GIKEN

Hand Tool Nut Runner Series

Pistol・Angle・Straight Type Nut Runners

Instruction Manual

Rev.4 2021.07.30

Giken Industrial Co., Ltd.

Before beginning operation

⚠Caution

■Note

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

⚠Caution

■Measures in case of an emergency

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

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

⚠Caution

■Precautions to turn ON the power for the first time after the installation.

1. Be sure to install RDC (residual-current-operated protective device) on the power supply.
   Breaker capacity: 15 A for use at 100 V. For use at 200 V, use 10 A.
   Sensitivity current: 15 mA used.
2. Check the power supply (specification) of the power supply, then take the power supply.
3. Ensure construction of earth ground. It may cause electric shock.
4. Install the controller in the stable place to prevent vibration and falling during operation.
   Installation in the inclined or unstable place causes an accident and trouble for falling of the controller due to slip, shock and vibration.
5. Please keep the space of W:160mm D:330mm H:220mm to install the controller.
6. Installation such as side placing of the controller is prohibited.
7. At the time of a cable wiring, please wire from the condition which stretched the cable once. With the winding and so on, it becomes the cause which damages the cable.
8. At the time of a cable wiring, please wire so that the extreme winding (less than R=100mm) may not exist.
   Also, as for the fixed part, fix it so that the fall of the cable and so on may not be expected.
9. Confirm that the connector was inserted firmly so that it may not be disconnected.
10. Make sure that the locking type connector is securely locked.
11. Confirm that the connection of the cable is right before the turning ON. (The watching check)

— Contents —

1． System outline

This system is hand tool type nut runners using the tightening know-how cultivated by the conventional multi-spindle tightening control “GSS Control System”. Three models are available; 「Pistol type(GP series)」, 「Angle type(GA series)」 and 「Straight type (GS series)」。

As for the controller、it united in the interface unit and the driver unit of the conventional GSS controller to realize simplification and downsizing as 1 tool to 1 controller.

Tool section

Tightening accuracy 6σ ± 2%

Small transducer is built in the top of the tool and it realized such accuracy that the conventional air hand tool could not obtain.

The tool is light and easy to operate due to the design based on ergonomics and lightening over the detail.

High-intensity lamp is installed in the body of the tool which enables to confirm the present condition and the tightening result easily with the lamp.

Controller section

Downsizing was realized by means of uniting the interface unit and the driver unit.

A large sized panel is used for the front and the tightening result as well as the abnormal contents can be confirmed at a glance.

Using USB cable connection, it is possible to change the setting data and obtain data of results, etc. by the special software through the communication with a personal computer.

6000 data as the past tightening history can be stored in the controller.

Tightening control processing

It is possible to set 3 kinds of speed at any timing of switching.

It has a preventing function with nibbling in the tightening part at beginning of tightening by the soft start feature.

It has a feature to reduce a load to the wrist and the arm by the gradient setting and the soft stop control.

2．Specifications

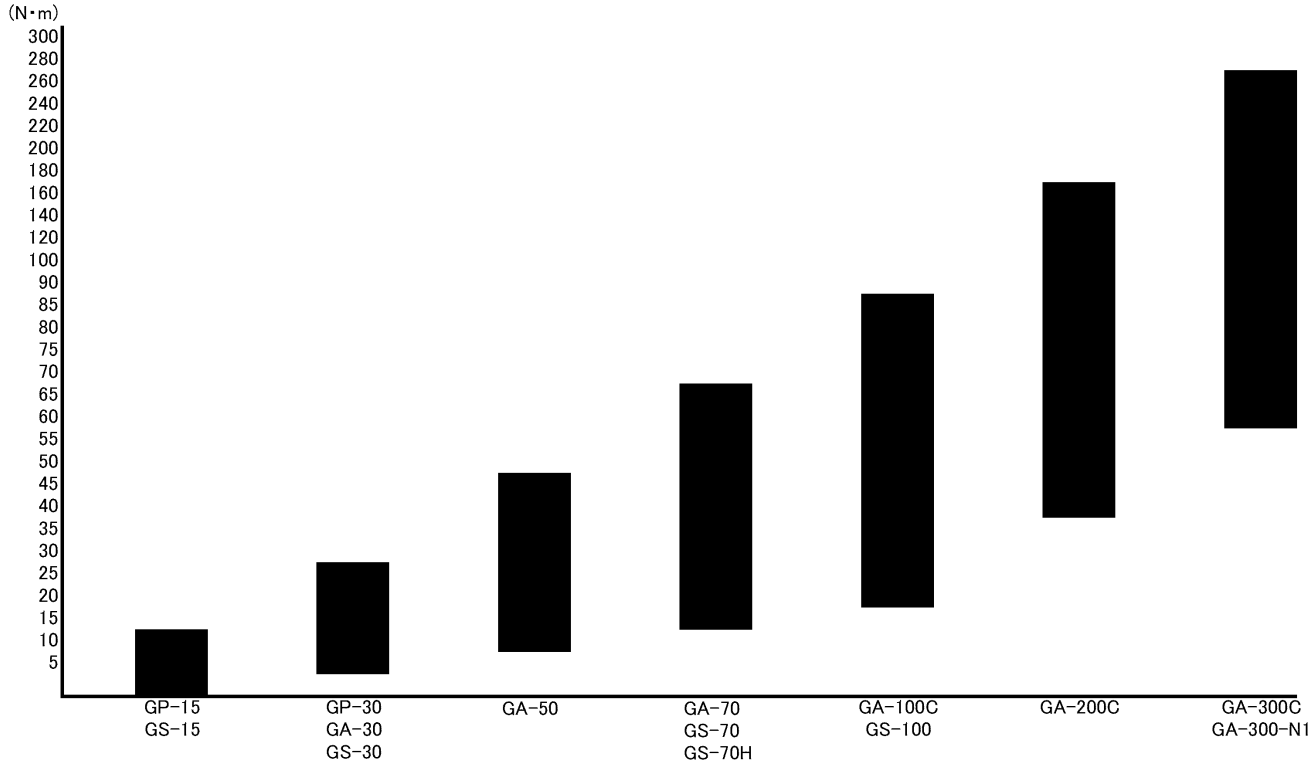
2－1 Nut runner specifications

Tool model		Proper Torque at 200V 【 】value at 100V (Nm)	Max.RPM (rpm)	Sq. size	Weight (Kg)	Overall length (mm)
PISTOL	GP－15	3～13【3～13】	1250	Hex, Bit □ 9.5	0.75	205
	GP－30	6～27【6～24】	950	□ 9.5	1.2	250
ANGLE	GA－30	6～27【6～21】	800	□ 9.5	1.4	430
	GA－50	10～45【10～35】	470	□ 9.5	1.5	444
	GA－70C	15～63【15～43】	400	□ 12.7	1.9	469
	GA－100C	20～90【20～68】	500	□ 12.7	3.0	538
	GA－200C	40～180【40～139】	220	□ 12.7	4.0	576
	GA－300C	60～250【60～185】	145	□ 19.05	4.4	599
	GA-300-N1	60～270【60～210】	90	□ 19.05	4.4	611
STRAIGHT	GS－15	3～13【3～13】	1250	□ 9.5	0.9	341
	GS－30	6～27【6～24】	950	□ 9.5	1.3	394
	GS－70	15～63【15～55】	300	□ 12.7	1.4	423
	GS-70H	15～63【15～55】	760	□ 12.7	2.5	473
	GS－100	20～90【20～78】	420	□ 12.7	2.9	505

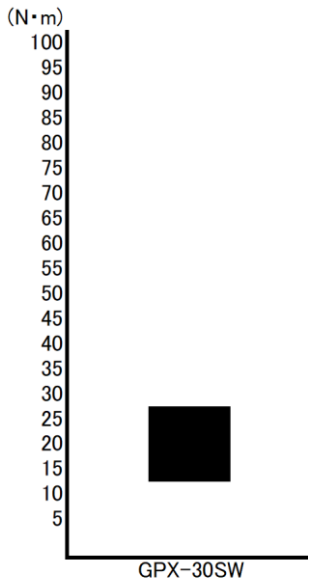
・Non-reaction pistol type

Tool model		Proper Torque at 200V 【 】value at 100V (Nm)	Max.RPM (rpm)	Sq. size	Weight (Kg)	Overall length (mm)
PISTOL	GPX－30SW	10～30【10～30】	4700	□9.52	1.15	241

*GPX-30SW is a pulse-only tool

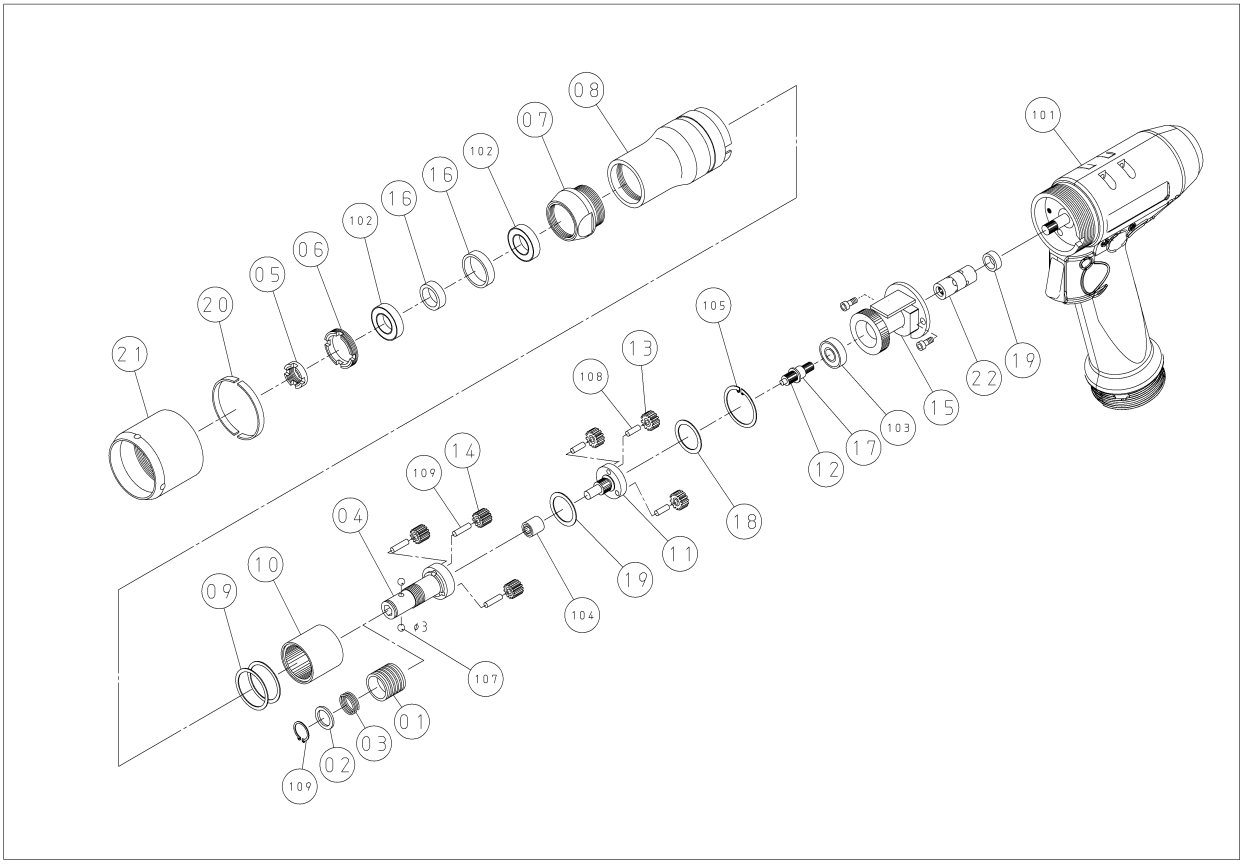


・Non-reaction pistol type



2－2 Exploded view of Nut runner

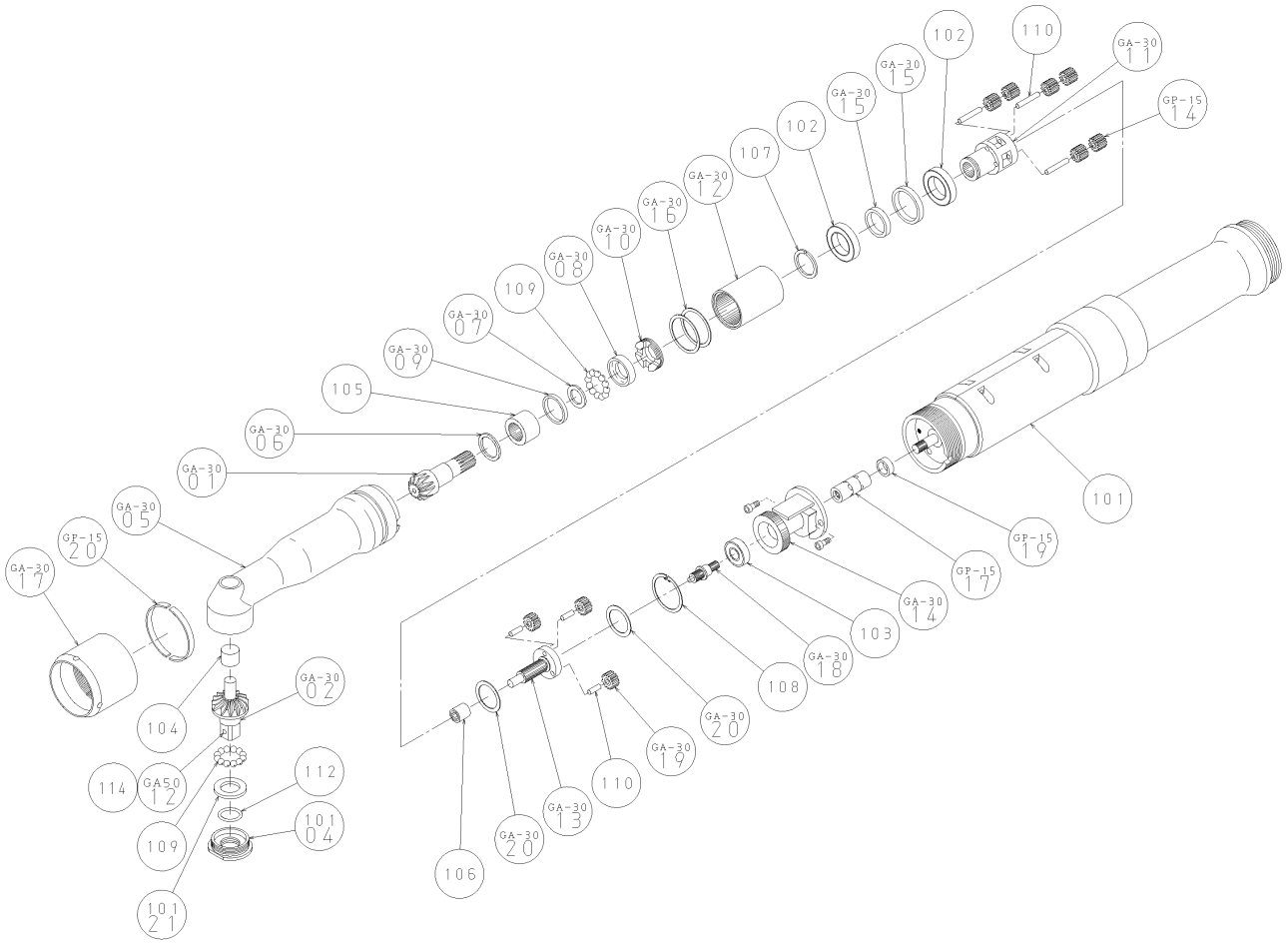
2－2－1 Pistol type



Part No.	Name	Model	Q'ty
101	AC servo motor		1
102	Ball bearing	6801ZZ	2
103	Ball bearing	697	1
104	Needle bearing	TLA59Z	1
105	Snap ring	IRTW22	1
106	Snap ring	ISTW10	1
107	Steel ball	φ3	2
108	Needle roller	φ3x9L	3
109	Needle roller	φ3x12L	3

Part No.	Name	Model	Q'ty
1	Bit chuck		1
2	Spring cap		1
3	Spring		1
4	Spring		1
5	Lock nut in.		1
6	Lock nut out		1
7	Cap		1
8	Case		1
9	Thrust washer		2
10	Internal gear		1
11	Planet frame		1
12	Drive gear		1
13	Planet gear		3
14	Planet gear		3
15	Transducer		1
16	Collar		1
17	Bearing cap		1
18	Thrust washer		2
19	Motor collar		1
20	Stopper ring		1
21	Nut		1
22	Coupling		1
23	Bushing		1
24	Bushing		3
25	Bushing		3

2－2－2 Angle type

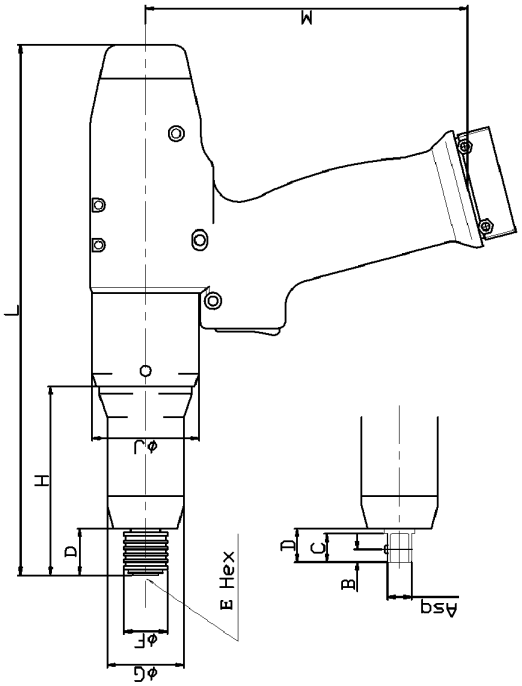


Part No.	Name	Model	Q'ty
101	AC servomotor		1
102	Ball bearing	6802	2
103	Ball bearing	697	1
104	Needle bearing	TLAM79	1
105	Needle bearing	TAF121912	1
106	Needle bearing	TLA59Z	1
107	Circlip	WR15	1
108	Snap ring	IRTW22	1
109	Steel ball	ϕ3	26
110	Needle roller	ϕ3x9. 5L	3
110	Needle roller	ϕ3x22.5L	3
112	O-ring	S12.5	1
114	Spring	WF3-5	1

Part No.	Name	Model	Q'ty
1	Bevel gear		1
2	Bevel gear		1
4	Cap		1
5	Body		1
6	Thrust washer		1
7	Bearing cap		1
8	Bearing race		1
9	Spacer		1
10	Lock nut		1
11	#2Planet frame		1
12	Internal gear		1
13	Planet frame		1
14	Transducer		1
15	Ins./Outs.collar		1
16	Thrust washer		2
17	Case		1
18	Drive gear		1
19	Planet gear		3
20	Thrust washer		2
21	Bearing cap		1
GP-15 14	Planet gear		6
GP-15 17	Coupling		1
GP-15 19	Motor collar		1
GP-15 20	Stopper ring		1
GA-50 12	Plunger pin		1

2－3 Dimensions table

2－3－1 Pistol type

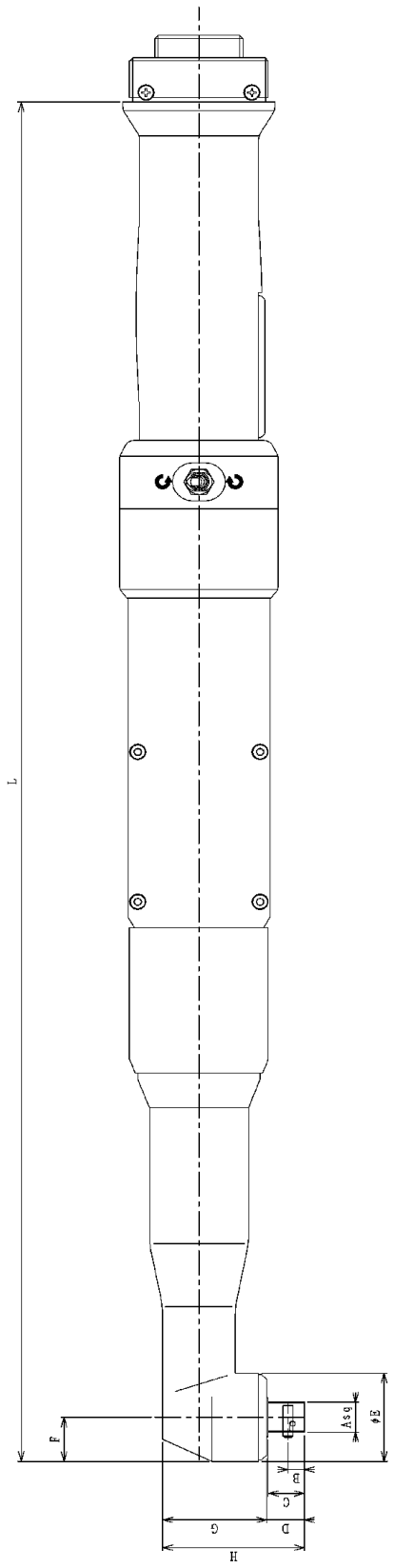


Model No.	A sq	B	C	D	E Hex	ΦF	ΦG	H	ΦJ	L	M	Weight(kg)
GP-15 Hex,Bit	–	–	–	18	6.35	17	30	73	42	205	127	0.75
GP-15 sq	9.52	5	11		–	–						
GP-30				13			37	86.5		250		1.2

Non-reaction pistol type

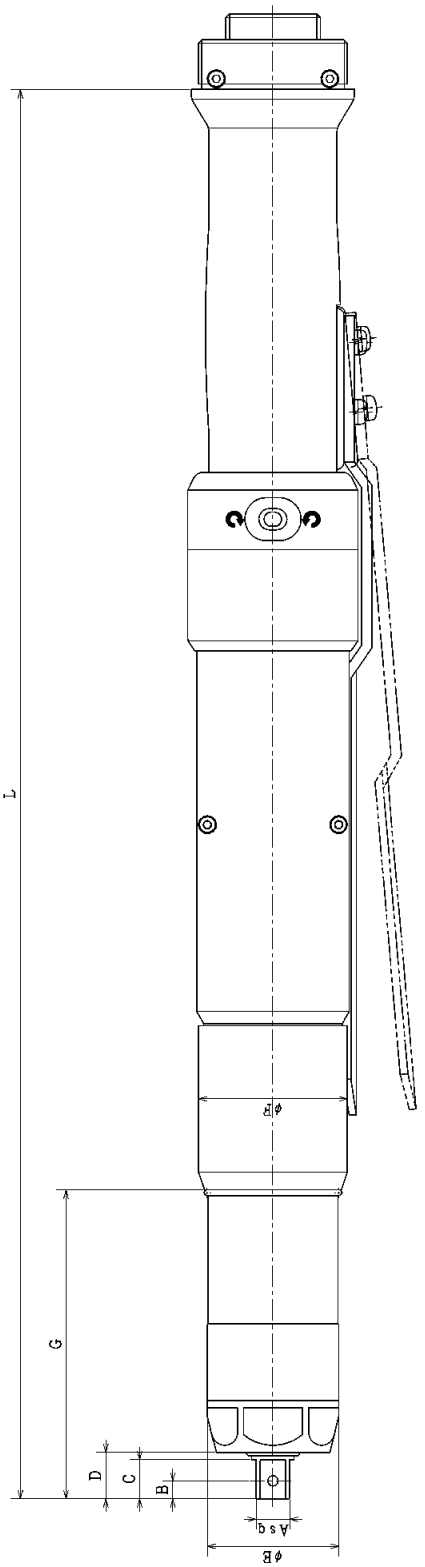
Model No.	A sq	B	C	D	E Hex	ΦF	ΦG	H	ΦJ	L	M	Weight(kg)
GPX-30SW	9.52	5	11	21.5	–	–	36.5	113	42	241	127	1.1

