F-TYPE NUTRUNNER SYSTEM

SPINDLE UNIT

UEC-F024, UEC-F040, F120

INSTRUCTION MANUAL

2.1 EDITION 2002 OCTOBER

URYU SEISAKU, LTD.

Revision History

Print date	Instruction manual number	Contents of revision

===================CONTENTS=========================

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====================CONTENTS====================

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Chapter 1 Outline

1-1   How to use this instruction manual

This instruction manual will tell you system structure, specifications and the handling etc of F-type nutrunner spindle unit but is not for F-type nutrunner main unit.   (Refer   to   F-type nutrunner system main unit instruction manual.)

This instruction manual is consisting of the following order.

Chapter	Title	Contents
1	Outline	F-type nutrunner spindle unit functions and instructions what should be followed
2	Specifications	Basic specifications of F-type nutrunner spindle unit
3	Parts names	Parts names of spindle unit, its tools and the functions
4	Installation and wiring	Installation and wiring of spindle unit
5	Switching ON and trial operation	Confirmation points prior to switching ON and trial operation procedure
6	Operation	Contents of panel display and how to determine setting values
7	Trouble shooting	Alarm display while in operation and the trouble shooting

1-2   Summary of functions

F-type nutrunner system is the multi-spindle nutrunner system which we developed for easy operation of all tightening applications.

Compact design

Small and compact, only 60mm width (F024) spindle unit despite both power unit and servo amplifier built-in design, that has been brought due to employment of transister-less and miniturize technology. Our rear side mounting method adoption has eliminated back door maintenance space earlier necessary when control box installation was made.

Screw tightening

This is not only for torque control method screw tightnening but also for angle monitoring. Spindles' synchronize setting will enable plural spindles to give synchronized tightening.

64 kinds setting values memory retention

Pursuit of degitalization has made less volume possible. You can input 64 kinds tightening setting values into spindle units via front panel (option). We have realized maintenance free due to no back up batteries used.

Motor

Resolver built-in motors can be used under tough environment.

Pre-amplifier

Loading module-processed high precision torque signal amplifier and the transmission functions, we have provided higher quality assurance and securities.

AMP

Adopting IGBT (ISOLATION. GATE. BIPOLAR, TRANSISTER), we have made motor control part compact and reignforced protection circuit for credibility improvement.

Zero Cal check functions

Torque sensor calibration check at tightening start stage will give function check with unit cable inclusive, and prevent bolt nut abnormal tightening and tool's break down.

Abnormal status display

When alarm takes the place, spindle unit will display alarm numbers in front panel (option).

1-3   Instructions for opeation

Follow the below-metioned instructions in order to use F-type nutrunner system under the best conditions.

Assembly

When tightening tools generate strong trque, whose equivalent force is given to tools' fixing part.   For fixing tools, therefore, fix tools to the specified place by specified screws.   Do not give tools strong vibration or excessive force since tools are consisting of mechanical parts and electric parts with torque sensor inclusive.   Assemble spindle unit by specified screws firmly in order not to create physical drops or error operation.

Tightening

Do not use tools at torque greater than maximum torque output.   Use tools within duty (ratio running time and stop time) even if tightening torque is smaller than maximum output.

Cable connections

Use power cord conform to specifications for power supply to spindle unit.   Make exact connections of tools and spindle units whose numbers agree each other.

Never make common use of (FG) ground terminal and high voltage circuit.   Give separate grouding connections for these terminals.

Installation environment

Mount spindle unit in a dust free control box.   Avoid spindle unit mounting in the below-mentioned places where error operation or breakdown can be caused, or give compulsory cooling equipment.

Where spindle unit is disposed under direct rays of the Sun or the environmental temperature is out of the specified range 0-45℃.

Where relative humidity is greater than specified range 20-90% or temperature variation is abrupt giving dew.

Never use spindle unit in the following places.   (Ask us if the probability can be expected.)

Where you have conductible powders such as iron metal powder, oil-mist, salinity or organic solvent.

Where you have corrosive gas or combustible gas.

Where you have strong electric field or strong magnetic field.

Where spindle units and tools receive strong vibration or shock.

Counter-measures to static electricity

Be careful of static electricity because spindle unit is composed of many electronic components.   Be sure to discharge static electricity of your body by touching a metal object before you touch spindle unit because an excessive static electricity can be generated at dry air atomosphere.

Cleanliness

When you clean circumference of spindle unit, never use any kinds of thinner or organic solvent that dissolves the paint coating of spindle unit or penetrating in the spindle unit inviting breakdown.   Use tapid water or alcohol-wet clothes for cleaning.

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Counter-measures to noise

Do not put electromagnetic switching device close to spindle unit in the dust free control box because spindle unit is consisting of electronic components.   Use and connect noise removers such as surge-dumpers in case you put electric relay or electromagnetic switching device in the dust free control box.   Separate spindle unit and tool connecting cable from power cable in order to avoid consolidation of these ones in a same wiring duct.

Chapter 2　　　　　Specifications

2-1　　　　Main specifications

Power voltage	3-phase AC200~220V ±10% 50/60Hz
Operation environment	Mount spindle unit in the dust free control box. Provide spindle unit with compulsory cooling equipment or heating equipment in case the environment is out of the following environment.
Operation temperature range	0-45℃ and no dew
Operation humidity range	less than 90% and no dew
Operation capacity	Less than 50% of duty (within 1 cycle standard operation time)
Storage environment	Temperature -5℃~55℃
	Humidity less than90% and no dew
Transportation by boat	Temperature -5℃～55℃
	Humidity 50%

Note)　　Intercept all units from atmosphere and pack them in a closed status. Give tools grease or oil coating for rust prevention.

2-1-1　　Duty calculation

Calculate duty of F-type nutrunner system.

$$\frac{\text{Nutrunner running time}}{\text{Nutrunner running time + nutrunner stop time}} \times 100 = \text{Duty \%}$$

1 cycle standard operation time is all different model by model. Refer to the specifications.

2-1-2　　Spindle unit specifications

Spindle unit type	UEC-F024	UEC-F040	UEC-F120
Motors used	F015	RM3	F050・F100・RM4
Power voltage	AC200-220V　3Φ		
Frequency	50 / 60 Hz common		

<Note for entry current>

Repetition of power [ON] and [OFF] will not activate entry current control circuit. Give 10 seconds or longer [OFF] interval when switch on again spindle unit.

[ON] and [OFF] action in a short period can cause no operation of spindle unit. If such a no operation of spindle unit has been caused, wait for more than 5 minutes in the status of [OFF] position and switch on spindle unit again.

2-2   Capacity

2-2-1   Nutrunner

Torque accuracy   from 1/2 to the max. output: $3\sigma/X$ less than 3%

from 1/4 to 1/2 of max. output: $3\sigma/X$ less than 4%

(as per our tightening standard)

Minimum angle display   0.1°

Minimum control angles   0.1°

Torque sensor accuracy (full scale) $\pm$1%

Torque sensor linearity $\pm$0.5%

Torque・running speed

Standard tool type	Max. Torque	Max. Speed	Spindle unit
UNR-F015-45	4.5Nm	3,200rpm	UEC-F024
UNR-F015-65	6.5Nm	2,222rpm	UEC-F024
UNR-F015-200	20.0Nm	730rpm	UEC-F024
UNR-F015-280	28.0Nm	507rpm	UEC-F024
UNR-F015-350	35.0Nm	412rpm	UEC-F024
UNR-F050-270	27.0Nm	1,778rpm	UEC-F120
UNR-F050-630	63.0Nm	756rpm	UEC-F120
UNR-F050-730	73.0Nm	653rpm	UEC-F120
UNR-F050-880	88.0Nm	540rpm	UEC-F120
UNR-F050-1400	140.0Nm	343rmp	UEC-F120
UNR-F100-1300	130.0Nm	730rpm	UEC-F120
UNR-F100-1900	190.0Nm	508rpm	UEC-F120
UNR-F100-2500	250.0Nm	376rpm	UEC-F120
UNR-F100-3700	370.0Nm	259rpm	UEC-F120
UNR-F100-5400	540.0Nm	175rpm	UEC-F120
UNR-F100-7000	700.0Nm	121rpm	UEC-F120
UNR-F100-10000	999.9Nm	90rpm	UEC-F120
UNR-F15-500C	50.0Nm	221rpm	UEC-F024
UNR-F15-800C	80.0Nm	180rpm	UEC-F024
UNR-F50-1300C	130.0Nm	324rpm	UEC-F120
UNR-F50-1800C	180.0Nm	232rpm	UEC-F120
UNR-F50-2800C	280.0Nm	165rpm	UEC-F120
UNR-F100-2200C	220.0Nm	351rpm	UEC-F120
UNR-F100-2800C	280.0Nm	244rpm	UEC-F120
UNR-F100-3800C	380.0Nm	245rpm	UEC-F120
UNR-F015-25C	25.0Nm	469rpm	UEC-F024
UNR-F015-55C	55.0Nm	264rpm	UEC-F024
UNR-F050-95C	95.0Nm	485rpm	UEC-F120
UNR-F050-130C	130.0Nm	347rpm	UEC-F120
UNR-F100-200C	200.0Nm	469rpm	UEC-F120
UNR-F100-250C	250.0Nm	325rpm	UEC-F120
UNR-F100-380C	380.0Nm	241rpm	UEC-F120
UNR-F100-550C	550.0Nm	166rpm	UEC-F120
UNR-601RM3-S	58.8Nm	790rpm	UEC-F040
UAN-801RM3-S	78.4Nm	500rpm	UEC-F040
UNR-132RM3-S	127.4Nm	395rpm	UEC-F040
UNR-202RM3-S	196.1Nm	220rpm	UEC-F040
UNR-302RM3-S	294.2Nm	150rpm	UEC-F040

2-2-2   Spindle unit

    CPU   32bit RISC

    Data communication   RS485 (half duplex operation) 2 port

2-3   Functions

2-3-1   Functions

(1) Tightening functions

F-type nutrunner system will give you the following 9 options.

1.   Torque control

2.   Angle control

3.   Plastic area angle control

4.   Spline fit-in control

5.   Pin hole control

6.   Pre-load controls

7.   Idle running control

8.   Spline angle control

9.   Yield control

(2) Non-operation (BYPASS) function

Spindle unit outputs BYPASS signal indicating non-operation status when you input BYPASS signal or select BYPASS of front panel RUN/BYPASS.   START signal does not switch on spindle unit under this status and SYNC signal becomes high impedance in order not to give synchronized tightening affections.
Spindle unit stops tightening when the status turns into non-operation status.
While in non-operation status, spindle unit will tell you non-operation by LED [BYPASS] lamp in the front panel flushing.

(3) Signal output functions when NOK or Alarm takes place

When tightening NOK or alarm takes the place, spindle unit stops tool running with corresponding error signal number output and contents of NOK and alarm number display on the front panel.

3-1   UEC-F panel (spindle unit)

3-1-1   UED front panel switch and connector
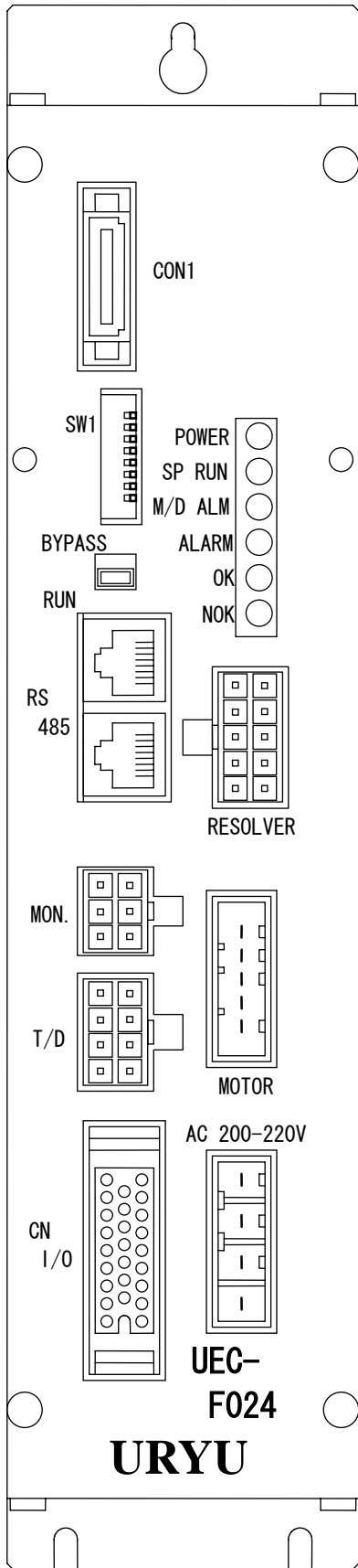
Status change switch

   RUN/BYPASS change switch

      RUN   : Operation possible status

      BYPASS: Non-operation status

External communication device

   RS485 connector

   RS485 connector

Connector

   Resolver connector

      Tool's resolver connection

   MON. connector (monitor output)

      Analog electric pressure of torque and angle pulse output

   T/D connector

      Tool's torque sensor connection

   AXIS I/O connector

      External input and output control connection

   MOTOR connector

      Tools' magnet motor connection

   AC IN connector

      AC200V~220V 3-phase power plug

Panel labels: CON1, SW1, POWER, SP RUN, M/D ALM, ALARM, OK, NOK, BYPASS, RUN, RS 485, RESOLVER, MON., T/D, MOTOR, CN I/O, AC 200-220V, UEC-F024, URYU
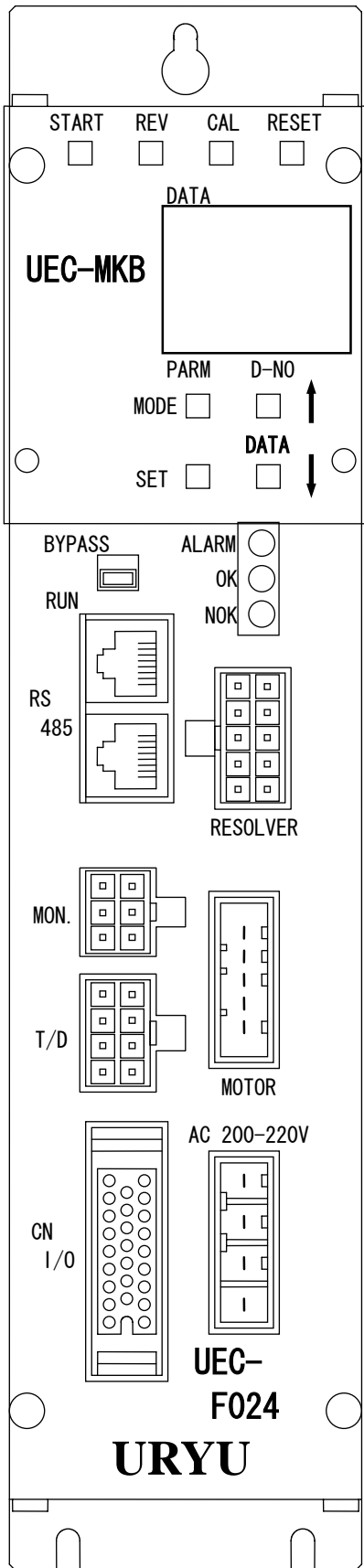
Manual operation switch

    START manual switch (not in use)

    REVERSE manual switch (not in use)

    CAL manual switch

    RESET manual switch

Data display operation switch

    MODE switch

    SET switch

    DATA UP cursor switch

    DATA DOWN cursor switch

Note: Display unit (UEC-MKB) is an option.

