, the tightening operation is stopped.

(3) Alarm signal output function

If an error occurs in the system due to a system check, connection check, overload check, etc., an alarm signal is output. At that time, STATUS LED of the unit lights in red and the alarm number and sub-code are displayed on the unit's display.

(4) Tool type check function

When the power is turned on or when the tool is replaced, the tool model set in the unit is checked against the model of the connected tool. If the tool model is different, an alarm signal A.03-02 "Tool type error" will occur.

(5) Self-check function

When the control power is turned on, ZERO voltage and CAL voltage that are used as the reference for tightening are obtained. In addition, perform a self-check to compare the reference value at power-on with the measured value before the start of tightening operation by acquiring the value of ZERO voltage and CAL voltage of the torque transducer before the start of tightening operation. (Self-check is not executed for reverse operation.)

In addition, tightening can be started without performing self-check according to the following settings.
PLC I/O INPUT "Auto Z/C CHECK OFF": "ON"

(6) Tightening torque waveform display function

The waveform of tightening torque can be displayed from the end of tightening to the point prior to 1980deg or from the start of tightening to 40 seconds on the dedicated software UNR-G series user console.

(7) Error history function

If an error occurs in the unit and an alarm is issued, up to 500 alarms are saved in the unit and 20 alarms are saved in the tooling ID.

(8) Waveform history function

The module stores 100 pieces of 2 types (OK/NG) of tightening data. A UNR-G series user console is required to read the waveform history.

- Save format : Torque-angle (540deg)
- Saved data (waveform history) : Up to 100 from the latest results
- ※The saved data (wave history) is erased when the control power supply of the unit is turned OFF.
- Saved data (NG waveform history): Spindle-determined "NOK", "ALARM", and "STOP" for 100 cases among the most recent data.

(9) Tightening Result History Function

Saves the tightening results up to 12000 data points before the latest results in the unit. The UNR-G series user console is required to read the tightening result history.

MASTER spindle saves the tightening result of the whole main-system separately from the result of each spindle. The number of items that can be saved for the whole main system depends on the number of configuration axes.

- Number of MASTER spindles (Main-system) that can be stored

System spindles #	1-Sp	2-Sp	3-Sp	4-Sp	5-Sp	6-Sp	7-Sp	8-Sp	9-Sp	10-Sp
Max Number of stored items	5880	3936	2952	2376	1968	1704	1488	1320	1176	1080

System spindles #	11-Sp	12-Sp	13-Sp	14-Sp	15-Sp	16-Sp	17-Sp	18-Sp	19-Sp	20-Sp
Max Number of stored items	984	912	840	792	744	696	648	624	576	552

System spindles #	21-Sp	22-Sp	23-Sp	24-Sp	25-Sp	26-Sp	27-Sp	28-Sp	9-Sp	30-Sp
Max Number of stored items	527	503	479	455	455	431	407	407	383	383

System spindles #	31-Sp	32-Sp
Max Number of stored items	359	359

※As there may be slight errors depending on the tightening method and conditions, use this as a rough guide.

● List of UNR-G series Nutrunner System Tightening Results Storage Functions

Function name	Save Result Data*1		Tightening Result History		
UNR-G users Console screen	Tightening result Monitor	Waveform monitor	Tightening result monitor		
Settings tab	Tightening result display	Auto Load Setting	Tightening history		
Storage target	Main/each spindle	Each spindle	Main	Each spindle	
Contents to be saved	Tightening history	Tightening waveform	Tightening history	Tightening history	Alarm history
Storage location	PC		MASTER spindle	Each unit	Each unit
Number of stored items	-		see previous page	12000 Incident	500 Incident
Setting items	Yes		None		
Indicator: Par No.SYS D-No.021 [Delete History]	OK	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	NOK	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	ALARM	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	BYPASS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	STOP	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Indicator: Par No.SYS D-No.021 [Delete History]	None		Multi	Single	ALARM

※1: Data collection status can be saved in the UNR-G series user console "Tightening Result Monitor".

Function name	Waveform history		Save CF card*2	
UNR-G users Console screen	Waveform history		-	
Contents to be saved	Waveform history *3	NG wave history	Tightening history	Tightening waveform
Storage target	Each spindle	Each spindle	Main/each spindle	
Storage location	Each unit		CF card	
Number of stored items	100 cases each		-	-
Save format	Torque-angle (540deg)		-	Torque-angle (180deg)
Indicator: Par No.SYS D-No.021 [Delete History]	OK	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	NOK	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	ALARM	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	BYPASS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	STOP	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Indicator: Par No.SYS D-No.021 [Delete History]	Curve1	Curve2	CF	

※2:Extension unit 2(UEC-GCF) and CF card are required separately.

※3:Turning OFF the control power supply of the module erases the content.

1-4. System configuration

The UNR-G series nutrunner system controls all units collectively by setting one unit I/O(PLC) control. Units that communicate directly with PC or fieldbus are called MASTER spindle. Units that communicate with PC or fieldbus through inter-spindle communication via MASTER spindle are called SLAVE spindle.

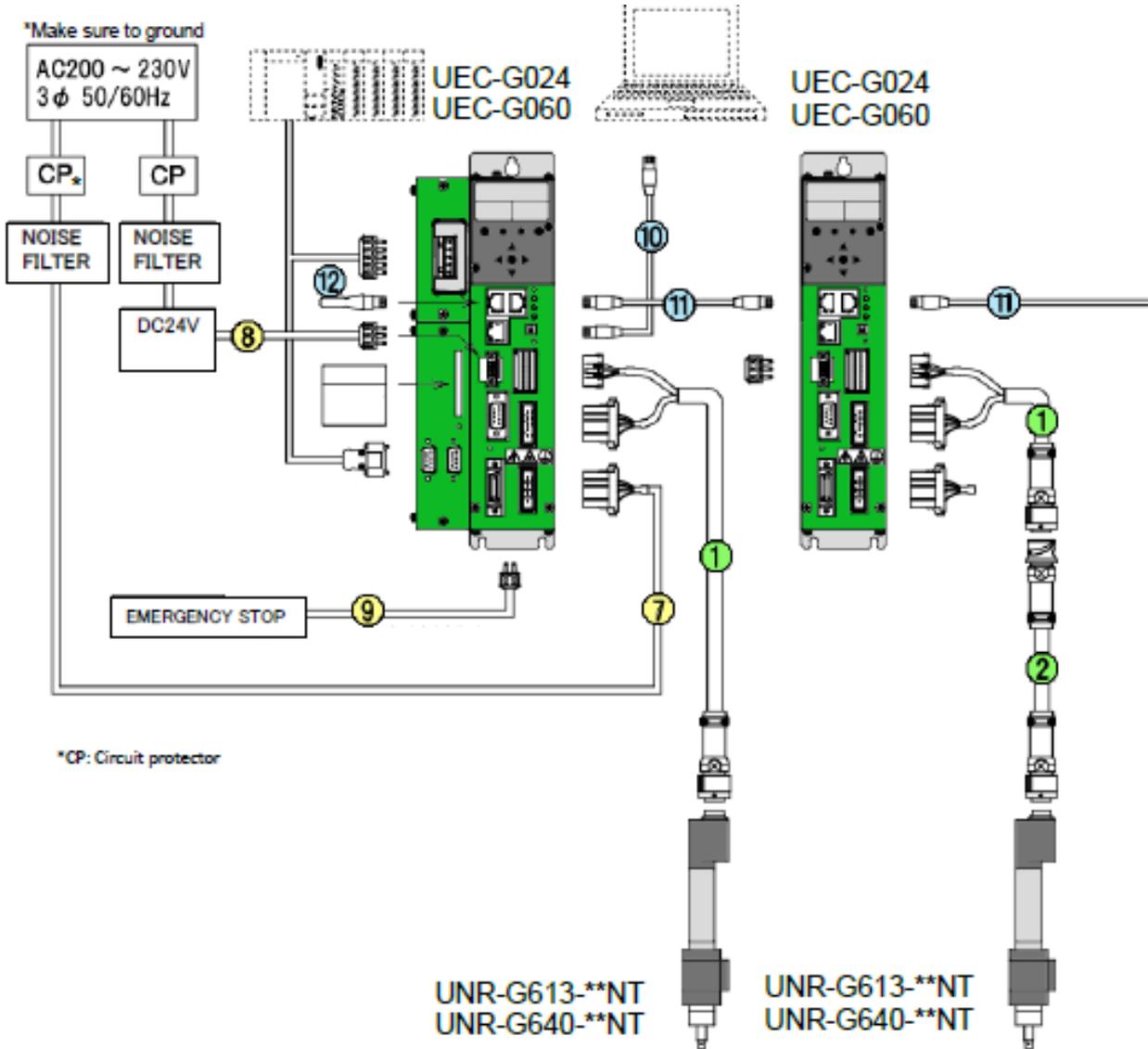
※MASTER and SLAVE spindles of the UNR-G series user console (PC) and I/O (PLC control are set using the special function SW1 switch on the front of the unit. Refer to PAGE 2-18 "Special function SW1 switching setting".

●Correspondence table by system

System configuration	Main
I/O (PLC) Control	MASTER units control all units
AUX. Connector (External) STOP	
Parameter (sequence) selection method	PLC I/O Input (Factory-set) ID Input UNR-G user console
Self-check function disabled	PLC I/O Input
During tightening operation START signal OFF stopped	Unit front SW1:2 number
Unit RS232C Out	Programmable
Fieldbus function	Enable
Extended RS232C function	Enable
Touch panel display	Enable
Indicator Par No.SYS D-No.003 [System-Display]	Multi

1-4-1. System construction

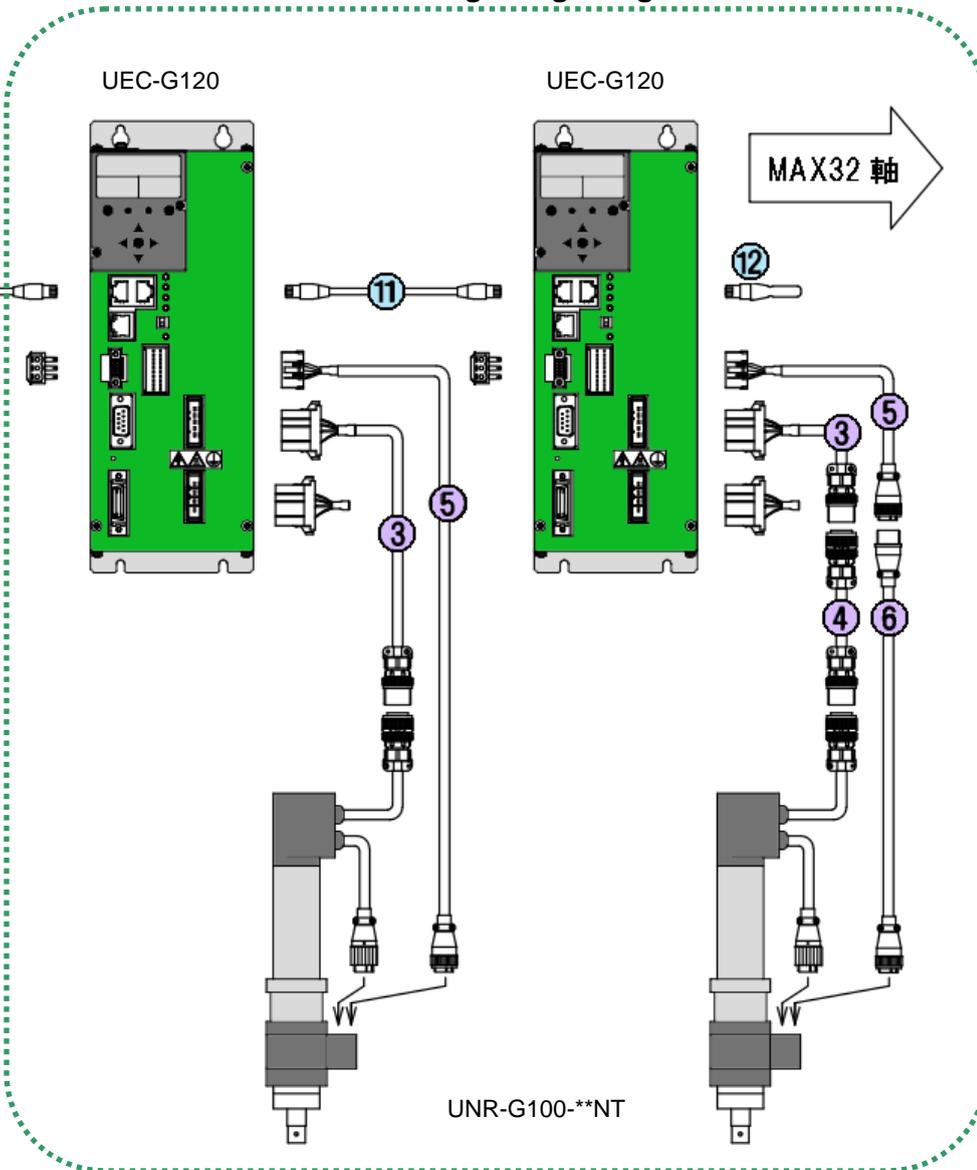
Unit setting	MASTER spindle No.1	SLAVE spindle No.2
Unit front SW1:8 No. "Communication spindle setting"	ON	OFF
System parameter D-No.SYS-003 [System indication]	Multi	Multi



*CP: Circuit protector

- LAN cable, circuit protector, and noise filter are not included. Circuit protectors and noise filters should be selected and prepared by the customer referring to our recommended products. (See PAGE 2-3 "G-Unit switch setting")
- When communicating between units, connect SPINDLE LINK IN connector of the leading spindle and SPINDLE LINK OUT connector of the terminating spindle with the inter-spindle communication cable. Or, connect the inter-spindle communication connector for folding. (See PAGE 3-24"SPINDLE LINK IN/OUT Interface)

When using a large single unit



※Refer to PAGE1-10 for more information on the individual cables/connectors.

1-5. How to check the model

1-5-1. Cable model

●System Wiring Diagram Cable List

No.	Item	Standard length [m]	Model	Remarks
1	Standard-tool cable (for G024,G060)	5,10,15	UK-ACGC1-*	
2	Extension tool cable (for G024,G060)	5,10	UK-ACGC2-*	
3	Standard Large Motor Cable (for G120)	5,10,15	UK-ACFA1-*	UNR-F series common
4	Extension Large Motor Cable (for G120)	5,10	UK-ACFA3-*	UNR-F series common
5	Standard Large Sensor Cable (for G120)	5,10,15	UK-ACGB1-*	
6	Extended Large Sensor Cable (for G120)	5,10	UK-ACGB2-*	
7	Drive power cable	2	UK-ACFPD-2	UNR-F series common
8	Control power connector	----	MC1.5/3-STF-3.81	Standard unit included
※1	Control power cable	2	UK-DCGPD-2	
9	STOP signal connector	----	MC1.5/2-STF-3.81	Standard unit included
※1	STOP signal-cable	2	UK-STPG-2	
10	PC communication cable (cross)	2	G-PC-CABLE-C	
	PC communication cable (straight)	2	G-PC-CABLE-S	Recommendation from URYU
11	Inter-spindle communication cable	0.2	F-SPINDLE-CABLE	UNR-F series common
12	Terminating resistor	----	G-END	

※1:Unless otherwise specified, these cables are shipped with connectors only.

※2:Refer to PAGE 1-25 for additional information.

1-5-2. Unit model

●Standard unit model

UEC- G 024

①

●Standard unit model list

Unit model	①Max. current of unit	Adaptive tool model
UEC-G024	24A	UNR-G613-***NT
UEC-G060	60A	UNR-G640-***NT
UEC-G120	120A	UNR-G100-***NT

●Extension unit model

UEC- GFB

①

●Extension unit model list

Unit model	①Mounting connector	Unit classification
UEC-GIO	Extended I/O (In: 32ch/ out: 32ch)	Extension unit 1
UEC-GFB	Fieldbus*1	Extension unit 1
UEC-GCC	CC-Link V2*2	Extension unit 1
UEC-GDN	DeviceNet*2	Extension unit 1
UEC-GPB	PROFIBUS DP-V1*2	Extension unit 1
UEC-GEN	Ethernet/IP*2	Extension unit 1
UEC-GPN	PROFINET IO *2	Extension unit 1
UEC-GCF	Compact Flash card-compatible Extension RS232C (2)	Extension Unit 2

※The Extension unit 1 and the Extension unit 2 can be installed for one standard unit. In addition, Extension units can be used with all standard units.

*1: Anybus-CompactCom module-board is not shipped with your computer.

*2: A UEC-FB is included. A Torx screwdriver (TORX: Size T9) for tightening screws for replacing modules is not included.

● List of Anybus-CompactCom Modules Single Units

Model	Fieldbus type	Description
ABCC-CCL	CC-Link	For Extension unit 1 CC-Link V2 Module Board*3
ABCC-DEV	DeviceNet	For Extension unit 1 DeviceNet Module Board*3
ABCC-DPV1	PROFIBUS DP-V1	For Extension unit 1 PROFIBUS DP-V1 Module Board*3
ABCC-EIPT	Ethernet/IP	For Extension unit 1 Ethernet/IP Module Board*3
ABCC-PRT	PROFINET IO	For Extension unit 1 PROFINET Module Board*3

*3: The Extension unit 1 (model: UEC-FB) with fieldbus is required when using the UNR-G series.

1-5-3. Tool model

To maintain the best tool condition, it is recommended that the tool be used in a torque range of 50% to 75% of the nominal torque.

• Tool model

UNR-G613-200NT

① ②

① Motor capacity

Symbol	Capacity
G613	70W
G640	200W
G100	250W

② Max. tightening torque

Symbol	Nominal torque [N · m]
50NT	5
800NT	80
10000NT	1000

• Straight type

Tool Number	Tool model	Max. torque [N · m]	Full scale torque [CAL]	Max. revs [rpm]	Mass [kg]	Applicable unit model
1	UNR-G613-50NT	5.0	11.5	5350	1.32	UEC-G024
3	UNR-G613-100NT	10.0	10.2	3000	1.32	UEC-G024
4	UNR-G613-200NT	20.0	44.0	1220	1.55	UEC-G024
5	UNR-G613-300NT	30.0	41.7	860	1.55	UEC-G024
6	UNR-G613-400NT	40.0	41.7	640	1.55	UEC-G024
11	UNR-G640-800NT	80.0	132.3	940	4.0	UEC-G060
12	UNR-G640-1000NT	100.0	132.3	760	4.0	UEC-G060
13	UNR-G640-1300NT	130.0	132.3	560	4.0	UEC-G060
21	UNR-G100-1900NT	190.0	252.6	720	8.4	UEC-G120
22	UNR-G100-2500NT	250.0	252.6	530	8.7	UEC-G120
23	UNR-G100-3700NT	370.0	382.4	370	10.2	UEC-G120
24	UNR-G100-5400NT	540.0	711.2	250	16.0	UEC-G120
25	UNR-G100-7000NT	700.0	711.2	170	16.0	UEC-G120
26	UNR-G100-10000NT	1000.0	1053.7	130	16.0	UEC-G120

※For tools other than listed, contact us.

1-6. Specification**1-6-1. UNR-G series system usage environment**

Drive power supply	Voltage	3 Phase AC200 ~ 230V ±10%
	Frequency	50/60Hz
Control power supply		DC24V ±10% 0.5A (UEC-G024, UEC-G060) DC24V ±10% 1.0A (UEC-G120)
Installation environment		A unit is installed in the dust-proof housing (control panel). Forced cooling / heating equipment is required outside the following operating range.
Usage	Ambient temperature	0°C to +45°C (with thermal convection)
	Ambient humidity	90%Rh or less (non-condensing)
Storage	Ambient temperature	-5°C to +55°C (no freezing)
	Ambient humidity	90%Rh or less (non-condensing)
Boatlift	Ambient temperature	-5°C to +55°C (no freezing)
	Ambient humidity	50%Rh or less (non-condensing)
	Packing method	Perfect seal
Atmosphere		Indoors (not exposed to direct sunlight) No corrosive gas, flammable gas, oil mist, dust, etc.



- Do not use the product in a closed environment. When used in an enclosed environment, the life of the tool will be shortened due to the high temperature of the motor.

1-6-2. Nutrunner performance

Torque accuracy	<ul style="list-style-type: none"> • Torque accuracy within the full scale torque range (x1/2 to 1): $3\sigma/X[\%]$ Within 3% • Torque accuracy within the full scale torque range (x1/4 to 1/2): $3\sigma/X[\%]$ Within 4% <p>(σ: Standard deviation, Q: Mean value, $3\sigma/F$: Torque accuracy)</p> $\bar{X} = \frac{1}{N} \sum_{i=1}^N X_i$ $s = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (X_i - \bar{X})^2}$ <p>{n : Total number of tightening data, xi (i=1,2,3,..., n) : respective tightening data}</p>
Angle display minimum unit	0.1 Degree
Angle internal control unit	0.1 Degree
Torque transducer accuracy	±1% (full scale)
Torque transducer linearity	±0.5%
Tightening method	Torque method / Angle method

1-6-3. Unit specifications

Unit model	UEC-G024	UEC-G060	UEC-G120
Display	6 Character x 2 lines 7-segment LED indicator, Function switch: 9 pcs.		
Switch	Spindle Off Slide Switch: RUN/BYPASS Switch Setting Switch: for user setting (unit front face) Spindle Setting Switch: Up to 32 spindles settable (1 spindle to 32 spindles) Internally set switch: 8bit for adjustment by manufacturer (on bottom of unit)		
LED	MULTI LED、STATUS LED、JUDGE LED、COM. LED、BYPASS LED CONTROL POWER LED, Ethernet LED		
CPU	SH-2A		
RS232C communication	38400bps (factory-set)/ 19200bps/9600bps, 1-port		
External analog Monitor output	Torque analog voltage, angle pulse, forward/reverse pulse, etc.		
Inter-spindle communication	Inter-spindle communication dedicated port (Maximum number of connections: 32 spindles)		
Ethernet	Compatible with PC communication port IEEE 802.3 (100BASE-T)		
Standard I/O	Input	Bi-directional photocoupler input DC 12V 5mA / DC 24V 10mA input point 12ch ※Both NPN (sink-common) and PNP (source-common) types can be connected.	
	Output	Photo MOS relay contact DC 24V 30mA number of outputting points 12ch ※Both NPN (sink-common) and PNP (source-common) types can be connected.	

Unit model	UEC-G024	UEC-G060	UEC-G120
RTC	Time display : Year/month/day/hour/minute/second Holding time : 30 days (fully charged, at ambient temperature of 20°C)		
Protective function	Overload: Load factor of 100% or more Driver overheat: Heat sink temperature over 80°C Overcurrent (short-circuit proof): Excessive current due to output-short circuit and/or ground fault, etc. Control power supply Voltage drop: Control power supply DC24V±2.4V or less Soft charge incomplete: Incomplete Charge of the drive power supply capacitor resolver error: Resolver burnout, tracking error CPU error: CPU watchdog timer		
Insulation resistance	50 MΩ or more /DC500V		
Dielectric strength	Below AC1500V/10mA		
Inrush current value when the drive power is turned on	22A max	22A max	40A max
Inrush current value when the control power is turned on	15A max (Convergence duration: 36ms)		
Continuous drive current (*1)	2.0 Arms	4.0 Arms	5.2 Arms
Instantaneous Max. Output Current	17.0 Arms	42.4 Arms	84.8 Arms
Power on/off Allowable number of times (*2)	1,000 Million times	300 Million times	250 Million times
Power on/off Allowable cycle (*3)	10 Seconds	10 Seconds	15 Seconds
Radiator fan	None	None	Yes
Back heat sink	None	Yes	Yes
Mass (kg)	1.62	1.98	4.90

(*1): Allowable current value in continuous constant output current (constant load torque) driving.

Limits mainly due to temperature rise of the heat sink

(*2): Life expectancy until soft charge resistance blows at maximum rated voltage (*3):

Limited value under continuous operation for long time (no limit in small number of times)



Precautions for drive power-on cycle]

- The power input circuit of the module is a capacitor input type. Therefore, there is an incorporated circuit that charges through a resistor by suppressing the inrush current at power-on until the internal voltage reaches a certain reference.
- The inrush current suppression resistor has a mechanical life. When turning OFF and ON the drive power at a fixed cycle, consider turning on/off the drive power with reference to the "Allowable number of times the drive power is turned on/off" table above.



• Pay attention to static electricity because the unit contains many electronic components. Excessive static electricity may be generated in a dry place. Before touching the operation switches on the front panel, touch a grounded metal object to discharge static electricity from the human body.

1-6-4. Duty calculation method

Duty is the ratio of the tool stop time to the tightening time.
 In the UNR-G series Nutrunner system, the duty is calculated as shown below.

$$\text{Duty (\%)} = \text{Tightening time} \div (\text{Tightening time} + \text{Idle time}) \times 100$$

1 cycle time specification depends on each tool, but should normally be less than 60%. If operation is continued with the duty factor exceeding 60%, an alarm A.08-10 "Overload error" may occur. Contact us for information on the time specifications for the 1 cycle.

1-6-5. Fieldbus specifications

Fieldbus name	I/O input/output		Message input/output	
	MASTER spindle → PLC	PLC→MASTER spindle	MASTER spindle → PLC	PLC→MASTER spindle
CC-Link V1.10	14 bytes (112 point)	14 bytes (112 point)	32bytes (16words)	30bytes (15words)
CC-Link V2.00	110 bytes (880 point)	110 bytes (880 point)	144bytes (72words)	142bytes(71 words)
DeviceNet	32 bytes (256 point)	12 bytes (96 point)	2048Ch. (4096bytes)	16Ch. (32bytes)
PROFIBUS DP-V1	32 bytes (256 point)	12 bytes (96 point)	2048words (4096bytes)	16words (32bytes)
ErtherNet/IP	32 bytes (256 point)	12 bytes (96 point)	2048words (4096bytes)	16words (32bytes)
PROFINET IO	32 bytes (256 point)	12 bytes (96 point)	2048Ch. (4096bytes)	16Ch. (32bytes)

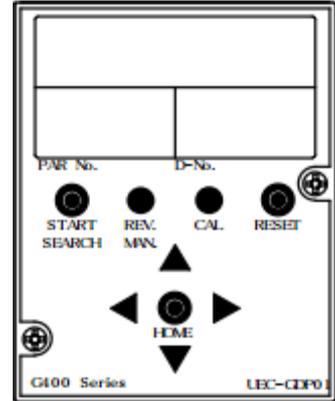
1-7. Names of the Parts

1-7-1. Unit front panel switch connector

● UEC-G024 · UEC-G060

Insert the connector on the back of the display here.

1:Indicator (UEC-DP01)



1:Display Mounting connector

2:Spindle Communication Connector IN/OUT

3: For PC communication ETHERNET Connector

4:Control power connector

5:RS232C Connector

6:Normal I/O Connector (IN: 12ch/OUT: 12ch)

A:Special function SW1

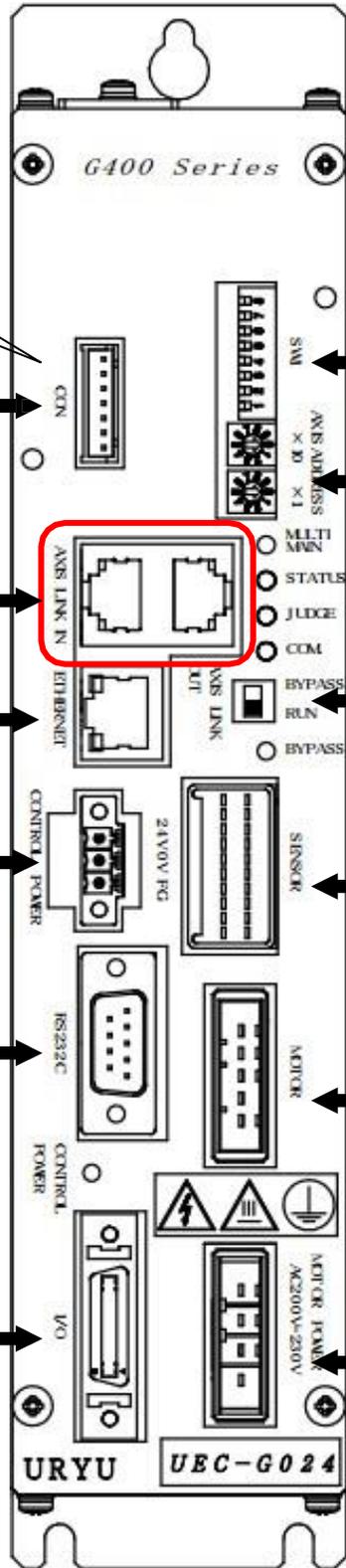
B:Spindle number switch

C:RUN/BYPASS Switch
 RUN : Operation ready
 BYPASS: Spindle-off status

7:Sensor connector

7:Motor connector

8:Drive power connector



※The above figure shows the unit model: UEC-G024, UEC-G060.

• Front panel item list

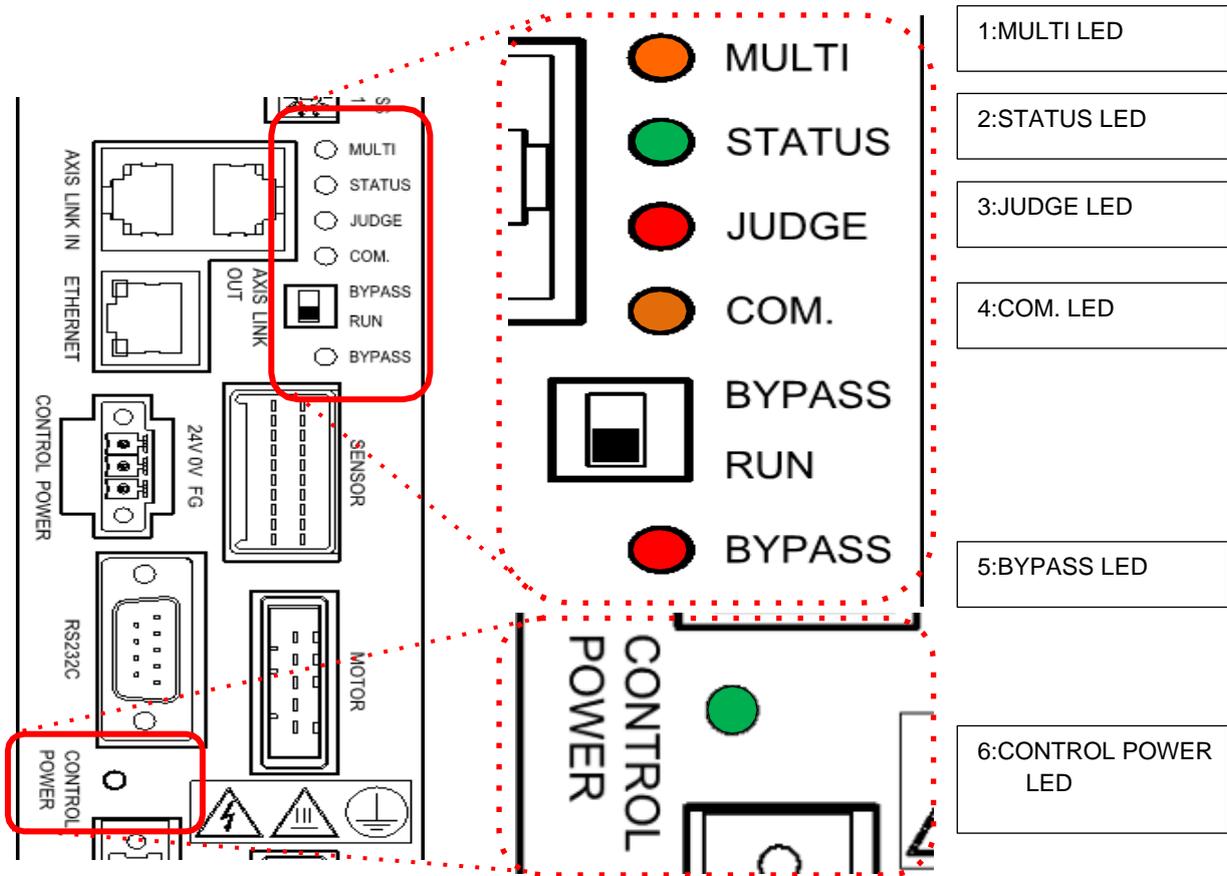
• Connector list

No.	Item	Contents	Reference section
1	Display	The parameters and tightening results can be checked by mounting on the module.	PAGE 5-2
	Display mounting connector	Insert the connector on the back of the display.	
2	Spindle cable connector IN/OUT	Communication port between units.	PAGE 3-24
3	PC Signal connectors	Communication port for the UNR-G series user console and touch panel.	PAGE 3-15
4	Control power connector	Connect the control power supply. DC 24V	PAGE 3-3
5	RS 232C connector	Outputs the tightening result.	PAGE 3-9
6	Standard I/O connector- In: 12ch/ out: 12ch	Connect the input and output signals from an external source. In addition, the available signals depend on the main system and single system, PC communication and I/O(PLC) control MASTER and SLAVE spindles.	PAGE 2-4
7	Sensor connector	Connect the tool cable.	PAGE 3-5
	Motor connector		
8	Drive power connector	Connect the drive power supply. AC200~230 V (±10%)、50/60 Hz	PAGE 3-3

• Switch list

No.	Item	Contents	Reference section
A	Special function SW1	Special functions related to tightening are set.	PAGE 2-16
B	Spindle number switch	Set the spindle No. for communication.	PAGE 2-15
C	RUN/BYPASS button	Switches the unit status. RUN : Ready for operation BYPASS: Spindle Disabled status	PAGE 5-5

1-7-2. Front-Panel LED



● LED Indication List (1/2)

No.	Name	Color	Condition	Contents
1	MULTI LED	Green	<ul style="list-style-type: none"> Total tightening judgment: OK T/D Integrated System Checking: OK 	<ul style="list-style-type: none"> The tightening results of all spindles are within the judgment range. CAL and ZERO voltage checks of all connected units are within tolerance.
		Orange	During tightening operation	During tightening operation
		Red	<ul style="list-style-type: none"> Overall tightening judgment: NOK T/D Comprehensive System-Check: NG 	<ul style="list-style-type: none"> The tightening result is out of the judgment range even for 1 spindle. CAL and ZERO voltages are checked on even 1 spindle, if they are out of tolerance.
2	STATUS LED	Green	Tightening ready	Can operate on external input signals
		Orange	During tightening operation	Tool tightening operation in progress (forward/reverse)
		Red	System error occur	An error occurs during system or tightening operation.

● LED Indication List (2/2)

No.	Name	Color	Condition	Contents
3	JUDGE LED	Green	<ul style="list-style-type: none"> • Spindle determination: OK • T/D System Check: OK 	<ul style="list-style-type: none"> • The tightening result of each spindle is within the judgment range. • CAL and ZERO Voltages checking: Within tolerance
		Red	<ul style="list-style-type: none"> • Spindle-judging: NOK • T/D System-Check: NG 	<ul style="list-style-type: none"> • The tightening result of each spindle is out of the judgment range. • CAL Voltage and ZERO Voltage Checking: Out of Tolerance
4	COM. LED	Orange	Communication in operation	Communication operation between units or between PC
5	BYPASS LED	Off	RUN (ready for operation) status	System is in RUN (ready for operation) status
		Orange	BYPASS (spindle cut) status	System is in BYPASS (spindle disabled)
		Red	Drive power is not supplied.	Drive power is not supplied.
6	CONTROL POWER LED	Green	Control power input in progress	Control power is being input
		Red	Unit error	Critical error occurs in the system

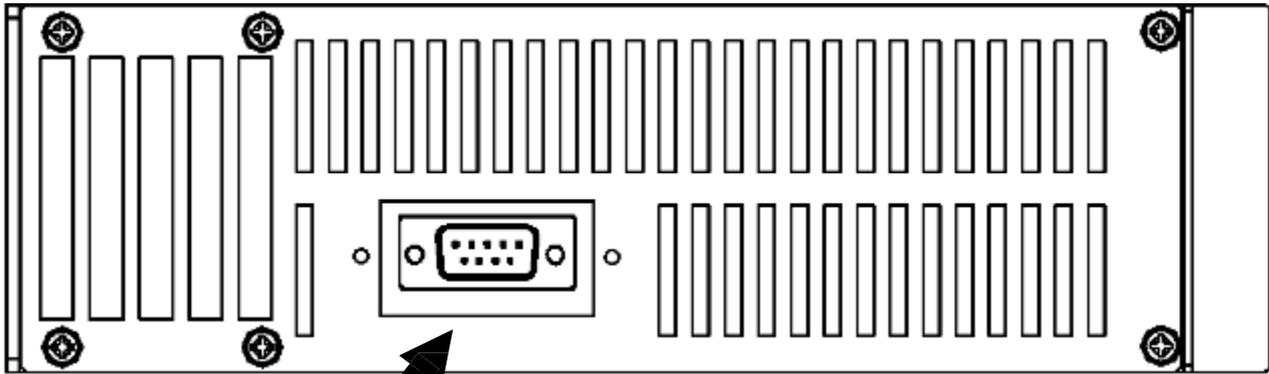


CAUTION

• If **CONTROL POWER LED** lights in red, no alarm number is displayed on the unit's display (see PAGE 9-2), and PLC I/O output-signal "ALARM" does not become "ON". (Refer to PAGE 2-9) Please contact us in such cases.

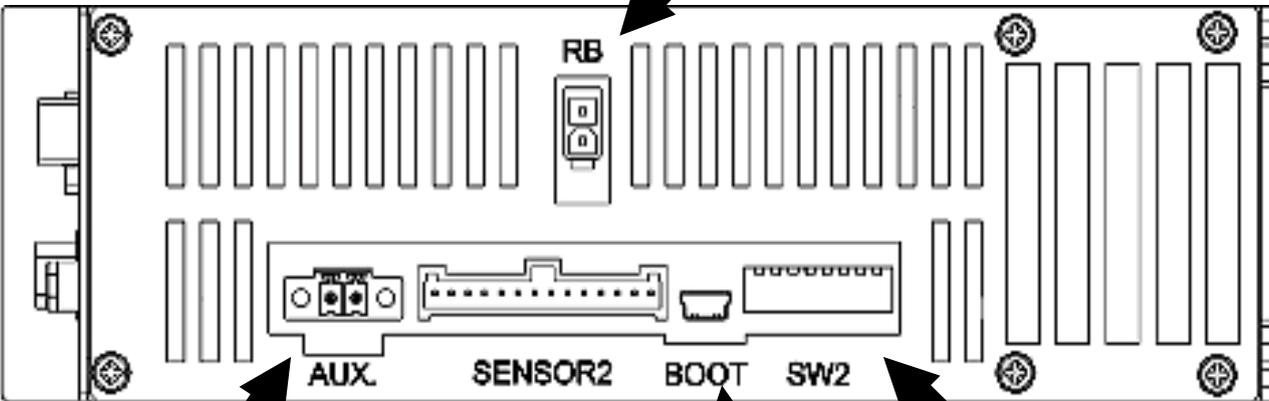
1-7-3. Unit Bottom/Top Panel Switch/Connector

● UEC-G024 · UEC-G060



1: External monitor output connector

2: External regenerative resistor connector



3: External STOP Signal connector

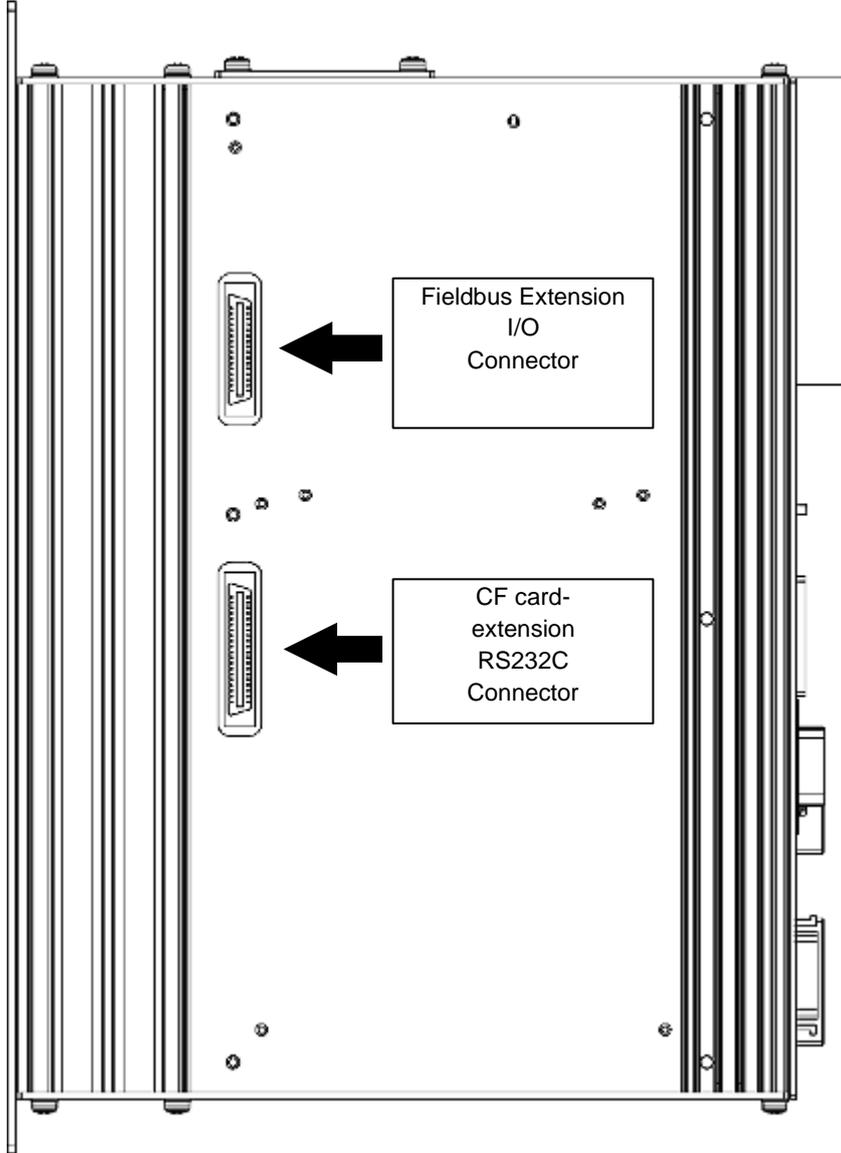
4: BOOT Communication Connector

5: Bottom panel SW2 switch

●List of Unit Bottom/Top Panel Switches/Connectors

No.	Item	Contents	Reference section
1	External monitor output connector	Outputs analog voltage of torque and monitor signals such as angle pulse.	PAGE 3-7
2	External regenerative resistor connector	For manufacturer adjustment	-
3	External STOP signal connector	The tightening operation can be terminated forcibly by inputting an external STOP. (The setting of the bottom-panel SW2 switching No.1 is required.)	PAGE 3-23
4	BOOT communication connector	For manufacturer adjustment	-
5	Bottom-Panel SW2 Switches	Change the settings related to the function of the unit.	PAGE 2-17

1-7-4. Unit side connector



● Unit side panel connector list

Item	Contents	Reference section
Fieldbus Extension I/O connector	Extension unit 1 can be installed.	PAGE 1-24
CF card / Extension RS232C connector	Extension unit 2 can be installed.	

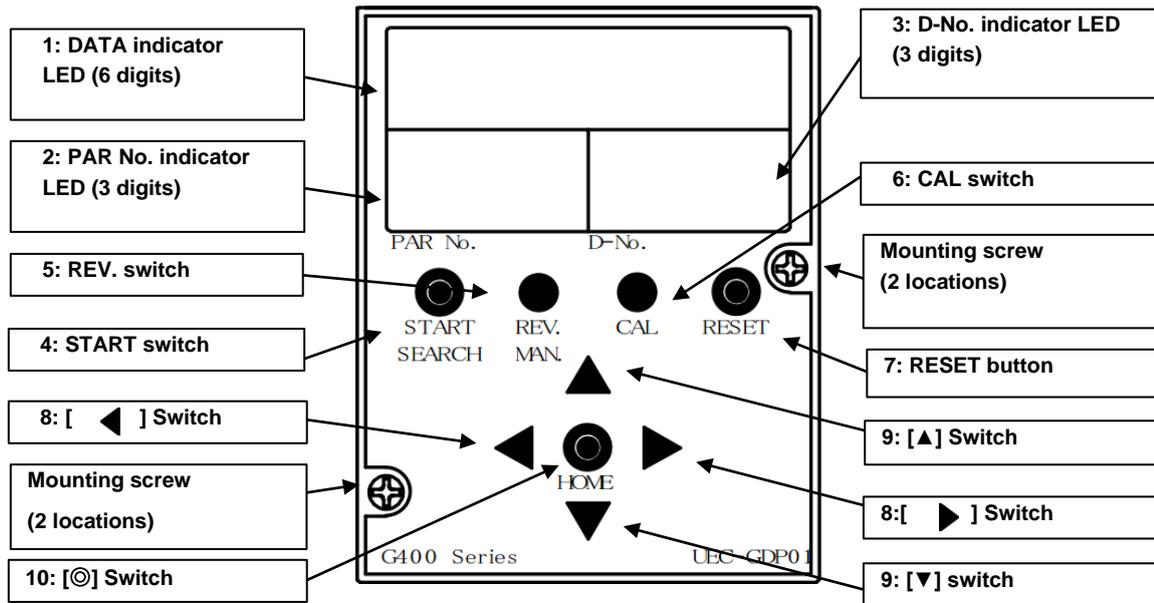
1-7-5. Unit indicator switch/ LED

Setting of parameters and tightening results can be checked by mounting the unit display to the unit. The display can be directly attached to CON connector. It can be removed after the control power supply is turned on. The unit can also be used with the display removed.



• When installing the display, tighten the mounting screws (2 locations) shown in the figure below to fix the display to the unit. If the display comes off, injury or damage may result.

Refer to PAGE 5-2 "Unit Indicator" for detailed operating instructions.



No.	Item	Contents
1	DATA indicator LED (6 digit)	The operation result data and setting data are displayed.
2	PAR No. indicator LED (3 digit)	Displays the display mode and parameter number. When an error occurs, the alarm number is displayed.
3	D-No. indicator LED (3 digit)	This displays the number of the data displayed in DATA area. If an error occurs, the alarm sub code is displayed. During tightening operation, the current speed status is displayed.
4	START switch	Tightening starts by pressing.
5	REV. switch	The tool rotates in reverse while pressed.
6	CAL switch	CAL voltage is checked while it is pressed.
7	RESET button	ZERO voltage is checked while it is pressed. It also resets the system by pressing.
8	[◀] [▶] switch	Used to switch between display modes and change setting digits.
9	[▲] [▼] switch	Used to switch display data and change setting data.
10	[◎] (SET)	Used to confirm the setting data.

1-7-6. Extension unit

- Extension unit 1
(UEC-DT, UEC-FB, UEC-CC, UEC-DN UEC-PB, UEC-EN, UEC-PN)

Fieldbus connector mounting slot
 • CC-Link Ver2.00(Ver1.10)
 • DeviceNet
 • EtherNet/IP
 • PROFIBUS DP-V1
 • PROFINET IO

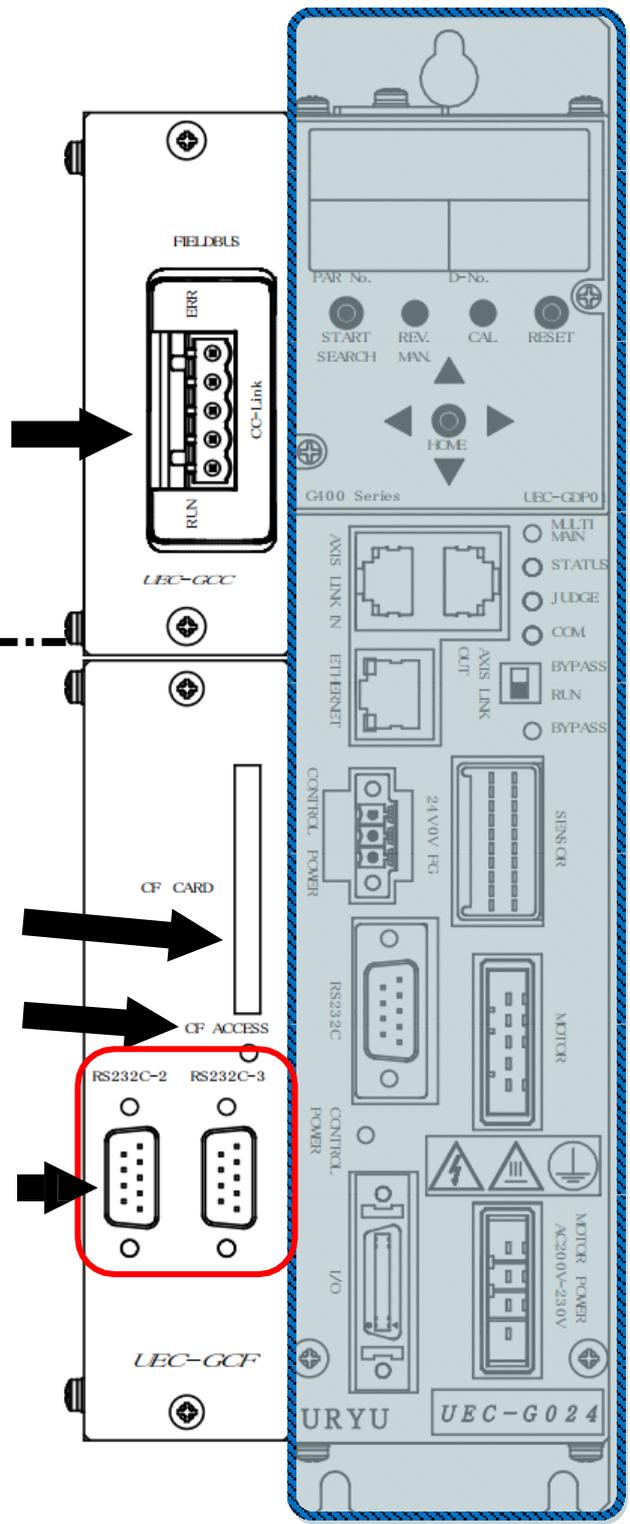
Extended D-I/O Connector (MFC-DT)
 In: 32ch/ Out: 32ch

- Extension unit 2 (UEC-GCF)

CF card slot

CF ACCESS LED

Extension RS232 Connector



●List of Extension Unit Functions

Function	Contents	Reference section
FIELDBUS connector-mounting slot	Mount the connector for external control.	PAGE 4-2
Extension D-I/O Connector	Connect the input and output signals from an external source.	PAGE 4-2
CF card slot	Compact Flash (CF) Insert the card.	PAGE 4-28
CF ACCESS LED	Indicates the status of CF card. This indicator lights up.	PAGE 4-28
Extension RS232C Connector	Enter ID data/output of the tightening result.	PAGE 4-38

1-7-7. Cable specifications

◆UNR-G series system cable model list

№	Name	Model	Unit connection point	Reference section
1	Drive power cable	UK-ACFPD-**	MOTOR POWER AC200 ~230V	PAGE 1-26
2	Standard-tool cable (for 24A/60A)	UK-ACGC1-**	SENSOR /MOTOR (2 Location)	PAGE 1-27
3	Relay tool cable (for 24A/60A)	UK-ACGC2-**	SENSOR /MOTOR (2 Location)	PAGE 1-28
4	Standard Large Motor Cable (fr 120A)	UK-ACFA1-**	MOTOR	PAGE 1-29
5	Relay Large Motor Cable (for 120A)	UK-ACFA3-**	MOTOR	PAGE 1-29
6	Standard Large Sensor Cable (for 120A)	UK-ACGB1-**	SENSOR	PAGE 1-30
7	Relay Large Sensor Cable (for 120A)	UK-ACGB2-**	SENSOR	PAGE 1-30
8	Control power cable	UK-DCGPD-**	CONTROL POWER	PAGE 1-31
9	STOP signal-cable	UK-STPG-**	AUX. ※Bottom of the unit	PAGE 1-32
10	PC communication cable (cross)	G-PC-CABLE-C	Ethernet	PAGE 1-33
11	PC communication cable (straight)	G-PC-CABLE-S	Ethernet	PAGE 1-33
12	Spindle cable	F-SPINDLE-CABLE	AXIS LINK IN or AXIS LINK OUT	PAGE 1-34
13	Spindle connector	G-END	AXIS LINK IN or AXIS LINK OUT	PAGE 1-34
14	Extension I/O Cable	UK-IOG-**	Extension unit 1 (UEC-DT): PLC I/O	PAGE 1-35

■ Drive power cord model: UK-ACFPD-** (**:Cable length)

Standard cable length [m]	2
---------------------------	---

● Cable Drawing



● Connector model number

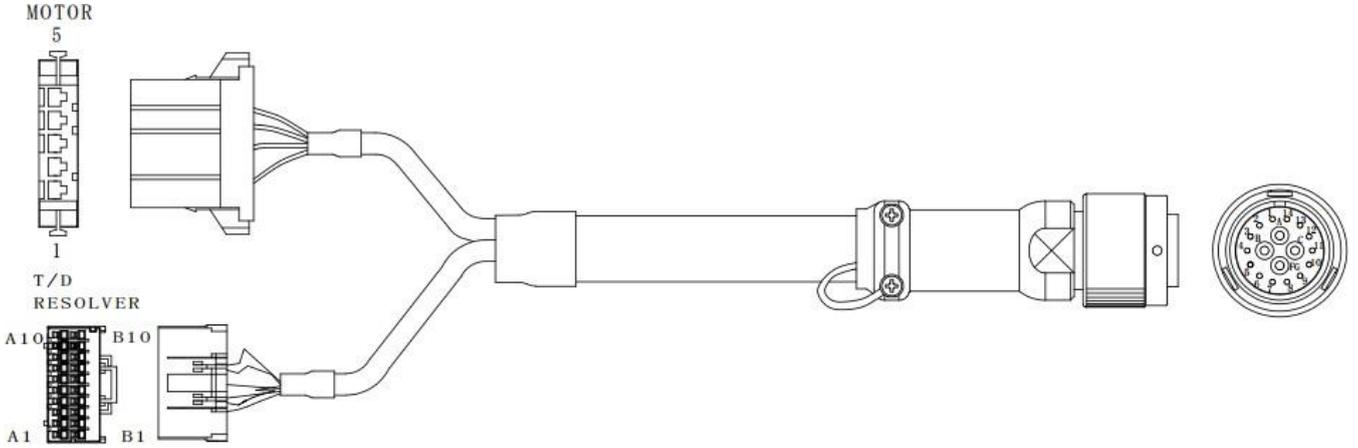
Type	Manufacturer	Model number
D3200S housings	AMP	1-178128-4
Contact	AMP	1-353717-2

● Standard Tool Cable Specifications October 24, 2023

■ Standard-tool cable (for 24A/60A) Model: UK-ACGC1-** (**: Cable length)

Standard cable length [m]	5, 10, 15, 20, 25
---------------------------	-------------------

● Cable Drawing



Controller				Tool	
J2IDF-20V-KX-L(JST)				DCA3106A16-18BS-D(D17)(DDK)	
Contents	Color	Size	Pin No.	Pin No.	
(T/D) SCL	Grey/Green	AWG26	A8	5	
(T/D) SDA	Orange	AWG26	B8	6	
(T/D) TQ IN+	Red	AWG26	A7	9	
(T/D) TQ IN-	White	AWG26	B7	10	
(T/D) GND	Brown/White	AWG26	A6	7	
(T/D) CAL CMD	Yellow	AWG26	B6	8	
(T/D) +12V	Blue	AWG26	A5	11	
(T/D) -12V	Purple/Red	AWG26	B5	12	
FG	Shield	B4	(Shielded wire connection)		
(RESOLVER) R1	Green	AWG26	A1	1	
(RESOLVER) R2	Orange	AWG26	B1	2	
(RESOLVER) S2	Blue	AWG26	A3	3	
(RESOLVER) S4	Red	AWG26	B3	4	
(RESOLVER) S1	White	AWG26	A2	13	
(RESOLVER) S3	Yellow	AWG26	B2	14	
FG	Shield	A4	(Shielded wire connection)		
			I-178288-5		
			I-175196-2(AMP)		
FG	Green	1	(Shielded wire connection)		FG (Shielded wire connection)
(MOTOR) W	Black	AWG17	3		C
(MOTOR) V	White	AWG17	4		B
(MOTOR) U	Red	AWG17	5		A

●Connector model No. (unit side: motor)

Type	Manufacturer	Model number
D3100S housings	AMP	1-178288-5
Receptacle contact	AMP	1-175196-2

●Connector model No. (Unit side: Resolver & T/D)

Type	Manufacturer	Model number
Wire to Wire Connector	JST	J21DF-20V-KX-L
Lise Contact	JST	SJ2F-002GF-P1.0

●Connector model No. (tool side)

Type	Manufacturer	Model number
Connector	DDK	DCA3106A16-18BS-D
Back shell	DDK	14T-11016-J12+C
Back shell clamp	DDK	14T-11016-J13+A

■ Repeater Tool Cable Model: UK-ACGC2-**

Standard cable length [m]	5 , 10
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●Cable Drawing



●Connector model number

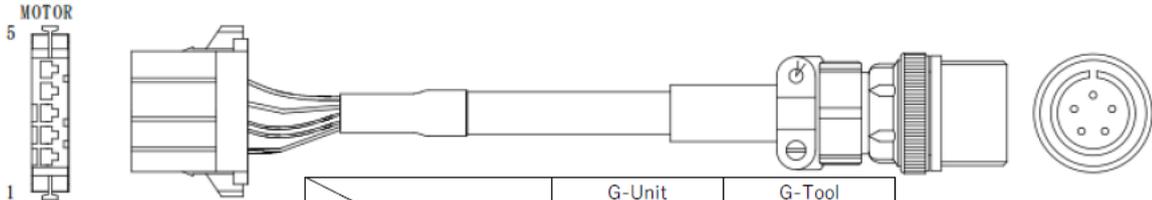
Type	Manufacturer	Model number
Connector (unit side)	Daiichi Electronics	DCA3106A16-18BS-D
Connector (cable side)	Daiichi Electronics	DCA3102A16-18BPS-D(D17)
Back shell case	DDK	14T-11016-J12+B
Back shell clamp	DDK	14T-11016-J13+A

● Standard large motor cable specifications

■ Standard Large Motor Cable (for 120A) Model: UK-ACFA1-** (**: Cable length)

Standard cable length [m]	5 , 10 , 15 , 20 , 25
---------------------------	-----------------------

● Cable Drawing



		G-Unit	G-Tool
		I-178288-5 I-353717-2(3L) (AMP)	MS3101B18-11S MS3057-10A (JAE)
Color	Signal contents	Pin No.	Pin No.
Red	U	5	A
White	V	4	B
Black	W	3	C
Green	Earth Shield	1	D

●Connector model No. (unit side)

Type	Manufacturer	Model number
D3100S Lise housings	AMP	1-178288-5
Receptacle contact	AMP	1-175196-2

●Connector model No. (tool side)

Type	Manufacturer	Model number
Connector	JAE	MS3101B18-11S
Back shell	JAE	MS3057-10A

■ Relay Large Motor Cable (for 120A) Model: UK-ACFA3-** (**: Cable length)

Standard cable length [m]	5 , 10
---------------------------	--------



●Connector model number

Type	Manufacturer	Model number
Tool side connector	JAE	MS3101B18-11S
Unit side connector	JAE	MS3106B18-11P
Cable clamp	JAE	MS3057-10A

■ Standard Large Sensor Cable (for 120A) Model: UK-ACGB1-** (**: Cable length)

Standard cable length [m]	5, 10, 15, 20, 25
---------------------------	-------------------

● Cable Drawing



			Controller		Sensor Casing	
			J21DF-20V-KX-L (JST)		SRCN6A21-16S(JAE)	
Contents	Color	Size	Pin No.		Pin No.	
(T/D) SCL	Blue	0.2sq	A8		1	
(T/D) SDA	White	0.2sq	B8		2	
(T/D) TQ IN+	Yellow	0.2sq	A7		3	
(T/D) TQ IN-	White	0.2sq	B7		4	
(T/D) GND	Green	0.2sq	A6		5	
(T/D) CAL CMD	White	0.2sq	B6		6	
(T/D) +12V	Red	0.2sq	A5		7	
(T/D) -12V	White	0.2sq	B5		8	
FG	Shield	B4 (Shielded wire connection)				
(RESOLVER) R1	Purple	0.2sq	A1		14	
(RESOLVER) R2	White	0.2sq	B1		15	
(RESOLVER) S2	Blue	0.2sq	A3		10	
(RESOLVER) S4	Brown	0.2sq	B3		11	
(RESOLVER) S1	Yellow	0.2sq	A2		12	
(RESOLVER) S3	Brown	0.2sq	B2		13	
FG	Shield	A4 (Shielded wire connection)			16	

● Connector model No. (unit side)

Type	Manufacturer	Model number
Wire to Wire Connector	JST	J21DF-20V-KX-L
Lise Contact	JST	SJ2F-002GF-P1.0

● Connector model No. (tool side)

Type	Manufacturer	Model number
Connector	JAE	SRCN6A21-16S

■ Connecting Large Sensor Cable (for 120A) Model: UK-ACGB2-** (**: Cable length)

Standard cable length [m]	5, 10
---------------------------	-------



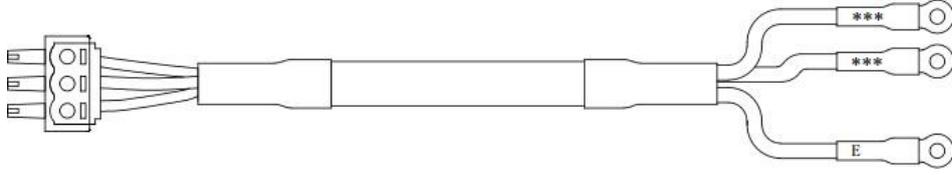
● Connector model number

Type	Manufacturer	Model number
Tool side connector	JAE	SRCN6A21-16S
Unit side connector	JAE	SRCN1A21-16P

■ Control power cable (common to all units)

Model: UK-DCGPD-** (**: Cable length)

Standard cable length [m]	2
---------------------------	---



Color	Signal contents	Pin No.	Mark tube No.
Red	DC24V	1	
White	DC 0V	2	
Black	FG	3	E

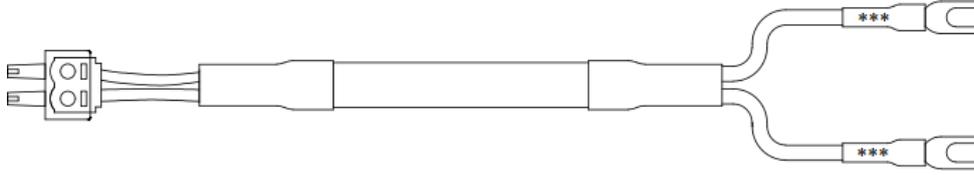
●Connector model No. (unit side)

Type	Manufacturer	Model number	Specification
Connector	Phoenix Contact	MC 1.5/3-STF-3.81	Applicable wire size AWG20~22 or 0.3mm ² ~0.5mm ²

- Unless otherwise specified, the control power cable is shipped only with the connector.
- If you wish to have a control power cord (2m), order the power cord with the model number above.