2－3－2 Angle type



Model No.	A sq	B	C	D	ΦE	F	G	H	L	Weight(kg)
GA-30	9.52	5	11	11.5	28	14	31.5	43	430	1.4
GA-50				12	32	16	35	47	444	1.5
GA-70C	12.7	8	16	16.5	35	17.5	41	57.5	469	1.9
GA-100C					40	20	47	63.5	538	3.0
GA-200C					53	26.5	57.5	74	576	4.0
GA-300C	19.05	10	20	20.5	62	31	61.5	82	599	4.4
GA-300-N1									611	4.4

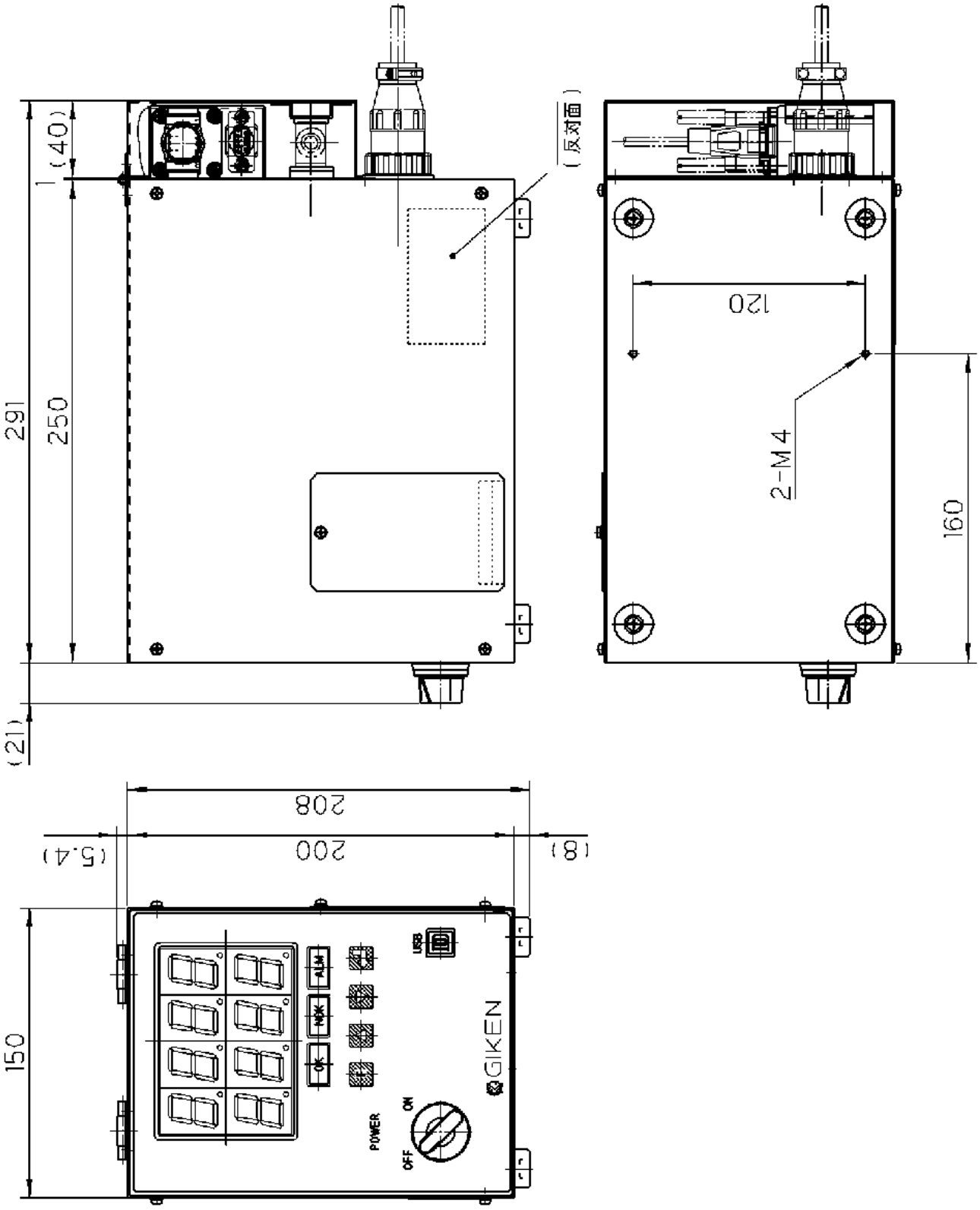
2－3－3 Straight type



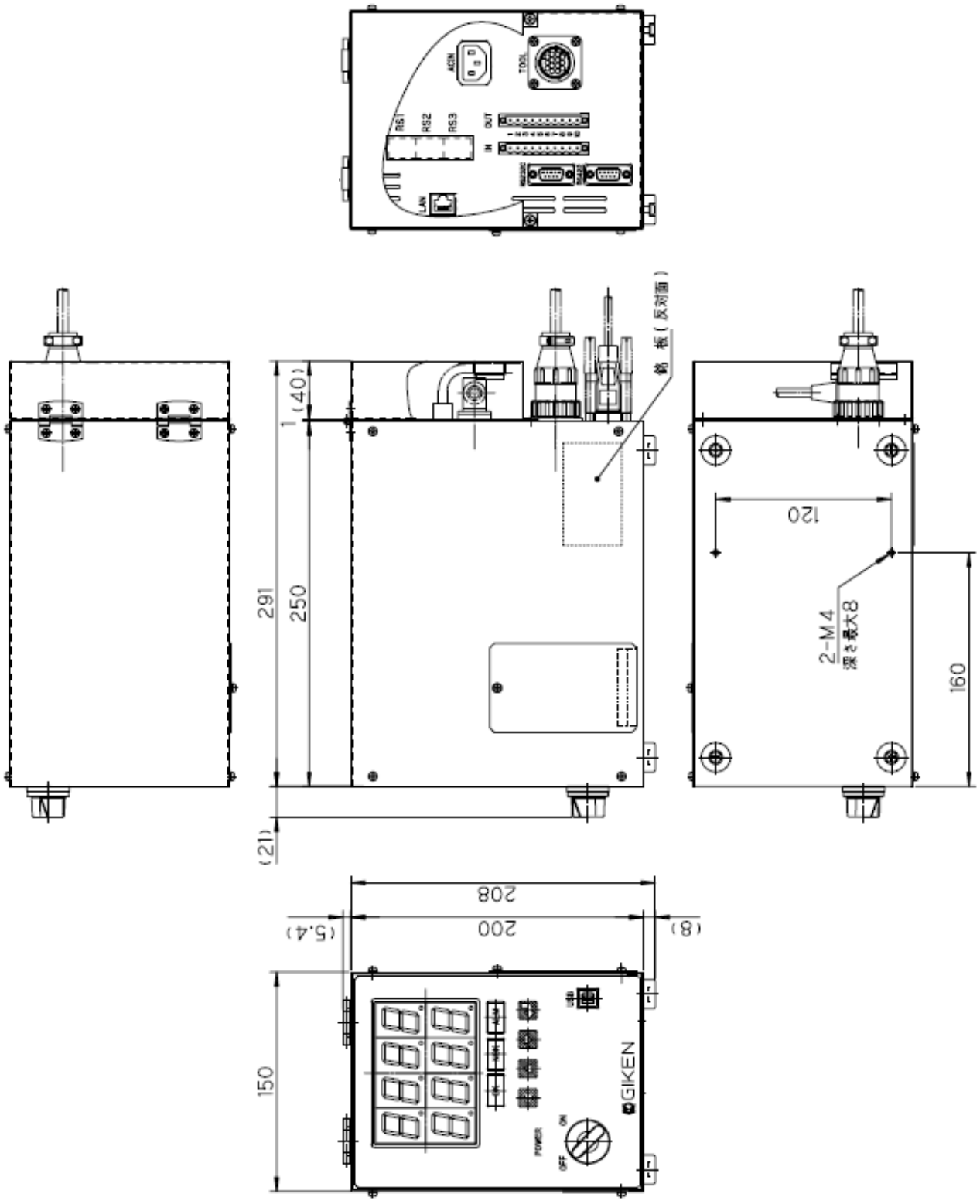
Model No.	A sq	B	C	D	ΦE	ΦF	G	L	Weight(kg)
GS-15	9.52	5	11	12	32	42	66	341	0.9
GS-30				13	37		86.5	394	1.3
GS-70	12.7	8	16	17	37		115.5	423	1.4
GS-70H					47	53	96.8	473	2.5
GS-100							128	505	2.9

2－3－4 Controller

Type : Basic (G※-T※-N04-M)



Type : With position detection function (G※-T※-N07-M)



２－４ Basic specification

Tool type	Pistol / Straight	Pistol / Angle / Straight	
Controller model (Type Basic)	GP-T1-N04(N05)-M	GA-T1-N04(N05)-M	GA-T5-N04-M
Controller model (Type With position detection function)	GA-T1-N07-M GA-T1-N07-MS(*2)		GA-T5-N07-M
Input power	Single phase AC100V-200V 50/60Hz		
Withstand voltage	AC1500V 1 minute		
Insulation resistance	DC500V 10MΩ or more		
Rated Current(*1)	AC100V : MAX11A , AC200V : 5.5A		
Electric capacity	500VA (5A)		1100VA (11A)
Controller`s heat generation	40W at the time of stand-by		
Tool model	GP-15 GS-15	GP-30 GA-30 GS-30 GS-70 GA-50 GA-70 GPX-30SW	GS-70H GS-100 GA-100C GA-200C GA-300C GA-300-N1
Motor output W	44	88	176
Operating temperature and humidity	0～40℃ Less than 90%RH(It shall be no condensation)		

*1. At the time of tightening the bolt rises in proportion to the time until reaching the cutting torque after seating, but a large current flows in the power supply though it is short time. At this time, average power from sitting to cutting torque is 1100 W at GA-300C , GA-300-N1.

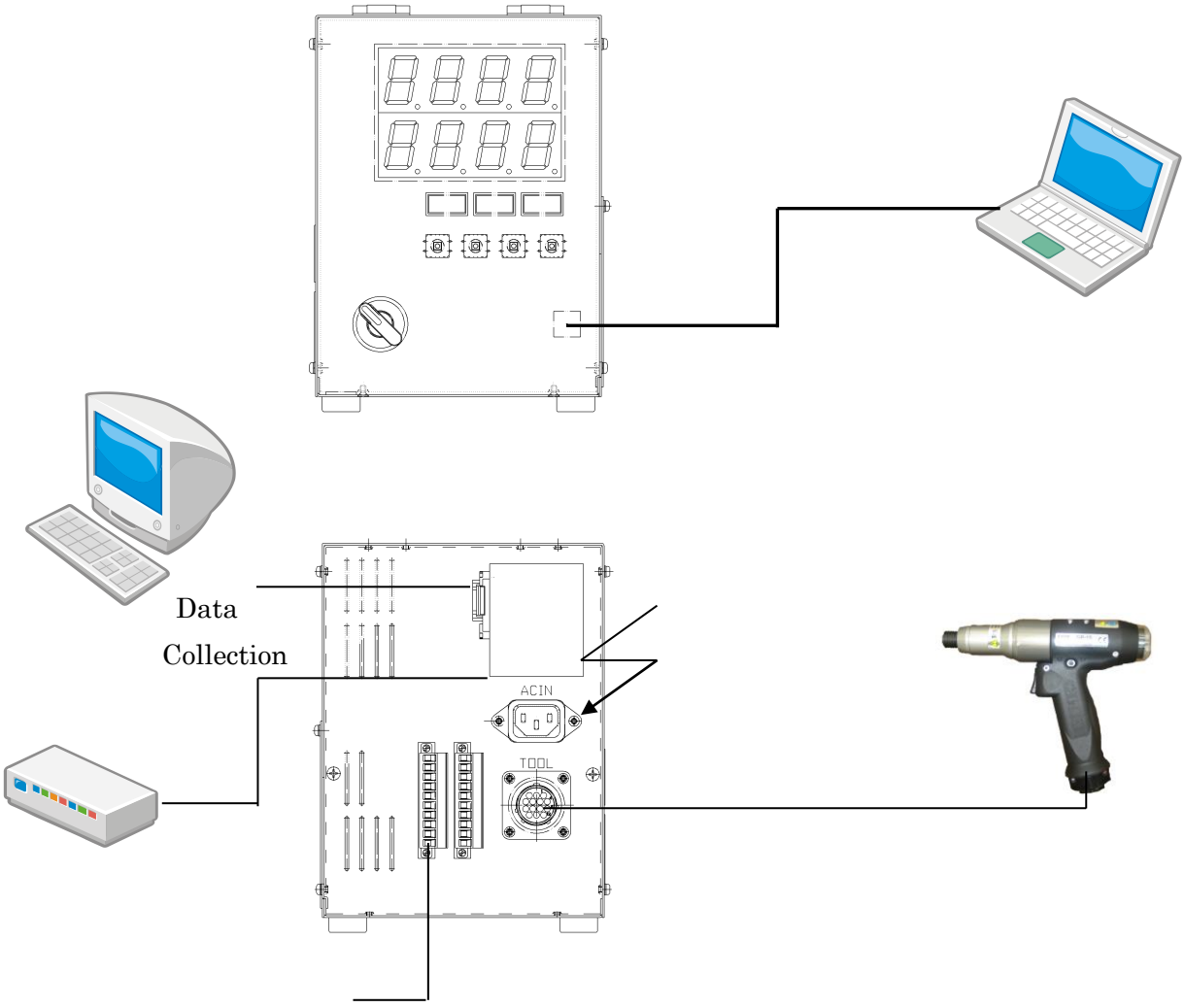
*2. GA-T1-N07-MS is a controller for GPX-30SW.

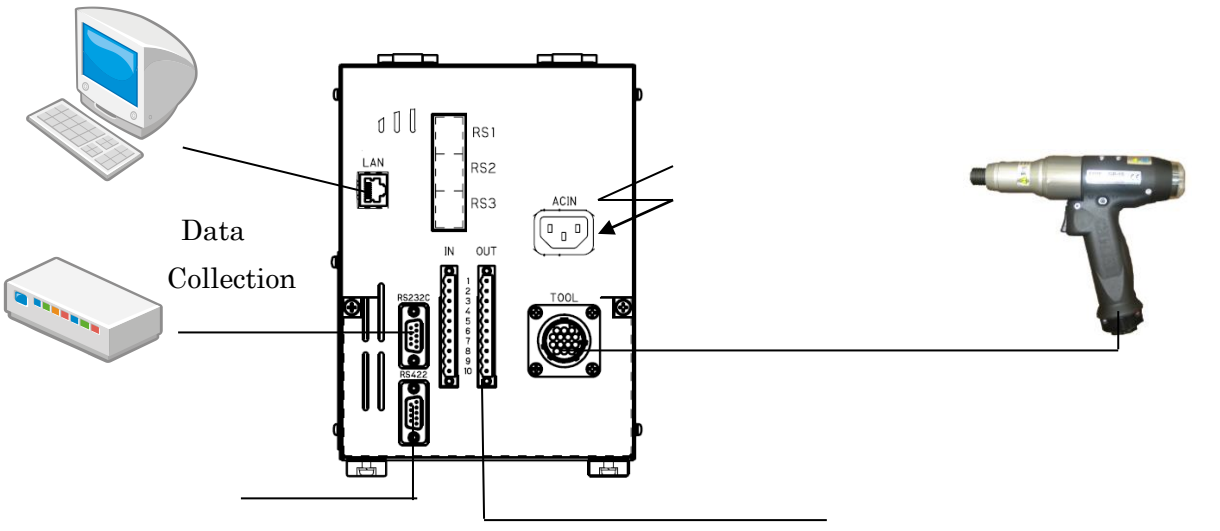
2－5 Functions Features

Protective function	Over load(AL20), overcurrent(AL30) and encoder failure(AL60), etc.
Display function	Alarm No., Tightening abnormal code, Program No. and Tightening result(Torque)
Rate setting	It automaticaly recognizes the rating data(including offset value)by turning ON the power after connection with the controller.
Parameter setting	Program 24 typesfiles(N07 series has 15 typesfiles) Tightening 24 types
Memory of tighteing results	It saves 6000 tightening results in the controller as the tightening history.It is possible to read out the data by the setting personal computer.(CSV data saving)
Communication with the sequencer	Serial communication(Global Pokayoke、 Tightening results from output) Parallel communication(Interlock box,etc. 24V repuired separately) Ethernet communication(Tightening results from output)
Zero magnification check function	Diagnosis function for the torque sensor malfunction (Performs per each program starting.)
Calendar function	Stores Year,Month,Day,Hour<Minute and Second per data.
Regenerative function	Built-in regenerative function
Standard inertia(INERTIA)	JL ≦ 30Ju
Rotating direction	Direction of CCW should be the forward rotation viewed from the motor shaft end.Reverse switch is put on the tool.