3-1-2   UEC-F front panel front display
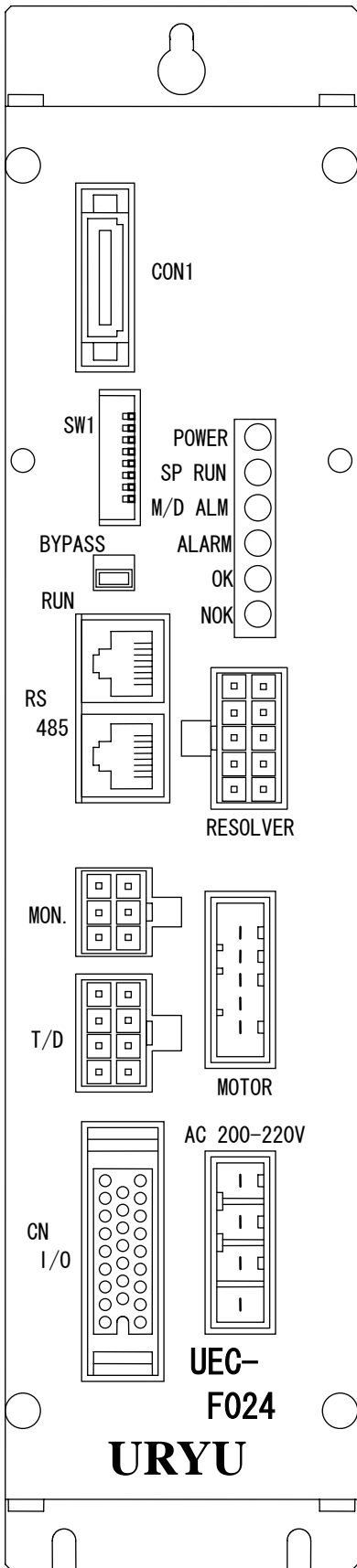
<Status display LED>
  POWER LED (Yellow)
    AC200V power supply will switch on.

  SP RUN (Orange)

    Lighting while tightening is in process, and flushing
    while reverse operation is in process.
    Lighting when power supply is switched on.

  M/D ALM. [MAIN/DRIVER ALARM] (RED)

    Lighting when the servo amplifier-related is giving
    error.

  ALARM (RED)

    Lighting when error occurs.

  OK (GREEN)

   Lighting when tightening is in normal operation.

  NOK [NO OK] (RED)

   Lighting or flushing when judgment has provided
   out of standard result.

   Lighting   :Torque value out of range
   Rapid flushing   :Angle value out of range
   Slow flushing   :Time out of range

  BYPASS LED (RED)

   Lighting when spindle unit is non-operation status.

<Data display LED>
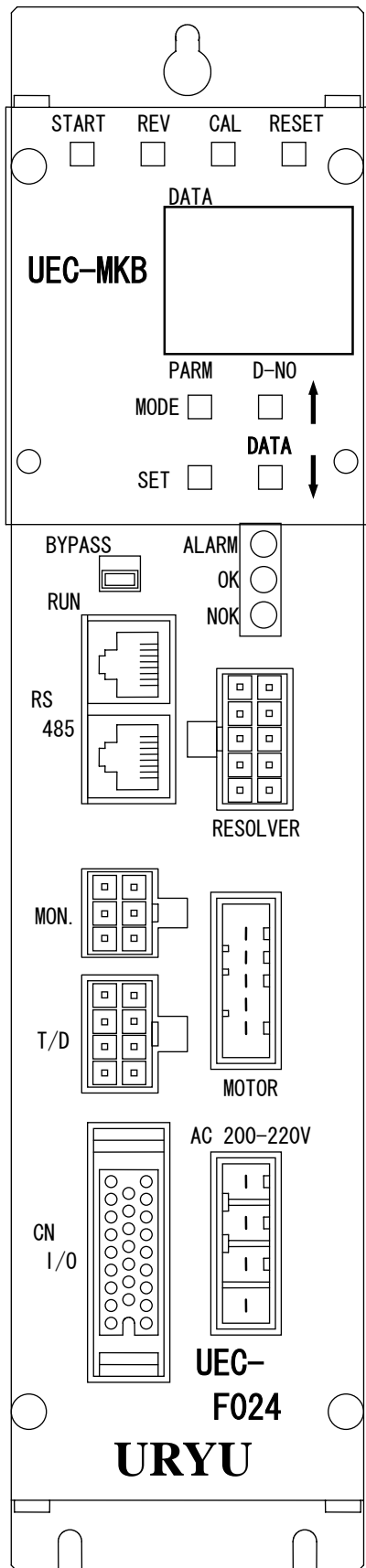
Data display (4-digit)
    Data display (torque and others)

PARM display (2-digit)
    Parameter number display
    Or, alarm number display

D-NO display (2-digit)
    Data number display
    Or, spindle unit number display

Note: Display unit (UEC-MKB) is an option.

START REV CAL RESET

DATA

UEC-MKB

PARM   D-NO
MODE

DATA

SET

BYPASS   ALARM
         OK
RUN   NOK

RS
485

RESOLVER

MON.

T/D

MOTOR

AC 200-220V

CN
I/O

UEC-
F024

URYU

3-2　　Tool

UNR-F015-350NT external appearance
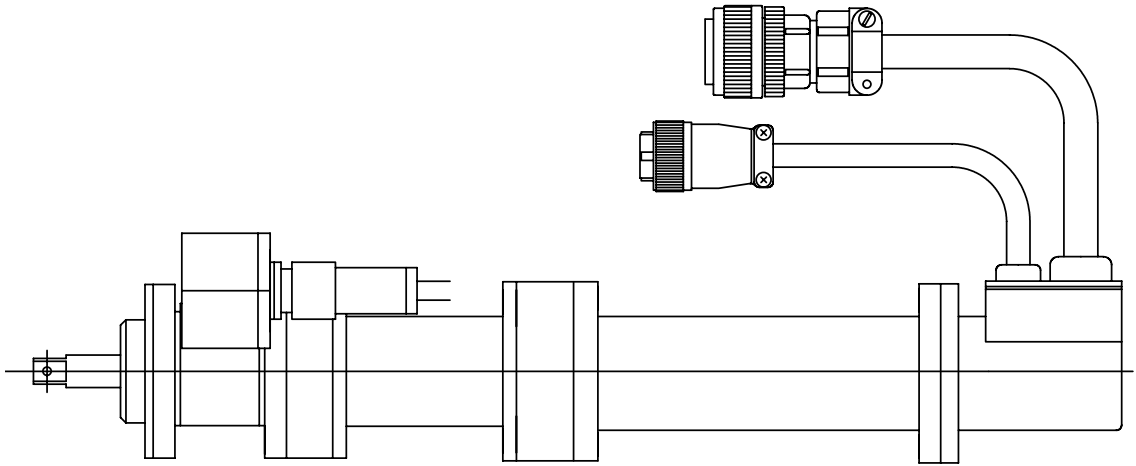
UNR-801RM3-S external appearance
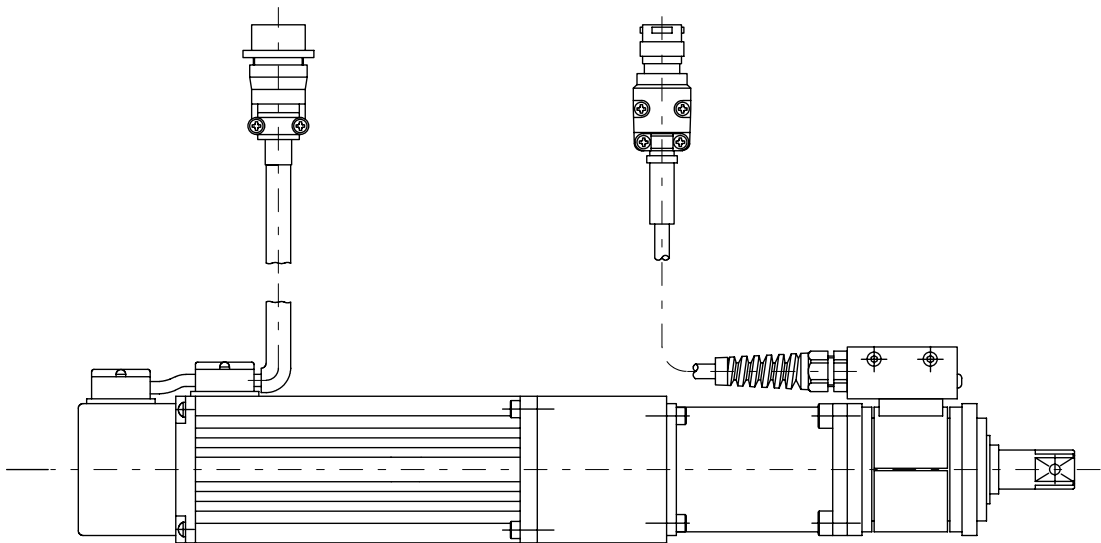
Chapter 4   Installation and wiring

How to set up
Conform to following instructions when you use UEC-F series system.

No.	Item	Contents	Ref.
①	Select dust free control box	Give spindle unit specified intervals.	4-1
②	Select cooling or heating equipment.	Have an appropriate one equipped according to your environment.	2-1
③	Select circuit protector.	Give each spindle unit circuit protector.	4-2
④	Select control equipment (I/O).	Connect only necessary control signals with spindle unit.	4-3
⑤	Number switch setting of spindle unit	Number switch setting is made prior to shipment. Confirm the setting before assembly.	4-4
⑥	Mount spindle unit to control box	Consider external dimensions and mount spindle unit by giving intervals described in 4-1.	4-1
⑦	Power cord connection with power socket	Make connections by accessory connectors.	4-2
⑧	Tool cable wiring	Do wiring and setting of pre-amplifier and motor cables.	
⑨	Power supply	Switch on power supply after wiring and power voltage check.	5-1 Chapter 5
⑩	Input setting values	Input torque value, angle number, speed, timer and etc.	Chapter 6
⑪	Initial action confirmation	Make initial action confirmation	5-2

4-1   External dimensions and mounting dimensions

Mounting   1 mounting slot at upper part M4 screw

2 deep holes at bottom part M4 screw

Weight   UEC-F024   1.4kg

UEC-F040   1.8kg

Handling instructions
1.   Give right and left of spindle unit 10mm or greater space for heat radiation.
2.   Give spindle unit under space about 100mm distance for cable wiring.

UEC-F024 type
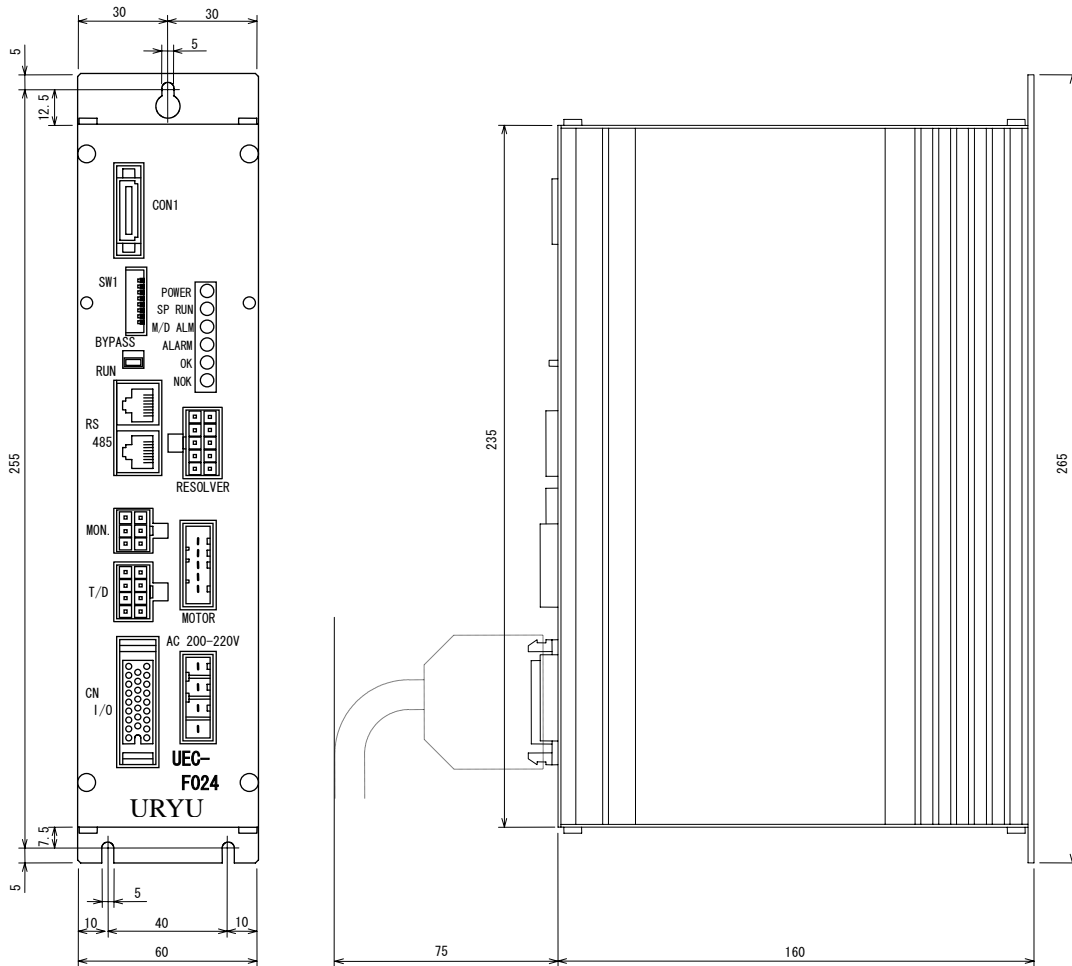
UEC-F040 type
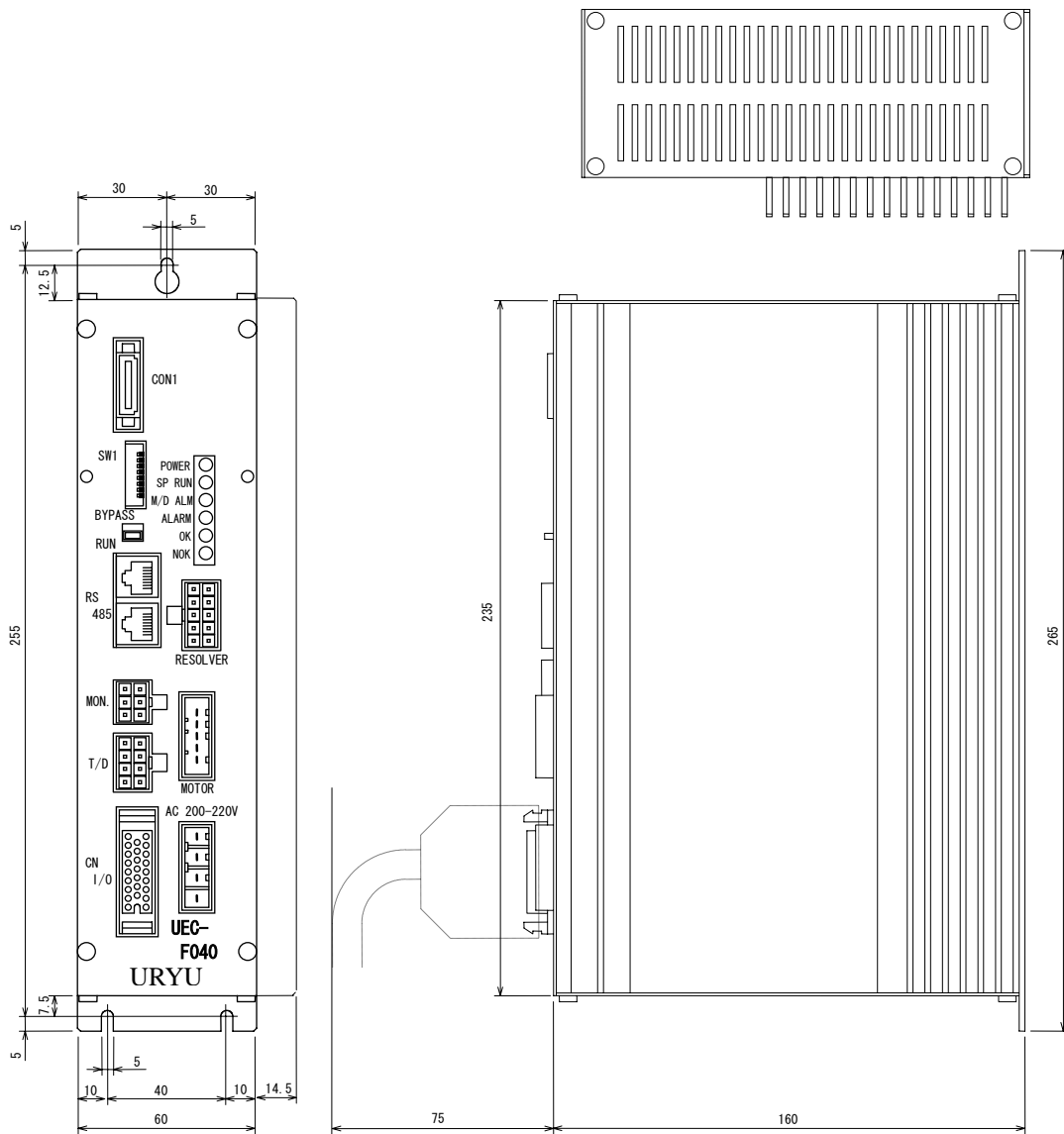
UEC-F120 type