■ STOP signal cable model: UK-STPG-** (**: cable length)

Standard cable length [m]	2
---------------------------	---



Color	Signal contents	Pin No.	Mark tube No.
White	STOP +	1	
Black	STOP -	2	

●Connector model No. (unit side)

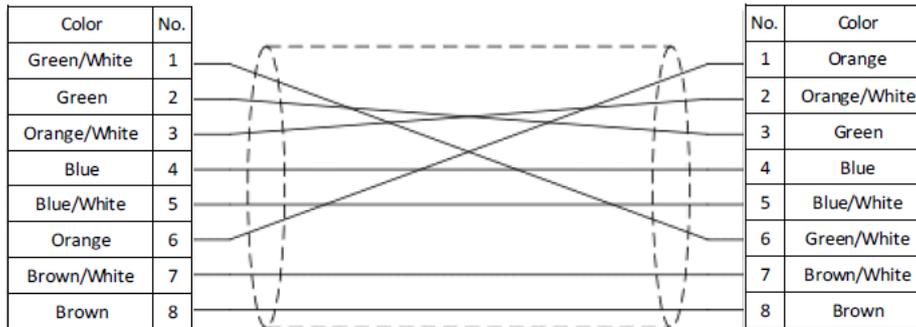
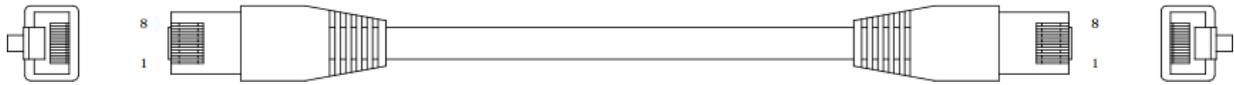
No.	Type	Manufacturer	Model number	Specification
1	Connector	Phoenix Contact	MC 1.5/2-STF-3.81	Applicable wire size AWG20~22 or 0.3mm ² ~0.5mm ²

- Unless otherwise specified, STOP signal cable is shipped only with the connector.
- If you wish to have a STOP signal cable (2m), please order using the above model number.

■ PC communication cable (cross) Model: G-PC-CABEL-C

Standard cable length [m]	2
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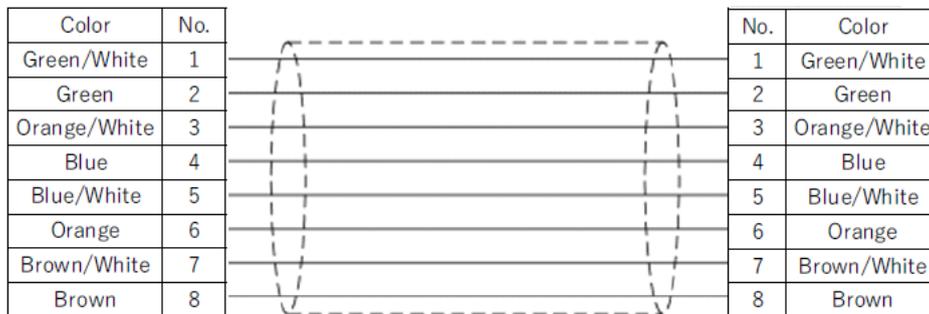
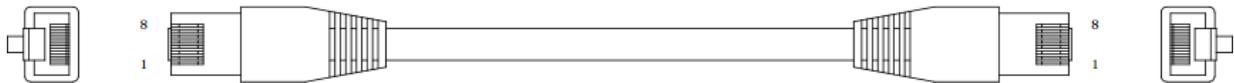
● Cable Drawing



■ PC communication cable (straight) model: G-PC-CABLE-S

Standard cable length [m]	2
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● Cable Drawing



■ Spindle cable Model: F-SPINDLE-CABLE

Standard cable length [m]	2
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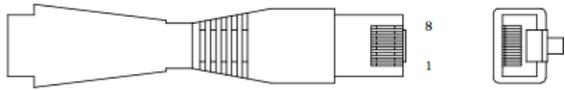
● Cable Drawing



Color	No.			No.	Color
Green/White	1		1	Green/White	
Green	2		2	Green	
Orange/White	3		3	Orange/White	
Blue	4		4	Blue	
Blue/White	5		5	Blue/White	
Orange	6		6	Orange	
Brown/White	7		7	Brown/White	
Brown	8		8	Brown	

■ Spindle connector model: G-END (2 Pcs.: 1 set) (Terminal Resistance)

● Cable Drawing

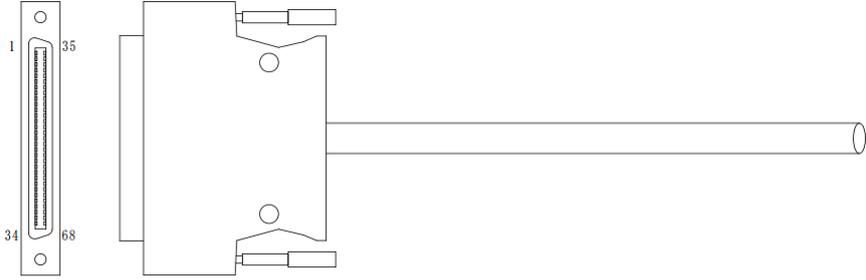


No.	Color
1	Green/White
2	Green
3	Orange/White
4	Blue
5	Blue/White
6	Orange
7	Brown/White
8	Brown

■ Extension I/O cable model: UK-GIO

Standard cable length [m]	2
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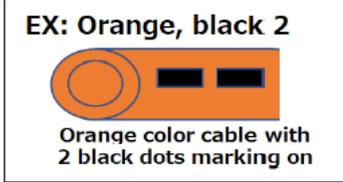
● Cable Drawing



● Connector model No. (unit side)

Type	Manufacturer	Model number
Case	HRS	DX-68-CV1
Connector	HRS	DX31A-68P(50)

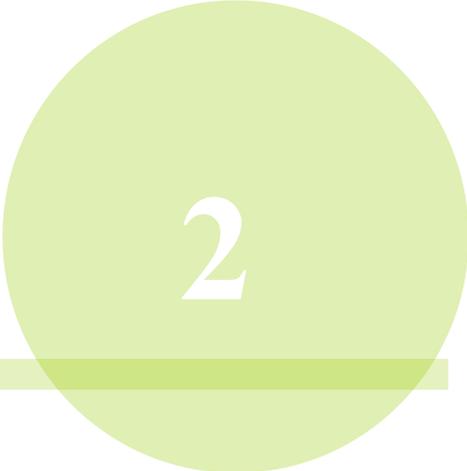
• For customers who wish to use the extended I/O cable (2m), order the cable with the model number above. In addition, when changing the overall length or connector shape depending on the operating distance and operating environment, select and prepare the cable by the user.



●Connector pin assignment

Pin No.	Wiring color*	Contents	Pin No.	Wiring color*	Contents
1	Blue/Red 1	IN COMMON1	35	Green/Red 4	OUT COMMON1
2	Blue/Black 1	IN COMMON2	36	Green/Black 4	OUT COMMON2
3	Pink/Red 1	Preparation for operation	37	Orange/Red 4	OUT DATA1
4	Pink/Black 1	Reset	38	Orange/Black 4	OUT DATA2
5	Green/Red 1	Reverse rotation	39	Gray/Red 4	OUT DATA3
6	Green/Black 1	Forward rotation	40	Gray/Black 4	OUT DATA4
7	Orange/Red 1	Start	41	Continuous Blue/Red	OUT DATA5
8	Orange/Black 1	Cycle start	42	Continuous Blue/Black	OUT DATA6
9	Gray/Red 1	Cycle count up	43	Continuous Pink /Red	OUT DATA7
10	Gray/Black 1	Cycle count clear	44	Continuous Pink/Black	OUT DATA8
11	Blue/Red 2	Step IN 1	45	Continuous Green/Red	OUT DATA9
12	Blue/Black 2	Step IN 2	46	Continuous Green/Black	OUT DATA10
13	Pink/Red 2	Step IN 3	47	Continuous Orange/Red	OUT DATA11
14	Pink/Black 2	Step IN 4	48	Continuous Orange/Black	OUT DATA12
15	Green/Red 2	Step IN 5	49	Continuous Gray/Red	OUT DATA13
16	Green/Black 2	Step IN 6	50	Continuous Gray/Black	OUT DATA14
17	Orange/Red 2	Step IN 7	51	Blue/Long-lit Red 1	OUT DATA15
18	Orange/Black 2	Work 9-16 Selection	52	Blue/ Long-lit Black 1	OUT DATA16
19	Gray/Red 2	Work 17-24 Selection	53	Pink/ Long-lit Red 1	OUT DATA17
20	Gray/black 2	Work 1 (9/17)	54	Pink/ Long-lit Black 1	OUT DATA18
21	Blue/Red 3	Work 2 (10/18)	55	Green/ Long-lit Red 1	OUT DATA19
22	Blue/Black 3	Work 3 (11/19)	56	Green/ Long-lit Black 1	OUT DATA20
23	Pink/Red 3	Work 4 (12/20)	57	Orange/ Long-lit Red 1	OUT DATA21
24	Pink/Black 3	Work 5 (13/21)	58	Orange/ Long-lit Black 1	OUT DATA22
25	Green/Red 3	Work 6 (14/22)	59	Gray/ Long-lit Red 1	OUT DATA23
26	Green/Black 3	Work 7 (15/23)	60	Gray/ Long-lit Black 1	OUT DATA24
27	Orange/Red 3	Work 8 (16/24)	61	Blue/ Long-lit Red 2	OUT DATA25
28	Orange/Black 3	Automatic/individual	62	Blue/ Long-lit Black 2	OUT DATA26
29	Gray/Red 3	Auto Z/C checking OFF	63	Pink/ Long-lit Red 2	OUT DATA27
30	Gray/Black 3	ID data clear	64	Pink/ Long-lit Black 2	OUT DATA28
31	Blue/Red 4	Manual Z/C checking	65	Green/ Long-lit Red 2	OUT DATA29
32	Blue/Black 4	Data select 0	66	Green/ Long-lit Black 2	OUT DATA30
33	Pink/Red 4	Data select 1	67	Orange/ Long-lit Red 2	OUT DATA31
34	Pink/Black 4	Data Select 2	68	Orange/ Long-lit Black 2	OUT DATA32

Chapter 2 Installation



2

Use the UNR-G series system according to the following instructions.

№	Item	Contents	Reference
1	Operating conditions	Installation of cooling/heating equipment	PAGE 1-13
2	Peripheral equipment of the G-unit	Circuit protector, noise filter, transformer capacity selection	PAGE 2-3
3	Selection of control device (I/O)	Connect only required control signals	PAGE 2-4
4	G-Unit switch setting	Factory setting (check before mounting the unit)	PAGE 2-15
5	Mounting the G-Unit	Mount the G-unit to the control panel based on the external dimensions, mounting dimensions, and mounting conditions.	PAGE 2-18
6	Connecting the Input Power	Input power wiring connection using the connector attached to the G-unit	PAGE 3-3
7	Routing the Tool Cable	Routing the Tool Cable and How to Install the Tool	PAGE 3-5
8	Wiring of various cables	Wiring of various cables • RS 232C Communication cable • PC communication cable (cross/straight) • STOP signal-cable • Spindle communication cable • Spindle communication connector	PAGE 3-7~
9	Check before turning on the power	Check the cable connections, wiring and power supply voltage.	PAGE 3-2
10	Connecting to a PC	Communicating with G User-Console via Ethernet Interface	PAGE 3-15
11	Set value	Set from UNR-G series user console • Setting of tightening parameters • Fieldbus setting, etc. (The tightening parameter can also be set on the display.)	PAGE6-2 User Console User's Manual
12	Trial run	Check of initial operation	PAGE 3-27

2-1. Peripheral equipment of the unit**● Recommended circuit protector**

Unit type	Circuit protector type (Manufacturer: Mitsubishi Electric)
UEC-G024	CP30-BA 3P 1-SD 5A
UEC-G060	CP30-BA 3P 1-SD 10A
UEC-G120	CP30-BA 3P 1-SD 20A



• Use the circuit protector with delay action function.

● Recommended noise filter

Unit type	Noise Filter Type (Manufacturer: COSEL)
UEC-G024	TAH-06-683
UEC-G060	TAH-10-683
UEC-G120	Not required

● Recommended transformer capacity

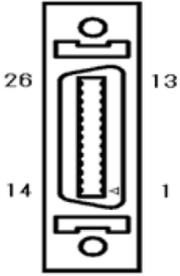
Unit type	Transformer capacity
UEC-G024	0.3kVA × Number of spindles
UEC-G060	0.8kVA × Number of spindles
UEC-G120	3.0kVA × Number of spindles

2-2. Connection of external control signals

2-2-1. Applicable Plug (I/O)

Manufacturer: Sumitomo 3M	
Type	: Cable connector Model :10126-3000 PE
Spec.	: Adaptive wire size AWG24~30 or 0.2mm ² ~0.05mm ²
type	: Cable connector case model: 10326-52A0-008

Front View



2-2-2. PLC IO (MASTER scale)

Pin No.	Signal name	IN/OUT	Functions and applications
1	IN COMMON	IN	Input signal common (bipolar)
2	STOP	IN NC	Tightening operation is stopped by setting to "OFF". (Emergency stop signal)
3	RESET	IN NO	Setting the switch to ON stops the tightening operation and deletes LED indication and PLC I/O output signal of the module.
4	REVERSE	IN NO	During "ON", the tool rotates in reverse with the selected parameter number.
5	START	IN NO	By setting it to "ON", the tightening operation is started with the selected parameter number.
6	BYPASS	IN NO	During "ON", the unit is placed in BYPASS (disabled) status.
7	Auto Z/C CHECK OFF	IN NO	Set to "ON", and G-Unit will start fastening on receipt of START "ON" signal without transducer's self-diagnosis before fastening.
8	WORK SELECT 1	IN NO	Work 1 to 4 can be selected. To use work 5 or later, an optional extension IO or various fieldbus units are required.
9	WORK SELECT 2	IN NO	
10	WORK SELECT 3	IN NO	
11	WORK SELECT 4	IN NO	
12	SENSOR	IN NO	Sensor input for pin hole control.
13	Data Select	IN NO	Bank switching input
14	OUT COMMON	OUT	Output signal common (bipolar)
15	OUT DATA 0	OUT NO	Outputs the system status externally by the data select signal.
16	OUT DATA 1	OUT NO	
17	OUT DATA 2	OUT NO	
18	OUT DATA 3	OUT NO	
19	OUT DATA 4	OUT NO	
20	OUT DATA 5	OUT NO	
21	OUT DATA 6	OUT NO	
22	OUT DATA 7	OUT NO	
23	OUT DATA 8	OUT NO	
24	OUT DATA 9	OUT NO	
25	OUT DATA 10	OUT NO	
26	OUT DATA 11	OUT NO	

IN: Input signal

OUT: Output signal

NC: Normally closed

NO: Normally open

**CAUTION**

- Turn OFF the INPUT "DATA SELECT" during tightening operation and when bank-switching is not used.
- After switching the data select signal to ON/OFF, wait for at least a 20msec before inputting the output signal of "OUT DATA".
- When bank switching is executed, the contents of the output signal are changed.
- When expansion unit 1 is installed, other input-signals than "Pin No.6:"BYPASS" cannot be used.

2-2-3. PLC IO signal (Main-system: MASTER spindle OUT DATA signal)

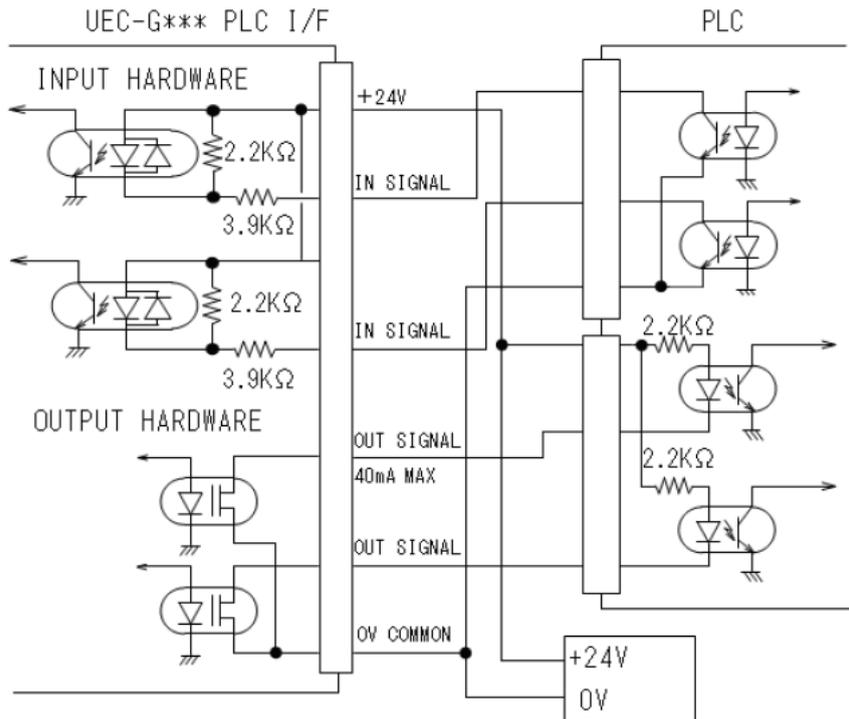
# 13	Pin #	OUT DATA	Signal name	Functions and applications
OFF	15	OUT DATA 0	TOTAL NOK	If the tightening is NOK even for 1-spindle of the system that has completed the tightening operation, it will be "ON".
	16	OUT DATA 1	TOTAL OK	When all the tightening of the unit after completing the tightening operation is OK, it is "ON".
	17	OUT DATA 2	TOTAL ALARM	If an error occurs in one of the connected units during a system/tightening operation, the status will be "ON".
	18	OUT DATA 3	TOTAL READY	If all the connected units are operable for external signals, they are set to "ON".
	19	OUT DATA 4	TOTAL WORKING	This is turned "ON" while the spindle is in tightening operation or reverse operation.
	20	OUT DATA 5	WORK SELECT BIT 0	Receiving sequence numbers selected by WORK SELECT BIT 0~4 combination, G-Unit outputs these signals in return.
	21	OUT DATA 6	WORK SELECT BIT 1	
	22	OUT DATA 7	WORK SELECT BIT 2	
	23	OUT DATA 8	WORK SELECT BIT 3	
	24	OUT DATA 9		Not used
	25	OUT DATA 10	DATA AVAILABLE	If there is a tightening result on the unit, it will be "ON".
26	OUT DATA 11	SPINDLE IN BYPASS	If even one of the connected units is in BYPASS status, it will be "ON".	
ON	15	OUT DATA 0	NOK (MASTER spindle)	If the tightening of MASTER spindle is completed outside the allowable range, the status is changed to "ON".
	16	OUT DATA 1	STEP OK (MASTER spindle)	When STEP tightening of MASTER spindle is completed within the judgment range. "ON" is displayed.
	17	OUT DATA 2	ALARM (MASTER spindle)	If an error occurs during MASTER spindle system or tightening operation, the status is "ON".
	18	OUT DATA 3	READY (MASTER spindle)	It is "ON" when MASTER spindle can operate in response to external signals.
	19	OUT DATA 4	WORKING (MASTER spindle)	MASTER spindle is turned "ON" during tightening operation.
	20	OUT DATA 5	PAR SELECT BIT 0: MASTER	The parameter number used is outputted. (The output ranges from 1 to 64. Outputs from 65 to 96 are not available.)
	21	OUT DATA 6	PAR SELECT BIT 1: MASTER	
	22	OUT DATA 7	PAR SELECT BIT 2: MASTER	
	23	OUT DATA 8	PAR SELECT BIT 3: MASTER	
	24	OUT DATA 9	PAR SELECT BIT 4: MASTER	
	25	OUT DATA 10	PAR SELECT BIT 5: MASTER	
26	OUT DATA 11	BYPASS (MASTER spindle)	With MASTER spindle in BYPASS (spindle disabled) If it is set to "ON".	

2-2-4. PLC IO Signaling (Main system: SLAVE Spindle)

Pin #	Signal name	IN/OUT	Functions and applications
1	IN COMMON	IN	Input signal common (bipolar)
2		IN NC	Not used.
3		IN NO	Not used.
4		IN NO	Not used.
5		IN NO	Not used.
6	BYPASS	IN NO	During "ON", the unit is placed in BYPASS status.
7		IN NO	Not used.
8		IN NO	Not used.
9		IN NO	Not used.
10		IN NO	Not used.
11		IN NO	Not used.
12	SENSOR	IN NO	Sensor input for pin hole control.
13		IN NO	Not used.
14	OUT COMMON	OUT	Output signal common (bipolar)
15	NOK (SLAVE spindle)	OUT NO	If the tightening of SLAVE spindle is completed outside the allowable range, the status is changed to "ON".
16	STEP OK (SLAVE spindle)	OUT NO	When STEP tightening of SLAVE spindle is completed within the judgement range, it becomes "ON".
17	ALARM (SLAVE spindle)	OUT NO	If an error occurs during SLAVE spindle system or tightening operation, the status is "ON".
18	READY (SLAVE spindle)	OUT NO	If SLAVE spindle can operate in response to an external signal, "ON" is selected.
19	WORKING (SLAVE spindle)	OUT NO	It becomes "ON" during the tightening operation of SLAVE spindle.
20	PAR SELECT BIT 0: SLAVE	OUT NO	The parameter number used is outputted. (Output ranges from 1 to 64. Outputs from 65 to 96 are not available.)
21	PAR SELECT BIT 1: SLAVE	OUT NO	
22	PAR SELECT BIT 2: SLAVE	OUT NO	
23	PAR SELECT BIT 3: SLAVE	OUT NO	
24	PAR SELECT BIT 4: SLAVE	OUT NO	
25	PAR SELECT BIT 5: SLAVE	OUT NO	
26	BYPASS (SLAVE spindle)	OUT NO	When SLAVE spindle is in BYPASS (spindle cut) status, it becomes "ON".

IN: Input signal OUT: Output signal NC: Normally closed NO: Normally open

2-2-5. I/O Hardware Specifications and Recommended Connection Circuits



※The figure above shows a typical NPN connector.



• Both NPN (Sink/-common) and PNP (Source/+common) can connect to G-Unit because the same is bipolar type supporting negative and positive poles.

2-2-6. Explanation of I/O signals

[Input Signal]



• This chapter describes the input-signal usage of the standard I/O. For the input signals used by the fieldbus or extension I/O, see PAGE4-4 "Input Signal Description".

OPERATION PREPARATION: Preparing for operation

Operation is possible with ON, and operation is stopped with OFF.

RESET: Resetting

When RESET signal is turned "ON", the output signal of the tightening result judgment disappears. When RESET is "ON", the tightening operation cannot be started. In addition, if RESET is turned "ON" during the tightening operation, the tightening operation will stop, but the tightening result data just before the stop will be held.

REVERSE: Tool Reverse

In the main system, the spindle number selected by WORK SELECT BIT0~4 signal is used as the target, and the tool rotates in the opposite direction at the set rotation speed. However, if REVERSE is started under the following conditions, the reverse-rotation will not be started.

- ◆ During tightening operation (when WORKING is "ON")
- ◆ ALARM signal "ON" or RESET signal "ON"
- ◆ When REVERSE signal is "ON" previously
- ◆ Unit is in BYPASS status
- ◆ Unit is in STOP status
- ◆ CAL is being checked by CAL switch.

START: Tightening starts

At the level-input ("OFF"→"ON") of START signal, the work number and SELF CHECK DISABLE signal selected by the signals from WORK SELECT BIT 0 to 4 are read, and the tightening operation starts. From the start of tightening to the end of tightening, WORKING of the unit is turned "ON". If START is turned "OFF" during the tightening operation, the tightening operation will be stopped. Tightening cannot be started if START is turned on under the following conditions.

- ◆ ALARM signal "ON" or RESET signal "ON"
- ◆ When REVERSE "ON"
- ◆ G-Unit is in BYPASS status (setting value editing, communication, etc.)
- ◆ G-Unit is in STOP status
- ◆ CAL is being checked by CAL switch.

BYPASS: Spindle Disabled

When BYPASS signal is set to "ON", the unit of the selected spindle No. is in BYPASS status, and the output signal of the result-attached judgment or LED indication other than BYPASS disappears. In addition, if BYPASS occurs during the tightening operation, the tightening operation will stop, but the tightening result data immediately before the stop will be held.

AUTO Z/C CHECK OFF: Torque Transducer Self Check disabled

By setting AUTO Z/C CHECK OFF signal to "OFF", all the units connected will perform Z/C checking when START signal is inputted.

(Z/C check: Check ZERO and CAL voltages of the torque transducer) If Z/C check of the torque transducer is not required, the tightening operation is started without executing the self-check by setting AUTO Z/C CHECK OFF signal to "ON" when START signal is input. When AUTO Z/C CHECK OFF signal is "ON", ZERO voltage used for tightening operation should be the value at the time of checking the latest. Checking ZERO voltage of the torque transducer is performed at the following timing. Other than when tightening is started.

- ◆ When the control power is turned on
- ◆ When RESET "ON"
- ◆ When using Manual Z/C checking

Data select: Bank Change

Switches the banks of output signals by switching the data select signals.

WORK SELECT 1 to 4: Sequence number selection (BIT)

Select the work to be tightened with WORK SELECT 1~4 signal.

SENSOR: Sensor In

Enter SENSOR for pin hole control/position matching tightening.

[Output signal]



- This section describes the output-signal used in the normal I/O. See the Output Signal Descriptions PAGE 4-8 for the output signals used for fieldbus, extension I/O, and PLC output layouts.

NOK: Tightening NOK

If the tightening is completed outside the allowable range, the status is turned "ON".
 ※It becomes "ON" after the tightening operation is completed.

TOTAL NOK : Total NOK

This is ON if even a spindle of judgment objectives ended in NOK result. This is also ON if START signal is switched on under BYPASS setting for all unit under judgment objective spindles.

※"ON" comes after fastening was completed

STEP OK: Tightening STEP OK

This bit is set to "ON" when the output of the tightening steps is completed within the allowable range.

TOTAL OK : Total OK

This is "ON" when all G-units covered by operation and judgment objective spindles provided OK result at fastening end.

※ "ON" comes after fastening was completed.

NR FAILURE: Nut runner error

This signal is turned "ON" when an error is detected during a system check or tightening operation.

※When ALARM signal is "ON", READY signal is "OFF", the tightening operation cannot be started, and CAL voltage check by CAL switch cannot be performed.

TOTAL ALARM: Total system error/abnormal termination

It is turned "ON" when an error is detected even for 1 spindle in the system which performed the operation or whose judgment was made.

※When TOTAL ALARM signal is "ON", READY signal is "OFF", the tightening operation cannot be started, and CAL voltage check by CAL switch cannot be performed.

WORKING: Operating

This turns ON while the unit is in the tightening operation. If the tightening operation with START or REVERSE signal is completed, or if the tightening operation with STOP or RESET signal is interrupted, WORKING signal is "OFF".

READY: Ready

This is set to "ON" when the unit is ready for operation with respect to signals from an external device such as a PLC. READY is "OFF" under the following conditions:

- ◆ Initial processing at control power ON
- ◆ ALARM "ON" is generated
- ◆ G-Unit is in BYPASS status
- ◆ G-Unit is in STOP status
- ◆ Drive power is OFF.
- ◆ RESET "ON" is generated

BYPASS: Spindle disabled

It is "ON" when the unit is in BYPASS status. When the unit is in RUN status, BYPASS is "OFF".

※In the main system, when the sequence operation starts, the G-unit in BYPASS status is ignored in the sequence judgment.

BYPASS YES: BYPASS

If even one spindle is BYPASS (spindle disabled) for all connected units, the status is "ON".

PAR SELECT BIT 0 to 4: Parameter returning (BIT)

Receiving selected PARAMETER 1~32 from PLC, G-Unit is "ON" returning the same signals to PLC.

※On the main system, parameter numbers are selected in the sequence settings.

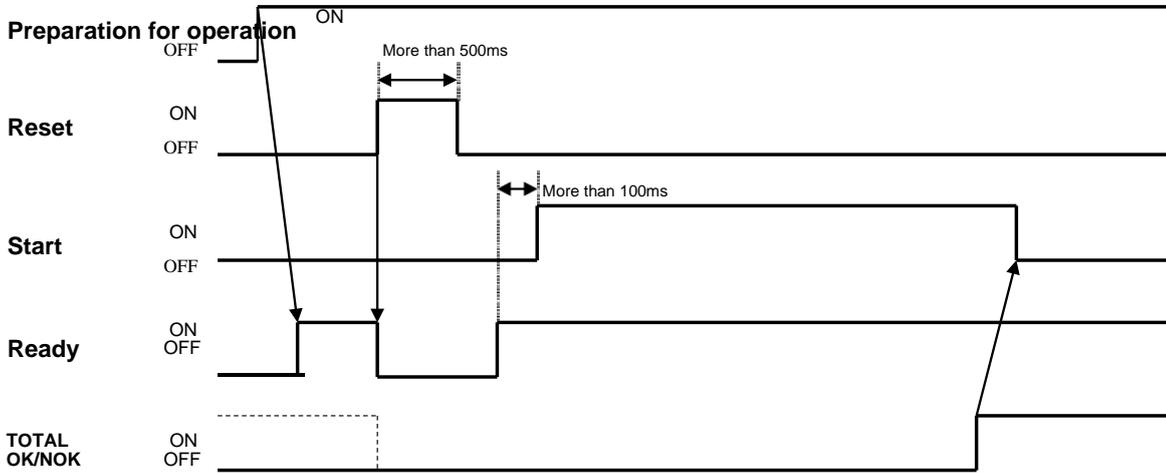
WORK SELECT BIT 1 to 4: Sequence returning (BIT)

Receiving selected WORK 1~4 from PLC, G-Unit is "ON" returning the same signals to PLC.

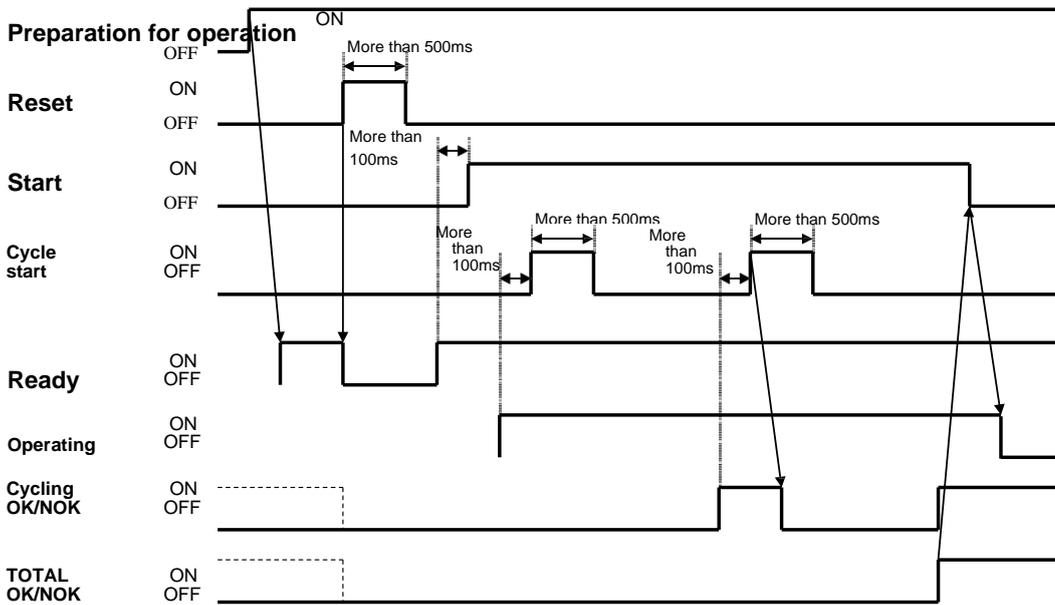
2-2-7. Tightening Timing Chart

OFF: Point OPEN seen from PLC
ON: Point CLOSE seen from PLC

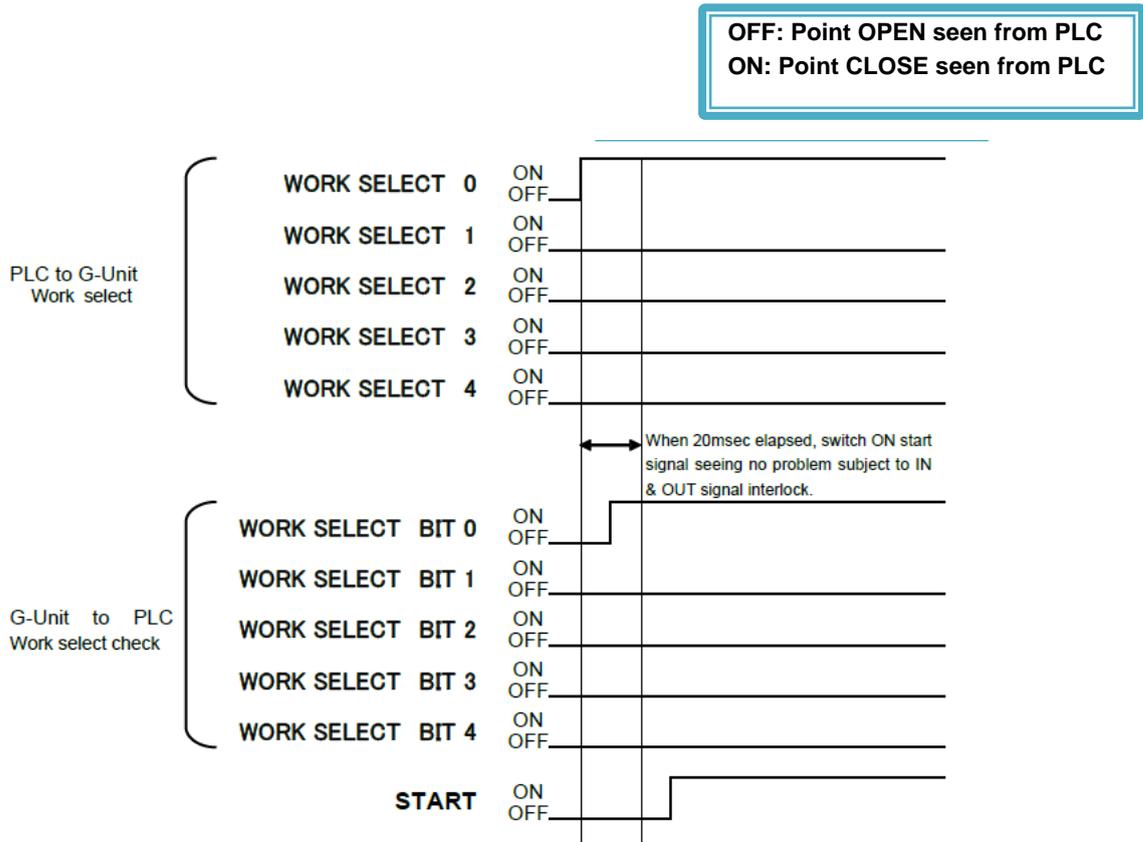
- Number of repetitions 1



- Number of repetitions 2 times



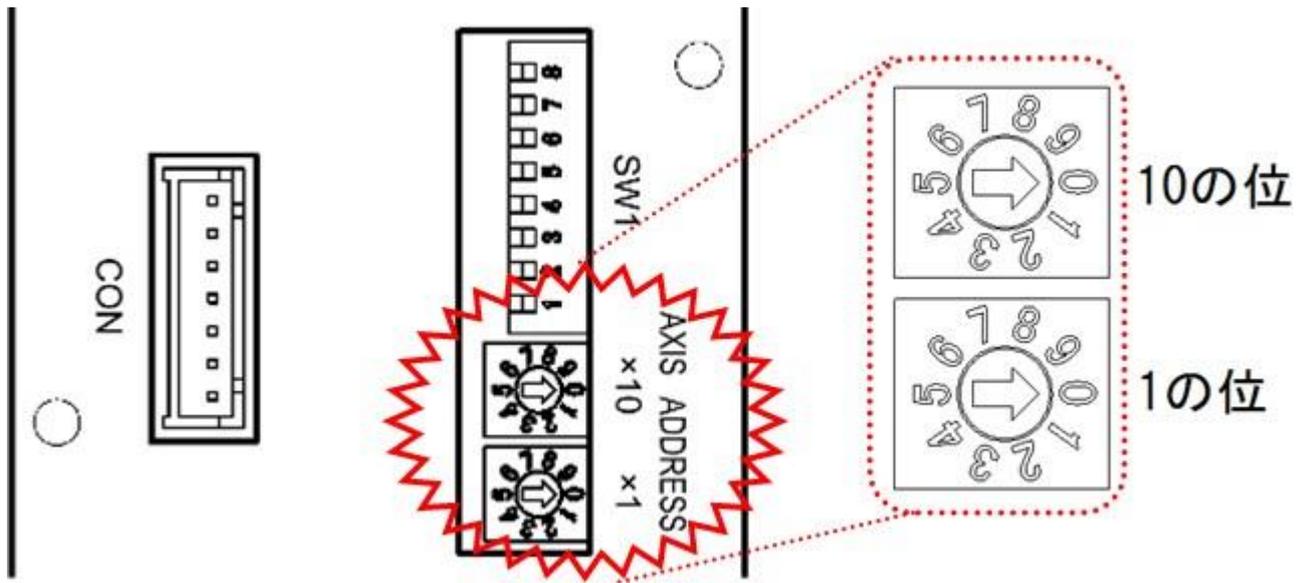
● Tightening parameter selection signal and start timing



- Set RESET and START to "ON" for at least 500msec.
- START signal must be interlocked with READY · STOP · RESET · REVERSE · ALARM signal.
- When ALARM is "ON", all operation commands are not executed.
- The unit immediately sets PLC I/O output signal "BYPASS" to "ON" when PLC I/O input signal "BYPASS" is turned "ON". In addition, PLC I/O output-signal "OK" and "NOK" are not set to "ON" for the unit in BYPASS status.

2-3. Unit switch setting

2-3-1. Setting of spindle number switch



To set the spindle number of each G-unit, use the rotary switch on the front of the unit. If the display is installed, loosen and remove the two screws at the bottom of the display.

※When setting the spindle number, change it while the control power of the unit is OFF.

Number	Setting	Number	Setting	Number	Setting	Number	Setting
01	1st	09	9th	17	17th	25	25th
02	2nd	10	10th	18	18th	26	26th
03	3rd	11	11th	19	19th	27	27th
04	4th	12	12th	20	20th	28	28th
05	5th	13	13th	21	21st	29	29th
06	6 th	14	14th	22	22nd	30	30th
07	7th	15	15th	23	23rd	31	31st
08	8th	16	16th	24	24th	32	32nd



• The spindle number of the unit cannot be duplicated.
 Turn on control power of G-Unit under spindle number setting 00, 33-99, G-Unit will switch on ALARM signal A.09-09 [SP NO ERROR].
 Turn OFF the control power and change the spindle number.

2-3-2. Special function SW1 setting

To set the special functions related to tightening, use SW1 switch on the front of the unit. If the display is installed, loosen the two screws to remove the display.

※When setting SW1 DIP-switch, change it while the control power supply of the unit is OFF.

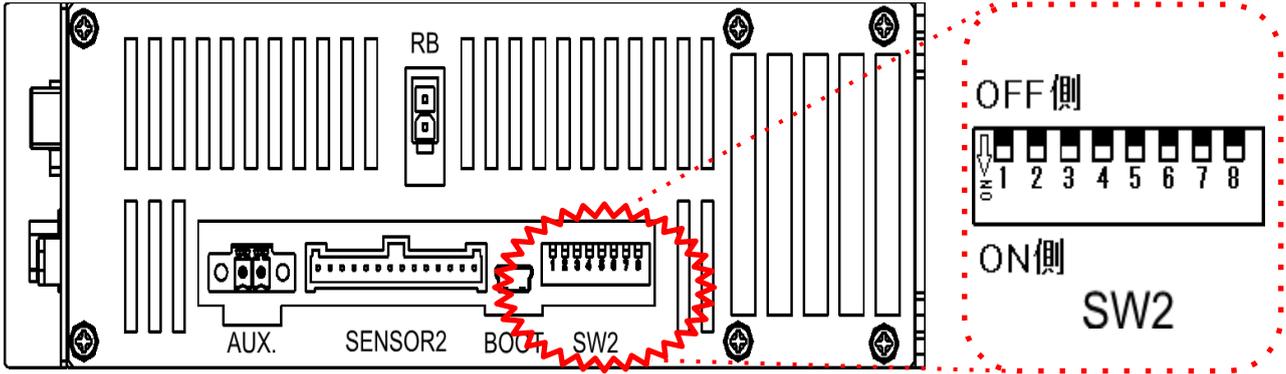


#	Factory setting	Function	Contents
1	OFF	ZERO Voltage Check Effective range Extension (±10%/±4%)	<ul style="list-style-type: none"> When ON is set, the valid range of ZERO voltage check is within the operating range of ±10% of the full scale torque. Set ON when the offset tool is mounted horizontally or when the previous tightening reaction force remains in the tightening operation, if the alarm occurs frequently at the beginning of tightening. Set OFF, and effective range of ZERO voltage check will be ±4% of full scale.
2	OFF	Not used	
3	OFF	Prohibition of storing counts in the tooling ID (prohibition/permission)	<ul style="list-style-type: none"> When ON is set, the tool cycle count to the tool ID (preamplifier) is not written when the control power is turned on. Normally, set OFF.
4	OFF	External monitor angle pulse output (0.1 Degree/1 degree)	<ul style="list-style-type: none"> When ON is set, 1-pulse is outputted every 0.1 degree. When OFF is set, 1-pulse is outputted every 1 time.
5	OFF	Not used	
6	OFF	Not used	
7	OFF	Not used	
8	Spindle No. • 1: ON • 2~32: OFF	Communication spindle setting (MASTER/SLAVE)	<ul style="list-style-type: none"> When ON is set, it functions as MASTER spindle of the communication between spindles. Communication of PC and PLC is performed from MASTER spindle. When OFF is set, it functions as SLAVE spindle of the communication between spindles. Communicates with PC and PLC through MASTER spindles.



- When you change above system, change system parameter D-No.003 [SYSTEM DISPLAY].
- When using in the main system, set SW1 No. 2 to OFF.

2-3-3. Setting the Bottom-Panel SW2



To change the settings related to the unit functions, use SW2 switch on the bottom of the G-unit.

When setting SW2 DIP-switch, change it while the control power supply of the G-unit is OFF.

No.	Shipping Setting	Function	Contents
1	OFF	AUX. Connector STOP Enabled	When ON is set, the tightening operation cannot be started by START signal until STOP signal connected from AUX. connector on the bottom of the unit is turned ON. For STOP signal, see PAGE 3-23"AUX. Interface.
2	OFF	Unit RUN/BYPASS disabled	When ON is set, it is impossible to switch to BYPASS status by RUN/BYPASS switch on the front of the unit. The only way to switch to BYPASS status is PLC I/O input signal "BYPASS". (Refer to PAGE 5-5 for switching)
3	OFF	STOP signal Always ON (STOP signal released)	When ON is set, PLC I/O input signal "STOP" is always ON. Be sure to set this function to OFF when operating the equipment.
4	OFF	Not used	
5	OFF	Not used	
6	OFF	Prohibition of Use	For manufacturer adjustment
7	OFF	Prohibition of Use	For manufacturer adjustment
8	OFF	Prohibition of Use	For manufacturer adjustment

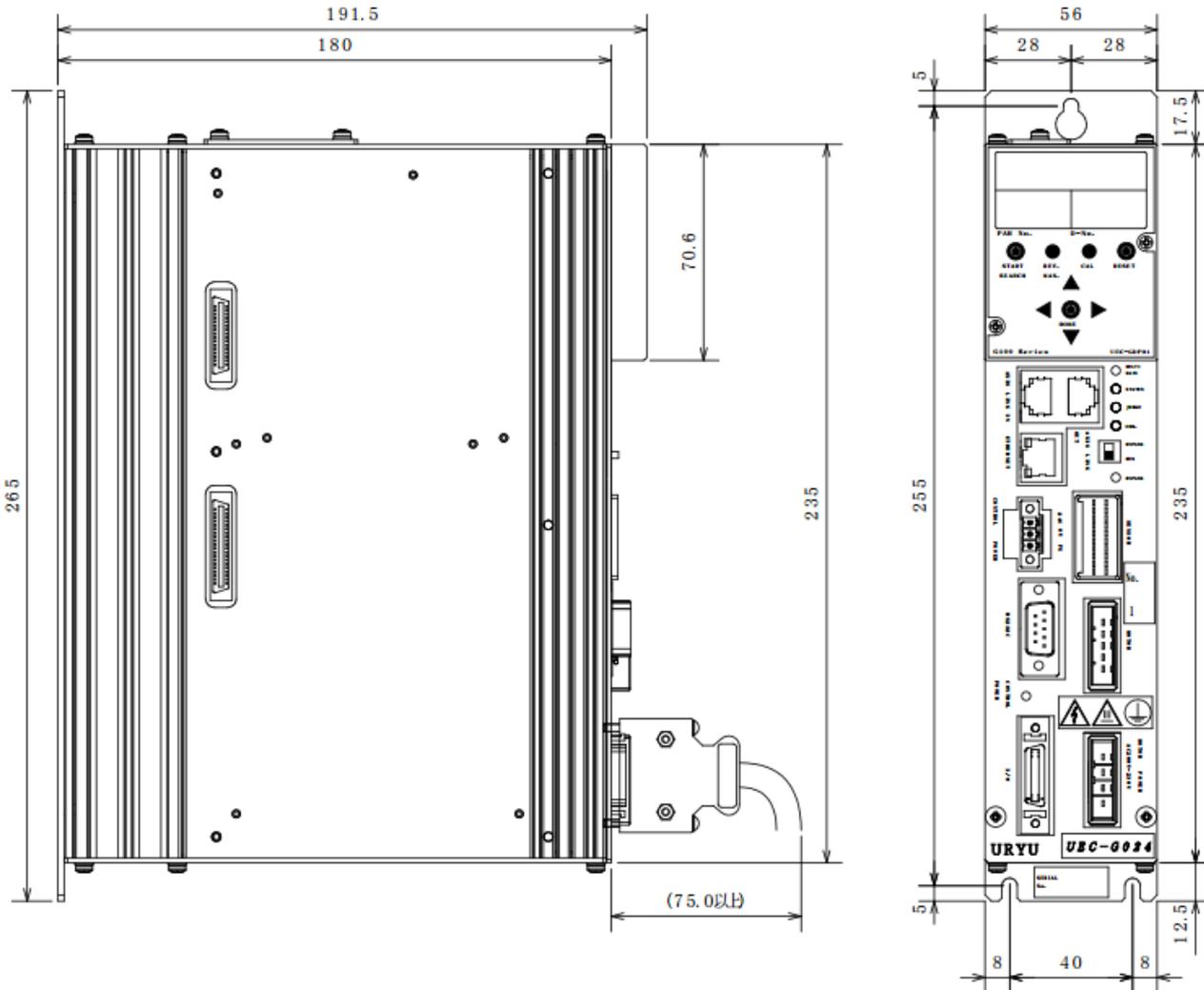
2-4. Unit dimensions

2-4-1. UEC-G024、UEC-G060、UEC-G120

Model	Mounting hole	Weight [kg]	Radi-ate fan	Ave. con-sumption (Calorific value)	Standby con-sumption (Calorific value)
UEC-G024	Potbelly hole 1 pc. of M4 screw (top) Long hole 2 pcs. of M4 screw (bottom)	1.62	None	About 29W	About 12W
UEC-G060	Potbelly hole 1 pc. of M4 screw (top) Long hole 2 pcs. of M4 screw (bottom)	1.98	None	About 38W	About 12W
UEC-G120	Potbelly hole 2 pcs. of M4 screw (top) Long hole 2 pcs. of M4 screw (bottom)	4.90	Yes	About 134W	About 12W

※The power consumption and the calorific value greatly depend on the operating conditions. Use these values as reference.