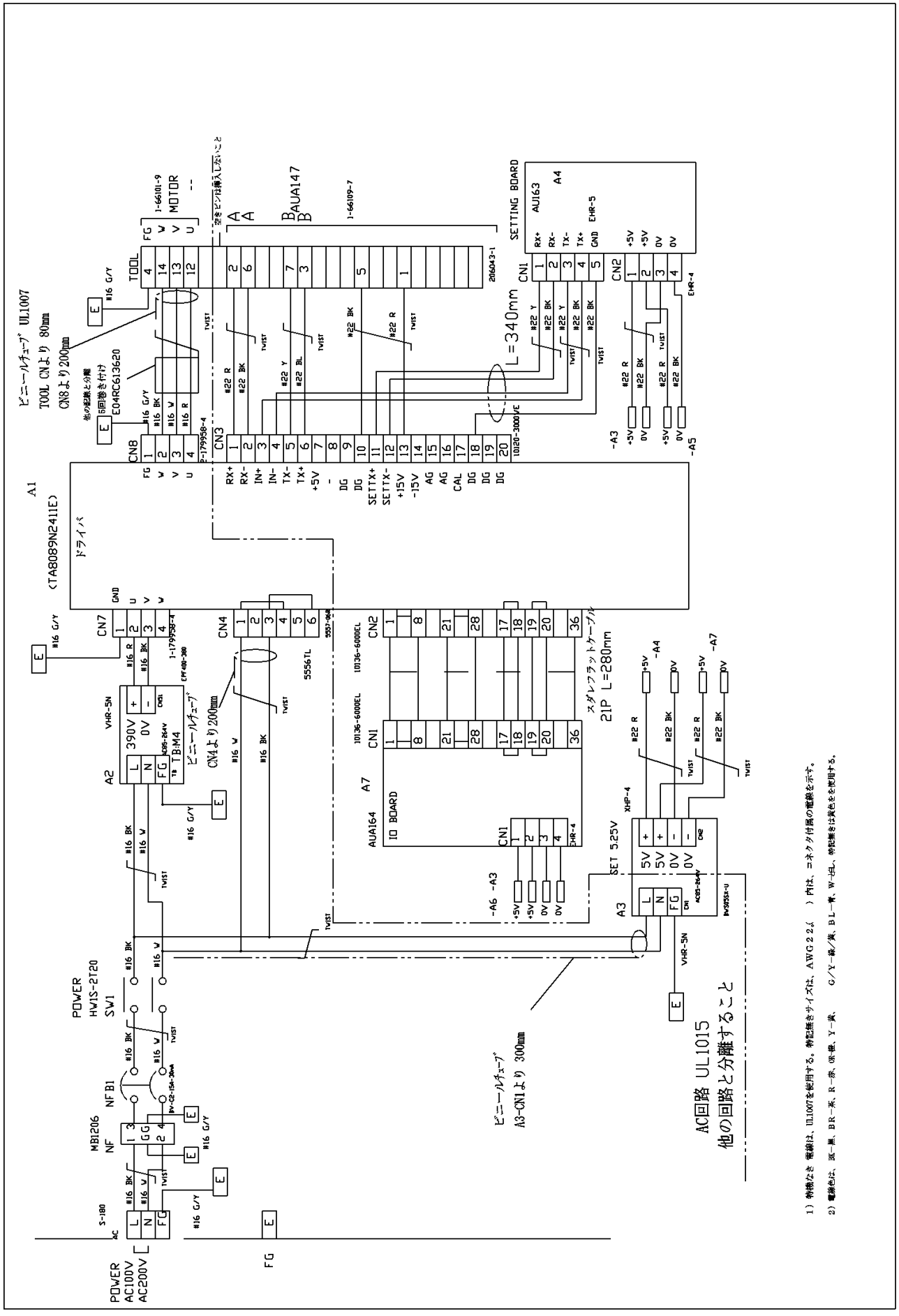
3． Wiring connection

3－1 System wiring referential layout

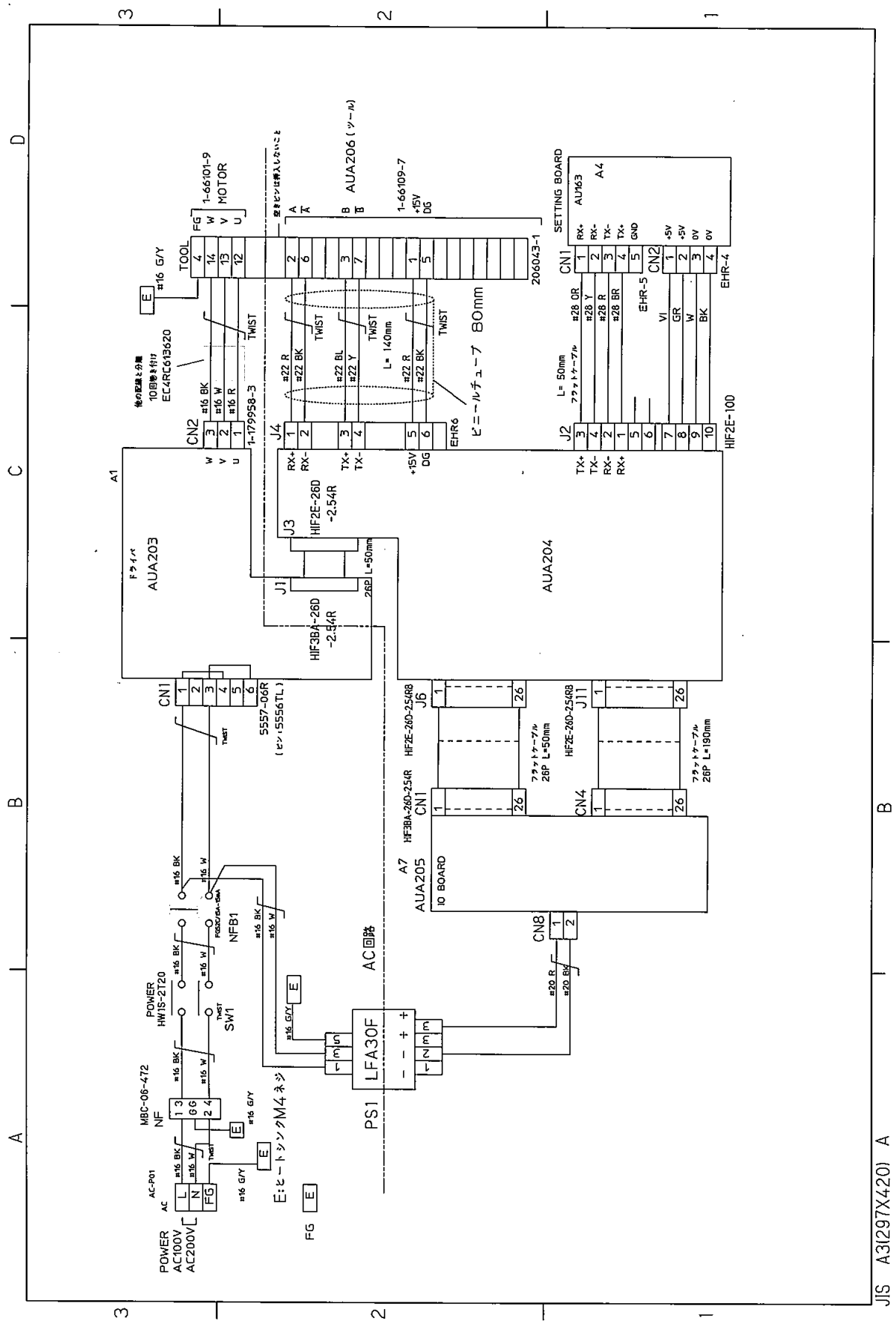




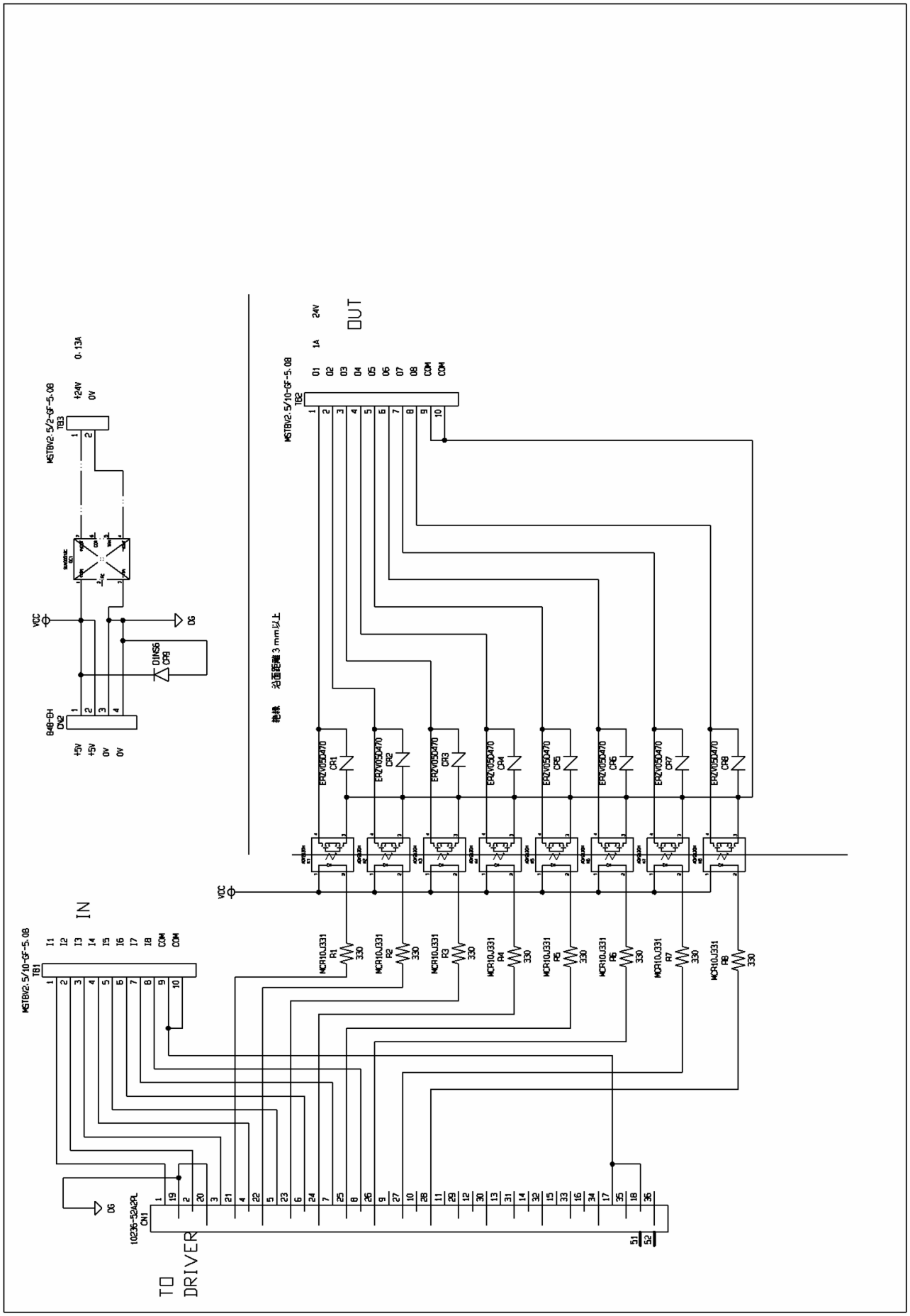
3－2　Internal wiring layout Type : Basic (G※-T※-N04-M)



3 － 3　Internal wiring layout Type : With position detection function (G※-T※-N07-M)

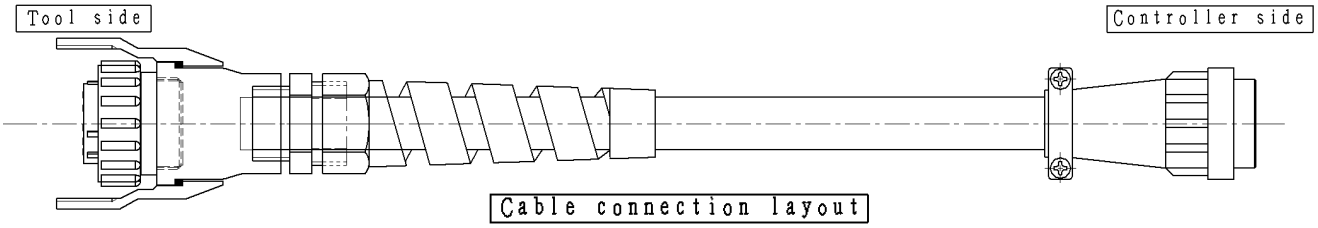


3－4 Parallel I／O Internal wiring layout

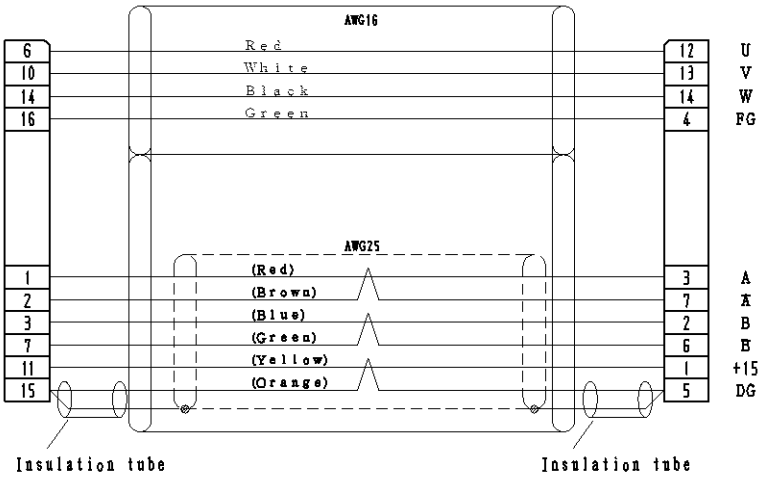


3－5 Tool cable connection layout

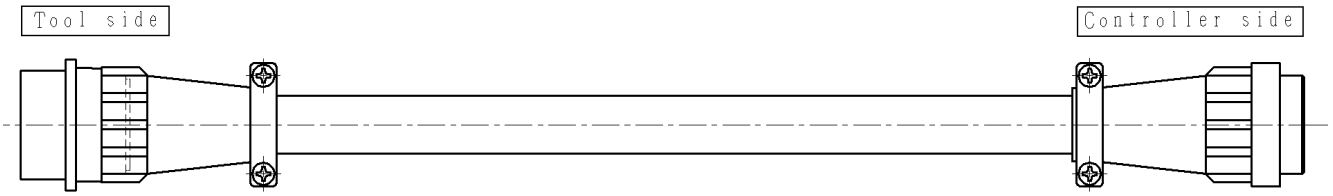
（Standard 5m cable ： GPR－K－5M）



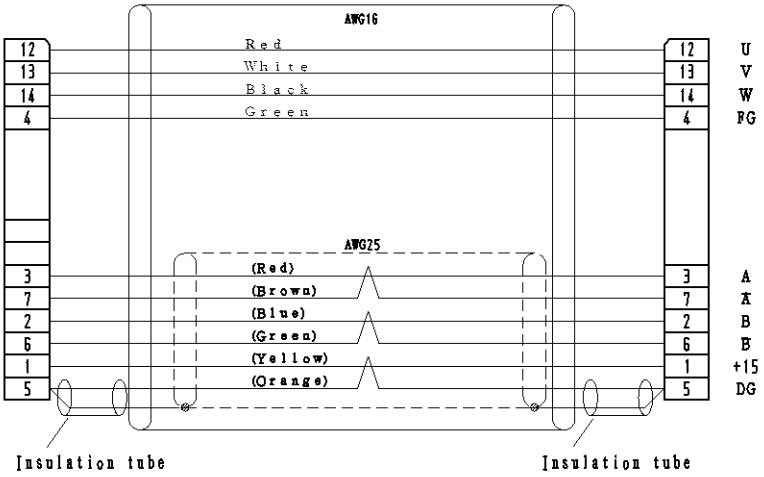
Cable connection layout



（Extension 15m cable ： GPR－KL－15M）

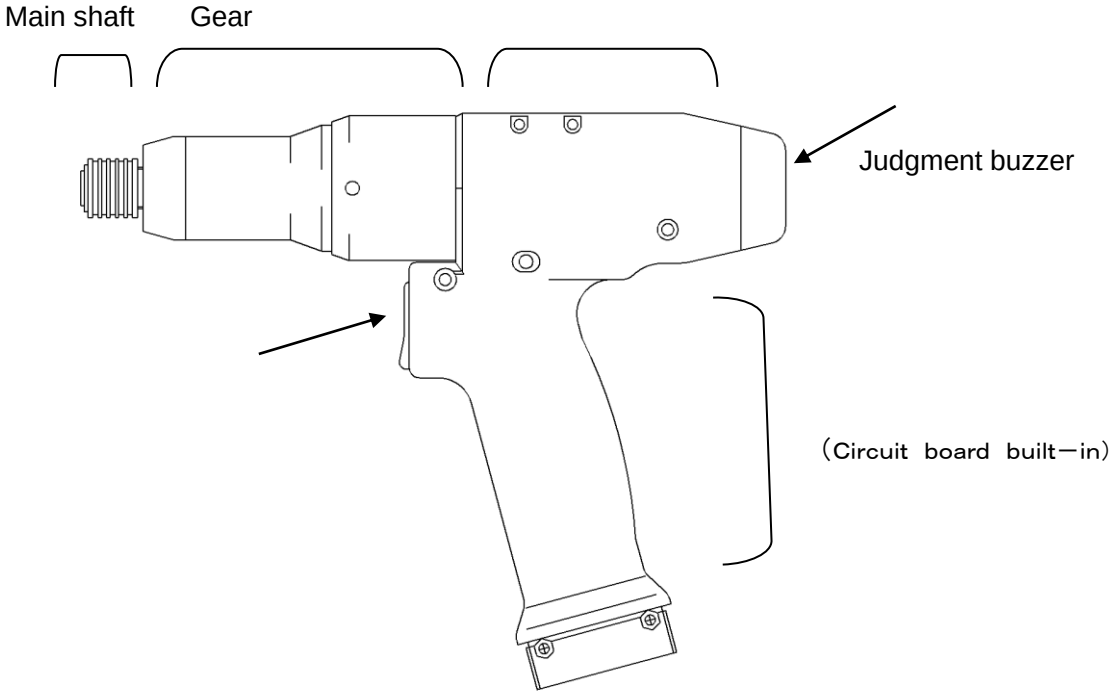


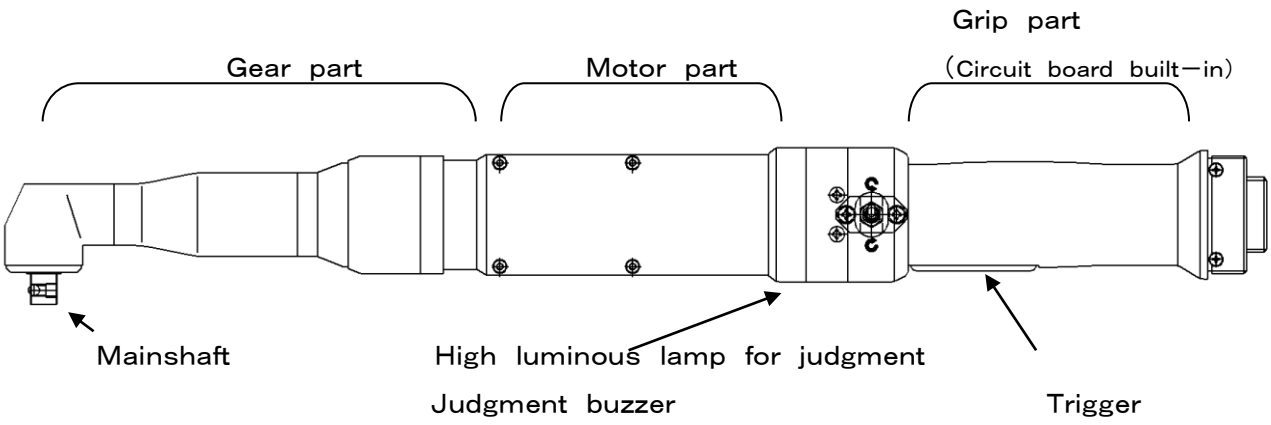
Cable connection layout



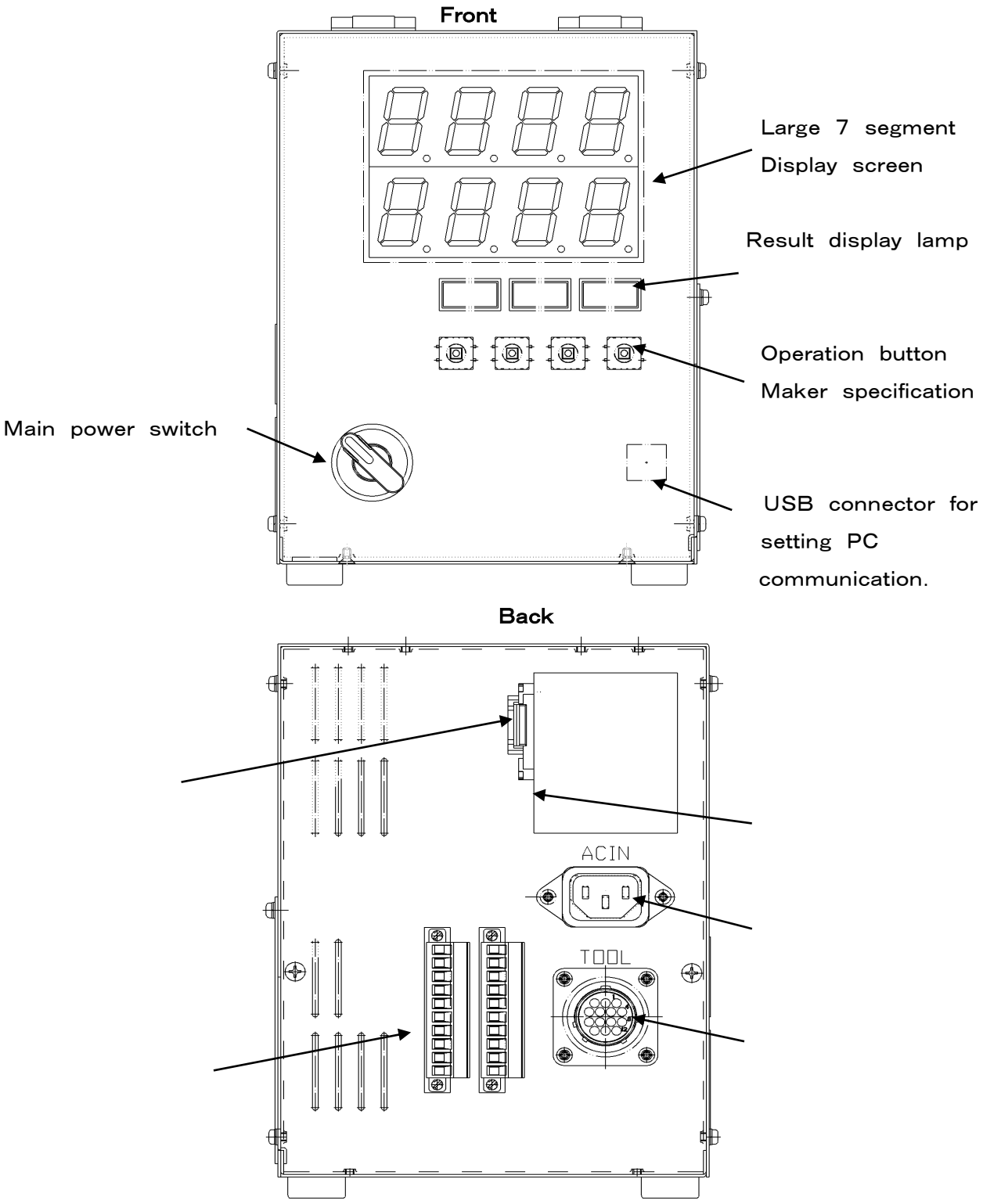
4． Explanation of each part

4－1 Tool





4－2 Controller



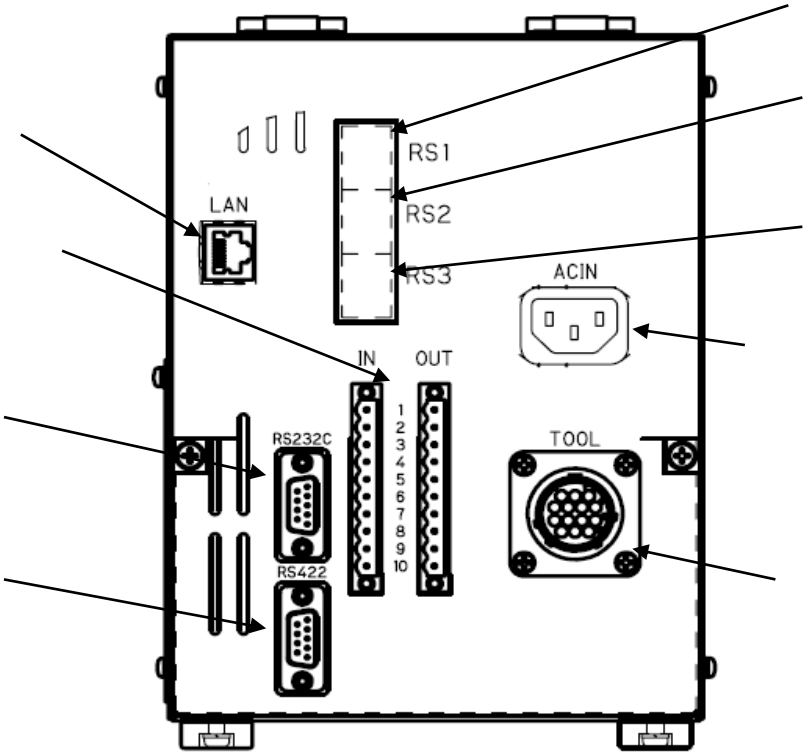
（Parallel I/O terminal pin arrangement）

Software version.1571-***

	Pin1	Pin2	Pin3	Pin4	Pin5	Pin6	Pin7	Pin8	Pin9	Pin10
Input side	Program1 select	Program2 select	Program3 select	Program4 select	Program5 select	Program6 select	Program7 select	Reset	24V COM	24V COM
Output side	Tightening OK	Tightening NG	Spare	Spare	Spare	Spare	Spare	Spare	24V COM	24V COM

Software version.1688-***

	Pin1	Pin2	Pin3	Pin4	Pin5	Pin6	Pin7	Pin8	Pin9	Pin10
Input side	Program1 select	Program2 select	Program4 select	Program8 select	Program16 select	Spare	Rotation command	Reset	24V COM	24V COM
Output side	Tightening OK	Tightening NG	Running	Equipment OK	Position NG	Spare	Spare	Trigger ON	24V COM	24V COM



	Pin1	Pin2	Pin3	Pin4	Pin5	Pin6	Pin7	Pin8	Pin9	Pin10
Input side	Program 1 select	Program 2 select	Program4 select	Program8 select	Tightening Possible	QL in	Resolver unavailable	Reset	24V COM	24V COM
Output side	Block determination OK	Block determination NOK	Running	Equipment OK	Position OK	Total OK	Spare	Spare	24V COM	24V COM

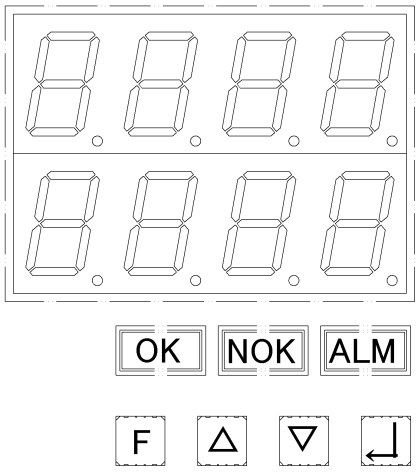
4－3 Display part

In the front of the controller, there are 2 stages large 7 segment display and lamps with results so that the current states of the tool, tightening results and abnormal contents can be understood.

Information of version with internal software is displayed in the 7 segment display when it turns on the power source.

During this time, following procedures、etc. are done in the controller;

① The self-diagnosis with software in the controller.
② Diagnosis with hardware of the controller.
③ Confirmation of the tool connection.
④ Confirmation with the motor cable communication.
⑤ Confirmation with the encoder cable communication.
⑥ Reading treatment with tool rating data.



When all confirmations are completed in right condition, current conditions are indicated.

In the upper stage of 7 segment,

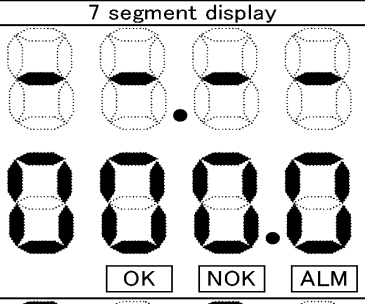
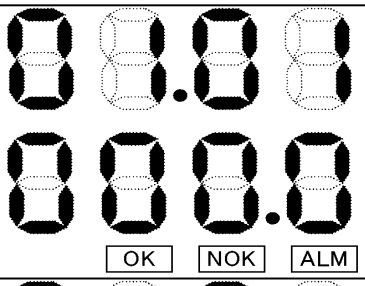
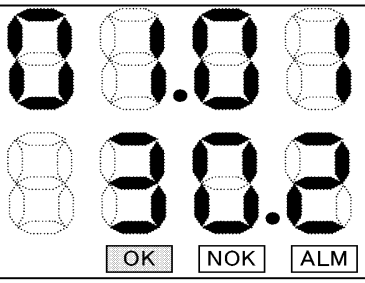
Selected program No.