Mounting   2 mounting slots at upper part M4 screw
            2 deep holes at bottom part M4 screw

Weight   UEC-F120   3.1kg

Handling instructions

1. Give right and left of spindle unit 10mm or greater space for heat radiation.
2. Give spindle unit under space about 100mm distance for cable wiring.
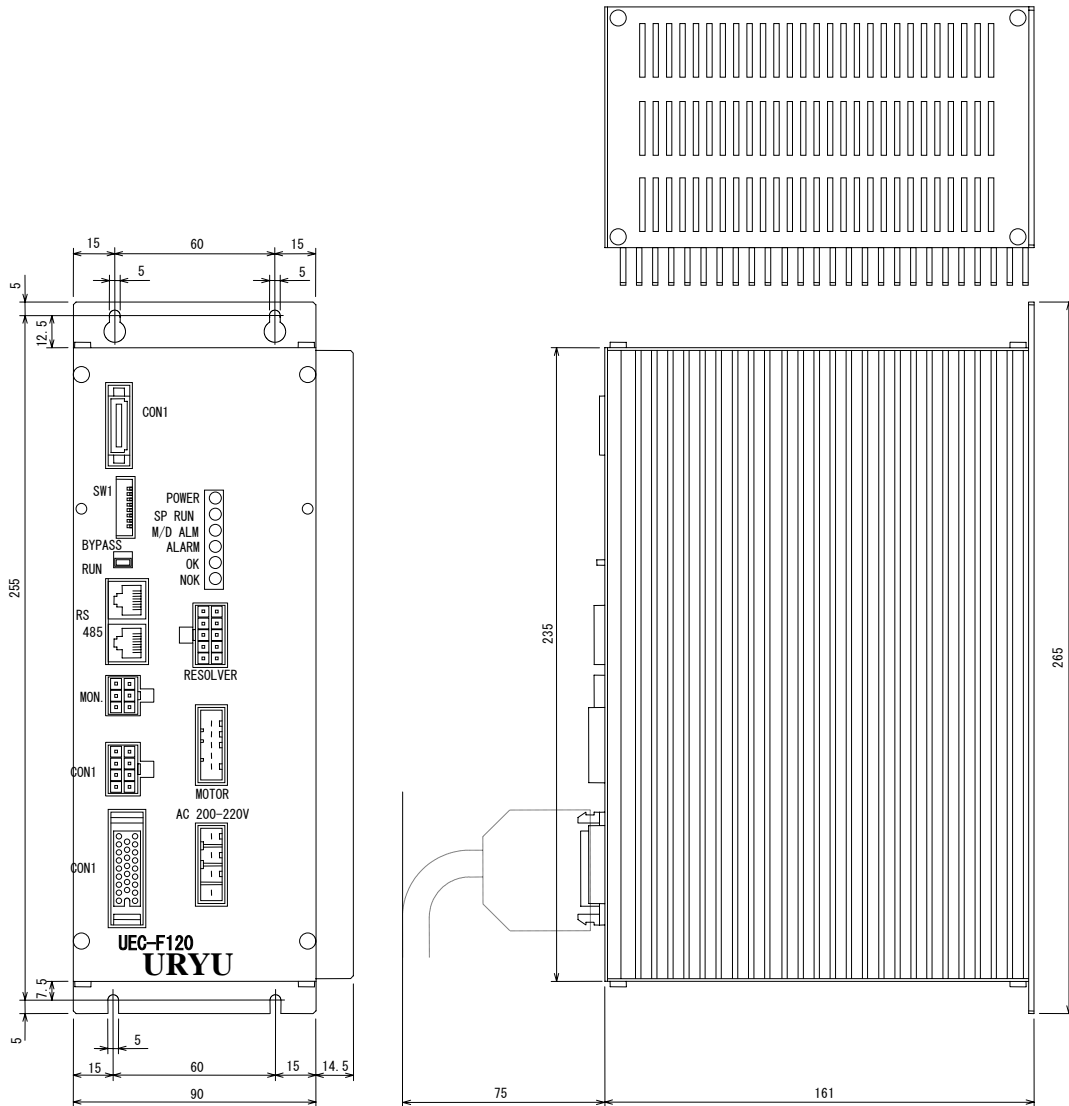
Unit heat value

Spindle unit type	Average heat value	Stand by heat value
UEC-F024	About 26W	About 18W
UEC-F040	About 39W	About 18W
UEC-F120	About 74W	About 18W
UEC-F300M (I/O)	About 5.5W	
UEC-F300M (CC-LINK)	About 5.5W	
UEC-F300M (D-NET)	About 5.5W	

4-2   Power plug connections

Use right bottom power socket to supply spindle unit with electricity.
Use accessory power cord which comes with spindle unit.
Protect spindle unit by circuit protector when power supply.
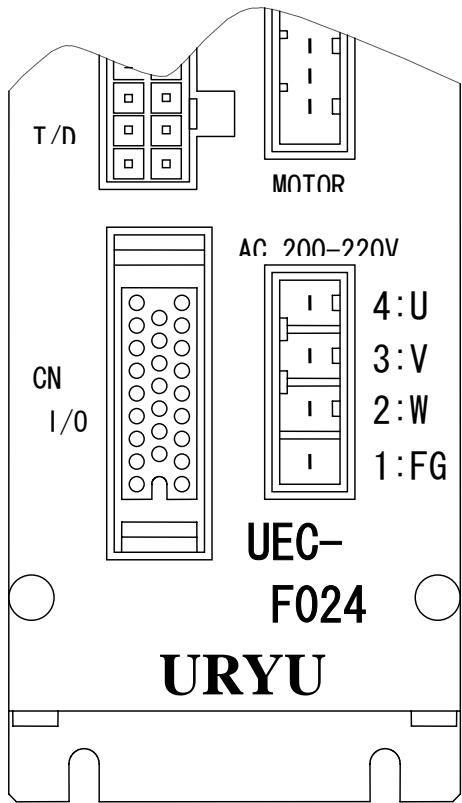
Connections

4: U

3: V 3-phase alternate current

2: W   AC-200~220V

1: FG

Suitable plugs

Manufacturer	:	AMP
Type	:	D3200S Rise Housing
Number	:	1-178128-4 (keying X)
Type	:	Rise contact (crimp type)
Number	:	1-175218-3

Recommended circuit protector

Spindle unit	Circuit protector type (manufacturer : Izumi electric
UEC-F024	NRC210L-5A-AA
UEC-F040	NRC210L-7A-AA
UEC-F120	NRC210L-15A-AA

Note: Select delay action type.

Recommended trans capacity

Spindle unit	Trans capacity
UEC-F024	0.2KVA~0.3KVA X Spindle numbers
UEC-F040	0.6KVA~1.0KVA X Spindle numbers
UEC-F120	3.0KVA~6.0KVA X Spindle numbers

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4-3   External control signal wiring

4-3-1   AXIX I/O signals   When main operation is under setting.

NO	Signals	IN/OUT		Contents
1				Do not use.
2				
3				
4				
5	BYPASS	IN	NO	Select non-operation
6				Do not use.
7				
8				Do not use.
9				Do not use.
10				
11	SENSOR	IN	NO	Proximity sensor connection for pin hole control
12				Do not use.
13	IN COMMON			Common for input signals, connect +12~24V
14				Do not use.
15	BANK SELECT 1	IN	NO	Change data OUT DATA 0-11 contents.
16	BANK SELECT 0	IN	NO	
17				Do not use.
18				
19				
20	CCW	IN	NO	Change rotating direction. Use for left thread or tools' front has an extra gear.
21				Do not use.
22	OUT DATA 11	OUT	NO	Output system status as per BANK SELECT signal.
23	OUT COMMON			Common for output signals, connect 0V.
24	OUT DATA 7	OUT	NO	Output system status as per BANK SELECT signal.
25	DATA OUT 6	OUT	NO	
26	DATA OUT 5	OUT	NO	
27	DATA OUT 4	OUT	NO	
28	DATA OUT 3	OUT	NO	
29	DATA OUT 2	OUT	NO	
30	DATA OUT 1	OUT	NO	
31	DATA OUT 0	OUT	NO	
32	DATA OUT 10	OUT	NO	
33	DATA OUT 9	OUT	NO	
34	DATA OUT 8	OUT	NO	

IN: Input signal   OUT: Output signal   NC: Normal close   NO: Normal open
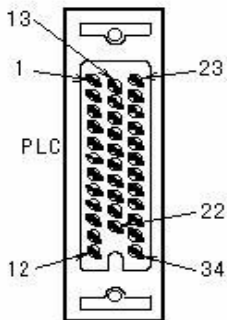
Suitable plugs

    Manufacturer: Honda communication industry (HONDA)

    Name   :Multipolar connector small Vertical case

    Type   :MR-34M,   MR-34L

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4-3-2   AXIS I/O OUT DATA signals

AXIS I/O BANK SELECT table

Pin No.	Signals	IN/OUT		Contents
16	BANK SELECT 0	IN	NO	Change OUT DATA 0-11 contents.
15	BANK SELECT 1	IN	NO	

	BANK SEL.0 Pin16	BANK SEL.1 Pin15	OUT DATA			Contents
			Pin No.	Signal		
BANK 1	OFF	OFF	31	OUT DATA0	NOK	Result was NOK.
			30	OUT DATA1	OK	Result was OK.
			29	OUT DATA2	READY	Unit is ready.
			28	OUT DATA3	HIGH NOK	Judgment was high.
			27	OUT DATA4	LOW NOK	Judgment was low.
			26	OUT DATA5	TQ.HIGH.NOK	Torque exceeded upper limit.
			25	OUT DATA6	TQ.LOW.NOK	Torque not exceeded low limit.
			24	OUT DATA7	BYPASS	Non-operation status
			34	OUT DATA8	NOK CODE 0	Output NOK contents by 4 codes.
			33	OUT DATA 9	NOK CODE 1	
			32	OUT DATA10	NOK CODE 2	
			22	OUT DATA11	NOK CODE 3	
B *Not in action When nutrunner is in in use.		OFF	31	OUT DATA0	TIME 1 NOK	1st tightening not completed in preset time.
			30	OUT DATA1	TIME 2 NOK	Final tightening not completed in preset time.
			29	OUT DATA2	PRAM.SELECT0	Output designated parameter numbers.
			28	OUT DATA3	PRAM.SELECT1	
			27	OUT DATA4	PRAM.SELECT2	
			26	OUT DATA5	PRAM.SELECT3	
			25	OUT DATA6	PRAM.SELECT4	
			24	OUT DATA7	PRAM.SELECT5	
			34	OUT DATA8	Not used	
			33	OUT DATA 9	Not used	
			32	OUT DATA10	Signal 1	Signal between main unit.
			22	OUT DATA11	Signal 2	Signal between main unit.
BANK 3	OFF	ON	31	OUT DATA0	NOK	Result was NOK.
			30	OUT DATA1	OK	Result was OK.
			29	OUT DATA2	READY	Unit is ready.
			28	OUT DATA3	ALARM	System is giving errors.
			27	OUT DATA4	BUSY	Tightening is in operation.
			26	OUT DATA5	ANG.HIGH.NOK	Turning angles exceeded upper limit.
			25	OUT DATA6	ANG.LOW.NOK	Turning angles not exceeded low limit.
			24	OUT DATA7	BYPASS	Non-operation status
			34	OUT DATA8	Not used	
			33	OUT DATA 9	Not used	
			32	OUT DATA10	Not used	
			22	OUT DATA11	Not used	
BANK 4	ON	ON	31	OUT DATA0	ALARM SUB 0	Alarm sub numbers: Output detailed code by 4 bit when alarm is provided.
			30	OUT DATA1	ALARM SUB 1	
			29	OUT DATA2	ALARM SUB 2	
			28	OUT DATA3	ALARM SUB 3	
			27	OUT DATA4	ALARM CODE0	Alarm sub numbers: Output code by 4 bit when alarm is provided.
			26	OUT DATA5	ALARM CODE1	
			25	OUT DATA6	ALARM CODE2	
			24	OUT DATA7	ALARM CODE3	
			34	OUT DATA8	Not used	
			33	OUT DATA 9	Not used	
			32	OUT DATA10	Not used	
			22	OUT DATA11	Not used	

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Upper limit:	Value greater than standard upper limit	NOK
	Value less than standard upper limit	OK
Low limit	Value greater than standard low limit	OK
	Value less than standard low limit	NOK

NOK< Standard low limit≦OK<Standard upper limit≦NOK

4-3-3   Input output H/W specifications and recommended connection circuit
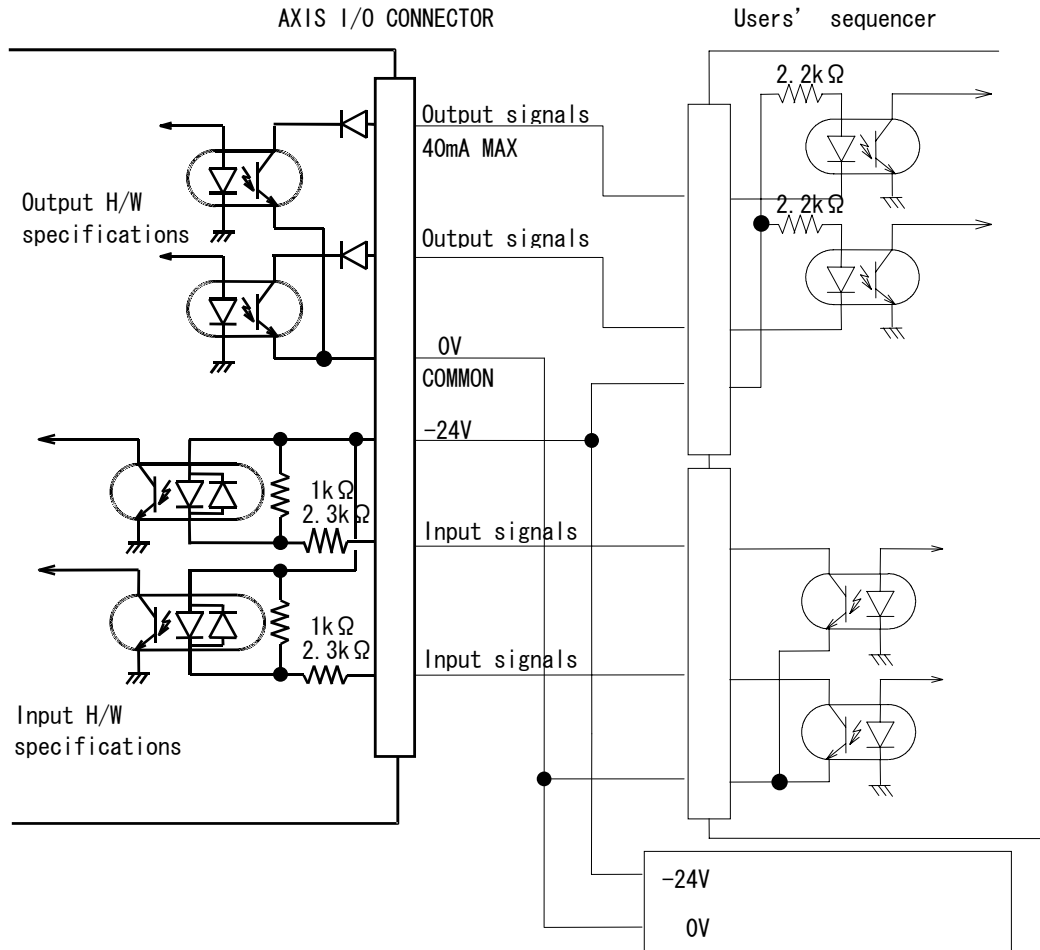
Users' sequencer

When high resistance unit is in use it can be possible that a sequencer is unable to receive OUT DATA signals normally due to external environment.