●UEC-G024,G060 outline drawing



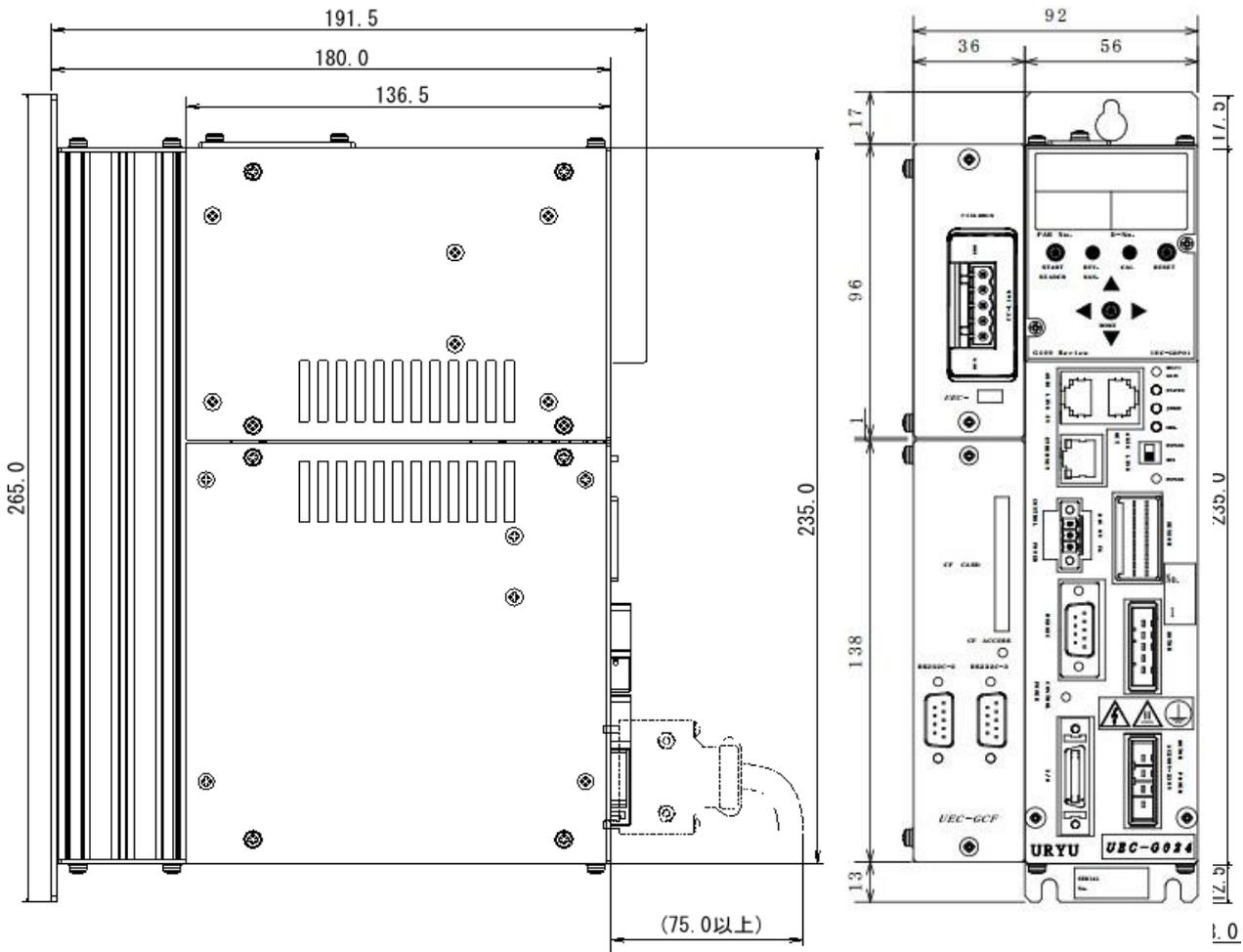
※Dimensions when an Extension unit is installed are as follows.

Model	Mounting hole	Weight [kg]	Radi-ate fan	Ave. con-sumption (Calorific value)	Standby con-sumption (Calorific value)
UEC-G024	Potbelly hole 1 pc. of M4 screw (top) oblong Long hole 2 pcs. of M4 screw (bottom)	2.54	None	About 32W	About 15W
UEC-G060	Potbelly hole 1 pc. of M4 screw (top) Long hole 2 pcs. of M4 screw (bottom)	2.90	one	About 41W	About 15W
UEC-G120	Potbelly hole 1 pc. of M4 screw (top) Long hole 2 pcs. of M4 screw (bottom)	5.82	Yes	About 137W	About 15W

※The weight of Extension unit 1 is 0.42kg, and the weight of Extension unit 2 is 0.5kg.

※The power consumption and the calorific value greatly depend on the operating conditions. Use these values as reference.

●UEC-G024,G060 Extension Unit Installation Dimensions

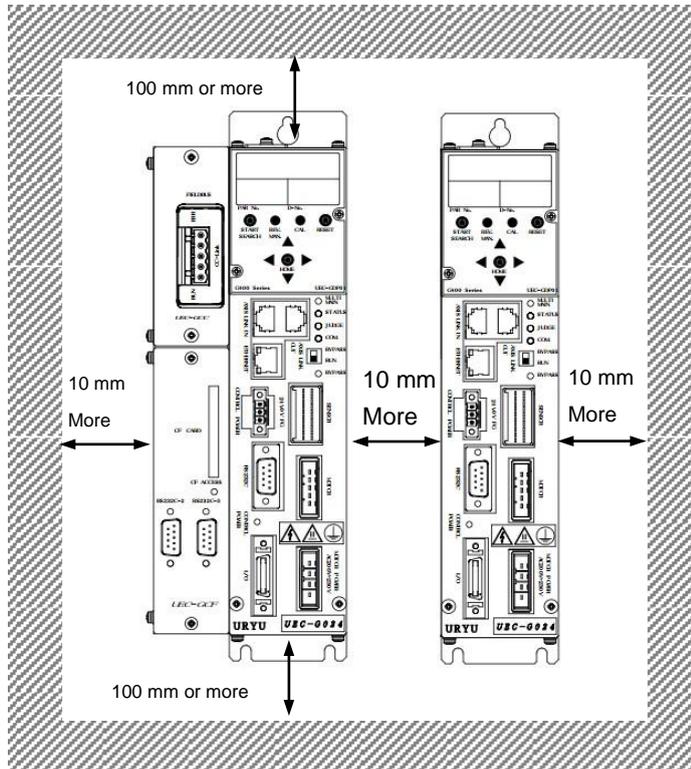
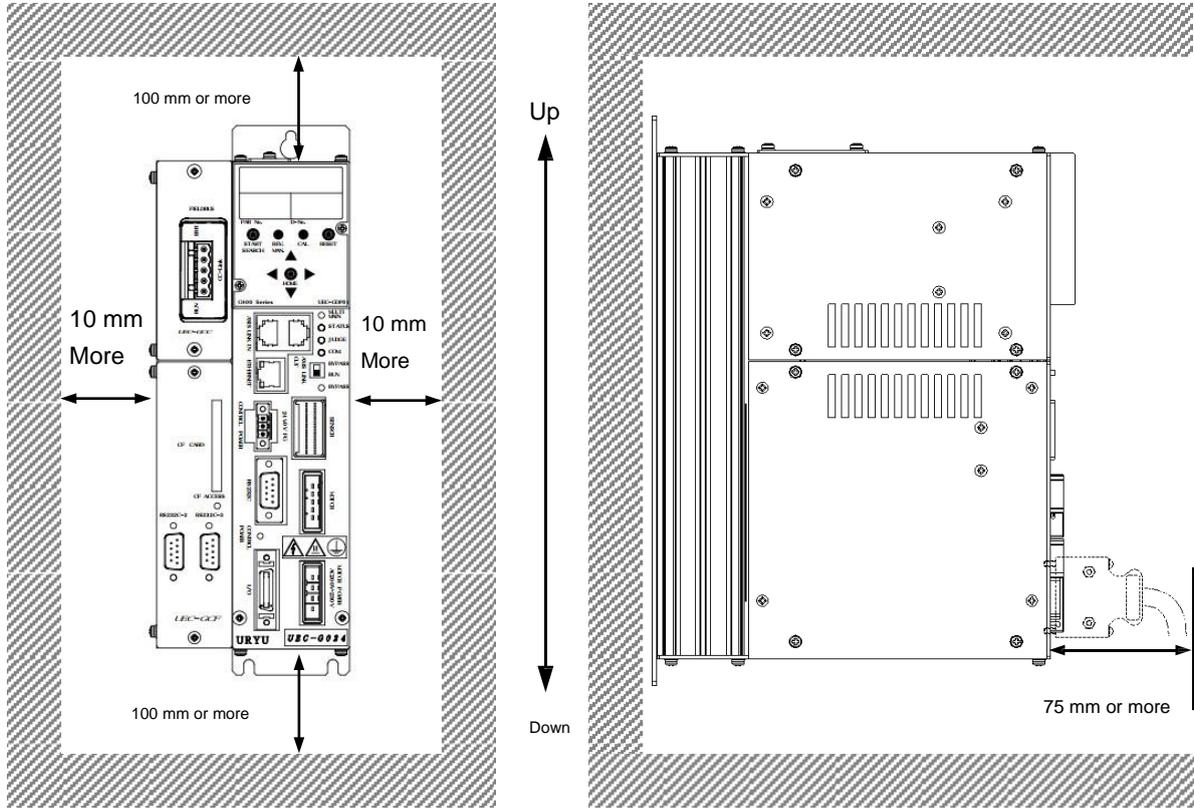


● Control panel mounting conditions

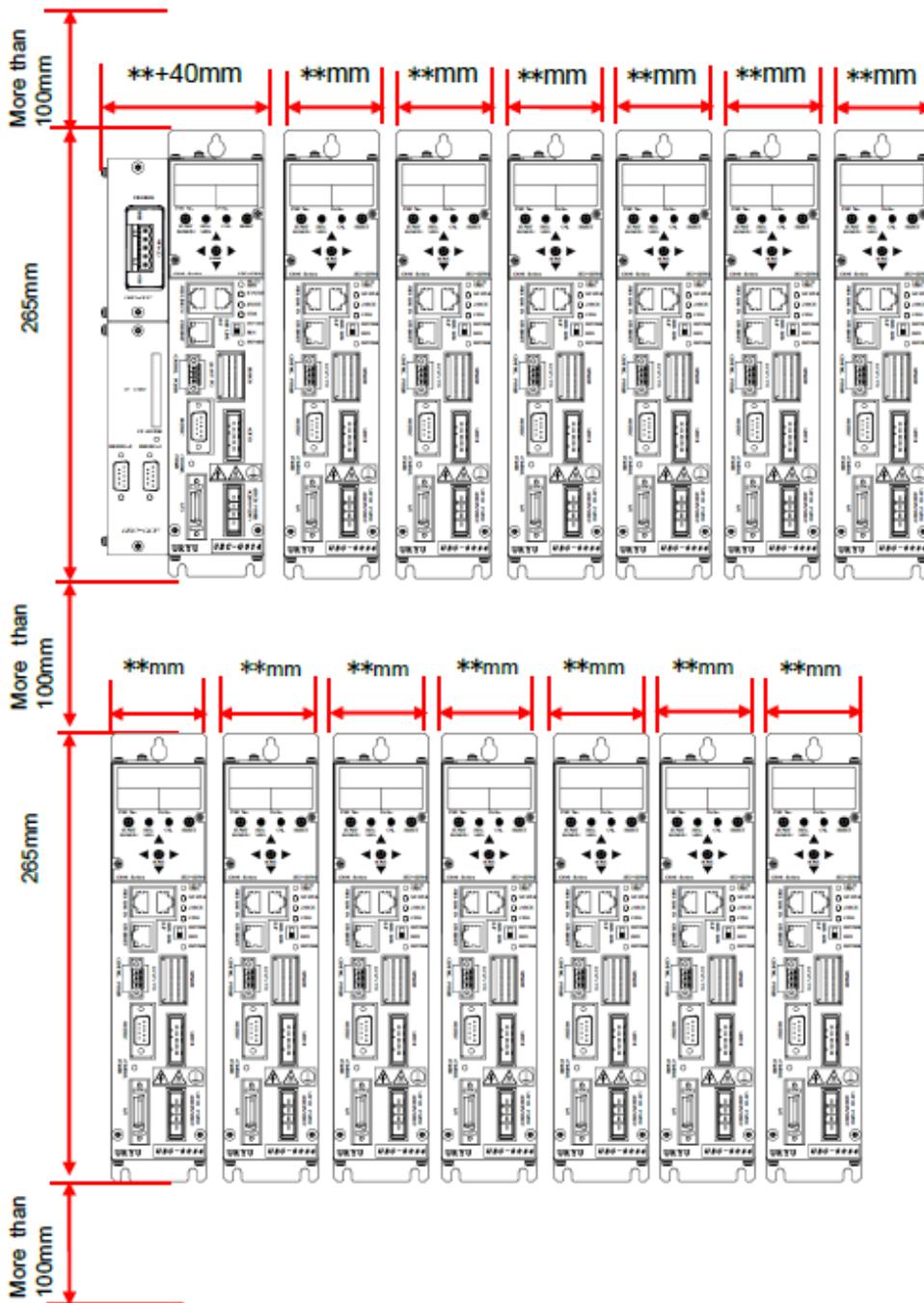


CAUTION

- Install a fan or cooler so that the ambient temperature of the unit does not exceed 45°C.
- Do not allow foreign objects to enter in the G-unit.
- Allow at least 10mm clearance to safely remove the unit.



2-4-2. Control panel layout



- ** is following different size by model of G-Type.
- UEC-G024 and UEC-G060 : 56mm
 - UEC-G120 : 95 mm

2-5. Tool dimensions

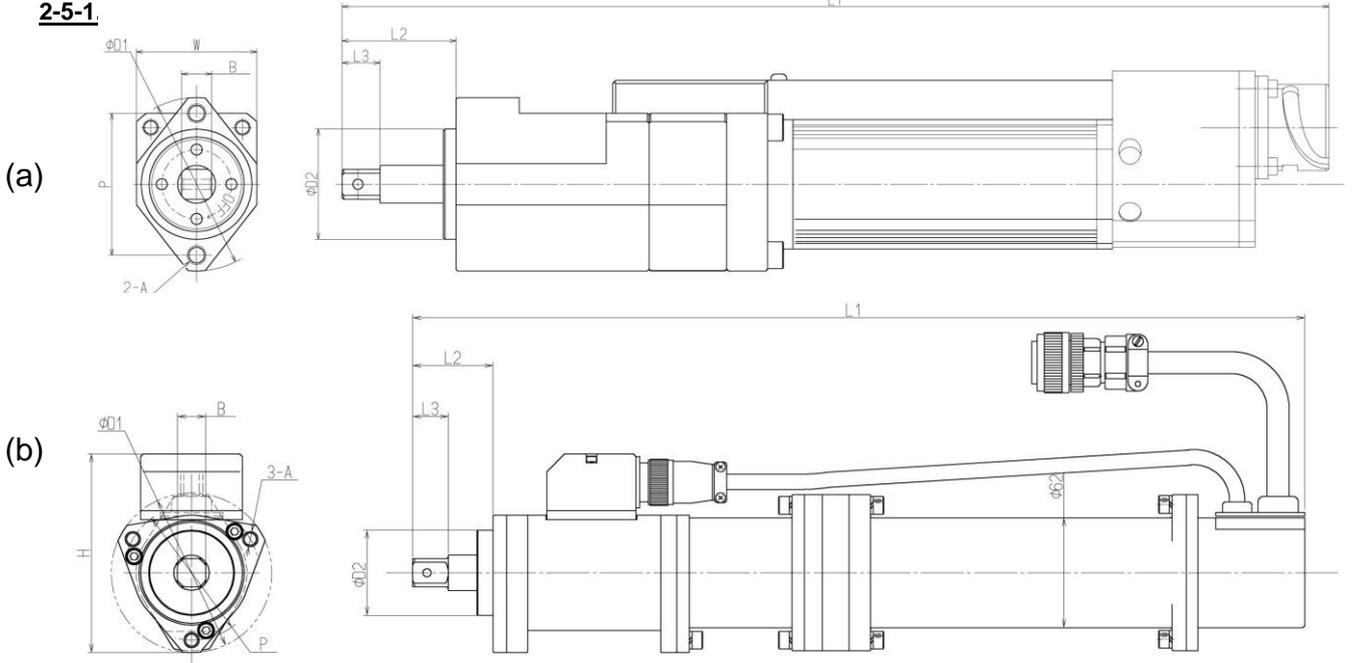
Tool dimensions and mounting conditions are used to design the tool mounting plate.



CAUTION Allow adequate space to prevent the tool from contacting other objects. If an appropriate space cannot be secured, the torque accuracy will become unstable and there is a risk of mechanical damage such as bolt breakage.

Refer to PAGE 3-5 for instructions on how to secure the tooling.

2-5-1.



(mm)

Model	Dimensions									Guideline set plate thickness	Motor	Torque sensor	Shape
	L1	L2	L3	W	φD1	φD2	P	A	B				
UNR-G613-50NT	288	36	12	38	55	35	45	M6	9.5Sq	9.0 More than	G613	Integrated	(a)
UNR-G613-100NT													
UNR-G613-200NT	312	40	20	51	73	44	59	M8	15.88Sq				
UNR-G613-300NT													
UNR-G613-400NT	419	45	30	115	90	48	φ76	M8	19.0Sq	12.0 More than	G100	(b)	
UNR-G640-800NT													
UNR-G640-1000NT	516	57	30	120.5	94	58	φ90	M10	25.4Sq				
UNR-G640-1300NT													
UNR-G100-1900NT	570	80	40	150.5	128	70	φ90	M10	25.4Sq				
UNR-G100-2500NT													
UNR-G100-3700NT	654	80	40	150.5	128	70	φ90	M10	25.4Sq				
UNR-G100-5400NT													
UNR-G100-7000NT	654	80	40	150.5	128	70	φ90	M10	25.4Sq				
UNR-G100-10000NT													

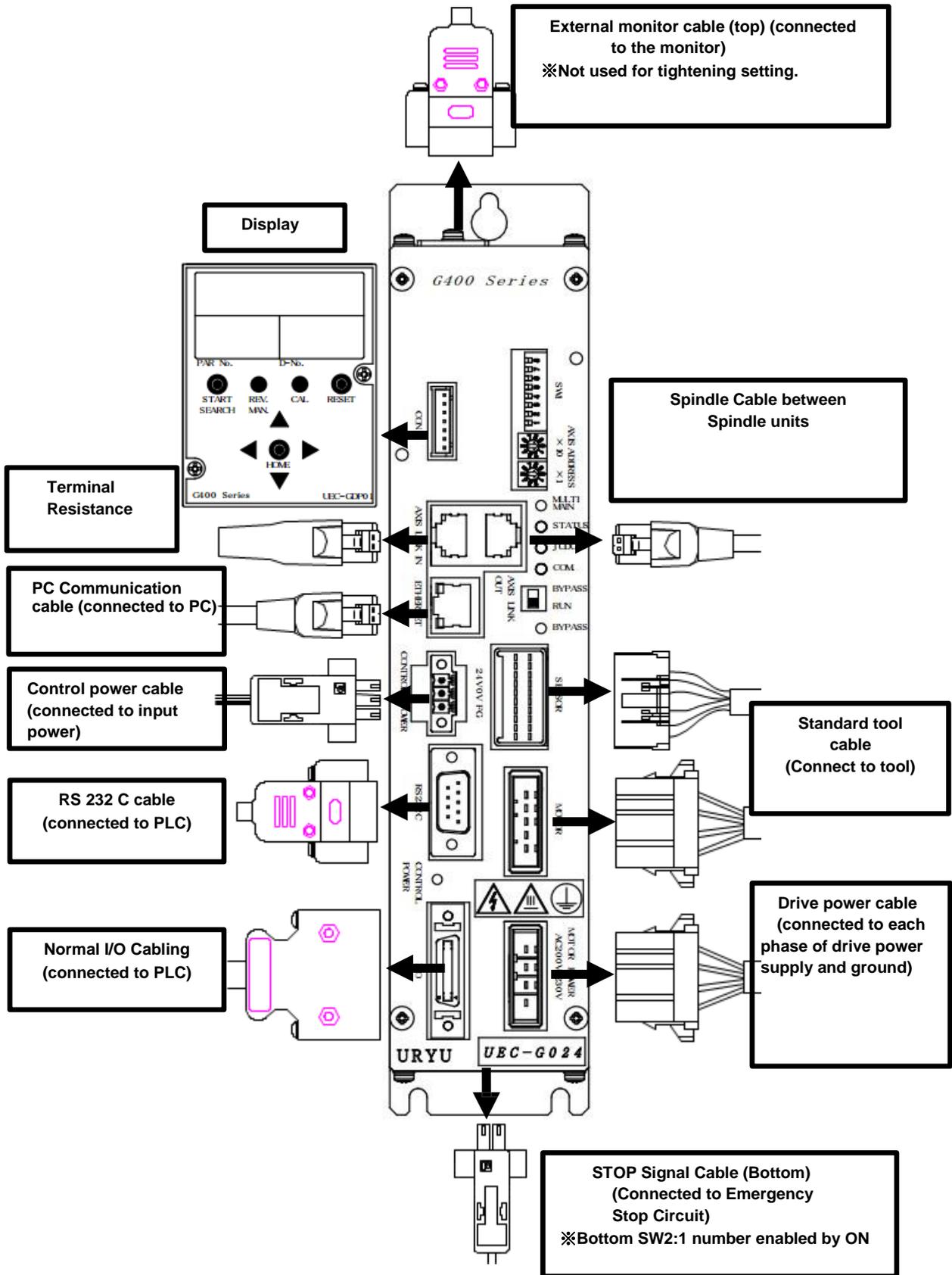
Chapter 3 Wiring and Test Operation



3

3-1. Cabling to the Unit

● UEC-G024 · UEC-G060



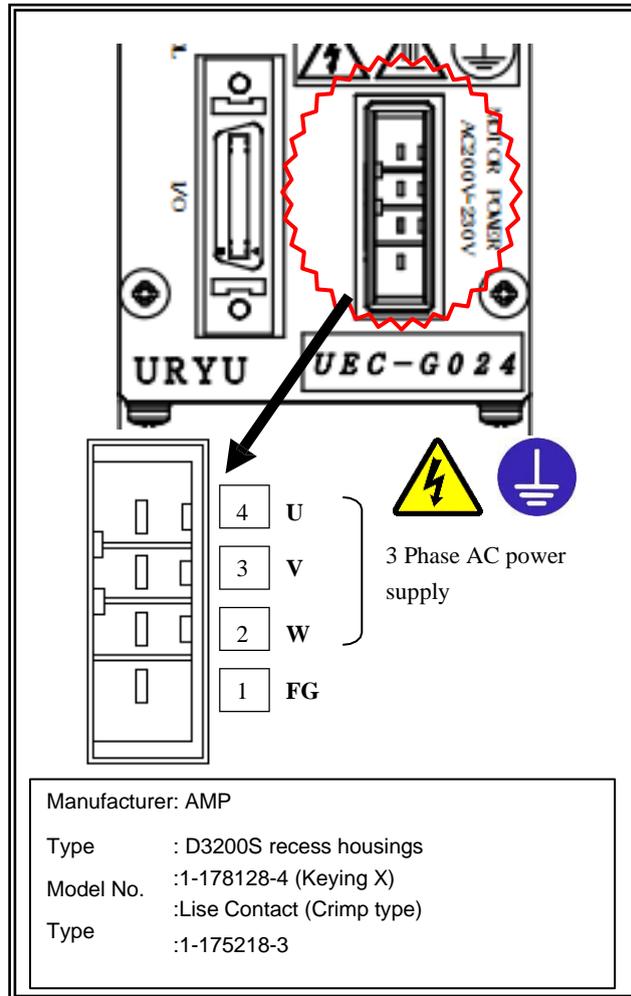
3-2. Connecting the Input Power



[Cable Wiring Precautions]

- Wiring work must be performed by an expert in electrical work.
- Do not turn on the power until the wiring is completed.

Supply drive power from MOTOR POWER AC 200V-230V connector which is located at the lower right of the module.



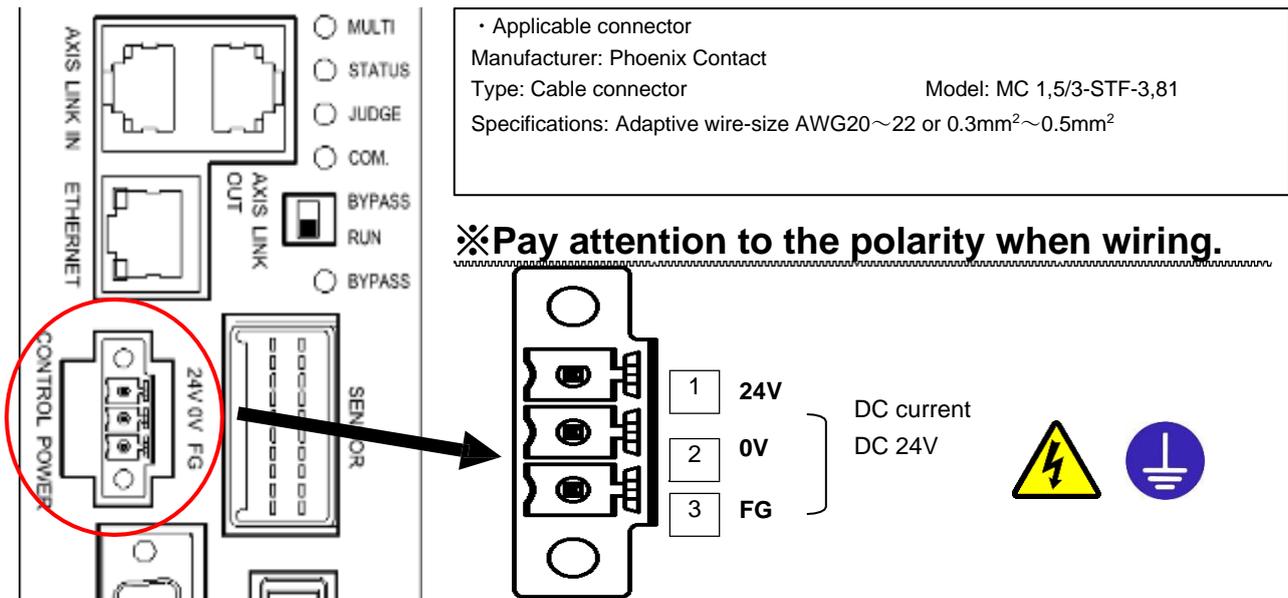
● Drive power cable pin assignment

Pin number	Signal name	Wire color	Description
4	U	Red	3 Phase AC power supply AC200~230V
3	V	White	
2	W	Black	
1	FG	Green	Equipment grounding



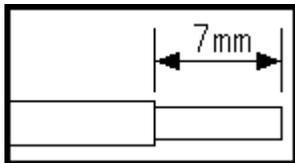
• Be sure to ground the power supply. In addition, the grounding terminal (FG) should be grounded separately to the third class, avoiding common use with the installation of a high-voltage circuit.

Supply control power from CONTROL POWER connector at the middle left of the G-unit. A connector for the control power supply is included.



Wiring Procedure for Control Power Supply

1. Prepare the wires and bar terminals (ferrules) to use.
 - Applicable wire ... AWG 20~22 (0.3 mm²~0.5 mm²)
 - Recommended bar terminal (ferrule) ... Model: AI 0,5-6 WH (Phoenix Contact)
2. Strip the wire insulation, following the below dimensions.



3. Crimp with a crimping tool. After crimping, cut the wire end at a point as long as the ferrule length or about 0.5 mm.
 - Recommended Crimping Tool... Model: CRIMPFOX6 (Phoenix Contact)
4. Loosen the screw of the insertion port of the connector and insert the ferrule into the insertion port. Insert one ferrule into one slot of the connector.
5. Tighten the screws of the connector's insertion slot and connect the cable to CONTROL POWER connector on the middle left of the unit.

CAUTION **Be sure to ground the power supply.**

- Select ferrules according to the wire size to be used. If the ferrule size is incorrect, a gap will be created when crimping, making the wire easier to get wet.
- Wire the control power supply (DC DC24V) with the correct polarity. Failure to do so may result in an electric shock or damage to the unit.

3-3. Wiring and Fixing Tools

3-3-1. How to fix the tool

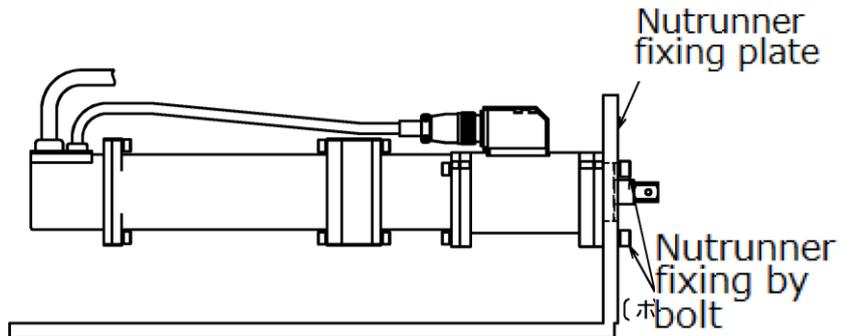
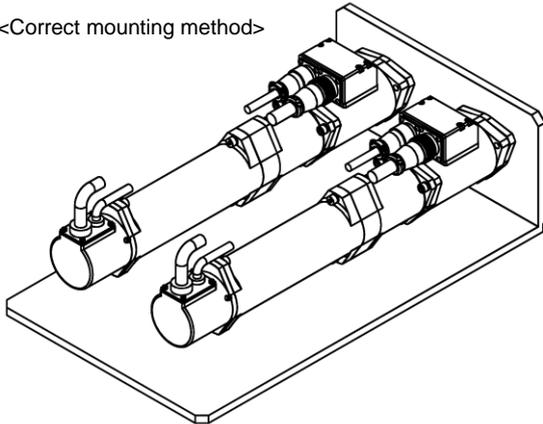


Pay attention to the following points so that there is no mechanical contact when installing the tool.

- Cabling or incorrect mounting position (method)

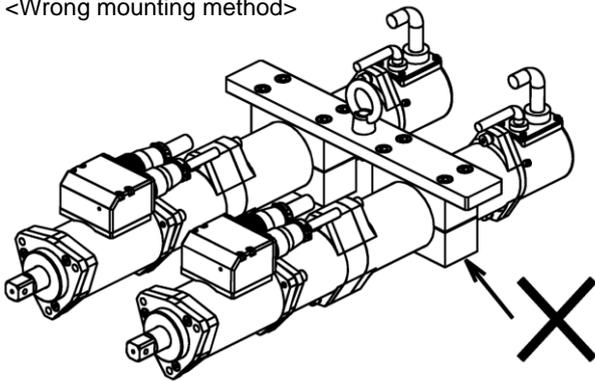
Securely fix the tool to the tool mounting plate with the bolts. If the torque accuracy becomes unstable and the torque cannot be detected normally, there is a risk of mechanical damage such as bolt breakage.

<Correct mounting method>



Attach the nut runner to the mounting plate with bolts.

<Wrong mounting method>



Do not overtighten the nut runner body. It may damage the motor or reduction gear section.

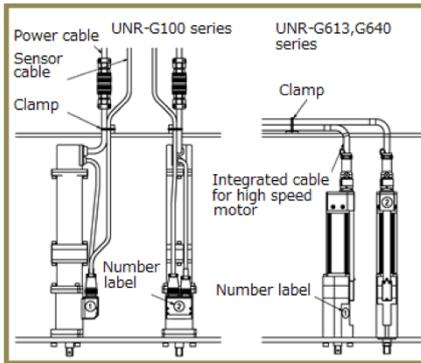
Do not hang only the nut runner, but hang and use the nutrunner mounting plate with the nut runner installed correctly.



[Installation Precautions]

- Strong torque is generated when tightening the tool, and equivalent force is applied to the mounting part of the tool. Therefore, when installing the tool, mount the tool using the screws specified for the specifications.
- The inside of the tool is composed of mechanical parts and electronic parts including sensors. Do not subject it to strong vibrations or excessive force.
- For high-speed operation with a short cycle time, use a cylinder cushion or shock absorber to fix the tool anvil and to prevent excessive vibration. Impact can damage the tool.

3-3-2. Routing the Tool Cable



1. When installing multiple nutrunners, attach stickers, etc. to distinguish them so that the spindle number can be known.
2. Connect the power cable to the external cable from the spindle unit with the same number.
3. When the nut runner moves, install and wire so that no stress is applied to the cable.
4. Fix the cable so that no force is applied to the connector. Be careful not to over-secure it to the nut runner body.

<Precaution for Cable Wiring>

For the moving parts of the nutrunner cable, flexible in-tube wiring or cable track wiring is recommended. In addition, pay attention to the following points when wiring the cable bundle in order to prevent wire breakage.

- To reduce the self-weight of the cable and to avoid stress caused by bending it back, divide the cable into several pieces and bind them in a large number of bundles.
- Even if the cable is not a moving part, the weight of the cable bundle will be applied. Be careful not to touch the cable directly at the corners.



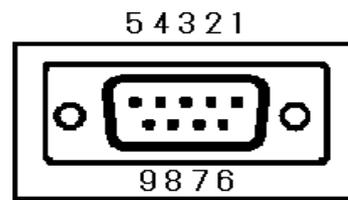
[Cable Connection Precautions]

- Be sure to turn off the control power of the system before connecting the cabling. Connecting or disconnecting the cable may cause the product to malfunction.
- For the power supply to the system, use a cable that meets the specifications.
- When fixing the cable, do not bend the connector part of various connecting cables or apply stress due to its own weight.
- Keep the bending radius of the standard-tool cable as large as possible (more than the radius 110mm).

3-4. External monitor interface

3-4-1. Applicable plug (external monitor)

Unit top view



3-4-2. External monitor signal specifications

Pin number	Signal name	IN/OUT	Contents
1	EA2	OUT	Cannot be used
2	EB2	OUT	Cannot be used
3	ANGLE PULSE	OUT	Angle pulse monitor output
4	ANGLE CW/CCW	OUT	Forward/reverse monitor output
5	GND	-	Monitoring signal-output GND
6	TD2	OUT	Cannot be used
7	MON1	OUT	Current monitor output. (10V: Unit max. current)
8	MON2	OUT	Speed-monitoring power (10V: max. tool speed)
9	TORQUE OUT	OUT	Torque analog voltage monitor output

TORQUE OUT: Torque analog voltage signal

The monitored voltage is expressed as a potential difference of approximately 3.75V from ZERO voltage to CAL voltage at full scale torque. ZERO voltage is the voltage when the tool is stopped. ※ZERO is not 0V. (within-0.1V~+0.1V)

In addition, ZERO is different for each tool even for the same type of tool.

(e.g.) When ZERO voltage is-0.03V, CAL voltage at full scale torque becomes + 3.72V and the voltage change becomes Δ .

ANGLE PULSE: Angle-pulse signal

(5V TTL Source)

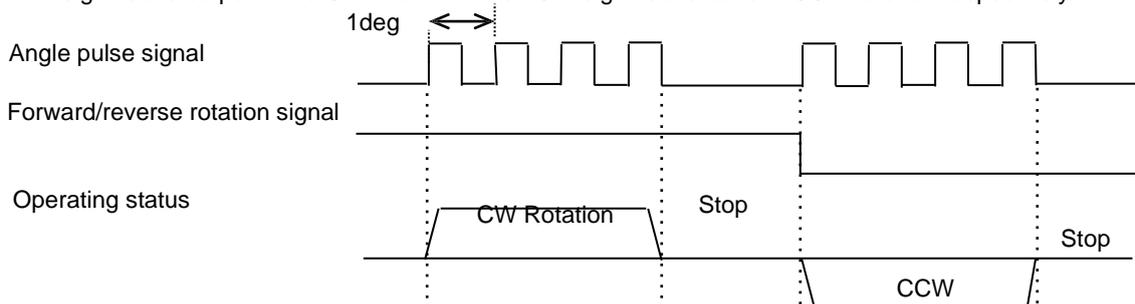
Angle pulses output one pulse at a time.

※There is a slight difference in the actual rotation angle. (Anvil 1 rotation: 358 to 362 pulses)

ANGLE CW/CCW: Forward/reverse rotation pulse signal

(5V TTL Source)

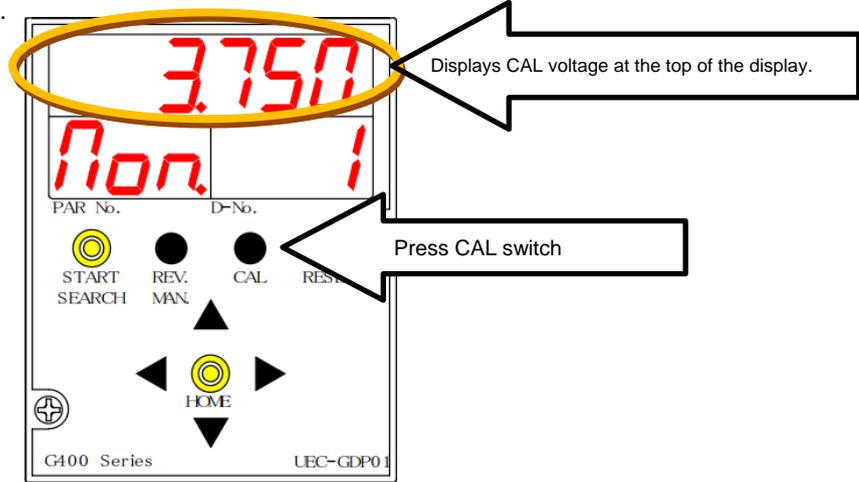
HI signals are output in the CW rotation while LOW signals are done in CCW rotation respectively.



3-4-3. How to calibrate an external monitor device

When CAL of the display is pressed with D-No. indicator of the unit display in the real-time mode (see PAGE5-8) displayed as "1", TORQUE OUT outputs CAL voltage with a potential difference of approximately $\Delta 3.75V$ and, at the same time, displays the torque value recognized by the unit in the upper row of the display. Adjust the torque voltage with an external monitor device to display the same torque value.

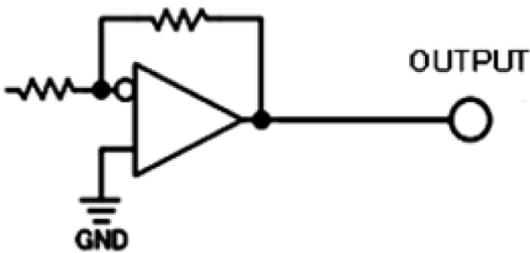
※The no-load ZERO is not 0V. For each unit or tool, ZERO voltage value is different. Compensation with an external monitoring device is required.



3-4-4. Output circuit

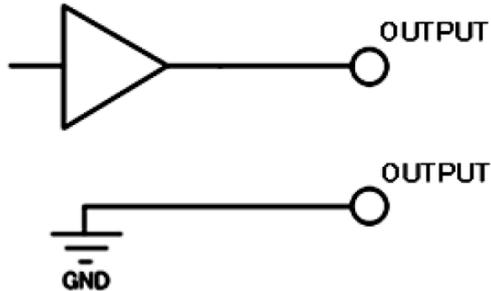
•Torque voltage output

Operational Amplifier output $0 \sim \pm 5V$



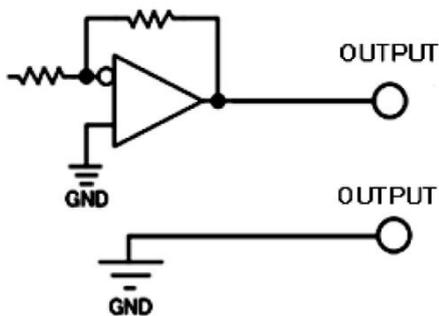
•Angle pulse, forward/reverse output

TTL(5V) output



•Current and speed output section

Operational Amplifier output $0 \sim \pm 10V$



3-5. RS232 C interface

In RS232C interface, the tightening data is outputted.



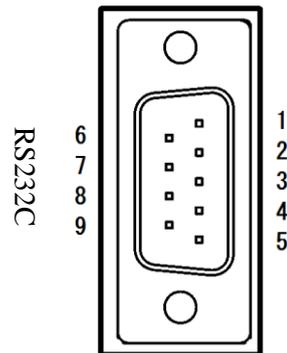
CAUTION

- The RS-232C in the front part of G-unit is dedicated to the above I/O.
Extension unit 2 (model: UEC-GCF) is required when inputting ID data etc. from RS232C.
- Enter from RS232C-2 interface of extension unit 2.

3-5-1. Applicable plug (RS 232 C)

Pin number	Signal name	IN/OUT	Contents
1	N.C.	-	Not used.
2	RxD	IN	ID data entry
3	TxD	OUT	Operation result data output
4	DTR	OUT	Always on output
5	GND	-	Signal ground
6	N.C.	-	Not used.
7	RTS	OUT	Always on output
8	N.C.	-	Not used.
9	N.C.	-	Not used.

Front view of the unit



3-5-2. RS 232 C Communication Specifications

The unit RS232C setting is factory-set as shown below. D-No. of the system-setting mode (PARNo. indicator: SYS) can be changed from [208 to 211]. Refer to PAGE 5-15 to change the setting, and PAGE 6-11 to change it.

Synchronous system	Asynchronous type	D-No.208 [Communication Speed]	38400bps
Communication mode	Half duplex system	Start bit	1 Bit
D-No.211 [data length]	8 Bit	D-No.210 [Stop Bit]	2 Bit
Error control	None	D-No.209 [Parity]	None



CAUTION

- Clear PLC receive buffers when the control power of the unit is turned on. If the dust data is output due to the influence of noise, etc., it may cause the data to shift.

3-5-3. RS232C Tightening Output (Main System)

On the main system, the data format to be output can be selected from ASCII format or BCD format. The assignment of output items is set in "Output Format" of "RS232C Output Format" of the UNR-G series user console. The data items that can be output are as follows.

● **Output Data Format (ASCII Format)**

Here is the output order of the tightening result data, "Header" → "Spindle data" of spindle number 1 → "Spindle data" of spindle number 2 → ... → "Spindle data" of spindle number 32 → "Footer". You can change the header output conditions.

In addition, spindle data is output for the connected spindle.

• Main format output items (ASCII format)

Output items	In bytes	Tightening data	Main format									
			1word		2word		3word		4word		5word	
Work cycle count	8	123456	—	—	1	2	3	4	5	6		
Date	10	2018/09/28	2	0	1	8	/	0	9	/	2	8
Time	8	12:34:56	1	2	:	3	4	:	5	6		
Main judgment ※1	4	NOK	N	O	K	—						
		OK	O	K	—	—						
		ALARM	A	L	A	R						
		STOP	S	T	O	P						
Workpiece number (1 to 24)	2	2	—	2								

※1: (20H) is a blank space code.

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Operation

• Spindle Format Output Item (ASCII Format)

Output items	In bytes	Tightening Data	Spindle format										
			1word		2word		3word		4word		5word		
Peak torque*2	8	123.4	—	1	2	3	.	4	Judgment	—			
Final angle*2	8	123.4	—	1	2	3	.	4	Judgment	—			
Tightening time ※2	6	12.3	—	1	2	.	3	Judgment					
Grade rate	6	12.3	—	—	1	2	.	3					
Snug Torque*2	8	123.4	—	1	2	3	.	4	Judgment	—			
Final torque*2	8	123.4	—	1	2	3	.	4	Judgment	—			
Spindle No. (1 to 32)	2	1	—	1									
Mode No. (1 to 48)	2	2	—	2									
Parameter number (1 to 96)	2	3	—	3									
Spindle step count*3	8	123456	0	0	1	2	3	4	5	6			
Step number	2	4	—	4									
Spindle judgment	4	NOK	N	O	K	—							
		OK	O	K	—	—							
		ALARM	A	L	A	R							
		STOP	S	T	O	P							
		BYPASS	—	—	—	—							
Peak current*2	10	12.3	—	—	—	—	1	2	.	3	Judgment	—	
Angle at peak current*2	6	123.4	—	1	2	3	.	4					
Number of rotation threads*2	8	12.3	—	1	2	.	3	Judgment	—	—			
CAL voltage*2	6	3.70	—	3	.	7	0	—					
ZERO voltage*2	6	-0.123	-	0	.	1	2	3					
NOK (BIN)	4	0000	00 00 00 00										
Alarm code (BIN)	4	5-1	00 00 05 01										
Low limit torque setting value	6	123.4	—	1	2	3	.	4					
High limit torque setting value	6	123.4	—	1	2	3	.	4					
Low limit angle setting value	6	123.4	—	1	2	3	.	4					
High limit angle setting value	6	123.4	—	1	2	3	.	4					
Final low limit torque setting value	6	123.4	—	1	2	3	.	4					
Final high limit torque setting value	6	123.4	—	1	2	3	.	4					
Snug high limit torque setting value	6	123.4	—	1	2	3	.	4					
RS232C#1 data	Variable*4	E0H	D	A	T	A		#	1			(8 Byte)	
RS232C#2 data	Variable*4	E1H	#	2								(3 Byte)	
RS232C#3 data	Variable*4	E2H	#	3								(2 Byte)	
RS232C#4 data	Variable*4	E3H	4									(1 Byte)	

※2: Output items in which the high/low limit setting exists are output in the following order: code, result display (including decimal point), judgment code, and tightening NG items that occurred first.

'- 123. 5L'

① ②

① Code

Display	Contents
Space (20H)	+ value
- (2DH)	-Value

② Judgment code

Display	Contents
Space (20H)	Within high/low limit range/without warning (peak current)
H (48H)	Out of high limit range/upper limit warning (peak current)
L (4CH)	Out of Low limit range/low limit warning (peak current)

※3: "Spindle step count" outputs up to 7 digits (order of millions).

※4: A total of 128 bytes of RS232C#1~#4 data can be set.

● Output Data Format (BCD Format)

The output order of the tightening result data is as follows: "Main format data" → "Spindle format data of spindle number 1" → "Spindle format data of spindle number 2" → ... → "Spindle format data of spindle No. 32". In addition, the spindle format outputs the data for the connected spindle.

• Main format output items (BCD format)

Output items	In bytes	Tightening data	Main format			
			1word		2word	
Work cycle count	4	123456	00	12	34	56
Date	4	2018/9/28	20	18	09	28
Time	4	12:34:56	12	34	56	00
Main judgment	2	NOK	00	01	-	-
		OK	00	02	-	-
		ALARM	00	04	-	-
		STOP	00	08	-	-
Work number (1 to 24)	2	2	00	02	-	-

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• Spindle-format output items (BCD format)

Output items	In bytes	Tightening Data	Spindle format			
			1word		2word	
Peak torque*5	4	123.4	00	12	34	01
Final angle*5	4	123.4	00	12	34	01
Tightening time ※5	4	12.3	00	01	23	01
Grade rate	4	12.3	00	01	23	01
Snug Torque*5	4	123.4	00	12	34	01
Final torque *5	4	123.4	00	12	34	01
Spindle No. (1 to 32)	2	1	00	01	-	-
Mode No. (1 to 48)	2	2	00	02	-	-
Parameter number (1 to 96)	2	3	00	03	-	-
Spindle step count*6	4	123456	00	12	34	56
Step number	2	4	00	04	-	-
Spindle Judgment	2	NOK	00	01	-	-
		OK	00	02	-	-
		ALARM	00	04	-	-
		STOP	00	08	-	-
		BYPASS	00	00	-	-
Peak current*5	4	12.3	00	01	23	01
Angle at peak current*5	4	123.4	00	12	34	01
Number of rotation threads *5	4	12.3	00	01	23	01
CAL voltage*5	4	3.512	00	35	12	03
ZERO voltage*5	4	-0.123	00	01	23	13
NOK (BIN)	4	0000	00	00	00	00
Alarm code (BIN)	4	5-1	05	01	00	00
Low limit torque setting value*5	4	123.4	00	12	34	01
High limit torque setting value*5	4	123.4	00	12	34	01
Low limit angle setting value*5	4	123.4	00	12	34	01
High limit angle setting value*5	4	123.4	00	12	34	01
Final low limit torque setting value*5	4	123.4	00	12	34	01
Final high limit torque setting value*5	4	123.4	00	12	34	01
Snug high limit torque setting value*5	4	123.4	00	12	34	01

※5: 2word displays up to six digits (without a decimal point), and outputs the data in the order of code and number of digits after the decimal point.

12 34 56 0 2

(A)(B)

(A) Code

Display	Contents
0	+ value
1	- value

(B) Digits after the decimal point

Display	Contents
0	No decimal point
1	1 digit after decimal point
2	2 digits after decimal point
3	3 digits after decimal point
4	4 digits after decimal point
5	5 digits after decimal point

※6: "Spindle step count" outputs up to 7 digits (place of millions).

Memo

3-6. Ethernet interface

Ethernet interface is for UNR-G user console installed on PC with windows ® and TCP/IP Ethernet communication of the optional touch panel display.

A commercially available LAN cable (cross/straight) can be used for the cable.



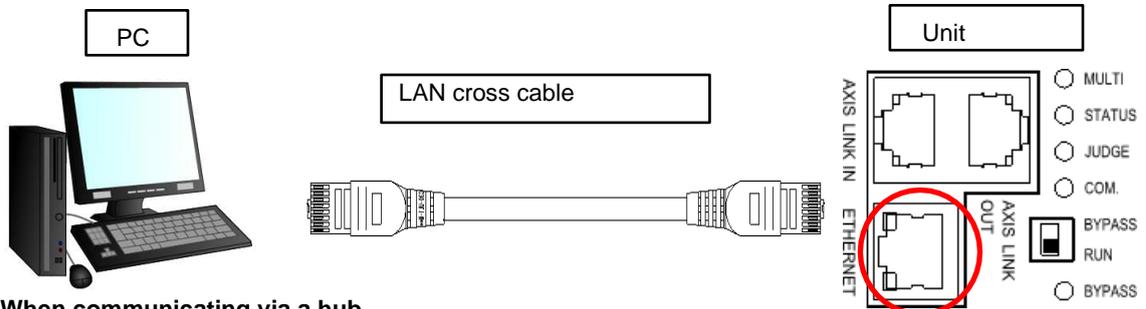
- When connecting PC communication cable, be careful not to connect it to the connector for AXIX LINKIN/OUT.
- Connect PC communication cable to MASTER spindle of PC communication and I/O(PLC) control.

The unit's TCP/IP settings are factory-set. To connect to PC for the first time, you must change the settings on PC.

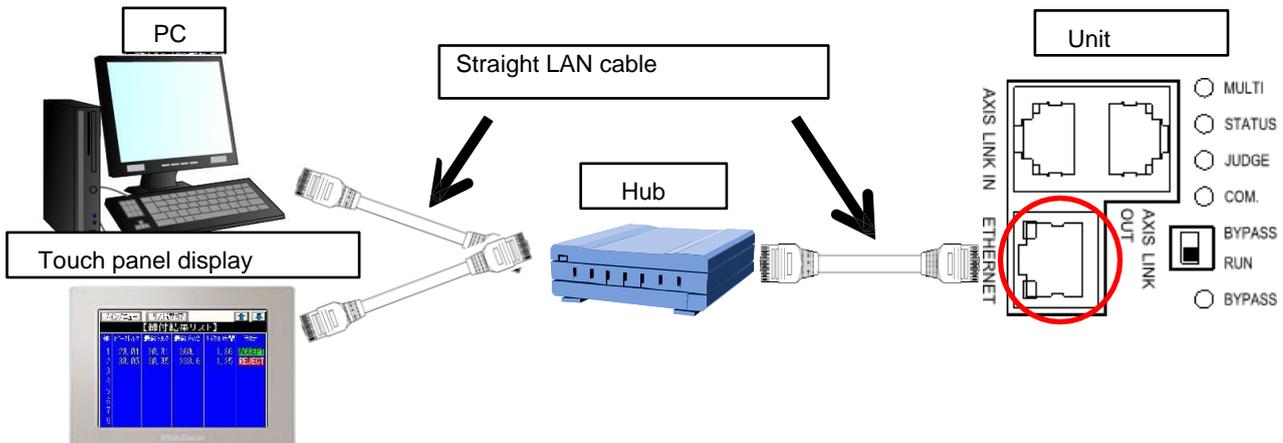
For TCP/IP setting procedure, refer to "TCP/IP Setting Procedure" on the next page.

IP address	192.168.11.10 (Factory-set)
Subnet Mask	255.255.255.0 (factory default)
Default gateway	192.168.11.1 (Factory setting)
Communications protocols	IEEE 802.3 Compliance
Ethernet standard	100BASE-T
Communication speed	100Mbps
Cable	Category 5 or higher (Category 5 recommended)
Connector shape	RJ-45

● Direct one-to-one communication with PC



● When communicating via a hub



3-6-1. TCP/IP Setup Steps (Windows)

TCP/IP settings of the unit are as follows at the time of shipment.

When connecting the unit to PC using the user console, you need to change the settings on PC. TCP/IP setting can be checked from PARNo. display: [SYS]D-No.[011~016] of the system-setting-mode of the display.

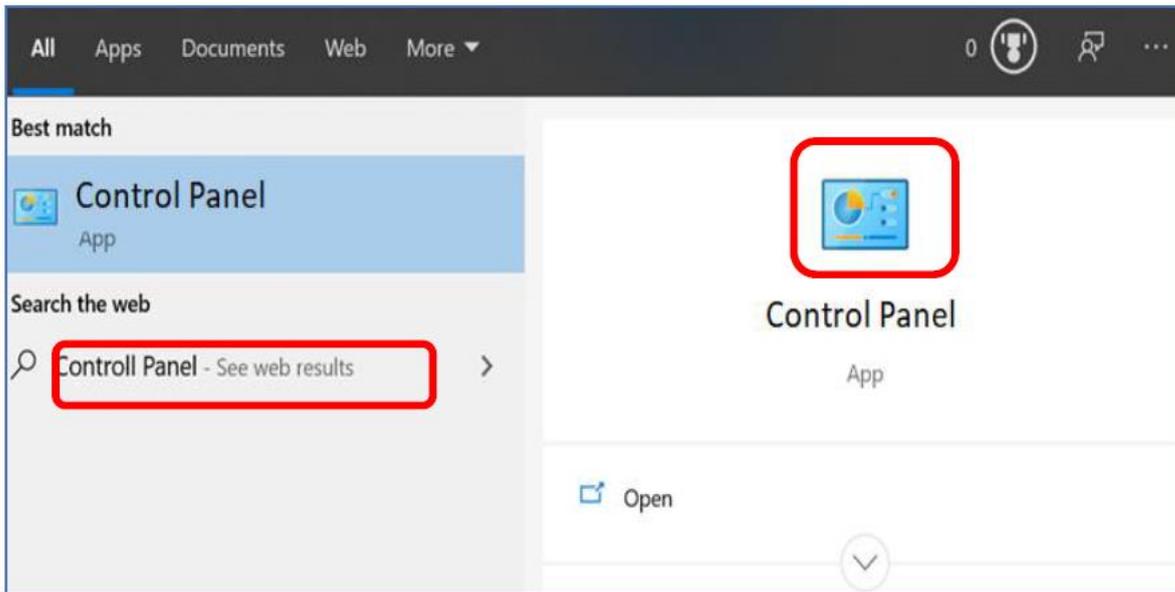
- Factory setting (system parameters)

D-No. [011], [012]:IP address	192.168.11.10
D-No. [013],[014]: Subnet Mask	255.255.255.0
D-No. [015],[016]: Default Gateway	192.168.11.1

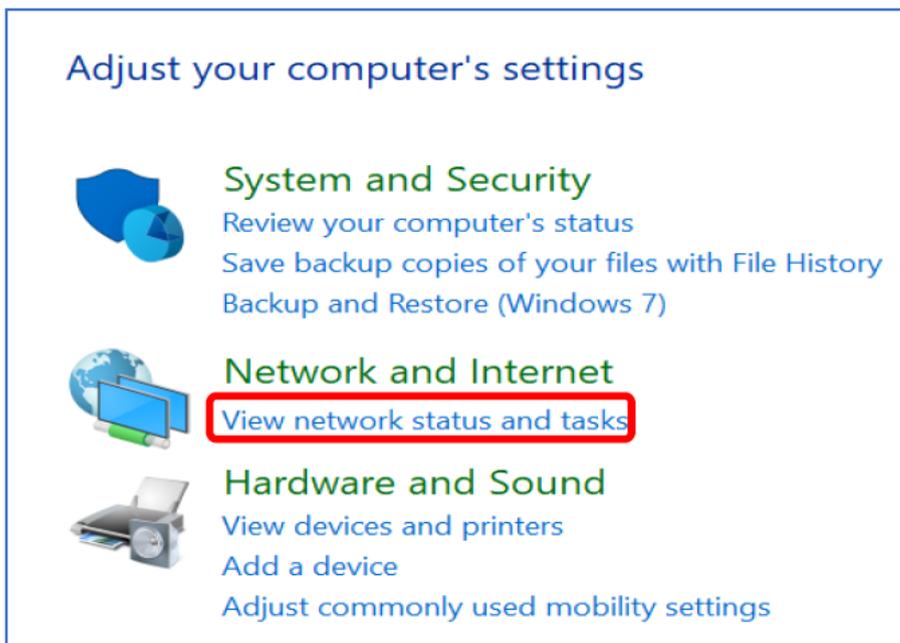
The following describes how to set TCP/IP in Windows 10 .