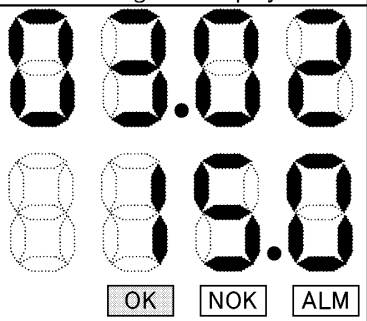
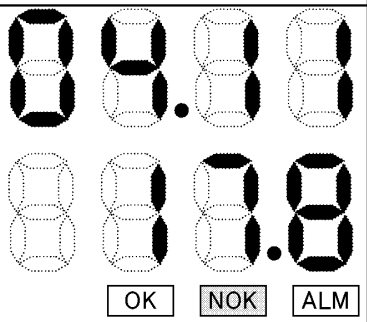
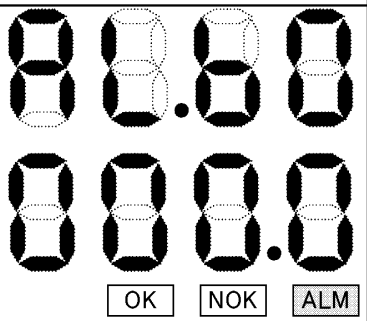
Tightening screw No. (Setting at the program setting screen)

Tightening abnormal code

Alarm code

In the lower stage of 7 segment、 Final tightening value is displayed.

State	7 segment display	Remark
Waiting program selection		After power ON, program select is not done. It displays "–" in the upper and "0" in the lower
Program No.1 Screw No.1 select		Program 1 is selected. Upper row left 2-digit : Program No. Upper row right 2-digit : Screw No.
Program No.1 Tightening OK at screw 1		After tightening at Program no.1, it shows the state of Tightening OK with 30.2Nm. Upper row left 2-digit: Program No. Upper row right 2-digit: Screw No. Lower row Tightening torque result

State	7 segment display	Remark
Tightening OK at Program No3 Screw No2		It displays the state of tightening OK with 15.0 Nm as the result of tightening at the program 3. Upper row left 2-digit: Program No. Upper row right 2-digit: Screw No. Lower row Tightening torque result The OK lamp lights up.
Tightening NG at Program No3 Screw No2		It is the state of the tightening NG with 17.8 Nm as tightening result at program No.3. Upper row: tightening error code (411: torque over) Lower row: tightening torque result The NOK lamp lights up.
Alam occurs		It is the state of occurrence with Alarm. Upper row Alarm code (AL60:location sensor signal error) Lower row Torque result immediately after the alarm occurred. The ALM lamp lights up.

5 Setting personal computer

5－1 Outline

This software is used for setting the「Hand tool controller」.

This software is used for setting, etc regarding tightening operation by the tool.

It is also possible to read out the tightening history and to confirm the tightening torque waveform by a graph.

WINDOWS XP Type : Basic for Ver.8.0.○

Type : With position detection function For Ver.8.1.○

WINDOWS 7 Type : Basic and Type : With position detection function

Ver.7.1.○（COMMON）

5－2 System requirements

OS : WINDOWS 98

WINDOWS NT

WINDOWS Me

WINDOWS XP

WINDOWS 7

WINDOWS 10

RAM : 64MB or more minimum need

Standard Install folder : C:¥Program Files¥HAND TOOL SETTING (WINDOWS 98,NT,Me,XP)

: C:¥GIKEN¥HANDTOOL SETTING Ver.7.1. (WINDOWS 7)

Password at the time of writing in the controller : 2003

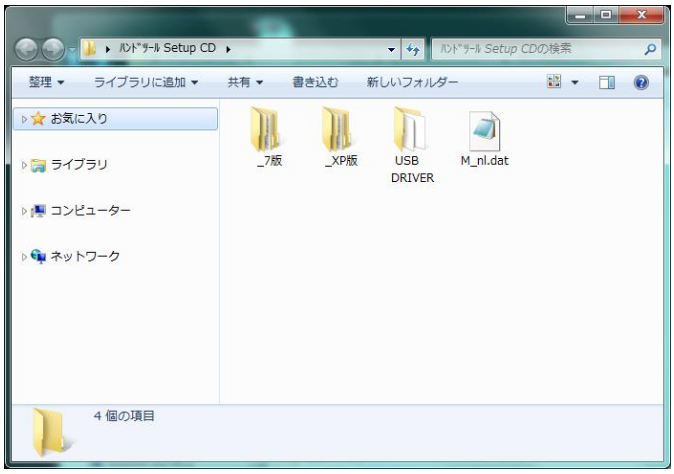
5－3 Installation procedure with the setting software

The way of installing the「Hand tool setting software」in your PC is described.

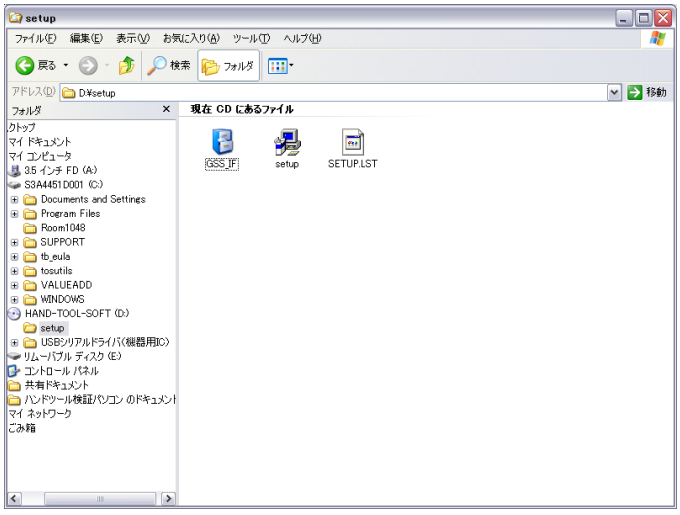
Please install in the PC in accordance with the following order.

1. Set a CD for the installation［Hand tool type nut runner setting software］in the PC.

2. Confirm the contents of the CD by Explorer, etc.



3. Select XP version or 7 version Execute the「SET UP.EXE」which is in the SET UP folder.



4. Installation of the hand tool setting software starts and operate according to the instruction of the screen.

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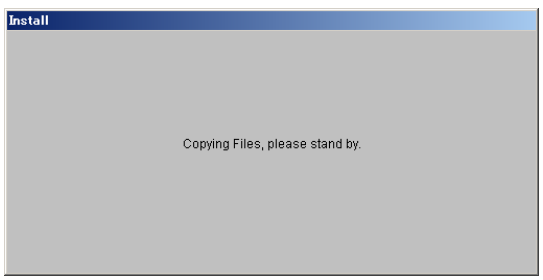
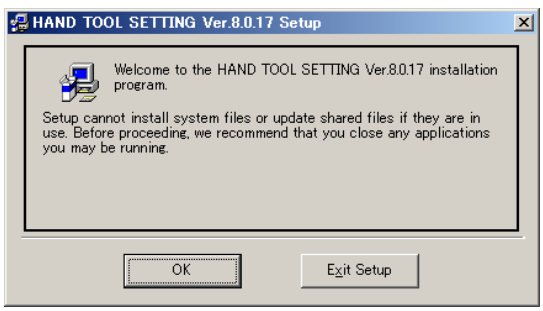
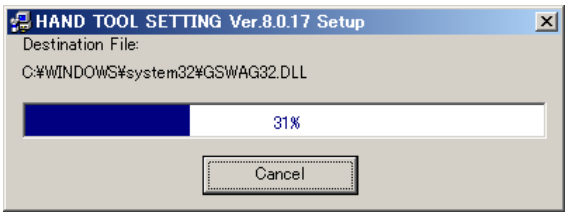
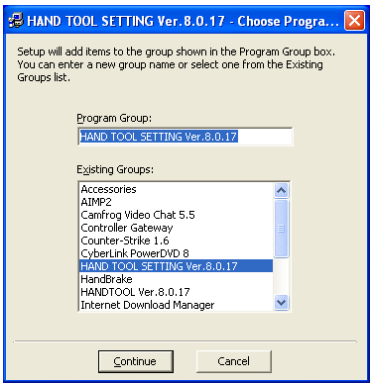
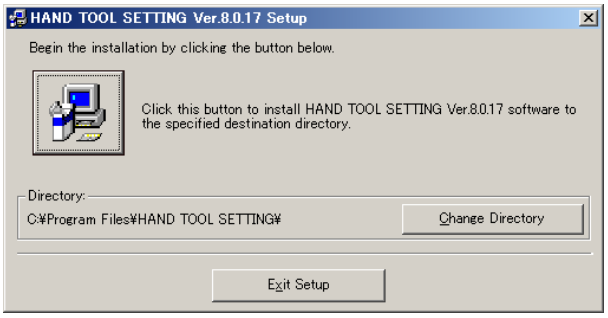










5. When the screen of 「Setup was completed」(right-upper) is displayed, the installation is finished.

6. Next step is to install the device of the connection cable(USB).

7. Insert connection cable in the USB connector of the personal computer.

8. Turn ON the controller for the hand tool and insert the USB cable in the setting cable connection port in the front of the controller.

9. When the insertion of the cable ends, the search of new hardware starts

10. Moreover, new hardware search Wizard's beginning screen is displayed.

11. Choose 「No, don't connect this time (T)」from the alternative of the screen and click the button (To next).

12. Choose 「Installing from the list or the specific place (details)(S)」from the alternative of the screen and click the button 「To next」.

13. Choose 「Searching a best driver in the following place (S)」from the screen alternative. Put a check in 「Removable media」「Including the following place」 and click the button 「Reference」.

14. In the choice screen of the folder (following drawing), select 「USB serial driver (the IC for the equipment)」 which is in the installation CD and click the 「OK」 button.

15. Confirming that the folder in the CD which was chosen a short while ago is displayed at the box under 「including the following place」, click the button 「To next」.

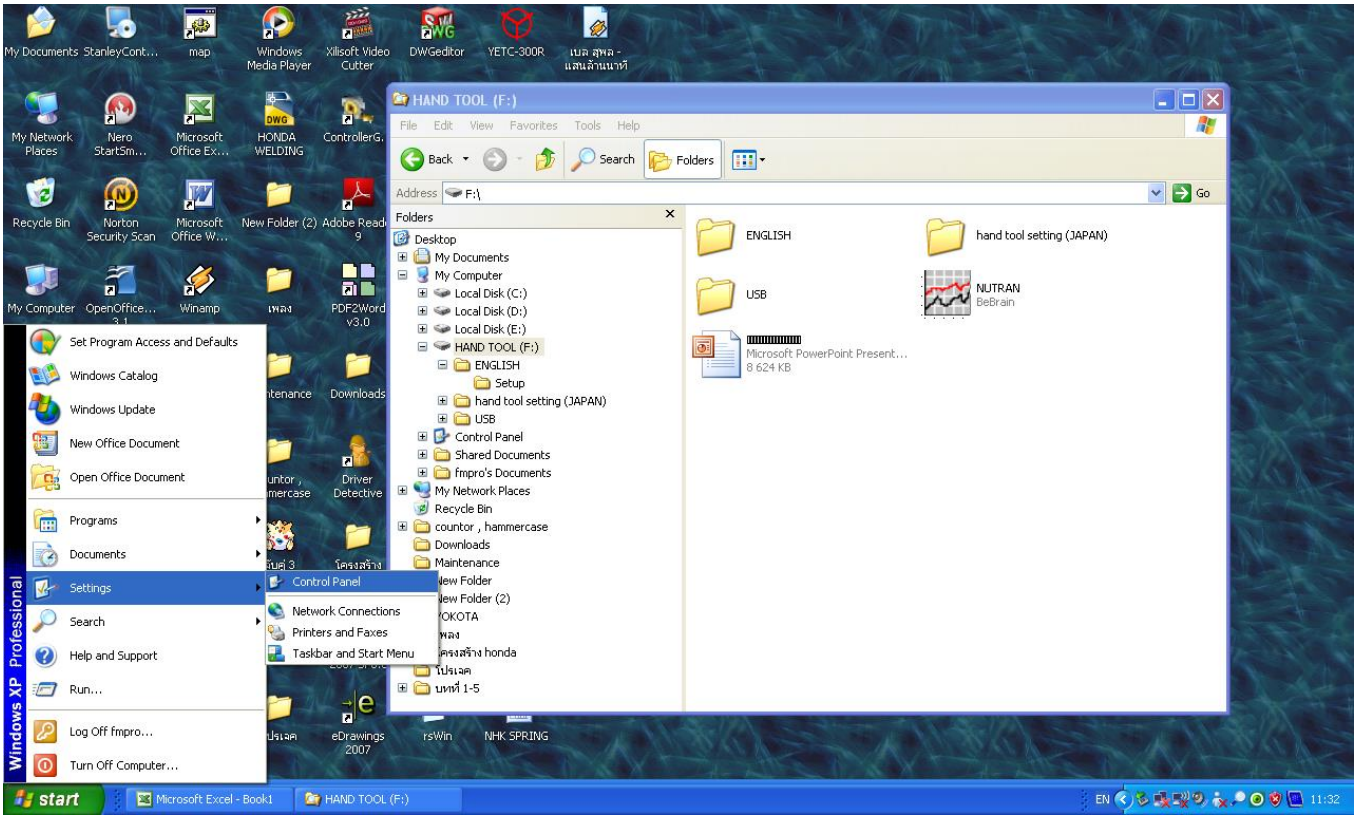
16. When the taking process of the device data in the personal computer is completed, the finishing screen of Wizard is displayed.

Click the 「Finish」 button and the device installation process is completed.

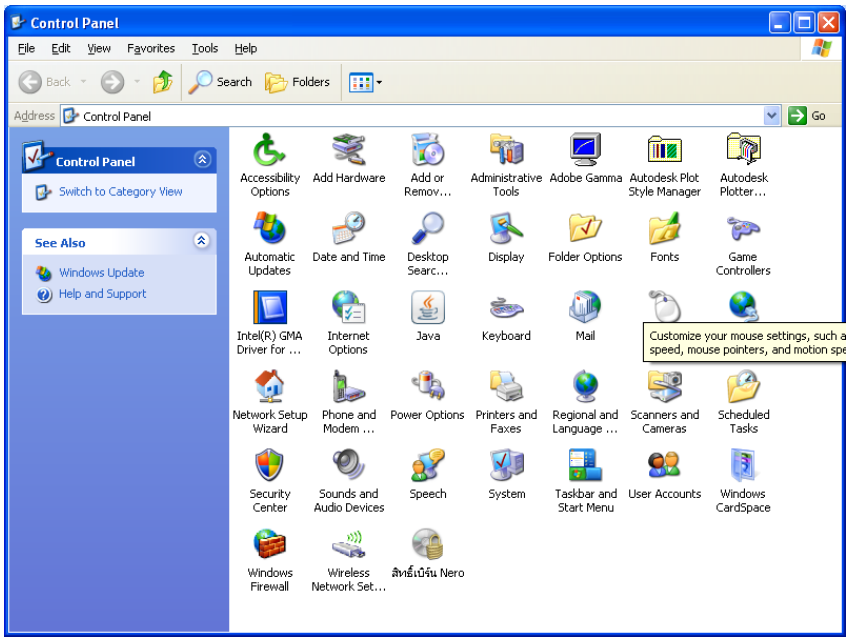
(Because there is a case which executes similar processing twice (displaying a screen automatically), you are requested to do similar processing. in such case.

17. Next, it sets a port number at the USB port.

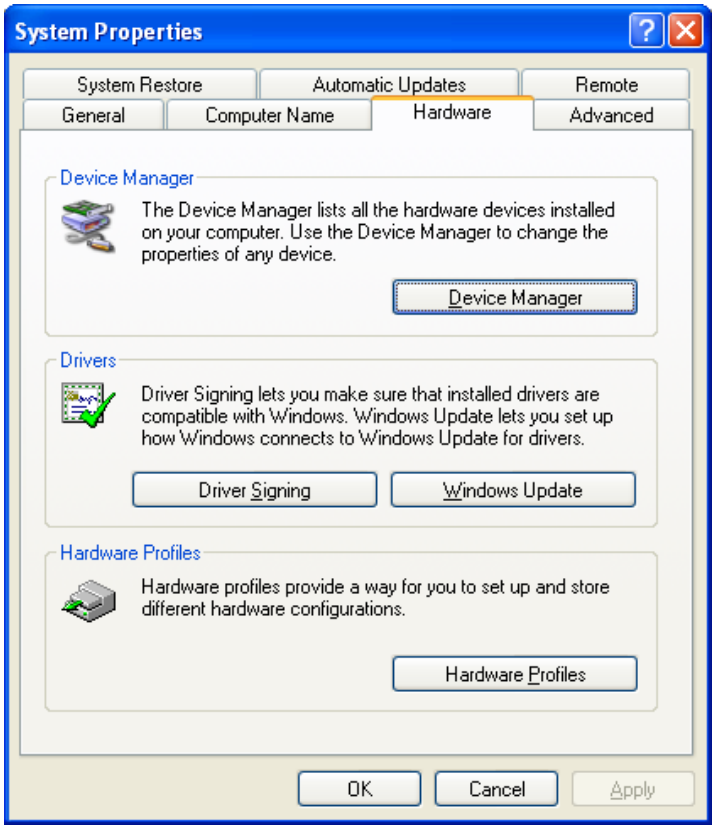
「Control panel 」 screen is displayed.



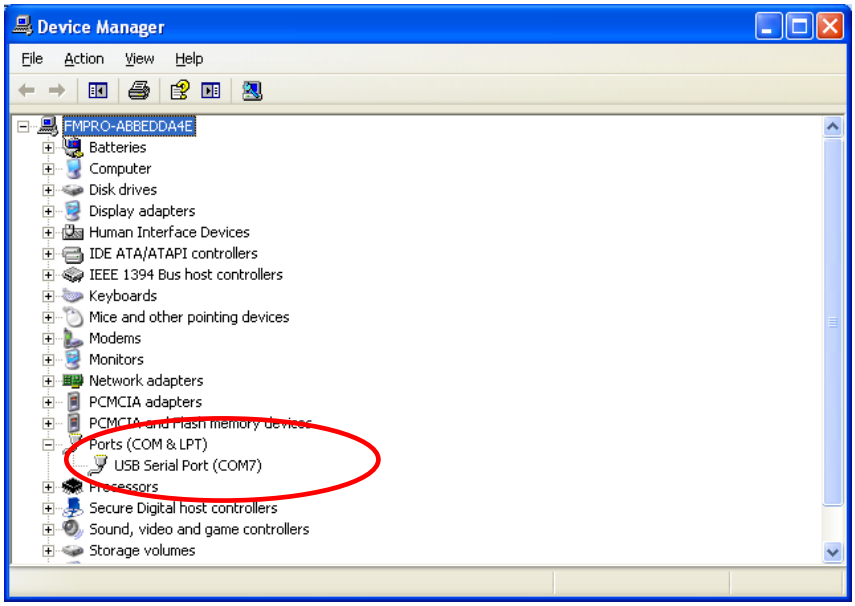
18. Select「Performance and maintenance」and moreover, select「System」.



19. As the screen「Property of System」is displayed, select「Hardware」by the tab in the upper part of the screen.



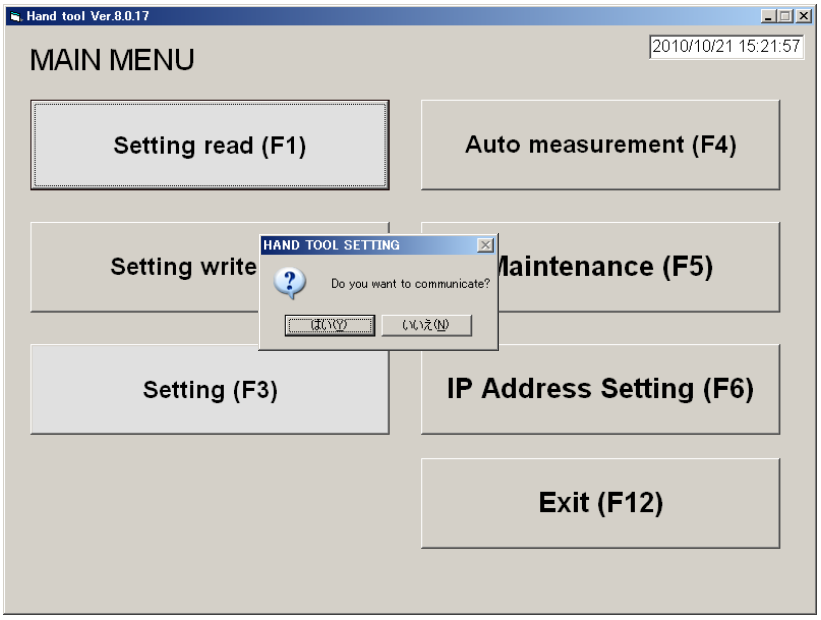
20. Select「Device manager」and choose「Port(COM and LPT)」to confirm the COM No. of the USB Serial Port. (The following picture in red frame, COM7 in case of the following picture)



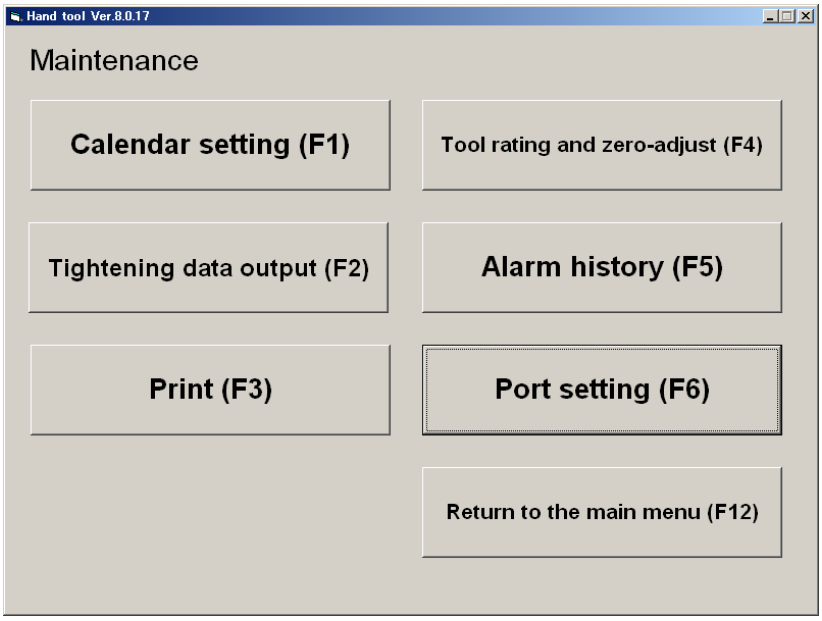
21. Make the device manager screen finish and start up the hand tool setting software which was installed a short while ago.

(Starting up should be done as Start – Program – GSS hand tool setting.)