<u>4-3-4   Input output signals</u>

(1) Input signals

Providing input terminals with LOW (0V) will change spindle unit to "ON" status.

1. BYPASS: Non-operation signal

While this signal is being switched "ON", spindle unit becomes non-operation status and does not start tightening with providing BYPASS signal.
Tightening operation will be suspended when spindle unit becomes non-operation status while in tightening operation.

2. BANK SELECT 0, 1:   Output signal bank select signal

Option of bank numbers 1~4 will change contents of 12 output signals.
Combination of BANK SELECT 0 and BANK SELECT 1 signals will make following output signal change possible.

BANK SELECT 1	BANK SELECT 0	OUTPUT BANK
OFF (OPEN)	OFF (OPEN)	1
OFF (OPEN)	ON	2
ON	OFF (OPEN)	3
ON	ON	4

(2) Output signals

Electric pressure of output terminals gets the same level as output common (0V) when output signals are switched "ON".   Output signals (OUT0~OUT11) will have the following meanings (output banks) due to BANK SELECT signals combination.

ON: Connected with 0V.
OFF: Input common (HIGH) level or open.

Pin No		BANK SEL.0 (Pin No.16)	OFF	ON	OFF	ON
		BANK SEL.1 (Pin NO.15)	OFF	OFF	ON	ON
			BANK1	BANK2	BANK3	
31	OUT DATA 0	NOK	TIME 1 NOK	NOK	ALARM SUB 0
30	OUT DATA 1	OK	TIME 2 NOK	OK	ALARM SUB 1
29	OUT DATA 2	READY	PRAM.SELECT0	READY	ALARM SUB 2
28	OUT DATA 3	HIGH NOK	PRAM.SELECT1	ALARM	ALARM SUB 3
27	OUT DATA 4	LOW NOK	PRAM.SELECT2	BUSY	ALARM CODE 0
26	OUT DATA 5	TQ.HIGH NOK	PRAM.SELECT3	ANG.HIGH NOK	ALARM CODE 1
25	OUT DATA 6	TQ.LOW NOK	PRAM.SELECT4	ANG.LOW NOK	ALARM CODE 2
24	OUT DATA 7	BYPASS	PRAM.SELECT5	BYPASS	ALARM CODE 3
34	OUT DATA 8	NOK CODE0	Not used	Not used	Not used
33	OUT DATA 9	NOK CODE1	Not used	Not used	Not used
32	OUT DATA 10	NOK CODE2	SIGNAL 1	Not used	Not used
22	OUT DATA 11	NOK CODE3	SIGNAL 2	Not used	Not used

※   Bank 2 is not in use when multiple spindles are in operation.

Output bank 1

(DATA 0) NOK: Tightening NOK signal (when completed with NOK)
    This is output when tightening result of spindle unit completed out of preset range.

(DATA 1) OK: Tightening OK signal (when completed with OK)
    This is output when tightening result of spindle unit completed normally within preset range.

(DATA 2) READY: Input permission signal
    This is output when spindle unit is prepared to give operation (tightening, reverse or etc) as per input signals provided by external equipment such as sequencer.

    READY signal will be switched OFF under the following conditions.
    ○ Under initial processing for a few seconds when switched on.
    ○ Error signal output
    ○ Non-operation status (under setting, download or etc.)
    ○ When not in use
    ○ Under reset processing
    ○ Others when spindle unit is unable to meet external input

(DATA 3) HIGH NOK: Upper limit NOK
    This is output when tightening completed with torque or angle exceeded upper limit, or initial NOK/cycle NOK detected.

(DATA4) LOW NOK: Low limit NOK
    This is output when tightening completed with torque or angle under low limit, or initial NOK/cycle NOK detected.

(DATA5) TQ HIGH NOK: Torque upper limit NOK
    This is output when tightening completed with peak torque or final torque exceeded upper limit.

(DATA6) TQ LOW NOK: Torque low limit NOK
    This is output when tightening completed with peak torque or final torque under low limit.

(DATA7) BYPASS: non-operation status
    This is output when spindle unit is non-operation status.

(DATA8-11) NOK CODE 0~3: NOK contents will be output via 4 points code.

NOK CODE0	NOK CODE1	NOK CODE2	NOK CODE3	Contents
Pin 34	Pin 33	Pin 32	Pin 22	
ON	OFF	OFF	OFF	Alarm (refer to bank4 for the details.
OFF	ON	OFF	OFF	Initial timer NOK
ON	ON	OFF	OFF	Cycle timer NOK
OFF	OFF	ON	OFF	Snug torque NOK
ON	OFF	ON	OFF	Fit-in upper torque NOK
OFF	ON	ON	OFF	Fit-in incline NOK
ON	ON	ON	OFF	Plastic area angle incline NOK
OFF	OFF	OFF	ON	Concurrent turning NOK
ON	OFF	OFF	ON	Angle upper limit NOK
OFF	ON	OFF	ON	Angle low limit NOK

==

Output bank 2 (Not applicable when multiple spindles are in use)

(DATA0) Time 1 NOK: Time over of 1st area (not used yet)
> This is output when tightening of spindle unit fails to reach 1st torque or 1st angle before time of 1st timer is over.　This is also output when tightening of spindle unit reaches 1st torque or 1st angle within preset minimum tightening time.　Use this function for "No bolt" or "No work" detection.

(DATA1) Time 2 NOK: Time over of final tightening area (not used yet)
> This is output when spindle unit running time from 1st torque or 1st angle got longer than final time before tightening torque reaches cut torque or cut angle.　This is also output when spindle unit running time to reach cut torque or cut angle was shorter than preset minimum tightening time.

(DATA2-7) PRAM.SELECT 0-5:
> Outputs designated parameter numbers.

(DATA10-11) SIGNAL 1-2:
> Signals amongst spindle units

Output bank 3

(DATA0) NOK: Tightening NOK signal (NOK end)
> This is output when spindle unit tightening completion ended with result out of preset range.

(DATA1) OK: Tightening OK signal (Normal completion)
> This is output when spindle unit tightening ended normally within preset range.

(DATA2) READY: Input permission signal
> This is output when spindle unit is prepared to give operation (tightening, reverse or etc) as per input signals provided by external equipment such as sequencer.
>
> READY signal will be switched OFF under the following conditions.
> ○ Under initial processing for a few seconds when switched on.
> ○ Error signal output
> ○ Non-operation status (under setting, download or etc.)
> ○ When not in use
> ○ When reset processing
> ○ Others when spindle unit is unable to meet external input

(DATA3) ALARM: System error signal (Abnormal completion)
> This is output when spindle unit system check detects error, or spindle unit detects error during tightening operation.

(DATA4) BUSY: In operation signal
> This is out put while tightening is in process.

(DATA5) ANG.HIGH NOK: Angle upper limit NOK
> This is output when tightening completed with tightening angles exceeded upper limit.

(DATA6) ANG/LOW NK: Angle low limit NOK
> This is output when tightening completed with tightening angles not exceeded low limit.

(DATA7) BYPASS: non-operation status
> This is output when spindle unit is non-operation status.

==

Output bank 4

(DATA0~3) ALARM SUB 0~3

Output detailed code when ALARM is provided.　4-bit will be provided.

(DATA4~7) ALARM CODE 0~3

Output detailed code when ALARM is provided.　4-bit will be provided.

Contents of errors shall be classified in the following table.This is from 8-bit combination of ALARM code and ALARM sub.

ALARM NUMBERS				ALARM SUB NUMBERS				CONTENTS
ALARM CODE0	ALARM CODE1	ALARM CODE2	ALARM CODE3	ALARM CODE0	ALARM CODE1	ALARM CODE2	ALARM CODE3	
Pin27	Pin26	Pin25	Pin24	Pin31	Pin30	Pin29	Pin28	
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	(A1_0)ZERO POINT MASTER ERROR
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	(A1_1)CAL ERROR
ON	OFF	OFF	OFF	OFF	OFF	ON	OFF	(A1_4)SWITCH ON UNDER ZERO POINT MASTER ERROR
ON	OFF	OFF	OFF	ON	OFF	ON	OFF	(A1_5)SWITCH ON UNDER CAL ERROR
ON	OFF	OFF	OFF	OFF	ON	OFF	ON	(A1_6)ZERO POINT ERROR
OFF	ON	OFF	OFF	ON	OFF	OFF	OFF	(A2_1)TORQUE OVER UNDER TORQUE CUT
ON	ON	OFF	OFF	ON	OFF	OFF	OFF	(A3_1)TOOL TYPE ERROR
ON	ON	OFF	OFF	OFF	ON	OFF	OFF	(A3_2)START WITH NO TOOL CONNECTED
ON	ON	OFF	OFF	ON	ON	OFF	OFF	(A3_3)TOOL NOT CONNECTED
OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	(A4_0)F-ROM WRITING ERROR
OFF	OFF	ON	OFF	ON	OFF	OFF	OFF	(A4_1)F-ROM UPLOAD ERROR
OFF	OFF	ON	OFF	OFF	ON	OFF	OFF	(A4_2)F-ROM AMPLIFIER SIDE ERROR
OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	(A6_0)NON-SETTING OF SERVO TYPE
OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	(A8_1)SPINDLE UNIT OVER –HEATING ERROR
OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	(A8_4)OVER CURRENT
OFF	OFF	OFF	ON	ON	OFF	ON	OFF	(A8_5)OVER VOLTAGE,INTERNAL POWER PRESSURE ERROR
OFF	OFF	OFF	ON	OFF	ON	ON	OFF	(A8_6)POWER VOLTAGE PRESSURE ERROR
OFF	OFF	OFF	ON	ON	OFF	OFF	ON	(A8_9)OVER SPEED
OFF	OFF	OFF	ON	OFF	ON	OFF	ON	(A8_10)OVER LOAD
OFF	OFF	OFF	ON	ON	ON	OFF	ON	(A8_11)RESOLVER ERROR
ON	OFF	OFF	ON	ON	OFF	OFF	OFF	(A9_1)SETTING ERROR
ON	OFF	OFF	ON	OFF	ON	OFF	OFF	(A9_2)SYSTEM ERROR 1
ON	OFF	OFF	ON	ON	OFF	ON	OFF	(A9_5)SYSTEM ERROR 4
ON	OFF	OFF	ON	OFF	ON	ON	OFF	(A9_6)SYSTEM ERROR 5
ON	OFF	OFF	ON	ON	ON	ON	OFF	(A9_7)TORQUE LIMIT OVER

4-4   Spindle unit number setting

Set spindle unit number from 1 when you use UEC-F300 system for multiple nutrunners.   Make this setting from DIP (SW1) switch available in the front panel of spindle unit.

Note: Keep DIP switch 1~3 OFF position for ordinary use.
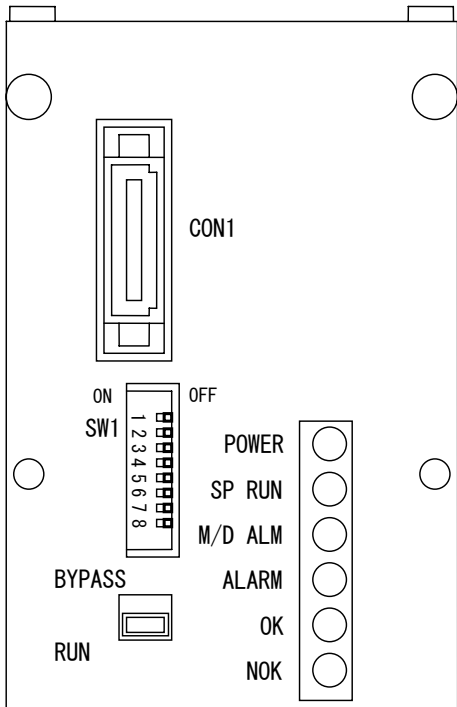
DIP switch numbers
1   OFF: Multiple spindles specifications
    ON: Single spindle specifications
2   OFF:Level start method
    ON:One pulse start method (effective for single specifications)
3   OFF:Smooth speed reduction to torque speed
    ON:Quick speed reduction to torque speed

Remove optional display unit when your spindle unit comes with optional display unit.   Open 2 screws available in the bottom of display unit. Refer to chapter 8.

Spindle numbers setting table

SPNDLE NUMBERS	DIP SWITCH NUMBERS					SPNDLE NUMBERS	DIP SWITCH NUMBERS				
	4	5	6	7	8		4	5	6	7	8
1	OFF	OFF	OFF	OFF	ON	17	ON	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	ON	OFF	18	ON	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	ON	ON	19	ON	OFF	OFF	ON	ON
4	OFF	OFF	ON	OFF	OFF	20	ON	OFF	ON	OFF	OFF
5	OFF	OFF	ON	OFF	ON	21	ON	OFF	ON	OFF	ON
6	OFF	OFF	ON	ON	OFF	22	ON	OFF	ON	ON	OFF
7	OFF	OFF	ON	ON	ON	23	ON	OFF	ON	ON	ON
8	OFF	ON	OFF	OFF	OFF	24	ON	ON	OFF	OFF	OFF
9	OFF	ON	OFF	OFF	ON	25	ON	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON	OFF	26	ON	ON	OFF	ON	OFF
11	OFF	ON	OFF	ON	ON	27	ON	ON	OFF	ON	ON
12	OFF	ON	ON	OFF	OFF	28	ON	ON	ON	OFF	OFF
14	OFF	ON	ON	ON	OFF	29	ON	ON	ON	OFF	ON
15	OFF	ON	ON	ON	ON	30	ON	ON	ON	ON	OFF
16	ON	OFF	OFF	OFF	OFF	31	ON	ON	ON	ON	ON

Note: Spindle number setting cannot be duplicated.   Make spindle number setting from 1 in order of number.

===

4-5   MON. Signal (external monitor signals)

UEC-F300 outputs voltage proportional to tightening torque and 1 pulse digital signal per turning angle 0.5° from MON. OUT connector.

Suitable plug

Manufacturer:	Molex
Name :	Receptacle, female terminal
Type :	5557-06R, 5556※

MON.
```
3 [o][o] 6
2 [o][o] 5
1 [o][o] 4
```
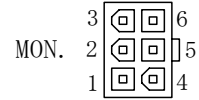
NO	SIGNAL NAME	IN/OUT	CONTENTS
1	TORQUE OUT	OUT	Torque voltage monitor output full scale torque △3.75V
2	ANGLE PULSE	OUT	Angle pulse monitor output
3	ANGLE CW/CCW	OUT	Forward reverse monitor output
4	CURRENT MONITOR	OUT	-10V~+10V 10V=(F024 24A, F040 40A, F120 120A)
5	SPEED MONITOR	OUT	-10V~+10V 10V=Maximum speed
6	GND		Earth for monitor signal output

Torque voltage   (Analog voltage)

Torque voltage expresses zero torque to CAL value by potential difference of 3.75V. The origin is the voltage under nutrunner stop status.