● **For Windows 10**

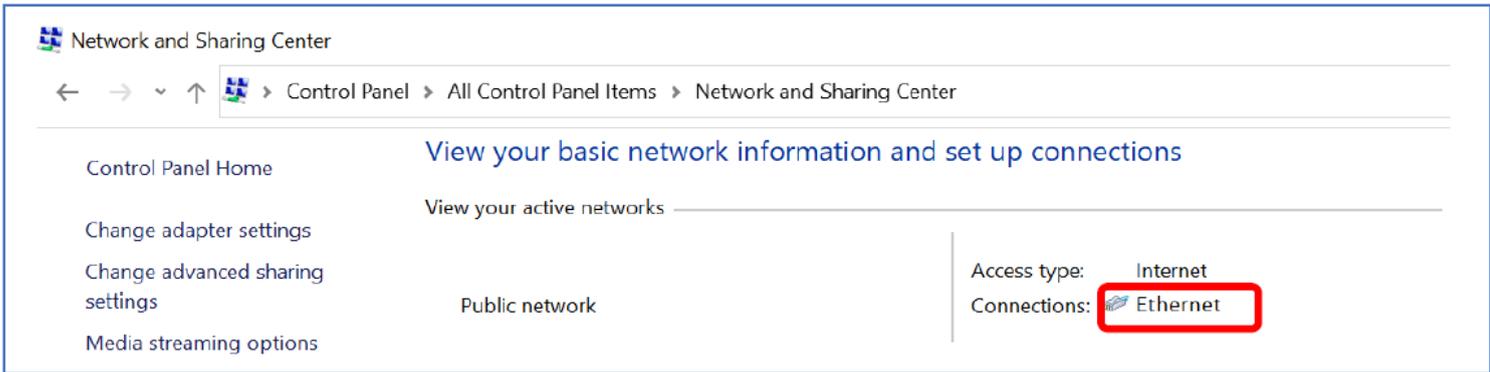
1. Find and select "Control Panel" from the search next to the Start menu.



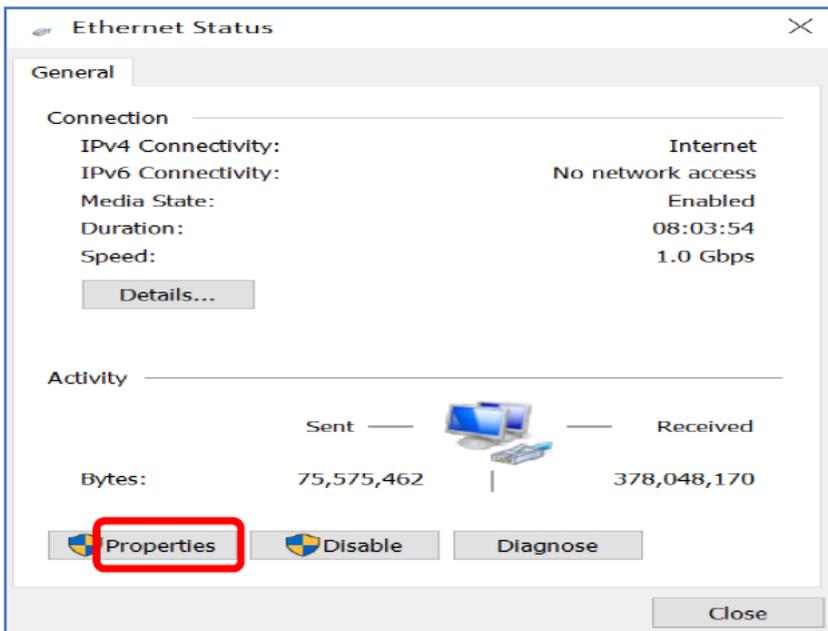
2. Select "View Network Status and Tasks" from the Control Panel.



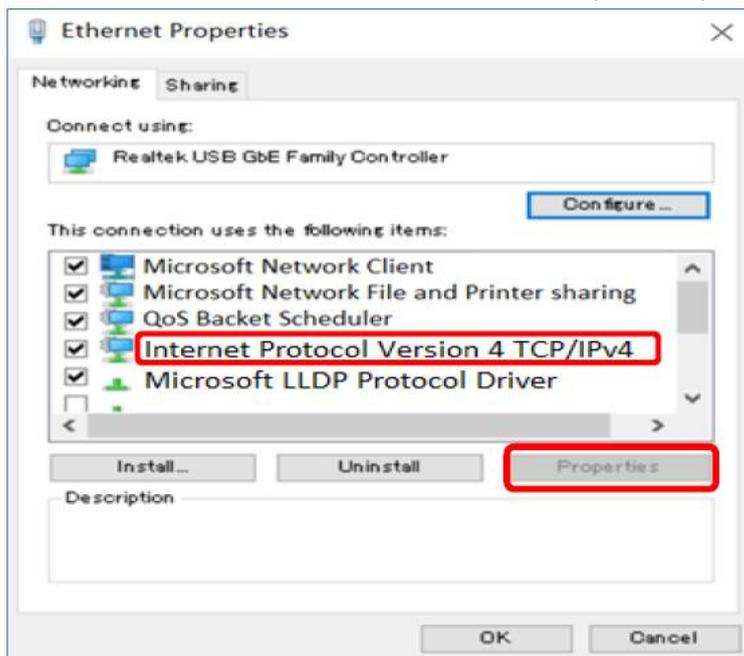
3. Select "Ethernet" from Network and Sharing Center.



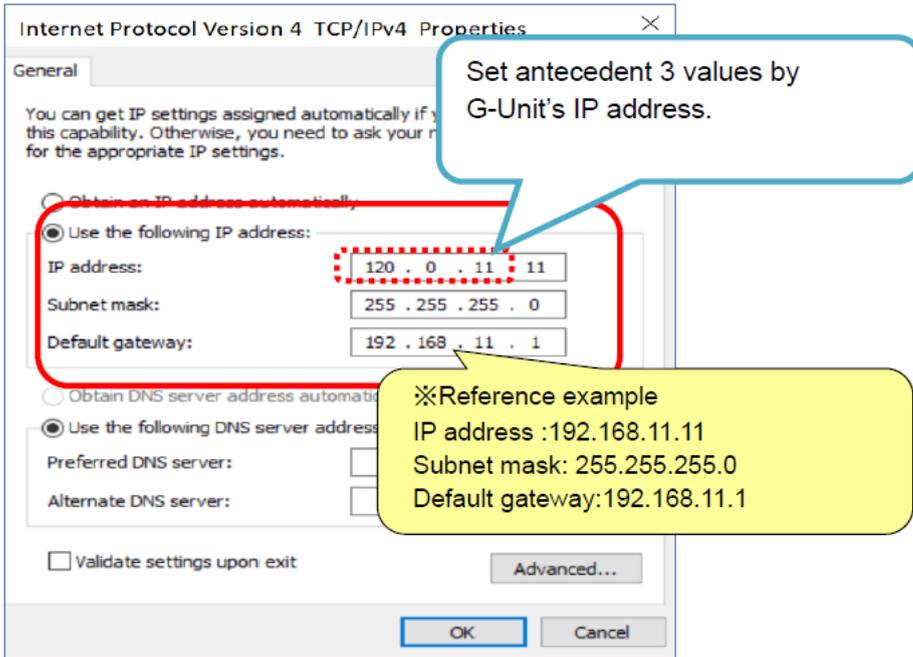
4. Select "Properties" from the Ethernet state.



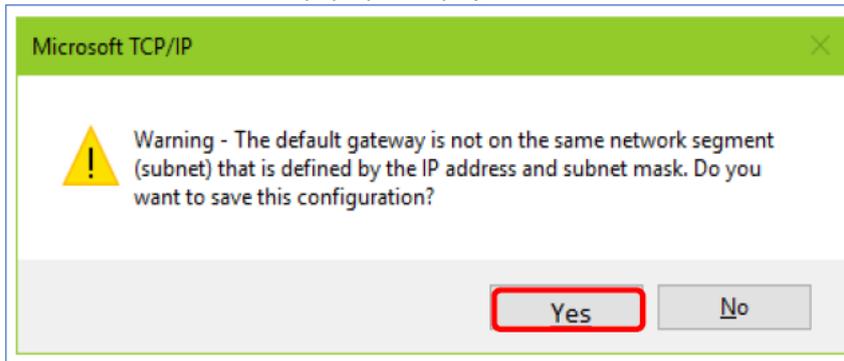
5. Select Internet Protocol Version (TCP/IPv4) from Ethernet Status Properties and select Properties.



6. Select "Use the following IP address" from the Internet Protocol Version 4(TCP/IPv4) properties to change IP address, subnet mask, and default gateway.



7. When Microsoft TCP/IP pop-up is displayed, select "Yes".



8.



- When "Obtain IP address automatically" is selected, you cannot connect to the unit.
- IP of PC does not overlap with the unit's factory-set value.
Please set. (e.g. IP : 192.168.11.11, 192.168.11.12, etc.)
- Set the subnet mask of PC to the same value as the factory-set value of the unit.
- Remember to make a note of the previous settings.

7. Register IP address in the UNR-G series user console.
See PAGE 3-19"TCP/IP Configuration Steps (User Console).

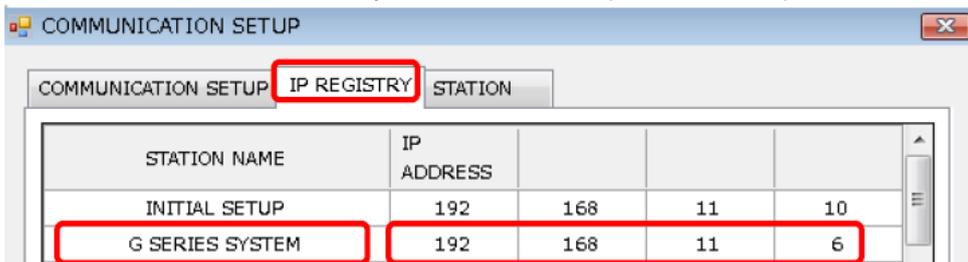
3-6-2. TCP/IP Configuration Steps (User Console)

Register TCP/IP settings of the unit to the UNR-G series user console.

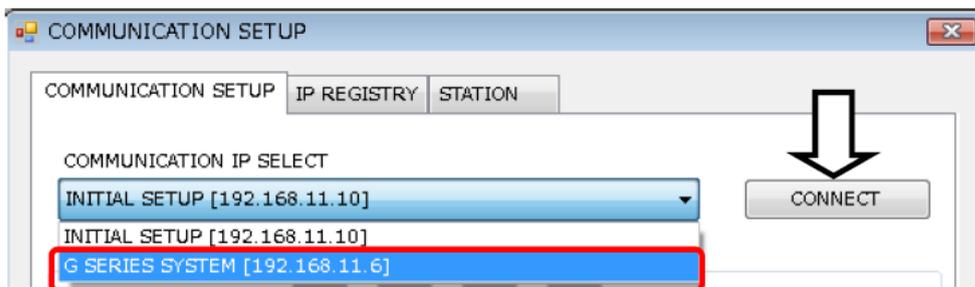
1. When UNR-G series user console is started, communication settings are automatically displayed. If you have already opened the UNR-G series user console, select the menu "Communication (C)" → "Communication setting".



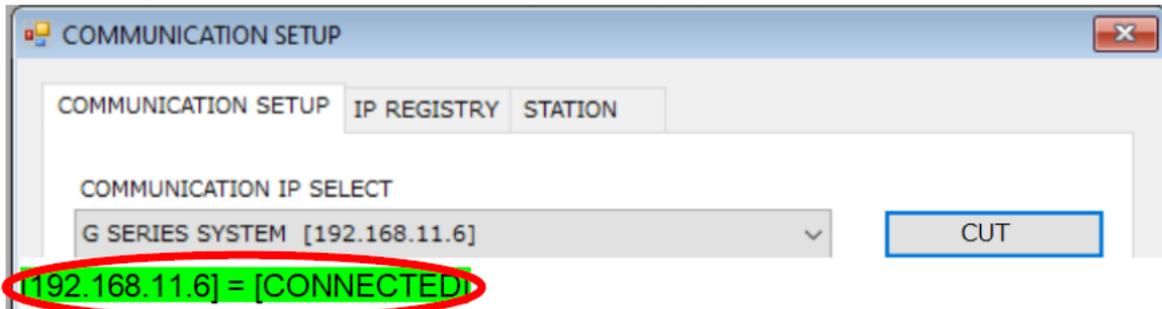
2. Select the communication setting display and select "Register IP ". Register TCP/IP setting set in the G-unit.
2-1. Enter the station name. (up to 30 characters)
Please enter your 2-2. IP address. (0~255 · 4 Side)



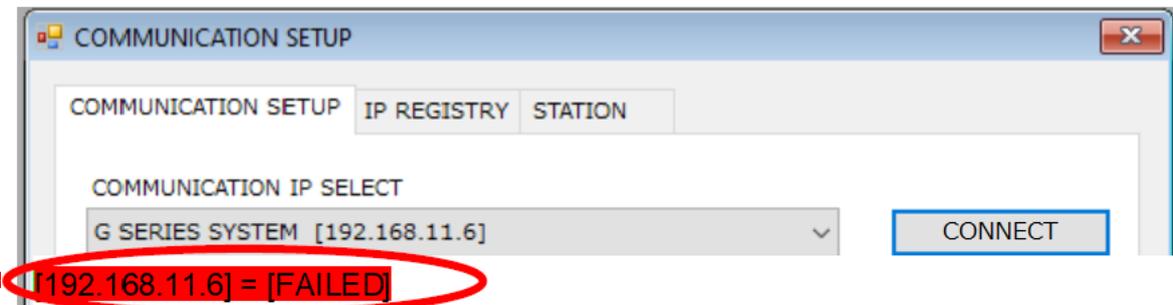
3. Return to the "Communication setting" tab. Select the station registered in step 2 in the "Communication IP selection" and then click "Connect".



4-A. If the connection to unit is successful, the "Connection" indication changes to "Disconnected" and "IP Address = Connection" set in step 2 is displayed in the status bar at the bottom left of the user console. After successful connection, you can read and write each set value and monitor the tightening result display.



4-B. If the connection with unit fails, the message "Failed to connect to IP address set in step 2." is displayed, and " IP address set in step 2." = Failed to connect" is displayed in the status bar at the bottom left of the user console.



 **CAUTION**

If another PC is already connected to the unit at the time of Step 3. execution, "Communication error occurred. Check the communication status." is displayed. On the status bar at the lower left of the user console after the message, "Not connected" is displayed.

3-6-3. TCP/IP Setting Instructions (Touch Panel Display)

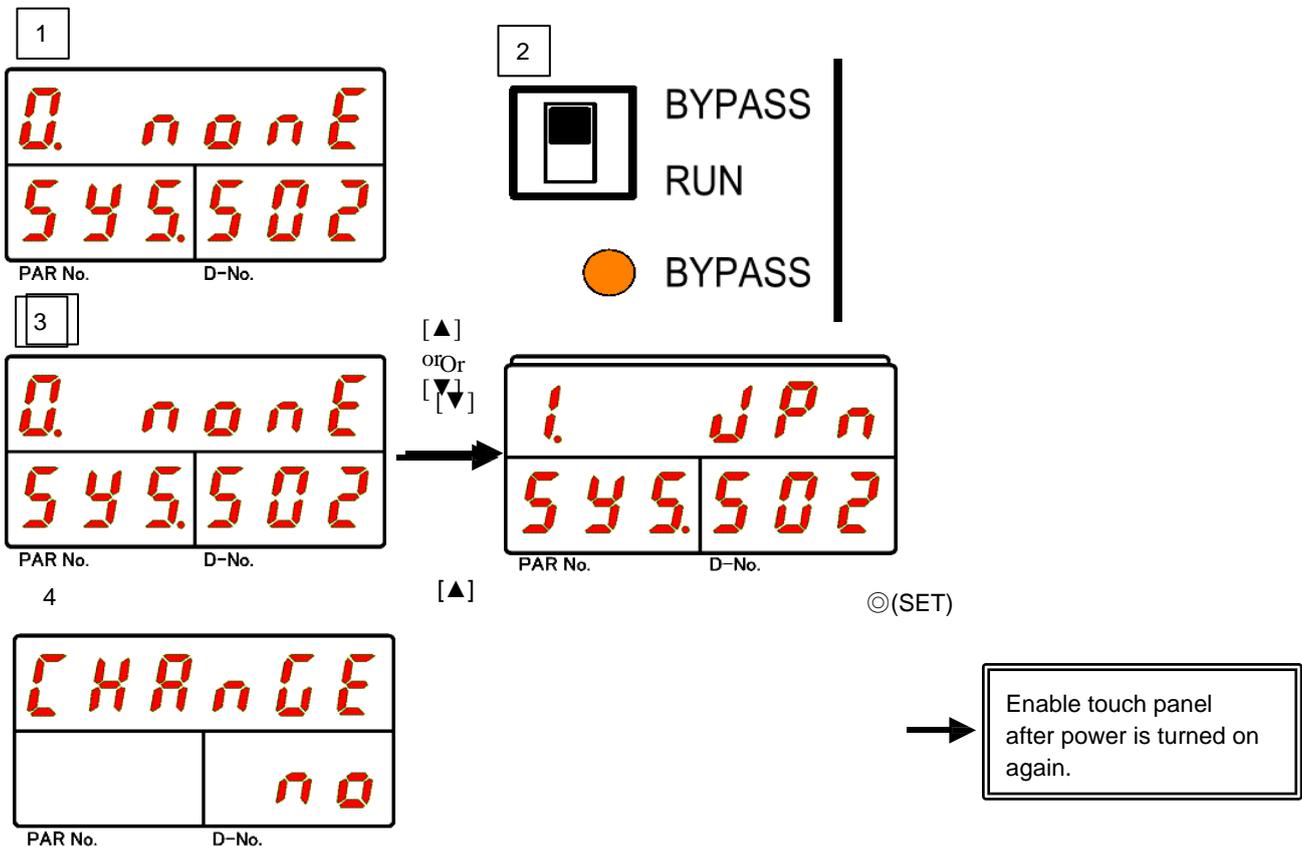
Since the touch panel function is disabled in the factory default settings, the unit cannot be connected to the touch panel display. To enable the touch panel function, the setting of the system parameter D-No.502 [Touch Panel Function/Language Setting] must be changed.

The setting can be changed from D-No.502 of the system-setting mode (PARNo. Display: [SYS]) on the display.

● Procedure for changing the touch panel function of the unit

Example: When using the language of the touch panel in "Japanese"

1. Operate the arrow switch on the display in order to display PAR No. display section: "SYS" and D-No. display section: "502": [Touch Panel Function/Language Setting].
2. When RUN/BYPASS switch of the unit is switched to BYPASS position, the unit enters the settings editing mode. Press the [⊙ (SET)] switch.
3. Use the [▲],[▼] switches to select from "1" to "4" according to the language used on the touch panel.
4. After pressing the [⊙ (SET)] switch, within 2 seconds, change the indication from "NO" to "YES" with the [▲] and [▼] switches, and then press the [⊙ (SET)] switch again.
5. Switch RUN/BYPASS of the unit to RUN.
6. Turn off the control power supply of the unit after checking that the "bypass" display at the upper row of the display turns ON → OFF.
7. The setting is completed by turning on the control power supply again after 10 seconds.



In addition, when connecting the unit to the touch panel display, the setting of IP addresses on the touch panel display side and the unit side must be the same.

※If the unit is used with the factory setting, it does not need to be changed.

TCP/IP setting for the touch panel display can be checked and changed from D-No.[500] & [501] of system-setting mode (PARNo. display section: [SYS]).

●Factory setting (system parameters)

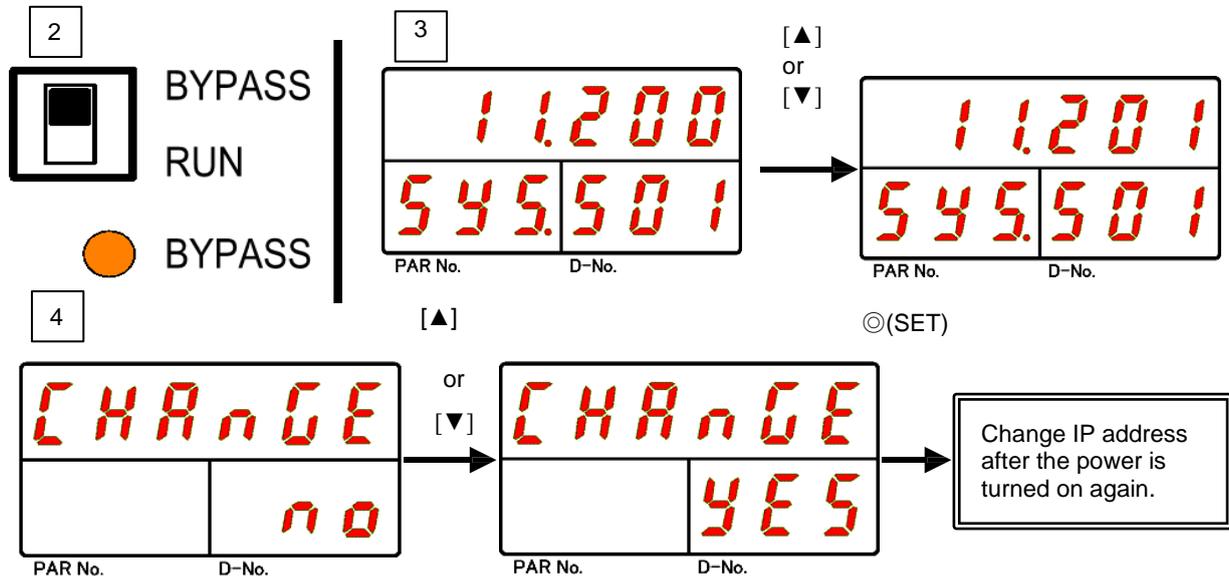
D-No. [500], [501]:IP address	192.168.11.200
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• For details on how to change the settings on the touch panel display, refer to "Changing the Touch Panel Display Settings" in the UNR-G Touch Panel Display Operation Manual.

● Procedure for changing TCP/IP setting for the touch panel indicator on the unit

e.g.: Changing IP address from "192.168.11.200" to "192.168.11.201"

1. Operate the arrow switch on the display unit to display PAR No. display unit: "SYS" and D-No. display unit: "501": [IP address]."
2. When RUN/BYPASS switch of the unit is switched to BYPASS position, the unit enters the setting editing mode. Press the [⊙ (SET)] switch.
3. Any address can be changed by operating the arrow switch ([▲] [▼]: Increment/Decrement: ◀▶ Move cursor)
4. After pressing the [⊙ (SET)] switch, within 2 seconds, change the indication from "NO" to "YES" with the [▲] and [▼] switches, and then press the [⊙ (SET)] switch again.
5. Switch RUN/BYPASS of the unit to RUN.
6. Turn OFF the control power supply of the unit after checking that the "bypass" message at the upper row of the display turns ON → OFF.
7. The setting is completed by turning on the control power supply again after 10 seconds.



3-7. AUX. interface

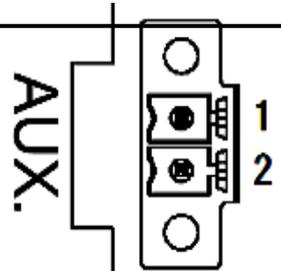
When STOP signal function is enabled, STOP signal is sent from AUX. connector on the bottom of the unit. The system can be stopped forcibly by setting this bit to OFF.



• STOP function from AUX. connector can be enabled by setting switch 1 of SW2 switch on the bottom of the unit to ON. See PAGE 2-17 "Setting the Bottom-Panel SW2 Switches."

3-7-1. Applicable connector (STOP)

Manufacturer: Phoenix Contact
 Type : Cable connector
 Model : MC 1,5/2-STF-3,81



The wiring of the cables is the same as that of the control power supply. See "Wiring Procedures for Control Power" in PAGE 3-3 "Connecting Input Power."

3-7-2. STOP signal.

- **Input/Output Specifications.** Voltage contact input

Pin No.	Signal name	IN/OUT	Contents
1	STOP+	IN	STOP In + (DC24V)
2	STOP-	IN	STOP In - (DC 0V)

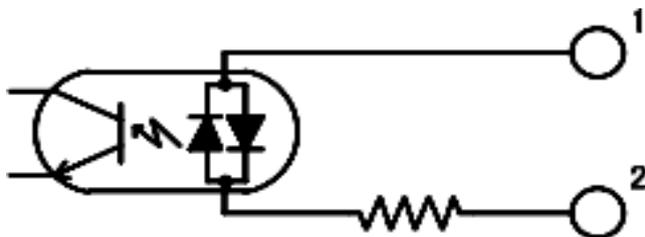
- **Fieldbus connection example**

When STOP is turned OFF, the tightening operation is stopped and a STOP is displayed in the upper row of the unit display. In addition, PLC I/O output-signal "READY" is set to "OFF".

- **External Emergency Stop Signal Function Compatibility Table by System and Communication Spindle**

System configuration and communication spindle	Function
Main system: MASTER spindle	Functions on all connected UNR-G spindles.
Main system: SLAVE spindle	It works for its own unit.

- **Output circuit**



Bi-directional photocoupler	Equivalent to PC 354 N 1 T(SHARP)
Input voltage	11.4~26V * Recommended 12V(5mA)/24V(10mA)
Input resistance	2.2K

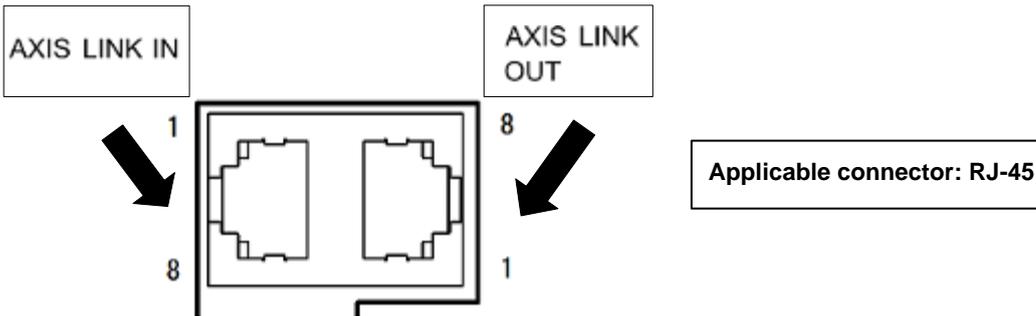
3-8. AXIS LINK IN/OUT interface

Communication between units is performed via the dedicated communication port.
Connect Axis LINK OUT connector of the unit and Axis LINK IN connector of another unit to each other using a spindle cable.

In addition, Axis LINK IN connector of the unit of the leading spindle and Axis LINK OUT connector of the unit of the terminating spindle connects the communication connector between spindles.

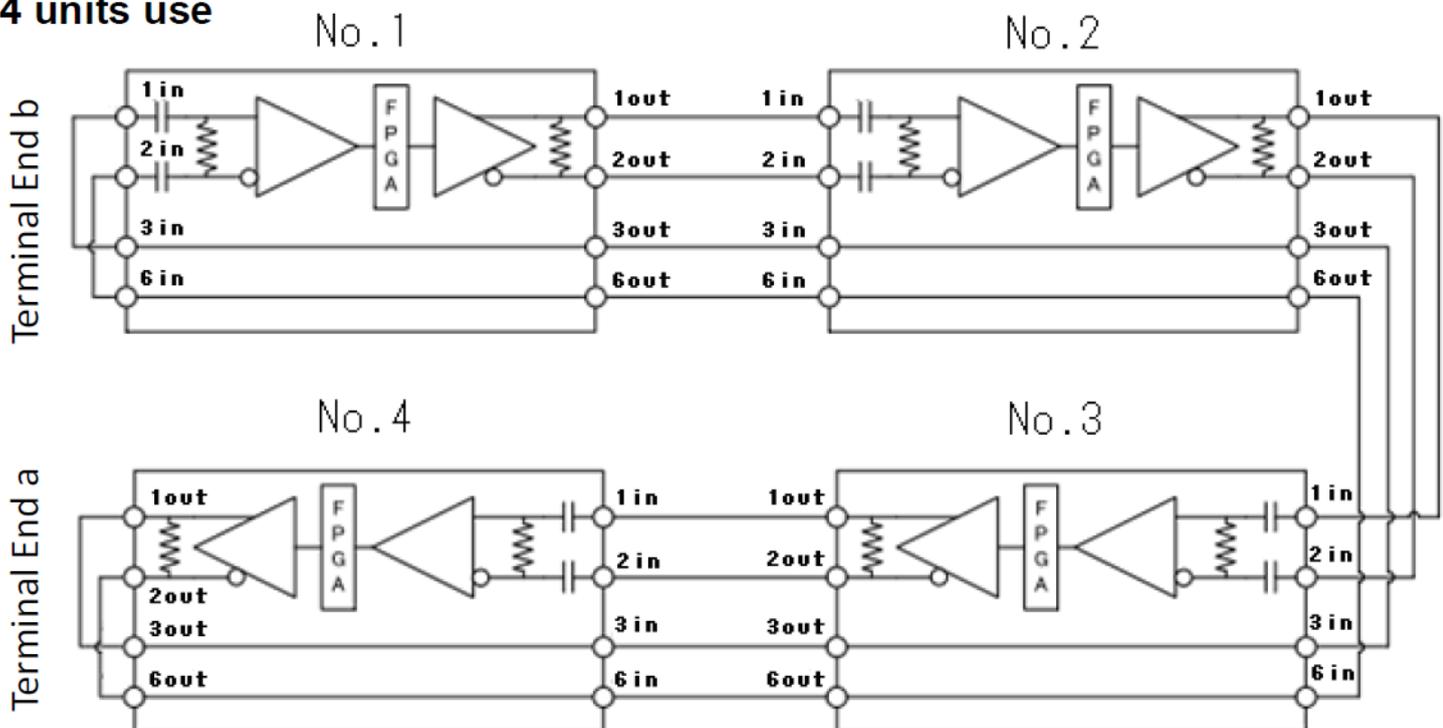


[To customers using the F-type nutrunner system]
Note that the spindle terminating connector (model: F-END) and the spindle connector (model: G-END) are not interchangeable.



- Since Axis LINK IN and Axis LINK OUT connectors have the same pin-numbers 1 and 2, if IN or OUT are connected to each other, communication between UNR-G units is not possible.
- When connecting the communication cable (G-END spindle connector) to the UNR-G unit, be careful not to connect it to Ethernet connector.

4 units use



3-9. Power on and trial run

3-9-1. Check items before power-on

1. Check of Power Supply Voltage

Wire correctly referring to PAGE 3-3 "Connecting the Power Supply."

Also, confirm that the drive power supply voltage is in the 3-phase AC200~230V 50/60Hz and the control power supply voltage is DC 24V .

2. Check the connection between the unit and the standard tool cable

Securely connect the standard tool cable between the unit and the tool. Do not apply excessive force to the standard tool cable.

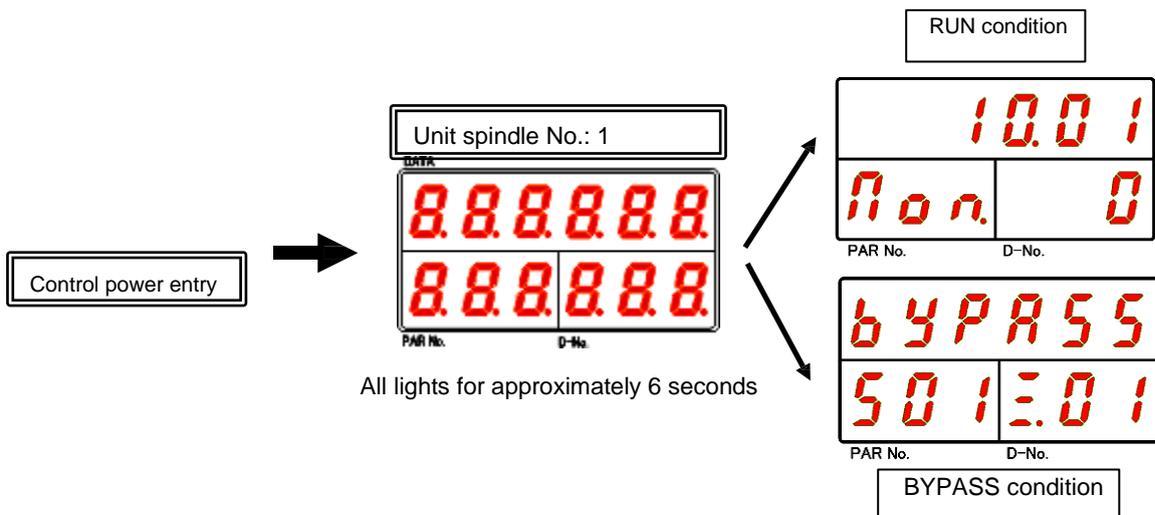
3. Check the wiring between the unit and PLC (external I/O control device).

Wire the I/O of the unit to PLC correctly.

Be sure to check the above items before turning on the power.

3-9-2. Check items at power-on

When the control power is turned on, the display contents shift as follows.



If "ALAr" is displayed at the top row of the display when the control power is turned on, eliminate the cause by referring to PAGE 9-3 "Description/Cause and Remedy" and ensure safety before turning the control power ON again.

Also, check the following precautions when turning on the drive power.



[Precautions when turning on the drive power again]

- When turning on the drive power again, be sure to wait for 20 seconds after the drive power is turned OFF before ON. If there is no waiting time or if it is turned on again within a short time, the following problems may occur.
- The circuit protector for circuit protection may be cut off because an abnormal current flows in the primary power supply circuit without the inrush current prevention circuit.
- The unit's power supply circuit detects an error and automatically shuts off the circuit. As a result, the power circuit does not work even if the drive power supply is turned on again. (will remain OFF)
- If the drive power cannot be turned on again, wait for at least 5 minutes after the drive power is turned OFF before turning it ON.

3-9-3. Initial setting value input

Enter the required settings for performing a trial run. The factory default settings are based on the customer's specifications. If you need to change the settings, refer to PAGE 5-1 and PAGE 7-1.

3-9-4. Check items after power-on

To perform the following checking, STOP signal must be turned "OFF" from PLC (external I/O control device) to the tool.

1. Checking ZERO Voltage

Press RESET button on the display and confirm that the value on the top row of the display is nearly-zero.

While RESET is pressed, make sure that the JUDGE LED does not turn red.

2. Checking CAL Voltage

Press CAL switch on the display and confirm that the upper display indicates full scale torque. Also, make sure that JUDGE LED does not light red while CAL is pressed.

3. Manual check of reverse rotation

Follow the steps below to press REV. switch on the display. Perform reverse rotation of one spindle at a time to check whether the corresponding tool rotates.

3-1. Switch RUN/BYPASS on the front panel to BYPASS position for all units, or change PLC I/O input signal "BYPASS" to "ON" to change the unit to BYPASS status.

3-2.1 After switching RUN/BYPASS switch to RUN, press REV. switch on the display. Confirm that the tool of the corresponding spindle number rotates in the reverse direction.

3-3. Perform step 3-2 for all units by one spindle.

3-4. Change RUN/BYPASS of all units to RUN or set PLC I/O INPUT BYPASS to OFF to return to RUN status.

3-5. For the main system, press REV. switch on the indicator to rotate all spindles in reverse simultaneously.

4. Confirmation of tightening start manually

Press START button on the indicator and try tightening.

5. Check of tightening start by external command

Confirm that the unit operates according to the command from PLC (external I/O control device).

Chapter 4 Extension Unit



4

4-1. External control interface

4-1-1. External Control Interface List

1. Extension I/O (In: 32ch/out: 32ch)
2. CC-Link Ver2.00 (Ver1.10)
3. DeviceNet
4. PROFIBUS DP-V1
5. PROFINET IO
6. Ethernet/IP

Each fieldbus has its own instruction manual. Refer to the "Extension Unit Operation Manual" for details of each. (Ex. CC-Link Expansion Unit Operation Manual)

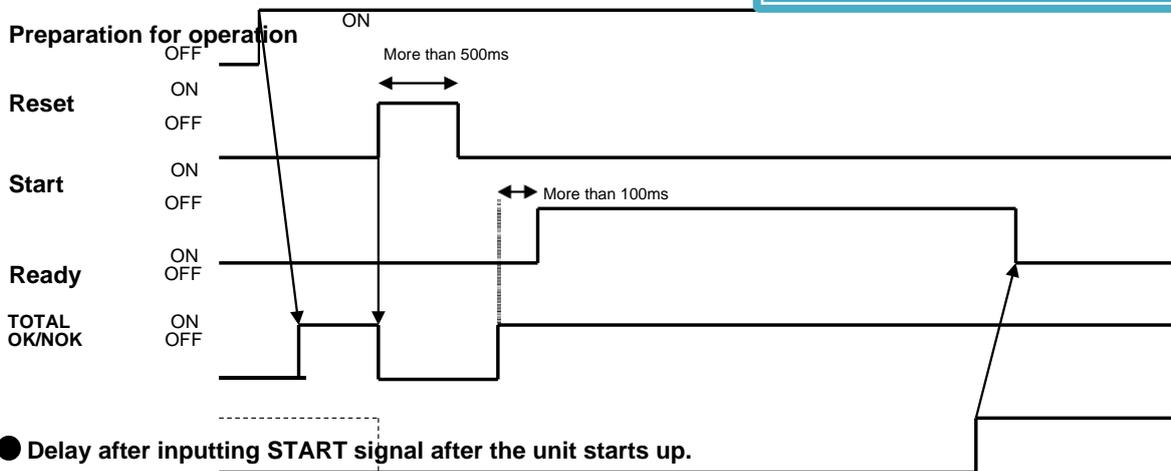


• When using an external control interface other than the extension I/O, the unit must be restarted after setting "Fieldbus setting" to MASTER spindle from the G type user console.

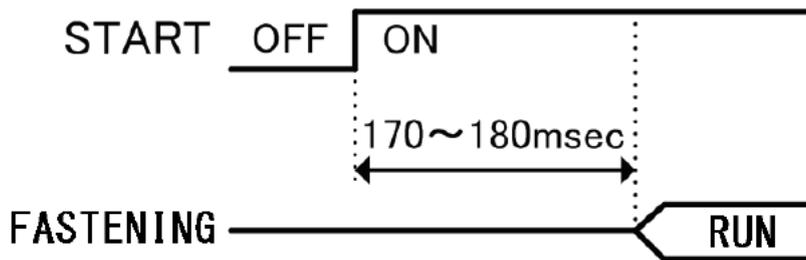
4-1-2. Timing chart (main system)

● Basic control signal: Main

OFF: Open seen from PLC
ON: Close seen from PLC



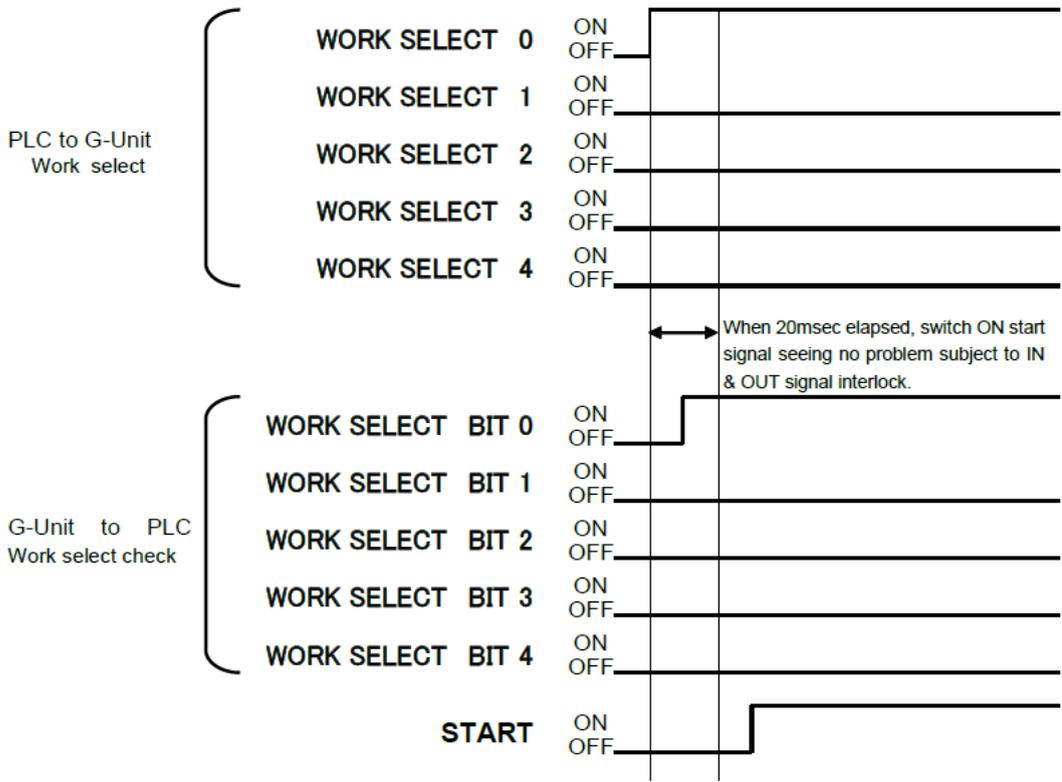
● Delay after inputting START signal after the unit starts up.



- Communication for PC and I/O (PLC) Control MASTER spindle unit startup process time: Approx. 170~180msec
 - PC communication and I/O (PLC) Control SLAVE spindle unit startup processing time per 3msec (1 spindle)
- Example: 10-spindle system processing time = (170~180msec)+ 3msec×10 spindles)
- Therefore, SLAVE spindle starts after 200~210msec after MASTER spindle start.

● Tightening sequence selection signal and start timing

OFF: Open seen from PLC
ON: Close seen from PLC



4-1-3. About input signal and output signal**OPERATION PREPARATION: Preparing for operation****RESET: Resetting****REVERSE: Tool Reverse****START: Tightening starts****WORK SELECT: Select work No.****AUTO ZERO/CAL CHECK OFF: Auto Z/C checking OFF**

For the above signals, refer to PAGE 2-9 "I/O Signals".

CYCLE START: Cycle start

Repeated operation starts at the beginning of operation ("OFF"→"ON":100msec) of CYCLE START during START signal inputting. Even if CYCLE START is turned "OFF" during the tightening operation, the tightening operation will not be stopped.

However, when START is turned OFF, the tightening operation is stopped and judgment is made.

CYCLE COUNT CLEAR: Resetting the work cycle count

When CYCLE COUNT CLEAR is turned "ON", the cycle count of the selected work number is erased. The work number after clearing the cycle count is the start of the next tightening operation, and the work cycle count is the first.

Work cycle count method can be changed by UNR-G Console.

(The factory default setting is "Auto Count Up")

CYCLE COUNT UP: Count up of the work cycle counter

When the cycle count method of the work is "signal input", setting CYCLE COUNT UP signal to "ON" will increment the cycle count of the selected work number by one.

Each time CYCLE COUNT UP is turned "ON", the work cycle count is incremented by one.

**CAUTION**

- When "Auto count up" is set as the method of the work cycle count, the sequential judgments including "OK", "NOK", or "ALARM" (Excluding ALARM10-*) increase the cycle count by one time.
- When a sequence judgment other than the above is finished, the cycle count is not updated, and the same cycle count as the previous one is output at the start of the next sequence operation.

STEP IN (1 to 7): IN of steps (1 to 7)

This signal is used to restart a step that has been stopped by the step OUT signal.

AUTO/EACH: Auto/Each

When "Auto" is set to "ON", it will automatically move to the next step when the step operation is completed. In addition, only the specified step can be tightened by using "OFF" and inputting the step start.

(※ Extension FB unit only)

ID DATA CLEAR: Unit's ID data erase signal

When ID DATA CLEAR is turned "ON", ID data that is being input from RS232C or fieldbus is erased. ID DATA CLEAR signal does not erase LED indication, PLC I/O output signal or tightening data of the unit.

In addition, if the following tightening operation is started with ID not entered, it will be filled with 20H: "Space". ID data is retained in the unit until ID DATA CLEAR signal turns "ON".

MANUAL Z/C CHECK: Manual Z/C checking

Performs a self-check of the torque transducer.

BYPASS No.# (1 to 32): Spindle 1 to 32 disabled

When BYPASS No.# (1 to 32) is set to "ON", the unit with the selected spindle number is in BYPASS (spindle disabled) status, and the tightening operation cannot be started.

If BYPASS (spindle switching) status is selected during the tightening operation, the tightening operation will stop, but the tightening data immediately before the stop will be held.

STEP START: Step start

Tightening of only the specified step is executed when selecting "each unit".

CYCLE SELECT NUMBER (1 to 24): Cycle-selection No. (1 to 24)

Select CYCLE number that G-Unit conducts fastening under EACH selection from AUTO/EACH.

STEP SELECT NUMBER (1 to 20): Step selection No. (1 to 20)

Select STEP number that G-Unit conducts fastening under EACH selection from AUTO/EACH.

4-1-4. PLC Out Layout

To assign the output signals, use the "PLC Output Layout" on the UNR-G series User Console.

Output layout banks "1" to "8" are programmable (pin numbers 1 to 32). The signals that can be output are as follows.

●Main

Signal name	Connection	Functions and purposes
TOTAL NOK	Normally open	If the unit is tightened to NOK even with 1 spindle, it is outputted.
TOTAL OK	Normally open	If the tightening is OK for all the units that have completed the tightening operation, it is outputted.
Nutrunner abnormality	Normally open	Outputs when an error occurs during the system or tightening operation.
Ready	Normally open	Outputs when the system can operate. It is set to "OFF" for [Processing at power-on], [Error occurrence], [Emergency-stop status], [Resetting], and [CAL checking].
Operating	Normally open	This signal is output during the tightening operation or reverse operation of the spindle in the main system.
End	Normally open	It is output when the sequence operation is completed.
#Spindle OK	Normally open	Outputs If the tightening result of the specified spindle unit whose tightening operation has been completed is OK.
Cycling NOK judgment	Normally open	Outputs when an NOK occurs at completion of repeated operation.
Cycling OK judgment	Normally open	Outputs when all judgments are OK at completion of repeated operation.
Z/C NOK	Normally open	Outputs when Zero Cal Check is NG.
Z/C OK	Normally open	Outputs when Zero Cal Check is OK.
With BYPASS spindle	Normally open	If the unit is BYPASS even on 1 spindle, it will be outputted.
Work selection BIT	Normally open	The selected work No. is output.
Work selection BIT HI	Normally open	The selected work No. is output.
OUT1 of steps to 7	Normally open	The set number is output after the step ends. This is used when the work is to be performed before the next step starts, etc.
Cycle No.# NOK	Normally open	Outputs when an NOK occurs during operation of the set number of repetitions.
Cycle No.# OK	Normally open	Outputs when all judgments are OK at the operation of the set number of repetitions.
Abnormal current value warning	Normally open	Outputs when the unit generates an abnormal current value warning even for 1 spindle.
CAL Error Alert	Normally open	It is outputted when the unit generates abnormal CAL voltage even on 1 spindle.
ZERO Error Alert	Normally open	It is outputted when the unit generates abnormal ZERO voltage even on 1 spindle.

※NO: Normally open

●Spindle No. 1 to 32

Signal name	Connection	Functions and purposes
NOK judgement	Normally open	The upper and lower limits such as torque, angle, time, and number of rotation threads are judged during the tightening operation. Output when the tightening result exceeds the upper/lower limit range.
Step OK judge	Normally open	The upper and lower limits like torque, angle, time, and number of rotation threads are judged at the end of a step. Outputs when the tightening result ends within the judgment range.
Nutranner abnormality	Normally open	Outputs when an error occurs during the system or tightening operation.
Ready	Normally open	Outputs when the unit can operate against an external input signal. It becomes "OFF" when [Power ON], [Error Occurrence], [Emergency Stop Status], [Drive Power OFF], [Resetting], [CAL Checking] or [BYPASS Status] occurs.
Run	Normally open	Output during tightening operation or reverse operation.
Bypass	Normally open	Outputs when the unit is in BYPASS status.
Initial Trouble NOK	Normally open	Outputs when "Cut torque (angle)" is reached within the time set for "Initial trouble timer" from the start of step.
Cycle NOK	Normally open	Outputs when the cut torque (angle) value is not reached even after the set time of "cycle timer" has elapsed from the start of step.
Peak torque low limit NOK	Normally open	Outputs when the peak torque is judged to be LOW.
Peak torque high limit NOK	Normally open	Outputs when the peak torque is judged to be HIGH.
Final torque low limit NOK	Normally open	When the final torque is judged to be LOW, the torque is outputted.
Final torque high limit NOK	Normally open	When the final torque is judged to be HIGH, the torque is outputted.
Angular low limit NOK	Normally open	Outputs when the angular judgment result is a LOW judgment.
Angular high limit NOK	Normally open	Outputs when the angular judgment result is a HIGH judgment.
Torque low limit NOK	Normally open	Outputs when LOW judgment is made.
Torque high limit NOK	Normally open	Outputs when HIGH judgment is made.
Information	Normally open	Outputs the signal assigned to the information signal setting. Refer to PAGE4-12 for more information.
Low limit NOK	Normally open	Outputs when the tightening result is a LOW judgment.
High limit NOK	Normally open	Outputs when the tightening result is a HIGH judgment.
Time NOK	Normally open	Outputs when the "initial trouble NOK" or "cycle NOK" occurs.
Step output	Normally open	Outputs the step that is performing the tightening operation in binary. (Example; When step 3 is executed, step outputs 1 and 2 are output.)
NOK output	Normally open	Combinations of assigned NOK are output at NOK outputs 1 to 8. Refer to PAGE4-13 for more information.
Start torque high limit NOK	Normally open	Output when "Start torque high limit" is reached within the thread of "Start torque thread number" setting value from the start of step.
Rotating thread count NOK	Normally open	Outputs when "Rotational thread count low limit / high limit NOK" occurs.
Rotating thread count lower limit NOK	Normally open	Outputs when LOW is judged as a result of the rotational thread count.
Upper limit NOK of rotational thread counts	Normally open	Outputs when HIGH is judged as a result of the rotational thread count.
Abnormal current value warning	Normally open	Outputs when "Current low limit / high limit warning" occurs.
Low current limit warning	Normally open	Outputs when the current at tightening is LOW judgement.
Current high limit warning	Normally open	Outputs when the current at tightening is HIGH judgement.
CAL Error Alarm	Normally open	Outputs when CAL voltage reaches the error warning value.
ZERO Error Alarm	Normally open	Outputs when ZERO voltage reaches the error warning value.

※You can set "Always ON" to "ON" at all times and "Always OFF" to "OFF" at all times as an output signal other than the above.

4-1-5. Output Signal Description**TOTAL OK : Total OK****STEP OK : OK of tightening steps****TOTAL NOK : Total NOK****NOK : Tightening NOK****NR FAILURE: Nut runner error****READY : Ready****WORKING : Operating****WORK SELECT BIT : Work number acknowledge signal (BIT)****BYPASS YES: Bypass enabled**

For the above signals, refer to PAGE 2-9 "I/O Signals".

END: Sequence-end signal

When the tightening operation is completed, WORKING is turned "OFF" and then turned "ON".

- ◆ When START is turned on ("OFF"→"ON")
- ◆ When RESET "ON"
- ◆ When CAL voltage check is started by PC communication or CAL switching from MASTER spindle under I/O(PLC) control.

CYCLE NOK JUDGMENT: Cycle NOK judgment

G-Unit outputs this judgment if any controlled objective spindle number's G-Units ended with NOK result under CYCLE operation.

CYCLE OK JUDGMENT: Cyclic OK judgment

When all of the units whose spindle numbers are subject to operation or judgment have been tightened with OK at the completion of repeated operation, this bit is set to "ON".

Z/C NOK:Z/C checking NOK

Outputs when Manual Z/C checking is NOK.

Z/C OK:Z/C checking OK

If Manual Z/C checking is OK, it is printed.

STEP OUT (1 to 7): OUT of steps (1 to 7)

Outputs the set number after the step ends, and stands by for the transition to the next step.

When the set "Step IN" signal is input or the "Signal Waiting Timer" time-up, the program moves to the next step, and the signal of the step OUT is turned "OFF".

※Output after the setting step is completed.

CYCLE NUMBER NOK: Cycle NO.# NOK

If tightening is completed in NOK even for 1-spindle when the set number of repetitions is executed, "ON" is set.
(Ex.: When "3" is set, "ON" is sent if the judgment during the third repeated operation is NOK.)

CYCLE NUMBER OK: Cycle NO.# OK

When the set number of times of repetition is executed, and all units of the spindle No. that are the targets of operation or judgment are tightened with OK, the status is set to "ON".

(e.g.: When set to "4", "ON" is sent if all judgments are OK during the fourth repeated operation)

CURRENT VALUE ERROR ALARM: Total current alarm

If the peak-current value in operation exceeds the range of [Current high limit / low limit] at the completion of tightening even for 1 spindle in the unit, "ON" will occur.

CAL VOLTAGE ERROR ALARM: Overall CAL voltage warning

When CAL voltage is checked after the control power is turned on or the tightening operation is started, even one spindle is out of the allowable range. "ON" will occur.

ZERO VOLTAGE ERROR ALARM : Overall ZERO voltage warning

When ZERO voltage is checked after the control power is turned on or the tightening operation is started, even one spindle is out of the allowable range. "ON" will occur.

OK No.# (1 to 32): 1 to 32-spindle OK

This bit is set to "ON" when the tightening result is completed within the judgment range when LAST steps are completed in the unit of the corresponding spindle number.

STEP OK No.# (1 to 32): 1 to 32-spindle STEP OK

It is turned "ON" when the tightening is completed within the judgment area at the end of the step with the unit of the corresponding spindle No.

NOK No.# (1 to 32): 1 to 32-spindle NOK

When the tightening result is finished outside the judgment range in the unit with the corresponding spindle number, this becomes "ON".

NR FAILURE# (1 to 32): 1 to 32-spindle nut runner error

It is turned "ON" when an error is detected during a system check or tightening operation with the unit of the corresponding spindle number.

※When NR FAILURE # (1 to 32) signal is output, the output of READY signal is "OFF" and the tightening operation cannot be started.

READY No.# (1 to 32): 1 to 32-spindle input enabled

This bit is set to "ON" when the system can operate in response to input signal from an external device such as a PLC in the unit with the corresponding spindle number.

WORKING No.# (1 to 32): 1 to 32 spindles in operation

It becomes "ON" during tightening operation with the unit of the corresponding spindle number.
It becomes "OFF" when the tightening operation by START signal or REVERSE signal is finished or the tightening operation by STOP signal or RESET signal is interrupted.

BYPASS No.# (1 to 32): Spindle 1 to 32 disabled

It becomes "ON" when BYPASS (spindle disabled) status is in the unit of the corresponding spindle No.
When the unit is in RUN (operable) status, BYPASS No.# (1 to 32) signal becomes "OFF".

INITIAL CROSS THREAD NOK. No.# (1 to 32): 1 to 32-spindle cross thread NOK

If the [Cut Torque (Angle)] is reached within the set period of the [Initial cross thread timer] from the beginning of the step in the unit with the corresponding spindle No., it will be "ON".

CYCLE NOK NO.# (1 to 32): 1 to 32 spindle-cycle NOK

If [Cut Torque (Angle)] is not reached even after the set period of [1ST Cycle Timer] has elapsed since the Step started, it will be "ON", on condition that [Cycle Judgment] is "ON" for the unit with the corresponding spindle No.,

PEAK TORQUE LOW LIMIT NOK No.# (1 to 32): 1 to 32 Spindles Peak Torque Lower Limit

If the peak torque of the tightening result of the corresponding spindle number is lower than [Low limit torque], it will be "ON".

PEAK TORQUE HIGH LIMIT NOK No.# (1 to 32): 1 to 32-spindle peak torque high limit

If the peak torque of the tightening result of the corresponding spindle number is higher than [Higher limit torque], it will be "ON".