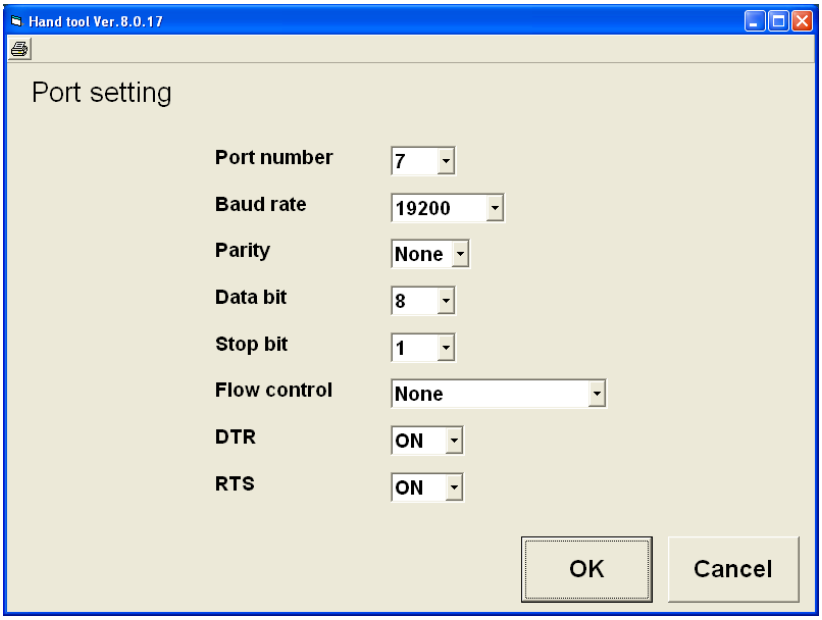
Starting up screen is displayed, and immediately main menu is displayed asking「Do you want to communicate?」. So select the「No」.



22. Select the「Maintenance」Menu from the main menu.



23. Select the「Port setting」from the maintenance menu.



24. Changing the「Port No.」in the port setting screen to the COM Port No. which was confirmed in the item 20 in short while ago, click「OK」.

As the maintenance screen is displayed, click「Return to the main menu」.

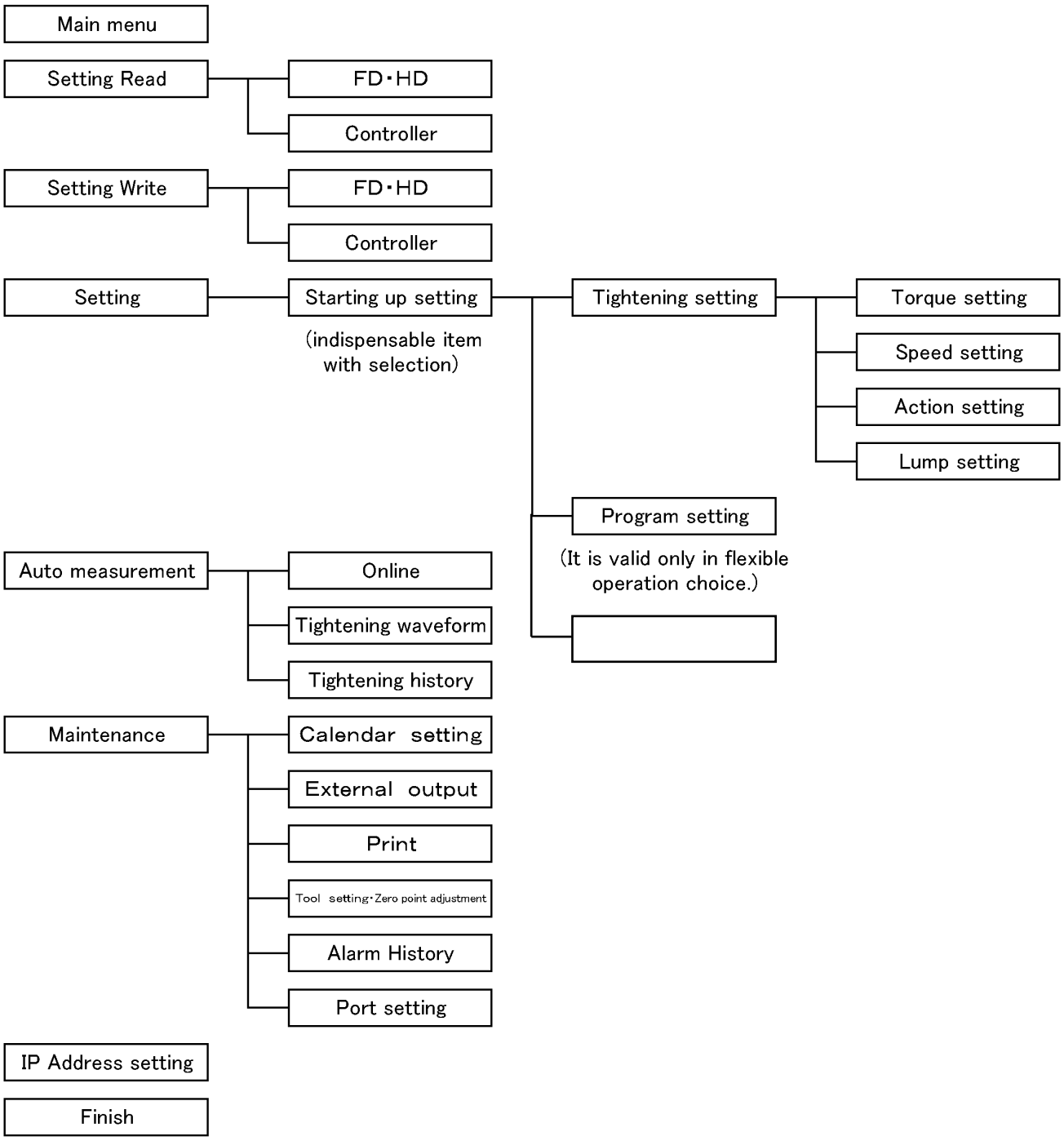
As the main menu screen is displayed, click「Finish」to finish the software once.

(In case of change with the port, it is necessary to finish the software once.)

All setting is ending as above.

The software starts up when you select「All program」—「Hand tool setting」from the「Start」menu..

5－4 Software hierarchy chart

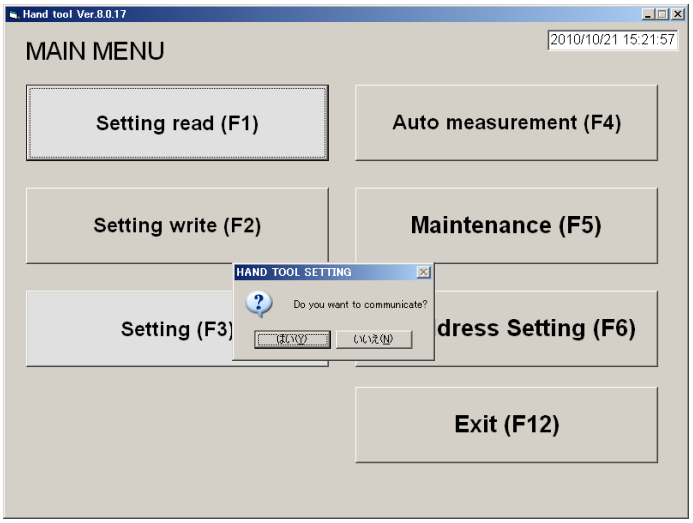


5－5 Software screen explanation

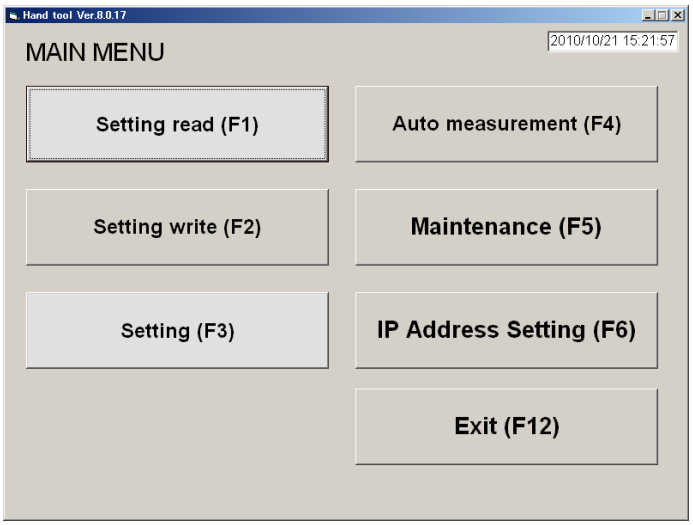
When the software starts up, the opening screen is displayed and immediately the main menu appears.

A message box of「Do you want to communicate？」is displayed.

In case of the condition which can communicate with the controller, please select「Yes」and if being in the condition which you cannot communicate, select「No」.



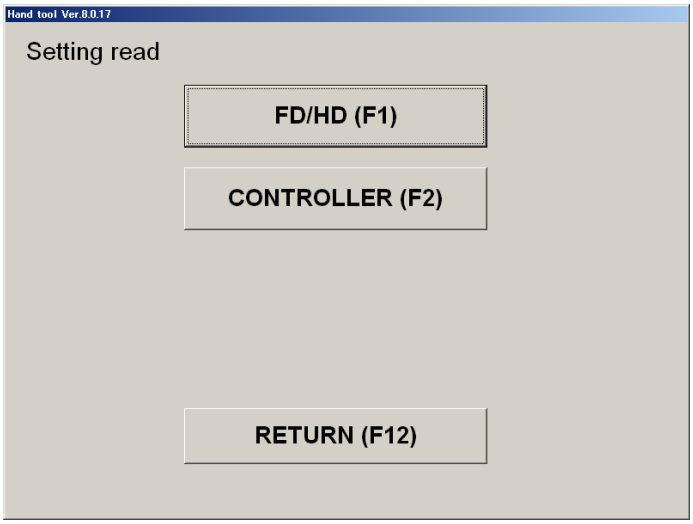
It is the main menu of this system. Changes about all setting are done from this main menu.



【Setting read】

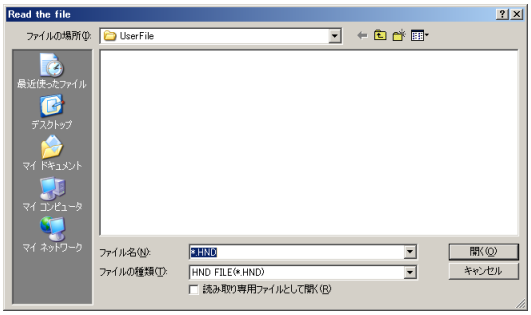
Reading in of the setting values of tightening is done.

It chooses the place of reading in from 「FD・HD」 and 「Controller」.



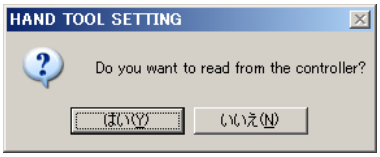
In case of selecting 「FD・HD」, the screen to select the place of reading in with the file is displayed. Choose the file and click the 「Open」 button.

Reading in with tightening data starts and when it is completed, it returns to the 「Setting read」 screen.



In case of selecting 「Controller」, click 「Yes」 in the message box confirming the connection with the setting PC and the controller by the setting cable.

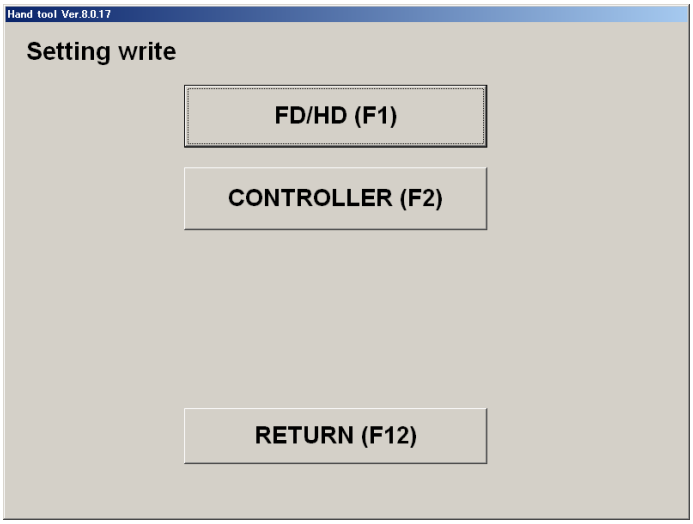
Reading in with tightening data starts and when it is completed, it returns to the 「Setting read」 screen.



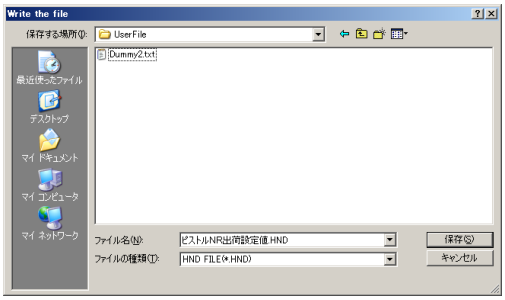
【Setting write】

Writing of the tightening setting value is done.

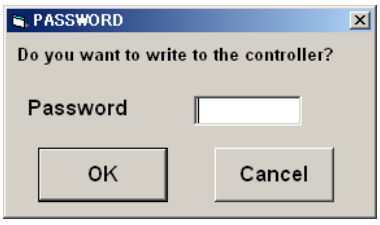
The place of writing is selected from 「FD・HD」 and 「Controller」.



In case of selecting 「FD・HD」,
the screen to input the place of writing the file and the file name is displayed. Input the file name and click the 「Save」button.
Writing of the tightening data starts and when it is completed, it returns to the 「Setting write」screen.



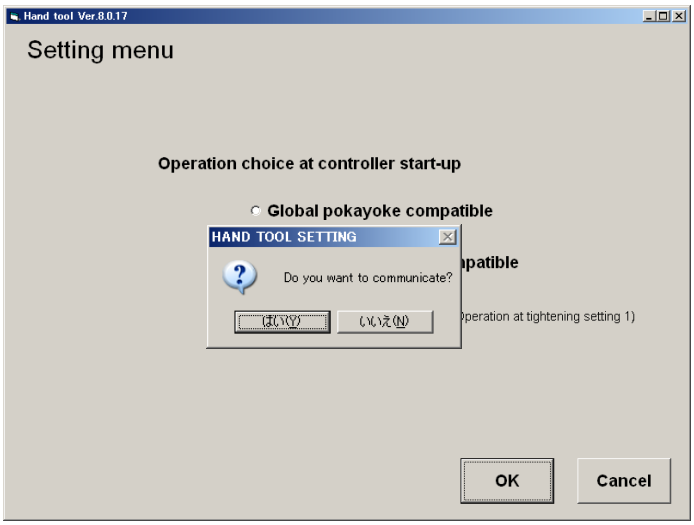
In case of selecting 「Controller」,
the screen to input a pass word is displayed. Input the writing pass word 「2003」 and click the 「OK」button confirming the connection of the setting PC and the controller by the setting cable. The message box is displayed and click 「Yes」.
Writing of the tightening data starts and when it is completed, it returns to the 「Setting write」screen.



【Setting】

It is the screen to set the contents about Tightening..

First, it chooses the start-up way of the controller.



If it is in the condition to be able to communicate with the controller, select 「Yes」.

If not, select 「No」.

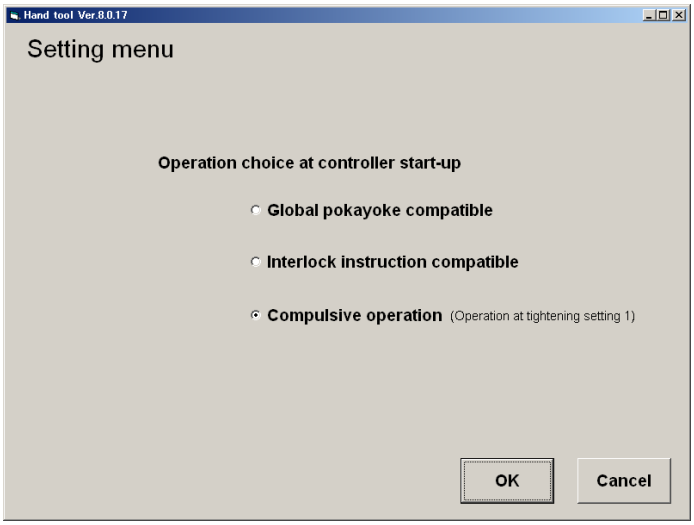
・Global pokayoke compatible

The way to make the program selection automatically receiving parts instruction from the RS-232C connector in the back..

・Interlock instruction compatible

The way to make the program selection automatically receiving parts instruction from the PIO connector in the back..

(The 24V voltage is necessary separately).



・Compulsive operation

In case of no signal from higher rank, it selects the Program 1 compulsorily at the moment of turning on the power. (It is valid when there is no environment to receive instructions from higher rank and it has one kind of program.)

Always, choose any one and click the 「OK」 button.

This is the setting No.2 screen.

In this screen, it selects a way of tightening operation in 1 program.

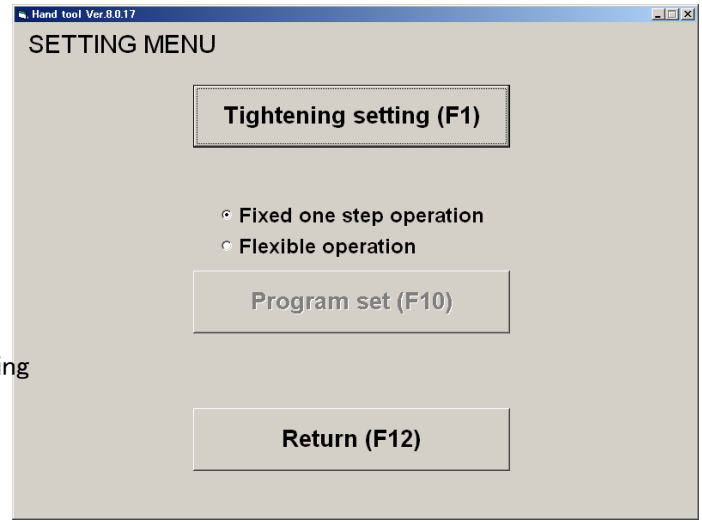
・Fixed one step operation

1 program — Finishing by 1 tightening

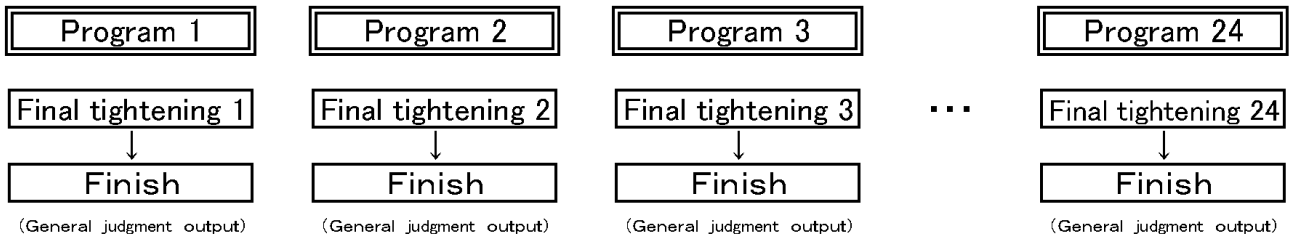
・Flexible operation

1 program — Finishing by plural tightening

Always, either choice becomes necessary.

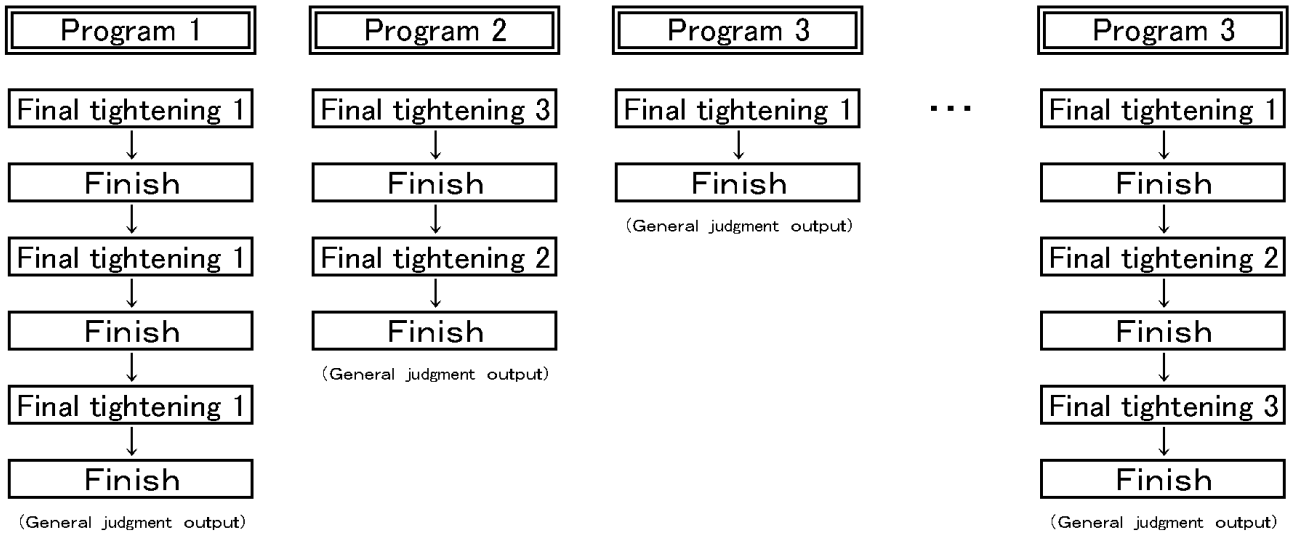


In case of Fixed one step operation



＊In case of the Fixed one step operation, Program No. and Final tightening No. is always set to a pair.

In case of the Flexible operation (setting example)



＊In case of Flexible operation, it is possible to change Program no. and Final tightening No. freely.

When 「Tightening setting」 is selected from the setting No.2 screen, the setting screen of tightening details appears.

This screen is roughly 4 screen structure;

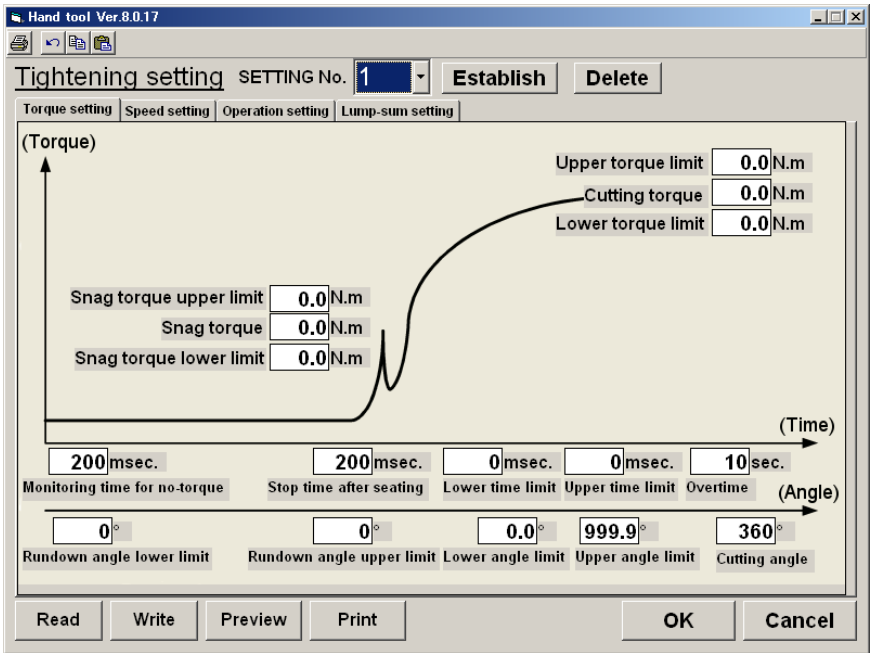
① Torque setting ② Speed setting ③ Operation setting ④ Lump-sum setting

(Switching of each screen can be done by the tab in the upper part of the setting screen.)