Note: Original voltage is not 0V. (-2V~+2V range depending upon type though, also being different tool by tool even the type is the same)

Example: Potential difference will be △3.75V because full scale voltage becomes +3.25V when original voltage is –0.5V.

Angle pulse   (TTL signal 0V or 5V)

Spindle unit outputs 1 pulse digital per 0.5° turning. There is subtle difference from actual turning angles. 716~724 pulses per rotation of tool's anvil (360 degree).

Forward reverse pulse   (TTL signal 0V or 5V)

Spindle unit outputs HI for forward and LOW for reverse.

0. 5°

Angle pulse

Forward reverse pulse

Forward   Stop

In operation

Reverse

4-6   RS-485 Interface signals
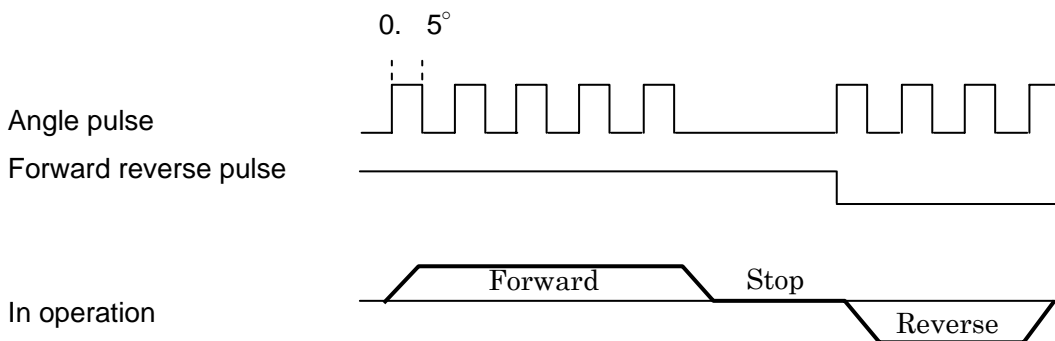
RS-485

NO	Signals	IN/OUT	CONTENTS
1	TRx2+	IN/OUT	Communication amongst units
2	TRx2-	IN/OUT	
3	TRx1+	IN/OUT	Receives data provided by mother device such as users' PC
4	TRx1-	IN/OUT	and responds to.
5	TRx1+	IN/OUT	Connected with 3.
6	TRx1-	IN/OUT	Connected with 4.
7	GND		
8	GND		

Top and bottom connectors are folded type.   Signal names are the same.

Direct connection with PC in not possible due to use of RS-485.

Commercial type LAN cable can be used as connection cable.

RS485
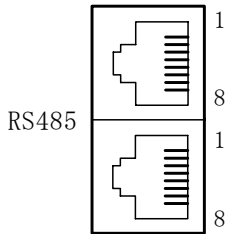
UEC-F300 internal circuit

RS-485

To F300   Other UEC-F

Communication
amongst units

GND

RS-485

To F300   Other UEC-F

Users' PC for
Communication
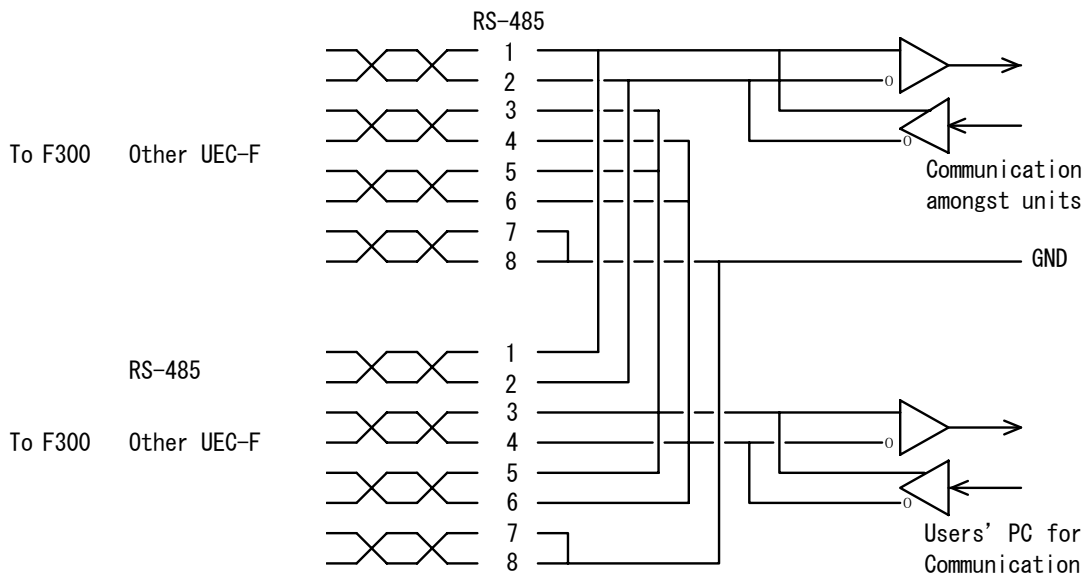
Chapter 5   Switching ON and trial operation

5-1   Confirmation points prior to switching on

① Confirmation of tool and spindle unit connection
Tool and spindle unit connection is made by two (2) cables, 1 is power cable
and the other is sensor cable. Confirm that these 2 cables are connected
with correct numbers and status of the connections. In case any sag with
cable is observed, check to see whether cable is stressed or not by physical
confirmation (by hand). Change the wiring arrangements if cables are
stressed.

② AXIS I/O cable wiring confirmation
Make connection between external control equipment by AXIS connectors.
Make sure that spindle unit input and output signals are connected with
external control equipment.

External control equipment(sequencer)
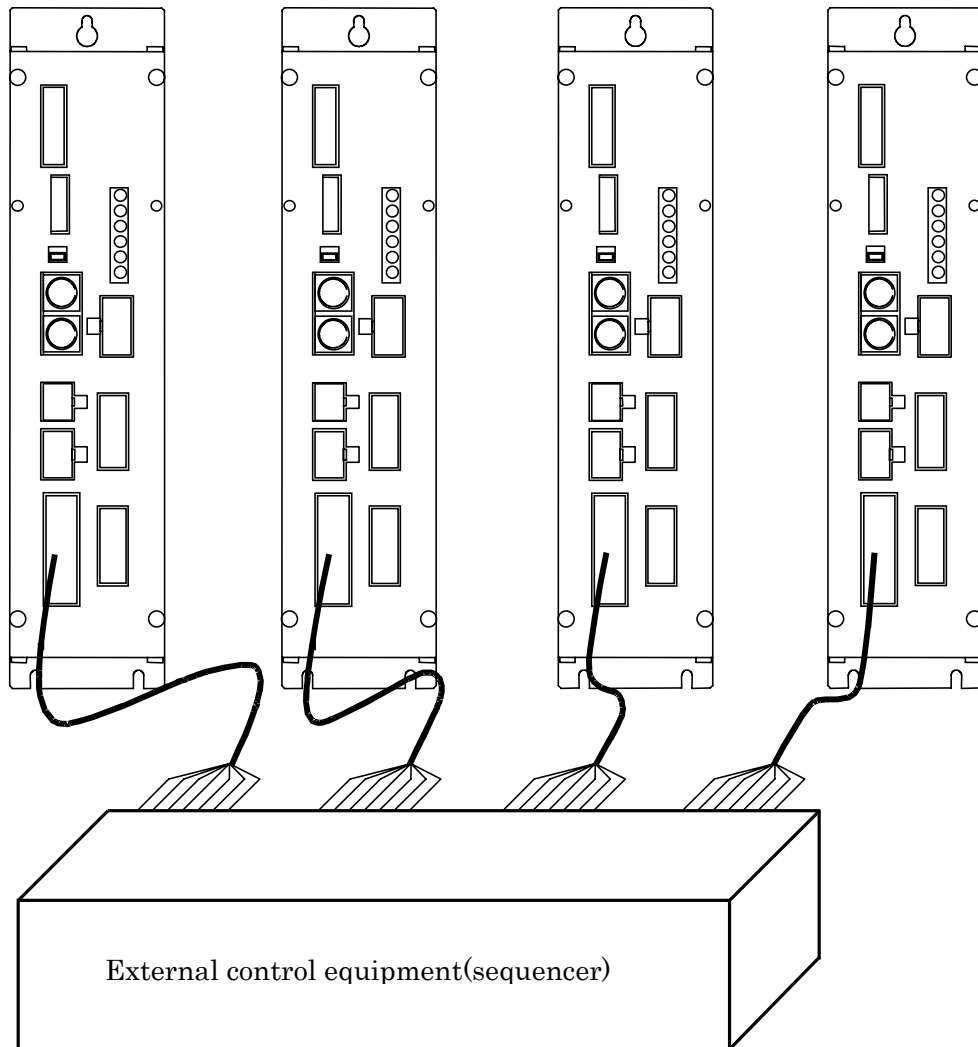
< Instructions for power ON/OFF operation>

Give waiting time (recommended 10 seconds) when you switch on again spindle unit after switching off. Unless you give waiting time or you switch on again spindle unit immediately after switching off, following troubles can happen.

● Entry current protector circuit does not function, abnormal current runs primary power circuit, then circuit protector can be closed.
● Spindle unit power circuit detects the abnormality and close the circuit automatically. Even if you switch on spindle unit again due the protection, power circuit will not function (maintained OFF position)

When spindle unit is not switched on again due to the above reasons, wait for 5 minutes or longer and switch on spindle unit again.

③ Power voltage confirmation

Confirm that the wiring has been made correctly by referring to 4-2 of Chapter 4 power plug connections. Be careful because wrong pin number connections will cause burnout. Confirm that power supply to spindle unit is 3-phase AC200~AC220V.

Confirm the above points always before switching on

④ Measure voltage after switching on to make sure of no voltage drop.

Do this measurement when nutrunner is running and giving maximum torque (at the time of maximum power consumption).

5-2   Initial setting data input

Input data necessary to carry out tightening only after switching on has been made exactly as per above instructions.   Spindle unit comes with prior to shipment parameter setting as per customers' specifications, however, change the setting as required by you.

Do the following check after switching on spindle unit.

In order to get spindle unit ready for operation, provide either main unit or spindle unit with operation preparation signal from external control equipment (sequencer) and do the following check.

1) Zero point confirmation Press RESET switch of spindle unit and confirm that torque display gives value close to 0 but ALARM LED (red) is not lighting.

2) CAL confirmation   Press CAL switch of either main unit or spindle unit and confirm that ALARM LED (red) is not lighting.

3) Manual reverse check Press REV switch of main unit and confirm that corresponding tool is running one by one.
① Switch on non-operation (BYPASS) switch of all spindle units.
② Switch off non-operation (BYPASS) switch of only 1 spindle unit and then switch on reverse (REV) switch of main unit to confirm that the BYPASS switched off tool is running. Do this check against all spindle units and tools.   Make sure to do this spindle by spindle.
③ After above 2 points have been confirmed, change all BYPASS switch to RUN position and press reverse switch to rotate all spindles.

4) Manual start confirmation   Press START switch of main unit to do tightening.

5) External start switch confirmation Confirm that start signal from external control equipment (sequencer) get spindle unit started.

==

Chapter 6　　　　Operation

This system has 2 status, RUN and BYPASS.

Under RUN status, spindle unit makes tightening and provides judgement display.
An optional display panel displays tightening result data.

Under BYPASS status, you can input setting value (parameter) spindle unit by an optional display panel but spindle unit does not do tightening operation.

Use below-mentioned change over switch RUN/BYPASS to select status.

6-1   Display and operation part functions
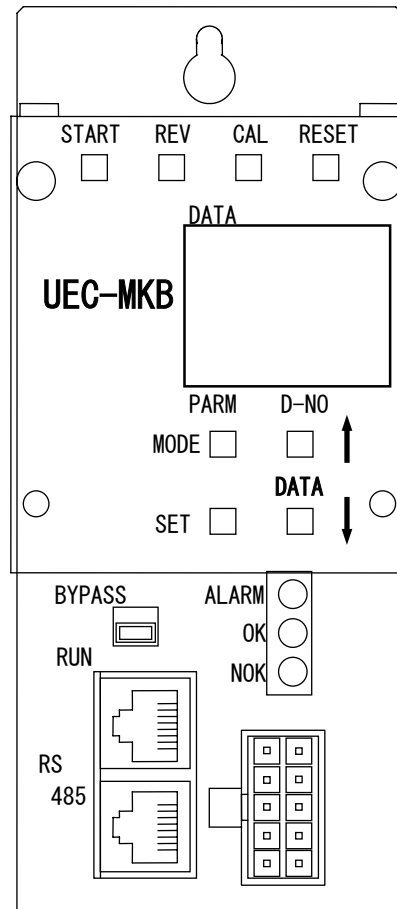
(1) Nutrunner manual operation switch (option)

```
┌─────────────────────────────────┐
│  START  REV   CAL   RESET       │
│ ○   □    □    □    □    ○        │
│          ┌─────────────┐        │
│          │   DATA      │        │
│          │             │        │
│ UEC-MKB  │             │        │
│          │             │        │
│          └─────────────┘        │
│           PARM    D-NO          │
│    MODE □     □     ↑           │
│                  DATA           │
│ ○                   ↓  ○        │
│    SET  □     □                 │
└─────────────────────────────────┘
```
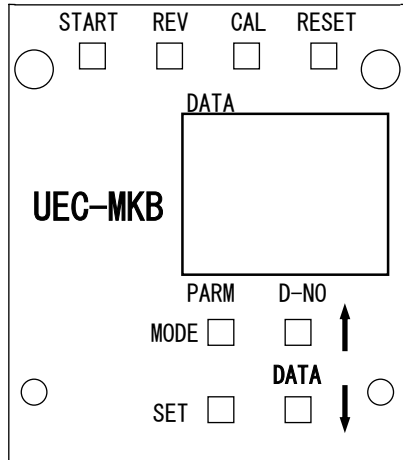
① [START] start switch   :   Cannot use.

② [REV] reverse switch   :   Cannot use.

③ [CAL] calibration switch   :   Calibration voltage check switch

Press this switch and calibration voltage from tool's pre-amplifier will
be output to check range of voltage.
4-digit [DATA] display will indicate CAL value set by parameter after
conversion from CAL voltage.
OK will be indicated when CAL value is within the limit.
NOK will be indicated when CAL value is out of the limit.   (Spindle
unit is unable to do tightening in case of NOK.)

④ [RESET] reset switch   :   Reset switch

This is used to reset spindle unit.   Press this switch while in
operation and tightening operation will be cancelled and tightening
data and output signals will be all reset.   Simultaneously spindle unit
will check torque sensor original level.
OK will be indicated when CAL value is within the limit.
NOK will be indicated when CAL value is out of the limit.   (Spindle
unit is unable to do tightening in case of NOK.)

(2) LED displaying operation status

① POWER LED   Yellow

Lighting when spindle unit is switched on.

② SP RUN LED   Orange
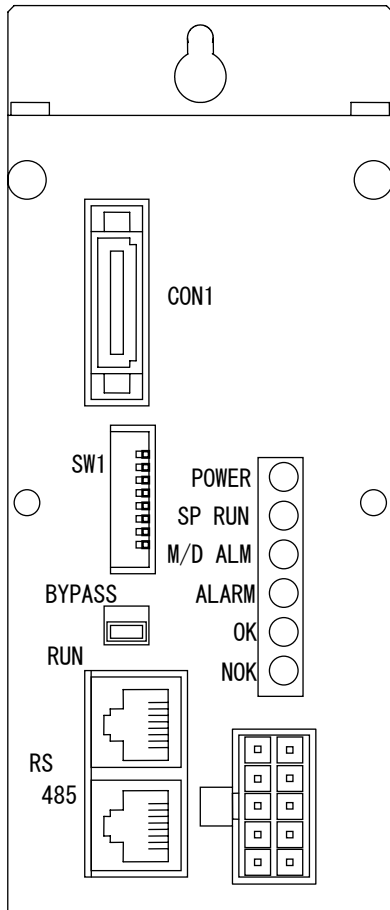
Lighting while in tightening operation.
Flushing while spindle unit is giving reverse operation.