FINAL TORQUE LOW LIMIT NOK No.# (1 to 32): 1 to 32 spindles final torque low limit

If the final torque after tightening is less than [Final Low Torque Limit] at completion of tightening with the unit with the corresponding spindle number, it will be "ON".

FINAL TORQUE HIGH LIMIT NOK No.# (1 to 32): 1 to 32 spindles final torque high limit

If the final torque exceeds [Final high limit torque] at the completion of tightening with the unit with the corresponding spindle number, it is turned "ON".

ANG LOW LIMIT NOK No.# (1 to 32): 1 to 32 Spindles Angle Low Limit

If the final tightening angle is less than [Low limit angle] at completion of tightening with the unit with the corresponding spindle number, it will be "ON".

ANG HIGH LIMIT NOK No.# (1 to 32): 1 to 32 Spindles Maximum Angle High

If the final angle exceeded [Angle High Limit] at completion of tightening with the unit with the corresponding spindle number, an "ON" will occur.

TORQUE LOW LIMIT NOK No.# (1 to 32): 1 to 32 Spindles Torque low limit

When [Peak torque low limit] [Final torque low limit] judgment is detected during tightening with the unit of the corresponding spindle number, it is "ON".

TORQUE HIGH LIMIT NOK No.# (1 to 32): 1 to 32 Spindles Torque high limit

It is ON when [Peak Torque High Limit], [Snug Torque High Limit] and [Start Torque High Limit] are detected, while the unit with the corresponding spindle number is tightened.

LOW LIMIT NOK No.# (1 to 32): 1 to 32 spindles low limit NOK

During tightening with the unit of the corresponding spindle number, if the value falls below the low limit in the judgment of [Torque] [Angle] [Time] [Thread], it will be "ON".

HIGH LIMIT NOK No.# (1 to 32): 1 to 32 spindles high limit NOK

If the upper limit is exceeded in [Torque], [Angle], [Time], or [Thread thread] when tightening with a unit of the corresponding spindle number, it is turned "ON".

TIME NOK No.# (1 to 32): 1 to 32 spindles time NOK

If an NOK occurs in the [Time] judgment during tightening with the unit of the corresponding spindle number, it will be "ON".

START TORQUE CUT HIGH LIMIT NOK No.# (1 to 32): 1 to 32 spindles starting torque high limit NOK

If the [Starting torque high limit] is reached within the set number of threads for [Starting torque thread number] from the beginning of step in the unit with the corresponding spindle number, it is turned "ON".

THREAD NUMBER NOK. No.# (1 to 32): 1 to 32 spindles rotational thread count NOK

If an NOK occurs in the judgment of [Thread] during tightening with the unit of the corresponding spindle No., it will be "ON".

THREAD NUMBER LOW LIMIT NOK No.# (1 to 32): 1 to 32 spindles thread count lower limit NOK

During tightening with the unit with the corresponding spindle number, if the number of rotation threads after tightening is lower than [Rotating thread number low limit], "ON" will occur.

THREAD NUMBER HIGH LIMIT NOK No.# (1 to 32): 1 to 32 spindles thread count upper limit NOK

During tightening with the unit of the corresponding spindle number, if the number of rotational thread exceeded the [high limit of rotational thread number], it will become "ON".

CURRENT VALUE ERROR ALARM No.# (1 to 32): 1 to 32 spindles current error alarm

If the peak-current value of the tightening result is out of the [Current low limit] and [Current high limit] limits at the end of tightening with the unit of the corresponding spindle number, an "ON" occurs.

CURRENT VALUE LOW LIMIT ALARM No.# (1 to 32): 1 to 32 spindles current low limit warning

If the peak-current value after tightening is less than [Current Low Limit] at the end of tightening with the corresponding spindle number, an "ON" occurs.

CURRENT VALUE HIGH LIMIT ALARM No.# (1 to 32): 1 to 32 spindles current high limit warning

If the peak-current value of the tightening result exceeds [Current high limit] at the completion of tightening with the corresponding spindle number, it is turned "ON".

CAL VOLTAGE ERROR ALARM No.# (1 to 32): 1 to 32 Spindles CAL voltage fault alarm

If CAL is out of range after the control power is turned on or the tightening operation is started on the unit with the corresponding spindle number, this bit is set to "ON".

ZERO VOLTAGE ERROR ALARM No.# (1 to 32): 1 to 32 spindles ZERO voltage warning

If ZERO is out of range after the control power is turned on or the tightening operation is started on the unit with the corresponding spindle number, this bit is set to "ON".

INFORMATION (1 to 8) No. # (1 to 32): 1 to 32 spindles information signals (1 to 8)

If NOK of the information setting INFO1~8 is detected in the unit with the corresponding spindle No., it becomes "ON".

STEP OUT PUT (1,2,4,8,16) No.# (1 to 32): 1 to 32 spindles step output signals (1, 2, 4, 8, 16)

Outputs the step number during tightening operation in the unit with the corresponding spindle number.

STEP output 16	STEP output 8	STEP output 4	STEP output 2	STEP output 1	Running Step
OFF	OFF	OFF	OFF	ON	1
OFF	OFF	OFF	ON	OFF	2
OFF	OFF	OFF	ON	ON	3
OFF	OFF	ON	OFF	OFF	4
OFF	OFF	ON	OFF	ON	5
OFF	OFF	ON	ON	OFF	6
OFF	OFF	ON	ON	ON	7
OFF	ON	OFF	OFF	OFF	8
OFF	ON	OFF	OFF	ON	9
OFF	ON	OFF	ON	OFF	10
OFF	ON	OFF	ON	ON	11
OFF	ON	ON	OFF	OFF	12
OFF	ON	ON	OFF	ON	13
OFF	ON	ON	ON	OFF	14
OFF	ON	ON	ON	ON	15
ON	OFF	OFF	OFF	OFF	16
ON	OFF	OFF	OFF	ON	17
ON	OFF	OFF	ON	OFF	18
ON	OFF	OFF	ON	ON	19
ON	OFF	ON	OFF	OFF	20

NOK CODE (1,2,4,8) No.# (1 to 32): 1 to 32-spindle NOK output signals (1, 2, 4, 8)

The combination of assigned NOK is output as NOK output 1 to 8.

No.	NOK CODE 8	NOK CODE 4	NOK CODE 2	NOK CODE 1	Output
0	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	ON	NR abnormality
2	OFF	OFF	ON	OFF	Initial Cross thread NOK
3	OFF	OFF	ON	ON	Cycle NOK
4	OFF	ON	OFF	OFF	Snug torque NOK
5	OFF	ON	OFF	ON	(Spare)
6	OFF	ON	ON	OFF	(Spare)
7	OFF	ON	ON	ON	Plastic zone gradient specific NOK
8	ON	OFF	OFF	OFF	SLIP NOK
9	ON	OFF	OFF	ON	Angle HIGH NOK
A	ON	OFF	ON	OFF	Angle LOW NOK
B	ON	OFF	ON	ON	Angle-rate HIGH NOK
C	ON	ON	OFF	OFF	Angle-rate LOW NOK
D	ON	ON	OFF	ON	P Torque monitor angular NOK
E	ON	ON	ON	OFF	(Spare)
F	ON	ON	ON	ON	(Spare)

4-1-6. Fieldbus message setting

PC and PLC-controlled MASTER spindle provides PLC (Fieldbus and RS232C) with the following information signals. Message information is output in BCD format or ASCII format.

Two types of message format can be set: main format as sequence operation result and spindle format as unit individual operation result.

● Main format output items (BCD format)

Output items	In bytes	Tightening data	Main format			
			1word		2word	
Work cycle count	4	123456	00	12	34	56
Date	4	2018/9/28	20	18	09	28
Time	4	12:34:56	12	34	56	00
Main judgment	2	NOK	00	01	-	-
		OK	00	02	-	-
		ALARM	00	04	-	-
		STOP	00	08	-	-
Workpiece number (1 to 24)	2	2	00	02	-	-

● Main format output items (ASCII format)

Output items	In bytes	Tightening data	Main format									
			1word		2word		3word		4word		5word	
Work cycle count	8	123456	┌	┌	1	2	3	4	5	6		
Date	10	2018/09/28	2	0	1	8	/	0	9	/	2	8
Time	8	12:34:56	1	2	:	3	4	:	5	6		
Main judgment ※1	4	NOK	N	O	K	┌						
		OK	O	K	┌	┌						
		ALARM	A	L	A	R						
		STOP	S	T	O	P						
Work number (1 to 24)	2	2	┌	2								

※1: (20H) is a blank space code.

● Spindle-format output items (BCD format)

Output items	In bytes	Tightening Data	Spindle format			
			1word		2word	
Peak torque*2	4	123.4	00	12	34	01
Final angle*2	4	123.4	00	12	34	01
Tightening time ※2	4	12.3	00	01	23	01
Grade Rate	4	12.3	00	01	23	01
Snug Torque*2	4	123.4	00	12	34	01
Final torque*2	4	123.4	00	12	34	01
Spindle No. (1 to 32)	2	1	00	01	-	-
Mode No. (1 to 48)	2	2	00	02	-	-
Parameter number (1 to 96)	2	3	00	03	-	-
Spindle step count*3	4	123456	00	12	34	56
Step number	2	4	00	04	-	-
Spindle Judge*4	4	----	①	②	③	00
Peak current*2	4	12.3	00	01	23	01
Angle at peak current*2	4	123.4	00	12	34	01
Number of rotation threads*2	4	12.3	00	01	23	01
CAL voltage*2	4	3.512	00	35	12	03
ZERO voltage*2	4	-0.123	00	01	23	13
NOK (BIN)	4	0000	00	00	00	00
Alarm code (BIN)	4	5-1	05	01	00	00
Low limit torque setting value*2	4	123.4	00	12	34	01
High limit torque setting value*2	4	123.4	00	12	34	01
Low limit angle setting value*2	4	123.4	00	12	34	01
High limit angle setting value*2	4	123.4	00	12	34	01
Final low limit torque setting value*2	4	123.4	00	12	34	01
Final high limit torque setting value*2	4	123.4	00	12	34	01
Snug high limit torque setting value*2	4	123.4	00	12	34	01

※2: G-Unit outputs the result by 2 words in order of max. 6-digit display (no decimal point included), code (A), and figures (B) under decimal point.

12 34 56 0 2

(A)(B)

(A)Code

(B)Digits after the decimal point

Display	Contents
0	+ value
1	-Value

Display	Contents
0	No decimal point
1	1 digit after decimal point
2	2 digits after decimal point
3	3 digits after decimal point
4	4 digits after decimal point
5	5 digits after decimal point

※3: "Spindle step count" outputs up to 7 digits (millions place)

※4: The output content of spindle judgment is set in the "Judgment data" and "Error data" tabs.

① "Judgment data 1", ② "Judgment data 2" and ③ "Error data" are output

● Spindle-format output items (ASCII format)

Output items	In bytes	Tightening Data	Spindle format										
			1word		2word		3word		4word		5word		
Peak torque*4	8	123.4	┌	1	2	3	.	4	Judgment	┌			
Final angle*4	8	123.4	┌	1	2	3	.	4	Judgment	┌			
Tightening time ※4	6	12.3	┌	1	2	.	3	Judgment					
Grade Rate	6	12.3	┌	┌	1	2	.	3					
Snug Torque*4	8	123.4	┌	1	2	3	.	4	Judgment	┌			
Final torque *4	8	123.4	┌	1	2	3	.	4	Judgment	┌			
Spindle No. (1 to 32)	2	1	┌	1									
Mode No. (1 to 48)	2	2	┌	2									
Parameter number (1 to 96)	2	3	┌	3									
Spindle step count*5	8	123456	0	0	1	2	3	4	5	6			
Step number	2	4	┌	4									
Spindle judgment*6	4	----	①	②	③	┌							
Peak current*4	10	12.3	┌	┌	┌	┌		1	2	.	3	Judgment	┌
Angle at peak current*4	6	123.4	┌	1	2	3	.	4					
Number of rotation threads*4	8	123.4	┌	1	2	3	.	4	Judgment	┌			
CAL voltage*4	6	3.70	┌	3	.	7	0	┌					
ZERO voltage*4	6	-0.123	-	0	.	1	2	3					
NOK (BIN)	4	0000	00 00 00 00										
Alarm code (BIN)	4	5-1	00 00 05 01										
Low limit torque setting value	6	123.4	┌	1	2	3	.	4					
High limit torque setting value	6	123.4	┌	1	2	3	.	4					
Low limit angle setting value	6	123.4	┌	1	2	3	.	4					
High limit angle setting value	6	123.4	┌	1	2	3	.	4					
Final low limit torque setting value	6	123.4	┌	1	2	3	.	4					
Final high limit torque setting value	6	123.4	┌	1	2	3	.	4					
Snug high limit torque setting value	6	123.4	┌	1	2	3	.	4					

※4: Output items in which the high/low limit setting exists are output in the following order: code, result display (including decimal point), judgment code, and tightening NG items that occurred first.

'- 123. 5L'

(A) (B)

(A) Code

Display	Contents
Space (20H)	+ value
- (2DH)	-Value

(B) Judgment code

Display	Contents
Space (20H)	Within high/low limit range/without warning (peak current)
H (48H)	Out of high limit range/high limit warning (peak current)
L (4CH)	Low limit out-of-range/low limit warning (peak current)

※5: "Spindle step count" outputs up to 7 digits (order of millions).

※6: The output content of spindle judgment is set in the "Judgment data" and "Error data" tabs.

① "Judgment data 1", ② "Judgment data 2" and ③ "Error data" are output.

Memo

●Output items: Example of spindle-judging output (for all BCD · ASCII)

Spindle judge data is set by bit-assignment of 2 bytes.

By combining the logical "OR/AND", you can change the condition of the output data.

• Judgment data setting

Item	Judgment 2 (BIT)								Judgment 1 (BIT)							
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Logic	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR
OK																○
NOK															○	
ALARM														○		
BYPASS												○				
STOP												○				
Peak torque high limit NG								○								
Peak torque Low limit NG							○									
Final torque high limit NG						○										
Final torque Low limit NG					○											
Final angle high limit NG				○												
Final angle Low limit NG			○													
}																

• Error data setting

The spindle judge error data is set by the bit-assignment of 1bytes. This corresponds to the alarm number when an alarm occurs.

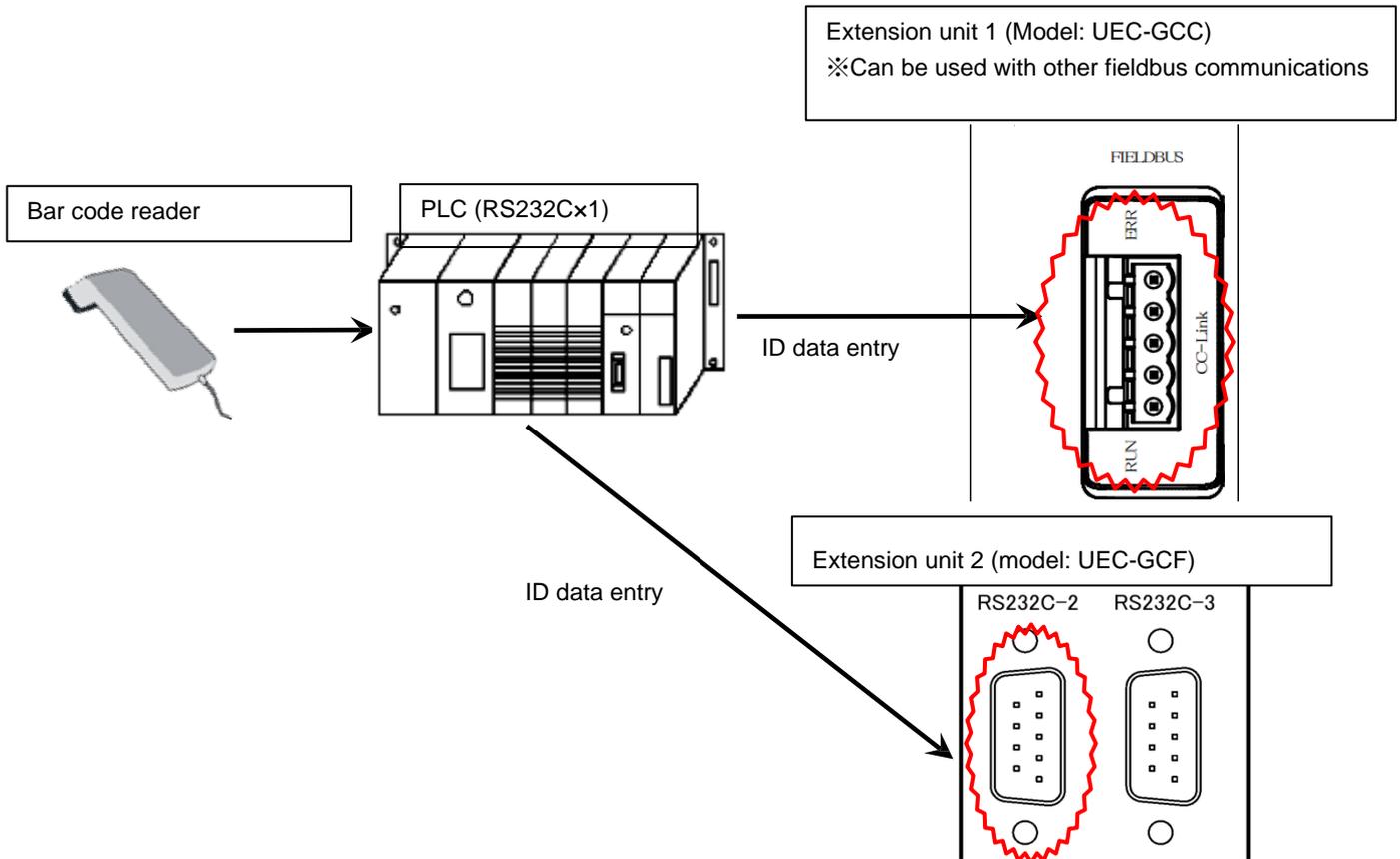
Item	Error date (BIT)							
	7	6	5	4	3	2	1	0
Alarm 1								○
Alarm 3							○	
Alarm 4						○		
Alarm 5					○			
Alarm 6				○				
Alarm 8			○					
Alarm 9		○						
Alarm 10	○							

4-1-7. ID entry setting

ID data. (Model No.) can be input for MASTER of PC communication and I/O (PLC) control in the UNR-G series system. RS232C-2 interface of the fieldbus or Extension-unit 2 can be selected as the input-destination. The extension RS232C is set in the default setting.

(Simultaneous entry from RS232C-2 of fieldbus and Extension unit 2 is not possible)

By inputting ID data (model No.) to MASTER spindle prior to starting the tightening operation, the input data is added to the tightening data, and it is outputted from the UNR-G series user console, the standard RS232C, the fieldbus, and the Extension RS232C-3 interface of the Extension unit 2.

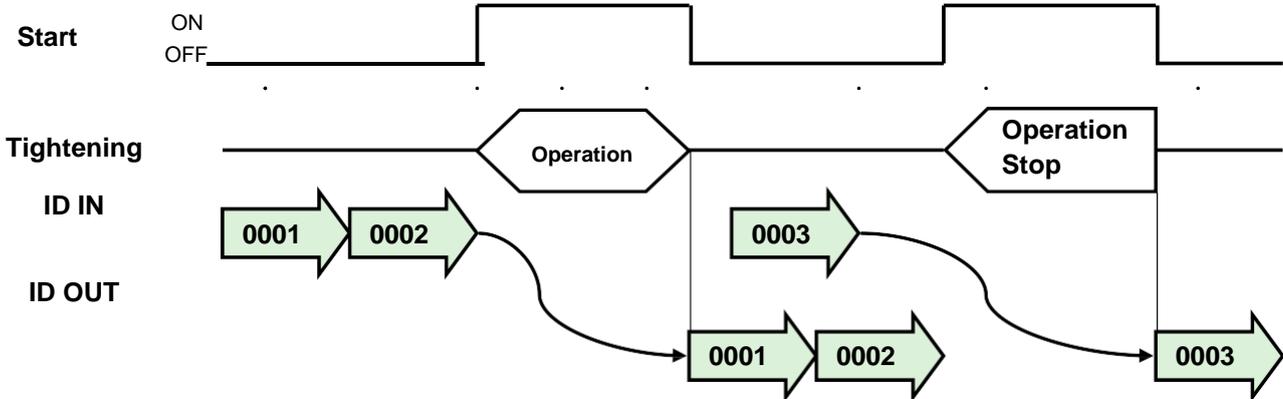
**CAUTION** [Precautions for entering ID]

- ASCII allowed character is "0x20" ~ "0x7E". If a code out of range is used, the display may be garbled.
- The maximum number of characters that can be printed is 32 (32bytes).
- If ID data is input continuously prior to starting the tightening operation, all the input data will be used as ID data.
- ID data to be used is acquired when the tightening operation starts. Complete the data transfer before the tightening operation is started.
- If ID data is input during tightening operation, the input data is not accepted.
- Even after the input ID data is output after the completion of tightening operation, the same data is output unless ID data is re-input.
- If ID data is entered after the completion of the tightening operation, ID data will be overwritten.

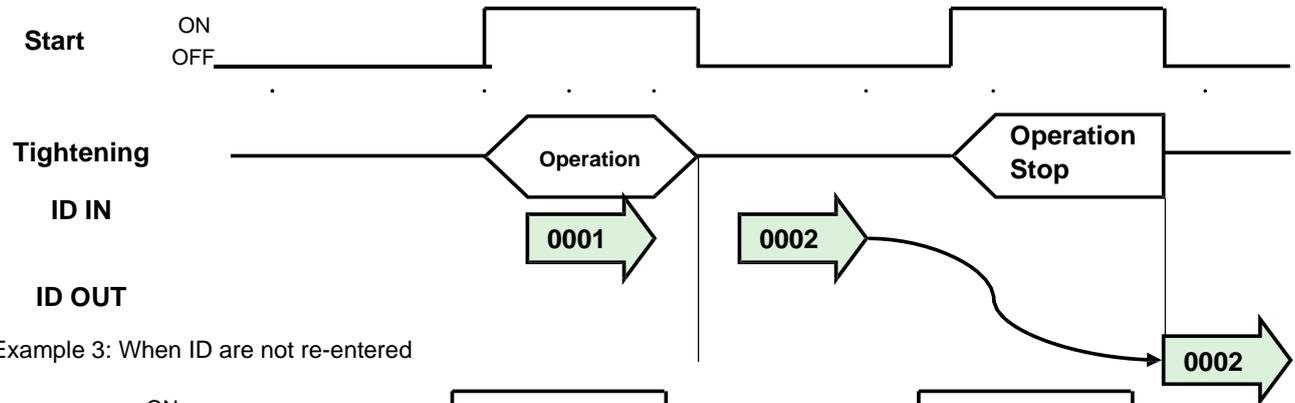
When Extension RS232C is selected for the data input method and "STX/ETX is added" is set, ID data is erased when a STX signal is received from RS232C-2. The input data is confirmed when ETX signal is received, and ID data is re-input. For ID data to be output, the data without STX/ETX is used.

● Sample ID Data-Output Timing

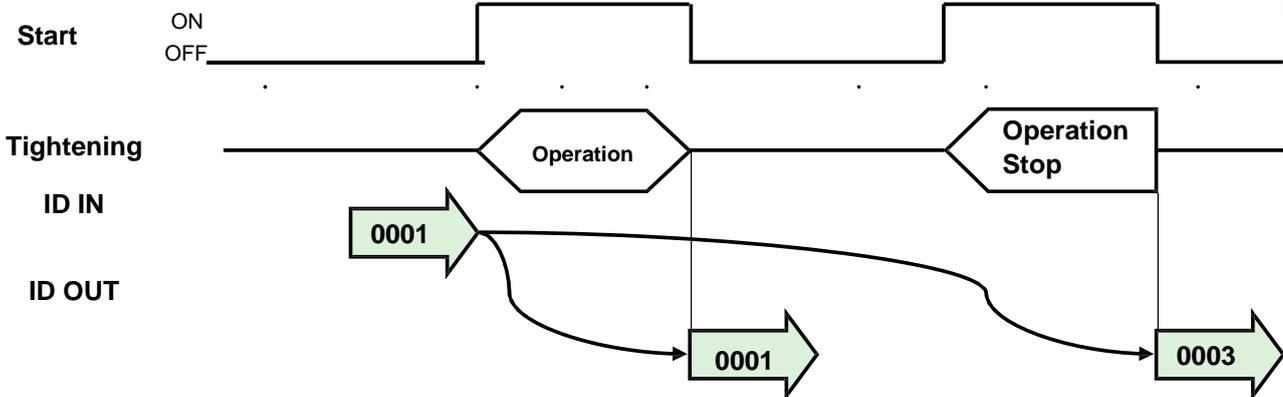
- Example 1: Continuous input before the start of tightening operation



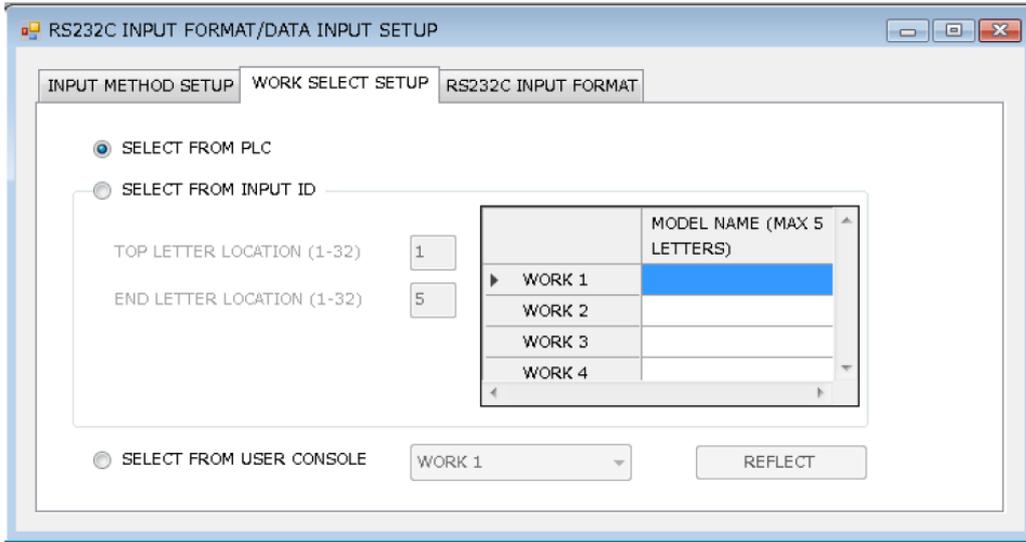
- Example 2: When ID is entered during tightening operation



- Example 3: When ID are not re-entered



In addition to the selection from PLC, you can set ID and UNR-G series user console-datum selection as a way of selecting the sequence number. "Select from PLC" is set as the default setting. To set the sequence selection method, use the UNR-G user console "RS232C input format/data input setting".



In Select from entry ID, you can set a ASCII of up to five characters for each sequence number.

If the selected setting does not match ID data because no ID data is input or the data has already been cleared, set PLC IO input signal "ALARM" to " " at startup of PLC IO input signal "START(REVERSE)".

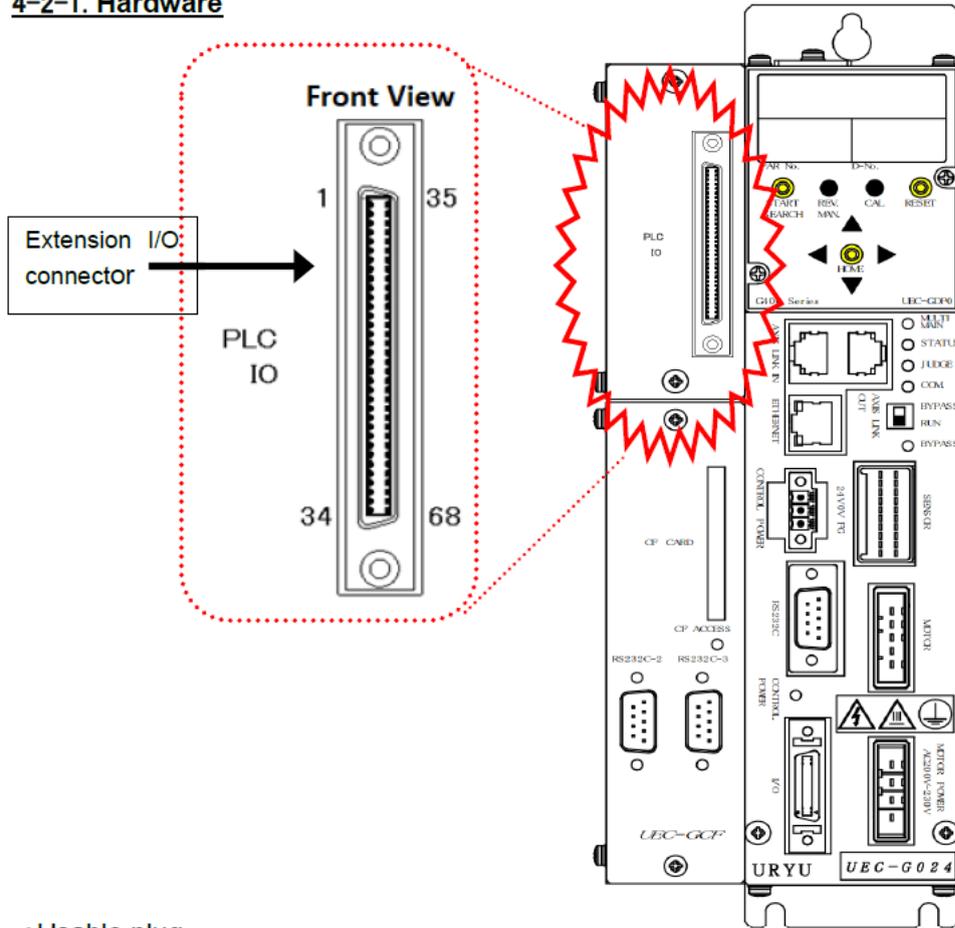
When "Select from input ID" is set, if the entered ID data and the selected setting do not coincide, ID data is not updated. It is updated and retained as ID data only when they coincide.

When "Select from PLC or UNR-G series User Console" is set, the entered ID will be updated and retained.

To clear ID data, set PLC IO input signal "Clear ID data" to "ON". For ID data input by PLC networking, clear ID data to be sent from PLC by PLC in advance, and then set PLC IO input signal "ID Data Clear" to "ON".

4-2. Extension I/O

4-2-1. Hardware



Applicable plug

Manufacturer: Hirose Electric	
Type	: Cable connector Model :DX 31 A-68 P(50)
Spec.	: Applicable Wire Size AWG28 or 0.08mm ²
Type	: Cable connector case Model :DX-68-CV1
※The cable is not included. Please order with the following model.	
• Manufacturer: URYU Model: UK-GIO	

 • Connect the cabling with all power OFF.

4-2-2. I/O Signal (Extension I/O)**● PLC Extension I/O Signal (Extension I/O → MASTER)**

Pin #	Signal name	IN/OUT	Functions and purposes
1	IN COMMON	IN COM	Input signal common (bipolar)
2	IN COMMON	IN COM	
3	Preparation for operation	IN NC	Can be operated with "ON". (Operation preparation signal)
4	Reset	IN NO	Setting the switch to ON stops the tightening operation and deletes LED indication and PLC I/O output signal of the module.
5	Reverse rotation	IN NO	During "ON", the tool rotates in reverse at the setting rate of the selected work number.
6	Forward rotation	IN NO	During "ON", the tool rotates forward at the set rpm of the selected work number.
7	Start	IN NO	By setting to "ON", tightening starts with the selected work number.
8	Cycle start	IN NO	Start repeat operation.
9	Cycle Count up	IN NO	Count up signal of the internal cycle counter. The counter counts 1 when 100ms pulses.
10	Cycle Count clear	IN NO	Count clear signal of the internal cycle counter. The counter is cleared by 100ms pulses.
11	Step IN 1	IN NO	This signal is used to restart the step that was stopped by the step OUT signal.
12	Step IN 2	IN NO	
13	Step IN 3	IN NO	
14	Step IN 4	IN NO	
15	Step IN 5	IN NO	
16	Step IN 6	IN NO	
17	Step IN 7	IN NO	
18	Work 9-16 Selection	IN NO	This signal is used to select 9-16 (17-24) of the work.
19	Work 17-24 selection	IN NO	
20	Work selection 1 (9/17)	IN NO	Switches to the selected work No.
21	Work selection 2 (10/18)	IN NO	
22	Work selection 3 (11/19)	IN NO	
23	Work selection 4 (12/20)	IN NO	
24	Work selection 5 (13/21)	IN NO	
25	Work selection 6 (14/22)	IN NO	
26	Work selection 7 (15/23)	IN NO	
27	Work selection 8 (16/24)	IN NO	
28	Automatic/individual (unused)	IN NO	Used when performing auto-tightening (* Valid only when FB unit is used)
29	Auto Z/C checking OFF	IN NO	Automatic self-check at the beginning of tightening is not performed by setting "ON".
30	ID data clear	IN NO	Setting this bit to "ON" clears the entered ID.
31	Manual Z/C checking	IN NO	Check the torque sensor.
32	Data select 0	IN NO	The banks of output signal contents are switched by the combination of data select signals 0 to 2. (Refer to the next page.)
33	Data select 1	IN NO	
34	Data Select 2	IN NO	

IN: Input-signal NC: Normally closed NO: Normally open

Data select 0 to 2: Bank switching signal

Pin No.: 32, 33, 34

Switches the banks of output signal contents from the combination of data select signals 0 to 2.

Data Select 2 Pin number :34	Data select 1 Pin number :33	Data select 0 Pin number :32	Bank number
OFF	OFF	OFF	1
OFF	OFF	ON	2
OFF	ON	OFF	3
OFF	ON	ON	4
ON	OFF	OFF	5
ON	OFF	ON	6
ON	ON	OFF	7
ON	ON	ON	8

※Refer to PAGE 2-9 and PAGE 4-4 for other signal descriptions.



CAUTION

- Turn OFF the data select 0 to 2 signals during tightening operation and when bank switching is not used.
- After switching the data select signal ON/OFF, wait for at least a 20msec before inputting the output signal OUT DATA.
- When bank switching is executed, the contents of the output signal are changed.



CAUTION

Input signal assignment is fixed. (Cannot be changed)

● PLC extension I/O (MASTER scale → extension I/O)

Only output signals of BANK No. 1 have been factory configured. Set output signal allocation by [PLC OUTPUT SIGNAL LAYOUT] of UNR-G User Console.

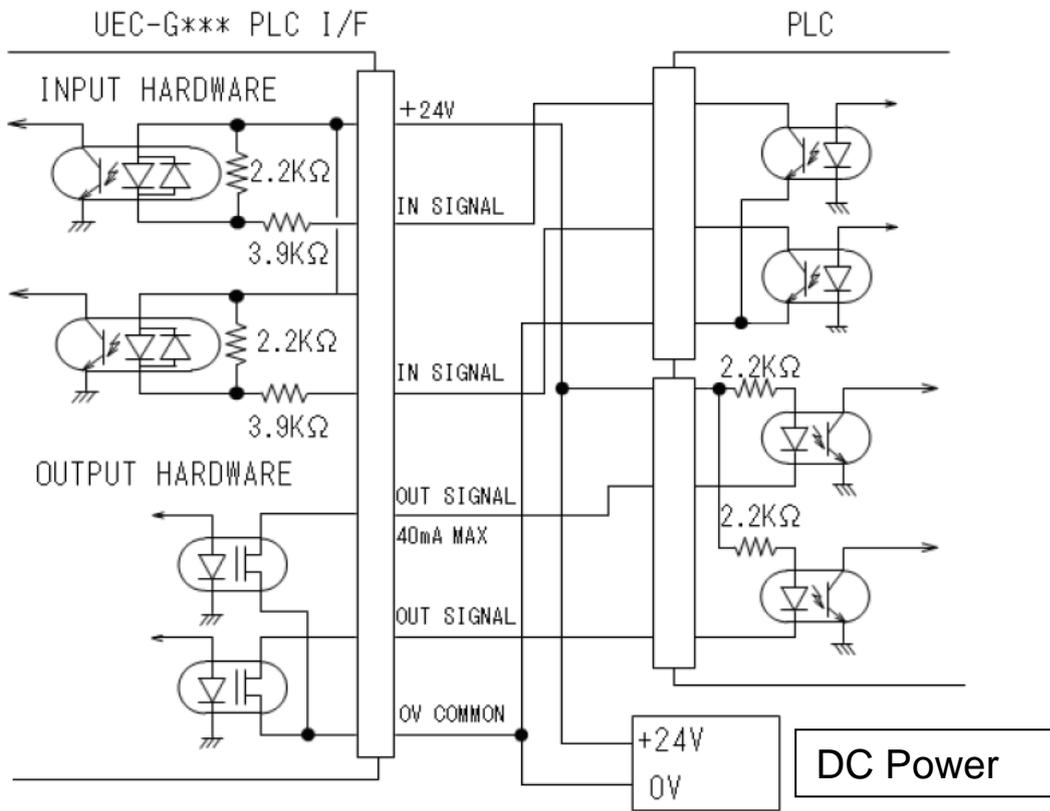
Bank	Pin #	Bank Pin No./ Signal	Bank	Pin #	Bank Pin No./ Signal
No.1 <u>Initial setting</u>	35	OUT COMMON	No.2 <u>Example of output signal setting</u>	35	OUT COMMON
	36	OUT COMMON		36	OUT COMMON
	37	1 TOTAL NOK		37	1 Spindle No.1 Bypass
	38	2 TOTAL OK		38	2 Spindle No. 2 Bypass
	39	3 Nutrunner abnormality		39	3 Spindle No. 3 Bypass
	40	4 Ready		40	4 Spindle No. 4 Bypass
	41	5 Operating		41	5 Spindle No. 5 Bypass
	42	6 End		42	6 Spindle No. 6 Bypass
	43	7 Cycling NOK judgment		43	7 Spindle No. 7 Bypass
	44	8 Cycling OK judgment		44	8 Spindle No. 8 Bypass
	45	9 Z/C NOK		45	9 Spindle No. 9 Bypass
	46	10 Z/C OK		46	10 Spindle No. 10 Bypass
	47	11 With BYPASS		47	11 Spindle No. 11 Bypass
	48	12 Work selection BIT 1(9/17)		48	12 Spindle No. 12 Bypass
	49	13 Work selection BIT 2(10/18)		49	13 Spindle No. 13 Bypass
	50	14 Work selection BIT 3(11/19)		50	14 Spindle No. 14 Bypass
	51	15 Work selection BIT 4(12/20)		51	15 Spindle No. 15 Bypass
	52	16 Stepped OUT 1		52	16 Spindle No. 16 Bypass
	53	17 Spindle No. 1 NOK judgement		53	17 Spindle No. 17 Bypass
	54	18 Spindle No. 1 OK judgement		54	18 Spindle No. 18 Bypass
	55	19 spindle No. 1 nut runner error		55	19 Spindle No. 19 Bypass
	56	20 Spindle No. 1 Initial NOK		56	20 Spindle No. 20 Bypass
	57	21 Spindle No. 1 Cycle NOK		57	21 Spindle No. 21 Bypass
	58	22 Spindle No.1 Bypass		58	22 Spindle No. 22 Bypass
	59	23 Spindle No. 1 low limit NOK		59	23 Spindle No. 23 Bypass
	60	24 Spindle No. 1 high limit NOK		60	24 Spindle No. 24 Bypass
	61	25 Spindle No. 2 NOK judgement		61	25 Spindle No. 25 Bypass
	62	26 Spindle No. 2 OK judgement		62	26 Spindle No. 26 Bypass
63	27 Spindle No. 2 nut runner error	63	27 Spindle No. 27 Bypass		
64	28 Spindle No. 2 Initial NOK	64	28 Spindle No. 28 Bypass		
65	29 Spindle No. 2 cycle NOK	65	29 Spindle No. 29 Bypass		
66	30 Spindle No. 2 Bypass	66	30 Spindle No. 30 Bypass		
67	31 Spindle No. 2 low limit NOK	67	31 Spindle No. 31 Bypass		
68	32 Spindle No. 2 high limit NOK	68	32 Spindle No. 32 Bypass		

Bank	Pin #	Bank Pin No./ Signal	Bank	Pin #	Bank Pin No./ Signal
No.3 Example of output signal setting	35	OUT COMMON	No.4 ~ No.8	35	OUT COMMON
	36	OUT COMMON		36	OUT COMMON
	37	1 Spindle No. 1 nut runner error		37	1
	38	2 Spindle No. 2 nut runner error		38	2
	39	3 Spindle No. 3 nut runner error		39	3
	40	4 Spindle No. 4 nut runner error		40	4
	41	5 Spindle No. 5 nut runner error		41	5
	42	6 Spindle No. 6 nut runner error		42	6
	43	7 Spindle No. 7 nut runner error		43	7
	44	8 Spindle No. 8 nut runner error		44	8
	45	9 Spindle No. 9 nut runner error		45	9
	46	10 Spindle No. 10 nut runner error		46	10
	47	11 Spindle No. 11 nut runner error		47	11
	48	12 Spindle No. 12 nut runner error		48	12
	49	13 Spindle No. 13 nutrunner error		49	13
	50	14 Spindle No. 14 nut runner error		50	14
	51	15 Spindle No. 15 nut runner error		51	15
	52	16 Spindle No. 16 nut runner error		52	16
	53	17 Spindle No. 17 nut runner error		53	17
	54	18 Spindle No. 18 nut runner error		54	18
	55	19 Spindle No. 19 nut runner error		55	19
	56	20 Spindle No. 30 nut runner error		56	20
	57	21 Spindle No. 21 nut runner error		57	21
	58	22 Spindle No. 23 nut runner error		58	22
	59	23 Spindle No. 23 nut runner error		59	23
	60	24 Spindle No. 24 nut runner error		60	24
	61	25 Spindle No. 25 nut runner error		61	25
	62	26 Spindle No. 26 nut runner error		62	26
	63	27 Spindle No. 27 nut runner error		63	27
	64	28 Spindle No. 28 nut runner error		64	28
	65	29 Spindle No. 29 nut runner error		65	29
	66	30 Spindle No. 30 nut runner error		66	30
67	31 Spindle No. 31 nut runner error	67	31		
68	32 Spindle No. 32 nut runner error	68	32		

※Refer to PAGE 4-4(Link) and PAGE 4-8(Link) for descriptions.

 CAUTION	Also reserves unused space in the banked No.2~8.
-------------------------------------------------------------------------------------------------------	---------------------------------------------------------

4-2-3. I/O Hardware Specifications and Recommended Connection Circuits



※The figure above shows a typical NPN connector.



• Since I/O hardware supports positive and negative polarities, both NPN (sync-common) and PNP (source+common) types can be connected.

4-3. CompactFlash

Tightening results and tightening waveforms can be saved in a file by using a CompactFlash (CF) card (hereafter memory card). Saved files can be downloaded to PC and checked.



• When using a memory card that is not used or has been used in another device, be sure to format it before using it. For formatting instructions, refer to PAGE 4-34 "Formatting a Memory Card."

- Confirmed operation memory card

Please refer to the following tables to select the following memory cards 32GB.

Series name	Manufacturer	Model
Extreme PRO	SanDisk	SDCFXPS-032G-J61
CFU-IVR	I-O DATA	CFU-IV2GR

- List of number of data items that can be saved by capacity

• Storage data format: tightening result + tightening waveform (180 degrees: torque-angle)

Storage capacity	Number of stored items by number of spindles					
	1 Spindle	2 Spindle	4 Spindle	8 Spindle	16 Spindle	32 Spindle
4GB	About 900,000	About 450,000	About 300,000	About 200,000	About 100,000	About 50,000
8GB	Some 1,800,000	About 900,000	About 600,000	About 400,000	About 200,000	About 100,000
16GB	Some 3,400,000	Some 1,700,000	Some 1,200,000	About 800,000	About 400,000	About 200,000
32GB	Some 7,000,000	Some 3,500,000	Some 2,400,000	Some 1,600,000	About 800,000	About 400,000



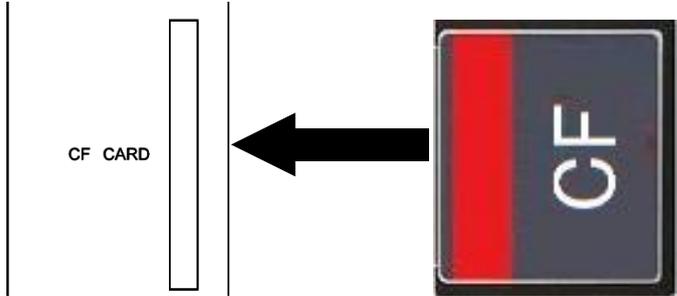
[Precautions when using memory card]

- When inserting or removing a memory card, be sure to turn OFF the control power of the module.
- Note that data saved on the memory card may be deleted under the following conditions.
 - ◆ When the user mishandles the memory card
 - ◆ When the memory card is used or stored in an environment where static electricity or electric noise is present
 - ◆ When the memory card is not used for a long time
- The memory card has a lifetime. If the machine is used for a long period of time (about six months or more) or is not used for a long period of time, stored data cannot be read or written. Back up the required data to a PC on a regular basis. If you are unable to read or write to the data, replace the data with a new one.
- For stable operation, it is recommended to delete the data after backing up the data in the memory card and use it with as much free space as possible.
- Avoid using or storing the product in places subject to sudden temperature changes, condensation, or direct sunlight.
- Do not bend the memory card or subject it to strong impact. Keep it away from water and store away from high temperature.

4-3-1. Saving Memory Cards

1. With the unit not turned on, insert the memory card into the memory card slot (CF CARD) of Extension unit 2, and then turn on the power.

 **CAUTION** • If the control power supply of the module is turned ON while a memory card is installed in the slot, it may take longer than usual for the module to operate because a folder for saving files is created on the memory card.



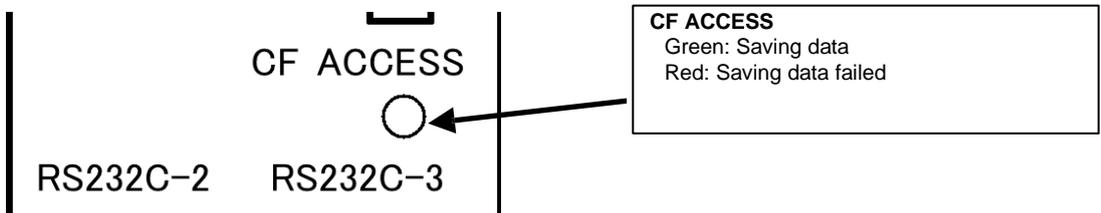
 **CAUTION** • Insert the memory card vertically and slowly with the surface facing to the left. If the card is reversed, it cannot be inserted, but if you try to force it in, it may cause damage to the unit or the card.

2. After completion of the tightening operation with the memory card loaded, the data is saved.

 **CAUTION** • Do not pull the card out of the slot or turn OFF the control power of the unit while the memory card is being saved. The saved data or memory card may be damaged.

• Note that if the tightening cycle is very short (1 second or less), the previous data may not be saved normally.

3. CF ACCESS LED lights up in green when data is stored on the memory card. CF ACCESS LED also lights up in red if the memory card cannot be saved.



4-3-2. Data storage flow

The tightening result and the tightening waveform are saved in the memory card every time the tightening operation is completed. The tightening data can be saved in TSV format for each date and displayed in Microsoft® Excel®. The tightening waveform stores the torque-angle (180deg) spindle waveforms as an extension dedicated to the UNR-G series user console. The tightening waveform displayed in the "Waveform Monitor" of the UNR-G series user console can be saved in TSV format.

For waveform display, refer to "Waveform Monitor" in the UNR-G series User Console Operation Manual.

•Tightening result

The tightening result is automatically saved in the "RESULT" folder to be created.

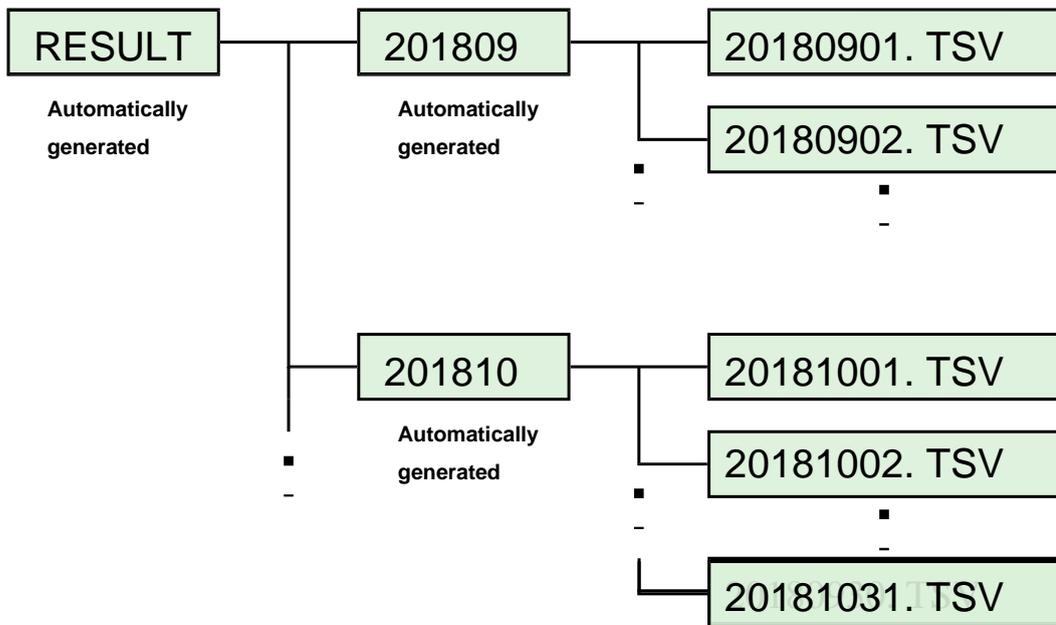
Folders for the calendar year and month of saved files, such as "201809", are automatically created in "RESULT", and folders are automatically created as "201810", "201811", and "201812" for each month or calendar change.

Within the folder of "201809", the following files are saved at the end of the tightening operation.

RESULT\YYYYMM\YYYYMMDD.TSV (TSV format file)

Year and month Date

Saves the tightening result for one day for each file. When the creation date is updated, files are automatically created in the same folder.



•Tightening waveform

Save the tightening waveform to the folder "CURVE" to be created automatically.

In "CURVE", a folder representing the calendar and month of a saved file such as "201809" is automatically created, and a folder is automatically added with "201810", "201811" and "201812" for each month or calendar change.

Within the "201809" folder, a folder representing the calendar and month and date of a saved file such as "20180901" is automatically created, and the folder is automatically added to "20180902", "20180903", and "20180904" for each time the date changes.

Within the 20180901 folder, a folder whose name is the time of the first saved tightening waveform is automatically created, such as "123456 to ", "123616 to ".

40 waveform files are saved for each folder. When 40 waveforms are saved, the following folders and files are automatically created in the "20180901" folder. In addition to the waveform file, a index.txt file for storing the number of saved items is created in the "CURVE" folder.



• **Do not change the content of index.txt file. Otherwise, the waveform file cannot be saved normally.**

The waveform file is saved in the folder of "123456 to" at the end of the tightening operation.

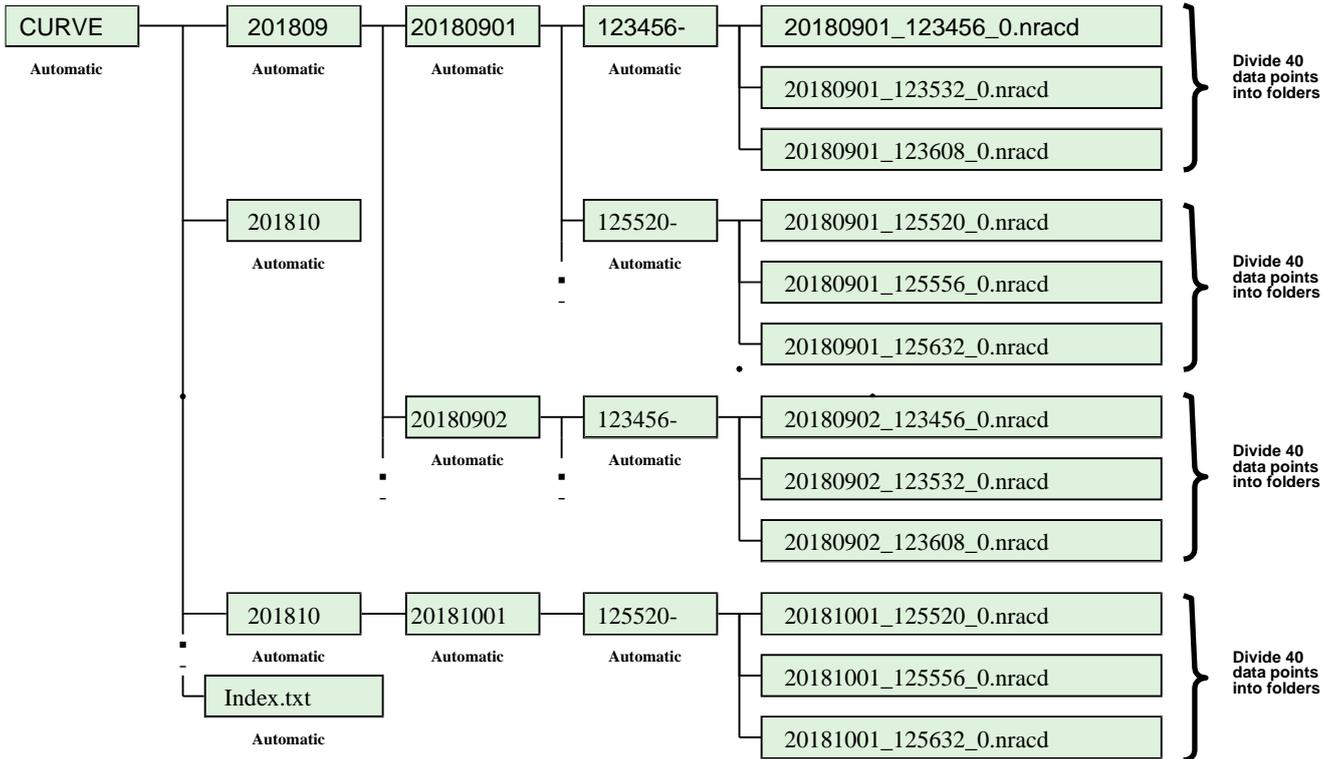
Saves waveform data of multiple spindles operated in the work setting as one waveform file.

CURVE \ YYYYMM \ YYYYMMDD \ hhmmss ~ \ YYYYMMDD_hhmmss_0 DD_hhmmss_0.nracd (nracd format)

Year and month Year and month Hour, minute and second Year and month Hour, minute and second*

※ 「0」 :Sequential number... If the tightening interval is less than 1 second, save the individual values as "0" → "1" →... → "9" to prevent overwriting of the file.

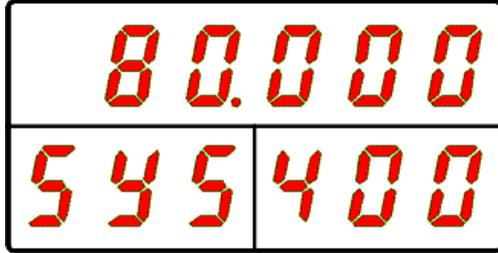
● Fastening waveform saving format



CF ACCESS LED lights up in orange when the storage capacity of the memory card is 1% or less. The storage capacity of the memory card can be checked from the display.

● Procedure for checking the memory card storage capacity

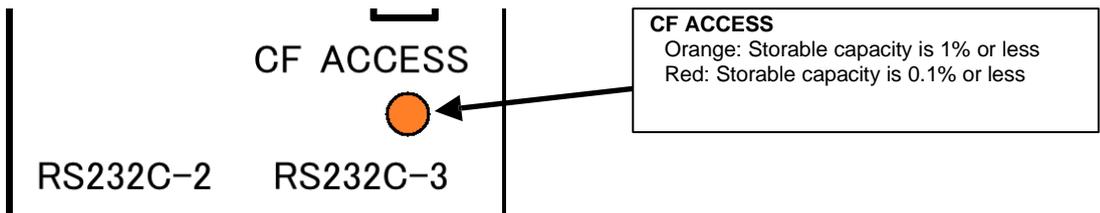
1. Perform this operation with I/O output-signal: READY set to "ON" with no external control activation applied.
2. The [◀] and [▶] switches on the unit display indicate the system-setting mode (see PAGE 5-13).
3. Switch D-No. indicator to "400" with the [▲] and [▼] switches on the unit indicator.