Moreover, it is possible to make 1～30 （30kinds） of each setting No.

・Torque setting screen

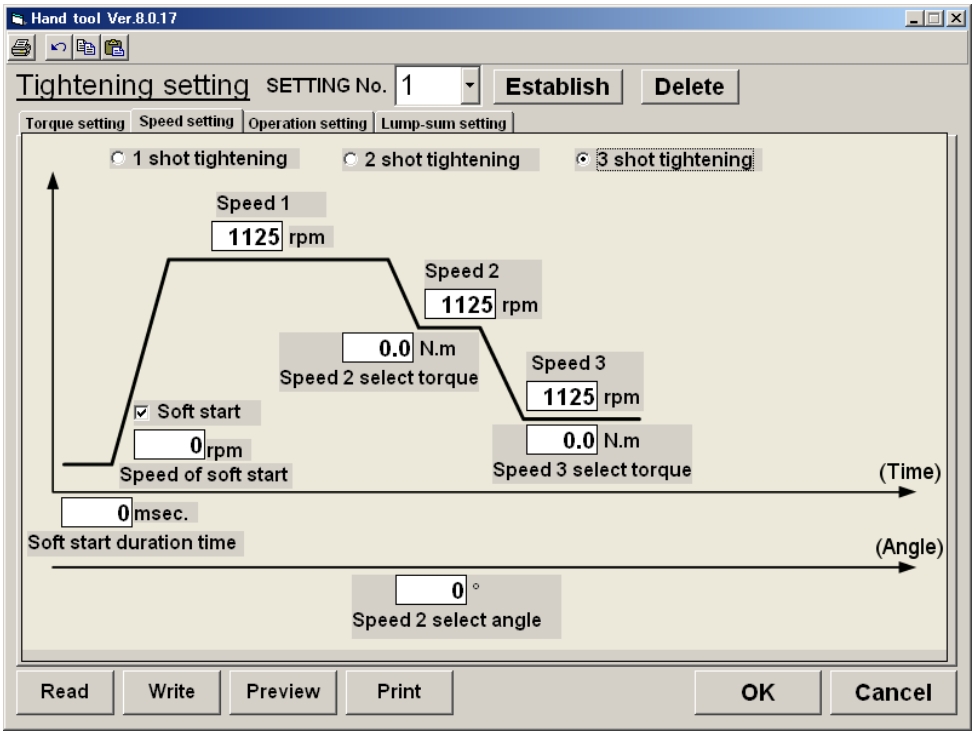
Main setting contents are about 「Torque」「Time」「Angle」.



Setting item	Unit	Contents	Remark
Upper torque limit	Nm	Upper limit value against Cutting torque	Upper torque limit＞Cut torque
Cutting torque	Nm	Torque value for tightening target	
Lower torque limit	Nm	Lower limit value against Cutting torque	Lower torque limit＜Cut torque
Snag torque upper limit	Nm	Upper limit value against Snag torque	Snag torque upper limit ＞Snag torque
Snag torque	Nm	Passing torque point to measure time・angle	1/2 ~ 1/5 to Cutting torque
Snag torque lower limit	Nm	Lower limit value to Snag torque	Snag torque lower limit＜snag torque
Monitoring time for no torque	msec	Time to disregard torque monitoring immediately after starting tightening operation	
Stop time after seating	msec	Time to stop rotation after reaching Snag torque	
Lower time limit	msec	Lower time limit from Snag torque until tightening finish	Upper time limit＞Lower time limit
Upper time limit	msec	Upper time limit from Snag torque until tightening finish	Upper time limit＞Lower time limit
Over time	sec	Limited time from starting rotation until tightening finish	
Rundown angle lower limit	deg	Rotation angle lower limit from starting rotation until Snag torque	Rundown upper limit＞Rundown lower limit
Rundown angle upper limit	deg	Rotation angle upper limit from starting rotation until Snag torque	Rundown upper limit＞Rundown lower limit
Angle lower limit	deg	Angle lower limit from Snag torque until tightening finish	Angle upper limit＞Angle lower limit
Angle upper limit	deg	Angle upper limit from Snag torque until tightening finish	Angle upper limit ＞Anglelower limit
Cutting angle	deg	Maximum angle from Snag torque until reaching Cutting torque	

・Speed setting screen

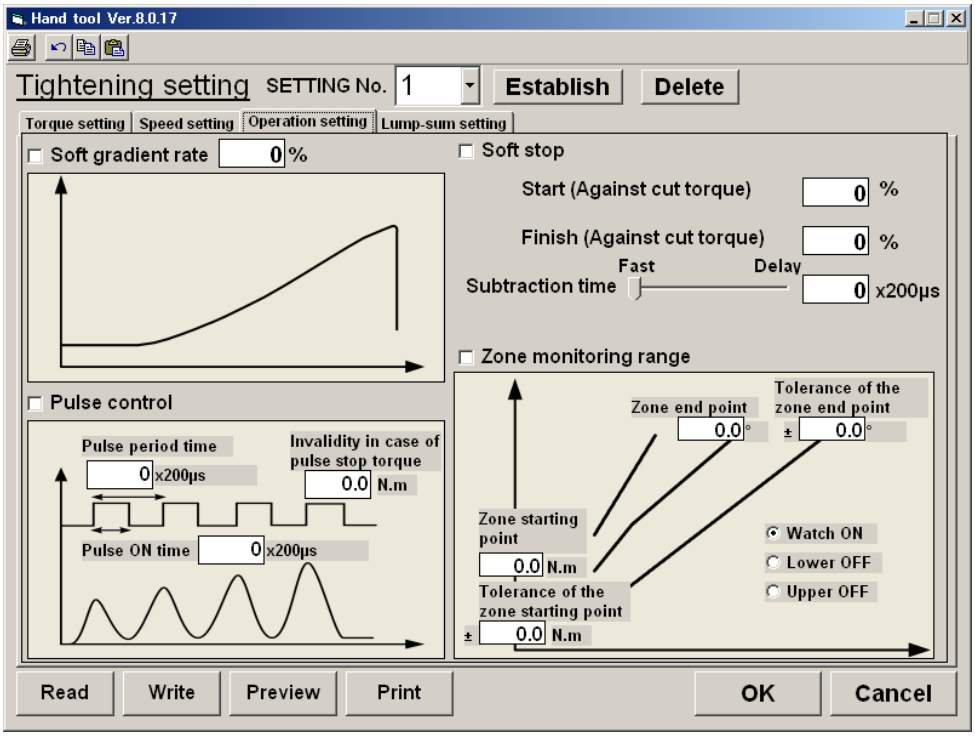
Main setting contents are about「Speed of the main shaft」「Switch timing」.



Setting item	Unit	Contents	Remark
1 shot tightening	Check	Check when tightening without speed switching	Setting after Speed 2 impossible
2 shot tightening	Check	Check when tightening at 2 stage speed swiching	Setting after Speed 3 impossible
3 shot tightening	Check	Check when tightening at 3 stage speed swiching	
Soft start	Check	Check when applying low speed rotation to prevent nibbling at starting rotation	Invalid if there is no check
Speed of soft start	rpm	Rotation speed when soft start is selected	Invalid if there is no check
Soft start duration	msec	Rotation time when soft start is selected	Invalid if there is no check
Speed 1	rpm	Rotation speed of Speed 1	
Speed 2	rpm	Rotation speed of Speed 2	
Speed 2 swiitching torque	Nm	Torque to be switched from Speed 1 to Speed 2	
Speed 2 switching angle	deg	Angle to be switched from Speed 1 to Speed 2	Including angle during Soft start
Speed 3	rpm	Rotation speed of Speed 2	
Speed 3 switching torque	Nm	Torque to be switched from Speed 2 to Speed 3	When pulse control is enabled, switching torque to pulse tightening

・Operation setting screen

Main setting contents are about reducing reaction and minute operation at the time of tightening.



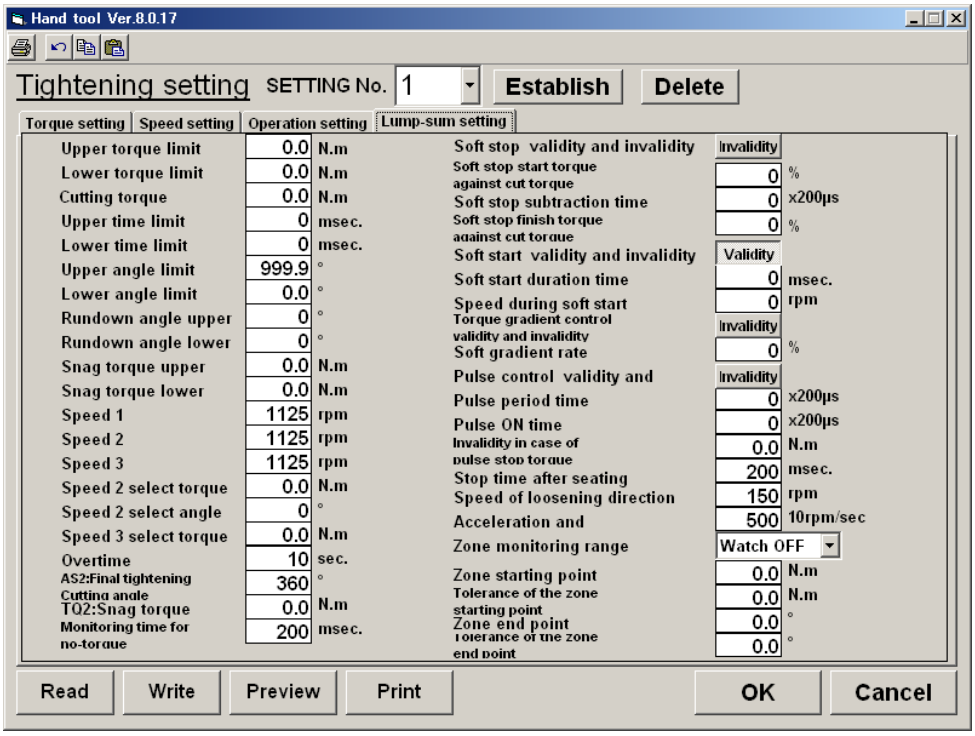
Setting item	Unit	Contents	Remark
Soft gradient	Check	It effects current restriction m snag to cut toruque.	
Soft gradient rate	%	Setting current output gradient (The lower the value is, the gentle gradient becomes)	If too low, it does not tighten.
Soft stop	Check	Effecting motor current restriction after tightening completed.	
Start(against Cut torque)	%	Setting timing of Start with current restriction.	The higher the value is, It is effective.
Finish(against Cut torque)	%	Setting timing of Finish with current restriction.	The lower the value is, It is effective.
Subtraction time	200μs	Setting speed of decreasing motor current.	The higher the value is, It changes drastically.
Pulse control	Check	Setting valid ・invalid of Pulse control setting.	In case of Invalid, it effects normal tightening.
Pulse period time	200μs	Setting 1 pulse period (ON～OFF).	The lower the value is, It makes small vibration.
Pulse ON time	200μs	Setting ON time during 1 period.	The higher the value is, the bigger the power is.
Pulse stop torque	Nm	Setting torque switching to the Normal operation during Pulse operation.	Invalid in case of Zero
Zone monitoring	Check	Setting Valid・Invalid of monitoring tightening torque waveform.	
Zone judgment starting torque	Nm	Setting judgment start torque.	
Zone judgment tolerance	Nm	Setting tolerance of the judgment start torque.	
Zone judgment finish angle	deg	Setting angle of the judgment finish.	
Watch ON	Check	Setting of the judgment monitoring zone.	Watching upper・lower limit zone.
Lower OFF	Check	Setting of the judgment monitoring zone.	Watching upper limit zone.
Upper OFF	Check	Setting of the judgment monitoring zone.	Watching lower limit zone.

・Lump－sum setting screen

It is the screen that the contents set in the before mentioned 3 screens are put together in 1 screen.

All setting set in each screen of torque setting･speed setting･operation setting is reflected.

In case of setting in this screen, it will be reflected in each screen of torque setting･speed setting･operation setting.



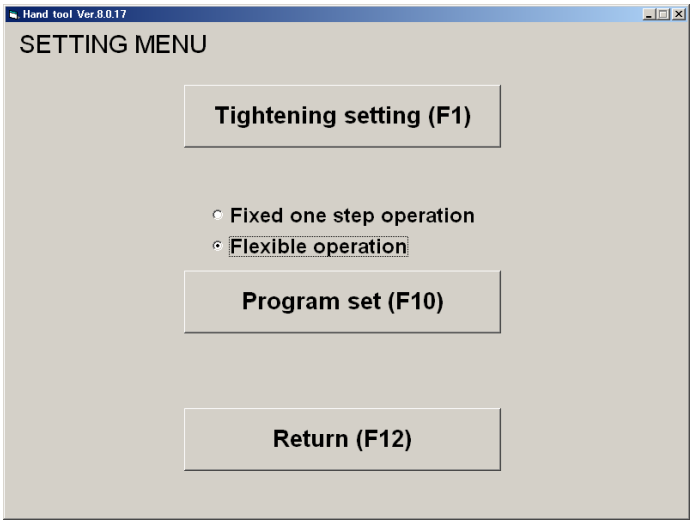
(Item which is only possible to be set in this screen)

Setting item	Unit	Contents	Remark
Speed of loosening direction	rpm	Setting speed rotating to the loosening direction.	
Limit of acceleration and deceleration with loosening direction.	10rpm／sec	Setting motor acceleration and deceleration value at the time of loosening rotation.	The lower the value is, it takes time to reach the target.

5－6 Setting standard with each setting item (Reference value)

Setting item	Standard		Remark
Upper torque limit	Cutting torque ＋ 10%[Nm]		Refer to working drawing
Lower torque limit	Cutting torque － 1%[Nm]		Refer to working drawing
Cutting torque	Drawing instruction torque [Nm]		Refer to working drawing
Upper time limit	9999 [msec]		See through online data, etc
Lower time limit	1[mesc]		See through online data, etc
Upper angle limit	180 [deg]		See through online data, etc
Lower angle limit	1 [deg]		See through online data, etc
Upper rundown angle limit	9999 [deg]		
Lower rundown angle limit	360 [deg]		Input "0" in case of additional tightening.
Upper snag torque limit	Snag torque value ＋ 50%[Nm]		
Lower snag torque limit	Snag torque value － 0. 1[Nm]		
Speed 1	Against max. RPM, about 70%[rpm]		
Speed 2	Against max. RPM, about 40%～50%[rpm]		If the value is set high, reaction at seating becomes big.
Speed 3	20～80 [RPM]		
Speed 2 switching torque	Against cutting torque、about 10%～20%[Nm]		
Speed 2 switching angle	Rotation no. from bolt set until seating － 720degree [dec]		
Speed 3 switching torque	Against cutting torque, about 30%～50%[Nm]		
Overtime	10 [sec]		
Final tightening cutting angle	180 [deg]		In case of the soft work, increase the value.
Snag torque value	Against cutting torque, about 30%～50%[Nm]		
Monitoring time for no-torque	0 [msec]		
Soft stop valid and invalid	Valid		
Soft stop start torque	80 [%]		
Soft stop subtraction time	50 [×200μsec]		In case of big reaction, increase the value.
Soft stop finish torque	30 [%]		
Soft start valid and invalid	Valid		
Soft start duration time	500 [mesc]		
Speed during soft start	60 [rpm]		
Torque gradient valid and invalid	Valid		
Soft gradient rate	70 [%]		When it is difficult for torque to rise, increase the value.
Pulse control valid and invalid	In case of invalid	In case of valid	
Pulse period time	0 [×200μsec]	180～250 [×200μsec]	When it is difficult for torque to rise, increase the value.
Pulse ON time	0 [×200μsec]	18～25 [×200μsec]	When it is difficult for torque to rise, increase the value.
Pulse stop torque	0 [Nm]	0 [Nm]	
Stop time after seating	0 [Nm]		
Loosening direction speed	200 [rpm]		
Limit of acceleration and deceleration with loosening direction.	1000 [10rpm/sec]		
Zone monitoring range	In case of invalid	In case of valid	
Zone starting point	0 [Nm]	Against cutting torque, 20%～30%[Nm]	
Tolerance of the zone starting point	0 [Nm]	Against cutting torque, 15%～10%[Nm]	
Zone end point	0 [deg]	100 [deg]	
Tolerance of the zone end point	0 [deg]	95 [deg]	

When the Flexible operation is selected in the setting No.2 screen, it comes to be possible to select「Program set」.



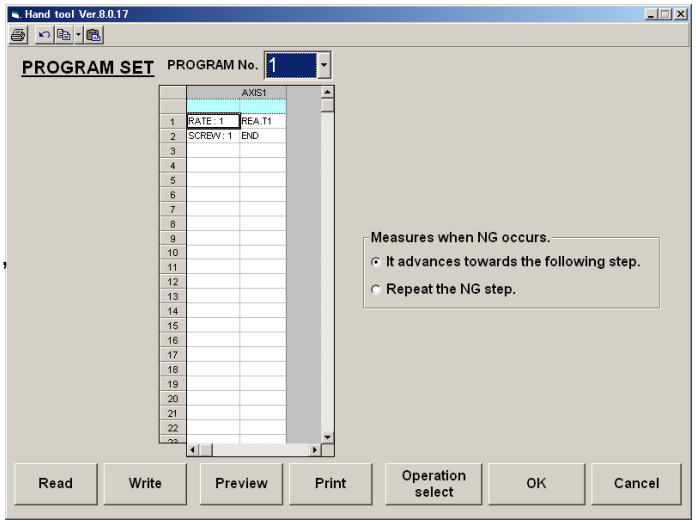
As explained about the setting No.2 screen, versatile tightening becomes possible when using the flexible setting.

If「Program setting」is selected, it moves to the screen for the setting of tightening operation.

It is the「Program setting」screen.

It is possible to make 1～24 kinds of Program No.

When plural times of tightening required, **Be sure to put「End」command and make out as 1 block..**



（Handling at NG occurrence）

When 1 block finished and the corresponding Judgment of tightening was NG,

・Move to the Next step

→ It moves to the next tightening operation.

・Repeat NG step

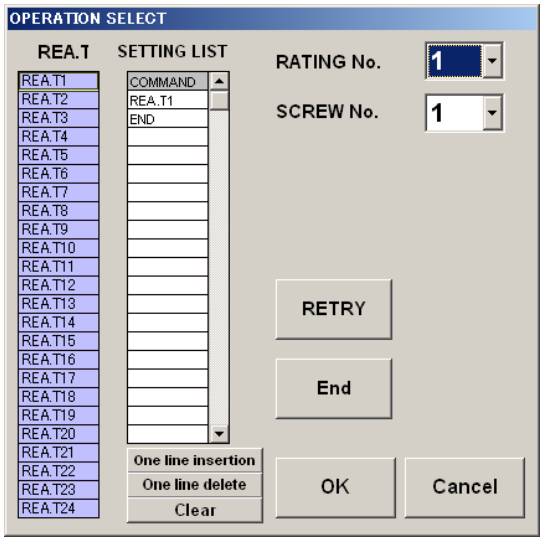
→Again, tightening of the step which NG occurred should be done.

（Until it turns OK, it doesn't advance towards the following step.）

Moving the cursor to the place where you want to add a block, click「operation select」button.

As the operation select screen is displayed, select a tightening No. (final tightening No.) to be used and click「End」button.　After that, click「OK」button.

Besides, it is not possible to select the No. which is not prepared with the final tightening setting.
(Blue turning-over condition)



Moreover, changing the screw no.（1～60） enables us to confirm by the controller which times of tightening is being done.

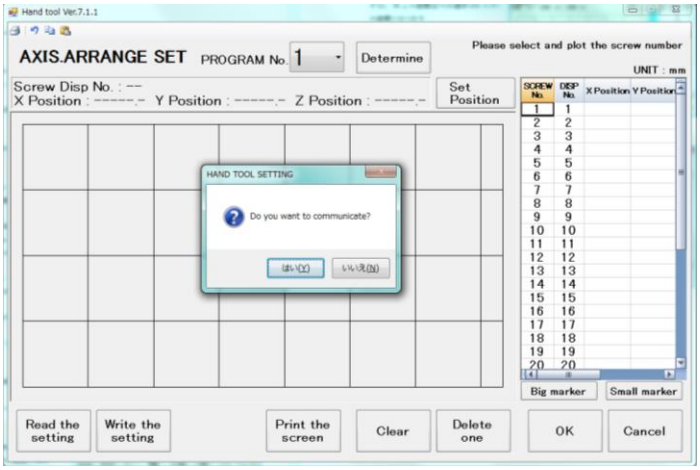
When「OK」button is clicked, the block which was set in the operation select screen comes to be added.

By the repeat of this work, a program is created.

Axis array setting screen（Type : With position detection function Correspondence only）

The program can be set up to 1-24

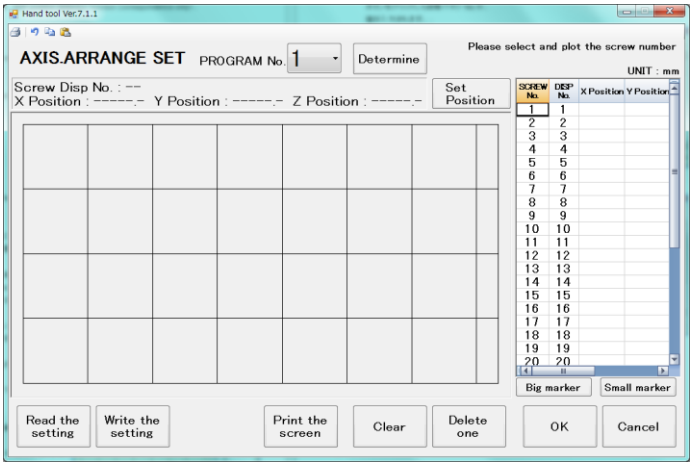
Please select the “Yes”



Screen right side of the table is to coordinate setting the position with each tightening Become.