③ M/D ALM LED <M/D ALARM> Red

Lighting when error is detected while in tightening operation or when system check is being made.

④ ALARM LED <ALARM> Red

Lighting when error takes the place while in tightening operation or when system check is being made.

⑤ OK LED <OK>   Green

Lighting when tightening operation was completed with result within setting range.

⑥ NOK LED <NOK>   Red

Lighting when torque NOK of upper limit or low limit
Lighting when angle NOK of upper limit of low limit

⑦ RUN/BYPASS LED   Red

Lighting when spindle unit in non-operation status.

(Panel diagram labels: CON1, SW1, BYPASS, RUN, RS 485, POWER, SP RUN, M/D ALM, ALARM, OK, NOK)

(3) Data display 7-segment LED

① [DATA] data display

Displays tightening result data and all setting data.

② [PARM] parameter number display

When a tightening cycle was over, this will indicate parameter number. This will indicate alarm number only when alarm takes the place.

③ [D-NO] data number display

This displays numbers indicating kind of data. (Refer to data number table.)   This displays number of spindle unit only when switched on or reset.   (U.01~U.31)

(4) Data display operation switch

① [MODE] mode key

Use this for mode change and move cursor (flushing display point).

② [SET] set key

Use this to fix display or data.

③ [↑] [↓] cursor key

This is to do scroll up and down display data and setting data.

6-2   RUN status operation

> When BYPASS LED is not lighting, spindle unit displays the status that BYPASS front switch is set RUN position and external non-operation signal is not input. Spindle unit gives tightening result, error and setting value displays.

6-2-1   Display

> [PARM]   : Displays numbers that is parameter number of last tightening.   Or, displays alarm number in case of alarm.

1.Parameter number 2 indication

```
DATA  ┌──────┐
PARM  │  02  │  D-NO
      └──────┘
```

2.Alarm number 8 indication

```
DATA  ┌──────┐
PARM  │  A8  │  D-NO
      └──────┘
```

3.E indication when no calibration number setting in parameter or connection of different tool is detected by pressing [CAL] switch.

```
DATA  ┌──────┐
PARM  │  E   │  D-NO
      └──────┘
```

> [D-No]: Displays data number on display.   (Refer to data number table.)

> [DATA]:Displays torque signal of torque sensor under real time mode.   Displays data that has been designated by [D-No] under tightening mode.

● Just after switching on and at the time of reset, this displays number of spindle unit.

Display of spindle number 03

```
DATA  ┌──────┐
PARM  │ U. 03 │  D-NO
      └──────┘
```

● Display of in tightening operation (number in tightening process)

Display of Work No. 3, repetition 1 time, mode No. 2 and step No. 4

```
DATA  │ 03  01 │        ←Work No, number of repetition
PARM  │ 02  04 │  D-NO  ←Mode No, step No.
```

6-2-2   Mode change

Press [MODE] switch under RUN status and you will be able to select 3 different display mode. Further, you can change display by operating switches $\boxed{\uparrow}$ and $\boxed{\downarrow}$.

Display will disappear while in tightening operation and it will be tightening result display mode when the tightening is completed. Pressing switches during tightening operation is not possible to change display or mode.

Tightening result display mode	$\boxed{\uparrow}$, $\boxed{\downarrow}$ changes contents of result. Does not display from tightening start to end.
$\downarrow$ MODE	
Tightening start → **Setting value display mode**	$\boxed{\uparrow}$、 $\boxed{\downarrow}$ changes display of setting value. Will be real time display mode when switched on.
MODE SWITCH ON	
Tightening start ← **Real time display mode**	$\boxed{\uparrow}$、 $\boxed{\downarrow}$ changes display contents. (Refer to data number table fordata numbers.)
MODE	
Status display	Displays status display when UEC-F300 gives alarm or stop signal is OFF input.
MODE	

6-2-3　　Key operation under RUN status

Press [MODE] key to select real time display mode, tightening result display mode or setting value display mode.

Will tell you change of display [DATA] mode with changing indication 「_1」, 「01」,and 「 1」 by pressing [MODE] key.
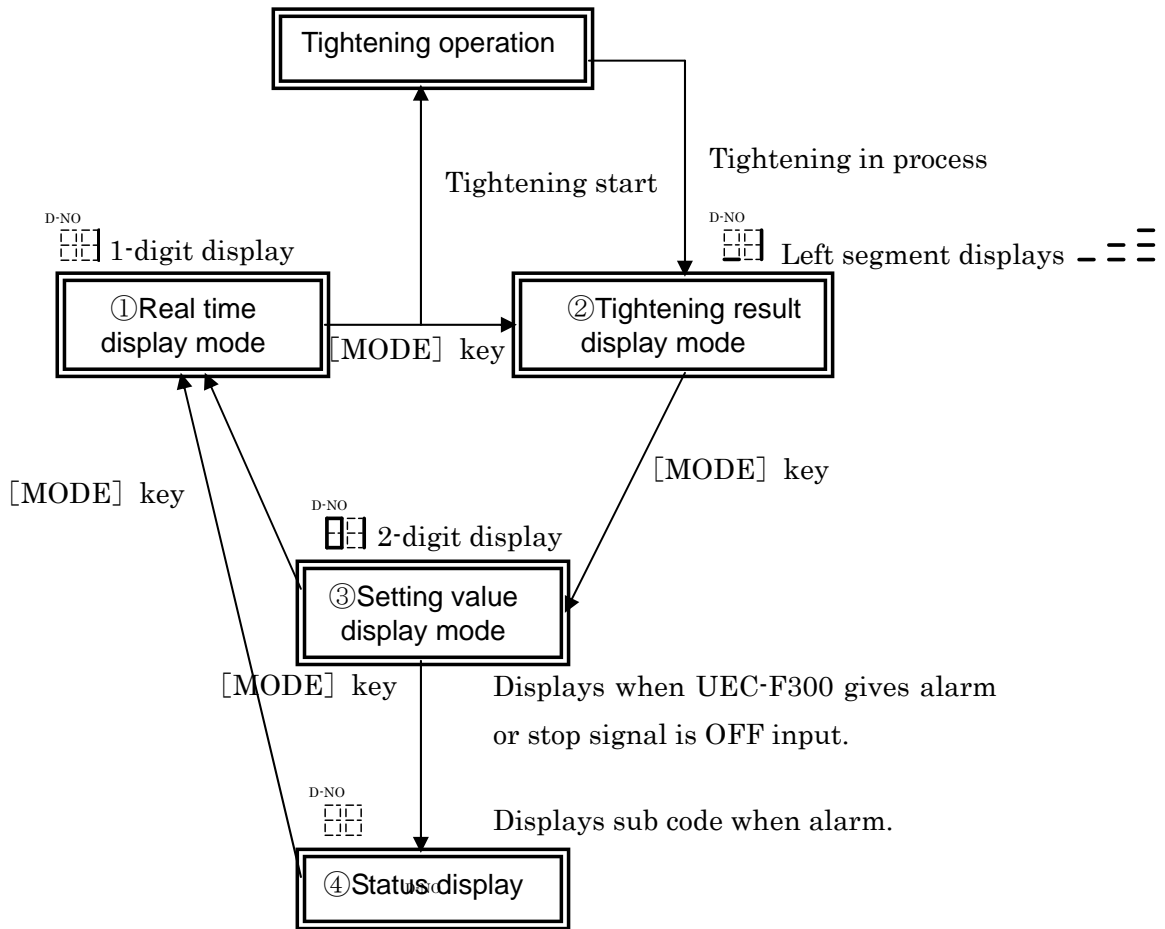
```
                    ┌─────────────────────┐
                    │ Tightening operation│
                    └─────────────────────┘
                       ↑              │
              Tightening start    Tightening in process

D-NO 1-digit display                    D-NO  Left segment displays  _ = ≡
┌──────────────┐                  ┌──────────────────┐
│①Real time    │  [MODE] key      │②Tightening result│
│ display mode │ ←──────────────→ │  display mode     │
└──────────────┘                  └──────────────────┘

[MODE] key                 [MODE] key
          D-NO 2-digit display
          ┌──────────────┐
          │③Setting value│
          │ display mode │
          └──────────────┘
                              Displays when UEC-F300 gives alarm
[MODE] key                    or stop signal is OFF input.

          D-NO                Displays sub code when alarm.
          ┌──────────────┐
          │④Status display│
          └──────────────┘
```

(1) When stop signal OFF input.
Displays STOP on [DATA] display.
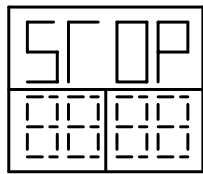
(2) When alarm occurs.
Displays Aln on [DATA] display.　　　Then [PARA] display will indicate alarm number with ALARM LED lighting and [D-NO] display will indicate sub code corresponding to alarm number.
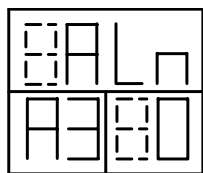
Alarm number 3 and sub code 0

==

① Real time data display mode

Pressing [↑] and [↓] key under real time display mode (「D-No」 display 0~5) will change 「D-No」 (data number) with following display appearing.

Following data will be displayed on 「DATA」 display.

D-NO	DATA
0	Display torque value
1	Display torque voltage
2	Display maximum torque (Maximum value hold)
3	Display turning angles
4	Electronic thermal value%(Over load detected when 100%) for adjustment
5	Motor current value (1024 is tool's maximum current) for adjustment

(D-No.0) Torque display value
　　Gives real time display of torque load applied to torque sensor.

(D-No.1) Torque voltage value display
　　Gives real time display of torque signal voltage from torque sensor.

(D-No.2) Maximum torque display
　　Displays peak torque that has been the maximum under selected mode since reset switch was pressed last.
　　Pressing [SET] key will maintain servo lock for a minute.

(D-No. 3) Turning angle display
　　Gives real time display of total angles in clockwise direction that has been turned under selected mode since reset switch was pressed last.
　　(-1999~9999 angles)

Key operation under <u>real time data display mode</u>

「D-No」 display　　　　Data displayed on 「DATA」

↑ key
or
↓ key

0	Torque value
1	Torque voltage value
2	Maximum torque display(maximum value hold)
3	Turning angle display
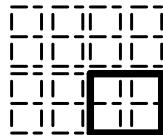
② Tightening result display mode

Pressing [↑] and [↓] key under tightening result display mode (「D-No」 display _0~=6) will change 「D-No」 (data number) with following display appearing. Following data will be displayed on 「DATA」 display. (D-No. with asterisk mark is effective for single spindle specifications)

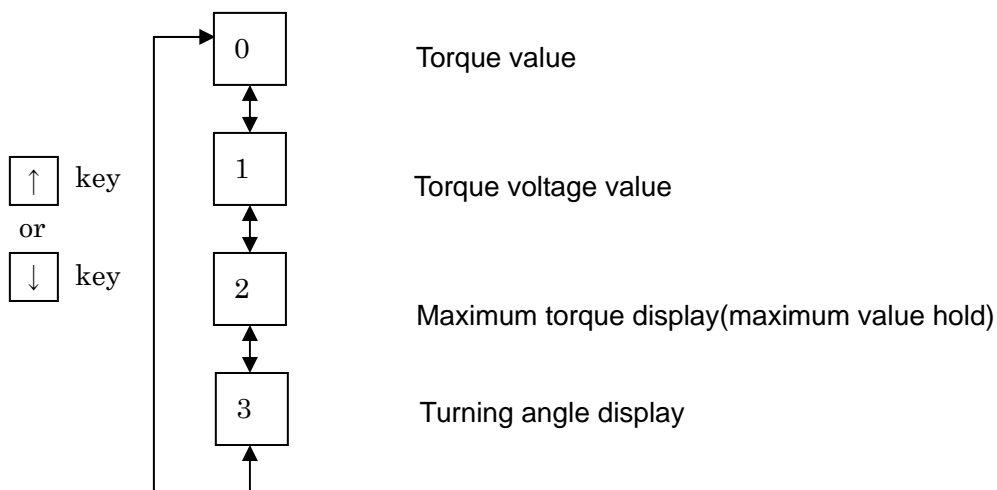|	D-NO	DATA
	__0	Peak torque value
	__1	Final angle value
	__2	Snug torque detection
	__3	Work Numbers
*	__4	1st area tightening time
*	__5	Final area tightening time
	__6	Cycle time
	__7	Tightening mode numbers
	==0	Tightening method numbers
	== 1	Step (multi-spindle:1/sindle spindle: 1 or 2)
	==2	For enhancement (not used yet)
	==3	Zero cal check ON: done / OFF:undone
	==4	Reverse flag ON:Yes/OFF:No
	==5	Why tightening suspended 0:reset/no data/after reverse, 1:alarm, 2:BYPASS signal, 3:stop signal, 4:NOK, 5:OK(when normal)
	==6	Torque judgment tq H/L(final) H/L(peak)
	==7	Angle judgment An H/L(angle
	==8	Snug judgment Sn H/L
*	==9	Timer judgment ti H/L(1st) H/L(FNL)
	==	CYCLE NO.
	== 1	MODE NO.
	==2	STEP NO.
*	==3	1st Peak torque
	==4	Final torque value
	==5	Angle at peak torque
	==6	Maximum current value (A)

Key operation under tightening result display mode

「D-No」 display   Data displayed on 「DATA」 display

| ↑ | key
or
| ↓ | key

_0   Final torque

_1   Final angle

_2   Detected snug torque
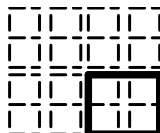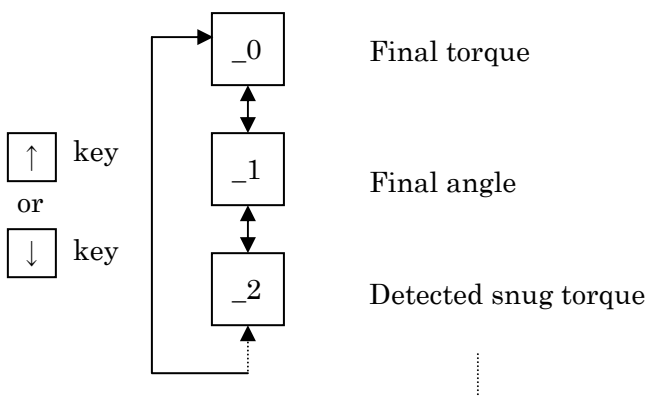
D-No. area display in tightening process for single spindle specifications

In. Tightening is in process under initial speed.
Fr. Tightening is in process under free run speed.
LS. Tightening is in process under slow down speed.
Tq. Tightening is in process under torque speed.
1E. 1st completed and waiting for 2nd step.
2d. Tightening is in process under 2nd step.
2E. 2nd (cross) completed and waiting for 3rd step.
3d. 3rd tightening is in process.

CH. Doing offset check.

Others
R2. Reverse 2 operation with designated number of thread is in process.
R3. Reverse 3 operation with designated number of thread is in process.

Ordinary reverse operation is not displayed.

③ Setting value display mode

Pressing [↑] and [↓] key under tightening setting value display mode (2-digit D-No)display 00~74) will change 「D-No」 (data number) and you will be able to see individual setting value. 「PARM」 parameter number can be changed from 1~64 and the corresponding data will be displayed. You can have all displays with setting value data and parameter numbers inclusive by operating [↑] or [↓] key. (Keep pressing [↑] or [↓] key and the display will proceed display of data number and parameter one by one.)