PAR No. D-No.

4. The value displayed at the top of the display indicates the storage capacity of the memory card (unit: %).

• When the allowable storage capacity of the memory card becomes 0.1% or less, the saving to the memory card is aborted to prevent mismatch between the tightening result and the stored contents of the tightening waveform. (CF ACCESS LED lights in red.)



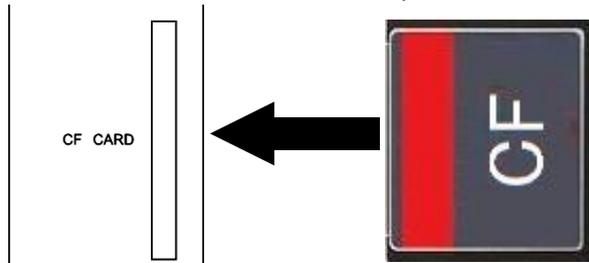
4-3-3. Formatting a Memory Card

All data stored on the memory card can be erased from the display. Refer to PAGE 5-2 "Unit Display" for the display.

 CAUTION	<p>Do not remove the memory card while it is being formatted. Doing so may damage the card and render it unusable.</p>
-----------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------

● Memory Card Formatting Procedure

Step 1. Insert the memory card into the memory card slot (CF CARD) of Extension Unit 2 with the unit not turned on, and then turn on the power.



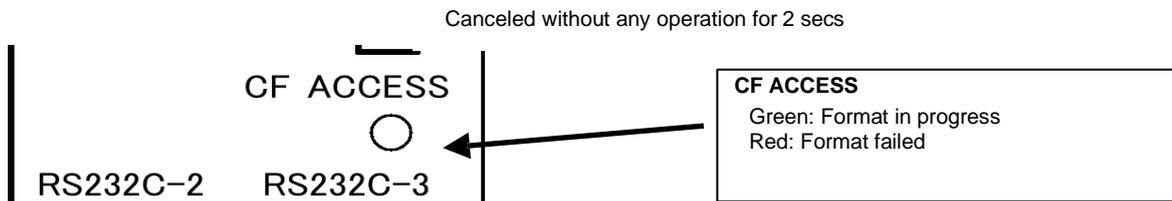
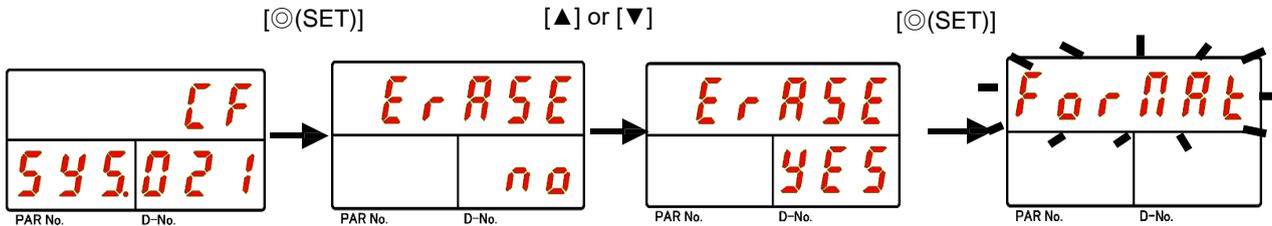
Step 2. Operate the arrow buttons to display PAR No. display area: "SYS", D-No. display area: "021" "History Erase".

Step 3. Set RUN/BYPASS switch on the front of the unit to BYPASS position, or set PLC I/O INPUT SIGNAL "BYPASS" to "ON". Turn the unit to BYPASS, and then press the [⊙ (SET)] switch.

Step 4. Press the [▲],[▼] switch to select "CF" as the type of data to be erased in the upper display. Then, press the [⊙ (SET)] switch.

Step 5. Press the [▲] and [▼] switches within 2 seconds to change from "Erase NO" to "Erase YES" and then press the [⊙ (SET)] switch within 2 seconds.

Step 6. When formatting is started, CF ACCESS LED starts to light green while the "Format" at the top row of the display flashes. When formatting is successful, "success" is displayed at the top of the display. If formatting fails, "failed" is displayed at the top row of the display and CF ACCESS LED lights in red.



4-3-4. Automatic backups of settings

When setting values are written from the UNR-G series user console to the memory card installed in Extension unit 2, various setting values are saved in the memory card.

The backup file is updated when you write it, and the most up-to-date content is stored in SETUP folder. However, if the setting value is changed from the display, it will not be saved to the memory card.



CAUTION

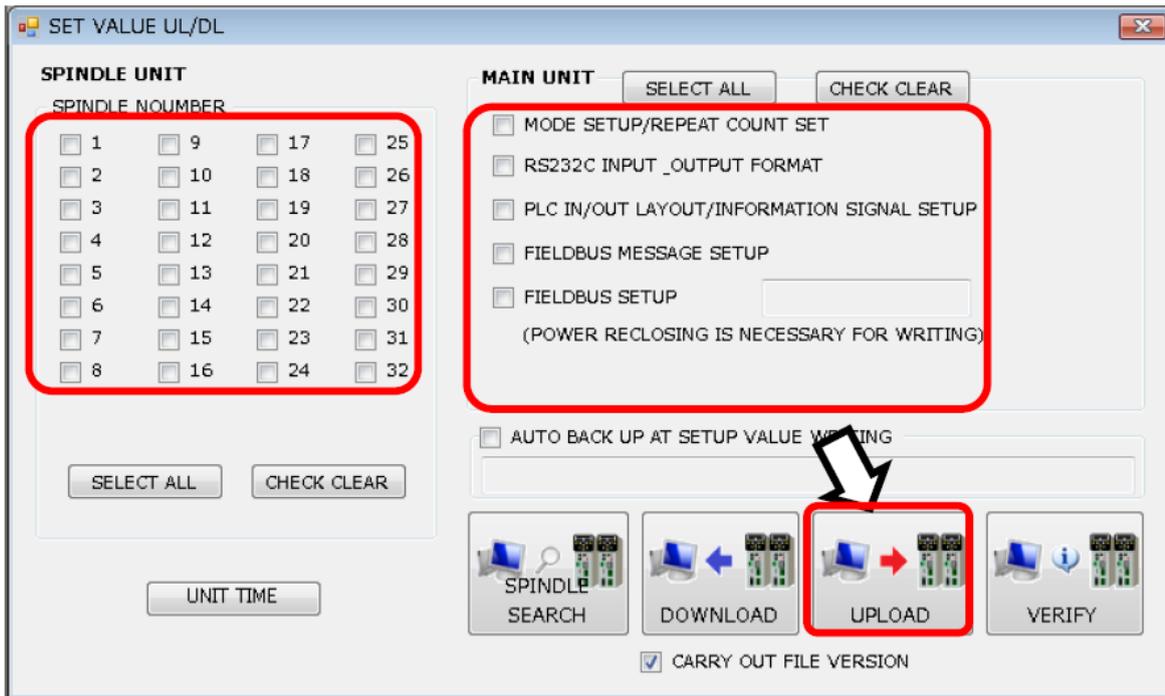
- The setting file saved in the memory card is read-only from the display. Cannot be read in the UNR-G user console.
- The spindle number is also saved in the setting file to be saved in the memory card. Only files whose spindle numbers (the first two characters of the file name) match the unit can be read.
- Do not change the content of version.txt files in the "SETUP" folder. The setting file cannot be read normally.

● Automatic backup procedure for setting values

Step 1. Displays the "Setting value UL/DL" (shown below) on the UNR-G series user console.

Step 2. Place a check in the various setting values (red frame in the figure below) for creating a backup file.

Step 3. Select "Write" (arrow below) to write the settings of the UNR-G series user console to the unit and save the various setting values to the memory card.





CAUTION

- Memory Card saves setting values of G-Console. Carry out [READ] before doing above 3. Select [WRITE] when you backup G-Unit's setting values in Memory Card.

4-3-5. Reading setting value from memory card

The setting file saved in the memory card can be read from the display.
 After System setting mode D-No.409 [CF card setting value reading] is displayed, set the unit to BYPASS status, and select the type of setting file at once or individually from the setting value editing mode to read.
 Refer to PAGE 5-2 "Unit Display" for the display.

•Type of configuration file

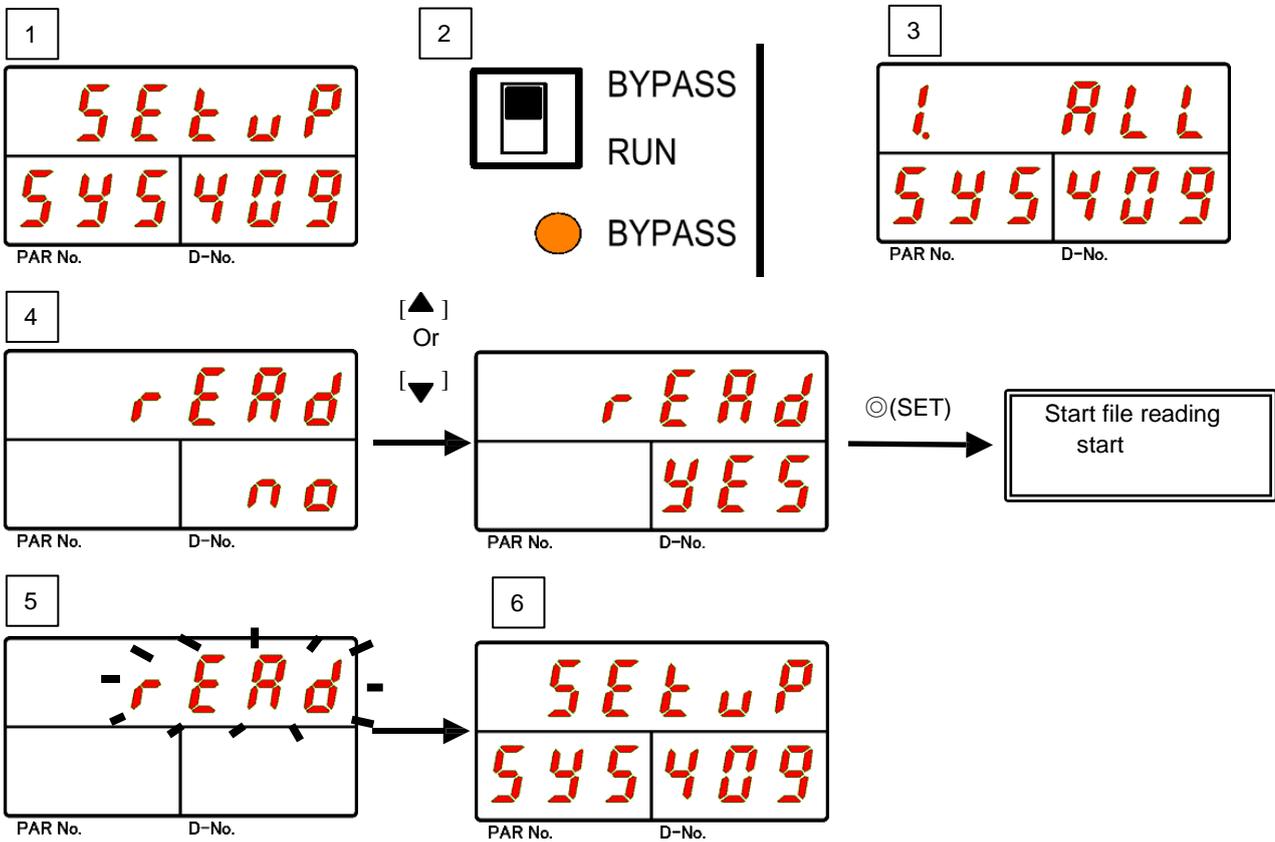
1.All configuration files (batch read)		2.Parameter file	
3.Sequence file		4.RS232C Input/output file	
5.PLC output-layout file		6.Fieldbus message file	
7.Fieldbus file			

• Procedure for reading memory card setting value

1. Operate the arrow buttons to display PAR No. display area: "SYS" and D-No. display area: "409" [CF Card Setting Reading].
2. When RUN/BYPASS switch of the unit is switched to BYPASS, the unit enters the setting value editing mode. Press the [⊙ (SET)] switch.
3. After entering the setting value editing mode, use the [▲] and [▼] switches to select the file type to be loaded.
4. After pressing the [⊙ (SET)] switch, within 2 seconds, change the indication from "NO" to "YES" with the [▲] and [▼] switches, and then press the [⊙ (SET)] switch again.
5. When loading starts, the display at the bottom of the display disappears and the "read" display at the top row of the display flashes.
6. When the display in the upper part of the display changes to "Setup", the reading of the setting is completed.



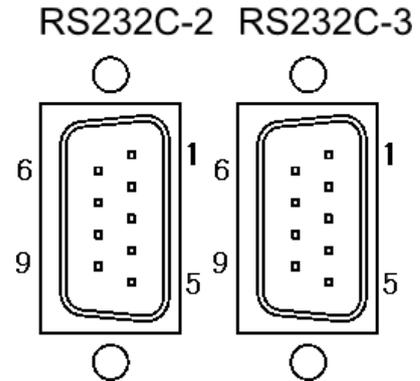
• Do not pull the memory card out of the slot or turn OFF the control power of the unit while the setting is being read from the memory card. Doing so may damage the module or memory card.



4-4. Extension RS232C Interface

The extension RS232C interface can be used for outputting tightening data and inputting ID data. The entered ID data is added to the waveform/tightening result data and is outputted to the extended RS232C or fieldbus message, etc.

Pin number	Signal name	IN/OUT	Contents
1	N.C.	-	Not used.
2	RxD	IN	ID data entry
3	TxD	OUT	Operation result data output
4	DTR	OUT	Always on output
5	GND	-	Signal ground
6	N.C.	-	Not used.
7	RTS	OUT	Always on output
8	N.C.	-	Not used.
9	N.C.	-	Not used.





• RS232C-2 is for input-only and RS232C-3 is for output-only.
• Choose master spindle from RS232C Input format / Data Input setting of UNR-G user console to set RS232C Port, Sequence Select from Input ID, and RS232C Input Format.
• Set RS232C output format from " RS232C output format" of the UNR-G user console to MASTER spindle.

RS232C-2 of Extension unit 2 and the default setting of RS232C-3 are as follows. In addition, the set values can be checked with D-No. [401] ~ [408] of the system-setting mode (PARNo. indicator: "SYS").

•Factory setting (system parameters)

D-No.401[RS232C-2: Communication speed]	38400bps	D-No.405 [RS232C-3: Communication speed]	38400bps
D-No.402 [RS232C-2: Parity]	None	D-No.406 [RS232C-3: Parity]	None
D-No.403 [RS232C-2: Stop bit]	1 Bit	D-No.407 [RS232C-3: Stop bit]	1 Bit
D-No.404 [RS232C-2: Data length]	8 Bit	D-No.408 [RS232C-3: Data length]	8 Bit

•Extension RS232C version

Synchronous system	Asynchronous type	Communication speed	9600 bps /19200 bps / 38400bps
Communication mode	Half duplex system	Start bit	1 Bit
Data length	7 Bits/8 bits	Stop bit	1 Bits/2 bits
Error control	None	Parity	Odd/Even/None

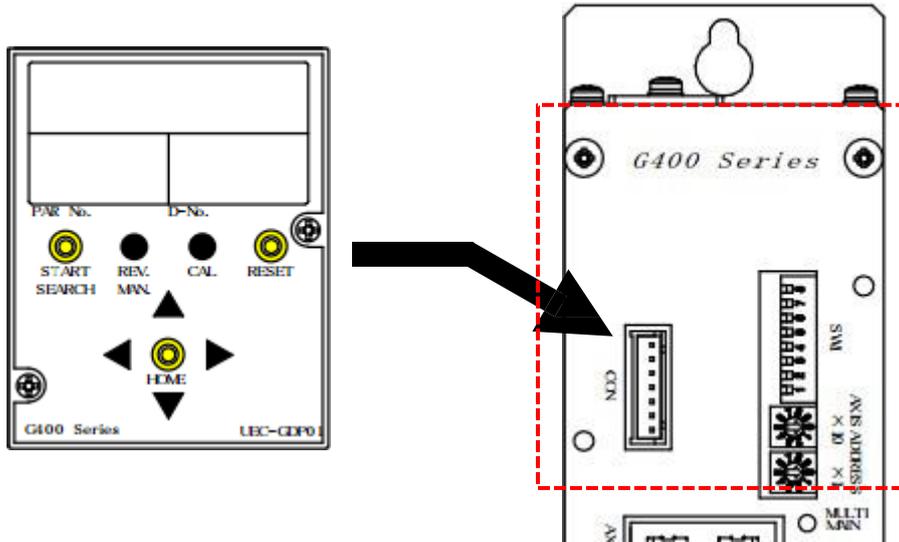
Refer to PAGE4-19 for details on inputting settings from RS232C-2. Refer to PAGE 3-10 for details on the tightening data outputted from RS232C-3.

Chapter 5 Setting Operation



5

5-1. Unit indicator



• Control Switch Function Compatibility Table by System and Communication Axes

System configuration and communication spindle	START	REV.	CAL	RESET
MASTER spindle	※	※	◎	◎
SLAVE spindle	×	×	○	○

"◎": Functions for the tool(s) of the connected spindle(s) including MASTER spindle.
 「○」: Functions for its own tool
 "※": Functions for the used spindle number(s) of the work number set to MASTER spindle.
 「×」: Not functional

START button

- ◆ The function differs between MASTER spindle and SLAVE spindle.
 - MASTER spindle... Activate spindles driven by WORK numbers selected by MASTER.
 - SLAVE spindle ... No activate



• Tightening is not executed when the used spindle number of the selected work number is not set in the main system.

REV. switch

- ◆ The function differs between MASTER spindle and SLAVE spindle.
 - MASTER spindle... While REV. is held down, the tool rotates in the reverse direction at the set value of the manual reverse rotation speed with the same parameter number as the selected work number. In addition, it functions for the spindle No. of the selected work No.
 - SLAVE spindle ... Does not function.



- **The reverse operation is not executed for the spindle for which the mode setting is not made to the selected work number.**

CAL switch

- ◆ With CAL pressed while the tool is stopped, the value converted to [Full Scale Torque] of the currently selected parameter number is displayed in the top row of the display. CAL voltage value of the torque transducer is checked. You can check if CAL is within the allowable range. You can check from the lighting color of JUDGE LED of the unit.
 - Within tolerance: JUDGE LED Green ON
 - Out of tolerance: JUDGE LED Red ON
- ◆ For MASTER spindles, check the torque transducer on all connecting spindles.

You can check whether CAL is within the allowable range from MULTI LED illumination color of MASTER spindle.

 - All connected spindles are within the allowable range. MULTI LED green LED is ON.
 - Even 1 Spindle has an unacceptable spindle: MULTI red LED is on.

In addition, if CAL switch is pressed while the real-time mode (PAGE 5-8) D-No.1 [Torque-voltage value display] is displayed, the value converted by the potential difference of approximately $\Delta 3.75V$ is displayed at the upper row of the display.



- **Do not press CAL button during tightening operation.**
If the tool stops suddenly, the workpiece may be damaged.

RESET button

- ◆ When RESET button is pressed, a value around "0" is displayed on the upper LED of the display, and the output signal of the tightening result is erased. Tightening operation is stopped during tool operation.

While holding down RESET button, you can check ZERO voltage of the torque transducer to see if ZERO voltage is within the allowable range from the illuminated color of the unit's JUDGE LED.

- Within tolerance: JUDGE LED Green ON
- Out of tolerance: JUDGE LED Red ON

- ◆ For MASTER spindles, all connected spindles, including themselves, are checked for tightening stoppage and clearance, and ZERO voltage of the torque transducer.

MULTI LED on MASTER can be used to check if ZERO power is within the specified range.

- Values of all connected spindles are within the usage range : MULTILED Green ON
- Even 1 spindle that is out of the usable range exist: MULTILED Red ON

[◀] · [▶] Switch

In the operation ready status (during RUN), the respective display modes (tightening result mode, set value mode, real-time mode, and status display) are switched.

When the spindle is disabled (during BYPASS), it is used to move the cursors and move the digits of the setting.

[⊙ (SET)] button

Used to confirm setting data in spindle-cutting status (at BYPASS).

Pressing the [⊙ (SET)] button at No. 2 in the real-time mode executes servo-lock for one minute. Refer to PAGE 5-8 for more information.

[▲], [▼] switches

Used to switch display data and change setting data.

※The content of LED on each indicator differs depending on the status (RUN · BYPASS) of the module.

Refer to "PAGE 5-6"RUN status" and "PAGE 5-15"BYPASS status" for details of indications.

5-2. RUN/BYPASS button

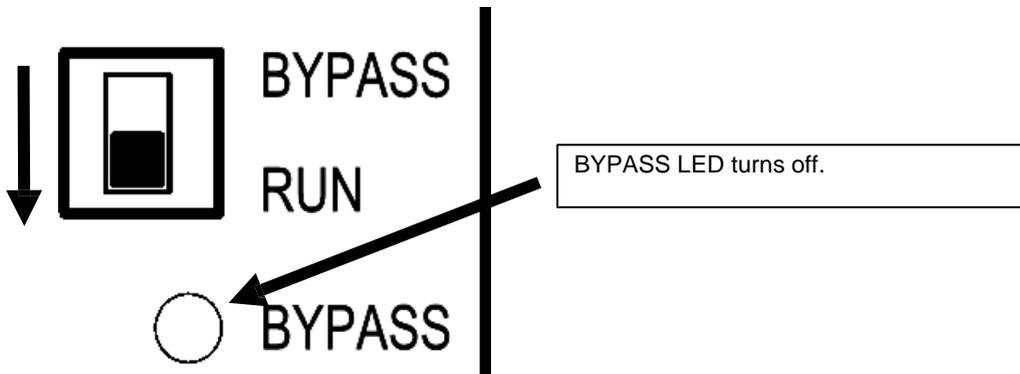
The unit has two conditions: RUN (operable) and BYPASS (spindle disabled). If the UNR-G series unit display is mounted on the front of the UNR-G series unit, RUN (operable) status can be used to indicate the tightening operation or judgment of the tightening result.

In BYPASS (spindle disabled) condition, the parameter can be set with the indicator, etc., but the tightening operation cannot be executed. Switching between RUN and BYPASS status can be made via BYPASS signal or the front-panel RUN/BYPASS switch on the unit.

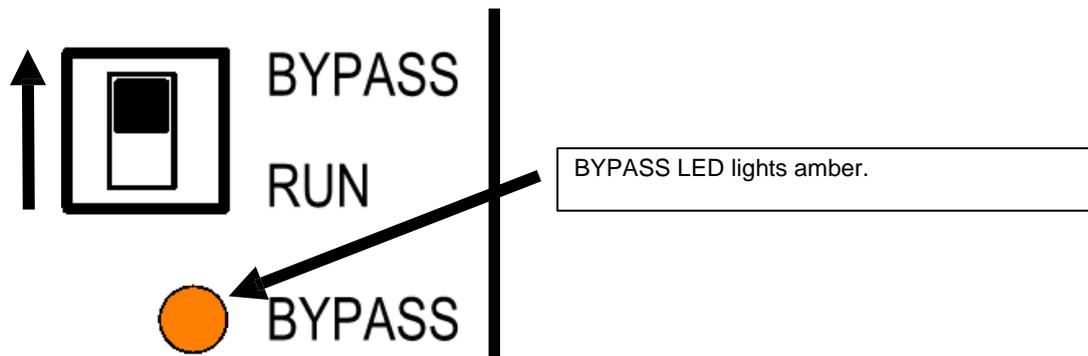


• The function of RUN/BYPASS switch can be disabled by setting SW2 DIP switch on the bottom of the unit. See PAGE 2-17 "Setting the Bottom-Panel SW2 DIP Switches."

- RUN (ready for operation) status
PLC IO Input Signal "BYPASS Signal": "OFF"
RUN/BYPASS switch on the front panel of the unit: RUN
BYPASS LED turns off in RUN status.



- BYPASS (spindle cut) status
PLC IO Input Signal "BYPASS Signal": "ON"
Or, RUN/BYPASS switch on the front of the unit : BYPASS
BYPASS LED is lit in orange when in BYPASS mode.

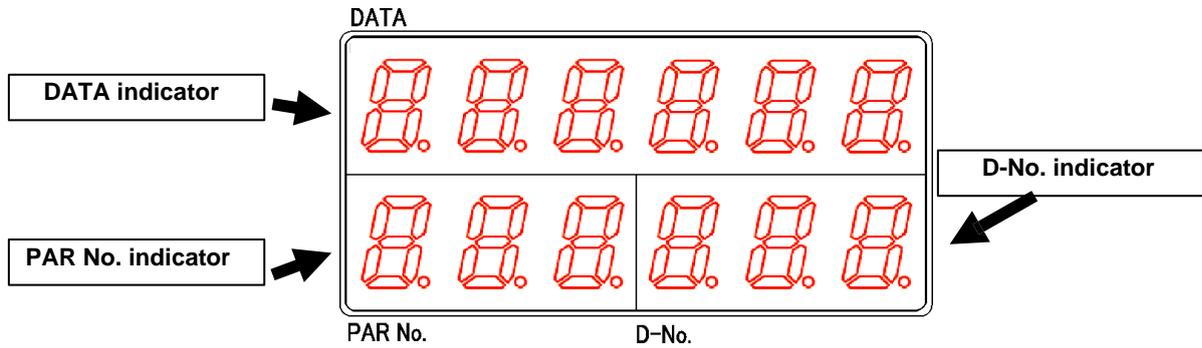


• If BYPASS LED illuminates red in RUN status, this indicates that the drive power (MOTOR POWER) is low or the drive power cord is disconnected.

5-3. RUN condition

In RUN condition, the tightening operation can be executed. The display shows the tightening results, status abnormalities, spindle numbers, parameters, etc.

Unit indicator (RUN status)



● **DATA indicator**

In the real-time mode, tightening result mode, and parameter (system) setting mode, the tightening result, set value (parameter), and executed value specified in D-No. indicator are displayed.

● **PAR No. indicator**

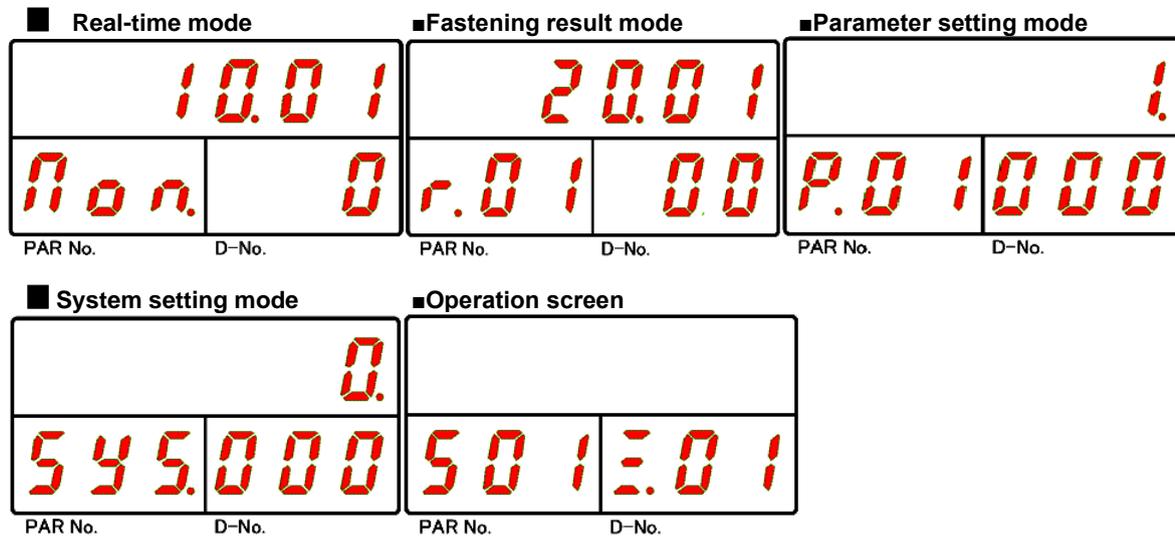
Displays the tightening parameter number. When an error occurs, the alarm number is displayed on the operation screen.

● **D-No. indicator**

In the real-time mode, tightening result mode, and parameter (system) setting mode, the number of the data displayed on DATA display is displayed.

In addition, the operation screen displays the current speed status during tightening operation, and the unit setting and spindle number if the tightening operation is not started respectively.

When an error occurs, the sub code of the alarm number is displayed.

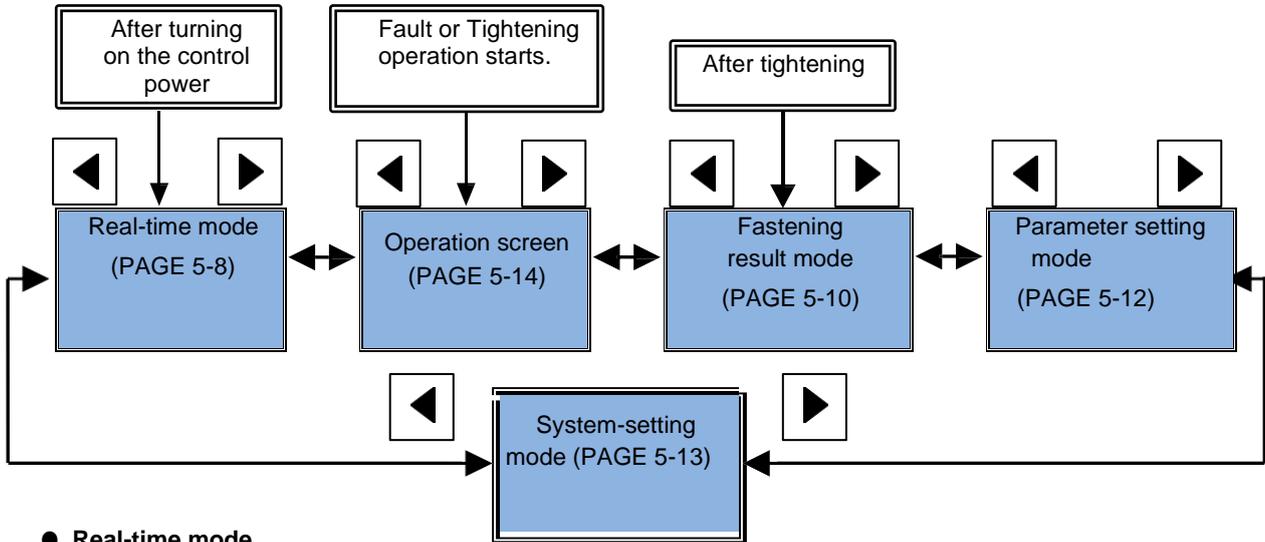


Refer to the following PAGE for details of RUN modes.

5-3-1. Mode-switching of RUN status

In RUN mode, press the [◀] or [▶] button to select one of five modes. In addition, in modes other than the "Operation" window, the displayed content can be changed by pressing the [▲] or [▼] switch.

Also, the "Operation screen" is automatically displayed at the start of tightening and at the end of tightening "Tightening result mode" is selected. However, display and mode cannot be changed by the switch during tightening operation.



- **Real-time mode**

The current execution value is displayed in this mode.

Use the [▲] [▼] switches to change the display contents, which are displayed immediately after the control power is turned on.

- **Operation screen**

This mode indicates the current unit status and the speed status during tightening operation. The display changes to the display "during tightening operation" from the start of tightening to the end of tightening. This is displayed when the unit status changes, such as, "OFF" of STOP signal or "ON" of BYPASS signal.

- **Fastening result mode**

This mode displays the tightening result.

Use the [▲] [▼] switches to change the tightening result, which is displayed automatically after completion of tightening.

- **Parameter setting mode**

This mode displays the tightening parameters.

Use the [▲] [▼] switches to change the display set value.

- **System setting mode**

This mode displays the system parameters.

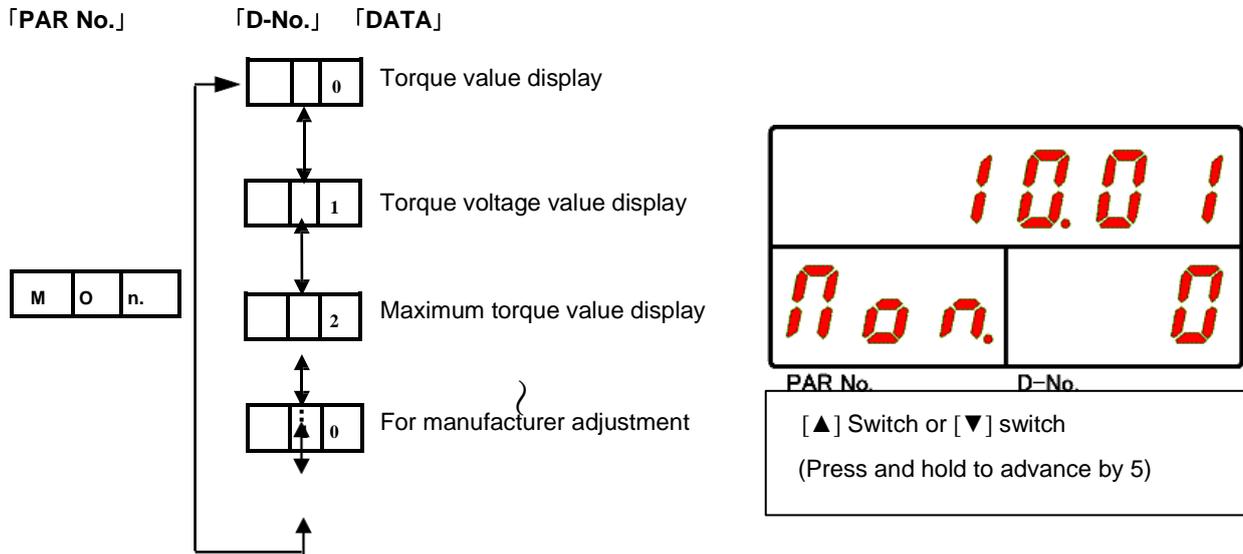
Use the [▲] [▼] switches to change the display set value.

5-3-2. Displaying RUN Status (Real Time Mode)

In the real-time mode, "Mon." is displayed on PAR No. display.

Use the [▲][▼] switches to increase or decrease the value on D-No. display. These switches change the display content.

Switch and hold [▲] or [▼] to skip D-No. display by 5.



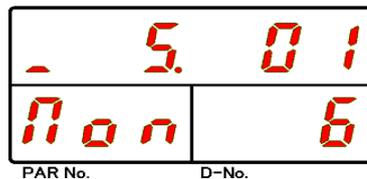
- "-----" is displayed on D-No.0 and D-No.2 when CAL voltage is an abnormal alarm.
- If "ON" is selected for CAL or RESET while D-No.3 ~ 10 is displayed, no torque is displayed at the top row of the display. (The check itself is executed.)
- In the real-time mode, "CAL" or "RES" is not displayed on D-No. display when CAL is pressed or RESET is set to "ON".

For details of the data to be displayed at the top of the display when "D-No." is changed, see "Real-time mode display details" on the following pages.

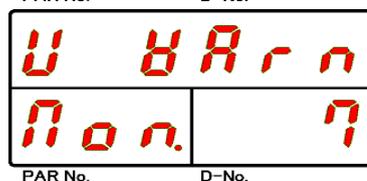
● Real-time mode display contents

PAR No.	D-No.	DATA	Unit
Mon.	0	[Torque value display] Displays the load on the current torque transducer in real time. Torque voltage converted to full scale torque is output by pressing the [CAL] switch.	N · m
	1	[Torque voltage value display] Displays the torque signal voltage applied to the current torque transducer in real time. When the [CAL] switch is pressed, a potential difference of approximately Δ3.75V is generated.	mV
	2	[Maximum torque value display] (Maximum torque value hold) Displays the peak torque since the [RESET] button was pressed in the real-time mode last time. In addition, pressing the [⊙ (SET)] button enables one minute of servo-lock.	N · m
	3	[Rotation angle display] The amount of the angle rotated from the current position is displayed in real time. When RESET signal is set to "ON" or when the tightening operation is started by START signal ("OFF"→"ON"), the angular value is set to 0.	Deg
	4	[Load factor] Displays the current motor load factor in real time. Exceeding 100 causes ALARM 08-10 "Overload error".	%
	5	[Current value] Displays the existing current value in real time.	A
	6	[Work number] The selected work No. is displayed. (W.01~W.24) If SW2 (Pin-3) on the bottom of the module is ON, [] is displayed at the beginning of the upper display. (PLC IO Output-Signal STOP Release)	
	7	[ZERO/CAL Voltage Error Warning] If CAL and ZERO voltages measured when the control power is turned on, when starting tightening self-check, when pressing CAL button on the display or when RESET is turned "ON", are error values, the display shown in the figure below (V Warn) appears. When RESET is turned "ON" after the warning is displayed, the display returns to [_ _ _].	
	8	[Tool rotation speed display] Displays the current rotation speed in real time during tool operation.	Rpm
	9~10	[For manufacturer adjustment]	

D-No.6:PLC IO output-signal STOP release
(SW2: Pin-number 3 is ON)



D-No.7:ZERO/CAL Error Alert



5-3-3. Indication of RUN status (fastening result-mode)

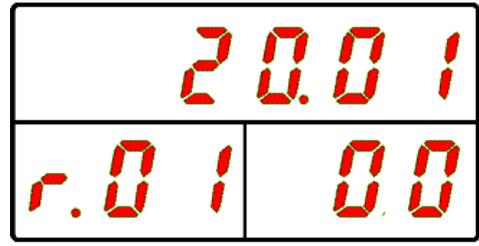
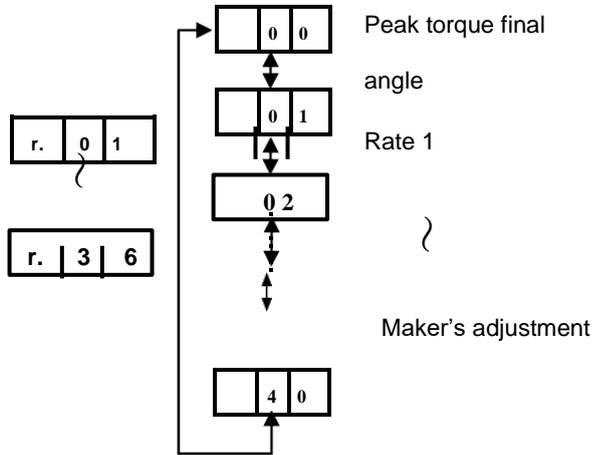
In the tightening result mode, the place of 100 on PAR No. display is "r.", and the parameter numbers (01 to 32) that were tightened by the places of 10 and 1 are displayed.

Use the [▲] [▼] switches to increase or decrease the value on D-No. display. This switch changes the display content.

※When tightening is not started, "r.00" is displayed.

Switch and hold [▲] or [▼] to skip D-No. display by 5.

「PAR No.」 「D-No.」 「DATA」



[▲] Switch or [▼] switch
(Press and hold to proceed by 5)

For details of the data to be displayed at the top of the display when the "D-No." is changed, refer to "Tightening Result-Mode Display Items" on the next page.

● List of fastening result mode display contents

Par No.	D-No.	DATA	Unit
r.01~r.36	00	Peak torque H/L	N · m
	01	Final angle H/L	Deg
	02	Snug Detect Torque H/L	N · m
	03	Tightening work number	
	04	Tightening time H/L	Sec
	06	Cycle time	Sec
	08	Current load factor	%
	10	Tightening method...trq: Torque method, ang: Angle method	
	11	Tightening step (1 fixed)	
	12	Tightening direction 0: CW direction 1: CCW (loosening)	
	13	Z/C checking ON / OFF	
	14	Reverse run flag (RV)...ON : Reversed OFF : Not run	
	15	Spindle judgment (reason for stopping tightening) OK / NOK / ALARM / STOP / BYPASS	
	16	1ST NG items	
	17	NOK number	
	20	Number of repetitions: 1 to 24	
	21	Mode number :1~48	
	22	Step number :1~20	
	24	Final torque	N · m
	25	Angle at final torque measurement	Deg
	26	Peak current	A
	28	Number of rotation threads	Rev.
	29	Load factor at end of tightening	%
	30	Current value when tightening is stopped	A
	32	Spindle unit cycle count (x1 million) ※"--" for less than 1 million cycles	
	33	Spindle unit cycle count (x1)	
	34	Tool cycle count (x1 million) ※"--" for less than 1 million cycles	
	35	Tool cycle count (x1)	
	36	Time judge	
	37~40	For adjustment for manufacturers	

5-3-4. Displaying RUN Status (Parameter Setting)

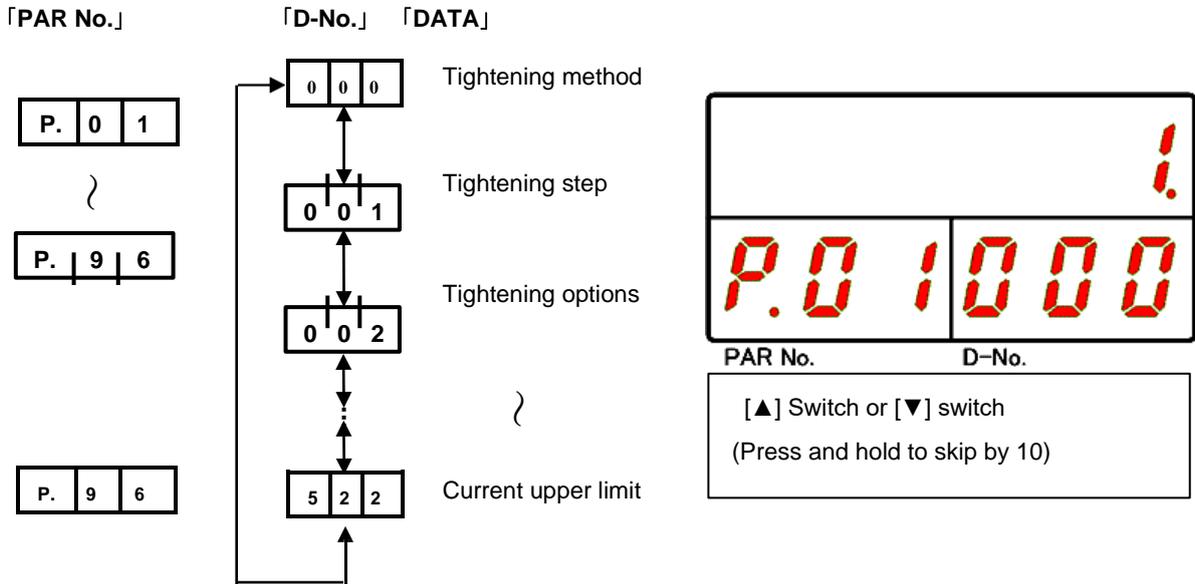
In parameter setting mode, the 100 place on PAR No. indicator is "P.," and the 10 place and 1 place indicate the parameter number (01 to 32). D-No. display changes by pressing the [▲] [▼] switches. The content of that data number is displayed.

Pressing the [▲] button at the final parameter number will increment PAR No. by one.

Pressing the [▼] button at the leading parameter number will decrease PAR No. by one.

Switch and hold [▲] or [▼] to skip D-No. display by 10.

Refer to Chapter 7 "Tightening Parameters" for details of the set value.



CAUTION

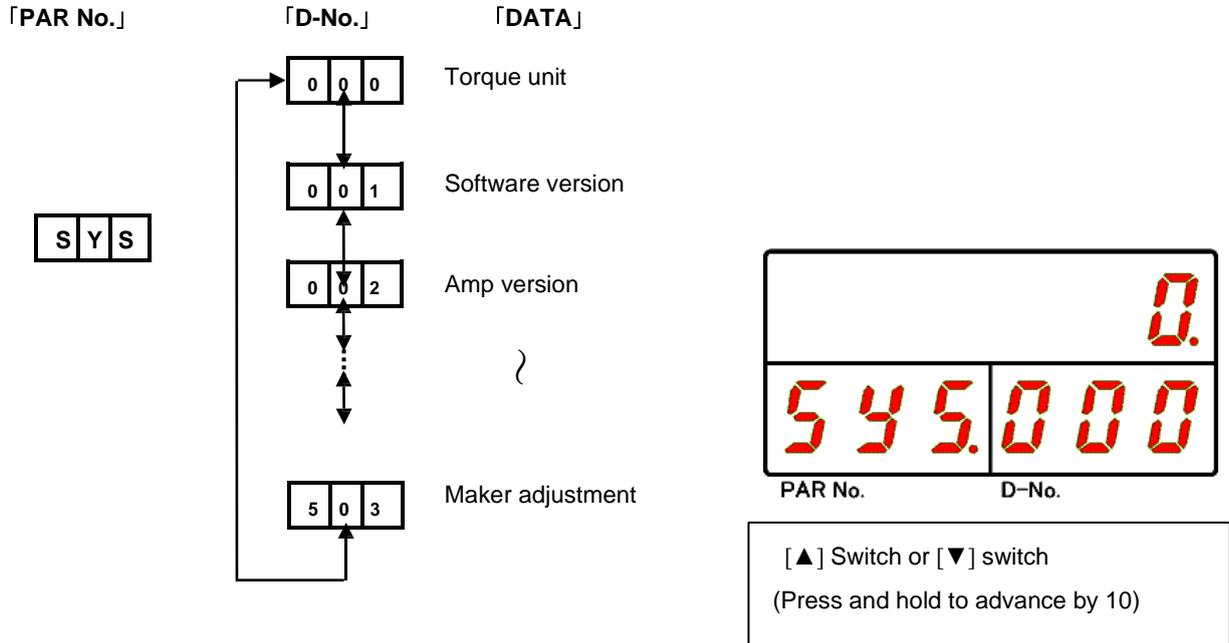
- To initiate the tightening operation, the "Repetition count setting" must be set from G type user console in addition to the tightening parameter setting.

5-3-5. Displaying RUN Status (System-Setting)

In the system setting mode, "SYS" is displayed on PAR No. indicator.

D-No. display changes by pressing the [▲] [▼] switch. The content corresponding to the number is displayed. Switch and hold the [▲] [▼] buttons to skip D-No. displayed in 10 steps.

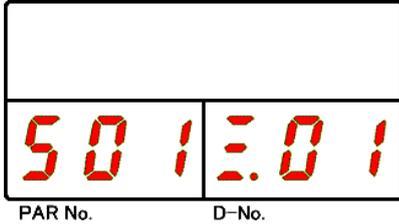
See Chapter 6, "System Parameters," for more information about these settings.



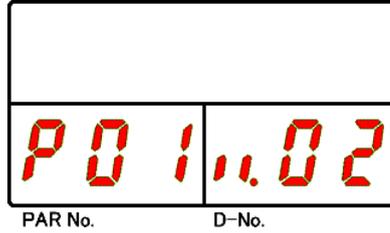
5-3-6. Displaying RUN Status (Operation Display)

In the operation window, the number (01 to 32) of the parameter/sequence currently selected in PAR No. window is displayed. The 10 place and the 1 place on D-No. display indicate the unit's spindle number. In addition, the number 100 in D-No. display section varies depending on the currently used system and whether it is a MASTER spindle or a SLAVE spindle.

■ Normal view (MASTER scale)



■ Normal view (SLAVE scale)

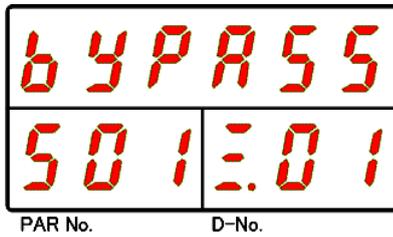


When an error occurs or STOP signal changes to "OFF", the monitor automatically shifts to the status display and changes the content of the displays.

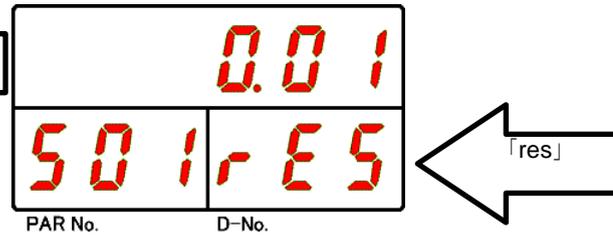
■ When an error occurs (ALARM signal "ON")



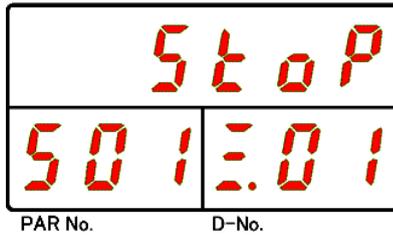
■ BYPASS "ON"



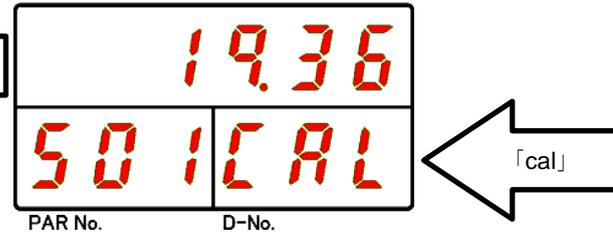
■ RESET "ON"



■ STOP "OFF"

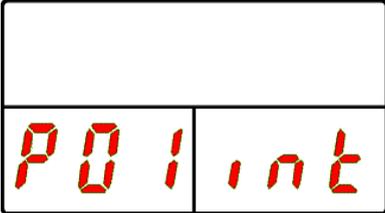
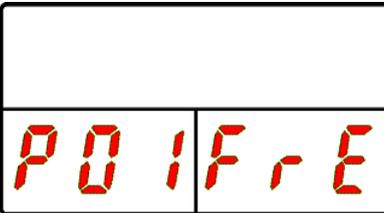
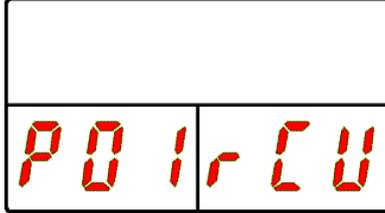
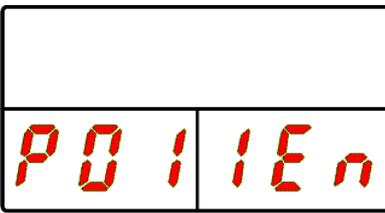
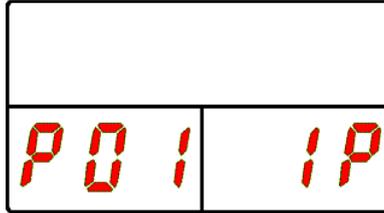


■ Indicator CAL switch "ON"



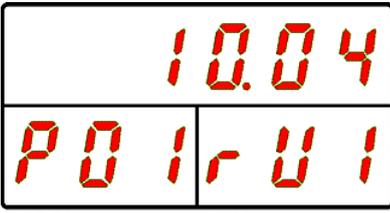
In addition, the operation speed and the state of the tightening step are displayed during the tightening operation. In the tightening operation display, PAR No. display shows the parameter number (01 to 96) currently in operation. The mode cannot be changed while the tightening operation is displayed. After completion of tightening, the unit automatically shifts to the tightening result mode.

The following is an example of display during tightening operation with parameter number 1.

<p>■ Initial speed in operation</p>  <p>PAR No. D-No.</p>	<p>■ Free-run speed in operation</p>  <p>PAR No. D-No.</p>	<p>■ Torque recovery in progress</p>  <p>PAR No. D-No.</p>
<p>■ Wait for step operation</p>  <p>PAR No. D-No.</p>	<p>■ 1P reverse in progress</p>  <p>PAR No. D-No.</p>	

※During reverse operation and when the real-time mode is displayed, the display contents at the top row of the display are held.

■ During reverse operation



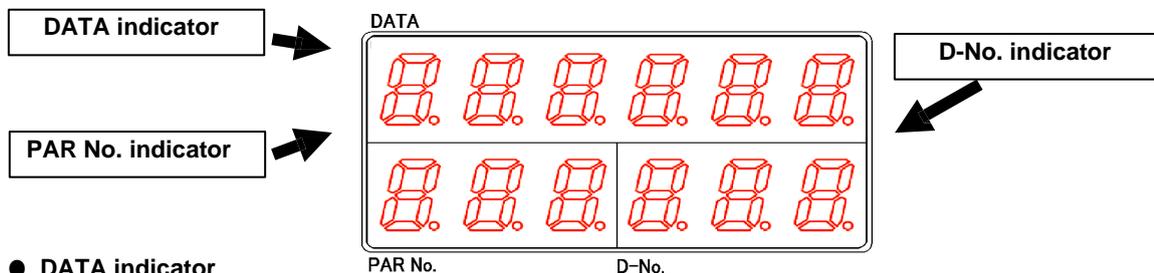
PAR No. D-No.

5-4. BYPASS condition

In BYPASS mode, the parameter settings can be changed.

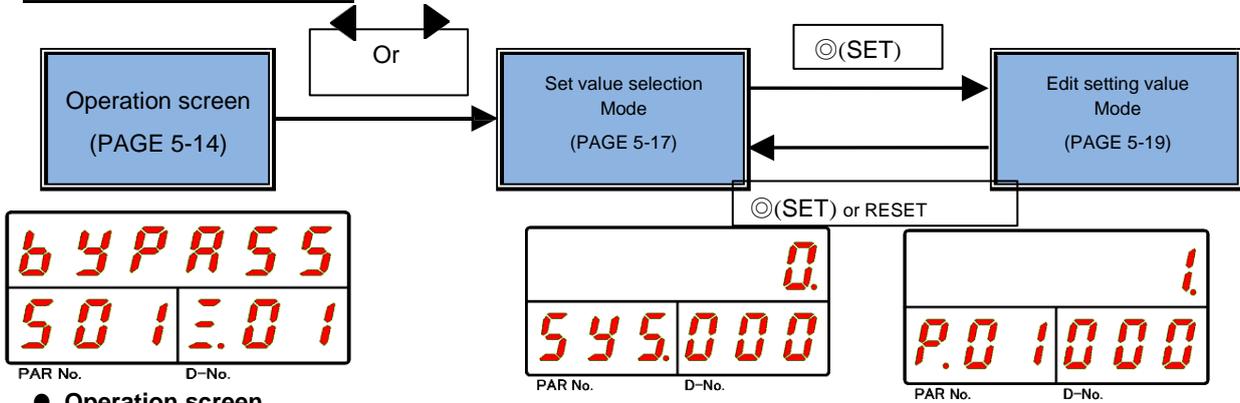
The display shows the data number and parameters for each parameter number.

Unit indicator (BYPASS status)



- **PAR No. indicator**
Displays the tightening parameter number.
- **D-No. indicator**
This displays the data number displayed on DATA area.

5-4-1. Switch BYPASS status



- **Operation screen**

This mode is used to display the current unit status.
Displayed immediately after switching from RUN status to BYPASS status.
The [◀] and [▶] switches to the set value selection mode.
However, in the case of "Parameter setting mode" and "System setting mode", it switches to the setting value selection mode directly.

- **Set value selection mode**

This mode selects the parameters.
Use the [◀] and [▶] switches to change the cursor position.
Use the [▲] and [▼] switch to change the display set value.