Click the selected frame
in the screw number

※This display will appear on the display
It is not related to the value of the coordinates。

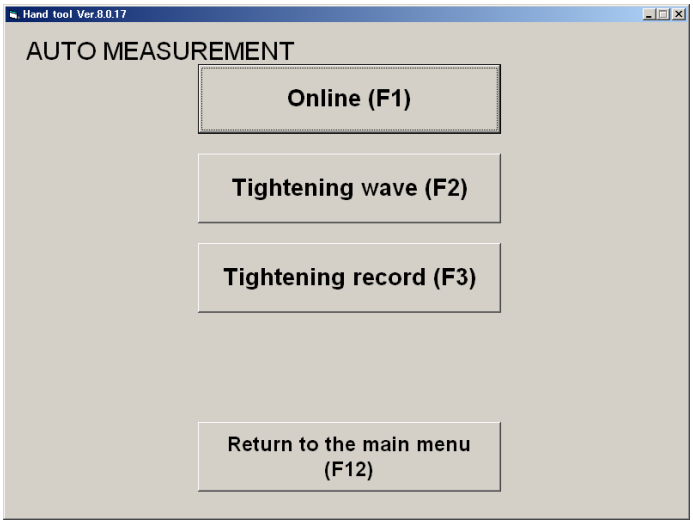


screw No.= Order tightening
Disp No. = Number of screws to be displayed on the display

When finished put the setting, please press always confirm button

【Auto measurement】

It is possible to get tightening data connecting a setting personal computer to the controller.



・Online

Keeping the Online screen on while the PC is connected, tightening data can be real time obtained.

・Tightening wave

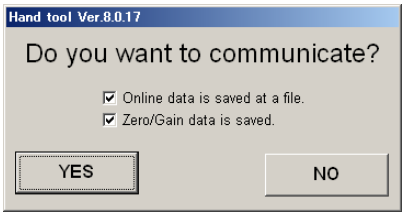
Keeping the Tightening wave screen on while the PC is connected, tightening wave can be real time obtained.

・Tightening history

It is possible to obtain past 6000 data of the tightening history saved in the controller.

Be careful that while getting data, it is not possible to do the tightening operation.

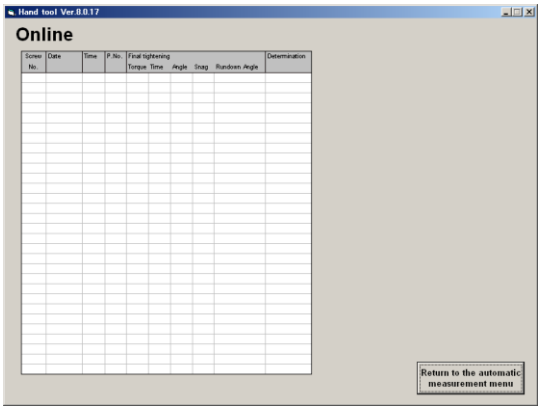
Online screen



Select「Online」and the message box as「Do you want to Communicate ?」is displayed.

Confirming the connection with the controller, click「Yes」.

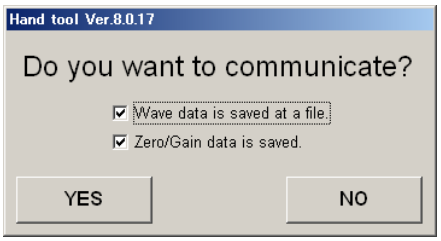
Besides, when a check is given at 「Online data is saved at a file」and 「Zero/Gain data is saved」, the obtained data are saved in the PC.



The place to be saved;

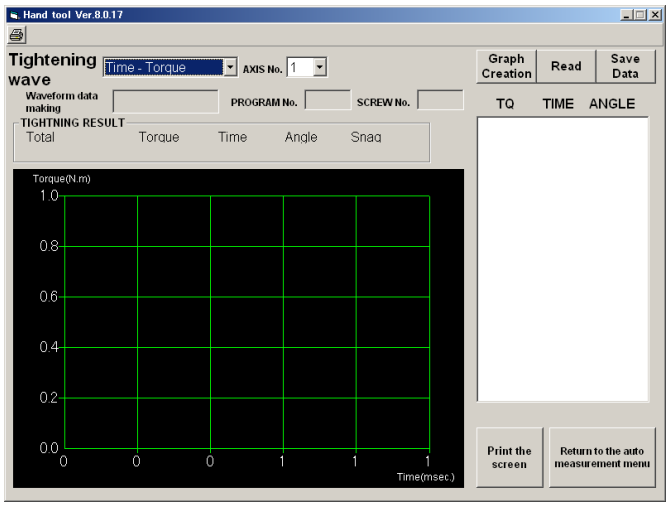
It is automatically saved in the ¥Auto measurement ¥Online¥ where this soft ware is installed.

Tightening wave screen



Select Tightening wave and the message box as 「Do you want to communicate？」 is displayed. Confirming the connection with the controller, click 「Yes」.

Besides, when a check is given at 「Wave data is saved at a file」 and 「Zero/Gain data is saved.」, the obtained data is saved in the PC.

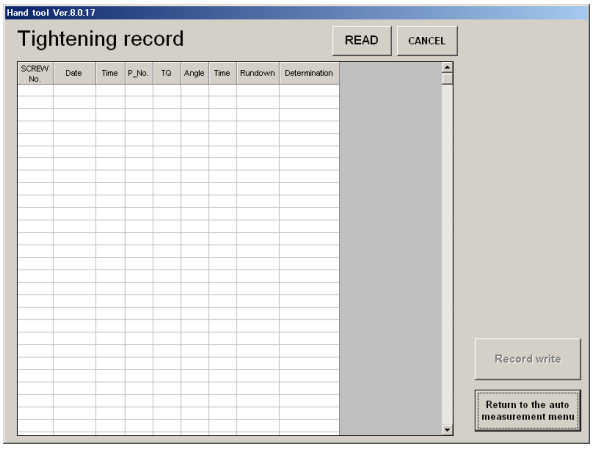


The place to be saved;
It is automatically saved in the ¥Auto measurement¥wave¥ where this soft ware is installed.

Tightening history screen

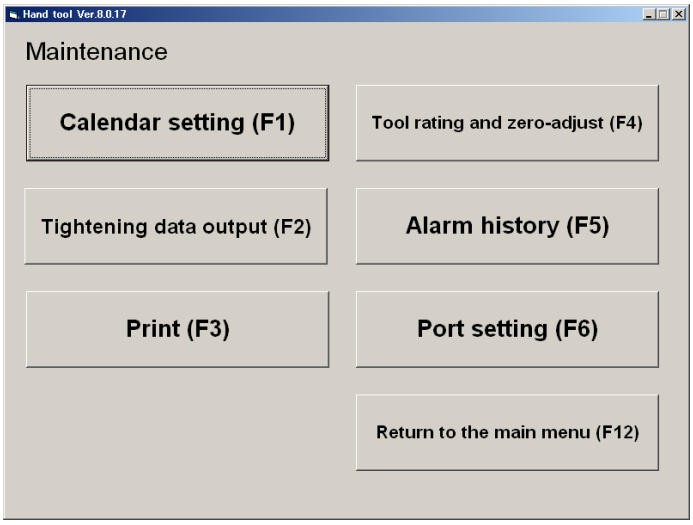
Select［Tightening wave］ and the message box as 「Do you want to communicate？」 is displayed. Confirming the connection with the controller, click 「Yes」.

Besides, Maximum 6000 data are saved in the controller.
It takes about 4 minutes to receive max. data.
While receiving data, it is not possible to use the tool, please pay much attention during communication.



When 「READ」 button in the screen upper part at the tightening history screen is clicked, the communication with the controller starts.
If 「READ」button is not clicked, communication does not start.
After finish of reading, clicking with 「History information writing」button comes to be possible.
Data obtained clicking 「History information writing」button are saved in the personal computer.
As the place to be saved, it is automatically saved in the ¥Auto measurement¥wave¥ where this soft ware is installed.

【Maintenance】



This is the screen to confirm the basic setting of the tool and the controller, and the alarm history.

・Calendar setting

It sets the calendar in the controller.

・External output

It sets the way to output the data of the tightening results to the outside.

(at present, not corresponding)

・Print

It is the screen to print the setting values of the tightening..

・Tool rate and Zero-adjust

It is the screen to set the initial value of the tool main unit.

・Alarm history

It is the screen to read out the alarm history occurred before.

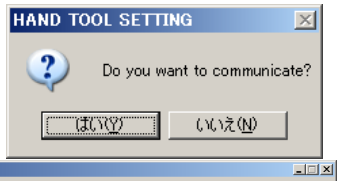
・Port setting

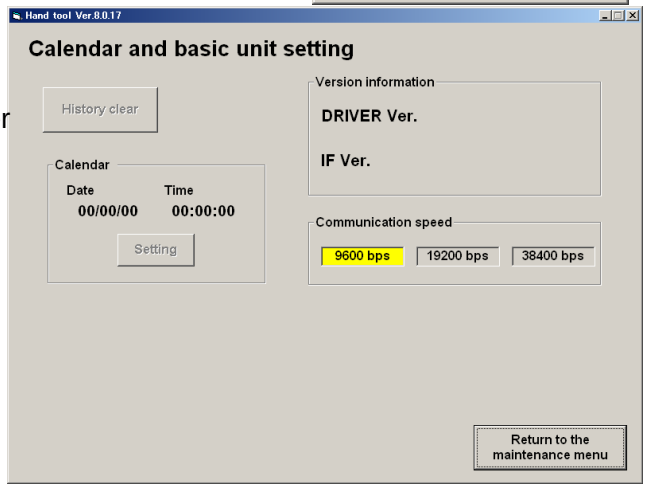
It is the screen to set the specifications of communication about the connection with the controller.

Calendar setting

Select the calendar setting and the message box as 「Do you want to Communicate？」 is displayed.

Confirming the connection with the controller, click「Yes」.





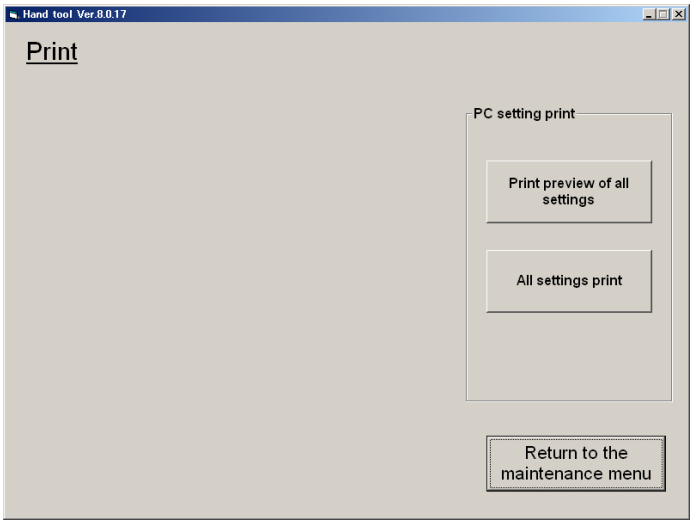
Version of the software in the current controller and inside clock will be displayed.

In case of changing the inside clock of the Controller, click「Setting」.

When deleting a tightening record inside the Controller, click「History clear」.

・Print

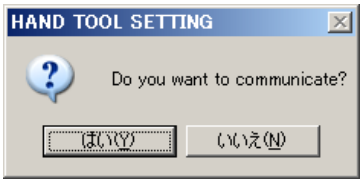
It is possible to confirm the printing image at「Print preview of all setting data」



At「All settings print」, it prints the setting values from a printer connected to the personal computer.

It is indispensable that「Normally used printer」is set in the personal computer.

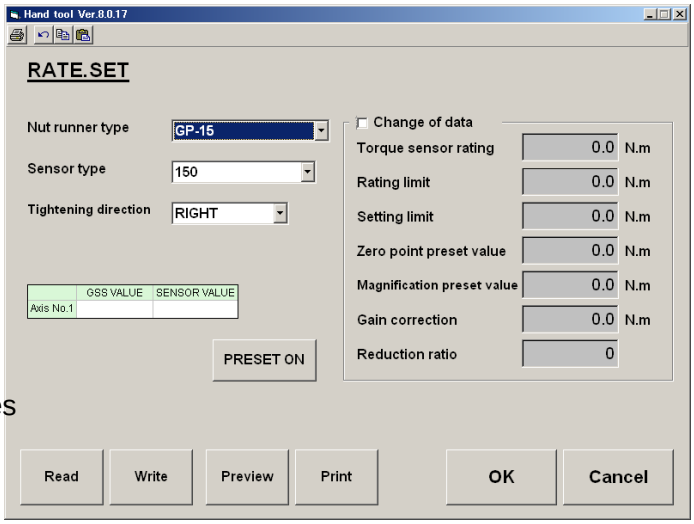
・Tool rate　Zero point adjustment



Selecting the calendar setting, the message box as「Do you want to communicate ?」is displayed.　Confirm the connection with the controller, and click「Yes」.

Regarding the rating data, they are put on record in the main unit of the tool (internal circuit board) at the time of shipment from the factory.

When the controller is connected with the tool, the controller automatically recognizes the rating data registered in the tool at the time of turning on the controller.



If rewriting of the rating data is done using the setting software, the changed content is reflected until turning off the power.　However, be careful that turning on the power again, it becomes invalid.

In case of rewriting with the internal circuit board of the tool, it requires a special work and please consult with the manufacturer.

（Contents of item）

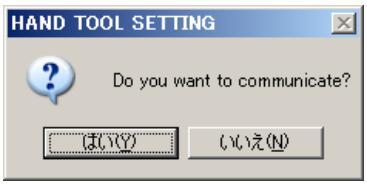
Item name	Meaning
Nut runner type	Tool type to be used
Sensor type	Sensor type being used
Screw tightening direction	Rotating direction at positive rotation
Torque sensor rating	Sensor rating value
Limit over	Tolerance of Zero point・magnification

Item name	Meaning
Set over	Change tolerance of Zero point・magnification
Zero point preset value	Sensor output value at no load
Magnification preset value	Sensor output value at checking magnification
Gain correction	Correction value of sensor output
Reduction ratio	Gear ratio of the tool being used

・Alarm history

If the calendar setting is selected, the message box as「Do you want to communicate？」is displayed.

Confirm the connection with the controller, and click「Yes」.

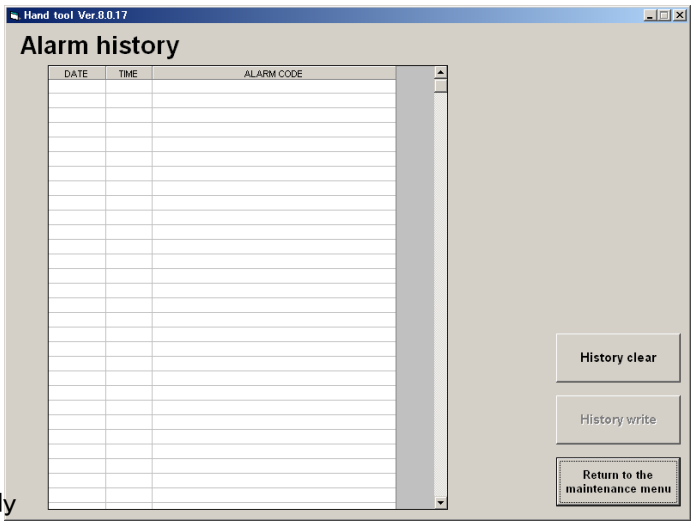


The alarm record (maximum of 16) which is registered inside the controller is displayed in the screen.

At「Alarm history clearing」, registered history data are cleared.

At「History information write」, obtained data are stored in the personal computer.

As the place to be stored, it is automatically stored in the ¥Auto measurement¥wave¥ where this soft ware is installed.

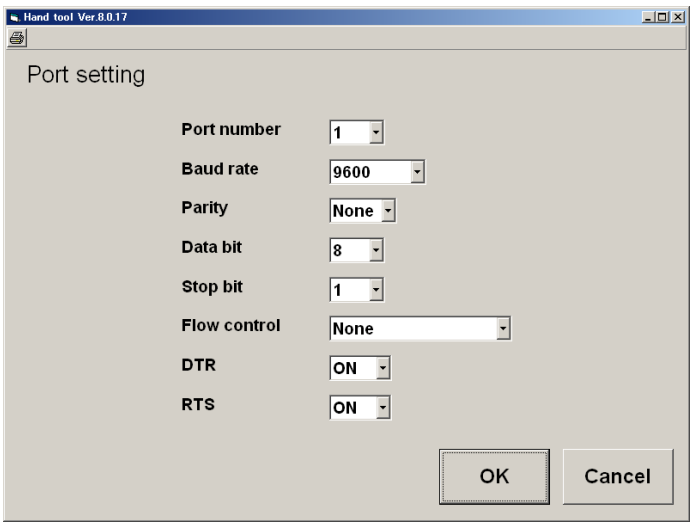


・Port setting

It sets the communication port ・protocol to connect the controller and the PC.

About port No., set the port No. which is connected with the controller.

(For details, please refer to 5－3, the setting software installation procedure ; since the clause 17.)

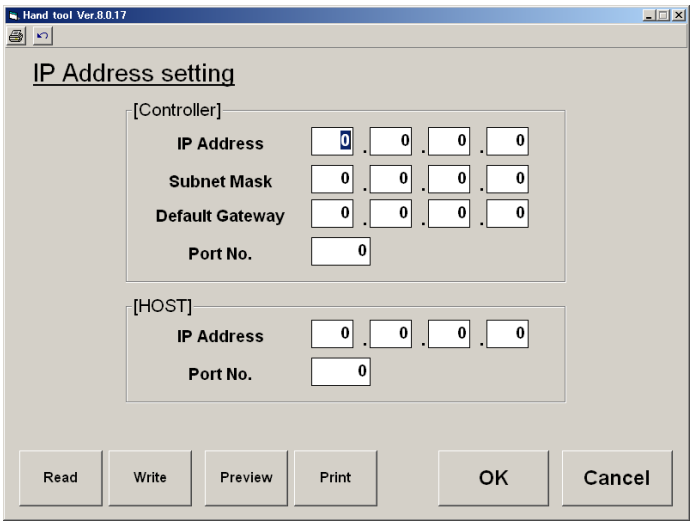


As for the protocol, please do not change from the prescribed value. There is possibility that the communication comes to be impossible.

【IP Address setting】

This is the address setting screen
in case of connecting to the higher rank
Personal computer through the Ethernet.

Confirm connection environment with the higher rank PC and set contents.



6． Code table

6－1 NG Code table

Operation	Code display	Contents
Zero magnification check and others	0001	Zero point offset error During the Zero/magnification check, Zero point output exceeded the limit over. AD converter initialization's inferior at the time of re-turning on the controller.
	0002	Magnification error During the Zero/magnification check, magnification output exceeded the limit over. AD converter initialization's inferior at the time of re-turning on the controller.
	0003	Zero point offset fluctuation error Difference between outputs of last time and present time exceeded the set over.
	0004	Magnification change error Difference between outputs of last time and present time exceeded the set over.
Final tightening	0403	Final tightening zone NG When the zone determination is set , tightening torque was not in the setting zone.
	0411	Final tightening torque over Torque value at stopping exceeded the setting value.
	0412	Final tightening torque under Torque value at stopping does not reach the setting value.
	0421	Final tightening time over Operation time at stopping exceeds the setting value.
	0422	Final tightening time under Operation time at stopping does not reach the setting value.
	0431	Final tightening angle over Operation angle at stopping exceeds the setting value.
	0432	Final tightening angle under Operation angle at stopping does not reach the setting value.
	0433	Final tightening over time Operation time until tightening finish exceeds the setting value.
	0434	Final tightening cut angle NG Operation angle until tightening finish exceeds the setting value.
	0441	Final tightening snag torque over. Snag torque at the time of tightening exceeded the setting value.
	0442	Final tightening snag torque under Snag torque at the time of tightening did not reach the setting value.
	0451	Final tightening rundown angle over Rundown angle at the time of tightening exceeded the setting value.
	0452	Final tightening rundown angle under. Rundown angle at the time of tightening did not reach the setting value.

Trigger	0500	Trigger releasing NG Trigger was released before reaching the cut upper limit after passing the snag torque at the time of tightening.
Heat	0600	Spindle unit (motor) heating error During tightening operation, the temperature of the motor coil exceeded 175℃. (But, the coil temperature calculation is based on the result of calculation.)
Position detection	0711	R/D1 Converter abnormal
	0721	Resolver1 cable disconnection
	0712	R/D2 Converter abnormal
	0722	Resolver2 cable disconnection
	0713	R/D3 Converter abnormal
	0723	Resolver3 cable disconnection

6－2 Alarm code table

＊ For all alarm and error occurrence, the initial measure is to turn off the power supply once and after 3 seconds turn on the power again confirming if the same alarm occurs.

Code display contents	Detected cause	Situation	Cause	Measures
AL10･AL11 Power drive error	Power drive error is detected Over current, over heat error, control power supply error.	Occurs simply when power supply is turned on.	Controller error	Replace controller
		Occurs when operated.	Wire short-circuit of tool	Check wiring to tool Replace tool
			Controller error	Replace controller
			Combination with tool and controller is not correct.	Change tool or controller
		Occurs during acceleration and deceleration	Controller adjustment improper	Replace controller
		Occurs during operation	Internal over heat with controller	Improve heat radiating condition Ease operating condition
AL20 Overload alarm	Average value of tool current exceeded the detecting level(Fn01-PA06)	Occurs when operated.	Motor seizure	Replace tool
		Occurs after operated.	Combination with tool and controller is not correct.	Change tool or controller Take another setting value
		Tool vibrates while running.	Adjustment improper.	Gain re-adjustment. (Fn.01-PA00~PA03)
		Occurs during acceleration and deceleration Occurs during rotation at a constant speed.	Too much acceleration /deceleration.	Lower acceleration/deceleration speed. (Fn.01-PA21)
			Too much load torque.	Reconsider tightening torque
		Occurs simply when operation starts	Tool wire wrong connection/not connected.	Check wiring
			Locking of gear part	Check mechanism.
		Screw is tightened.	Torque sensor error	Check torque sensor.
			Torque sensor rate, cut torque setting error.	Check settling value.
		Occurs simply when turning on the power supply.	Overload detecting level error	Reconsider Fn.01-PA06
AL21	RS1 Resolver abnormal	Occurs when power supply is turned on	Resolver1 cable disconnection	Check wiring. Loose connection Replace cable
AL22	RS2 Resolver abnormal		Resolver2 cable disconnection	
AL23	RS3 Resolver abnormal		Resolver3 cable disconnection	
AL30 Speed alarm	Motor speed exceeded detecting level (FN01-PA05).	Occurs during operation.	Speed overshoot.	Readjust gain. (Fn.01-PA00~PA03)
			Tool sensor error	Replace tool
			Sensor signal receiver error.	Replace controller.
		Occurs simply when turning on the power supply.	Over speed detecting level error	Reconsider Fn.01-PA05
AL40 Sensor initial error	Failed to initialize sensor.	Motor does not rotate after drive power supply is turned on.	Wrong wiring to tool.	Check wiring to tool.
			Tool defect	Replace tool.
			Gear mechanism is heavy.	Improve mechanism section.
			Combination with tool and controller is not correct.	Change tool or controller.
		Motor rotates after drive power supply is turned on.	Sensor defect	Replace tool.
			Sensor signal receiver error.	Replace controller.