Key operation under <u>tightening setting data display mode</u>

	「D-No」 display	Data displayed on 「DATA」 display
↑ key or ↓ key	00 PARM 0	Torque unit
	01 PARM 0	NR version
	02 PARM 0	Amplifier version
	03 PARM 0	External gear ratio
	PARM 1 〜 PARM 64	· · · · ·
	73 PARM 64	Torque unit
	74 PARM 64	1P torque

③ Setting value display mode
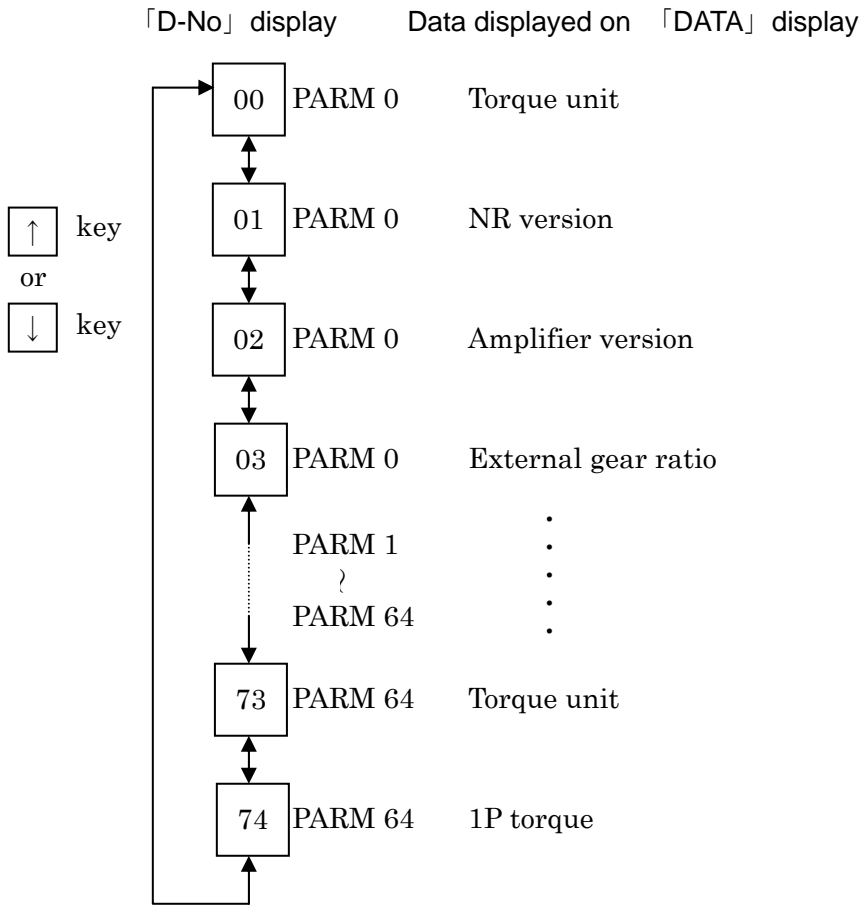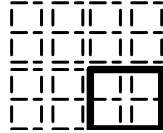
Status display

Displays this status display when UEC-F300 gives alarm or stop signal is OFF input. Status display will be the following display (「D-NO」 display is not available).

(1) When stop signal OFF input.

Displays STOP on 「DATA」 display.
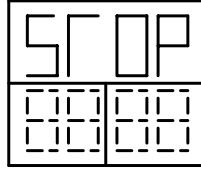
(2) When ALARM occurs.

Displays Aln on 「DATA」 display.

At the same time display of ALARM LED on 「PARA」 will light with alarm number display, and display of 「D-NO」 displays sub code number corresponding to alarm number.
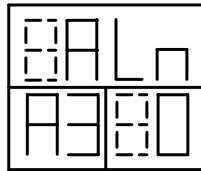
Alarm number 3 and sub code 0 display

6-3   BYPASS (non-operation) status

Position of BYPASS switch will tell you non-operation switched on status.   Spindle unit will display on D-No display "U.01" together with spindle number but will not give 「DATA」 display under non-operation switched on status.

6-3-1   Download mode and setting value select mode

(1) Down load mode

Spindle unit becomes down load mode after switching on BYPASS.   Download mode is the status that you can re-write setting values from your PC.

Press [MODE] key and spindle unit will move from download mode to setting value select mode.   (In case spindle unit is in transmission mode due to communication circuit, download mode will be maintained until the transmission is completed.)

(2) Setting value select mode

After entering setting value select mode, a cursor will appear on 「PARM」 display with flushing (indicating data input ready).

You can change display contents in the cursor by pressing [↑] [↓] key.   「DATA」 display will display parameter numbers 「PARM」or setting values on data numbers of 「DATA」 .

Pressing [MODE] key will move cursor.

Parameter number

MODE
key

Upper rank data number

Subordinate rank data number
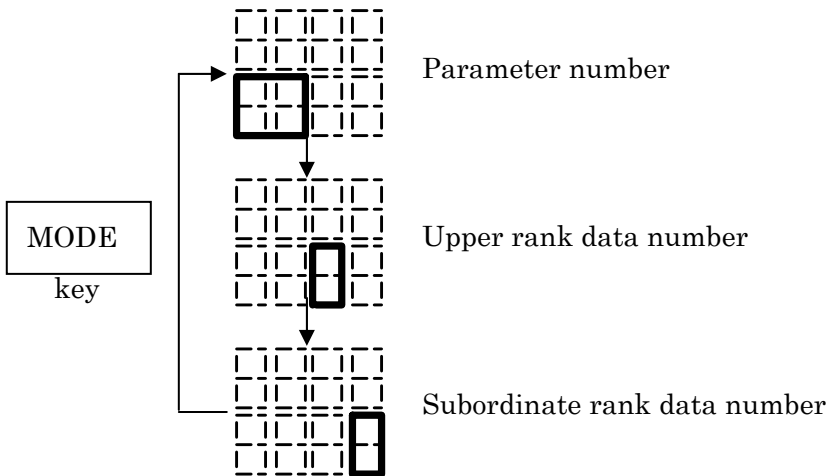
Data edit mode can change data that is on display.
Pressing [SET] key and the mode will be changed to data edit mode.

6-3-2   Mode change

Press [MODE] switch one time to change to setting value select mode and a cursor appearing with the first digit flushing.

```
┌─────────────────┐
│ Spindle number  │
│ display U.xx     │
└─────────────────┘
        │
     ┌──────┐
     │ MODE │
     └──────┘
        │
┌─────────────────┐
│ Parameter       │
│ number select   │
└─────────────────┘
     ┌──────┐
     │ SET  │
     └──────┘
     ┌──────┐
     │ MODE │
     └──────┘
        │
┌─────────────────┐
│ Select of upper │
│ rank data number│
└─────────────────┘
     ┌──────┐
     │ SET  │
     └──────┘
     ┌──────┐
     │ MODE │
     └──────┘
        │
┌──────────────────────┐
│ Select of subordinate│
│ rank data number     │
└──────────────────────┘
     ┌──────┐
     │ SET  │
     └──────┘
     ┌──────┐
     │ MODE │
     └──────┘
```

Press MODE switch to change to setting value select mode and a cursor appearing with the first digit flushing.

Change parameter numbers +1, -1 by pressing ↑ and ↓ key.
Press SET switch to change to EDIT mode in order to amend setting value on display on DATA display.

Do ups and downs by pressing ↑ and ↓ key.(Refer to data number table.)

Do ups and downs by pressing ↑ and ↓ key.   (Refer to data number table.)

Data edit mode

MODE MODE MODE

┌──────┐
│ MODE │
└──────┘

```
┌───┐ ┌───┐ ┌───┐ ┌───┐
│ ⊔ │ │ ⊔ │ │ ⊔ │ │ ⊔ │
└───┘ └───┘ └───┘ └───┘
```

┌──────┐
│ SET │
└──────┘

Press MODE switch to move cursor.Pressing MODE switch 4 times will cancel the values and display will return to parameter number select mode.
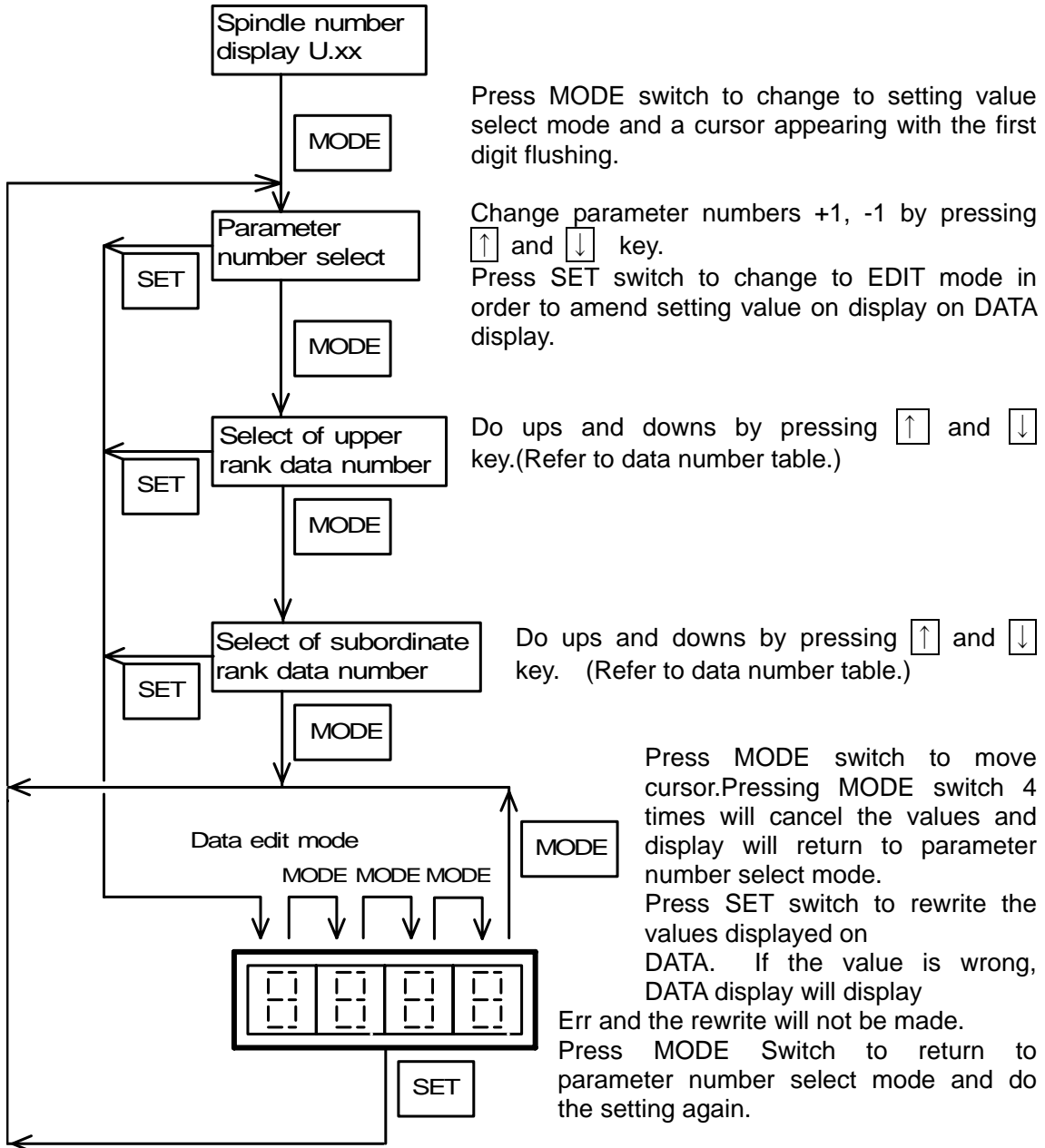Press SET switch to rewrite the values displayed on
DATA.   If the value is wrong, DATA display will display
Err and the rewrite will not be made.
Press MODE Switch to return to parameter number select mode and do the setting again.

When you change torque unit number or tool type, DATA display will CHNG with Π_____ (NO) indication on [D-NO].   You can select YES or NO by pressing ↑ and ↓ key.   When your selection is "YES" (YES) press SET switch and the data setting will be made.   Selection of NO by SET switch, pressing mode switch or not pressing any switch for 5 seconds under option of NO will return to setting value select mode by canceling amended values.

Note: Change of tool type (D-No 20 of PARM 0) will chancel data of torque rate (D-NO 00~1E) and rotation speed (D-NO 50~56).
Note: Spindle unit will store amended setting values when non-operation switch has been set from BYPASS to RUN position.   If power supply to spindle unit is turned off during setting value change is in process (BYPASS status), amended values will be disregarded and setting values will remain the same as before amendment.

===

45

6-3-3   Key operation under non-operation status

```
┌─────────────────────┐
│  Download mode      │
└─────────────────────┘
```
［MODE］key   ↓

```
┌─────────────────┐   ［SET］key   ┌─────────────────┐
│  Setting value  │ ─────────────> │  Data edit mode │
│  select mode    │ <───────────── │                 │
└─────────────────┘                └─────────────────┘
```
                    ［SET］key :Data setting
                              or
        Press ［MODE］key at bottom digit :Data not changed
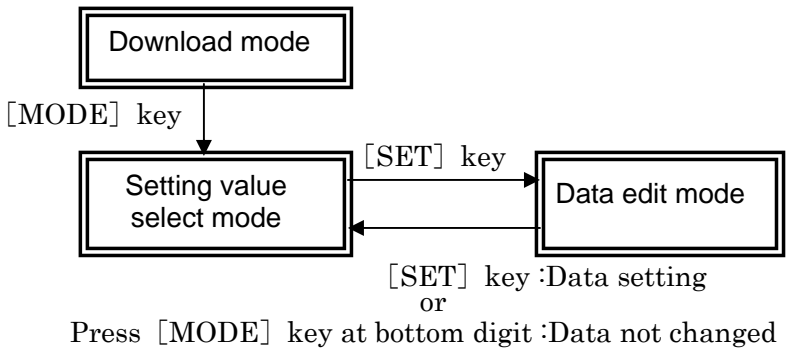
Key operation under <u>setting value select mode</u>

Parameter number   Data number   Data number
「PARM.ALN」 ───────────> 「D-NO」① ───────────> 「D-NO」②
          ［MODE］key   ［MODE］key

                        ［MODE］key
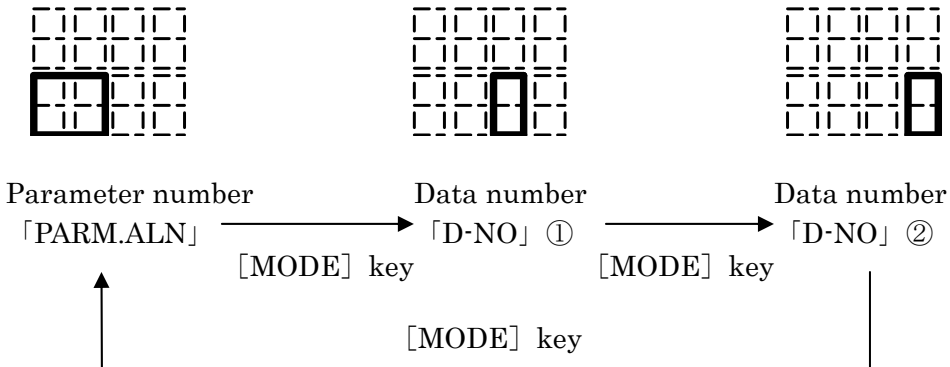
(1)Select of parameter number

When cursor is with 「PARM」 press ↑ and ↓ key and the display will change
0~64. 「DATA」 display will display input parameter number.