- **Set value edit mode**

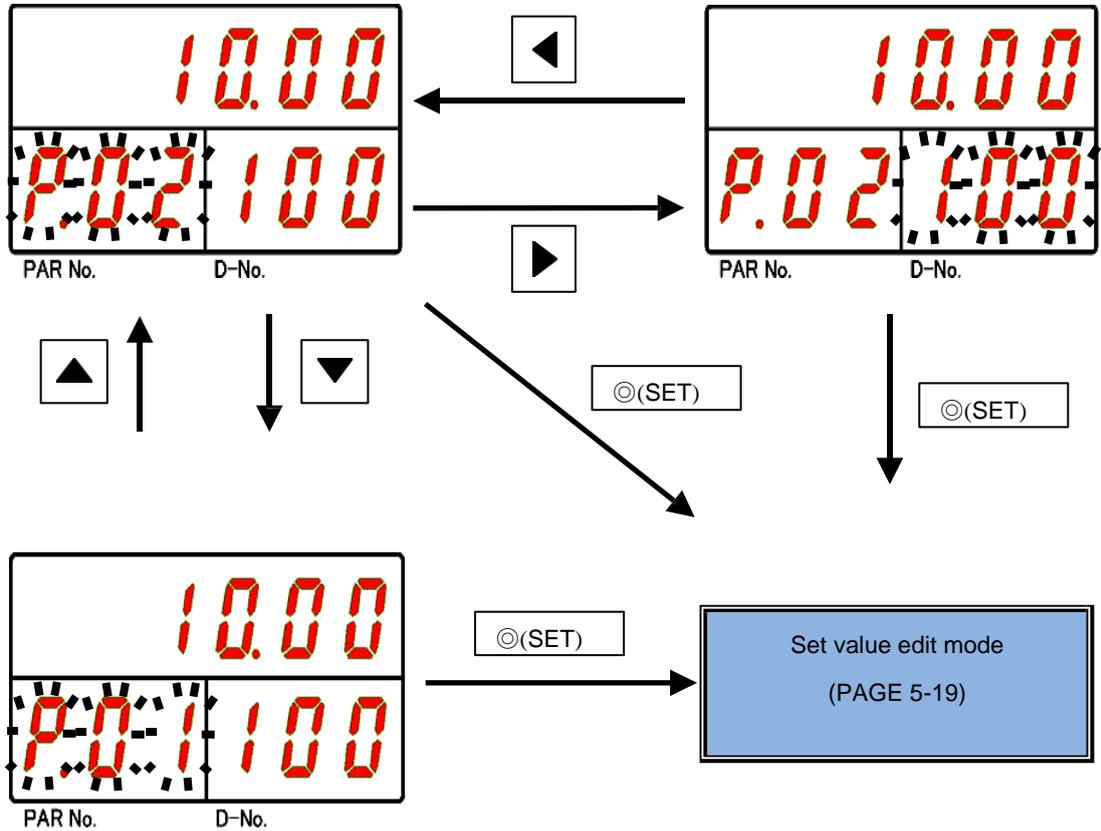
This mode is used to set parameters.
Use the [▲] and [▼] switches to edit the settings and the \odot (SET) switch to set them.

5-4-2. Indication of BYPASS status (setting value selection)

Immediately after you have changed to the "Setting value selection" mode, you can move the cursor (blinking digits) to PAR No. or D-No. display by pressing the [◀] switch or [▶] switch.

The value at the cursor position changes by ±1 when the [▲][▼] switches are pressed.
 Press the [▶] button to move the cursor to D-No. area.

Pressing the [◀] button moves the position to PAR No. area. Press the [⊙ (SET)] button to switch to "Setting value edit mode."

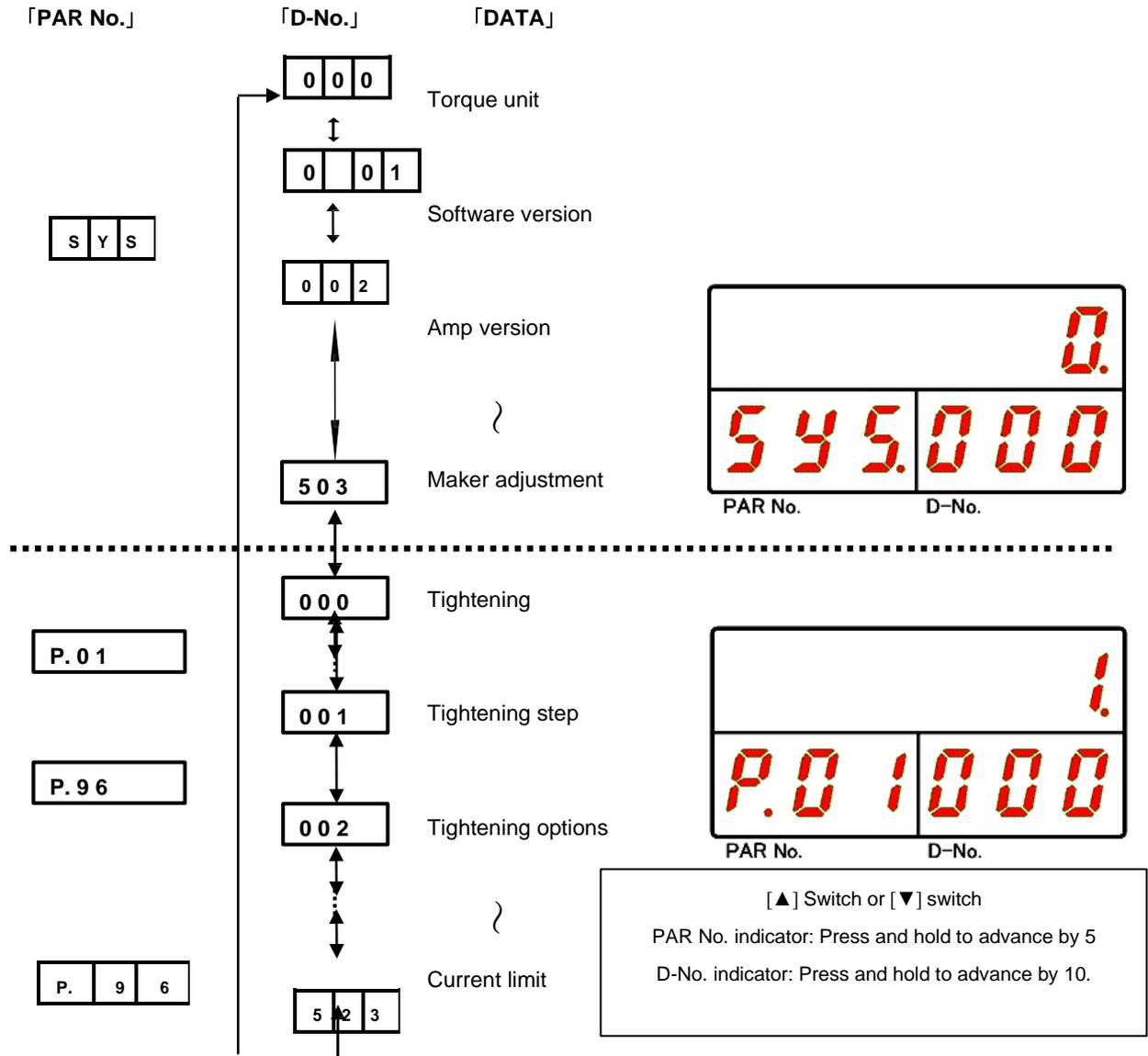


In the set value selection mode, "SYS" is displayed if PAR No. indicator is a system parameter, and parameter number (01 to 32) is displayed if it is a tightening parameter. D-No. display changes by pressing the [▲] [▼] switches. The content of that data number is displayed.

Pressing the [▲] button at the final parameter number will increment PAR No. by one. Pressing the [▼] button at the leading parameter number will decrease PAR No. by one.

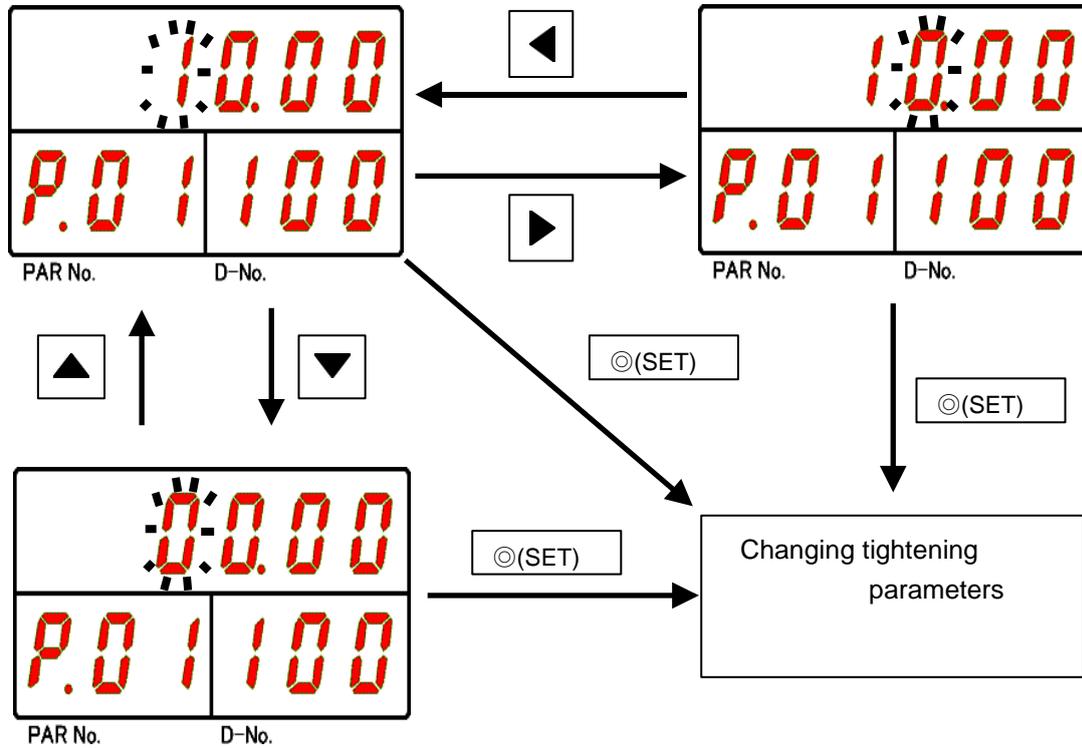
Pressing the [▶] and [◀] switches can also move the cursor position. Pressing and holding the [▲] and [▼] switches can skip the value on PAR No. display by 5 and the value on D-No. display by 10.

For more information on the settings, refer to PAGE 6-3 "Parameter List".



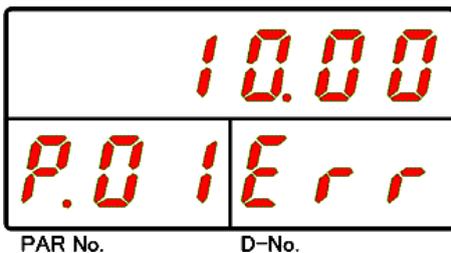
5-4-3. Displaying BYPASS status (set value editing mode)

Immediately after changing to "Set value editing mode", a cursor (blinking digits) is displayed at the top row of the display. The value at the cursor position changes by ± 1 when the [\blacktriangle] and [\blacktriangledown] switches are pressed. Pressing the [\blacktriangleleft] and [\blacktriangleright] switches also change the number of digits at the cursor position by ± 1 .



If you edit the set value and press the [\odot (SET)] switch, the set value will be changed before switching to the set value selection mode. Press the [RESET] switch in the "Set value edit mode" to switch to the Set value selection mode without changing the setpoint.

If the changed setting value is out of the setting range, "Err" is displayed on D-No. indicator, and the unit switches to the set value selection mode without changing the set value.

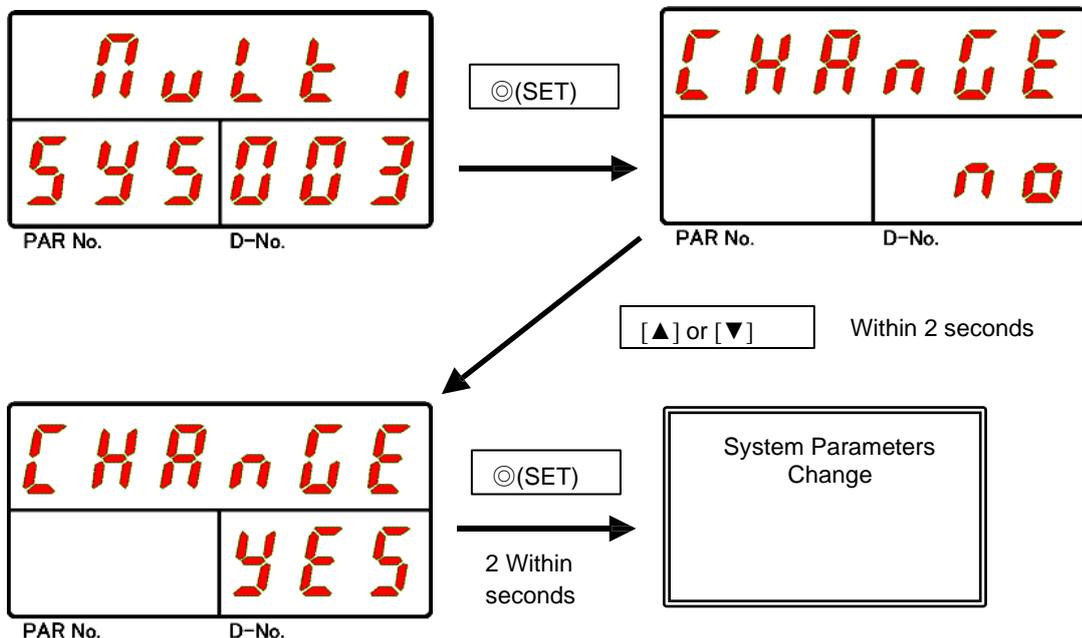


- When RUN/BYPASS is switched from BYPASS to RUN or BYPASS is switched from "ON" to "OFF", the changed parameters are stored in the unit. If the control power is turned OFF in BYPASS status during setting change, the parameter returns to the previous parameter without change.

•How to Set System Parameters

When PAR No. is set to [SYS], the parameters become system parameters. After editing the settings and pressing the [⊙ (SET)] switch, press the [▲] and [▼] switches.

Change the setting by changing the indication from "NO" to "YES" and then pressing the [⊙ (SET)] button again.



※After pressing the [⊙ (SET)] switch, change from "NO" to "YES". If the [▲] and [▼] switches are not operated for 2 seconds until the [⊙ (SET)] switch is pressed again, the unit switches to the set value selection mode without changing the set value.



- When RUN/BYPASS is switched from BYPASS to RUN or BYPASS is switched from "ON" to "OFF", the changed parameters are stored in the unit. If the control power supply is turned OFF in BYPASS status during setting change, the parameters are not changed and returns to the parameter.
- Some system parameters are enabled by turning the control power off and on again after changing them.
(D-No.003 [System-View], D-No.011~016 [TCP/IP Settings], etc.)
- When the unit setting tool number (PAR No."SYS or D-No."200) is changed, the setting of the tightening parameter is initialized and automatically corrected.
- Initialization...CAL, Motor torque limit, Current upper limit and Current limit are the targets.
- Automatic correction: If the set values of torque, speed, and current low limit exceed the high /low limit of the changed tool number, it becomes the target.

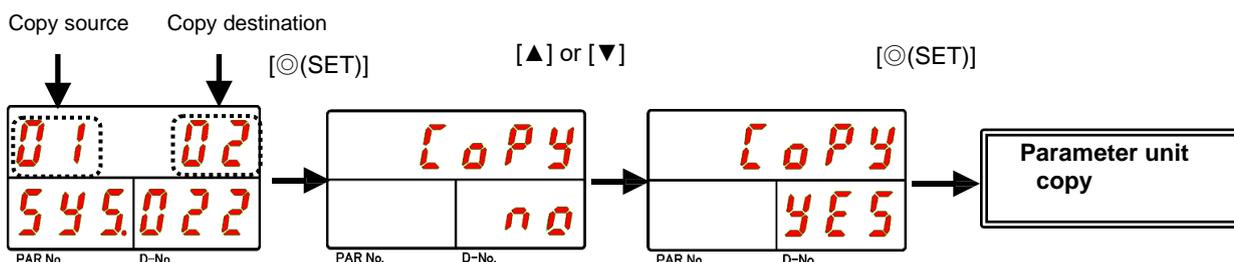
5-5. Clear parameter copy/tightening result history

When setting multiple parameter numbers, you can copy a parameter number to another parameter number in the set value edit mode.

Parameter copying can be performed by the following operation procedure.

●Parameter Copy Operation Procedure

1. Use the arrow buttons to view PAR No. : "SYS" and D-No.. Display: [Parameter Copy] of "022".
2. With the unit in BYPASS mode, press the [⊙ (SET)] button.
3. Select the parameter number of the copy source to the upper two digits of the upper display.
4. Select the parameter number of the copy source to the lower two digits of the upper display.
5. Press the [⊙ (SET)] switch, and within 2 seconds, press the [▲] and [▼] switches to change from "Copy NO" to "Copy YES", and then within 2 seconds, press the [⊙ (SET)] switch.
6. Performs a copy by parameter.

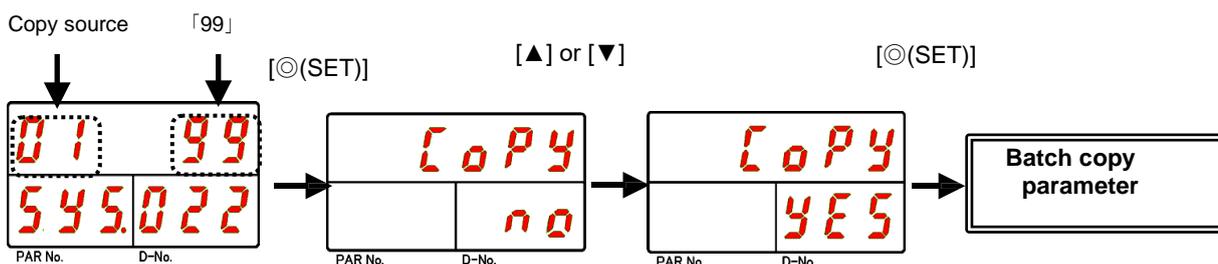


Cancel without any operation for 2 seconds

●Batch-copy operation procedure

Example: Copying parameter 1 to parameters 2 to 32

1. Use the arrow buttons to view PAR No. : "SYS" and D-No.. Display: [Parameter Copy] of "022".
2. With the unit in BYPASS mode, press the [⊙ (SET)] button.
3. Select the parameter number of the copy source to the upper two digits of the upper display.
4. Select "99" for the lower two digits of the upper display. Then, press the [⊙ (SET)] button.
5. Press the [▲] and [▼] switches within 2 seconds to change from "Copy NO" to "Copy YES" and then press the [⊙ (SET)] switch within 2 seconds.
6. Batch-copy the parameters selected in step 3 to all parameters.



Cancel without any operation for 2 seconds

The same procedure can be used to delete all the history of tightening data stored in the unit from [Delete History] in D-No. indicator: "021".

• Data cannot be restored after the tightening result history is erased. Use caution when performing the erase operation.

• Clearing procedure of tightening result history

Example: To delete the main tightening history (sequence operation)

Step 1. Operate the arrow switches to display [Delete History] in PAR No. display area: "SYS" and D-No. display area: "021".

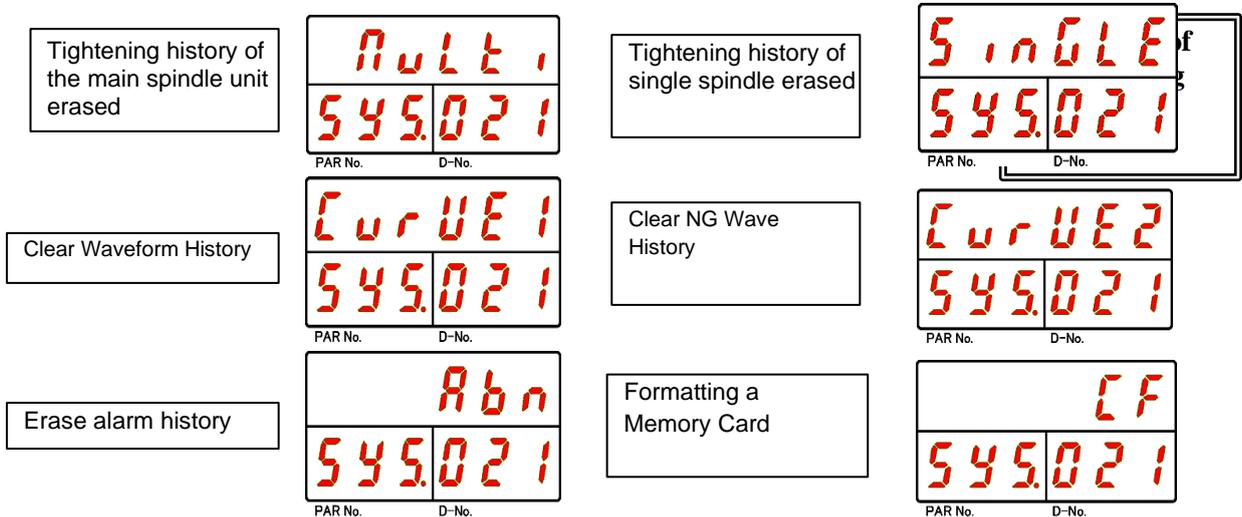
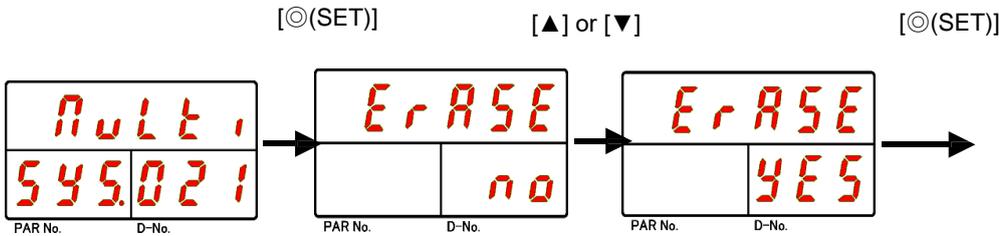
Step 2. Set RUN/BYPASS on the front panel to BYPASS position or set I/O INPUT: BYPASS to "ON".

Step 3. Turn the unit to BYPASS and press the [⊙ (SET)] button.

Step 4. Press the [▲] and [▼] switches to select "Multi" for the history to be erased, and then press the [⊙ (SET)] switch.

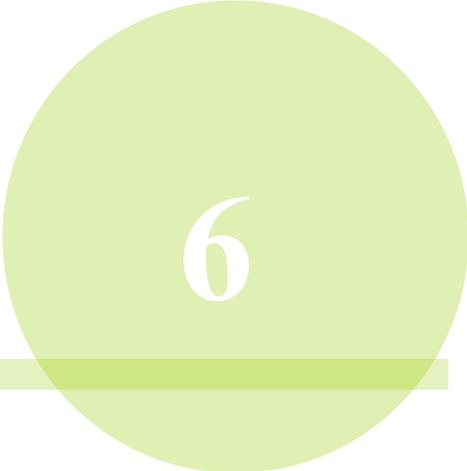
Step 5. Within 2 seconds, press the [▲] and [▼] switches to change from "Erase NO" to "Erase YES", and then within 2 seconds, press the [⊙ (SET)] switch.

Step 6. When the tightening result history is erased, the "Erase" in the upper row of the indicator flashes, MULTI LED and COM.LED light up in orange, and STATUSLED and JUDGELED flash in orange, and all the data in the tightening result history of the type selected in Step 4 is erased.



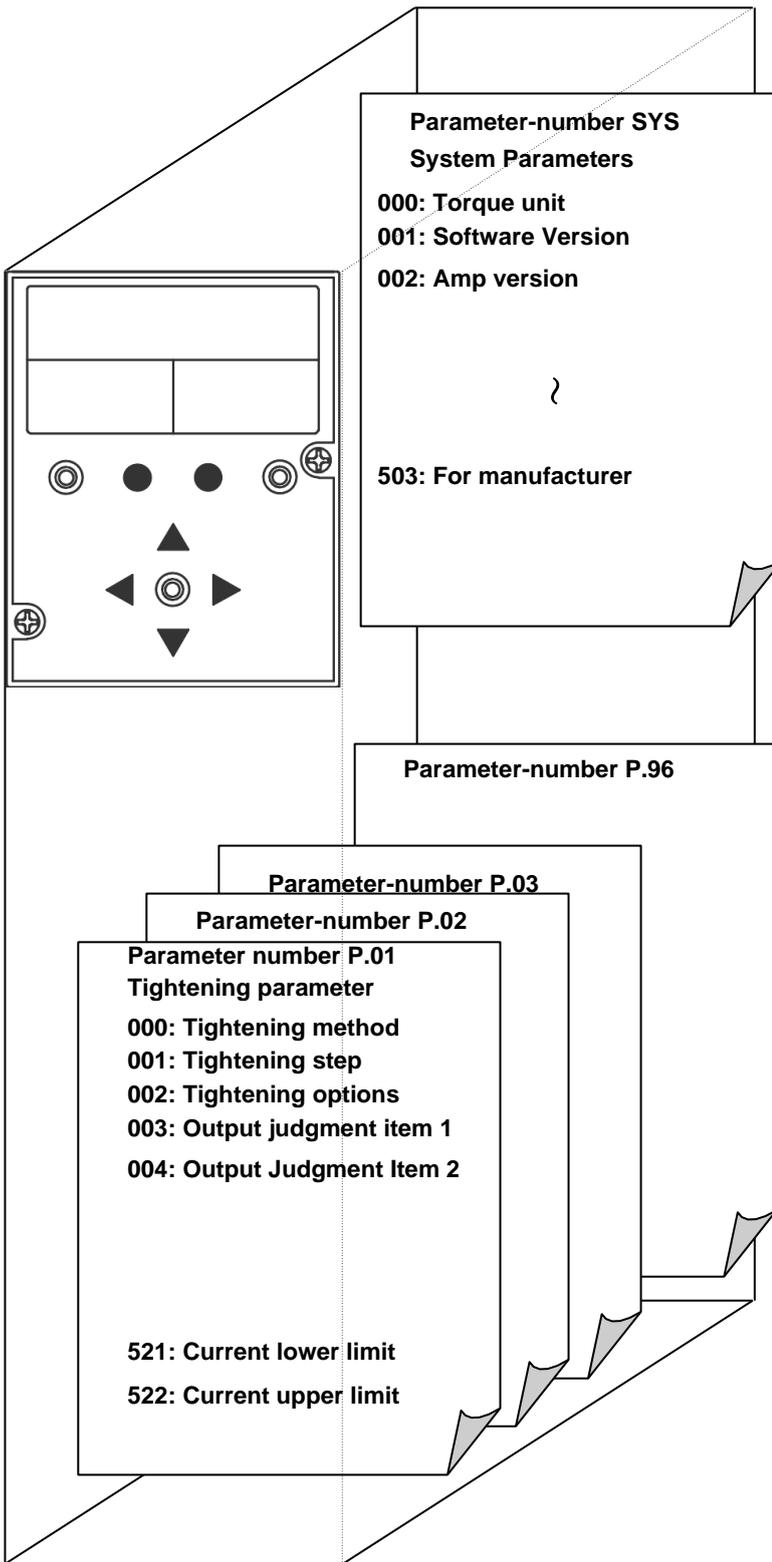
※When "ALL" is selected, all records except Memory Card are deleted.

Chapter 6 System Parameters



6

6-1. Parameter Configuration



●System Parameters

You can check the settings of spindle unit information and Extension unit information as well as the connection tool settings.

●Tightening parameters

Parameter setting used for tightening. 96 parameters can be set per spindle unit. Refer to Chapter 7 "Tightening Parameters" for details of the set value.

6-2. System Parameters

<System parameter> PAR No. indication: SYS

Item	D-No.	Contents	Setting	Unit
Unit Information 1	000	Torque unit		
	001	Software version		
	002	Amp version		
	003	Function Version (Multi/Single)	○	
	005	For manufacturer adjustment		
	006	For manufacturer adjustment		
	007	MASTER/SLAVE		
	008	Spindle cycle count (×1 million)		
	009	Spindle cycle count (×1)		
	010	Max. current of unit		
	011	IP addressing (6 significant digits): 192.168	○	
	012	IP addressing (lower 6 digits): 11.10	○	
	013	Subnet mask (upper 6 digits): 255.255	○	
	014	Subnet mask (lower 6 digits): 255.0	○	
	015	Default gateway (upper 6 digits): 192.168	○	
	016	Default gateway (lower 6 digits): 11.1	○	
	017	MAC address (upper 6-digit):0012F9		
	018	MAC address (lower 6 digits): 001000		
	019	RTC: Date "180925" 2018 September 25	○	
	020	RTC: Time "123456" 12 Hour 34 minutes 56 seconds	○	
	021	Tightening history erase /CF card format	○	
	022	Parameter Copy	○	
023 ~025	For manufacturer adjustment			
026	Unit front SW1 setting status			
027	Unit bottom SW2 setting status			
Connected Tool Settings	100	Connection Tool Information		
	101	Connection Tool Name		
	102	CAL Torque Decimal Point Position		
	103	Tool CAL Torque		N · m
	104	Tool CAL Volt		V
	105	Tool ZERO		V
	106	Tool internal gear ratio (×100)		
	107	Tool serial number (upper 3 digits)		
	108	Tool serial number (lower 4 digits)		
	109	Direction of rotating of the tool		
	110	Tool Order Number (Top 2 digits)		
	111	Tool Order Number (Lower 5 digits)		
	112	Tool cycle count (×1 million)		
113	Tool cycle count (×1)			

Item	D-No.	Contents	Setting	Unit
Unit Information 2	200	Unit setting tool number	○	
	201	Unit setting tool name		
	202	Parameter setting file version		
	203	Work configuration file version		
	204	PLC Output Layout Setting File Version		
	205	Fieldbus Configuration File Version		
	206	Fieldbus Message Configuration File Version		
	207	RS232C I/O configuration file version		
	208	Unit RS232C communication rate	○	Bps
	209	Unit RS232C parity	○	
	210	Unit RS232C stop bit	○	Bit
211	Unit RS232C length	○	Bit	
Extension unit 1 Information	300	Connection fieldbus information		
	301	ANYBUS-CC version		
	302	Unit setting fieldbus information		
	303	Station number (node address)		
	304	Communication speed (0~4)		
	305	Occupied station number (1,2,3,4)		
	306	Extension cyclic setting (1, 2, 4, 8)		
	307	I/O setting byte count "PLC → MASTER spindle"		Byte
	308	I/O setting byte count "MASTER spindle → PLC"		Byte
	309	Number of message block bytes		Byte
	310	Message setting byte count "PLC → MASTER spindle"		Byte
	311	Message setting byte count "MASTER spindle → PLC"		Byte
	312	IP address (upper 6-digit)		
	313	IP address (lower 6 digits)		
	314	Subnet mask (upper 6 digits)		
	315	Subnet mask (lower 6 digits)		
	316	Gateway (upper 6 digits)		
317	Gateway (lower 6 digits)			
Extension Unit 2 Information	400	CF storage capacity		%
	401	Extension RS232C-2 communication rate		Bps
	402	Extension RS232C-2 parity		
	403	Extension RS232C-2 stop bit		Bit
	404	Extension RS232C-2 Word Length		Bit
	405	Extension RS232C-3 communication rate		Bps
	406	Extension RS232C-3 parity		
	407	Extension RS232C-3 stop bit		Bit
	408	Extension RS232C-3 Word Length		Bit
	409	Read CF setting	○	
Touch panel	500	IP address (upper 6 digits): 192.168	○	
	501	IP address (lower 6 digits): 11.200	○	
	502	Touch Panel Function/Language Setting	○	
	503	For manufacturer adjustment		

6-2-1. System Parameters (Unit Information 1)

Set with the parameter number **SYS** and data number **0 **** of the system parameter.

- **D-No.000** ... Torque unit
- **D-No.001** ... Software version
- **D-No.002** ... Amp version
- **D-No.003** ... System display
- **D-No.005** ... Unit serial No. (Top part)
- **D-No.006** ... Unit serial No. (Next part)
- **D-No.007** ... MASTER / SLAVE
- **D-No.008** ... Spindle cycle count (× 1 million)
- **D-No.009** ... Spindle cycle count (×1)
- **D-No.010** ... Max. current of unit
- **D-No.011、 012** ... IP address
- **D-No.013、 014** ... Subnet Mask
- **D-No.015、 016** ... Default gateway
- **D-No.017、 018** ... MAC address
- **D-No.019** ... RTC: Date
- **D-No.020** ... RTC: Time
- **D-No.021** ... Tightening history clear / CF card format
- **D-No.022** ... Parameter Copy
- **D-No.023** ... For manufacturer adjustment
- **D-No.024** ... For manufacturer adjustment
- **D-No.025** ... For manufacturer adjustment
- **D-No.026** ... Unit front SW1 setting status
- **D-No.027** ... Unit bottom SW2 setting status

D-No.000 Torque unit

All tightening parameters in the unit are in the same torque unit.

D-No.001 Software version

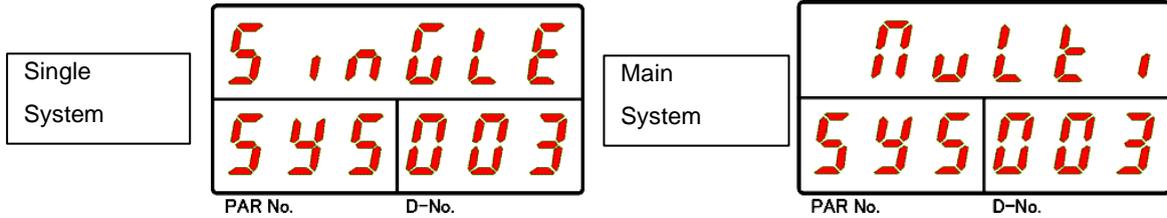
Software version of the module.

D-No.002 Amp version

Amplifier version.

D-No.003 System display

Displays whether the unit is a main system or a single system.



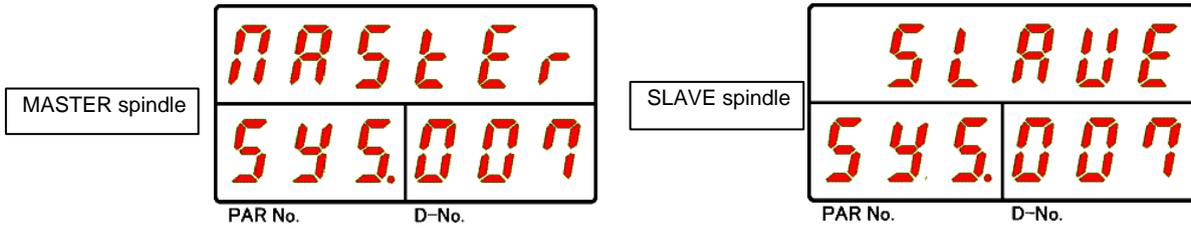
D-No.005 For maker adjustment

D-No.006 For maker adjustment

Not used.

D-No.007 Communication spindle

Displays whether the unit is MASTER or SLAVE spindle for (PC) communication and I/O (PLC) control.



D-No.008 spindle cycle count (× 1 million)

D-No.009 spindle cycle count (×1)

Displays the count that the unit has performed the tightening operation.
 ※If counting is less than 1 million times, "-----" is shown on D-No.008.

D-No.010 Max. current of unit

Displays the maximum current value of the unit.

D-No.011 IP address (upper 6-digit)

D-No.012 IP address (lower 6 digits)

Setting range: 0 to 255

Set IP address.

D-No.013 subnet mask (upper 6 digits)

D-No.014 subnet mask (lower 6 digits)

Setting range: 0 to 255

Set the subnet mask.

D-No.015 default gateway (upper 6 digits)

Setting range: 0 to 255

D-No.016 Default Gateway (Lower 6 Digits)

Setting range: 0 to 255

Set the default gateway.



- D-No.011~016 is enabled by turning the control power supply off and on again after the change.
- To restart the control power supply, make sure that the "BYPASS" indicator on the upper part of the display turns off after the change.
 If the control power is turned OFF while "BYPASS" is lit, the parameter may be initialized.

D-No.017 MAC address (upper 6-digit)

D-No.018 MAC address (lower 6 digits)

Displays MAC addressing.

D-No.019 RTC: Date

Setting range: 13 to 99 (year), 1 to 12 (Monday), 1 to 31 (Sunday)

D-No.020 RTC: Time

Setting range: 0 to 23 (hour), 0 to 59 (minute), 0 to 59 (second)

This displays RTC date and time. The year is 2013-2099.

※It is not displayed on SLAVE of the main system.

D-No.021 tightening history clear / CF card format

Erase the tightening result history. For how to clear the tightening result history, refer to PAGE 5-21 "Parameter Copy/Clear Tightening Result Log". When the Extension unit 2 (model: UEC-GCF) is installed, formatting of CF card can be executed. For information on formatting a CF card, see PAGE 4-34 "Formatting a Memory Card".

D-No.022 Parameters Copy

Perform a parameter copy. For details on how to copy parameters, refer to PAGE 5-21 "Parameter Copy/Tightening Result History Clearance".

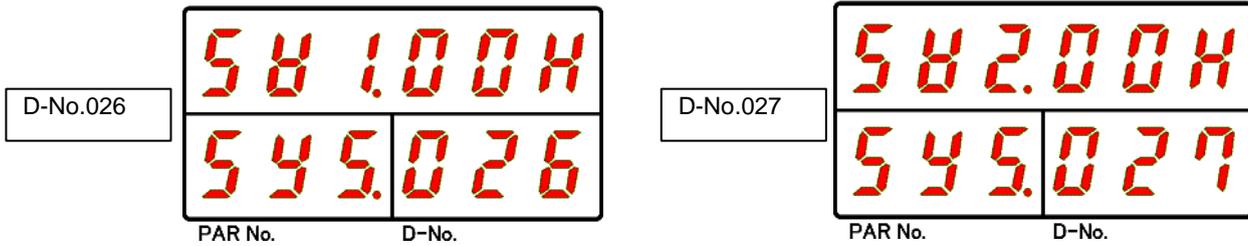
D-No.023 D-No.024 D-No.025 For manufacturer's adjustment

Not used.

D-No.026 Unit front SW1 setting status

D-No.027 Unit bottom SW2 setting status

Display the setting status of SW1 switch on the front of the unit and SW2 switch on the bottom of the unit.



"00" in the above figure indicates ON/OFF status of SW No. 1 to No. 8 with 8bits hexadecimal code.

SW Setup example	Display example
All OFF	00H
1 Only number ON	01H
2 Only number ON	02H
3 Only number ON	04H
4 Only number ON	08H
5 Only number ON	10H
6 Only number ON	20H
7 Only number ON	40H
8 Only number ON	80H
All ON	FFH

6-2-2. System Parameters (Connected Tool Settings)

Set with the parameter number SYS and data number 1 ** of the system parameter.

- D-No.100 ... Connected Tool Number
- D-No.101 ... Connected Tool Information
- D-No.102 ... CAL Torque Decimal Point Position
- D-No.103 ... Tool CAL Torque
- D-No.104 ... Tool CAL Volt
- D-No.105 ... Tool ZERO Volt
- D-No.106 ... Tool internal gear ratio (×100)
- D-No.107 ... Tool serial number (upper 3 digits)
- D-No.108 ... Tool serial number (lower 4 digits)
- D-No.109 ... Direction of rotating of the tool
- D-No.110 ... Tool Order Number (Top 2 digits)
- D-No.111 ... Tool Order Number (Lower 5 digits)
- D-No.112 ... Tool cycle count (×1 million)
- D-No.113 ... Tool cycle count (×1)

D-No.100 Connected Tool Number

Displays the tool number corresponding to the tool model. Refer to PAGE 1-12 "Tool. Model".

D-No.101 Connected Tool Information

Displays the max. instantaneous torque and motor capacity of D-No.100 [Connected Tool Number]

D-No.102 CAL Torque Decimal Point Position

Displays the torque decimal point position of D-No.103 [Tool CAL torque].

D-No.103 Tool CAL Torque [N•m]

Displays CAL torque of the tooling.

D-No.104 Tool CAL [V]

Displays CAL power of the tool.

D-No.105 Tool ZERO [V]

Displays ZERO voltage of the tool.

D-No.106 Tool internal gear ratio (×100)

Displays the value obtained by multiplying the gear ratio of the tool by 100.

D-No.107 Tool Serial Number (upper 3 digits)

Displays the serial number of the tool.

D-No.108 Tool Serial Number (Lower 4 Digits)

D-No.109 Direction of rotating of the tool

Displays the direction of tool rotation. (CW:0, CCW:1)

D-No.110 Tool Order Number (2 upper digits)

Displays the order number of the tool.

D-No.111 Tool Order Number (Lower 5 Digits)

D-No.112 tool cycle count (×1 million)

D-No.113 tool cycle count (×1)

The count which the connected tool performed the tightening operation by is displayed.

※If counting is less than 1 million times, D-No.112 shows "-----".

6-2-3. System Parameters (Unit Information 2)

Set with parameter number SYS and data number 2 ** of system parameter.

- D-No.200 ... Unit setting tool number
- D-No.201 ... Unit setting tool information
- D-No.202 ... Parameter setting file version
- D-No.203 ... Sequence configuration file version
- D-No.204 ... PLC Output Layout Setting File Version
- D-No.205 ... Fieldbus Configuration File Version
- D-No.206 ... Fieldbus Message Configuration File Version
- D-No.207 ... RS232C I/O configuration file version
- D-No.208 ... Unit RS232C communication rate
- D-No.209 ... Unit RS232C parity
- D-No.210 ... Unit RS232C stop bit
- D-No.211 ... Unit RS232C data length

D-No.200 Unit setting tool number

Setting range: Tool number for which the model number is registered

Refer to PAGE 1-12 "Tool model" to set the connected tool number.

When the unit setting tool number is changed, the set value of the tightening parameter is initialized and automatically corrected.

D-No.201 Unit setting tool information

Displays the nominal torque and motor capacity of D-No.200 [Unit setting tool number].

D-No.202 Parameter setting file version

This displays the version of the parameter file that has been set for the unit.

D-No.203 Sequence configuration file version

This displays the version of the sequence file that is set to the unit.

D-No.204 PLC Output Layout Setting File Version

Displays the version of PLC output-layout file set in the unit.

D-No.205 Fieldbus Configuration File Version

This displays the version of the fieldbus file that is set for the unit.

D-No.206 Fieldbus Message Configuration File Version

This displays the version of the fieldbus file that is set for the unit.

D-No.207 RS232C I/O configuration file version

This displays the version of RS232C input/output file that is set for the unit.

D-No.208 Unit RS232C baud rate [bps]

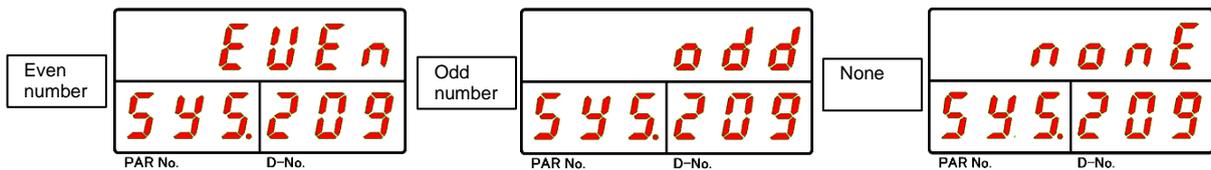
Setting range: 9600, 19200, 38400

Sets the communication rate of RS232C interface on the front of the unit.

D-No.209 Unit RS232C parity

Setting range: Even, Odd, None

Sets the parity of RS232C interface on the front of the unit.



D-No.210 Unit RS232C stop bit [bit]

Setting range: 1, 2

Sets the stop bit of RS232C interface on the front of the unit.

D-No.211 Unit RS232C length [bit]

Setting range: 7, 8

Sets the length of RS232C interface on the front of the unit.

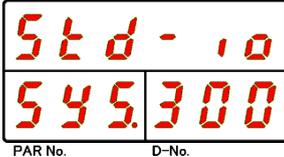
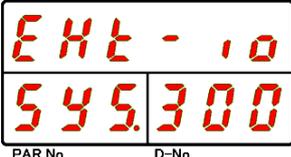
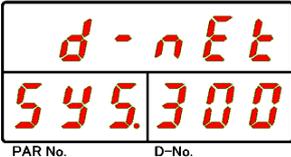
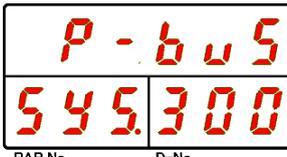
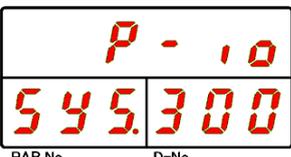
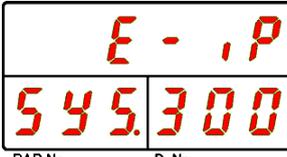
6-2-4. System Parameters (Extension Unit 1 Information)

Set by parameter number SYS and data number 3 ** of system parameter.

- D-No.300 ... Connected fieldbus information
- D-No.301 ... ANYBUS-CC version
- D-No.302 ... Unit setting fieldbus information
- D-No.303 ... Station number (node address)
- D-No.304 ... Communication speed
- D-No.305 ... Occupied station number
- D-No.306 ... Extension cyclic setting
- D-No.307 ... I/O setting byte count "PLC → MASTER spindle"
- D-No.308 ... I/O setting byte count "MASTER spindle → PLC"
- D-No.309 ... Number of message block bytes
- D-No.310 ... Message setting byte count "PLC → MASTER spindle"
- D-No.311 ... Message setting byte count "MASTER spindle → PLC"
- D-No.312, 313... IP address
- D-No.314, 315... Subnet Mask
- D-No.316, 317... Gateway

D-No.300 Connected fieldbus information

Displays the type of fieldbus installed in Extension unit 1.

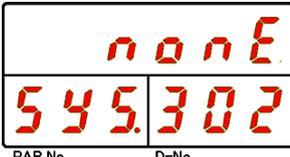
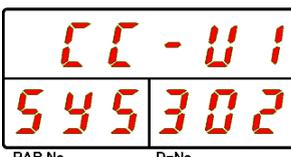
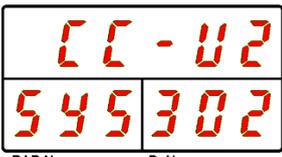
Expansion unit 1 not installed (Normal IO)			
UEC-GIO mounting (extension IO)		UEC-GCC mounting (CC-Link)	
UEC-GDN mounting (DeviceNet)		UEC-GPB mounting (PROFIBUS DP-V1)	
UEC-GPN mounting (PROFINET IO)		UEC-GEN mounting (EtherNet/IP)	

D-No.301 ANYBUS-CC version (Except for Normal IO and Extension IO)

Displays the version of ANYBUS-CC for Extension unit 1.

D-No.302 Unit setting fieldbus information

Displays the type of fieldbus set in the unit.

Fieldbus not set			
CC-Link V1		CC-Link V2	

○:Parameters to use

D-No.300	EXT IO	CC-Link	DeviceNet	PROFIBUS DP-V1	PROFINET IO	Ethernet/IP
D-No.303	-	○	○	○	-	-
D-No.304	-	○	○	-	-	-
D-No.305	-	○	-	-	-	-
D-No.306	-	○	-	-	-	-
D-No.307	-	○	○	○	○	○
D-No.308	-	○	○	○	○	○
D-No.309	-	○	○	○	○	○
D-No.310	-	○	○	○	○	○
D-No.311	-	○	○	○	○	○
D-No.312	-	-	-	-	○	○
D-No.313	-	-	-	-	○	○
D-No.314	-	-	-	-	○	○
D-No.315	-	-	-	-	○	○
D-No.316	-	-	-	-	○	○
D-No.317	-	-	-	-	○	○

D-No.303 Station number (node address) (CC-Link、DeviceNet、PROFIBUSDP-V1)

Displays the station number (node address) of the fieldbus currently set to the module.

Fieldbus type		
CC-Link	DeviceNet	PROFIBUSDP-V1
1~64	0~63	0~125

D-No.304 Communication speed Setting range: 0 to 4 (CC-Link、DeviceNet)

Displays the communication speed of the fieldbus set in the unit.

Fieldbus type	System parameter D-No.304				
	0	1	2	3	4
CC-Link	156kbps	625kbps	2.5Mbps	5Mbps	10Mbps
DeviceNet	125kbps	250kbps	500kbps	-	-

D-No.305 Occupied station number Setting range: 1 to 4 (CC-Link)

Displays the number of occupied stations of the fieldbus set in the module.

D-No.306 Expansion cyclic setting Setting range: 1, 2, 4, 8 (CC-Link)

Displays the expansion cyclic setting of the fieldbus set in the unit.

D-No.307 I/O setting byte count "PLC → MASTER spindle" [byte]

(Except for Normal IO and Extension IO)

Displays I/O setting byte count "PLC → MASTER spindle" of the fieldbus set in the unit.

D-No.308 I/O setting byte count "MASTER spindle → PLC"[byte] (Except for Normal IO and Extension IO)

Displays I/O setting byte count "MASTER spindle→ PLC" of the fieldbus set in the unit.

D-No.309 Message block bytes [byte] (Except for Normal IO and Extension IO)

Displays the number of message block bytes of the fieldbus that is set to the unit.

Fieldbus type				
CC-Link	DeviceNet	PROFIBUSDP-V1	PROFINET IO	Ethernet/IP
144bytes	250 bytes	64 bytes	250 bytes	250 bytes

D-No.310 Message setting byte count "PLC → MASTER spindle" [byte]

(Except for Normal IO and Extension IO)

Displays the message setting byte count "PLC → MASTER " of the fieldbus set in the unit.

D-No.311 Message setting byte count "MASTER spindle → PLC"[byte]

(Except for Normal IO and Extension IO)

Displays the message setting byte count "MASTER -> PLC" of the fieldbus set in the unit.

D-No.312 IP address (upper 6 digits)

D-No.313 IP address (lower 6 digits)

Setting range: 0 to 255 (PROFINET IO, Ethernet/IP)

This displays IP address of the fieldbus that is set for the unit.

D-No.314 subnet mask (6 upper digits)

D-No.315 subnet mask (lower 6 digits)

Setting range: 0 to 255 (PROFINET IO, Ethernet/IP)

This displays the subnet mask of the fieldbus that is set for the unit.

D-No.316 gateway (upper 6 digits)

D-No.317 gateway (lower 6 digits)

Setting range: 0 to 255 (PROFINET IO, Ethernet/IP)

Displays the gateway of the fieldbus set in the unit.

6-2-5. System Parameters (Extension unit 2 information)

Set with the parameter number **SYS** and data number **4 **** of the system parameter.

- **D-No.400** ... **CF storage capacity**
- **D-No.401** ... **Extension RS232-2 communication rate**
- **D-No.402** ... **Extension RS232-2 parity**
- **D-No.403** ... **Extension RS232-2 stop bit**
- **D-No.404** ... **Extension RS232-2 data length**
- **D-No.405** ... **Extension RS232-3 communication rate**
- **D-No.406** ... **Extension RS232-3 parity**
- **D-No.407** ... **Extension RS232-3 stop bit**
- **D-No.408** ... **Extension RS232-3 length**
- **D-No.409** ... **Read CF setting**

D-No.400 CF Card Storage Capacity [%]

Displays the available storage capacity of CF installed in Extension unit 2.

D-No.401 Extension RS232C-2 baud rate [bps]

Displays the communication rate of RS232C-2 interface of Extension unit 2.

D-No.402 Extension RS232C-2 parity

Displays the parity of RS232C-2 interface of Extension unit 2.

D-No.403 Extension RS232C-2 Stop Bit [bit]

Displays the stop bit of RS232C-2 interface of Extension unit 2.

D-No.404 Extension RS232C-2 data length [bit]

Displays the data length of RS232C-2 interface of Extension unit 2.

D-No.405 Extension RS232C-3 baud rate [bps]

Displays the communication rate of RS232C-3 interface of Extension unit 2.

D-No.406 Extension RS232C-3 parity

Displays the parity of RS232C-3 interface of Extension unit 2.

D-No.407 Extension RS232C-3 Stop Bit [bit]

Displays the stop bit of RS232C-3 interface of Extension unit 2.

D-No.408 Extension RS232C-3 data length [bit]

Displays the data length of RS232C-3 interface of Extension unit 2.

D-No.409 Read CF setting

Load the settings saved in CF card installed in Extension unit 2. For how to read the setting value from CF card, refer to PAGE 4-36 "Reading the setting value from the memory card".

6-2-6. System Parameters (Touch Panel)

Set with the parameter number **SYS** and data number **5 **** of the system parameter.

- **D-No.500, 501... IP address**
- **D-No.502... Touch Panel Function/Language Setting**
- **For adjusting D-No.503... manufacturers**

D-No.500 IP address (upper 6 digits)

D-No.501 IP address (lower 6 digits)

Setting range: 0 to 255

Displays IP address of the touch panel to be connected to the unit.

D-No.502 Touch Panel Function/Language Setting

Standard setting: 0 Setting range: 0 to 4

Change the touch panel function enable/disable and language setting.

- When not using the touch panel
Please set "0".
- Using the touch panel
Set "1 to 4" to match the language to be used.

D-No.502	0	1	2~4
Setting contents	Touch panel Disable function	Language: Japanese	Language: English



- D-No.500~502 is enabled by turning the control power supply off and on again after the change.
- To restart the control power supply, make sure that the "BYPASS" indicator on the upper part of the display turns off after the change.
If the control power is turned OFF while "BYPASS" is lit, the parameter may be initialized.

For adjusting D-No.503 manufacturers

Not used.

Chapter 7 Fastening Parameter



7

Chapter 7 Fastening Parameter

<Tightening parameter> * D-No disable-functions are displayed by fill patterns.

Item	D-No.	Contents	Torque	Angle	Plastic Angle	Pre-Load	Pin hole	Spin Check	Position
Tightening setting	000	Tightening method	0	1	2	3	4	5	6
	001	Tightening step	○	○	○	○	○	○	○
	002	Tightening options	○	○	○	○	○	○	○
	003	Output judgment item 1	○	○	○	○	○	○	○
	004	Output Judgment Item 2	○	○	○	○	○	○	○
	005	Output judgment item 3	○	○	○	○	○	○	○
	006	Operation after tightening	○	○	○	○	○	○	○
Torque [N · m]	100	CAL	○	○	○	○	○	○	○
	101	peak torque low limit	○	○	○	○	○	○	○
	102	Peak torque high limit	○	○	○	○	○	○	○
	103	Cut torque	○						
	104	Speed change torque	○	○	○	○	○	○	○
	107	Snug torque	○	○	○	○	○	○	○
	108	Snug Torque High Limit	○	○	○	○	○	○	○
	109	Motor torque limit	○	○	○	○	○	○	○
	111	Start torque cut high limit	○	○	○	○	○	○	○
	112	Corotation start torque		○	○				
	113	Corotation end torque		○	○				
	114	Grade detection torque			○				
	118	Final torque low limit	○	○	○	○	○	○	○
	119	Final torque high limit	○	○	○	○	○	○	○
	120	1P Torque	○	○	○	○	○	○	○
Angle [deg]	200	Final angle low limit	○	○	○	○	○	○	○
	201	Final angle high limit	○	○	○	○	○	○	○
	202	Cut angle		○	○		○		○
	204	Peak torque monitor judgment angle	○	○	○	○	○	○	○
	205	Angle change amount	○	○	○	○	○	○	○
	206	High limit angle change	○	○	○	○	○	○	○
	207	Low limit angle change	○	○	○	○	○	○	○
	215	Corotation judge angle		○	○				

Chapter 7 Fastening Parameter

Item	D-No.	Contents	Torque	Angle	Plastic Angle	Pre-Load	Pin hole	Spin Check	Position
Rate [N · m/deg] Time [sec]	300	Grade %			○				
	310	Initial rotation timer	○	○	○	○	○	○	○
	311	Initial trouble detection timer	○	○	○	○	○	○	○
	312	Cycle timer	○	○	○	○	○	○	○
	315	Cut hold time	○	○	○	○	○	○	○
	316	Start delay timer				○		○	
	317	SPIN measure timer						○	
	318	Acceleration time	○	○	○	○	○	○	○
	320	Speed down time under no load	○	○	○	○	○	○	○
	321	1P timer	○	○	○	○	○	○	○
	323	Reverse acceleration time	○	○	○	○	○	○	○
Speed [rpm]	400	Initial speed	○	○	○	○	○	○	○
	401	Free run speed	○	○	○	○	○	○	○
	402	Slow down speed	○	○	○	○	○	○	○
	403	Torque speed	○	○	○	○	○	○	○
	406	Manual reverse speed	○	○	○	○	○	○	○
	408	1P speed	○	○	○	○	○	○	○
Thread Number [rev] Current [A]	500	Free run thread number	○	○	○	○	○	○	○
	501	Start torque thread number	○	○	○	○	○	○	○
	503	Thread number low limit	○	○	○	○	○	○	○
	504	Thread number high limit	○	○	○	○	○	○	○
	521	Current low limit	○	○	○	○	○	○	○
	522	Current high limit	○	○	○	○	○	○	○

7-1. Tightening parameters (tightening settings)

Set with the parameter number P.01~P.32 and data number 0 ** of the tightening parameter.