Code display contents	Detected cause	Situation	Cause	Measures
AL48 Angle data reading error.	Sensor position data cannot be read normally.	Occurs during operation.	Signal receiver defect.	Replace controller.
			Sensor defect.	Replace tool.
AL60 Sensor signal error	Signal line of sensor was broken.	Occurs when power supply is turned on.	Sensor signal line broken.	Check wiring. Loose connection Replace tool
AL71 Drive power supply over voltage	Drive voltage is high.	Occurs during deceleration.	Regenerative ability insufficient	Replace controller Lower acceleration/ deceleration speed. (Fn.01-PA21)
AL72 Regeneration circuit error	Regeneration processing circuit malfunctioned	Occurs simply when power supply is turned on.	Drive voltage specification is wrong.	Replace controller
		Occurs simply when power supply is turned on. Occurs during deceleration.	Controller defect	Replace controller
			Regenerative resistor broken	Replace controller
AL80 Drive power supply interrupted	Drive voltage cutting or momentary power interruption occurred	Occurs simply when power supply is turned on.	Regenerative processing ability insufficient	Replace controller
			Drive voltage specification is wrong.	Change controller Check power supply wiring
		Occurs simply when power supply is turned on. Occurs at a specific timing.	Voltage detecting circuit malfunction	Replace controller
			Drive power supply was cut off during controller operation.。	Check higher rank timing and preparation signal of operation.
	Drive voltage is too low Momentary power interruption(about 0.1sec.) occurred.	Occurs during operation.	Voltage drop and power supply momentary interruption of input power supply	Check input power supply
AL90 Driver section E2PROM error	Data cannot be read /written from / to E2PROM.	Occurs at a specific timing.	Drive power supply was cut off during controller operation.	Check higher rank timing and preparation signal of operation.
		Occurs when power supply is turned on. Occurs when parameters are saved.	E2PROM defect ／ operating life	Replace controller
AL91 Tool E2PROM Disappearing DATE	Disappearing DATE From E2PROM	Occurs at a specific timing.	Tool E2PROM Malfunction	Exchange of tools
		Raised in the middle data writing	Tool E2PROM Malfunction	
AL92 Tool E2PROM error	E2PROM Checksum error	Occurs at a specific timing.	Tool E2PROM Malfunction Cable error	Exchange of tools Exchange of cable
		Raised in the middle data writing	Tool E2PROM Malfunction Cable error	
AL93 Tool E2PROM error ZERO error	Data cannot be read /written from / to E2PROM.	Occurs at a specific timing Occurs when parameters are saved.	It has been input Rating setting Magnificationpreset value “0”	Magnificationpreset Enter the appropriate value
ALA0 Tool connection error	Controller type and tool type not matching	Occurs when power supply is turned on after initial connection.	Mismatch of Controller type and tool type.	Replace controller or tool

Code display contents	Detected cause	Situation	Cause	Measures
ALC0 Program No. error	Program selection error/contents error	Occurs when power supply is turned on.	Tool cable being broken	Replace tool cable
		Occurs at input enable	Specified program no. is 0, or more than 25.	Check program selection signal
ALC1 Operation content error	Undecipherable step has been set.	Occurs when program starts.	There is no content of specified program.	Reconfigure program.
		Occurs when program starts. Occurs when each operation starts.	Selected block which operation was already completed.	Check block selection signal.
			Setting of upper/lower limit is both 0. Final tightening cut angle is 0.	Check settings.
		Occurs when program starts/while executing	E2PROM defect/ operating life	Replace controller
ALC2 No operating axis error	Specified axis is not actually installed ／ axis no. is doubled.	Occurs when power supply is turned on.	Due to communication error with PC, program contents are not stored normally.	Retransmitting from PC Check communication cable
			Unit setting mistake	Check unit setting axis (Fn.11)
ALC3 Controller E2ROM error	Data cannot be read/written from /to E2ROM normally.	Occurs when power supply is turned on. Occurs when parameters are saved.	Noise	Put ferrite core to the tool cable.
			E2ROM defect /operating life time	Replace controller.
ALC5 Program setting error	No rate setting	Occurs when operation starts	Rate setting mistake	Check rate setting
ALC6 Pokayoke communication error	Timeout of communication with external Pokayoke。	Occurs after turning on power supply	Communication setting mistake	Reconsider communication setting (Fn.10-PA3)
ALC7 Tightening remaining Q'ty error	Count of tightening remaining quantity with pokayoke differed.	Occurs during the operation	Controller error	Replace controller
		Occurs during the operation	Error in Pokayoke side	Replace pokayoke equipments
		Occurs during the operation	Noise mixed to RS-232C line	Put ferrite core to the communication cable
			Controller error Replace controller	
＝ CPU error	C P U cannot operate normally.	Becomes normal when the tool cable is disconnected	Error in pokayoke side Replace pokayoke equipments	
			Noise mixed to RS-232 C line Put ferrite core to the communication cable	
			Short-circuit of tool cable, wrong wiring Check wiring	
LED OFF	CPU is not Operating.	Occurs when power supply is turned on.	Controller defect Replace controller	
		Becomes normal when tool cable is disconnected.	Short-circuit of tool cable, wrong wiring Check wiring	

7． Precautions・Maintenance

【Precautions】

・When the tool is replaced, make sure to cut off the power supply of the controller.

・Do not operate the trigger switch when your hands are wet.

・This product is not water-proof construction. Please avoid such use in the place where water splashes.

・Be sure to use the tool with the corresponding controller.

・Do not make sudden shock on the one touch chuck part. There is the possibility that snap ring comes off and the one touch chuck is disassembled.

・Do not make sudden shock on the square socket pin preventing falling.. There is the possibility that the safety-catch pin shears.

【Maintenance】

Please make daily inspection on the following contents in order to ensure that you use this product correctly.

1）Check the connectors for loosened condition.

2）In the state of no-load rotation, are there any strange sound and rotation sound in discontinuity ?

3）Check the output axis for loosened condition.

4）Check the trigger switch for loosened condition or late returning when released.

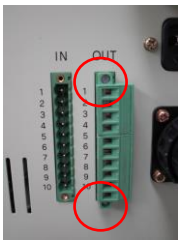
5）Check the cable for flaw and cracks.

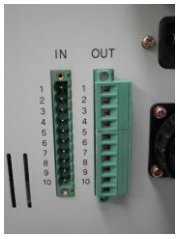
6）Check the cable if it is transformed by being inserted or crushed.

7）Check if the alarm lamp lights at the condition that the power supply of the controller turned on.

Besides, in order to ensure the most suitable accuracy and quality, we recommend the revision confirmation (implementing in us) once a year.

8． Measures in case of the abnormal-occurrence

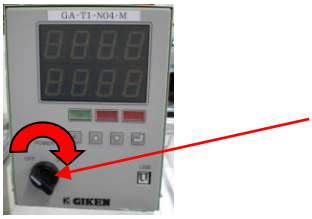
Hand tool (Angle)　nut runners　replacing procedure (at replacing the controller)　1/2			
Way	Working contents	Necessary tools	Remark
1	Back up saving of the setting values with the current controller	PC for setting Communication cable	For details, refer to「PC　setting　procedure」
2	Turn off the power supply of the controller.		
3	In case of fixing the controller, remove the fixing metal, etc.	Screwdriver Nipper, etc.	
4	Pull out first side power source connector of the back.		
5	When external input／output connectors are equipped, remove the connectors. （only when the connector is used.）	Precise minus screwdriver	 
6	Replace the controller.		

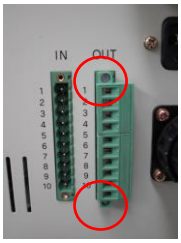
Hand tool (angle) nut runner Replacing procedure (at replacing the controller) 2/2			
Way	Working contents	Necessary tools	Remark
7	When external output/input connectors are equipped, assemble the connectors.	Precise minus Screwdriver	 
8	Insert the first side power supply connector of the back.		
9	When the controller was fixed, fit the fixing metal, etc.	Screwdriver, etc	
10	Turn on the power supply of the controller。		
11	Write setting values saved for back up into the controller.	PC for setting Communication cable	

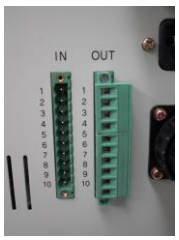
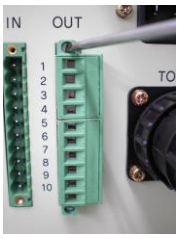
Hand tool(angle)nut runner　Replacing procedure　(at replacing　the cable)　1/2			
Way	Working contents	Necessary tools	Remark
1	Turn off the power supply of the controller.		
2	In case of the controller being fixed, remove the fixing metal, etc.	Screwdriver, Nipper, etc.	
3	Pull off the first side power supply connector of the back。		
4	Pull out the cable of tool side		  
5	Replace the cable taking around from the tool to the controller.	Nipper, etc.	

Hand tool (angle) nut runner　Replacing procedure (at replacing the cable)　2/2			
Way	Working contents	Necessary tools	Remark
6	Insert cable of tool side		
7	Insert the first side power supply connector of　the back.		
8	In case of　the controller being fixed, install the fixing metal, etc.	Screwdriver, etc.	
9	Turn on the power supply of the controller.		

Hand tool (angle) nut runner Replacing procedure (At replacing the tool) 1/2			
Way	Working contents	Necessary tools	Remark
1	Turn off the power supply of the controller		
2	Pull out the cable of the tool side		  
3	Replace tool.		
4	Install the cable of the tool side.		    

Hand tool (angle) nut runner Replacing procedure (At replacing the tool) 2/2			
Way	Working contents	Necessary tools	Remark
5	Turn on the power supply of the controller		

Hand tool (Pistol) Nut runner　Replacing procedure (At replacing the controller)　1/2			
Way	Working contents	Necessary tools	Remark
1	Save the setting values of the current controller for back up.	PC for Setting Communication cable	
2	Turn off the power supply of the controller.		
3	In case of the controller being fixed, remove the fixing metal, etc.	Screwdriver, Nipper, etc.	
4	Pull out the first side power supply connector of the back.		
5	When external input／output connectors are equipped, remove the connectors. (only when the connector is used.)	Precise minus Screwdriver	 
6	Replace the controller.		

Hand tool (pistol)　nut runner　Replacing procedure (At replacing the controller)　2/2			
Way	Working contents	Necessary tools	Remark
7	When external input /output connectors are equipped, assemble the connectors.	Precise minus Screwdriver	 
8	Put in the first side power supply connector of the back.		
9	In case of the controller being fixed, install the fixing metals, etc.	Screwdriver, etc.	
10	Turn on the power supply of the controller。		
11	Write the back-up saved setting values in the controller.	Setting PC Communication cable	

Hand tool （Pistol） Nut runner Replacing procedure （At replacing the cable） 1/2			
Way	Working contents	Necessary tools	Remark
1	Turn off the power supply of the controller		
2	In case of the controller being fixed, remove the fixing metals, etc.	Screwdriver, Nipper,etc.	
3	Pull out the first side power supply connector of the back		
4	Pull out the cable of the tool side.		  
5	Replace the cable taking around from the tool to the controller.	Nipper, etc.	

Hand tool （Pistol） Nut runner Replacing procedure （At replacing the cable ） 2/2			
Way	Working contents	Necessary tools	Remark
6	Install the cable of the tool side.		
7	Put in the first side power supply connector of the back.		
8	In case of the controller being fixed, install the fixing metal, etc.	Screwdriver, etc	
9	Turn on the power supply of the controller.		

Hand tool (Pistol) Nut runner　Replacing procedure　(At replacing the tool)　1/2			
Way	Working contents	Necessary tools	Remark
1	Turn off the power supply of the controller		
2	Pull out the cable of the tool side		  
3	Replace the tool.		
4	Install the cable of the tool side.		     

Hand tool (Pistol) Nut runner Replacing procedure (At replacing the tool) 2/2			
Way	Working contents	Necessary toools	Remark
5	Turn on the power supply of the controller		

９． Ethernet　Specifications of communication

９－１ Outline

Using higher rank side sequencer, etc., it is possible to output specific data in the controller.

Specifications of Communication are as follows;

９－２ Specifications of interface

Item		Contents
Controller model		GP-T1-N04(N05)-M GA-T1-N04(N05)-M GA-T5-N04-M
Software version		1688-***
The standard being based		Ethernet TCP/IP being conformed
Quantity in connection		1:n (it distinguishes by IP address)
Communication speed		10/100Mbps (automatic switching)
Transmission block length		25byte
Specifications of communication	Character way	ASCII
	Character length	8bit
	Error check	According to the Check Sum. The lower rank 16 bit data with total from the character after STX to the semicolon「;」in front of Check Sum data.
	End of dater	End character of each dater shall be「, 」.
Transmission control code		STX(0x02) ,ETX(0x03) It makes output completely with ASCII code except transmission code. (Decimal number, hexadecimal intermingling)

９－３ Communication procedure

Communication is only the transmission with regular data from the side of the controller.

The controller side will not react even if some data transmission is done from the host side (higher rank sequencer, etc.).

Data is transmitted only for the last tightening data in one program.

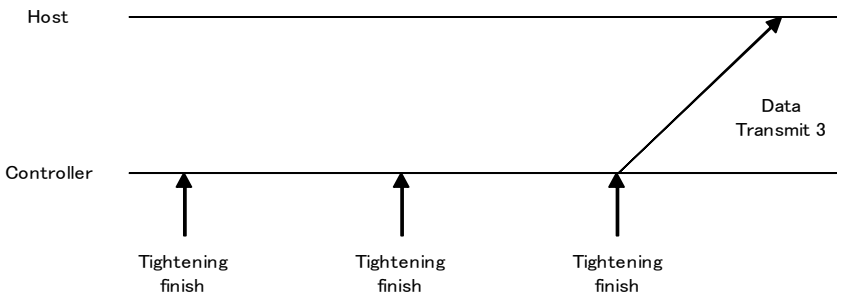


Figure 1 Data transmission from the Controller

9－4 Message format of communication

Transmitting and receiving message of communication is done with the following Format. All data are sent with ASCII.. Check Sum is output by hexadecimal and others are output by decimal number.

*	STX	Node No.	,	Screw No.	,	Torque result	,	Angle result	,	Tightening judge	;	Check Sum	ETX

Name	Number of Characters	Contents	Check Sum range
*	10max	Dummy character「Z」×10times max It is output as dummy in front of STX but receive as data after STX.	
STX	1	Start code (0x02) It shows the top of the message.	
Node No.	3	It outputs the 4th of the IP address of the equipment by 3 digits in the decimal number. ex) 192.186.0.123 → 「1」「2」「3」 transmitting	○
,	1	End symbol of the data (0x2C)	○
Screw No.	2	It outputs the screw number tightened by 2 digits in the decimal number. ex) screw No.「12」 → 「1」「2」 transmitting	○
,	1	End symbol of the data (0x2C)	○
Tightening torque result	4	It outputs the tightening torque result in the decimal number. Unit is 0.1[Nm]. ex) 123.4[Nm] → 「1」「2」「3」「4」 transmitting.	○
,	1	End symbol of the data. (0x2C)	○
Tightening angle result	4	It outputs the angle from detecting the snag torque to tightening finish in the decimal number. Unit is 0.1[°]. ex) 123.4 [°] → 「1」「2」「3」「4」 transmitting.	○
,	1	End symbol of the data. (0x2C)	○
Tightening judgment	1	It outputs the judgment of tightening result according to the following table 1.	○
;	1	End symbol which shows the data finish and the Check Sum starts (0x3B)	○
Check Sum	4	Check Sum Check Sum calculation range is from 「Node No.」 to 「;」、 which ASCII character code is summed in the hexadecimal number、and lower rank 4 digits are converted to ASCCII to give it. Data format : hexadecimal 4 digits(0000h ～ FFFFh)	
ETX	1	Finish code (0x03)	

Table 1　Judgment result table

ASCII Code	BIN Code (HEX)	Name
@	40h	ＯＫ
%	25h	ＮＧ
A	41h	ＺＥＲＯ Error／broken wire／tool degradation
E	45h	Initial error
F	46h	Cycle over time error
G	47h	Torque ＬＯＷ／Torque insufficient
H	48h	Torque ＨＩＧＨ／Double tightening
I	49h	Angle ＬＯＷ／Seizure
J	4Ah	Angle ＨＩＧＨ／diagonal entering

9－5 ASCII Code table

The following table shows the ASCII code to which this controller corresponds.

It does not correspond to the characters in the part of

		0 (0000)	1 (0001)	2 (0010)	3 (0011)	4 (0100)	5 (0101)	6 (0110)	7 (0111)
0	(0000)	NUL	DEL	SP	0	@	P	‘	p
1	(0001)	SOH	DC1	!	1	A	Q	a	q
2	(0010)	STX	DC2	”	2	B	R	b	r
3	(0011)	ETX	DC3	#	3	C	S	c	s
4	(0100)	EOT	DC4	$	4	D	T	d	t
5	(0101)	ENQ	NAK	%	5	E	U	e	u
6	(0110)	ACK	SYN	&	6	F	V	f	v
7	(0111)	BEL	ETB	’	7	G	W	g	w
8	(1000)	BS	CAN	(	8	H	X	h	x
9	(1001)	HT	EM	)	9	I	Y	i	y
A	(1010)	LF	SUB	*	:	J	Z	j	z
B	(1011)	VT	ESC	+	;	K	[	k	{
C	(1100)	FF	FS	,	<	L	¥	l	|
D	(1101)	CR	GS	-	=	M	]	m	}
E	(1110)	SO	RS	.	>	N	^	n	～
F	(1111)	SI	US	/	?	O	_	o	DEL

１０．RS－232C Specifications of communication

・１０－１ Outline

Using higher rank side sequencer, etc., it is possible to output specific data in the controller.

Specifications of Communication are as follows;

・１０－２ Specifications of interface

Item		Contents
Controller model		GP-T1-N04(N05)-M GA-T1-N04(N05)-M GA-T5-N04-M GA-T1-N07-M GA-T5-N07-M
Software version		1688-*** 2757-2**
Output connector		Back of controller RS-232C
The standard being based		RS-232C compliant
Quantity in connection		1:1 Full dual communication Synchronous communication
Communication speed		9600bps
Transmission block length		Variable
Specifications of communication	Character way	ASCII
	Character length	8bit
	Stop bit	1bit
	Error check	No parity
Transmission control code		# Start sending CR End of transmission Output with ASCII code except for transmission code (Mixed decimal and hexadecimal numbers)

・１０－３ Communication procedure

Communication is only the transmission with regular data from the side of the controller.

The controller side will not react even if some data transmission is done from the host side (higher rank sequencer, etc.).

Data is sent every time when tightening is done once.

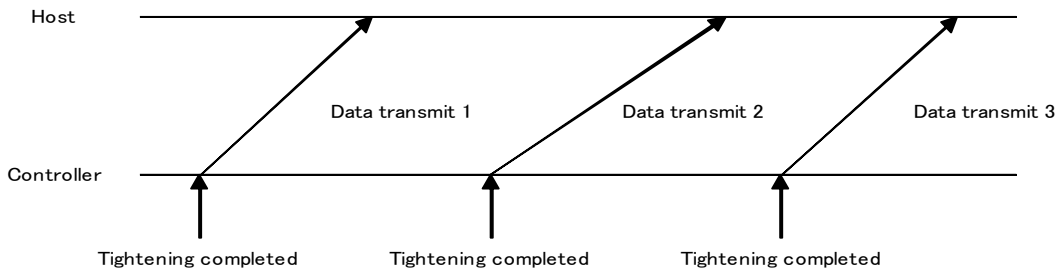


Figure 2 Data transmission from the controller

１０－４　Message format of communication

Transmitting and receiving message of communication is done with the following Format.　All data are sent with ASCII..

Judgment is output in hexadecimal, otherwise in decimal

#	Year	/	Month	/	Day	␣	Time	:	Minutes	Judgment	Screw No.	Program No.	0	Tightening time	0	Angle result	0	Snag torque	CR

Name	Number of Characters	Contents	Send selection ○:Optional Change transmission selection with Fn12
#	1	Start symbol (0x23)	
Date and time	14	YY/MM/DD␣hh:mm YY(Year)/MM(Month)/DD(Day)␣hh(Time):mm(Minutes) There is a space between DD and hh. ／ : 0x2F　　: :0x3A	○ Fn.12 no.1 SEG0
Judgment	4	Output tightening judgment result OK:0000　NG:NG code	○ Fn.12 no.1 SEG1
Screw No.	2	Outputs the tightened screw No. in two decimal numbers Ex)Screw No.『12』 → 『1』『2』Send	○ Fn.12 no.1 SEG2
Program No.	2	Decimal output of tightening program No. Ex)Program No.『5』 → 『0』『5』Send	○ Fn.12 no.1 SEG3
0	1	Data delimiter (0x30)	
Tightening torque result	5	Decimal output of tightening torque result　　Unit : N. m Ex)123. 4N. m → 『1』『2』『3』『. 』『4』Send	○ Fn.12 no.2 SEG0
Tightening time	4	Decimal output of tightening time results　　Unit : ms Ex)1234ms → 『1』『2』『3』『4』Send	○ Fn.12 no.2 SEG1
0	1	Data delimiter (0x30)	
Tightening angle	5	Decimal output of the angle from snag torque detection to tightening completion　　Unit : deg Ex)123. 4° → 『1』『2』『3』『. 』『4』Send	○ Fn.12 no.2 SEG2
0	1	Data delimiter (0x30)	
Snag torque	5	Decimal output of snag torque results　　Unit : N. m Ex)123. 4N. m → 『1』『2』『3』『. 』『4』Send	○ Fn.12 no.2 SEG2
CR	1	Completion code (0x0D)	

10－5 ASCII code table

The following table shows the ASCII code to which this controller corresponds.

It does not correspond to the characters in the part of

MSD / LSD		0 (0000)	1 (0001)	2 (0010)	3 (0011)	4 (0100)	5 (0101)	6 (0110)	7 (0111)
0	(0000)	NUL	DEL	SP	0	@	P	‘	p
1	(0001)	SOH	DC1	!	1	A	Q	a	q
2	(0010)	STX	DC2	”	2	B	R	b	r
3	(0011)	ETX	DC3	#	3	C	S	c	s
4	(0100)	EOT	DC4	$	4	D	T	d	t
5	(0101)	ENQ	NAK	%	5	E	U	e	u
6	(0110)	ACK	SYN	&	6	F	V	f	v
7	(0111)	BEL	ETB	’	7	G	W	g	w
8	(1000)	BS	CAN	(	8	H	X	h	x
9	(1001)	HT	EM	)	9	I	Y	i	y
A	(1010)	LF	SUB	*	:	J	Z	j	z
B	(1011)	VT	ESC	+	;	K	[	k	{
C	(1100)	FF	FS	,	<	L	¥	l	|
D	(1101)	CR	GS	-	=	M	]	m	}
E	(1110)	SO	RS	.	>	N	^	n	～
F	(1111)	SI	US	/	?	O	_	o	DEL

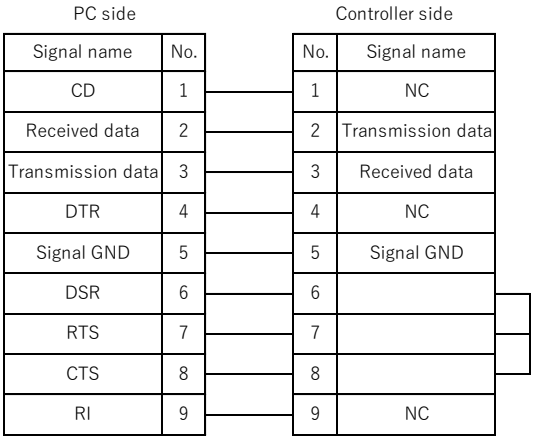
１０－６ Connection cable

D-SUB 9-pin controller side uses female connector

Connect with a straight cable

※Communication is not possible with a cross cable

Used with a cable length of 10 m or less



Pin assignment and cable diagram