「DATA」 ──────>

            「D-NO」①   「D-NO」②
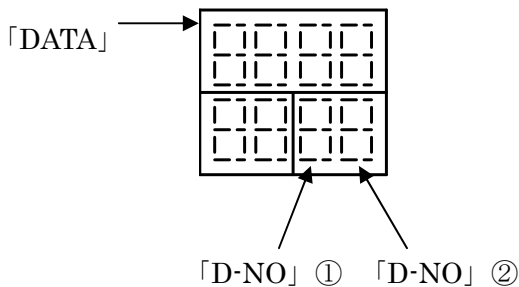
(2)Select of data number

When cursor is with ① display 「D-NO」, key operation of ↑ and ↓ will change
one digit of upper rank of data number.
When cursor is with ② display 「D-NO」, key operation of ↑ and ↓ will change
one digit of subordinate rank of data number.
Data of data number is displayed on 「DATA」.
Please note that spindle unit may not display unnecessary setting data depending upon
tightening method setting.

6-3-4   (1) Parameter list (mutli-spindle specifications)
【System parameter】

PARM   D-NO

00-00	Torque unit	0	Nm (Others not available)
00-01	(Spindle soft version)	0.17	
00-02	(Amplifier soft version)	4	
00-03	Function version	1.00	
00-04	External gear ratio	1.000	
00-20	Connected tool umber	5	UNR-F015-350NT
			(Refer to next page tool list.)

【Tightening parameter】

Parameter (01~64   01~32 for single spindle use)

PARM   D-NO

01-00	Tightening mode	0x10:Torque method
		0x11: Angle mode
		0x12: Spline fit-in torque method
		0x13: Plastic area angle method
		0x14: Pre-load
		0x15: Pin hole control
		0x16: Idle running check
		0x17: Spline angle method (cut torque valid) exclusive use for spline angle method
	Tightening direction	x0xx: clockwise x1xx: counter-clockwise

PARM   D-NO

01-05	Tightening mode OPTION 1	0000 for enhancement
06	Tightening mode OPTION 2	0000 for enhancement
07	Motor speed control	0: fixed speed 1: variable speed
08	Torque judgment	0: peak, no final torque judgment
		1: torque judgment
09	Angle judgment	0: No 1: Yes
0A	Cycle judgment	0: No 1: Yes
0B	1P reverse	0: No 1: Yes
0C	Snug torque judgment	0: No 1: Yes
10	CAL value	Note: Depending upon work numbers
11	Torque low limit	Peak torque value
12	Torque upper limit	
13	Cut torque	Torque
14	Speed change torque	
16	Snug torque	
17	Snug torque low limit	※ Does not display
18	Snug torque upper limit	parameter numbers
19	Final torque low limit	not in use.
1A	Final torque upper limit	
1B	Incline detection torque	Plastic
1C	Fit-in torque upper limit	
1D	Concurrent turning start torque	Angles
1E	Concurrent turning end torque	Angles
1F	Start torque upper limit	
20	Angle low limit	
21	Angle upper limit	
22	Cut angle	Angles
23	Concurrent turning judgment angle	Angles
30	Incline rate	Plastic
31	Fit-in incline ratio	Spline
32	Cut point	Spline
33	Measurement clear point	Spline
34	Start point	Spline
40	Initial rotate timer	

===

```
PARM   D-NO
   41    Cycle timer
   43    Initial timer
   45    Rotate speed increase time           0.5 seconds
   46    Rotate speed decrease time            0.5 seconds
   47    Reverse rotate speed increase time    0.5 seconds
   48    Cut hold timer
   49    Start delay timer                Pre-load
   4A    1P timer                         1P
   4B    Idle running measurement timer
   50    Initial speed
   51    Free run speed
   52    Reduction speed
   53    Torque speed
   54    Reverse speed             Note: Depending upon work numbers
   55    1P speed                  1P
   60    Thread numbers for free run
   61    Thread numbers for start torque    Start torque cut    Thread numbers
   73    Motor torque              Nm
   74    1P torque                 Nm   1P
```

※ Values of D-No.10, 54 (CAL and reverse speed) will depend upon PARM01→WORK 1 ~ PARM16→WORK16 respectively.

==

6-3-4   (2) Tool list

Tool setting No.	Tool type	Max. torque Nm	Max. speed	CAL	Spindle unit
1	UNR-F015-45NT	4.5	3200	34.3	UEC-F024
2	UNR-F015-65NT	6.5	2222	34.3	UEC-F024
3	UNR-F015-200NT	20.0	730	34.3	UEC-F024
4	UNR-F015-280NT	28.0	507	34.3	UEC-F024
5	UNR-F015-350NT	35.0	412	34.3	UEC-F024
11	UNR-F015-500NT	50.0	221	78.6	UEC-F024
12	UNR-F015-800NT	80.0	180	78.6	UEC-F024
13	UNR-F015-25NTC	28.0	469	53.4	UEC-F024
14	UNR-F015-55NTC	55.0	264	53.4	UEC-F024
21	UNR-F050-270NT	27.0	1778	34.3	UEC-F120
22	UNR-F050-630NT	63.0	765	83.4	UEC-F120
23	UNR-F050-730NT	73.0	653	83.4	UEC-F120
24	UNR-F050-880NT	88.0	540	147.1	UEC-F120
25	UNR-F050-1400NT	140.0	343	147.1	UEC-F120
31	UNR-F050-1300NTC	130.0	324	194.3	UEC-F120
32	UNR-F050-1800NTC	180.0	231	342.7	UEC-F120
33	UNR-F050-2800NTC	280.0	165	306.0	UEC-F120
34	UNR-F50-95NTC	95.0	485	129.7	UEC-F120
35	UNR-F50-130NTC	130.0	347	228.8	UEC-F120
41	UNR-F100-1300NT	130.0	730	147.1	UEC-F120
42	UNR-F100-1900NT	190.0	507	245.2	UEC-F120
43	UNR-F100-2500NT	250.0	376	245.2	UEC-F120
44	UNR-F100-3700NT	370.0	259	392.3	UEC-F120
45	UNR-F100-5400NT	540.0	175	686.5	UEC-F120
46	UNR-F100-7000NT	700.0	121	686.5	UEC-F120
47	UNR-F100-10000NT	999.0	90	980.6	UEC-F120
51	UNR-F100-2200NTC	220.0	351	306.0	UEC-F120
52	UNR-F100-2800NTC	280.0	244	509.9	UEC-F120
53	UNR-F100-3800NTC	380.0	245	507.5	UEC-F120
54	UNR-F100-200NTC	200.0	469	228.8	UEC-F120
55	UNR-F100-250NTC	250.0	325	381.4	UEC-F120
56	UNR-F100-380NTC	380.0	241	381.4	UEC-F120
57	UNR-F100-550NTC	550.0	166	610.2	UEC-F120
107	UNR-801RM3-S	80.0	500	78.5	UEC-F040
108	UNR-132RM3-S	130.0	395	127.5	UEC-F040
109	UNR-202RM3-S	200.0	220	196.1	UEC-F040
110	UNR-302RM3-S	300.0	150	294.2	UEC-F040
120	UNR-601RM3-S	60.0	790	58.8	UEC-F040

======Chapter 6==

Calibration value setting

Input tools' torque in spindle unit as the calibration value usually. Change calibration number, however, to compensate the difference UEC-F300 detect display and inspection result by test equipment which can be caused by physical circumstances such as special socket or additional offset gears giving tools' front part burdens, or fasteners' nature of joint.

$$\frac{\text{Inspection result from test equipment}}{\text{UEC display}} \times \text{CAL value} = \text{New CAL value}$$

Example 1   Use of F015-350NT with CAL value 34.3 gives UEC display 20.0 but detected value on testing equipment shows 18.0Nm.

$$\frac{18.0}{20.0} \times 34.3 = 30.8$$ Change CAL value to 30.8.

Example 2   Use of F100-3700NT with CAL value 392.3 gives UEC display 200.0 but detected value on testing equipment shows 210.0Nm.

$$\frac{210.0}{200.0} \times 392.3 = 411.9$$ Change CAL value to 411.9.

Note: Make sure that all other setting values are smaller than new CAL values when you change CAL number.
Other setting values must be smaller than tools' maximum torque and also CAL value.

==

Chapter 7   Trouble shooting

7-1   Alarm display

We will explain trouble conditions and how to pursue the causes when ALARM LED on spindle unit front panel is lighting while in operation of UEC-F300.

Display of alarm sub code   Note: Optional display panel is required.

Keep pressing [MODE] switch until 「DATA」 "ALn" is displayed.   Make it a few times.   Panel display will become the following status with alarm sub code display on 「ANGL/SPNO」.

Display of ALARM 1
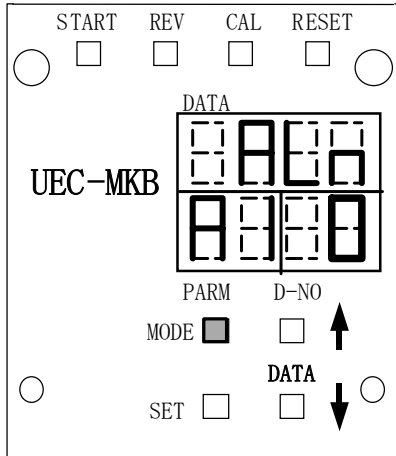
Refer to 6-2-2 of Chapter 6 status display.

「D-NO」will display alarm sub code.

Alarm No. 1:   Zero/CAL error
          CAL check has detected an error with torque sensor original point.
Alarm No. 2:   Pre-amplifier error
          Torque over under torque cut status
Alarm No. 3:   Pre-amplifier error
          An error with ID of pre-amplifier has been detected.
Alarm No. 4:   System memory error
          An error with system memory has been detected.
Alarm No. 6:   Servo amplifier type error
          Type of motor and servo amplifier are different.
Alarm No. 8:   Servo amplifier error
          An error with servo amplifier has been detected.
Alarm No. 9:   Tightening setting data error
          Tightening setting data has an error.

7-2 Alarm numbers and the contents

Alarm	Sub Code	Place	Error contents and remarks	Disposi- tion
1	0	Zero/ CAL Error	Zero point master error. Tool and torque sensor connection original point voltage error.	01.09.11. 31.33.34. 36
	1		CAL error. Torque sensor CAL voltage error.	01.09.11.31. 33.34.36
	4		Switched on under Zero point master error. Unable to start tightening due to Zero point master error. Unable to start tightening until fixed.	01.09.11.31. 33.34.36
	5		Tightening after CAL error. Unable to start tightening due to CAL error. Unable to start tightening until fixed.	01.09.11.31. 33.34.36
	6		Zero point error. Torque sensor original point error either by reset or Zero/CAL check.	01.09.11.31. 33.34.36
2	1	Pre-ampli-fier	Torque over under torque cut status	
3	1	Pre-ampli-fier	Tool type error. Tool number memory-retained by spindle unit is different from actually connected tool.	12
	2		Tool not connected when tightening start.	01.31.36
	3		Tool not connected	01.31.36
4	0	Sys-tem me-mory	F-Rom writing error	33.35.39
	1		F-Rom download error	33.35.39
	2		F-Rom amplifier side error	33.35.39
6	0	Type of servo amp	Setting of servo type is not made yet. Motor type and servo type are different.	12.13.31. 32.35.36
8	1	Ser- vo amp-lifier	Spindle unit over heat.	28.29.31 32.35.36
	4		Over current	10.16.17. 22
	5		Over voltage, internal power voltage	10.18.19 22.32
	6		Power source voltage	18.19
	9		Over speed	02.05.31. 36
	10		Over load	10.29.36. 38
	11		Resolver	02.05.31. 36
9	1	Tigh-tening setting data	Setting error. 0 setting for start (time, speed)	12.13
			System error 1. No setting designated parameter and reverse speed	12
			System error 4. Wrong torque setting.	12.39
			System error 5. Wrong angle setting	12.39
			Torque limit over. (1.25 times of rated output under stall and reverse)	

Trouble shooting

No.	Trouble shooting
01	Check pre-amplifier cable.
02	Check resolver cable.
03	Check motor power cable.
04	Replace pre-amplifier cable with spare.
05	Replace resolver cable with spare.
06	Check motor power cable with spare.
07	Replace spindle unit power cord.
08	Check rotating resistance given by nutrunner front tool (spindle adapter or etc).
09	Check original point calibration value.
10	Check fasteners (to be tightened by spindle unit and tool).
11	Check whether nutrunner center and fastener center are in a line.
12	Input right setting values.
13	Input tightening setting values.
14	Carry out tightening.
15	Cool down.
16	Replace spindle unit with regular spindle unit.
17	Replace tool with regular tool.
18	Confirm power source voltage is AC200~220V.
19	Check power source plug and socket.
20	Check I/O wiring f spindle unit.
21	Check tightening sequence setting.
22	Confirm rotating speed setting.
23	Check resolver.
24	Check motor resistance value.
25	Confirm that free running torque is smaller than 1/8 of CAL value.
26	Press spindle unit START switch to switch on start.
27	Press spindle unit REVERSE switch to switch on start.
28	Check if environmental temperature conforms to the specifications.
29	Check if cycle time duty conform to the specifications.
30	If cooler is equipped, check the cooling conditions.
31	Connect tool in operation and check.
32	Replace spindle unit in operation and check.
33	Switch on and check after keeping spindle unit switched OFF position for 5 minutes.
34	Check if tool has been firmly fixed.
35	Replace spindle unit.
36	Replace tool.
37	Give URYU a report together with your present setting values.
38	Take torque wave curve and give it to URYU.
39	Contact URYU.
40	

Note: Tightening cycle, tightening time, tool speed or character of fasteners can cause over load of ALARM No. 8 and sub code 10.

Counter measures:
1.   Make tightening time short.   (Increase slow down speed and tightening speed.)
2.   Increase torque value that switches on speed change from slow down speed to torque speed.   When this torque value setting is greater than 1st torque, tool will shift to torque speed as soon as tightening reaches 1st torque.   Increase 1st torque setting together.
3.   Extend tightening intervals.

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Chapter 8   Option

UEC-F300 unit provide the following options.

   1. UEC-MKB
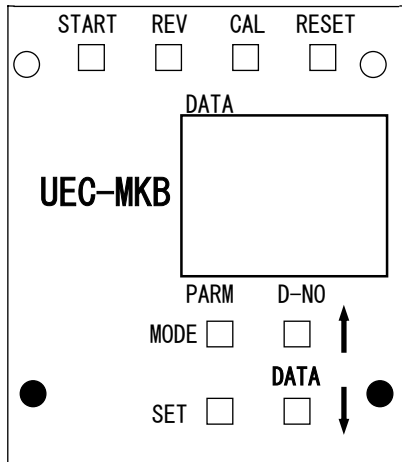
        Display unit to be installed to UEC-F024 and UEC-F040.
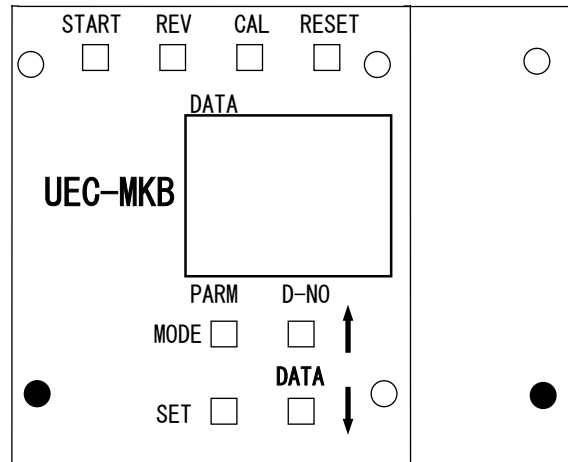
   2. UEC-MKB II

        Display unit to be installed to UEC-F120.

Installation and removal

      Open or tighten 2 screws at the bottom part highlighted by black circle (●) for installation and removal.   Do not open screws available at top part this display unit.

UEC-MKB	UEC-MKB II