● **D-No.000... tightening method**

- 0 : Torque method
- 1 : Angle method
- 2 : Plastic area angle method
- 3 : Preload
- 4 : Pin hole control
- 5 : Spin check
- 6 : Position Adjustment

● **D-No.001... tightening steps**

- 1 : 1 Step Tightening (Fixed)

● **D-No.002... tightening optional**

- *****1 : Tightening direction
- *****1* : Direction of rotation
- ***1** : (Spare)
- **1*** : (Spare)
- *1**** : Motor speed control
- 1***** : Corotation detection ON

● **D-No.003... Output judgment items 1**

- *****1 : Peak torque judgment
- *****1* : (Spare)
- ***1** : Final angle determination
- **1*** : Peak torque monitor judgment
- *1**** : (Spare)
- 1***** : (Spare)

● D-No.004... Output judgment items 2

- *****1 : Cycle judgment
- *****1* : Thread number judgment
- ***1** : Angle rate Judgment
- **1*** : Snug torque judgment
- *1**** : (Spare)
- 1***** : Start torque cut action

● D-No.005... Output judgment items 3

- *****1 : Initial trouble detection
- *****1* : (Spare)
- ***1** : (Spare)
- **1*** : (Spare)
- *1**** : (Spare)
- 1***** : (Spare)

● D-No.006... Operation after tightening

- *****1 : 1P Reverse
- *****1* : (Spare)
- ***1** : (Spare)
- **1*** : Servo lock



The unused set values are skipped on the display depending on the settings of D-No.003 [Output Judgment Item 1], D-No.004 [Output Judgment Item 2], D-No.005 [Output Judgment Item 3], and D-No.006 [Operation after tightening].

Chapter 7 Fastening Parameter

D-No.000 Tightening method

Set the method used for tightening.

0:Torque method 1:Angle method 2:Plastic area angle method 3:Preload
4:Pin hole control 5:Spin check 6:Position Adjustment

D-No.001 Tightening step

Set the number of steps to be used for tightening.

1:1 Step Tightening (Fixed)

D-No.002 Tightening options

Set the options used for tightening.

****1:Tightening direction

- Set the direction of tightening control. Tightening direction: 0 Loosening : 1

****1*:Direction of rotation

- For special tightening of left-hand thread, etc. Rotational CW (clockwise): 0 CCW (counterclockwise): 1

*1****:Motor speed control

- This is the setting for the step rotation speed switching.
 To control the step at a fixed speed, set a FIXED speed.
 To perform speed switching in the middle of a step, set AUTO.

1*****: Slip (corotation) detection ON

- When the peak torque value in the middle of tightening drops by the setting of the corotation detection torque, it is determined that the corotation has occurred, and the angle measurement starts.
 If the torque does not return to the angle set for the corotation detection angle, a corotation NOK is judged.



Note that when the setting of D-No.003 [Output Judgment Item 1] and D-No.004 [Output Judgment Item 2] is "0", the output judgment is not performed regardless of the high / low limit of the set value.

D-No.003 Output judgment item 1

0→1 Changeable only

****1:Peak torque judgment

- Determines if the peak torque during tightening operation is within the high / low limit range.

***1**:Final angle determination **0→1 Changeable only**

- Determines if the final angle at the end of tightening is within the high / low limit range.

The starting point of the angular measurement is D-No.107[SNUG torque.]

1*:Peak torque monitor judgment

- Monitors peak torque increase. If the angle set in D-No.204 [Peak Torque Monitor Judgment Angle] is rotated from the point where the peak torque value no longer rises, the torque down NOK occurs.

Chapter 7 Fastening Parameter

D-No.004 Output Judgment Item 2

Default: 000001

*****1:Time determination →**1 Changeable only**

- Determine whether the tightening time from the start of tightening to D-No.103 [Cutting Torque] or D-No.202 [Cutting Angle] is within the high and low limits.

****1*:Thread count judgment

- Determines whether the number of rotation threads from the start to the end of tightening is within the high / low limit range.

***1**:Angle Rate Judgment

- Set the angle change amount for each 0.1 secs tightening time and determine whether the change amount at the completion of tightening is within the high and low limit angle change amount.

1*:Snug torque judgment

- Determines if the torque is within the high limit when D-No.107[SNUG torque] is detected.

1*****:Start torque judgment

- Determines if the torque is within the high limit of D-No.111 [Starting Torque Cut High Limit] during D-No.501 [Starting Torque Threads] from the start of tightening.

D-No.005 Output judgment item 3

*****1:Initial trouble detection

- Determines if the torque does not exceed D-No.103 [Cut Torque] or D-No.202 [Cut Angle] during D-No.311 [Initial trouble detection timer] from the beginning of tightening.

D-No.006 Operation after tightening

****1: 1P Reverse

- After completing the tightening, perform the loosening operation with D-No.120[1P torque.]
1P reverse operates at D-No.408[1P speed] during D-No.321[1P timer].

1*: Servo lock

- Lock the motor to prevent the tool from rotating at the end of operation and fix the anvil. However, if backlash occurs in the gear, socket, etc., it rotates within the range including backlash.
- Servo-lock can be released by PLC I/O input signal "ON" of "BYPASS", "START", and "RESET", and "OFF" of "STOP" (1 second or more). In addition, it can be monitored from the tightening result-mode D-No.16 [Servo Lock Execution Flag] of the indicator.

7-2. Tightening parameters (torque)

Set with the parameter number P.01~P.32 and data number 1 ** of the tightening parameter.

- D-No.100 ... CAL
- D-No.101 ... Peak torque Low limit
- D-No.102 ... Peak torque High limit
- D-No.103 ... Cut torque
- D-No.104 ... Speed change torque
- D-No.107 ... Snug torque
- D-No.108 ... Snug Torque High Limit
- D-No.109 ... Motor torque control
- D-No.111 ... Start torque cut high limit
- D-No.112 ... Slip start torque
- D-No.113 ... Slip end torque
- D-No.114 ... Grade detection torque
- D-No.118 ... Final torque low limit
- D-No.119 ... Final torque high limit
- D-No.120 ... 1P Torque

Chapter 7 Fastening Parameter

D-No.100 CAL value[N · m]

Sets the full-scale torque value of the connected tool. When connecting a socket or an offset gear that applies a load to the tool anvil, or when the results of the tightening result indication and the tightening torque tester differ from the workpiece characteristics, the tightening torque can be corrected by CAL setting.

$$\text{CAL to be changed} = \frac{\text{Actual measured torque (test result)}}{\text{Target torque}} \times \text{CAL}$$

e.g. D-No.100[CAL]	:294.2N · m	}	Actual
D-No.103 [Target Torque]	:200.0N · m		
value (test result)	:210.0N · m		

$$210.0 \text{ N} \cdot \text{m} \div 200.0 \text{ N} \cdot \text{m} \times 294.2 \text{ N} \cdot \text{m} = 308.9 \text{ N} \cdot \text{m. Change CAL to } 308.9 \text{ N} \cdot \text{m.}$$



• When changing CAL, calculate the mean value as the actual measured torque from the tightening result data. (The number of samples of the tightening result data should be 20 times as a guideline.)

D-No.101 Peak torque low limit [N·m]

D-No.102 Peak torque high limit [N·m]

Set the high and low limits of the tightening torque.

If the tightening torque exceeds the peak torque high limit or does not reach the peak torque low limit, the spindle judgment is NOK.

D-No.103 Cutting Torque [N·m]

Set the target torque for tightening.

Valid only when D-No.000 [Tightening method] is "Torque method".

Example: When 10.0 is set, tightening is executed until the torque value becomes 10.0 [N·m].



[Precautions for tightening]

Avoid tightening more than the maximum instantaneous torque of the tool.

Also, use the tool so that the duty (the ratio of the tightening time to the stop time) is within the specification even when the torque is below the nominal torque. For details on how to calculate the duty, refer to PAGE 1-16 "How to calculate the duty".

D-No.104 Speed Change Torque [N·m]

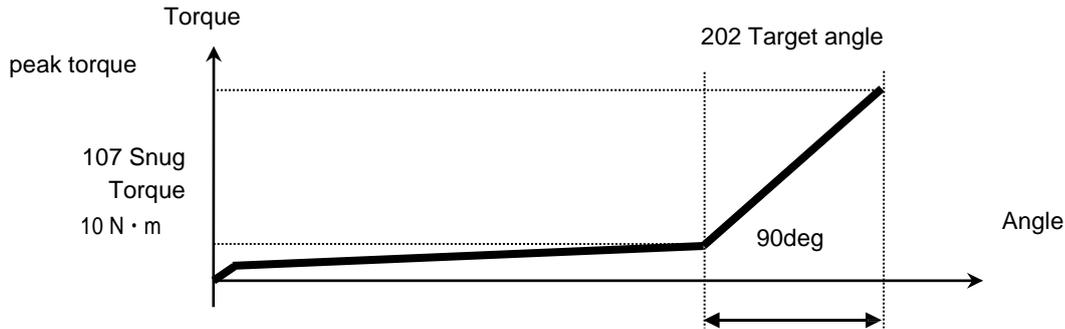
When "Auto" is selected for the motor speed control, set the torque value that switches from D-No.401 [Free Run Speed] to D-No.402 [Slow Speed]. However, even if speed change torque is not detected, if D-No.500 [Free Run Thread Number] is reached, it will switch to D-No.402 [Slow speed].

D-No.107 Snug Torque [N·m]

Starting torque for angle measurement. (This is the start point for angle measurement.)

When D-No.000 [Tightening Method] is "Angle Method", it is the starting point for tightening. Judgment is made by starting angle measurement from Snug torque.

(e.g., when the Snug torque is 10 N m and D-No.202 [Target Angle] is 90deg)



D-No.108 Snug torque high limit [N·m]

Set the high limit of the starting torque for angle measurement. If D-No.107 [snug torque] value exceeds the snug torque high limit, the spindle judgment is NOK.

D-No.109 Motor torque limit [N·m]

Initial value :9999.9

Utilize this setting when limiting the motor torque. D-No.109 [Motor torque limit] is exceeded and the motor does not apply torque.

Set a higher value than D-No.103 [Cut Torque].

D-No.111 Start torque cut upper limit [N·m]

Used for tightening to cut torque at the start of a step.

If the cut torque high limit is exceeded during D-No.501 [start torque thread number], the spindle judgment will be NOK.

D-No.112 Slip start torque [Nm]

D-No.113 Slip end torque [Nm]

When the torque value during angle tightening decreases by the setting of slip start torque, it is judged that slip has occurred, and angle measurement starts. If the torque does not return for the set amount of the slip end torque during the period up to the angle set for the slip detection angle, the slip NOK is judged.

D-No.114 Grade detection torque [N•m]

Set GRADE torque when G-Unit serves Plastic area Angle Method.

G-Unit works out GRADE ratio measuring torque for 8 deg (17 points) retroactive from GRADE detect torque.

D-No.118 Final torque low limit [N•m]**D-No.119 Final torque high limit [N•m]**

Set the high and low limits of torque at the end of tightening.

- When D-No.000 [Tightening method] is "Torque method", the value of final torque and peak torque will be equal. Therefore, set the same value as D-No.101 [Peak torque lower limit] and D-No.102 [Peak torque upper limit].
※D-No.006 [Operation after tightening]: Set a different value only when using "cut-hold".
- When D-No.000 [Tightening Method] is "Angle Method", set the high and low limits of the tightening torque when the target angle is reached. If the tightening torque exceeds the final torque high limit or falls below the final torque low limit, the spindle judgment will be NOK.

D-No.120 1P Torque [N•m]

D-No.006 [Operation after tightening]: Torque to be used in "1P reverse". Set the torque limit during 1P reverse.

7-3. Tightening parameters (angle)

Set with the parameter number P.01~P.32 and data number 2 ** of the tightening parameter.

- D-No.200 ... Final angle low limit
- D-No.201 ... Final angle high limit
- D-No.202 ... Cut angle
- D-No.204 ... Peak torque monitor judgment angle
- D-No.205 ... Angle change amount
- D-No.206 ... High limit angle change
- D-No.207 ... Low limit angle change
- D-No.215 ... Slip detect angle

Chapter 7 Fastening Parameter

D-No.200 Final Angle Low Limit [deg]**D-No.201 Final Angle high Limit [deg]**

Set the high and low limits of the output judgment angle. If the tightening angle exceeds the final angle high limit or does not reach the final angle low limit, the spindle judgment will be NOK.

D-No.202 Cut Angle [deg]

Set the angle value of the tightening target. D-No.000 [Tightening method] is used in "Angle method". Ex.: When 10.0 is set, tighten until the tightening angle value becomes 10.0[deg with D-No.107 [Snug torque] as 0.0[deg].

D-No.204 Peak Torque Monitor Detection Angle [deg]

If the motor rotates at the angle set in D-No.204 [Peak Torque Monitor Judgment Angle] from the point where the torque no longer rises from the peak, the torque down NOK will occur.

D-No.205 Angle rate [deg]

Utilize this setting when using angle rate judgment. If the angle change amount for each tightening time 0.1sec is set and the high limit angle change amount is exceeded at the end of tightening, or if the low limit angle change amount is not reached, the spindle judgment will be NOK.

D-No.206 Angle Rate High Limit [deg]**D-No.207 Angle Rate Low Limit [deg]**

Sets the high and low limits of angle rate judgment. Spindle judgment is NOK when the high limit angle change amount is exceeded or the low limit angle change amount is not reached at the end of tightening.

D-No.215 Slip detection angle [deg]

Monitors slip within this setting when slip detection is ON with D-No.002 tightening option.

When the peak torque value in the middle of tightening decreases by the setting of the slip start torque, it is judged that slip has occurred, and angle measurement starts.

If the torque does not recover within the angle set for the slip detection angle, it is judged as a slip NOK.

7-4. Tightening parameters (Rate/Time)

Set with the parameter number P.01~P.32 and data number 3 ** of the tightening parameter.

- D-No.300 ... Grade Ratio
- D-No.310 ... Initial rotate timer
- D-No.311 ... Initial trouble detect timer
- D-No.312 ... Cycle timer
- D-No.315 ... Cut hold time
- D-No.316 ... Start delay timer
- D-No.317 ... SPIN timer
- D-No.318 ... Acceleration time
- D-No.320 ... Slow speed time under no load
- D-No.321 ... 1P times
- D-No.323 ... Reverse acceleration time

D-No.300 Grade [%]

Sets the grade ratio when the plastic zone angle method is used.

The slope ratio is calculated by comparing the slope value of 8° (17 points) from the end of tightening with the slope value similarly calculated from the slope detection torque.

If the measured value exceeds the slope rate of the set value, the spindle-judgment is turned NOK.

D-No.310 Initial rotate timer [sec]

Sets the time to ease the torque spike at the start of tightening or for mating bolts and sockets, etc., when motor speed control "Auto" is selected. Execute D-No.400 [Initial speed] during the initial period or during D-No.500 [Free run thread number].

When "0.0" is set as the initial time, it will be executed from D-No.401 [Free run speed], but when "0.0" is set as

D-No.500 [Free run thread number], slow speed will be executed after executing initial speed for the initial time.

D-No.311 Default initial trouble detection timer [sec]

Set the low limit time from when tightening starts until D-No.103 [Cut Torque] or D-No.202 [Cut Angle] is reached. If the target torque (angle) is reached within the set time of the initial trouble detection timer, the initial trouble NOK is generated.

D-No.312 Cycle timer [sec]

Set the high limit time from when tightening starts until D-No.103 [Cut Torque] or D-No.202 [Cut Angle] is reached. If the cycle timer is exceeded while the cycle judgment is ON, the cycle NOK is entered.

D-No.315 Cut-hold time [sec]

After the target torque is reached, the torque keeping time keeps the torque at 95% of the target.

※Normally, set this to 0. An alarm ALARM.08-10 "Overload error" may occur.

D-No.316 Start delay timer [sec]

Used for preload and IDLE check. Within the set time, the error is not detected even if the high limit torque is exceeded. Used for stable torque monitoring by ignoring the load applied at the start of rotation.

D-No.317 Space Measurement Timer [sec]

Used in the idling check. The torque is monitored only for the time set by the idling timer. This function is effective for workpieces that may be backlash, etc., at the end of tightening.

Chapter 7 Fastening Parameter

D-No.318 Acceleration [msec] Standard setting : 500

Set the constant time for acceleration from zero speed to reaching the maximum rotational speed of the tool during tightening operation. Acceleration time is used in the following cases.

- From the beginning of tightening with PLC I/O input signal "START",
D-No.400 [Initial speed] or D-No.401 [Coasting speed] is reached
- Manual reverse rotation with PLC I/O input signal "REVERSE"

D-No.320 Slow speed time under no load [msec] Standard setting: 0

When D-No.500 [Free-run thread number] is reached during the tightening operation, set the time-constant time for the deceleration from the maximum rotational speed of the tool to reach the zero-speed.

D-No.321 1P timer [sec]

This is the duration used in "1P Reverse".
Executes 1P reverse operation during 1P timer.

D-No.322 Reverse acceleration [msec] Standard setting: 500

This is the duration used in "1P Reverse".
Set the constant-time to accelerate from zero-speed to 1P speed in 1P reverse operation.



CAUTION

- D-No.318 [Acceleration time], D-No.320 [No-load Deceleration time] and D-No.322 "Reverse acceleration time" should be used in the normal setting without any change, unless there is a special reason. If it is necessary to have any change, push [▲] and [▼] switches in 2 sec upon seeing [CHANGE NO] to replace it with [CHANGE YES] display. After changing to [CHANGE YES], push [◎] (SET), and setting change will be possible.

7-5. Tightening parameters (speed)

Set with the parameter number P.01~P.32 and data number 4 ** of the tightening parameter.

- D-No.400 ... Initial speed
- D-No.401 ... Free run speed
- D-No.402 ... Slow speed
- D-No.403 ... Torque speed
- D-No.406 ... Manual reverse speed
- D-No.408 ... 1P speed



• The minimum tool rotation and the maximum tool speed differ for each tool model. Refer to PAGE 1-12 [Tool types] for input possible range.

D-No.400 Initial speed [rpm]

Set the speed to ease the torque spike at the start of tightening and for mating the bolt and socket, etc. When Motor Speed Control "Auto" is selected, the Motor rotates at the initial speed during D-No.310 [Initial Time].

D-No.401 Free run speed [rpm]

Set the speed at which the motor rotates at high speed after D-No.310 [Initial time] ends.
When "Auto" motor speed control is selected, the motor rotates at a free run speed during D-No.500 [Free run thread number] or until D-No.104 [Slow Speed Starting Torque] is reached.

D-No.402 Slow speed [rpm]

Set the speed from D-No.401 [Free run speed] to D-No.404 [Torque speed] when motor speed control "Auto" is selected. Rotates at slow speed from D-No.500 [Free run thread number] until D-No.104 [Speed change torque] is detected.

※If D-No.104 [Speed Change Torque] is reached during D-No.401 [Free Run Speed] operation, the slow speed is not used and it is switched to D-No.403 [Torque Speed].

D-No.403 Torque Speed [rpm]

Set the speed after the speed change torque.
The speed after D-No.104 [Speed Change Torque] is detected.

D-No.406 Manual reverse speed [rpm]

Set the speed during reverse operation.
This is the rate at which the switch reverses while REV. is pressed.
This is the speed during manual reverse rotation with PLC I/O input signal "REVERSE".

D-No.408 1P Speed [rpm]

Set the speed during 1P reverse operation.

7-6. Tightening parameters (number of threads/current)

Set with the parameter number P.01~P.32 and data number 5 ** of the tightening parameter.

- D-No.500 ... Free run thread number
- D-No.501 ... Start torque thread number
- D-No.503 ... Thread number low limit
- D-No.504 ... Thread number high limit
- D-No.521 ... Current low limit
- D-No.522 ... Current high limit

Chapter 7 Fastening Parameter

D-No.500 Free run thread number [rev.]

When "Auto" motor speed control is selected, set the number of threads to be switched from the start of tightening to D-No.402 [slow Speed]. However, if D-No.104 [Speed Change Torque] is detected before the free run thread number is reached, it will switch to D-No.403 [Torque Speed].

In addition, when "0.0" is set to D-No.500 [Free run thread number], the motor rotates at the deceleration speed after the initial speed is executed during D-No.310 [Initial time].

D-No.501 Start Torque Thread Count [rev.]

Number of threads used in "judgment of tightening torque".

When starting torque judgment "ON" is selected, if the starting torque high limit is exceeded within the setting of the start torque thread count, the start torque upper limit NOK is set.

D-No.503 thread number low limit [rev.]

D-No.504 thread number high limit [rev.]

Set the high and low limits of the number of turned threads from the start of tightening to the end of tightening. If the number of screw threads rotation at completion of tightening exceeds the high limit of the number of screw threads, or the low limit of the number of screw threads rotated does not reach, spindle judgment is NOK.

D-No.521 Current low limit [A]

D-No.522 Current high limit [A]

Set from the values listed below according to the combination of the unit type and tool type used.

Unit type	Tool model	D-No.521 Current lower limit [A]	D-No.522 Current upper limit [A]
UEC-G024	UNR-G613-***	0.0	24.0
UEC-G060	UNR-G640-***	0.0	60.0
UEC-G120	UNR-G100-***	0.0	120.0

If D-No.521 [Current lower limit] and D-No.522 [Current upper limit] are exceeded, the unit outputs spindle judgment as OK, but in the output signal of PLC, "Main: Abnormality Current Value Warning", "Spindle: Current Low Limit Warning, Current Value High Limit Warning, Current Value Abnormal Warning" are output as ON. Refer to "PAGE 4-6"PLC Output Layout" for the output signal.

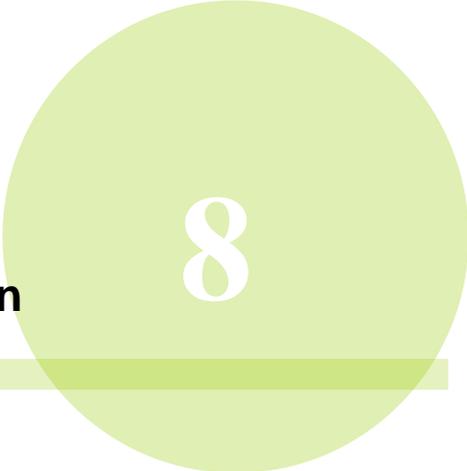
7-7. Tightening parameter setting sheet

D-No	Contents	Parameter number							
000	Tightening method								
001	Tightening step								
002	Tightening options								
003	Output judgment item 1								
004	Output Judgment Item 2								
005	Output judgment item 3								
006	Operation after tightening								
100	CAL								
101	Peak torque Low limit								
102	Peak torque high limit								
103	Cut torque								
104	Speed change torque								
107	Snug torque								
108	Snug Torque Limit								
109	Motor torque limit								
111	Start torque cut high limit								
112	Slip start torque								
113	Slip end torque								
114	Grade detection torque								
118	Final torque low limit								
119	Final torque high limit								
120	1P Torque								
200	Final angle low limit								
201	Final angle high limit								
202	Cut angle								
204	Peak torque monitor judgment angle								
205	Angle change amount								
206	High limit angle change								
207	Low limit angle change								
215	Slip judgment angle								

Chapter 7 Fastening Parameter

D-No	Contents	Parameter number							
300	Grade Rate								
310	Initial rotation timer								
311	Initial trouble detection timer								
312	Cycle timer								
315	Cut hold time								
316	Start delay timer								
317	Spin timer								
318	Acceleration time								
320	Slow speed time at no load								
321	1P timer								
323	Reverse acceleration time								
400	Initial speed								
401	Free run speed								
402	Slow speed								
403	Torque speed								
406	Manual reverse speed								
408	1P speed								
500	Free run thread number								
501	Start torque thread number								
503	Thread number low limit								
504	Thread number high limit								
521	Current low limit								
522	Current high limit								

Chapter 8 Maintenance and Inspection



8

Regularly inspect the UNR-G system to ensure that it is used in the best condition.

8-1. Inspection item

Perform periodic inspections based on the following items to ensure proper operation of the UNR-G series system over a long period of time.

As a guideline, periodic maintenance should be performed at least once a year, though this may vary depending on the installation environment and operating conditions of the module.

Periodic torque accuracy inspection and calibration inspection for accurate torque management in one year should be recommended.

Make sure that the power supply can be shut off in the event of an error before carrying out inspection.

8-1-1. Tool (motor)

The tool is subjected to a strong torque every tightening, which causes mechanical deterioration and failure.

- Is the ambient environment within the range of the environmental conditions described in Safety Precautions?
- Check that the tightening duty is within the specified range. (See PAGE 1-16.)
(The motor is not heated by excessive duty or torque.)
- Is there any abnormal noise or self-vibration when the tool rotates?
- Is there any dirt or foreign matter on the tool?
- Check that the tool is securely fixed, and that the mounting screws are not loose.
- Is the tool in contact with another object, or is there any excessive force other than in the tightening direction?

8-1-2. Cable

The cable connects the unit and the tool. Check carefully if there are moving parts around the cable.

- Is the cable in contact with the moving part or is excessive force applied?
- Are there any scratches on the cable that may cause disconnection?
- Is there any dirt, foreign matter, or oil on the cable?
- Is there any deformation of the sheath due to heat generation or heat generation in the cable?
- Is there any excessive way to fix the cables when installing?
- Check for loose mounting screws.
- Are the cable connectors between the tools securely inserted?

8-1-3. G-Unit

The module of the UNR-G series system is composed of semiconductor elements, and high reliability is guaranteed. However, depending on the surrounding environment and operating conditions, deterioration of the elements may occur. Periodic inspection is required.

- Is an ALARM (error) displayed on the unit indicator?
- Check that the power supply voltage is within the specified range. (Including tightening operation · PAGE 1-14)
- Is there a momentary power loss or a sudden voltage change?
- Are the surrounding environment (or the environment inside the enclosure) within the environmental conditions listed in Safety Precautions?
- Is there any dirt, foreign matter, or oil on the unit?
- Check that the unit is securely fixed and that there is no play or looseness in the mounting screws.
- Is there any abnormal heat generation in the unit?
- Is the display of the unit mounted securely?

8-2. Inspection items

This section describes the simple inspection method of the system.

8-2-1. Torque transducer

The torque transducer of the UNR-G series system stores the calibrated value at the time of manufacture in the preamplifier, and compares and judges the calibrated value with the current value for each tightening. It is maintenance-free, but it can be confirmed by the following method.

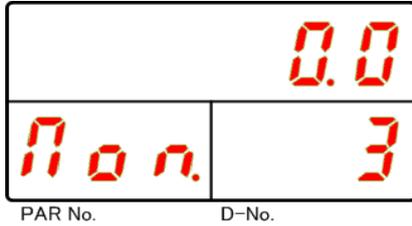
● Inspection method using the display of the unit

1. Perform this operation with PLC I/O output-signal "READY" set to "ON" without starting by external control.
2. With RESET switch on the unit display pressed, confirm that the value shown at the top row of the display is near "0".
3. Confirm that JUDGE LED lights in green at the same time as step 2.
4. Confirm that the torque value at the upper stage of the display is the full-scale torque value while pressing CAL switch on the unit display.
5. Confirm that JUDGE LED lights in green at the same time as step 4. ZERO and CAL voltages can be checked by the following methods.
 1. The [◀] and [▶] switches on the unit display indicate the real-time mode (see PAGE 5-8).
 2. Use the [▲] and [▼] switches on the unit display to switch D-No. display to "1" and display the torque/voltage display. The displayed value is the present value of ZERO.
 3. Holding down CAL button displays CAL voltage value at the top row of the display.

8-2-2. Resolver

You can check the resolver by following the steps below.

1. Perform this operation with PLC I/O output-signal "READY" set to "ON" without starting by external control.
2. The [◀] and [▶] switches on the unit display indicate the real-time mode (see PAGE 5-8).
3. Use the [▲] and [▼] switches on the unit display to switch D-No. display to "3" and select the rotational angle display.



4. Check that turning the tool tip (socket) in the tightening direction increases the angle value in the upper part of the display and turning it in the anti-tightening direction decreases the angle value. Also, confirm that the rotation angle and the value of the display match.

8-2-3. Motor

To check the motor, measure the resistance of the winding and check the insulation resistance.



Turn OFF the power supply of the unit and the tooling equipment before measuring the resistor.

CAUTION

1. Unplug the motor cable connector.
2. Check if the resistance is within $\pm 10\%$ by measuring the resistance between the windings. (Measurement should be performed with a milliohm tester)
3. Measure the insulation resistance between each phase and frame.

Specified value of line resistance		Pin assignment
Motor Type	Resistance value [Ω]	
UNR-G613-***	2.6	
UNR-G640-***	0.5	
-	-	

Insulation resistance: 500V with mega-ohm meter 50 M Ω or more

8-3. Replacement procedure

8-3-1. Unit

Replacement of the unit cannot partially replace the inside of the unit. Replace with a unit of the same model.

Unit Replacement Procedure

1. Turn OFF the power to the unit and the tooling equipment.
2. Remove the cable etc. connected to the unit to replace the unit.
3. Refer to PAGE 1-7 "System Configuration" to connect the cables.
4. Set the spindle number and communication spindle of the unit.

(To set the spindle number and communication spindle, set PAGE 2-15 "Setting the Unit Switch" and 5. Tightening parameters. For more information on the settings, refer to PAGE 6-3 "List Parameters".



The tightening parameter can be set from the display of the unit, but it takes time to set. Therefore, the recovery time can be shortened by writing the set value to the unit from the setting file of the tightening parameter using the G type user console.

In addition, the following setting items must be set by manual operation.

- Spindle No. switch (SPINDLE ADDRESS)
- Special function SW1 switchNo.8 "Communication spindle specifications"
- PAR No."SYS and D-No."003: [System-Display]

8-3-2. Tools

Tools are optimally adjusted with an integrated assembly of torque transducers, gears, and motor resolvers. Replace each tool when replacing the assembly.

If the tool unit is of the same type, simply remove the existing product and install a new tool. Be sure to turn OFF the control power of the unit before replacing the tool.

When replacing a tool with a different tool model, you may also need to replace the G-unit. Refer to PAGE 1-12 "Tool Model".

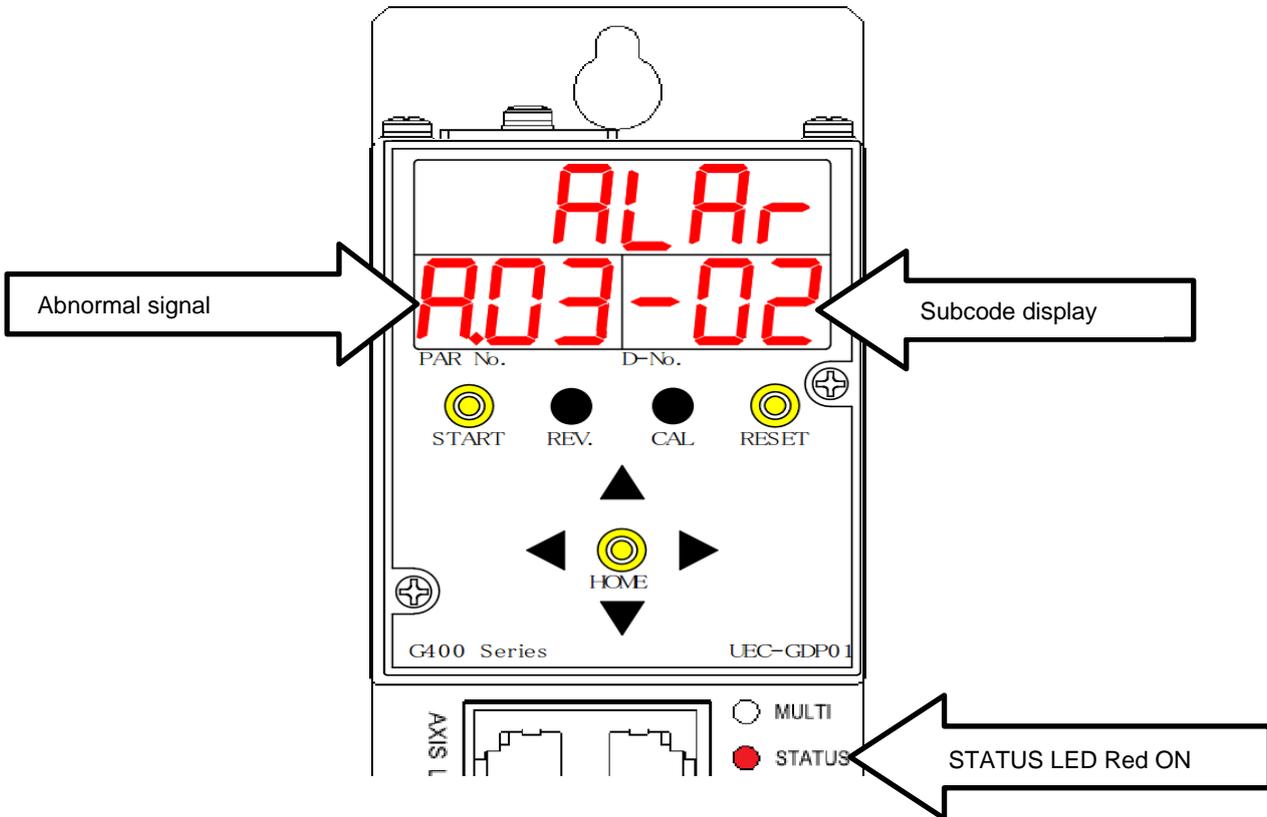
Chapter 9 Troubleshooting



9

9-1. Display of alarm signals

If an error occurs in the tool or unit, STATUS LED of the G-unit lights up in red and the alarm number is displayed on PAR No. of the display unit and the sub-code is displayed on D-No..



Alarm No. on PAR No. indication	Alarm category
A.01	Torque Transducer Error
A.03	Preamplifier error
A.04	System memory error
A.05	Servo response error
A.06	Servo type error
A.08	Servo amplifier error
A.09	Setup data error
A.10	Main signal error

9-2. Description of alarm/cause and remedy



- When an alarm occurs, eliminate the cause and ensure safety before restarting operation.
- If a fatal error occurs in the unit, the alarm number is not displayed and CONTROL POWER LED lights in red. Please contact us. (Refer to PAGE 1-19 for the indication of LED)

Contact us if the alarm signal cannot be cleared by each action or if there is a possibility of damage or failure of the cable/tool/unit.

9-2-1. A.01: Torque transducer error

Display	Contents / Cause	Procedure
A.01-01	ZERO master failure An error occurred when checking ZERO voltage of the torque transducer after the control power was turned on.	1. Check the tool cable. 2. Check that the tool is mounted securely. 3. Please check ZERO and CAL voltages. (Refer to "How to check: PAGE 3-8 ") 4. Check the drive load of the tool accessory tool (e.g. bracket). 5. Check the alignment of tool and workpiece. 6. Wait at least 5 minutes after the power is turned OFF. Turn on the power again. 7. G-Tool and the cable breakage or failure is suspected. 8. Replace the tool. ※"A.01-03:ZERO check error" If socket gets stuck and outputs torque at [A.01-03: ZERO Check error], drive it CCW to open or wait for a while to expect natural relax.
A.01-02	CAL master failure An error occurred when checking CAL voltage of the torque transducer after the control power was turned on.	
A.01-03	ZERO check error An error occurred when checking ZERO voltage of the torque transducer at the beginning of tightening.	
A.01-04	CAL check error This is a self-check. An error occurred when checking CAL voltage of the torque transducer at the beginning of tightening.	
A.01-05	CAL judgment failure An error occurred when checking CAL voltage of the torque transducer at the beginning of tightening without the self-check.	
A.01-06	Operation at ZERO Failure The tightening operation was started when an error occurred in ZERO voltage check of the torque transducer when the control power was turned on.	
A.01-07	Operation in case of CAL failure The tightening operation was started when an error occurred in CAL voltage check of the torque transducer after the control power was turned on.	

9-2-2. A.03: Preamplifier error

Display	Contents / Cause	Procedure
A.03-01	ID data error in preamplifier There is a problem with ID in the preamplifier.	1. Check the tool cable. 2. The tool cable or tool may be damaged or malfunctioned.
A.03-02	Tool type error System Parameters D-No.100 [Connection tool number] and D-No.200 [Unit setting tool number] are different.	1. Set the tool-number D-No.100 and D-No.200 of the system parameter (PAR No.SYS) to the same value. (See PAGE 1-12: Tool format list.) 2. The tool cable or tool may be damaged or malfunctioned.
A.03-03	Tool not connected The tool is not connected.	1. Check the tool cable. 2. The tool cable or tool may be damaged or malfunctioned.

9-2-3. A.04: System memory error

Display	Contents / Cause	Procedure
A.04-01	Flash ROM write failure An error occurred while writing the flash ROM of the unit.	1. After turning OFF the control power supply, wait for at least 5 minutes before turning it on again. 2. The unit may be damaged or malfunctioned.
A.04-02	Flash ROM read failure An error occurred while reading the flash ROM of the unit.	
A.04-03	Amplifier-side flash ROM failure An error occurred while reading or writing the flash ROM of the amplifier.	
A.04-04	Write tightening history error An error occurred while writing SDRAM save.	
A.04-05	Fastening history reading error An error occurred while loading SDRAM save.	
A.04-06	RTC write failure Failed to write configuration to RTC.	
A.04-07	RTC read failure Failed to read configuration to RTC.	

9-2-4. A.05: Servo-response error

Display	Contents / Cause	Procedure
A.05-01	<p>Servo response error</p> <p>The position pulse from the resolver that indicates tool motion has not changed. Or, the speed command on the amplifier side does not respond.</p>	<ol style="list-style-type: none"> 1. Check tool cables and tools. 2. Replace the cable. 3. Replace the tool. 4. The tool cable or tool may be damaged or malfunctioned. 5. Limited by D-No.523 [Current Limit].

9-2-5. A.06: Servo type error

Display	Contents / Cause	Procedure
A.06-01	<p>Servo type mismatch</p> <p>The motor type and servo amplifier type do not match.</p>	<ol style="list-style-type: none"> 1. Set the tool-number D-No.100 and D-No.200 of the system parameter (PAR No.SYS) to the same value. (See PAGE 1-12: Tool format list.) 2. There is a possibility of damage or failure of the tool or the unit.

9-2-6. A.08: servo amplifier error

Display	Contents / Cause	Procedure
A.08-01	<p>Driver overheat error</p> <p>The servo drive circuit is not working properly due to overheating of the unit.</p>	<ol style="list-style-type: none"> 1. Check that the ambient temperature is 0 to 45°C. 2. Check if the duty is within the specified range. (Calculation method: see PAGE 1-16) 3. After turning OFF the control power supply, wait for at least 5 minutes before turning it on again.
A.08-02	<p>Watchdog timer failures</p> <p>The G-unit's watchdog timer function is not working properly.</p>	The unit may be damaged or malfunctioned.
A.08-04	<p>Overcurrent</p> <p>The unit is overcurrent.</p>	<ol style="list-style-type: none"> 1. Check the speed setting value. 2. Check the tool cable. 3. There is a possibility of damage or failure of the tool cable or the unit.
A.08-05	<p>Overvoltage error</p> <p>The unit is overvoltage.</p>	<ol style="list-style-type: none"> 1. Check the speed setting value. 2. Check that the power supply of the drive power supply is AC200~230V. 3. The unit may be damaged or malfunctioned.
A.08-06	<p>Abnormal power voltage</p> <ol style="list-style-type: none"> 1. The internal power circuit of the unit is not working properly. 2. The power supply voltage is not within the standard. 	<ol style="list-style-type: none"> 1. Check the wiring of the control power supply. 2. This occurs when an instantaneous power failure or the like occurs. Check the power supply capacity.
A.08-07	<p>Control power voltage drop</p> <p>The power supply of the control power supply is 18V~17V.</p>	

A.08: Servo amplifier error (continued)

Display	Contents / Cause	Procedure
A.08-08	Overspeed The unit cannot control motor rotation.	<ol style="list-style-type: none"> 1. Check the tool cable. 2. The tool cable or tool may be damaged or malfunctioned.
A.08-10	Trouble overload Motor load factor has exceeded 100%. (1 Seconds)	<ol style="list-style-type: none"> 1. Check the workpiece. 2. Check if the duty is within the specified range. (Calculation method: see PAGE 1-16) 3. Increase the rotation speed of the tightening, Reduce the cycle time. 4. Increase the interval until the next operation.
A.08-11	Resolver error The unit cannot recognize the resolver.	<ol style="list-style-type: none"> 1. Check the tool cable. 2. The tool cable or tool may be damaged or malfunctioned.
A.08-12	System error An error occurred in the unit.	The unit may be damaged or malfunctioned.
A.08-14	Motor parameter error The internal parameters of the unit are abnormal.	
A.08-15	System error An error occurred in the unit.	
A.08-16	Drive power supply error The drive power supply is not connected. Or, the driving power supply was turned OFF during the tightening operation.	<ol style="list-style-type: none"> 1. Check the drive power cable. 2. Check that the power supply of the drive power supply is AC200~230V. 3. This occurs when an instantaneous power failure or the like occurs. Check the power supply capacity.
A.08-17	System error An error occurred in the unit.	The unit may be damaged or malfunctioned.
A.08-20	Current sensor error An error occurred in the unit.	The unit may be damaged or malfunctioned.

9-2-7. A.09: setup data error

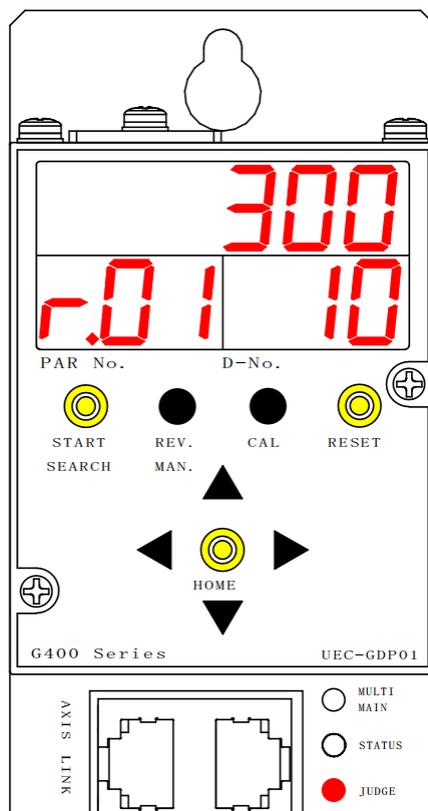
Display	Contents / Cause	Procedure
A.09-02	Torque setting value error Torque setting value is not set.	If the following setting values are set to 0 or a value outside the range, set the correct value. <ul style="list-style-type: none"> • D-No.100 [Full scale torque] • D-No.102 [Peak torque high limit] • D-No.103 [Cut Torque]*1 ※1:When the tightening method is "Torque method"
A.09-03	Angle setting value error The angle setting value is not set.	If the following setting values are set to 0 or a value outside the range, set the correct value. <ul style="list-style-type: none"> • D-No.201 [Final Angle High Limit] • D-No.202 [CUT ANGLE] *2 ※2:When the tightening method is "angle method"
A.09-04	Time setting value error The time setting has not been set.	If the following setting values are set to 0 or a value outside the range, set the correct value. <ul style="list-style-type: none"> • D-No.312 [Cycle timer]
A.09-05	Speed setting value error The speed setting value is not set.	If the following setting values are set to 0 or a value outside the range, set the correct value. <ul style="list-style-type: none"> • D-No.400 [Initial Speed] • D-No.401 [Free Run speed] • D-No.402 [Slow Speed] • D-No.403 [Torque Speed] • D-No.408 [1P speed]
A.09-08	Reverse torque error The torque has exceeded D-No.110 [Reverse torque high limit] during reverse operation.	<ol style="list-style-type: none"> 1. Check the drive load during reverse rotation. 2. Check the output spindle of the tool for any stress. 3. There may be possible damage or failure of the tool or unit.
A.09-09	Spindle No. setting value error <ol style="list-style-type: none"> 1. The spindle number of the unit is 0 or 33 to 99. 2. 2~32 ON is set to SW1:8 of the spindle. 	<ol style="list-style-type: none"> 1. After powering OFF the unit, remove the indicator on the front of the unit and check the rotary switch on SPINDLE ADDRESS. (Refer to PAGE 2-15 for the setting procedure.) 2. After turning OFF the power to the unit, remove the indicator on the front of the unit and check the setting of the unit front SW1:8 number. (Refer to PAGE 2-16 for the setting procedure.)

9-2-8. A.10: Main-signal error

Display	Contents / Cause	Procedure
A.10-01	Work select error Selected at the start of tightening operation, an error was detected in the work number.	1. Check PLC I/O INPUT WORK SELECT. 2. RS232C Input Formats: Check the sequencing selection settings.
A.10-02	Mode setting error An error is detected in the mode setting when mode operation starts or during operation.	Review the mode setting.
A.10-03	Execution step No. error No response from the unit during tightening operation.	Contact us if abnormalities occur frequently.
A.10-04	Parameter setting error The set parameter number is invalid.	If the setting is written again from the user console, create the mode setting again.
A.10-05	Spindle control signal error Parameter or step number out of range	Check PLC I/O input-signal WORK SELECT and tightening settings.
A.10-06	Connected spindle mismatch error An error was detected in the sequence setting at the start of sequence operation or during operation.	From the UNR-G series user console, check the tightening sequence setting. It occurs when the number of set spindles differ from the number of connected ones.
A.10-07	Drive power supply OFF error The drive power of the spindle (BYPASS spindle is excluded) set as the spindle No. is OFF.	1. Check the drive power cable. 2. Check that the power supply of the drive power supply is AC200~230V. 3. This occurs when an instantaneous power failure or the like occurs. Check the power supply capacity.
A.10-08	Inter-spindle communication error An error was detected from the data sent from SLAVE spindle.	Contact us if abnormalities occur frequently.
A.10-09	ANYBUS setting error ANYBUS setting does not match with the module installed in the controller.	Review the setting.
A.10-10	The parameter number mismatch operation instruction and operation result are mismatched.	Contact us if abnormalities occur frequently.
A.10-11	Inter-spindle communication error Connection retry high limit error.	Check the area around the spindle cable and spindle communication connector.

9-3. Spindle Judgment: Check the content of NOK

If a value exceeding (below) the high / low limit value of the tightening parameter is detected during the tightening operation, the spindle judgment will be turned NOK and JUDGE LED of the unit will be lit red. In addition, the reason for the first detected tightening stop can be checked from the display.



- Check tightening parameters (sequence)

Step 1. After tightening, PAR No. indicator on the unit indicator shows "r.**" as shown above, and the number displayed on ** shows the last parameter number.

(The parameter number is not updated unless the tightening operation is performed.)

Step 2. To check the operating sequence number, press the [▲] and [▼] switches on the display. D-No. display: Select "33" and the number displayed in "****" of "S.**" on the upper display becomes the operating sequence number.

(Sequencing No. is displayed only for MASTER spindle)

- Check the reason for stopping tightening

Step 1. After completing the tightening, press the [▲] and [▼] switches on the display to select D-No. display section: "09." The reason for stopping the spindle is indicated on the upper display.

Step 2. When Spindle judgment is "NOK", D-No. of the parameter setting that was first stopped is displayed on D-No. indicator: "10" as shown in the figure above. In addition, "H/L" is displayed at the leading digit of the upper part of the indicator for the items where the tightening NG is detected.

D-No. display: Refer to PAGE 7-1 for the upper display value indicated by "10" and PAGE 5-10 for the content of the items indicated after completion of tightening.

9-4. Ethernet communication

If your PC cannot communicate Ethernet with the user console, refer to the table below.

Item	Measures and confirmation details	Reference section
Is there any mistake in TCP/IP setting?	Check TCP/IP setting.	PAGE 3-16
Is SLAVE spindle set to PC and the connected unit?	Change the communication spindle setting.	PAGE 2-16
Spindle communication connector is IN/OUT (AXIS IN · AXIS OUT) connected?	Connect it to Ethernet connector.	PAGE 1-17
Is PC communication cable OK?	<ul style="list-style-type: none"> · When connecting PC and the unit without a hub, use a cross cable. · When connecting via a hub, use a straight cable. · Select a LAN cable of Category 5e or higher. 	PAGE 3-15
Can PC to be used for Ethernet communication be networked?	<ul style="list-style-type: none"> · Configure PC settings to enable networking, or prepare a different PC. 	-
Confirmation at command prompt	<ul style="list-style-type: none"> · You can check Ethernet settings of PC at the command prompt. 	Next section

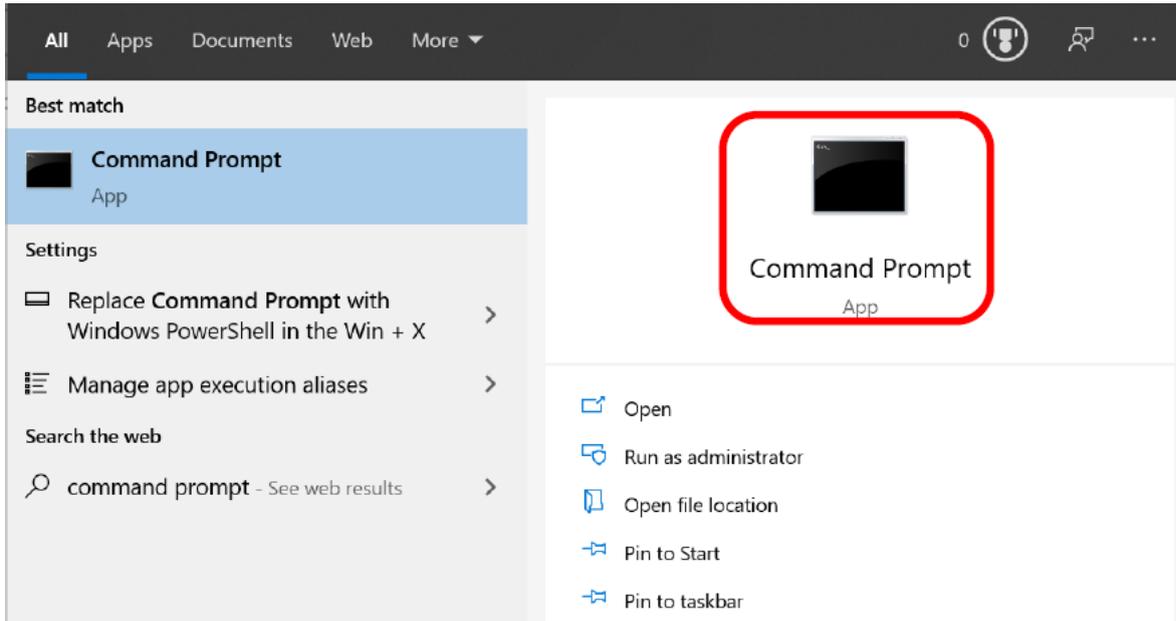
If there is no problem with the communication and the data is not output normally, refer to the following table and take corrective action.

Item	Measures and confirmation details	Reference section
No data is output.	<ul style="list-style-type: none"> · Check that the protocol to be output is set. 	Next section
Part of the data does not output	<ul style="list-style-type: none"> · Do not start the tightening operation with an unset sequence number. · If an incorrect unit spindle number is set, the tightening result will not be output. Check the sequence setting again and set the correct unit spindle number. 	

● Checking using the command prompt (for Windows 10)

Step 1. Connect the G-unit and PC with PC communication cable.

Step 2. Search and select "Command Prompt" from the search next to the Start menu.



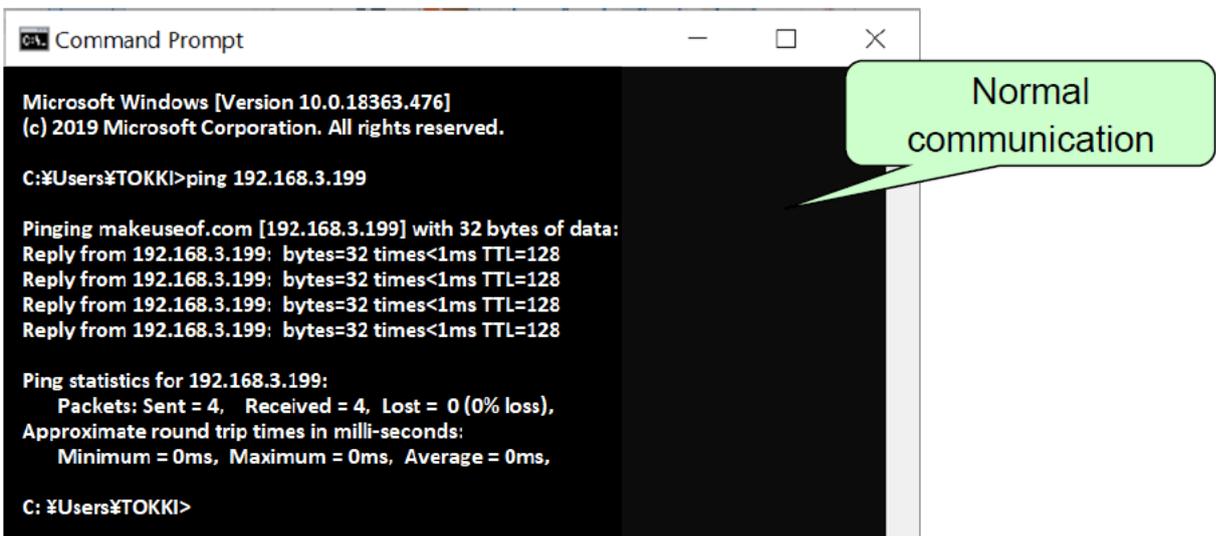
Step 3. When the command prompt window appears, enter ipconfig and press Enter to view the current PC settings. If the displayed settings differ, check PC settings again.



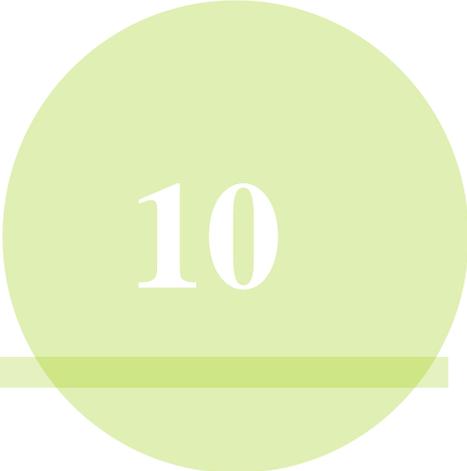
Step 4. If there is a successful reply as shown in the above window and the connection fails in the UNR-G series user console, start the command prompt again and enter ping 192.168.3.199 or ping 192.168.3.198.

※After ping, enter IP of the unit or PC.

When communication between the unit and PC can be performed normally, the following window appears.



Chapter 10 Warranty and Service



10

10-1. Warranty

The warranty period and the scope of this product are as follows:

10-1-1. Warranty Period

The warranty period for this product shall be one year after the product is purchased or delivered to the specified location, or the tightening cycle count shall be within 1 million.

10-1-2. Guarantee range

In the event of failure within the warranty period under normal use conditions in accordance with this manual, the product will be repaired or replaced free of charge. However, in the following cases, the warranty will be charged even if the warranty period is still effective.

1. If the cause is not indicated in the Operation Manual, or the condition, environment or handling.
2. If the product is modified or repaired by the user
3. Case caused by equipment other than this product
4. If the product is used outside the specifications
5. Case caused by fire, earthquake, wind, flood, salt, or other natural disaster
6. If the product falls or is damaged during transportation after it is purchased or delivered to the specified location.
7. When trouble is caused by entry of water, oil, metal strip, and any other foreign substance.

Note that the warranty only covers our product only, and that any secondary loss arising from a breakdown of this product is excluded from the scope of warranty.

10-2. Inquiries

Contact your nearest sales office.